

EXHIBIT LL-1

FORM OF OPITZ BOULEVARD RAMP CONSTRUCTION CONTRACT

[SEE ATTACHED]

CONSTRUCTION CONTRACT
RELATING TO
THE 95 EXPRESS LANES OPITZ BOULEVARD PROJECT
BY AND BETWEEN
95 EXPRESS LANES LLC,
a Delaware limited liability company
AND
Shirley Contracting Company, LLC,
a Virginia limited liability company

Dated as of August ___, 2022

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LIST OF EXHIBITS

- Exhibit A – Definitions
- Exhibit B – Contract Documents
 - B-1 – Technical Requirements
 - B-2 – Design Plans
 - B-3 – Geotechnical Reports
 - B-4 – TMS Interface Plan
- Exhibit C – Federal Requirements and Civil Rights Requirements
- Exhibit D – Special Provisions
- Exhibit E – Safety Requirements
- Exhibit F – Price Proposal
- Exhibit G – *Not Used*
- Exhibit H – *Not Used*
- Exhibit I – Forms of Lien Waiver
- Exhibit J – Forms of Performance and Payment Bonds
- Exhibit K – *Not Used*
- Exhibit L – *Not Used*
- Exhibit M – Requirements for Service Commencement
- Exhibit N – Requirements for Final Completion
- Exhibit O – Initial Baseline Schedule
- Exhibit P – *Not Used*
- Exhibit Q – Insurance Requirements
- Exhibit R – *Not Used*
- Exhibit S – Minor Change Request Form

CONSTRUCTION CONTRACT

This CONSTRUCTION CONTRACT RELATING TO THE 95 EXPRESS LANES OPITZ BOULEVARD PROJECT (this “Contract”) is made and entered into as of August ___, 2022 (the “Contract Date”), by and between 95 EXPRESS LANES LLC (“Concessionaire”) and Shirley Contracting Company, LLC (“Contractor”) for the purposes of providing construction services. Concessionaire and Contractor may be singularly identified as “Party” and collectively as “Parties”. The Exhibits listed above are attached hereto and fully incorporated herein.

WITNESSETH:

WHEREAS, Concessionaire desires to secure services from Contractor to construct a south-facing, reversible ramp between the 95 Express Lanes and an expanded Opitz Boulevard (Route 2000) bridge.

WHEREAS, Contractor has represented that it is experienced and capable of performing and willing to perform such services for Concessionaire.

NOW, THEREFORE, in consideration of the covenants hereinafter set forth, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

Section 1 Definitions, Interpretation, and Precedence

1.1 Unless the context otherwise requires, capitalized terms and acronyms used in this Contract have the meanings given in **Exhibit A**. Where a term is defined in both the Comprehensive Agreement and this Contract, the definition in this Contract shall govern.

1.2 *Order of Precedence*

- (a) Without limiting the other provisions within this Section 1, if there is any conflict, ambiguity, or inconsistency between the provisions of this Contract (including all Exhibits), the order of precedence will be as follows, from highest to lowest:
- (i) the main body of this Contract;
 - (ii) **Exhibit C** to this Contract (Federal Requirements and Civil Rights Requirements) and **Exhibit E** (Safety Requirements);
 - (iii) **Exhibit B-1** to this Contract (Technical Requirements);
 - (iv) Special Provisions – Copied Notes in **Exhibit D** to this Contract;
 - (v) TMS Special Provisions in **Exhibit D** to this Contract;
 - (vi) Special Provisions in **Exhibit D** to this Contract;

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- (vii) VDOT Road and Bridge Supplemental Specifications (Divisions II-VII only) contained in **Exhibit D** to this Contract;
- (viii) VDOT Road and Bridge Supplemental Specifications (Divisions II-VII only) published in the annual supplemental volume;
- (ix) VDOT Road and Bridge Specifications 2020 (Divisions II-VII only);
- (x) **Exhibit B-2** to this Contract (Design Plans), excluding the specifications listed in clauses (vii) through (ix);
- (xi) VDOT Road and Bridge Standard Drawings (including all revisions issued through the date of submission of Price Proposal); and
- (xii) all other Exhibits to this Contract;

in each case, as amended or supplemented in accordance with this Contract.

- (b) If there is any conflict, ambiguity, or inconsistency between two or more provisions in this Contract (including all Exhibits) regarding safety, reliability, durability, performance, or service, the provision establishing a higher standard will prevail.
- (c) Good Industry Practice shall be utilized hereunder, among other things, to implement and in no event to displace or lessen the stringency of the standards set forth in this Contract and the Contract Documents.
- (d) Additional or supplemental details or requirements in a provision of this Contract with lower priority will be given effect, except to the extent that they irreconcilably conflict with any provision of this Contract with higher priority.
- (e) An amendment to this Contract or a Work Order shall take precedence over the terms it amends.

Section 2 General

- 2.1 Contractor will fully perform and timely complete, as an independent contractor, all work ("Work") in accordance with this Contract and as described in the documents identified on **Exhibit B**, the Federal Requirements and Civil Rights Requirements described on **Exhibit C**, the Special Provisions described in **Exhibit D** and the Safety Requirements described on **Exhibit E** (this Contract and the documents identified on such **Exhibits B, C, D and E** are collectively, the "Contract Documents") for the Contract Price as shown on this Contract. Contractor shall accept the Contract Price as full payment for the following: (i) all Materials, Equipment, tools, incidentals, bonds, labor, sales and use taxes, supervision, insurance, overhead and profit required to perform the Work, (ii) all

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loss or damage arising from the nature of the Work or from action of the elements or any unforeseen difficulties that may be encountered during prosecution of the Work and until its final acceptance, except as otherwise expressly provided in this Contract, (iii) any license, use, or infringement of a patent, trademark, or copyright, and (iv) the completion of the Work in accordance with the Contract Documents. Time is of the essence in performing all Contract obligations.

2.2 Prior to executing this Contract, Contractor has carefully determined to its satisfaction all requirements of this Contract and the extent and the costs of all aspects of the Work, and has:

- (a) ascertained the conditions and requirements of its Work, including: (a) the location, accessibility and character of the Site and adjacent areas; (b) surface conditions and reasonably ascertainable subsurface conditions (including potential water, Materials, Utilities or obstacles); (c) any errors, omissions or conflicts in the documents set forth in **Exhibit B** that could reasonably be discovered by a Contractor experienced in the Work in the area of the Project; (d) existing facilities at or near the Site; (e) transportation, disposal, handling and storage of Materials or Equipment; (f) labor availability; (g) location and availability of Utilities; (h) needed Equipment and facilities; (i) foreseeable weather conditions; and (j) all laws, treaties, ordinances, judgments, Federal Requirements, decrees, injunctions, writs and orders of any Governmental Authority, and all rules, regulations, orders, formal interpretations and permits of any Governmental Authority having jurisdiction over construction of the Project on the Project Right of Way, performance of the Work, or operation of the Project, or the health, safety or environmental condition of the Project or the Project Right of Way, as the same may be in effect from time to time, including the Code of Virginia and the Uniform Act applicable to any aspect of performance of the Work or to Contractor (“**Law**”); and
- (b) reviewed all information made available by Concessionaire or others, satisfying itself with the correctness and accuracy of the Contract Price in light of all information and required investigations.

2.3 ***Safety Requirements.*** Contractor acknowledges the critical importance to the Project and to all Project personnel of Concessionaire’s safety requirements. Contractor will comply with the safety requirements in **Exhibit E**, as may be amended, all Laws relating to safety in executing the Work and disposing or handling Materials (including any Hazardous Substances), and all rules of Concessionaire and VDOT regarding the performance of Work and the Site, including compliance with the current Site logistics plan. Contractor at all times maintains primary control of and responsibility for safety for its Work and will meet or exceed all safety requirements of this Contract. Contractor will at no time start, continue, or resume any Work which Contractor or any representative of Concessionaire identifies as unsafe, until Contractor has taken corrective measures satisfactory to Concessionaire. Failure of Concessionaire or others to stop an

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unsafe practice will not relieve Contractor of its responsibilities. If Contractor or any person for whom Contractor is responsible fails to adhere to or enforce Concessionaire's safety requirements or any safety-related Laws, Concessionaire may, in addition to other remedies, bar such party from the Site.

- 2.4 With respect to its Work and this Contract, and in addition to the other duties specified in this Contract, Contractor owes to Concessionaire the duties timely and fully to: (i) comply with all applicable Laws; (ii) provide within 3 Business Days any requested written assurances of complete and timely performance, including assurances prompted by any actual or potential insolvency, bankruptcy or failure to continue as a going concern; (iii) notwithstanding any provisions in this Contract which give Concessionaire the right to direct Contractor as to details of the Work (including safety) or to exercise a measure of control over the Work, Contractor will remain fully responsible for performance of the Work and be solely responsible for the acts or omissions of its laborers, and those of its Subcontractors and suppliers at all tiers (collectively, "Lower Tiers"); (iv) ensure that all obligations of this Contract and the Contract Documents are included in all agreements involving Lower Tiers as respects their performance of any Work; (v) comply with this Contract and the Contract Documents; (vi) promptly provide all financial and performance information required by Concessionaire as part of Concessionaire's program for qualifying subcontractors to work on a Project with Concessionaire; and (vii) allow no bankruptcy or receivership filing to delay or otherwise adversely impact the Work, and consent upon request to any request by Concessionaire to expedite hearings or other actions by the bankruptcy court to minimize impacts on the Work or the Project.

Section 3 Payments to Contractor

3.1 *Progress Payments.*

- (a) Contractor shall submit to Concessionaire on or before the fifteenth (15th) day of each month, Contractor's application for payment ("Application for Payment") in accordance with Section 3.6 below. Applications for Payment received after the fifteenth (15th) day of the month shall not be considered properly submitted and may not be processed until the subsequent payment period.
- (b) Concessionaire shall make payment of undisputed amounts within thirty (30) days after Concessionaire's receipt of each properly submitted and accurate Application for Payment in accordance with Section 3.6 below, but in each case less the total of payments previously made, and less amounts properly withheld under Section 3.8 below.
- (c) Contractor agrees that, within seven (7) days following receipt of monies from Concessionaire for work performed by any Subcontractor, Contractor shall either: (a) pay the Subcontractor for the proportionate share of the total payment received from Concessionaire attributable to the work performed

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by the Subcontractor; or (b) notify Concessionaire and Subcontractor, in writing, of Contractor's intention to withhold all or a part of the Subcontractor's payment, specifying the reason for the non-payment. Contractor also agrees that it shall include in all of its subcontracts a provision that: (a) obligates Contractor to pay interest to Subcontractors on all amounts owed by Contractor that remain unpaid after seven (7) days following receipt of monies from Concessionaire for work performed by any Subcontractor, except for amounts withheld as allowed in the preceding sentence; (b) states, "Unless otherwise provided under the terms of this Contract, interest shall accrue at the rate of one percent per month."; and (c) obligates each Subcontractor to include or otherwise be subject to the same payment and interest requirements as specified in this Section (c) with respect to each lower-tier sub-subcontractor.

- (d) Contractor agrees to provide Concessionaire, within five (5) days of the date of this Contract, its federal employer identification number.
- (e) Failure of Concessionaire to pay Contractor all undisputed amounts within twenty (20) days after becoming due and written notice is provided to Concessionaire, in addition to remedies described under Section 3.3, shall be considered cause for Contractor to stop work; provided that Contractor shall resume work promptly following payment by Concessionaire of all undisputed amounts in full.

3.2 ***Retainage on Progress Payments.*** If Concessionaire determines Contractor's progress is unsatisfactory in relation to the Baseline Schedule or the applicable Contract Documents, Concessionaire will send a notice of unsatisfactory progress to Contractor advising it of such determination. This notification will also advise Contractor that five percent (5%) retainage of the monthly Application for Payment is being withheld and will continue to be withheld for each month Contractor's actual progress is determined to be unsatisfactory. When Concessionaire determines that Contractor's progress is satisfactory in accordance with these requirements, the five percent (5%) retainage previously withheld because of unsatisfactory progress will be released in the next monthly Application for Payment, and the remaining monthly Application for Payment will be paid in full provided Contractor's progress continues to be satisfactory.

3.3 ***Interest.*** Payments due and unpaid by Concessionaire to Contractor, whether progress payments or Final Payment, shall bear interest commencing ten (10) days after payment is due at an interest at a variable rate per annum equal to the reference rate announced by Bank of America, N.A., from time-to-time, plus one percent (1%).

3.4 ***Record Maintenance and Retention of Records.*** Contractor shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management, using accounting and control systems in accordance with generally accepted accounting principles and as may be provided in the Contract

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Documents. During the performance of the Work and for a period of five (5) years after Final Payment, Concessionaire and Concessionaire's accountants shall be afforded access from time-to-time, upon reasonable notice, to Contractor's records, books, correspondence, receipts, subcontracts, purchase orders, vouchers, memoranda and other data, including but not limited to electronic schedules and other electronic data (all collectively referred to as "Books and Records") relating to: (a) changes in the Work performed on a cost basis; or (b) any request by Contractor for an adjustment in the Contract Price or Contract Times. Contractor shall preserve all of its Books and Records for a period of five (5) years after Final Payment. Contractor shall permit Concessionaire to audit, examine, and copy all documents, computerized records, electronic mail, or other records of Contractor during the life of this Contract and for a period for not less than five years after the earliest of: (i) the date of Final Payment, (ii) the date Contractor is declared in default of Contract, and (iii) the date of termination of this Contract; provided that the exercise of Concessionaire's right to so audit, examine and copy documents, records, mail and other records of Contractor shall be limited to no more than one time per year (but such limitation shall not apply at any time a Contractor Default has occurred and is continuing or such exercise is in connection with (x) compliance by Concessionaire with Applicable Law or any order or decision issued by a court or regulatory or other governmental body, or (y) compliance by Concessionaire with any request or requirement by VDOT, or (z) the adjudication or resolution of any dispute under this Contract).

3.5 *Schedule of Payments.*

The Schedule of Values (SOV) is a detailed, itemized list of payment activities for which the Contractor desires to be paid and establishes the value or cost of each detailed part of the Work. An initial SOV shall be derived from the cost-loaded, Approved Initial Baseline Schedule, and a complete SOV shall be derived from the cost-loaded, Approved Baseline Schedule. The Contractor shall allocate the Contract Price in the SOV consistent with the Price Proposal, which shall be attached hereto as **Exhibit F**. Concessionaire reserves the right to withhold approval for all or part of Contractor's Applications for Payment, until such time Contractor furnishes an approved Baseline Schedule.

3.6 *Applications for Payment.*

- (a) Prior to the eighth (8th) day of each month, Contractor shall submit a draft Application for Payment for Concessionaire's concurrence for all Work performed as of the first day of such month and coinciding with the progress reflected in the monthly Baseline Schedule update. The mutually agreed upon Application for Payment details shall then be submitted formally on or before the fifteenth (15th) day of the month. The Application for Payment shall be in a form approved by Concessionaire and shall be accompanied by all supporting documentation, including the full and complete monthly progress report, required by the Contract Documents. Payment shall be made in accordance with the following earned value calculation:

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- (i) Contractor shall identify each activity, and the value in dollars of such activity, in accordance with the Schedule of Values issued pursuant to Section 3.5 above. Applications for Payment shall be made based on a mutually agreeable earned value calculation; provided that if such a calculation is not agreed between the Parties, the disagreement will be elevated to senior management Representatives designated by each Party with binding authority under this Contract to reach a resolution.
 - (ii) Quality assurance and quality control shall be an integral part of each activity. As part of each Application for Payment that includes completed activities, Contractor shall submit with the Application for Payment evidence of the quality assurance/quality control reviews, including any checklists, summary data, high-level/outline calculations, and evaluations of the work and the qualifications of the responsible personnel that completed the work, and the basis on which the relevant quality assurance or quality control reviewer relied on to make its determination the Work is complete and conforms to the requirements of the Contract Documents. Furthermore, the QAM shall: (a) certify that the construction included in each activity has been completed in accordance with the Contract Documents; and (b) certify that all required quality assurance/quality control tests, measurements, permits or other requirements have been completed and all non-conformance reports relative to the respective activity have been resolved. The QAM's certification for monthly Application for Payment for construction activities shall include the following statement: "As the Quality Assurance Manager, I certify, to the best of my knowledge, information and belief based upon and to the extent of: (i) current on-site observations and field testing required to be performed; and (ii) material certifications and test reports, that each portion of Work shown herein as complete has been completed in accordance with the Contract Documents, and that all required quality assurance/quality control tests, measurements, permits or other requirements have been completed and all non-conformance reports relative to the applicable Work have been resolved except for the attached list of open issues."
- (b) Contractor shall furnish to Concessionaire such detailed information as Concessionaire may request to assist Concessionaire in the approval of Applications for Payment. It is understood that the progress payments shall be approximate only, and all progress payments shall be subject to correction in the estimate rendered following the discovery of an error in any previous estimate, and such estimate shall not in any respect be taken as an admission of Concessionaire of the amount of work done or of its quality or sufficiency nor as an acceptance of the work or the release of Contractor of any of their responsibility under this Contract.

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- (c) The Application for Payment may request payment for Equipment and Materials not yet incorporated into the Project, provided that: (i) Concessionaire, in its sole discretion, agrees that it is willing to allow payment for such Equipment and Materials; (ii) Concessionaire is satisfied that the Equipment and Materials are suitably stored at either the Site or another acceptable location; (iii) the Equipment and Materials are protected by suitable insurance; and (iv) upon payment, Concessionaire will receive the Equipment and Materials free and clear of all liens and encumbrances.
- (d) The Application for Payment shall constitute Contractor's representation that the Work has been performed consistent with the Contract Documents, has progressed to the point indicated in the Application for Payment, and that title to all Work will pass to Concessionaire free and clear of all claims, liens, encumbrances, and security interests upon Contractor's receipt of payment.
- (e) In each Application for Payment, Contractor shall (a) certify to Concessionaire that the Project, the Project Right of Way and any and all interests and estates therein, and all improvements and Materials placed on the Site, are, to the extent of the most recent payment received by Contractor, free from any and all claims, liens, security interests or encumbrances in the nature of mechanics', labor or materialmen's liens or otherwise, arising out of or in connection with performance by Contractor, or any Subcontractor in excess of \$50,000, of the Work, and (b) provide an interim lien waiver, in the form of **Exhibit I-1** hereto, of Contractor's lien claims, to the extent of the most recent payment received by Contractor, and interim lien waivers, in the form of **Exhibit I-2** hereto, from each Subcontractor with a subcontract in excess of \$50,000, to the extent of the most recent payment received by Contractor, as are necessary to support Contractor's certificate. If any claim, lien, security interest or encumbrance is filed or notification of withholding money for labor or Material furnished under the Contract Documents is served on Concessionaire or VDOT, Concessionaire may withhold from any payment or other amount payable to Contractor under the Contract Documents or otherwise, an amount sufficient to discharge any or all such liens or claims, unless Contractor shall furnish a bond in form, substance and amount reasonably satisfactory to Concessionaire and VDOT to protect Concessionaire, the Project, Project Right of Way, and the Site against such liens or claims, and, after thirty (30) days from the time such lien or claim is made, unless Contractor shall have furnished a bond as described above, Concessionaire may discharge such lien or claim with the moneys withheld, whereupon for purposes of the Contract Documents such moneys shall be deemed to have been paid to Contractor hereunder. In addition, Contractor shall deliver to Concessionaire a final release and waiver of liens, in the form of **Exhibit I-3** hereto, from each Subcontractor with a subcontract in excess of \$50,000 on the payment date next following the date on which final payment to such Subcontractor is made. If any claim, lien, security interest or encumbrance

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is filed or notification of withholding money for labor or Material furnished under the Contract Documents is served on Concessionaire or VDOT, Concessionaire may withhold from any payment or other amount payable to Contractor under the Contract Documents or otherwise, an amount sufficient to discharge any or all such liens or claims, unless Contractor shall furnish a bond in form, substance and amount reasonably satisfactory to Concessionaire and VDOT to protect Concessionaire, the Work and the Site against such liens or claims, and, after thirty (30) days from the time such lien or claim is made, unless Contractor shall have furnished a bond as described above, Concessionaire may discharge such lien or claim with the moneys withheld, whereupon for purposes of the Contract Documents such moneys shall be deemed to have been paid to Contractor hereunder.

3.7 *Mobilization.*

Mobilization work shall consist of performing preliminary work and planning, including: moving personnel and Equipment to the Project site, paying bonds and insurance premiums, and establishing Contractor's offices, buildings, and other facilities necessary to allow construction work under this Contract to commence. Payment for mobilization will be made in two separate installments. The first installment of 50% will be made promptly following acceptance by Concessionaire of a submittal by Contractor of the first Application for Payment following partial mobilization and initiation of construction work. The second installment of 50% will be made promptly following acceptance by Concessionaire of a submittal by Contractor of the next progress estimate following completion of substantial mobilization. (The dates and amounts will be included in the Initial Baseline Schedule and Schedule of Values). The total amount paid for mobilization will be as shown in the Price Proposal.

3.8 *Withholding of Payments.*

- (a) On or before the date established in this Contract, Concessionaire shall pay Contractor all amounts properly due. If Concessionaire reasonably determines that Contractor is not entitled to all or part of an Application for Payment, it will notify Contractor in writing at least seven (7) days prior to the date payment is due. The notice shall indicate the specific amounts Concessionaire intends to withhold, the reasons and contractual basis for the withholding, and the specific measures Contractor must take to rectify Concessionaire's concerns. Contractor and Concessionaire will attempt to resolve Concessionaire's concerns prior to the date payment is due. If the parties cannot resolve such concerns, Contractor may pursue its rights under the Contract Documents.
- (b) In addition to express provisions elsewhere contained in this Contract, Concessionaire may withhold from any payment otherwise due Contractor such amount as determined necessary to protect Concessionaire's interest,

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or if it so elects, may withhold or retain all or a portion of any progress payment or refund payment on account of:

- (i) breach or reasonably expected breach of this Contract by Contractor;
 - (ii) to protect VDOT and/or Concessionaire against potential or actual indemnity claim against Concessionaire under this Contract;
 - (iii) unsatisfactory progress of the work not caused by conditions beyond Concessionaire's control;
 - (iv) defective work not corrected;
 - (v) Contractor's failure to carry out instructions or orders of Concessionaire or its representative;
 - (vi) a reasonable doubt that the Work can be completed for the balance then unpaid;
 - (vii) work or execution thereof not in accordance with the Contract Documents;
 - (viii) claim filed against Contractor or Concessionaire or reasonable evidence indicating probable filing of claims;
 - (ix) failure of Contractor to make payments to Subcontractor or for Materials or labor;
 - (x) damage to another contractor, unsafe working conditions allowed to persist by Contractor or failure of Contractor to provide work schedules as required by Concessionaire; or
 - (xi) use of Subcontractors without Concessionaire's approval.
- (c) To the fullest extent permitted by law, Contractor agrees to waive any rights it has under applicable laws, including but not limited to any bond, payment, or trust fund statutes, which would otherwise prevent Concessionaire from exercising these rights.
- (d) Any amounts withheld under this Section 3.8 are in addition to any retainage held under and in accordance with Section 3.2.
- (e) All sums withheld and applied by Concessionaire under this Section 3.8 will be deemed to be payments for Contractor's account under this Contract. Contractor must re-invoice any amounts of monthly progress payment withheld under this Section 3.8 with the next monthly progress

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payment made pursuant to Section 3.1 if and once the cause for such withholding has been removed or resolved, as agreed by Concessionaire.

- (f) If Concessionaire does not withhold out of any payment (final or otherwise) a sum for any of the circumstances described in Section 3.8(b), even though the circumstance has occurred at the time of Concessionaire's payment to Contractor, Concessionaire will not forfeit its right to exercise such withholding from a future payment or any other rights or remedies it may be entitled to obtain such amount from Contractor.
- (g) Nothing under this Contract (including Section 3.2 and this Section 3.8) will create any obligation of Concessionaire of any kind to any Subcontractors, architects, mechanics, laborers, engineers, workmen or other third persons.
- (h) The right of Contractor to any amount to be paid under this Contract (even where any amounts have already been approved or determined as due) will be subject to and subordinate to the rights of Concessionaire under this Section 3.8.
- (i) Without limiting any other provision of this Section 3.8 or any other rights of Concessionaire under this Contract, and subject to Section 3.8(j), if Contractor or any Subcontractor pays wages or supplements in an amount less than required by this Contract or the relevant subcontract, Concessionaire may:
 - (i) withhold out of any payment (final or otherwise and even though a payment has already been approved) due to Contractor under this Contract, an amount that Concessionaire deems sufficient to pay laborers, mechanics, architects, draftsmen, engineers and technical workers, and others employed to perform the Work, the difference between the sums those Persons should have received as wages or supplements from Contractor or Subcontractor and the amounts they actually received; and
 - (ii) pay those sums over to those Persons.

All amounts withheld and paid by Concessionaire under this Section 3.8(i) will be deemed to be payments made to Contractor under this Contract on account of the Contract Price.

- (j) Without limiting any other provision of this Section 3.8 or any other rights of Concessionaire under this Contract, if Concessionaire conducts an investigation and discovers that Contractor or any of its Subcontractors has failed to pay wages or supplements as required by this Contract or the relevant subcontract:

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- (i) Contractor must pay to Concessionaire an amount equal to Concessionaire's cost of conducting that investigation, within fourteen (14) days of receiving a demand from Concessionaire for such payment; and
 - (ii) if Contractor fails or refuses to pay for the cost of any investigation within that 14-day period, Concessionaire may withhold out of any payment (final or otherwise and even though a payment has already been approved) due to Contractor under this Contract, or under any other agreement between Contractor and Concessionaire, an amount equal to the cost of such investigations plus a 15% administrative charge.
- (k) Concessionaire may withhold out of any payment due to Contractor under this Contract, any amounts required or permitted under this Section 3.9.

All amounts withheld by Concessionaire under this Section 3.8(k) will be deemed to be payments made to Contractor under this Contract on account of the Contract Price.

3.9 ***Contractor's Payment Obligations.*** Contractor will pay Subcontractors, in accordance with its contractual obligations to such parties, all the amounts Contractor has received from Concessionaire on account of their work. Contractor will impose similar requirements on Subcontractors to pay those parties with whom they have contracted. Contractor will indemnify and defend Concessionaire against any claims for payment and mechanic's liens as set forth in Section 7.1 hereof.

3.10 ***Completion.***

- (a) Other than damage caused by Concessionaire or other parties not under the Contractor's direction performing maintenance or other work, including snow plowing, Contractor shall have charge and care thereof and shall take every precaution consistent with Good Industry Practice against damage to any part of the Work thereof by action of the elements or from any other cause. Contractor shall rebuild, repair, restore, and make good on damage to any portion of the Work occasioned by any of the foregoing causes and shall bear the expense thereof. Contractor's obligations under this Section 3.10 shall cease as of the date Concessionaire has provided a signed certificate of Service Commencement to Contractor; provided, however, that if the Work related to the Dale Boulevard slip ramp is accepted by the Concessionaire and any requirements or conditions of VDOT are satisfied, in each case, pursuant to Section 4.9 then Contractor's obligations under this Section 3.10(a) shall cease to apply to the Dale Boulevard slip ramp.
- (b) Upon obtaining Final Completion, Contractor will provide Concessionaire with a final Application for Payment. Concessionaire shall make the final payment to Contractor (the "Final Payment") by the time required in this

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Contract. At the time of submission of its final Application for Payment, Contractor shall provide the following information:

- (i) a final lien waiver, in the form of **Exhibit I-4**, of all liens that Contractor may have against Concessionaire, the Project and the Project Right of Way, and an affidavit that there are no claims, or obligations or liens outstanding or unsatisfied for labor, services, Material, Equipment, taxes or other items performed, furnished or incurred for or in connection with the Work which will in any way affect Concessionaire's interests;
 - (ii) a general release executed by Contractor waiving, upon receipt of Final Payment by Contractor, all claims, except those claims previously made in writing to Concessionaire and remaining unsettled at the time of Final Payment, which claims shall be specifically listed in an attachment to the general release;
 - (iii) consent of Contractor's surety to Final Payment;
 - (iv) all operating manuals, warranties and other deliverables required by the Contract Documents, including all project records; and
 - (v) certificates of insurance confirming that required coverages will remain in effect consistent with the requirements of the Contract Documents.
- (c) Upon making Final Payment, Concessionaire waives all claims against Contractor except claims relating to: (i) Contractor's failure to satisfy its payment obligations; (ii) Contractor's failure to complete the Work consistent with the Contract Documents, including defects appearing after Final Payment; and (iii) warranties and indemnifications as set forth in the Contract Documents. Upon acceptance by Contractor of the Final Payment, Contractor waives all claims under the Contract Documents, including all Subcontractor claims, for anything done or furnished or relating to the work under the Contract Documents or for any act or neglect of Concessionaire relating to or connected with the Contract Documents. Contractor is warned that the execution by it of a release, in connection with the acceptance of the Final Payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Section 3.10(c) or those for amounts deducted from the final requisition or from the Final Payment approved by Concessionaire, shall not be effective to reserve such claims, anything stated to Contractor orally or in writing by any official, agent or employee of Concessionaire to the contrary notwithstanding.

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- 3.11 ***Pricing for Asphalt and Fuel.*** Price adjustments for asphalt and fuel shall be permitted only in accordance with the Special Provisions set forth in **Exhibit D**.
- 3.12 ***Payment for Material on Hand.*** When requested in writing by Contractor, payment allowances may be made for materials secured for use on the Project and required to complete the Project. Such material payments will be made for only those actual quantities of materials identified in this Contract, approved change orders, or otherwise authorized and documented by Concessionaire based on delivery tickets, bills of lading, or paid invoices. All such payments shall be in accordance with the following terms and conditions:
- (a) **Structural Steel and Reinforcing Steel.** An allowance of one hundred percent (100%) of the cost to the Contractor for structural steel or reinforcing steel materials secured for fabrication not to exceed sixty percent (60%) of the Contract Price may be made when such material is delivered to the fabricator and has been adequately identified for exclusive use on the Project. The provisions of this Section 3.12 for steel reinforcement will only apply where the quantity of steel reinforcement is identified as a separate and distinct bid item for payment. An allowance of one hundred percent (100%) of the cost to the Contractor for superstructure units and reinforcing steel, not to exceed ninety percent (90%) of the Contract Price, may be made when fabrication is complete. Prior to the granting of such allowances, the materials and fabricated units shall have been tested or certified and found acceptable to the Concessionaire and shall have been stored in accordance with the requirements specified herein. Allowances will be based on invoices, bills, or the estimated value as approved by the Concessionaire. For the purposes of this Section 3.12, fabrication is defined as any manufacturing process such as bending, forming, welding, cutting or coating with paint or anti-corrosive materials which alters, converts, or changes raw material for its use in the permanent finished work.
 - (b) **Other Materials.** For aggregate, pipe, guardrail, signs and sign assemblies, and other nonperishable material, an allowance of one hundred percent (100%) of the cost to Contractor for materials may be made when such material is delivered to the Project and stockpiled or stored in accordance with the requirements specified herein. Prior to the granting of such allowances, the material shall have been tested and found acceptable to Concessionaire. Allowances will be based on invoices, bills, or the estimated value of the material as approved by Concessionaire.
 - (c) **Excluded Items.** No allowance will be made for fuels, form lumber, false work, temporary structures, or other work that will not become an integral part of the finished construction. Additionally, no allowance will be made for perishable material such as cement, seed, plants, or fertilizer.

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- (d) Storage. Material for which payment allowance is requested shall be stored in an approved manner in areas where damage is not likely to occur. If any of the stored Materials are lost or become damaged, Contractor shall repair or replace them at no additional cost to Concessionaire. Repair or replacement of such Material will not be considered the basis for any extension of Contract Times. If payment allowance has been made prior to such damage or loss, the amount so allowed or a proportionate part thereof will be deducted from the progress estimate payment and withheld until satisfactory repairs or replacement has been made. When it is determined to be impractical to store materials within the limits of the Project, Concessionaire may approve storage on private property or, for structural units and reinforcing steel, on the manufacturer's or fabricator's yard. Requests for payment allowance for such stored Material shall be accompanied by a release from the owner or tenant of such property or yard agreeing to permit the removal of the Materials from the property without cost to Concessionaire. Concessionaire must be allowed access to the Materials for inspection during normal business hours.
- (e) Materials Inventory. If Contractor requests a payment allowance for properly stored Material, it shall submit a certified and itemized inventory statement to Concessionaire with the draft Application for Payment. The statement shall be submitted on forms furnished by Concessionaire and shall be accompanied by invoices or other documents that will verify the Material's cost. Following the initial submission, Contractor shall submit to Concessionaire a monthly-certified update of the itemized inventory statement within the same time frame. The updated inventory statement shall show additional Materials received and stored with invoices or other documents and shall list Materials removed from storage since the last certified inventory statement, with appropriate cost data reflecting the change in the inventory. If Contractor fails to submit the monthly-certified update within the specified time frame, Concessionaire may deduct the full amount of the previous statement from the progress payment. At the conclusion of the Project, the cost of Material remaining in storage for which payment allowance has been made will be deducted from the progress payment.

- 3.13 ***Utility Relocation Reimbursement***. Required utility relocations which are not shown in **Exhibit B-2** ("Unknown Utility Relocation Work") will be paid by Concessionaire through reimbursement for actual direct costs plus allowable Contract mark-ups for Contractor self-perform activities. Such costs and third party utility costs and associated documentation will be submitted on a monthly basis as part of Contractor's Application for Payment with reasonable supporting documentation. Third party utility-provider costs will not be subject to Contractor

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mark-up. In addition, Concessionaire and Contractor shall agree on an adjustment to the Contract Times, if applicable.

Section 4 Operations

- 4.1 Contractor will at all times be thoroughly familiar with all requirements regarding the Work, and promptly notify Concessionaire, in writing and before proceeding with affected Work, of any deficiencies, errors, discrepancies, unanticipated Site conditions, anticipated conflicts or unusual difficulties not specifically addressed in this Contract. Contractor's non-compliance with any notice and claim requirements in the Contract Documents or in this Contract will constitute a waiver of claim. Contractor will coordinate its Work with that of Concessionaire and all other Subcontractors. Concessionaire will upon reasonable request provide shop drawings by other Subcontractors to Contractor.
- 4.2 Each of Concessionaire and Contractor shall designate an individual authorized to make decisions and bind such Party on matters relating to the Contract documents (each individual, an "Authorized Representative"). The initial Authorized Representative for Concessionaire shall be Jeff Taylor, Vice President of Project Delivery, and the initial Authorized Representative for Contractor shall be Chuck Smith, Senior Vice President. Each Party may change its Authorized Representative by a notice delivered to the other Party. An Authorized Representative may, by notice delivered to the other Party, delegate its authority under this Section 4.2 or any other matter to be performed by the Authorized Representative under this Contract, to another individual or individuals to perform those functions, and make binding decisions with respect to those matters, specified in that notice. Contractor's Authorized Representative and Contractor's other pertinent representatives will attend all coordination meetings and project meetings. Contractor's Authorized Representative will represent Contractor and will have full authority to make decisions and commitments regarding Contractor's Work. All communications and notices given to Contractor's Authorized Representative will be binding as if given to Contractor, and Contractor's Authorized Representative is authorized to bind Contractor. Contractor represents that its crew will include one or more supervisor-level employees that qualifies as an expert in the Work, a competent person as defined by the Occupational Safety and Health Administration, and is knowledgeable of all applicable Laws.
- 4.3 Contractor shall participate in meetings between Concessionaire and VDOT, upon VDOT's reasonable request, concerning matters pertaining to Contractor or its work; provided, that all direction to Contractor will be provided by Concessionaire; and provided further, that nothing in this Section 4.3 will limit the authority of VDOT pursuant to the Comprehensive Agreement to give such direction or take such action which in the opinion of VDOT is necessary to remove an immediate and present threat to the safety of life or property.
- 4.4 Concessionaire is not responsible for damage to Contractor's Work or stored Materials or Equipment unless directly damaged by Concessionaire's employees,

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subcontractors (other than Contractor and others under its direction), or others working under Concessionaire's direction, but will cooperate with Contractor to secure payment for such damage from the responsible party or applicable insurance.

- 4.5 Contractor will be responsible for and will use the highest degree of care in regard to all loading/unloading of Materials, tools, and Equipment.
- 4.6 Contractor will employ only laborers who will work in harmony with those employed by Concessionaire or other Subcontractors, or by VDOT in its operations. Subcontracts may be awarded, and labor employed by Contractor or its other Subcontractors without regard to union status. Contractor will not allow labor disputes to delay or hinder its Work, that of any other Subcontractor, or VDOT's operations. If Concessionaire's job site is picketed, and Concessionaire establishes a reserved gate for Contractor's use, Contractor will continue to properly perform the Work without interruption or delay. Contractor will bind and require all of its sub-subcontractors (of every tier) performing job site work to comply with this Section 4.6. Contractor agrees to include this entire Section 4.6 in all lower-tier subcontract and supply agreements.
- 4.7 So long as Contractor has been paid in accordance with this Contract, Contractor will maintain a lien-free and claim-free Project and must immediately secure release of any Lower Tier lien or stop payment notice through payment or release bond. Contractor must timely and fully pay and/or ensure payment of: (i) wages and benefits due to laborers; (ii) taxes, contributions, fees, penalties, and the like in respect of the Work or this Contract; and (iii) all amounts due to all Lower Tiers and their laborers. Concessionaire may require satisfactory evidence as to the status of any payments or payment obligations in connection with this Contract. Notwithstanding the foregoing, Contractor will ensure that no liens or claims of Contractor or any of its subcontractors will attach at any time to any interest of VDOT in the Project or the Project Right of Way.
- 4.8 In performing its Work, and in addition to the other duties specified in this Contract, Contractor owes to Concessionaire the duties timely and fully to: (i) furnish and pay for all permits (except where such permits are provided by Concessionaire), Governmental Approvals, licenses, Equipment, labor, Materials, supervision, required safety measures and employee parking and transportation required for the proper and complete performance of the Work, and provide copies of all permits and permit modifications to the Concessionaire upon receipt; (ii) perform all Work with no unapproved deviations or substitutions; (iii) provide quality control to ensure that Work is performed in strict accordance with this Contract and the Contract Documents and as needed to ensure the required quality; (iv) uncover and correct/replace any Work identified as defective during construction; (v) comply with Concessionaire's written directives; (vi) submit proper notices, warranties, Work Order proposals, submittals, parts lists, O&M manuals and other documents or Materials required by the Contract Documents or by Concessionaire; (vii) correct defects in the Work which appear within the guaranty or Warranty Period established in the Contract Documents or by law (if no period is stipulated

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in the Contract Documents or by law, then the guarantee and/or warranty will be for two (2) years from date of completion and written acceptance of the Work by Concessionaire); (viii) perform all required lay-out accurately and completely from control lines or benchmarks provided by VDOT or Concessionaire; (ix) execute and deliver, and/or deliver from suppliers, any special guaranty or warranty required by the Contract Documents; (x) clean up daily from its operations as required by VDOT or Concessionaire, and/or if requested contribute reasonably to a composite clean-up crew at no additional cost; (xi) prevent any damage to or trespass on adjoining lands or facilities; (xii) reasonably inspect work of other contractors of Concessionaire to ensure that it has been performed properly to accommodate Contractor's Work, and advise Concessionaire in writing of any deficiencies that would prohibit or interfere with the proper performance of the Work; (xiii) pay all royalties and avoid any infringement of patents or copyrights; (xiv) provide daily reports, safety data sheets (or similar sheets as required), job hazard analyses (or similar documents reflecting safe planning for safety risks in the Work), copies of all subcontracts and purchase orders and other reasonable documentation requested by Concessionaire; (xv) remove any employee for reasonable cause upon written request of Concessionaire; (xvi) protect its Work and stored Materials from damage or destruction until Final Payment, and avoid damage to the work or Materials of other trades; (xvii) provide a Punch List and complete all Punch List work identified by Concessionaire (xviii) release no Hazardous Substances, and properly document and dispose of any Hazardous Substances discovered or used so as not to violate any applicable Law; (xix) provide and pay for power, gas, water, trailers, storage, temporary protection, guardrails, overhead protection and other temporary facilities needed for the Work; (xx) subordinate lien rights, to the extent required of Concessionaire by a project lender; (xxi) obtain any required waivers or variances as required for the proper and complete performance of the Work from each applicable local government regarding local noise ordinances, adhere to such waivers and variances and pay all costs associated with any violation of such waivers and variances identified by such local government; (xxii) pay all costs associated with compliance with any ordinance or law or any violations of law attributable to the activities of Contractor hereunder; and (xxiii) provide such other services, documentation and Materials needed to meet the VDOT's requirements for the Work.

- 4.9 ***Dale Boulevard Slip Ramp Partial Acceptance.*** If Contractor completes the portion of the Project in respect of the Dale Boulevard slip ramp, Contractor may request Concessionaire to make final inspection of such work. If Concessionaire finds upon inspection that the work conforms to the requirements of the Contract and that acceptance is in the best interest of the public, Concessionaire may accept such work as being completed, subject to Contractor's satisfying any requirements or conditions of VDOT. Partial acceptance shall in no way void or alter any terms of the Contract, nor shall it alter the obligation of Contractor to achieve Final Completion of the Work in its entirety in accordance with the terms of the Contract. If any damage is sustained by that portion of the Project in respect of the Dale Boulevard slip ramp at any time following acceptance thereof attributable to causes beyond the control of Contractor, Concessionaire may authorize the Contractor to

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make the necessary repairs to Concessionaire's reasonable satisfaction. These repairs will be paid for at the applicable price under the Contract for each of the items requiring repair. In the absence of Contract prices covering the items of repair, the repair work will be paid for in accordance with Section 10.

4.10 ***Contractor's Warranty.*** Contractor warrants to Concessionaire and VDOT that (x) the Work when complete will conform to Good Industry Practice and (y) the Work, including all Materials and Equipment furnished as part of the construction, shall be new unless otherwise specified in the Contract Documents, of good quality, in conformance with the Contract Documents and free of defects in Materials and workmanship. Contractor's warranty obligation excludes defects caused by abuse, damage, alterations, or failure to maintain the Work by persons other than Contractor or anyone for whose acts Contractor may be liable. All warranties received by Contractor from Subcontractors shall be passed through to Concessionaire in full. Nothing in this warranty is intended to limit any manufacturer's warranty which provides Concessionaire with greater warranty rights than set forth in this Section 4.910 or the Contract Documents. Contractor will provide Concessionaire with all manufacturers' warranties prior to the Final Completion Date for all Work.

4.11 ***Correction of Defective Work.***

(a) Contractor agrees to promptly and completely correct, at its cost, any Work that is found not to be in conformance with the Contract Documents, including that part of the Work subject to Section 10, within a period of two (2) years from the date of Final Completion of the Work, as applicable, or within such longer period to the extent required by the Contract Documents or applicable Laws or Governmental Approvals (the "Warranty Period").

(b) Contractor shall, within seven (7) days, or other time period as mutually agreed, of receipt of written notice from Concessionaire or the QAM that the Work is not in conformance with the Contract Documents, take meaningful steps to commence correction of such nonconforming Work, including the correction, removal or replacement of the nonconforming Work and any damage caused to other parts of the Work affected by the nonconforming Work. If Contractor fails to commence the necessary steps within such time period, Concessionaire, in addition to any other remedies provided under the Contract Documents, may take any steps that it considers necessary to correct the nonconforming Work, including providing Contractor with written notice that Concessionaire will commence correction of such nonconforming Work with its own forces. If Concessionaire does perform such corrective Work, Contractor shall be responsible for all costs and expenses incurred by Concessionaire in performing such correction within fourteen (14) days of Contractor receiving demand from Concessionaire. If the nonconforming Work creates an emergency requiring an immediate response, the seven (7) day periods identified herein shall be deemed inapplicable.

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- (c) If any item of Work is repaired or replaced, the Warranty Period for that last item of Work will be extended until the later of (x) an additional twelve (12) months from the date the repair or replacement is completed and (y) the end of the Warranty Period, and this Section 4.11 will continue to apply with respect to that Work for the extended Warranty Period.
- (d) The Warranty Period referenced in Section 4.11(a) above applies only to Contractor's obligation to correct nonconforming Work and is not intended to constitute a period of limitations for any other rights or remedies Concessionaire may have regarding Contractor's other obligations under the Contract Documents.

4.12 ***Concessionaire's Rights to Direct Contractor.*** When any act, omission, or other action or inaction of Contractor occurs that violates the requirements, conditions, or terms of the Contract Documents or affects the health, safety, or welfare of the public or natural resources, Concessionaire will have the right, but not the obligation, to direct Contractor to take prompt action to repair, replace, or restore the damage or injury within a time frame established by Concessionaire. If Contractor fails to make such repair, replacement, or restoration within the established time frame, Concessionaire will have the damage or injury repaired, replaced, or restored and will deduct the cost of such repair, replacement, or restoration (plus 25% for supervisory and administrative personnel costs) from monies due Contractor.

4.13 ***Site Conditions.***

- (a) ***Inspection of Site Conditions.*** Contractor represents and warrants that it has, as of the Contract Date, using Good Industry Practice, ascertained the nature and location of the Work, the character and accessibility of the Site, the existence of obstacles to construction, the availability of facilities and Utilities, the location and character of existing or adjacent work or structures, the surface and subsurface conditions, and other general and local conditions (including labor) which might affect its performance of the Work or the cost thereof.
- (b) ***Further Investigations and Protection of Utilities.*** Prior to commencing any trenching or excavations, Contractor shall, taking into account the information in **Exhibit B** and in compliance with Good Industry Practice, conduct further Site investigations, including exploratory excavations and further borings, to confirm the location and type of underground structures that could be damaged as a result of the excavations. Such underground structures include all Utilities and other piping, and manholes, chambers, electrical conduits, wires, tunnels and other existing subsurface work located within or adjacent to the Site. As defined in **Exhibit B**, Contractor shall carefully sustain in their places and support or, if identified in **Exhibit B-2** (Design Plans), relocate all underground and surface structures and Utilities located within or adjacent to the Site. To the extent any of

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Contractor's work will or may impact the Utilities and businesses or residents in the area surrounding the Site, Contractor shall notify, at least seven (7) Business Days in advance of such work: (1) Concessionaire of any work that might impact Utilities and businesses or residents in the area surrounding the Site; and (2) such businesses or residents of such work. To the extent that seven (7) Business Days' advance notice is not feasible, Contractor shall provide as much advance notice as is reasonably possible under the circumstances to Concessionaire and to impacted businesses and residents of Contractor's work.

- (c) *Discovery of Differing Site Conditions.* Contractor recognizes the existence of certain surface and subsurface geotechnical conditions at the Site, as reflected in **Exhibit B-3**. Upon discovering an alleged Differing Site Condition and before the condition is further disturbed, Contractor shall promptly, after taking appropriate measures to secure the affected Work, notify Concessionaire of the alleged Differing Site Condition. Contractor's notice to Concessionaire shall be issued by telephone or in person and followed within three (3) business days thereafter by written notice, providing a brief description of why the condition encountered is considered a Differing Site Condition. To the extent possible based on Contractor's knowledge at the time of such notice, Contractor's written notice shall describe the specific subsurface geotechnical condition encountered that is alleged to constitute a Differing Site Condition and the measures taken to deal with such Differing Site Condition. Upon receipt of such notice, subject to Section 13.1, Concessionaire shall make a Compensation Event claim or any other claim available to it pursuant to the Comprehensive Agreement with respect to a Differing Site Condition, and Contractor shall use commercially reasonable efforts to timely provide information and support as needed to allow Concessionaire to make such claims thereunder (including complying with the Equivalent Project Relief Provisions).
- (d) No relief shall be allowed for any alleged Differing Site Condition unless Contractor complies with the requirements in this Section 4.13, including providing Concessionaire with notice in accordance with this subsection. Contractor shall be entitled to reimbursement for increased costs to the Work and/or an extension of applicable Contract Times directly attributable to a Differing Site Condition, and such entitlement is not contingent on Concessionaire receiving equivalent cost relief from VDOT under the Comprehensive Agreement, provided that, for any circumstance in which Concessionaire is eligible for relief for the same or substantially the same Differing Site Condition (other than the discovery of lead or asbestos on the Opitz Boulevard (Route 2000) bridge, for which this exception shall not apply and Contractor's right to increased costs or extension of applicable Contract Times shall not be contingent on Concessionaire receiving equivalent cost or schedule relief from VDOT) under the Comprehensive Agreement, Concessionaire shall be obligated to pay Contractor only upon

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payment by VDOT to Concessionaire under the Comprehensive Agreement under the Pay-When-Paid Principles

4.14 *Hazardous Environmental Conditions.*

(a) *General Obligations*

- (i) Contractor will be responsible for the management, treatment, handling, storage, monitoring, remediation, removal, transport and/or disposal of any Hazardous Environmental Conditions that are encountered on, in or under the Site.
- (ii) If Contractor encounters any Unknown Pre-Existing Hazardous Substances the presence of which constitutes a Hazardous Environmental Condition, then Contractor will promptly notify Concessionaire and, in consultation with Concessionaire, will develop a Remedial Action Plan setting out the scope of the Remedial Actions that Contractor proposes to take in relation to the relevant Hazardous Environmental Condition, such actions to include, but not be limited to: (i) conducting such further investigations as may be necessary or appropriate to determine the nature and extent of the Hazardous Substances and submitting copies of such data and reports to Concessionaire for its review and approval, (ii) taking reasonable steps, including in the case of excavation, construction, reconstruction or rehabilitation, modifications and/or construction techniques, to avoid or minimize excavation or dewatering in areas with Hazardous Substances, (iii) preparing and obtaining Governmental Approvals for remedial action plans, including Concessionaire approval and (iv) carrying out the Remedial Action Plan, including, as necessary, disposal of the Hazardous Substances. Contractor shall keep Concessionaire regularly apprised of its progress in executing any Remedial Action Plan.
- (iii) Before any Remedial Actions for Unknown Pre-Existing Hazardous Substances are taken that would inhibit Concessionaire's ability to ascertain the nature and extent of the Hazardous Environmental Condition, Contractor will afford Concessionaire the opportunity to inspect areas and locations that require Remedial Actions; provided, that in the case of a sudden release of any Unknown Pre-Existing Hazardous Substances, Contractor may take all reasonable actions necessary to stabilize and contain the release without prior notice or inspection, but will promptly notify Concessionaire of the sudden release and its location.
- (iv) Contractor will obtain all Governmental Approvals relating to all Remedial Actions. Contractor will be solely responsible for

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compliance with such Governmental Approvals and applicable Law concerning or relating to Hazardous Substances.

- (v) Unless directed otherwise by Concessionaire, Contractor will seek to recover costs from any available reimbursement program or from any third party responsible for generating or otherwise creating or contributing to conditions that led to the need for Remedial Action. Without limiting the preceding sentence, Contractor will seek pre-approval and pursue reimbursement from the Virginia Petroleum Storage Tank Fund for qualifying expenses incurred during the course of investigation, containment, management, mitigation or remediation activities on petroleum storage tank releases. The Parties will cooperate with and notify each other with respect to activities undertaken pursuant to this Section 4.14(a)(v).
- (vi) Except as provided in Section 4.14(b) below, Contractor will bear all costs and expenses of preparing and complying with any Remedial Action Plan, of complying with applicable Law and obtaining and complying with Governmental Approvals pertaining to Hazardous Substances, and otherwise of carrying out Remedial Actions.

(b) *Unknown Pre-Existing Hazardous Substances.*

- (i) Subject to Section 4.13(d), Concessionaire will reimburse, to the extent permitted by applicable Law, Contractor for Contractor's costs for Remedial Actions with respect to any Unknown Pre-Existing Hazardous Substances, the presence of which constitutes a Hazardous Environmental Condition.
- (ii) Subject to Section 4.13(d), Concessionaire will assume, to the extent permitted by applicable Law, responsibility for third-party claims against Contractor for personal injury, damages or harm to property or business due to any Unknown Pre-Existing Hazardous Substances, the presence of which constitutes a Hazardous Environmental Condition, and all related penalties, fines and administrative or civil sanctions arising out of or related to such Unknown Pre-Existing Hazardous Substances; except to the extent Contractor is obliged to indemnify Concessionaire pursuant to Section 7 below.
- (iii) Contractor will provide cost estimates with respect to such Remedial Actions which may be reimbursed by Concessionaire, for Concessionaire's review and approval prior to proceeding with any such Remedial Actions, subject to Section 4.14(a)(ii) above.

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- (iv) Concessionaire reserves the right to perform Remedial Actions for Unknown Pre-Existing Hazardous Substances in lieu of, and as replacement for, Contractor's Remedial Action obligations subject to Section 4.14(a)(ii) above.
 - (v) Contractor will be entitled to submit a request for a Work Order in accordance with this Contract, to an adjustment in its Contract Price and/or Contract Time(s) to the extent Contractor's cost and/or time of performance meeting the conditions set forth in Section 10.6 have been adversely impacted by the presence, removal or remediation of Unknown Pre-Existing Hazardous Substances that constitute a Hazardous Environmental Condition.
- (c) *Contractor's Indemnification Obligations Regarding Hazardous Substances.*
- (i) Contractor will indemnify, protect, defend and hold harmless and release each of Concessionaire and its Representatives from and against any and all claims against each of Concessionaire and its Representatives by a person not party to this Contract, including reasonable attorney's fees, expert witness fees and court costs suffered or incurred by Concessionaire or its Representative, as applicable, to the extent caused by:
 - (A) Hazardous Substances introduced to or brought onto the Site by Contractor or its Subcontractors;
 - (B) failure of Contractor or any of its Subcontractors to comply with any requirement of the Contract Documents relating to Hazardous Substances (including any failure to perform any Remedial Action required in accordance with Section 4.14(a) above) or to otherwise comply with applicable Law and Governmental Approvals; or
 - (C) the exacerbation, release, spreading, migration, or toxicity of Hazardous Substances due to the negligence, omission, recklessness, or willful misconduct of Contractor or any of its Subcontractors.
 - (ii) Contractor shall defend such claims in accordance with Section 7 below.
 - (iii) Contractor's indemnification under this Section 4.14(c) will not apply to claims to the extent caused by the negligence, recklessness, or willful misconduct of any of Concessionaire and its Representatives.

4.15 *TMS Contractor*

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- (a) The Project's traffic management system software upgrades and systems integration scope of work will be performed by the TMS Contractor under a direct contract with the Concessionaire. Contractor acknowledges that the Project's success is dependent upon the ability of Contractor and the TMS Contractor to perform their respective obligations in a cooperative, collaborative and integrated manner. To help accomplish this, Concessionaire, Contractor and TMS Contractor agree to follow the TMS Interface Plan set forth in **Exhibit B-4** and will reasonably cooperate with each other to meet the mutual goals of successful and timely completion of their respective work and the Project as a whole.
- (b) Although the traffic management system software upgrades and systems integration scope of work does not form part of the Work, Contractor shall be responsible for: (a) scheduling and coordinating all work and services of the TMS Contractor; (b) directly obtaining all information it requires from the TMS Contractor to perform the Work; and (c) providing all information the TMS Contractor requires to perform its work. In performing its scheduling and coordination services, Contractor shall consider the reasonable requirements of the TMS Contractor, recognizing that each party not only has contractual obligations to complete its work timely, but that the ability of Concessionaire to use the Project for its intended purpose requires the timely completion of both the Work and the TMS Contractor scope of work. Consequently, both Contractor and the TMS Contractor shall make reasonable accommodations to their schedules to meet the reasonable needs of the other party.
- (c) Contractor acknowledges that it has made full allowance for complying with its obligations relative to the TMS Contractor in the Contract Price.
- (d) For the avoidance of doubt, Contractor shall not have any liability for the acts or omissions of the TMS Contractor, nor shall the TMS Contractor have any liability for the acts or omissions of Contractor.

4.16 *Impacts to 95 Express Lanes Facilities and Operations.*

- (a) Contractor shall be responsible for any impact to the existing intelligent transportation system or electronic toll collection roadside equipment and infrastructure within the construction limits. Prompt response is required to any damage caused by Contractor and in the event the repair is not completed or Contractor does not initiate or diligently engage in such repair, Concessionaire may restore critical systems and bill Contractor for such restoration.
- (b) In the event Concessionaire takes the steps described in clause (a) above, Contractor shall reimburse Concessionaire for the direct damages caused by Contractor, including but not limited to repair or replacement of the existing fiber and electrical network, but not with respect to lost revenue. The cost

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of the repair work performed will include the actual maintenance Contractor costs plus 25% for supervisory and administrative personnel.

4.17 *Inadequate Maintenance.*

If Contractor fails to remedy unsatisfactory maintenance of the Work not complying with the Contract within a mutually agreed upon time after receipt of a written notice by Concessionaire, Concessionaire may proceed with adequate forces, Equipment, and Material to maintain the Project and the Work. Concessionaire will deduct the cost of proceeding with its own forces and Equipment (plus 25% for supervisory and administrative personnel costs) from monies due Contractor. Contractor shall have the right to dispute Concessionaire's determination that maintenance is unsatisfactory.

Section 5 **Time for Completion; Delay Liquidated Damages.**

5.1 ***Notice to Proceed.*** Contractor will not commence construction of the Project unless and until the following conditions have been satisfied (or Concessionaire, in its discretion, waives such conditions) and Concessionaire has delivered notice to that effect to Contractor (such notice being referred to as the "Construction Notice to Proceed" or "Construction NTP"):

- (a) all rights of access or other property rights necessary for the commencement of construction have been obtained;
- (b) all Governmental Approvals (including any applicable VDOT and Federal approvals and agreements) necessary for the commencement of construction have been acquired (and copies provided to Concessionaire), and Contractor has satisfied all applicable pre-construction requirements of the Governmental Approvals;
- (c) Concessionaire has approved the following: (A) Initial Baseline Schedule; (B) Quality Management Plans; (C) DBE/SWaM Plan; (D) Environmental Management Plan; (E) Health, Safety and Security Plan; and (f) updates to the Maintenance of Traffic Plan (if necessary); and
- (d) Contractor certifies to Concessionaire that all Insurance Policies required under Section 9.2 necessary for the Work, have been obtained and will be in full force and effect, and in the case of Project-specific policies, Contractor has delivered to Concessionaire duplicate originals or copies thereof certified by Contractor's insurance broker to be true and correct copies of the originals.

Concessionaire may waive any condition precedent set forth in this Section 5.1; *provided*, that no person or entity will be entitled to assume that Concessionaire will waive any condition precedent. Unless Concessionaire waives in writing (as distinguished from a deemed waiver) a condition precedent that requires action by

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Contractor to be satisfied, Contractor will remain bound to use diligent efforts to satisfy the condition precedent.

5.2 *Completion Dates.*

- (a) *Scheduled Service Commencement Date.* The “Scheduled Service Commencement Date” shall be the date that is 700 days following the date of issuance of the Construction NTP except as set forth in Section 5.2.
- (i) At least thirty (30) days prior to the date when Contractor anticipates that it will submit a notice of Service Commencement, it shall provide an advanced notice of Service Commencement to Concessionaire to allow sufficient time to schedule the resources necessary for an expeditious inspection of the completed Work.
- (ii) After receipt of the notice of Service Commencement, Concessionaire shall have thirty (30) days to inspect the Work completed by Contractor and either: (a) deliver to Contractor a signed certificate of Service Commencement; or (b) if reasonable cause exists for doing so, notify Contractor that Service Commencement has not been achieved stating in reasonable detail the reasons therefor. Service Commencement shall only be achieved hereunder if Concessionaire has provided a signed certificate of Service Commencement to Contractor acknowledging that Contractor has satisfied all conditions set forth within **Exhibit M**. The foregoing process shall be repeated until Concessionaire is satisfied that all conditions set forth within **Exhibit M** have been satisfied. The “Service Commencement Date” shall be deemed to be the date of the notice of Service Commencement issued by Contractor pursuant to this Section 5.2(a) (i.e., the notice that results in Concessionaire’s delivery to Contractor of a signed certificate of Service Commencement).
- (b) *Scheduled Final Completion Date.* The Scheduled Final Completion Date shall be 90 days after the Scheduled Service Commencement Date. Contractor will deliver to Concessionaire a notice of Final Completion (“Notice of Final Completion”) in accordance with **Exhibit N** after all the Work is complete and Contractor has received the Service Commencement certificate issued pursuant to Section 5.2(a)(ii). After receipt of Contractor’s Notice of Final Completion, Concessionaire shall have thirty (30) days to inspect the Project and all Work completed by Contractor and either: (a) deliver to Contractor a signed certificate of Final Completion; or (b) if reasonable cause exists for doing so, notify Contractor that Final Completion has not been achieved stating in reasonable detail the reasons therefor. Final Completion shall only be achieved hereunder if Concessionaire has provided a signed certificate of Final Completion to Contractor acknowledging that Contractor has satisfied all conditions of the

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Contract Documents. The foregoing process shall be repeated until Concessionaire is satisfied that all conditions set forth within Contract Documents have been satisfied. The “Final Completion Date” shall be the date of the last Notice of Final Completion issued by Contractor pursuant to this Section 5.2(b) (i.e., the notice that results in Concessionaire’s delivery to Contractor of a signed certificate of Final Completion).

- (c) If applicable, one hundred eighty days (180) calendar days prior to the Long Stop Date, Contractor shall prepare a detailed plan describing the actions it plans to take to achieve Final Completion by the Long Stop Date (“**Final Completion Recovery Plan**”), and in any case as soon as reasonably practicable. The Final Completion Recovery Plan may contain a new proposed Long Stop Date, if applicable. Contractor agrees to prepare a second Final Completion Recovery Plan as needed. Contractor acknowledges that approval and the terms of any Final Completion Recovery Plan is solely in the discretion of Concessionaire, and subject to VDOT’s approval.

5.3 **Adjustments.** All of the scheduled completion dates set forth in Section 5.2 (collectively referred to as “Contract Times”) shall be subject to adjustment in accordance with Section 10.

5.4 **Time is of the Essence.** Concessionaire and Contractor mutually agree that time is of the essence with respect to the Contract Times.

5.5 **Delay Liquidated Damages.** Contractor understands that if the Service Commencement Date or the Final Completion Date is not attained, Concessionaire will suffer damages which are difficult to determine and accurately specify. To compensate Concessionaire for such damages, Contractor hereby agrees as follows:

- (a) **Service Commencement Delay LDs.** If the Service Commencement Date is not attained by the Scheduled Service Commencement Date, Contractor shall pay Concessionaire \$9,600 as liquidated damages for each day that the Service Commencement Date extends beyond the Scheduled Service Commencement Date.
- (b) **Final Completion Delay LDs.** If the Final Completion Date is not attained by the Scheduled Final Completion Date, Contractor shall pay Concessionaire \$3,100 as liquidated damages for each day that the Final Completion Date extends beyond the Scheduled Final Completion Date.
- (c) **Long Stop Delay LDs.** If the Final Completion Date is not attained by the Long Stop Date, Contractor shall pay Concessionaire \$10,000 as liquidated damages for each day that the Final Completion Date extends beyond the Long Stop Date.

5.6 **Lane Closure Damages.**

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(a) If all lanes are not open to traffic during the times required in the approved request for a temporary lane closure, Contractor shall pay Concessionaire liquidated damages (“Lane Closure Damages”) in the amounts set forth below until all lanes are opened as determined by Concessionaire:

Lane Closure Damages (\$ per minute)			
Elapsed Time (min)	I-95, and all ramps which includes General Purpose Lanes, HOV and HOT Lanes	Major Arterials	All other roads
1-5, or any portion thereof	\$0	\$0	\$0
Every additional minute or any portion thereof after initial 5 minutes stated above	\$1,000 for the sixth minute plus \$1,000 per each additional minute	\$1,000 for the sixth minute plus \$500 per each additional minute	\$500 for the sixth minute plus \$500 per each additional minute

(b) If a lane closure outside the Technical Requirements that is not approved by the Concessionaire (a “Non-Permitted Closure”) occurs, Concessionaire will notify Contractor thereof and of the amount of associated Lane Closure Damages in writing within 48 hours of the Non-Permitted Closure. If there are no additional Non-Permitted Closures occurring within 90 days, Concessionaire shall refrain charging of the Lane Closure Damages for the prior Non-Permitted Closures. Otherwise, the Contractor shall pay all Lane Closure Damages to the Concessionaire within 30 days of the date on which last written notice of Lane Closure Damages is given to Contractor for violating having two (2) or more Non-Permitted Closure occurrences within 90 days. Once there is a clean period of 90 days without a Non-Permitted Closure occurrence, the new 90 days period will start for future Lane Closure Damages. All liquidated damage charges will be capped at \$100,000 per violated Non-Permitted Closure. For avoidance of doubt, Contractor shall pay all Lane Closure Damages to Concessionaire for Non-Permitted Closures that occur on all roadways except for the Non-Permitted Closures occurring within the 95 Express Lanes. If there are Non-Permitted Closures that occur on the 95 Express Lanes and another adjoining roadway, Contractor shall be responsible for 50% of the resulting Lane Closure Damages.

(c) In addition to the assessed Lane Closure Damages for failure to restore traffic lanes, Contractor will not be allowed further lane closures until the reason for the failure are evaluated and Contractor can provide assurance that the causes have been corrected. A formal submission as to the reasons for the failure to restore traffic lanes within the contract lane closure restrictions and the proposed corrective measures is to be provided to Concessionaire within two (2) days of the occurrence. Concessionaire will respond to the adequacy of the submission within two (2) working days of receipt. No modification of the Contract Price or Contract Time(s) will be granted or considered for these days.

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- (d) Concessionaire may, at its sole discretion, choose not to assess damage recovery/user fees for failure to open traffic if such cause is not related to or caused by Contractor’s operations.
- (e) Concessionaire reserves the right to monitor traffic conditions affected by the Work and to make additional restrictions as may be necessary, such as terminating a lane closure early. These adjustments shall be handled under the section of **Exhibit B-1** entitled “Allowance for Additional Lane Closure Restriction by the Concessionaire and/or Contractor Request for Additional Lane Closures”.

5.7 Key Personnel Damages.

- (a) If Contractor changes any of the key personnel set forth in the table below for reasons other than such individual’s voluntary or involuntary termination of employment, retirement, death, disability or incapacity, or because Contractor has been directed by Concessionaire to change such individual, Contractor acknowledges that Concessionaire will suffer significant and substantial losses due to such change and that it is impracticable and extremely difficult to determine the actual losses that Concessionaire would incur therefrom. Therefore, in the event of any such change, Contractor agrees to pay to Concessionaire liquidated damages in the amounts set forth in the table below (the “Key Personnel Damages”). If the change is deemed equal or better by the Concessionaire (in its sole discretion) then Key Personnel Damages shall not apply.

Key Personnel Damages	
Position	Amount of Key Personnel Damages
Project Manager	\$100,000
HSE Manager	\$50,000
QAM	\$50,000
Construction Manager	\$50,000
ITS Construction Manager	\$50,000

5.8 Payment of Liquidated Damages. Any Delay Liquidated Damages, Lane Closure Damages and Key Personnel Damages payable by Contractor shall be paid by Contractor or withheld by Concessionaire, as applicable, in arrears at the next scheduled monthly payment intervals applicable after the Scheduled Service Commencement Date or Scheduled Final Completion Date, as applicable, with the last such payment to occur on the date on which Service Commencement or Final Completion, as applicable, actually occurs.

5.9 Liquidated Damages Not Penalty. The parties acknowledge, recognize and agree on the following:

- (a) that because of the unique nature of the Project, it is difficult or impossible to determine with precision the amount of damages that would or might be

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incurred by Concessionaire as a result of Contractor's failure to complete the Work on or before the applicable Contract Time(s);

- (b) that any sums which would be payable under Section 5.5, Section 5.6 or Section 5.7 are in the nature of liquidated damages, and not a penalty, and are fair and reasonable and such payment represents a reasonable estimate of fair compensation for the losses that may reasonably be anticipated from such failure; and
- (c) that any sums which would be payable under Section 5.5, Section 5.6 or Section 5.7 shall be in lieu of all liability for any and all extra costs, losses, expenses, claims, penalties and any other damages, whether special or consequential, and of whatsoever nature incurred by Concessionaire which are occasioned by any delay in achieving the applicable Contract Times for the above-referenced Work or any non-permitted lane closures, as applicable. Notwithstanding the above, Delay Liquidated Damages, Lane Closure Damages and Key Personnel Damages are not intended to excuse Contractor from liability for any other breach of its obligations under the Contract Documents.

5.10 ***Obligation to Achieve the Contract Time.*** Contractor agrees that it will commence performance of the Work and achieve the Contract Time(s) in accordance with this Section 5.

5.11 ***Delay Events.***

- (a) ***Contractor Reinstatement.*** If all or any part of the Project is damaged or destroyed on account of a Delay Event, Contractor shall promptly repair, replace or restore the part of the Project so damaged or destroyed to at least the character or condition with Materials of like kind and quality and without deduction for depreciation at the time and place of loss, and in compliance with applicable Law, and in accordance with the requirements of Section 5.13.
- (b) ***Schedule Relief.*** If a Delay Event occurs, then Concessionaire is entitled to make a claim for a Delay Event pursuant to the Comprehensive Agreement and Contractor shall use commercially reasonable efforts to timely provide information and support as needed to allow Concessionaire to make a corresponding claim for a Delay Event under the Comprehensive Agreement.

No extension of the Scheduled Service Commencement Date, the Scheduled Final Completion Date or the Long Stop Date, as applicable, shall be allowed for any Delay Event unless Contractor complies with the requirements in this Section 5.11 and Section 5.14. Notwithstanding any other provision to the contrary in this Contract, Contractor's entitlement to schedule relief directly attributable to a Delay Event is not contingent on

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Concessionaire receiving equivalent relief from VDOT under the Comprehensive Agreement.

- (c) *Termination Relief.* If any Contractor Default or breach of this Contract would not have occurred but for the occurrence of the Delay Event, such Contractor Default or breach will be deemed to have not occurred for the purposes of this Contract. Notwithstanding the foregoing, nothing in this Section will have the effect of (1) relieving either Party from performing any payment obligations contemplated in this Contract or (2) preventing Concessionaire from claiming any “Concessionaire Damages” as defined in and pursuant to the Comprehensive Agreement.

5.12 *Compensation Events.*

- (a) *Contractor Reinstatement.* If all or any part of the Project is damaged or destroyed on account of a Compensation Event, Contractor shall promptly repair, replace or restore the part of the Project so damaged or destroyed to at least the character or condition with Materials of like kind and quality and without deduction for depreciation at the time and place of loss, and in compliance with applicable Law, and in accordance with the requirements of Section 5.13.
- (b) *Relief.* If a Compensation Event occurs then (x) (i) Concessionaire is entitled to make a claim and (ii) Contractor is entitled to make a corresponding claim, pursuant to the Equivalent Project Relief Provisions, for an extension to the Contract Times and (y) (i) Concessionaire is entitled to make a claim for a Compensation Event pursuant to the Comprehensive Agreement, and (ii) Contractor, subject to the Equivalent Project Relief Provisions, shall also be entitled to make a corresponding claim for performance relief and compensation relief hereunder pursuant to the Equivalent Project Relief Provisions and subject to the Pay-When-Paid Principles.

5.13 *Contractor’s Obligations Upon Material Damage or Destruction.*

- (a) *Draft Reinstatement Plan.* If the Project suffers damage or destruction that is likely to cost more than \$250,000, to repair, replace and restore, Contractor shall, as soon as practicable and in any event within twenty (20) days of such damage or destruction, and before undertaking any material remedial work (other than any emergency work required to stabilize other parts of the Project), provide Concessionaire with a draft plan (the “Draft Reinstatement Plan”) for the carrying out of the works necessary (the “Reinstatement Works”) to repair, replace and restore the damaged or destroyed portions of the Project and related assets, and containing to the extent possible the details required to be included in the Reinstatement Plan under Section 5.13(c).

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- (b) *No Reinstatement in Same Form.* As soon as reasonably practicable and in any event within thirty (30) days after the delivery of the Draft Reinstatement Plan, Concessionaire shall pass on its comments on the Draft Reinstatement Plan, which shall include providing Contractor with any comments it (or VDOT under the Comprehensive Agreement) may have on the Draft Reinstatement Plan.
- (c) *Reinstatement Plan.* As soon as reasonably practicable and in any event within ten (10) Business Days after receipt of Concessionaire's comments, Contractor shall deliver to Concessionaire a revised plan (the "Reinstatement Plan") to reasonably take into account the comments received from Concessionaire (and VDOT, if applicable) and making changes to the Draft Reinstatement Plan necessary to reflect the contractual terms agreed (as negotiated and finalized) with the person effecting the Reinstatement Works.
- (d) *Reinstatement Plan Details.* The Reinstatement Plan shall set forth in as much detail as is reasonable in the circumstances:
 - (i) The identity of the person, or (if Contractor is conducting a competitive process) persons, intended to effect the Reinstatement Works;
 - (ii) The terms and timetable or (if not then established) the reasonably anticipated terms and timetable upon which the Reinstatement Works are to be effected;
 - (iii) The impact that implementation of the Reinstatement Plan will have on the revenues of Contractor under this Contract and on the payment obligations of Contractor under this Contract, including in respect of life cycle requirements; and
 - (iv) The total cost or (if not then established) the reasonably anticipated total cost of the Reinstatement Works.

5.14 *Schedule Impact Analysis for Proposed Time Extensions.*

- (a) If Contractor claims that any event, including but not limited to a change in the Work, justifies an extension to the Contract Time(s), Contractor shall submit to Concessionaire a written Schedule Impact Analysis ("SIA") in accordance with Section 1.4 of the Technical Requirements in **Exhibit B-1**. Upon approval by Concessionaire, the event shall be included in the next Baseline Schedule update.
- (b) Activity delays shall not automatically mean that an extension of the Contract Time(s) is warranted or due Contractor. Contractor recognizes that certain events will not affect existing critical activities or cause non-critical activities to become critical, and that such events may result in only

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absorbing a part of the available total Float that may exist within an activity chain of the net Work, thereby not causing any effect on the Contract Time.

- (c) Float is not for the exclusive use or benefit of either Concessionaire or Contractor, but rather shall be used for the benefit of the overall Project. Activity splitting or Float suppression techniques will not be permitted. Extension of the Contract Time(s) will be granted only to the extent the equitable time adjustments to the activity or activities affected by the event exceeds the total float of a critical activity or path and extends the Contract Time(s).
- (d) Two (2) copies of each SIA shall be submitted and the following, along with a written proposal for any requested time extension:
 - (i) Within seven (7) days after receipt of a Contract Change Directive issued pursuant to Section 10.2.
 - (ii) Within ten (10) days from the beginning of any other event claimed to give rise to a delay.
 - (iii) Within the time period required for the filing of a written notice of claim pursuant to Section 10.
- (e) In cases where Contractor does not submit a SIA within the time requirements stated above, it shall be considered a waiver of any request for an extension of the Contract Time(s).
- (f) Approval or rejection of each SIA by Concessionaire shall be made within twenty-eight (28) days after receipt of each SIA, unless subsequent meetings and negotiations are necessary. Upon approval, a copy of the SIA signed by Concessionaire shall be returned to Contractor, and incorporated into the next Baseline Schedule update.
- (g) The SIA related to a Work Order shall be incorporated into and attached to the applicable Work Order.

5.15 ***Concessionaire-Caused Event.*** In the event of (i) any failure by Concessionaire to comply with any of its obligations under this Contract or (ii) any negligent acts or omissions, fraud or willful misconduct of the Concessionaire, then Contractor will be entitled to an equitable adjustment to the Contract Price and/or Contract Times, in each case in accordance with the procedures set forth in Section 10.

Section 6 Electronic Documents

6.1 Contractor will utilize Concessionaire's electronic document management system if it is made available to Contractor for the Project. This system can accept electronic submission of submittals, Applications for Payment, proposed Work Orders and other items. By submitting documents electronically, Contractor is

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affirming that it has the appropriate license to use the documents, and it is not violating any copyright or other rights of owners of original documents.

- 6.2 Contractor will utilize an electronic plan room to reference drawings if one is provided for its use.

Section 7 Indemnity

- 7.1 To the fullest extent permitted by law, Contractor will indemnify, protect and hold harmless Concessionaire and its surety (and any other parties as required by Contract Documents) and each of their respective officers, directors, members, managers, agents or employees, (individually, the “Indemnified Party” and collectively the “Indemnified Parties”) from any and all claims, losses, demands, judgments, suits, actions and proceedings, as well as all attorneys’ fees and costs, which may be asserted against any Indemnified Party, with respect to bodily injury, death or property damage to the extent arising out of or occurring in connection with: (i) any default, or failure to timely, properly, or fully perform the Work as required, by Contractor; (ii) any negligence, injury, loss, damage or death to any person or persons (including but not limited to any Indemnified Party) or any destruction of or damage to property; (iii) the use of unacceptable Materials in the Project; and/or (iv) any act or omission in violation of this Contract, or neglect or misconduct of Contractor. In no event shall Contractor’s defense or indemnity obligations extend to the negligence of Concessionaire or other indemnitees.
- 7.2 To the fullest extent permitted by law, in addition to the express duties to indemnify, protect and hold harmless, there is a duty, separate from the duties in Section 7.1, to defend each Indemnified Party in connection with a claim, demand or suit described in Section 7.1 (collectively, the “Claims”). The duty to defend includes all costs of litigation, attorneys’ fees, expert and consultant fees, settlement costs and reasonable expenses in connection with the claim or litigation, regardless of whether the Claims are valid or groundless and regardless of whether the defense of an Indemnified Party is maintained by that party or assumed by Contractor, as long as the Claims asserted arise out of or relate to Contractor’s alleged or actual default described in Section 7.1(i), to an alleged or actual negligent act or omission or intentional wrongful act as described in Section 7.1(ii), to an alleged or actual use of unacceptable Materials as described in Section 7.1(iii) or to an act, omission, neglect or misconduct as described in Section 7.1(iv). An Indemnified Party, at its option, may defend any or all of the Claims (at Contractor’s expense) or tender to Contractor the defense of any or all of the Claims. Upon tender to Contractor, Contractor will promptly assume the defense of the Claims. If an Indemnified Party tenders the defense of a Claim to Contractor and Contractor fails to assume the defense, an Indemnified Party facing liability for the Claim may defend, compromise and/or settle any such suit or action, and Contractor will be bound and obligated to reimburse each Indemnified Party for the amount expended in settlement, and/or the amount expended in paying any judgment, together with all reasonable attorneys’ fees and costs of litigation, so long as the Indemnified Party

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demonstrates that the settlement or compromise was made in Good Faith and the Claim was one for which the duty of defense was owed.

- 7.3 In addition to the foregoing obligations, where the Comprehensive Agreement requires Concessionaire to provide an indemnity or defense of VDOT or any other party, Contractor agrees that, in respect of its Work under this Contract, it will indemnify, defend and hold harmless: (i) VDOT and all applicable parties to the full extent required of Concessionaire under the Comprehensive Agreement to indemnify VDOT or any such parties; and (ii) Concessionaire, to the full extent that Concessionaire is required by the Comprehensive Agreement to indemnify, defend or hold harmless any such party with respect to Contractor's Work; provided that in no event shall Contractor's defense or indemnity obligations extend to any copyrights, patents or other intellectual property specified by any Indemnified Party in the Contract Documents.
- 7.4 In addition to the foregoing obligations, Contractor will indemnify, protect and hold harmless the Indemnified Parties from any and all claims, losses, demands, judgments, suits, actions and proceedings, as well as all attorneys' fees and costs, which may be asserted against any Indemnified Party, in connection with any breach by Contractor or Contractor's failure to comply with any applicable law, regulation or legal requirement.
- 7.5 The obligations of this Section 7 are not limited by insurance limits in policies maintained by Contractor. Nothing in this Section 7 will be interpreted to require Contractor to indemnify, defend or hold harmless any party to the extent such an obligation is prohibited by law. To the extent that applicable law would invalidate any part of the indemnity and defense obligations of this Section 7, then this Section 7 will be interpreted and applied only to the extent legally permitted. To the extent that a claim is made by an employee of Contractor against an Indemnified Party, Contractor must defend, indemnify, and hold harmless the Indemnified Party to the same extent as if the claim was made by a non-employee of Contractor. Contractor waives any defense or immunity it may have under any applicable worker's compensation Laws or any other statute or judicial decision disallowing or limiting such defense and indemnification obligations.
- 7.6 Neither termination for any reason, nor Final Payment by Concessionaire, nor acceptance of the Work, will waive any obligations of Contractor under this Section 7.
- 7.7 The cause of action on a claim for indemnity under this Contract or any bond provided by Contractor will accrue on the later of: (i) the date of a written demand for indemnity to Contractor or its surety; or (ii) the date when Contractor or its surety makes the last payment with respect to which indemnity is sought.

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Section 8 Limitations on Liability

- 8.1 **LD Cap.** Subject to Section 5, the aggregate liability of Contractor to Concessionaire in relation to Delay Liquidated Damages will be limited to ten percent (10%) of the Contract Price (the “LD Cap”).
- 8.2 **Aggregate Liability Cap.** Subject to Section 8.3, the total, maximum aggregate liability of Contractor to the Concessionaire arising out of this Contract, including, without limitation, for default, breach, negligence, any Delay Liquidated Damages, indemnity obligations or otherwise in connection with this Contract claimed breach thereof, or the Work shall be limited to an amount equal to thirty percent (30%) of the Contract Price (the “**Aggregate Liability Cap**”) herein, which liability arises under any theory of liability under applicable Law.
- 8.3 **Exclusions from Liability Cap.** The limitations of liability in Sections 8.1 and 8.2 do not apply to, nor will the calculation of such limitations include:
- (a) any liabilities or obligations to the extent that:
 - (i) the amount of such liabilities or obligations is paid from the proceeds of insurance maintained by VDOT or Concessionaire or required to be maintained by Contractor or Contractor Party under this Contract;
 - (ii) an amount is paid by Contractor but subsequently recovered by Contractor from proceeds of insurance referred to in Section 9.2, or from Concessionaire, VDOT or any third party (other than an entity providing insurance or a Contractor Party); or
 - (iii) the same would have been recovered by Contractor through such insurance if Contractor or any Contractor Party had maintained the coverage required to be maintained by it under this Contract, or if Contractor or such Contractor Party had otherwise complied with its obligations under, and the limitations of, such Insurance Policies and diligently pursued the relevant insurance claim;
 - (b) liabilities that arise out of third-party claims (other than from VDOT) associated with the Work or the performance by Contractor or any Contractor Party of any obligations under this Contract (including any third-party claims for any damage or destruction of property, death or personal injury or third-party Intellectual Property (except for design documents provided by Concessionaire constituting Contract Documents));
 - (c) liabilities that arise out of the bad faith, willful misconduct, gross negligence or fraud of Contractor or any Contractor Party or any Contractor Default under Section 12.3(a)(i);

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- (d) any costs paid or incurred by Contractor in connection with its correction of any nonconforming Work or Defect;
- (e) fines and penalties under any applicable Law or any costs that Contractor or any Contractor Party incurs or is liable for in complying with obligations that arise out of any failure by Contractor or any Contractor Party to comply with any applicable Laws (including workman's compensation, employment or health and safety laws or regulations); or
- (f) fines and penalties under any applicable Law or any costs incurred by Contractor or any Contractor Party as a result of a failure by Contractor or any Contractor Party to comply with any applicable Laws (including workman's compensation, employment or health and safety laws or regulations).

8.4 ***Consequential Loss.*** To the maximum extent allowed by law, neither Party shall be liable to the other for any Indirect Losses suffered or incurred by such Party, provided that the following will not be deemed to be Indirect Losses:

- (i) any Contractor payment under this Contract for any Delay Liquidated Damages;
- (ii) any loss or reduction of the Contract Price received or receivable by Contractor under this Contract;
- (iii) any compensation amount expressly required to be paid by either Party under Section 12;
- (iv) all damages, losses, liabilities and costs arising from any claim by a third party in respect of which Contractor or Concessionaire indemnifies the other Party under this Contract;
- (v) losses that are covered liability for claims (including defense costs) to the extent (A) they are required to have been covered by insurance pursuant to this Contract and (B)(x) proceeds for which liability have actually been received, or (y) Contractor or Concessionaire, as applicable, failed to properly claim under and/or obtain or maintain such insurance in full force and effect as required in this Contract;
- (vi) all losses arising out of the willful misconduct, gross negligence, fraud, criminal conduct, recklessness or bad faith on the part of any Contractor Party or Concessionaire;
- (vii) amounts that Concessionaire is obligated to pay or reimburse VDOT under the express provisions of the Comprehensive Agreement, or that VDOT sets-off or deducts from payments to Concessionaire, including any liquidated damages thereunder or any other damages owed to VDOT, in each case, of which Concessionaire actually pays

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to VDOT due to Contractor's performance or non-performance under this Contract; and

- (viii) interest, late charges, fees, transaction fees and charges, penalties and similar charges expressly provided under this Contract and the Contract Documents that arise out of the Work.

- 8.5 ***Statute of Limitations.*** Notwithstanding anything to the contrary in this Contract, neither Party may bring any action against the other Party in any way arising out of, or relating directly or indirectly to, this Contract, including any action in any way arising out of, or relating (directly or indirectly) to, any breach of contract or negligence in the performance of its obligations or of any indemnity obligation under this Contract, after the expiration of the relevant limitation period under the relevant statute of limitations. Neither Party will be obligated to exhaust its remedies against any insurer before being entitled to claim against the other Party.

Section 9 Insurance and Bonds

- 9.1 ***Not Used.***

- 9.2 ***Insurance.*** Contractor shall procure and maintain insurance in accordance with the requirements set forth on **Exhibit Q** (the "**Insurance Requirements**") and policies required thereunder, the "**Insurance Policies**"). Evidence of insurance shall be submitted on or before the date of this Contract.

- 9.3 ***Performance and Payment Bonds.***

- (a) Contractor shall procure and maintain the Performance Bond and Payment Bond substantially in the form of **Exhibit J** executed by a surety that: (i) is authorized to do business and issue bonds in the Commonwealth of Virginia; (ii) appears on the current list of the U.S. Department of the Treasury as acceptable sureties to the U.S. Department of the Treasury and whose aggregate underwriting limitations on any one risk equals or exceeds \$20 million; (iii) is rated in the top two categories by two of the four major ratings agencies or has a then-current A.M. Best's Financial Strength Rating and Financial Size of at least "A-/VIII"; and (iv) is approved by Concessionaire. Each of the Performance Bond and Payment Bond shall have a penal sum in the amount of one hundred percent (100%) of the Contract Price and shall be issued in accordance with the Insurance Requirements. Receipt of Performance and Payment Bond for the full Contract Price is a condition precedent to the execution and delivery of this Contract.
- (b) All bonds shall be executed by Contractor and a surety company or financial institution authorized to do business in Virginia in accordance with the laws of Virginia and the rules and regulations of the State Corporation Commission. To be considered properly executed, the Performance and Payment Bonds shall include authorized signatures and titles.

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- (c) In lieu of Performance or Payment Bonds, the Contractor may furnish a certified check or cash escrow in the face amount required for each of the bonds, which will be held for the full statutory period as applicable for each bond.
- (d) If Contractor is structured as a limited liability company, partnership or joint venture, the bonding approach used will ensure that the members of such organizations will have joint and several liability for the performance of the Work required for the Project. A single 100% Performance Bond and a single 100% Payment Bond shall be provided regardless of any co-surety relationship.
- (e) Any increase in the Contract Price shall automatically result in a corresponding increase in the penal amount of the Performance Bond and Payment Bond without notice to or consent from the surety, such notice and consent being hereby waived. Decreases in the Contract Price shall not, however, reduce the penal amount of the Performance Bond and Payment Bond unless specifically provided in any Work Order decreasing the scope of the Work.

Section 10 Changes

10.1 *Work Orders.*

- (a) A “Work Order”, is a written instrument, issued after the Contract Date signed by Concessionaire and Contractor, stating their agreement upon all of the following:
 - (i) The scope of the change in the Work;
 - (ii) The amount of the adjustment to the Contract Price; and
 - (iii) The extent of the adjustment to the Contract Time(s).
- (b) All changes in the Work authorized by applicable Work Order shall be performed under the applicable conditions of the Contract Documents. Concessionaire and Contractor shall negotiate in Good Faith and as expeditiously as possible the appropriate adjustments for such changes.
- (c) If Concessionaire requests a proposal for a change in the Work from Contractor and subsequently elects not to proceed with the change, a Work Order shall be issued to reimburse Contractor for reasonable costs incurred for estimating services and services involved in the preparation of proposed revisions to the Contract Documents.

10.2 *Contract Change Directive.*

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- (a) A “Contract Change Directive” or “CCD” is a written order prepared and signed by Concessionaire, directing a change in the Work prior to agreement on an adjustment in the Contract Price and/or the Contract Time(s).
- (b) Concessionaire and Contractor shall negotiate in Good Faith and as expeditiously as possible the appropriate adjustments for the Contract Change Directive. Upon reaching an agreement, the parties shall prepare and execute an appropriate Work Order reflecting the terms of the agreement.
- (c) Concessionaire may issue a CCD by unilateral Work Order, subject further to the terms of Section 10.4(a)(iv).

10.3 ***Minor Changes in the Work.*** Minor changes in the Work do not involve an adjustment in the Contract Price and/or Contract Time(s) and do not materially and adversely affect the Work, including the quality, performance and workmanship required by the Contract Documents (“Minor Changes”). Either Party may make a written request to the other Party in the form attached as **Exhibit S** to make Minor Changes consistent with the intent of the Contract Documents. Any such Minor Change request may only be implemented by Contractor if such Minor Change request form attached as **Exhibit S** is signed in writing by Concessionaire. All Minor Change requests must certify that such Minor Change will not (i) impair or diminish any performance criteria or Work requirements, (ii) cause a delay to achieving any Contract Times and (iii) cause Contractor or Concessionaire to incur any additional cost or expense to complete the Project at the cost of Concessionaire. If either Party disputes that such change is a Minor Change, the disputing Party shall promptly notify the other Party in writing. Upon request by Concessionaire, Contractor may be required to provide further evidence, at its sole cost and expense, to demonstrate that the proposed Minor Change is compliant and conformant with this Section 10.3. Any approved Minor Change requests must be catalogued and recorded as part of this Contract.

10.4 ***Contract Price Adjustments.***

- (a) The increase or decrease in Contract Price resulting from a change in the Work shall be determined by one or more of the following methods:
 - (i) Unit prices set forth in this Contract or as subsequently agreed to between the parties;
 - (ii) A mutually accepted, lump sum, properly itemized and supported by sufficient substantiating data to permit evaluation by Concessionaire;
 - (iii) Costs, fees and any other markups set forth in accordance with Section 109.05 of the Division 1 Amendments; and

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(iv) If an increase or decrease cannot be agreed to as set forth in Section 10.4(a)(i) through 10.4(a)(iii) above and Concessionaire issues a Contract Change Directive, the cost of the change of the Work shall be determined by the reasonable expense and savings in the performance of the Work resulting from the change, including a reasonable overhead and profit, as may be set forth in this Contract. If the net result of both additions and deletions to the Work is an increase in the Contract Price, overhead and profit shall be calculated on the basis of the net increase to the Contract Price. If the net result of both additions and deletions to the Work is a decrease in the Contract Price, there shall be no overhead or profit adjustment to the Contract Price. Contractor shall maintain a documented, itemized accounting evidencing the expenses and savings associated with such changes.

(b) If unit prices are set forth in the Price Proposal or are subsequently agreed to by the parties, but application of such unit prices will cause substantial inequity to Concessionaire or Contractor because of differences in the character or quantity of such unit items as originally contemplated, such unit prices shall be equitably adjusted. Contractor shall bear the burden of proving that there is a substantial inequity in the unit rates.

10.5 *Emergencies.*

In any emergency affecting the safety of persons and/or property, Contractor shall act, at its discretion, to prevent threatened damage, injury or loss. Any change in the Contract Price and/or Contract Time(s) on account of emergency work shall be determined as provided in this Section 10. Contractor shall comply with all requirements with respect to Emergency management and response under the Technical Requirements.

10.6 *Requests for Contract Adjustments and Relief.*

(a) If Contractor believes that it is entitled to an adjustment to the Contract Price or Contract Times or other relief for any occurrence arising out of or related to the Work or Project, including the acts or omissions of Concessionaire, it shall submit a written request to Concessionaire stating the basis for such Contract Price or Contract Time adjustment or relief.

(b) Such request shall be submitted: (a) prior to Contractor incurring any cost or expense, or performing any work on which the request is based; and (b) in accordance with any specific requirements contained in applicable sections of this Contract or, absent any specific requirement, then within a reasonable time, not to exceed twenty-one (21) days, after the time of the occurrence giving rise to the request for Contract Price or Contract Time adjustment or relief or after Contractor reasonably should have recognized

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the occurrence giving rise to the request for Contract Price or Contract Time adjustment or relief, whichever is later.

- (c) Such request shall include sufficient information to advise Concessionaire of the facts and circumstances giving rise to the request for Contract Price or Contract Time adjustment or relief, the specific contractual adjustment or relief requested and the basis for Contractor's entitlement to the adjustment or relief.
- (d) If Contractor in Good Faith is unable to provide final price or schedule information at the time of its written request, Contractor shall provide final price and schedule information no later than thirty (30) days, or other time period as mutually agreed, from the date of submitting its request for contractual adjustment or relief.
- (e) In cases where Contractor does not submit final price and schedule information within thirty (30) days, or other time period as mutually agreed, of submitting its request, it shall be considered a waiver of any request for contract adjustment or relief for Contract Price or Contract Time, unless otherwise agreed in writing by Concessionaire.

10.7 ***Value Engineering Proposals.*** Contractor may submit to Concessionaire written Value Engineering Contractor Proposals ("VECP") modifying the requirements of Contract Documents for the purpose of reducing the total Contract Price or Contract Times without reducing the design capacity or quality of the finished product. If Concessionaire accepts VECP, Concessionaire and Contractor will equally divide the net savings or Contract Time, or both. Each VECP shall result in a net savings over the Contract Price or Contract Times, or both without impairing essential functions and characteristics of the item(s) or of any other part of the Project, including, but not limited to, service life, reliability, economy of operation, ease of maintenance, aesthetics, and safety. At least the following information shall be submitted with each VECP:

- Statement that the proposal is submitted as a VECP
- Statement concerning the basis for the VECP benefits to Concessionaire and an itemization of the pay items and requirements affected by the VECP
- Detailed estimate of the cost under the existing Contract and under the VECP
- Proposed specifications and recommendations as to the manner in which the VECP changes are to be accomplished
- Statement as to the time by which a contract Work Order adopting the VECP must be issued so as to obtain the maximum cost-effectiveness

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- (a) Concessionaire will process the VECP in the same manner as prescribed for any other proposal that would necessitate issuance of a Work Order. Concessionaire may accept a VECP in whole or part by issuing a Work Order that will identify the VECP on which it is based. Concessionaire will not be liable to Contractor for failure to accept or act on any VECP submitted pursuant to these requirements or for delays in the work attributable to any VECP. Until a VECP is put into effect by a Work Order, Contractor shall remain obligated to the terms and conditions of the existing Contract. If an executed Work Order has not been issued by the date on which Contractor's proposal specifies that a decision should be made or such other date as Contractor may subsequently have specified in writing, the VECP shall be deemed rejected.
- (b) The Work Order effecting the necessary modification of this Contract will establish the net savings agreed on, and provide for adjustment of the Contract Price, or Contract Time, or both. The Contractor shall absorb all costs incurred in preparing a VECP. Costs for reviewing and administering a VECP will be borne by Concessionaire. Concessionaire may include in the agreement any conditions it deems appropriate for consideration, approval, and implementation of the VECP. The Contractor's fifty percent (50%) share of the net savings or Contract Time or both shall constitute full compensation to him for effecting all changes pursuant to the VECP Work Order.
- (c) Unless specifically provided for in the Work Order authorizing the VECP, acceptance of the VECP and performance of the work thereunder will not change the Contract Time.
- (d) Proposed changes in the basic design of a bridge or pavement type or those changes that require different right of way limits will not normally be considered an acceptable VECP. If a VECP is based on or is similar to a change in the Contract Documents prior to submission of the VECP, Concessionaire will not accept the VECP.
- (e) Concessionaire will be the sole judge of the acceptability of a VECP. The requirements herein apply to each VECP initiated, developed, and identified as such by the Contractor at the time of its submission to Concessionaire. However, nothing herein shall be construed as requiring Concessionaire to approve a VECP.
- (f) Subject to the provisions herein, Concessionaire or any other public agency shall have the right to use all or part of an accepted VECP without obligation or compensation of any kind to the Contractor.

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Section 11 Contract Interpretation and Disputes

- 11.1 For any dispute involving an act or omission of the VDOT or those for whom the VDOT is responsible, Contractor must follow the disputes procedures and requirements in the Comprehensive Agreement, and Contractor agrees it may be joined into any court or arbitration proceedings required by the Contract Documents. Contractor is bound to Concessionaire to the same extent that Concessionaire is bound to the VDOT, by the terms of the Contract Documents, and by any and all preliminary and final decisions or determinations made thereunder by the party, board, arbitrator(s), or court authorized in the Contract Documents or by law, regardless of whether Contractor is a party to the proceedings. Contractor will, as a condition precedent to its right to prosecute any claim, comply with all notice, claim, and dispute resolution provisions of the Contract Documents, including allowing a reasonable time for Concessionaire to analyze and forward to the VDOT any required communications or documentation. Contract adjustments will be made only to the extent that Concessionaire is entitled to relief from VDOT. It is expressly understood and agreed in connection with the determination of such disputes pursuant to this Section 11.1 that Concessionaire will not be liable to Contractor to any greater extent than VDOT is liable to Concessionaire. Further, each Contract adjustment will be equal only to Contractor's allocable share of any adjustment in Concessionaire's contract with VDOT. Contractor's allocable share will be determined by Concessionaire, after allowance of Concessionaire's normal overhead and profit on any recovery and Concessionaire's expense of recovery (including without limitation attorneys' fees), by making a reasonable apportionment, if applicable, between Contractor, Concessionaire, and other Subcontractors or persons with interests in the adjustment. Concessionaire's determination of Contractor's allocable share is final and not subject to review unless the determination was made in bad faith. Contractor agrees that it is an express condition precedent to any payment to Contractor for such disputes that Concessionaire receives payment from VDOT. Contractor will timely furnish Concessionaire with any claim certification required by the Contract Documents or by Law, in a form satisfactory to Concessionaire, and agrees to indemnify, defend, and hold Concessionaire harmless from any losses, claims, damages or expenses Concessionaire may incur as a result of Contractor's prosecution of claim and/or failure or inability to support any part of the claim as required by the certification or by Law. Concessionaire is not required to certify a claim when it cannot do so in Good Faith, and may, in its discretion, provide a qualified certification when appropriate.
- 11.2 Disputes between Contractor and Concessionaire not covered by Section 11.1 will at Concessionaire's election, to the extent allowed by law, be arbitrated under the American Arbitration Association's Construction Industry Arbitration Rules (the "Rules") subject to the limitations contained in this Section 11. Arbitration will be in Fairfax County, Virginia and may include other necessary parties.
- 11.3 A written notice to the other Party is required if either Party wishes to initiate a dispute pursuant to Section 11.1 or 11.2. Any such notice shall be provided by

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Concessionaire to Contractor within 15 Business Days of the occurrence of the event giving rise to such dispute. Any such notice shall be provided by Contractor to Concessionaire within 15 Business Days of either: (a) Concessionaire's denial of a change in the scope of the Work or (b) the occurrence of another event giving rise to a dispute. Failure to provide timely notice shall be considered a waiver of the Contractor's request for dispute resolution, unless otherwise agreed in writing by Concessionaire.

- 11.4 If Concessionaire or its surety notifies Contractor in Good Faith that any arbitration or lawsuit brought under Section 11.2 involves a controversy within the scope of Section 11.1, then the disputes process under Section 11.2 must be stayed until the procedures under Section 11.2 are completed.
- 11.5 If Concessionaire elects not to invoke the arbitration procedures set forth in Section 11.2, then all claims, disputes and other matters in controversy between Concessionaire and Contractor arising out of or relating to this Contract and covered by Section 11.2 will be resolved through litigation in the state court in the County of the Project or in the federal court closest to the location of the Project. EACH PARTY WAIVES ITS RIGHT TO A TRIAL BY JURY IN ANY LITIGATION RELATED TO THIS CONTRACT, UNLESS THE MATTER ARISES UNDER SECTION 11.1 AND THE CONTRACT DOCUMENTS ALLOW THE OWNER A RIGHT TO TRIAL BY JURY.
- 11.6 Unless otherwise agreed in writing by the parties, Contractor will timely and fully perform the Work during any dispute and Concessionaire will make undisputed payments to Contractor. Contractor will make relevant books and records available for inspection and copying if it asserts a claim for additional compensation, or if Concessionaire reasonably contends that Contractor is in default under this Contract, or to the extent otherwise required under the Contract Documents.
- 11.7 This Contract is governed by the laws of the Commonwealth of Virginia, without regard to any contrary conflicts of laws rules of that state. Both parties waive all claims for their own special, indirect, or consequential damages in connection with any dispute or claim related to this Contract or the Project. This waiver does not preclude liability for liquidated damages or consequential damages assessed by VDOT or payable to third parties.

Section 12 Termination

12.1 *Termination for Convenience.*

- (a) Upon ten (10) days written notice to Contractor, Concessionaire may, for its convenience and without cause, elect to terminate all or part of the Work if Concessionaire, in its sole discretion, determines that such a termination is in Concessionaire's best interests. Concessionaire shall notify Contractor of the decision to terminate by delivering to Contractor a written notice of termination specifying the extent of termination and its effective date (a

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“Notice of Termination”). Pursuant to this Section 12.1(a), Concessionaire shall have the right to terminate this Contract immediately (and this Contract shall terminate automatically upon delivery of written notice by Concessionaire to Contractor) upon termination of the Comprehensive Agreement for whatever reason.

- (b) After receipt of a Notice of Termination, and except as directed by Concessionaire, Contractor shall immediately proceed as follows, regardless of any delay in determining or adjusting any amounts due under this Section 12.1:
- (i) Stop any Work as specified in the notice;
 - (ii) Enter into no further Subcontracts and place no further orders for Materials, services or facilities, except as necessary to complete the continued portion of the Work, if any, or for mitigation of damages;
 - (iii) Unless instructed otherwise by Concessionaire, terminate all Subcontracts to the extent they relate to the Work terminated and except to the extent that continuation of this Contract is necessary in order to mitigate damages;
 - (iv) Assign to Concessionaire or its designee in the manner, at the times, and to the extent directed by Concessionaire, all of the right, title, and interest of Contractor under the Subcontracts so terminated, in which case Concessionaire will have the right, in its sole discretion, to accept performance, settle or pay any or all claims under or arising out of the termination of such Subcontracts;
 - (v) Settle outstanding liabilities and claims arising out of such termination of Subcontracts, with the approval or ratification of Concessionaire, to the extent it may require, which approval or ratification shall be final;
 - (vi) Transfer and deliver to Concessionaire or its designee, as directed by Concessionaire: (1) possession and control of the Project; and (2) all right, title and interest of Contractor in and to: (i) the Work in process, completed Work, supplies and other Materials produced or acquired for the Work terminated; (ii) the Contract Documents and all other completed or partially completed drawings (including plans, elevations, sections, details and diagrams), specifications, records, reports, books, samples, information and other Work Product that would have been required to be furnished to Concessionaire if the Work had been completed; and (iii) all intellectual property developed specifically for the Project;
 - (vii) Complete performance in accordance with the Contract Documents of all Work not terminated;

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- (viii) Take all action that may be necessary, or that Concessionaire may direct, for the protection and preservation of the property related to the Contract Documents that is in the possession of Contractor and in which Concessionaire has or may acquire an interest; and
- (ix) As authorized by Concessionaire, use its best efforts to sell at fair market value any property of the types referred to in Section 12.1(c) below; provided, however, that Contractor: (1) shall not take any such action with respect to any items for which title has previously transferred to Concessionaire; (2) is not required to extend credit to any purchaser; and (3) may acquire the property itself, under the conditions prescribed and at prices approved by Concessionaire. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by Concessionaire under the Contract Documents or paid in any other manner directed by Concessionaire.
- (c) *Inventory.* Contractor shall submit to Concessionaire a list of termination inventory not previously disposed of and excluding items authorized for disposition by Concessionaire; and within thirty (30) days of receipt of the list, Contractor shall deliver such inventory to Concessionaire and Concessionaire shall accept title to such inventory as appropriate.
- (d) *Settlement Proposal.* After termination, Contractor shall submit a final termination settlement proposal to Concessionaire in the form and with the certification prescribed by Concessionaire. Contractor shall submit the proposal promptly, but no later than thirty (30) days from the effective date of termination unless Contractor has requested a time extension in writing within such 30-day period and Concessionaire has agreed to allow such an extension.
- (e) *Amount of Termination Settlement.*
 - (i) Subject to clause (e)(ii) below, Contractor and Concessionaire shall negotiate in Good Faith to reach agreement on the settlement amount to be paid to Contractor by reason of the termination of Work pursuant to this Section 12.1 and any such settlement shall be subject to the dispute resolution provisions of Section 11. Such negotiated settlement shall include a reasonable allowance for profit solely on Work that has been performed as of the termination date. Such amount or amounts payable for the terminated Work, exclusive of demobilization costs, breakage costs and other shut-down costs, shall be the lesser of (x) the total Contract Price as reduced by the Contract Price of Work not performed and (y) any amount or amounts agreed upon by the Parties. Upon determination of the settlement amount, this Contract will be amended accordingly, and Contractor will be paid the agreed amount as described in this Section 12.1(e). Concessionaire's execution and delivery of any

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settlement agreement shall not be deemed to affect any of its rights with respect to compliance of the Work or any components of the Work which has achieved Service Commencement or Final Completion, with all applicable Contract requirements, or any of its rights under payment and performance bonds or any of its rights against Subcontractors.

- (ii) Notwithstanding clause (e)(i) above, if this Contract is terminated in accordance with applicable provisions of the Comprehensive Agreement providing for termination upon a default by VDOT or other event not arising from a breach by Concessionaire under the Comprehensive Agreement and this Contract is terminated under Section 12.1(e)(i) above, the termination settlement amount payable to Contractor shall be paid by Concessionaire only with proceeds of a termination payment received by Concessionaire from VDOT, in each case subject to Pay-When-Paid Principles.
- (f) *No Agreement as to Amount of Claim.* In the event of failure of Contractor and Concessionaire to agree upon the amount to be paid Contractor by reason of the termination of Work pursuant to this Section 12.1, the amount payable (exclusive of interest charges) shall be determined in accordance with the Dispute Resolution Procedures.
- (g) *Reduction in Amount of Claim.* The amount otherwise due Contractor under this Section 12.1 shall be reduced by: (a) the amount of any valid claim which Concessionaire may have against Contractor in connection with this Contract; and (b) the agreed price for, or the proceeds of sale of, Materials, supplies or other things previously paid for by Concessionaire and to be retained by Contractor or sold by Contractor (with the proceeds being retained by Contractor), pursuant to the provisions of this Section 12.1.
- (h) *Payment.* Concessionaire may, from time-to-time, under such terms and conditions as it may prescribe and in its sole discretion, make partial payments on account against costs incurred by Contractor in connection with the terminated portion of this Contract, whenever in the opinion of Concessionaire the aggregate of such payments shall be within the amount to which Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this Section 12.1, such excess shall be payable by Contractor to Concessionaire upon demand together with interest at a variable rate per annum equal to the reference rate announced by Bank of America, N.A., from time-to-time, plus one percent (1%).
- (i) *Inclusion in Subcontracts.* Contractor shall insert in all Subcontracts that the Subcontractor shall stop Work on the date of, and to the extent specified in, a Notice of Termination from Concessionaire, and shall require that Subcontractors insert the same provision in each subcontract at all tiers.

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Contractor shall communicate, immediately upon receipt thereof, any Notice of Termination issued by Concessionaire to all affected Subcontractors.

- (j) *No Consequential Damages.* In the event of a termination for convenience under this Section 12.1, Contractor acknowledges and agrees that it shall not be entitled to any compensation in excess of the value of the Work performed plus its settlement and closeout costs. Under no circumstances shall Contractor or any Subcontractor be entitled to anticipatory or unearned profits, unabsorbed overhead, opportunity costs, or consequential or other damages as a result of a termination for convenience under this Section 12.1. The payment to Contractor determined in accordance with this Section 12.1 constitutes Contractor's exclusive remedy for a termination hereunder.

12.2 *Concessionaire's Right to Stop Work.*

- (a) Concessionaire may, without cause and for its convenience, order Contractor in writing to stop and suspend the Work. Any stoppage or suspension pursuant to this Section 12.2 in excess of one hundred and eighty (180) days (whether consecutive or in aggregate) shall entitle Contractor to terminate the Contract Documents pursuant to Section 12.1.
- (b) Contractor is entitled to seek an adjustment of the Contract Price and/or Contract Time(s) if its cost or time to perform the Work has been adversely impacted by any suspension or stoppage of work by Concessionaire, by requesting a Work Order.
- (c) In case of suspension of work, Concessionaire shall issue instructions and directions to Contractor as to the implementation of the suspension, which may include directing Contractor to develop a maintenance and transition plan. Unless specifically directed otherwise by Concessionaire, Contractor shall, during the suspension period, continue to have full responsibility for the Project, including but not limited to its obligations to take such precautions as may be necessary to prevent damage to the Work, comply with Governmental Approvals, and ensure public safety. Such obligations include, but are not limited to, erosion control and drainage and erection of any necessary temporary structures, signs, or other facilities necessary or appropriate for the protection of the Work and the public. During the suspension of the Work, Contractor shall properly and continuously maintain in acceptable growing condition all living material in newly established plantings, seeding, and soddings furnished under the Contract and shall take adequate precautions to protect vegetation against damage.

12.3 *Contractor Default; Concessionaire's Right to Perform and Terminate for Cause.*

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- (a) *Contractor Default.* The occurrence of any one or more of the following will constitute a “Contractor Default”:
- (i) Contractor Abandons the Project or makes any written repudiation of this Contract or any of its terms;
 - (ii) Contractor fails to commence the Work upon receipt of Concessionaire’s NTP or by the required date in the Initial Baseline Schedule;
 - (iii) Contractor fails to progress the Work diligently to ensure that Service Commencement is likely to be achieved by the Scheduled Service Commencement Date and Final Completion is likely to be achieved by the Scheduled Final Completion Date;
 - (iv) Contractor fails to complete the Work by the Long Stop Date;
 - (v) provide a sufficient number of skilled workers, Equipment, or supply the Materials required by the Contract Documents;
 - (vi) Contractor fails to comply with the third sentence of Section 16.8 (Assignment);
 - (vii) an Insolvency Event arises with respect to Contractor or any Contractor Member, as applicable;
 - (viii) Contractor fails to pay any amount due to Concessionaire under this Contract when due, except to the extent the payment is being reasonably disputed by Contractor, which failure continues for twenty (20) days after written notice of such non-payment;
 - (ix) any representation or warranty made by Contractor in this Contract or any certificate, schedule, report, instrument or other document delivered to Concessionaire in accordance with this Contract is or was false, misleading or inaccurate when made, in each case in any material respect, or omits material information when made;
 - (x) Contractor fails to comply with any Governmental Approval or applicable Law in any material respect;
 - (xi) Contractor fails to promptly comply with any order to stop and suspend the Work issued by Concessionaire in accordance with Section 12.2, except to the extent that this failure arises as a direct result of a Delay Event;
 - (xii) Contractor fails to allow VDOT or Concessionaire to inspect the Site, the Work and any Materials or documents where required under this Contract;

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- (xiii) Contractor fails, for any reason other than failure of Concessionaire to make payments to Contractor when obligated in accordance with this Contract, to make prompt payments required to be made by Contractor to any Subcontractor that are not in dispute, which failure continues for thirty (30) days after written notice of such non-payment (which notice requirement will be deemed waived if applicable Law prohibits the giving of such notice);
 - (xiv) Contractor fails to obtain any Performance Bond or Payment Bond when required under this Contract or any such Performance Bond or Payment Bond is terminated, or is no longer maintained in full force and effect, as applicable;
 - (xv) Contractor, at any time, fails to obtain, provide and maintain the insurance in accordance with Section 9.2; and
 - (xvi) without limiting Section 12.3(a)(i) through (xv), Contractor materially breaches any other obligation under this Contract or any Contractor Party engages in fraud, criminal conduct, willful misconduct, recklessness or bad faith.
- (b) If any of the conditions set forth in Section 12.3(a) above exists, Concessionaire will give written notice to Contractor and its surety of the condition (“Contractor Default Notice”).
- (c) Upon receipt of a Contractor Default Notice, the following cure periods will apply:
- (i) for a Contractor Default under Section 12.3(a)(i) (*Abandonment*), 12.3(a)(iv) (*Long Stop Date*), 12.3(a)(vi) (*Assignment*) and 12.3(a)(vii) (*Insolvency Event*), there is no cure period; or
 - (ii) for each other Contractor Default, unless otherwise noted in Section 12.3(a) for any specific Contractor Default a period of ten (10) days after Contractor receives the Contractor Default Notice.
- (d) If a Contractor Default occurs that has no cure period or if it is not cured within the applicable cure period, Concessionaire may, in its sole discretion:
- (i) require Contractor to prepare and implement a Remedial Plan in accordance with Section 12.3(e); or
 - (ii) terminate this Contract in accordance with Section 12.3(f).
- (e) *Remedial Plan for Contractor Default.*
- (i) Without prejudice to any other right or remedy available to Concessionaire, if a Contractor Default occurs (whether or not any

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cure period has expired), Concessionaire may require Contractor to prepare and submit to Concessionaire, within any period as Concessionaire determines, a plan to remedy or cure the relevant Contractor Default, as applicable (“Remedial Plan”).

- (ii) Within thirty (30) days of receiving a Remedial Plan, Concessionaire must notify Contractor as to whether Concessionaire accepts the Remedial Plan. If Concessionaire determines that the Remedial Plan is not acceptable, Concessionaire may for a Contractor Default terminate this Contract in accordance with Section 12.3(f) or notify Contractor of its deficiency and require correction of the deficiency within five (5) days of the notice.
 - (iii) If Concessionaire notifies Contractor that its Remedial Plan is acceptable, Contractor must diligently implement the Remedial Plan in accordance with its terms.
- (f) *Termination for Contractor Default.*
- (i) If a Contractor Default occurs and:
 - (A) there is no cure period for that Contractor Default under Section 12.3(c);
 - (B) Concessionaire determines that the Contractor Default has not been cured within the relevant cure period under Section 12.3(c); or
 - (C) if Concessionaire requires Contractor to deliver a Remedial Plan under Section 12.3(e), one of the following applies:
 - (1) Contractor fails to deliver the required Remedial Plan within the time required by Concessionaire or Concessionaire rejects any Remedial Plan that is delivered, in each case in accordance with Section 12.3(e); or
 - (2) where a Remedial Plan has been accepted by Concessionaire, Concessionaire determines that Contractor or its sureties have failed to comply with the Remedial Plan or cure the Contractor Default, in each case in accordance with the schedule provided in that Remedial Plan,

Concessionaire may by written notice to Contractor terminate this Contract (“Concessionaire Termination Notice”). A Concessionaire Termination Notice must specify the Contractor Default that has occurred and the date that this Contract will terminate.

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(g) *Taking Over the Work*

- (i) If Concessionaire terminates this Contract in accordance with this Section 12.3:
 - (A) in addition to any other right available at law or in equity, Concessionaire may:
 - (1) take possession, for the purpose of completing the Work, of all Materials, completed Work, Subcontracts, Intellectual Property, Work Product, Insurance Policies, and other items that Contractor has previously received payment from Concessionaire or that Contractor is able to assign or transfer to Concessionaire;
 - (2) employ any Person or Persons to complete the Work and provide all of the required labor, services, Materials, Equipment and other items; and

Contractor must at no cost to Concessionaire transfer and assign the items referred to in this Section 12.3(g) and comply with all requirements in Section 12.1(b), including assigning all Subcontracts to Concessionaire as may be requested by Concessionaire.

(h) *Payments on Termination for Contractor Default.*

- (i) If Concessionaire terminates this Contract in accordance with Section 12.3(f):
 - (A) Contractor will not be entitled to receive any further payments under Contract; and
 - (B) Contractor must pay Concessionaire, within thirty (30) days upon demand, an estimated amount equal to the aggregate of:
 - (1) all Losses incurred or estimated to be incurred by Concessionaire associated with termination of this Contract and the Contractor Default (the “Concessionaire Estimated Damages”); and
 - (2) any outstanding Delay Liquidated Damages or other claims that have accrued up to, and remain unpaid as of, the date of termination of this Contract.
 - (C) upon Final Completion, Concessionaire will calculate its actual Losses incurred due to such termination of this

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Contract (the “Concessionaire Actual Damages”), and based on such calculation:

- (1) if Concessionaire Actual Damages are less than the Concessionaire Estimated Damages, then Concessionaire will return any Concessionaire Estimated Damages received in excess of the Concessionaire Actual Damages; or
 - (2) if Concessionaire Actual Damages are more than the Concessionaire Estimated Damages, Concessionaire may issue a demand to Contractor to pay Concessionaire, within thirty (30) days upon demand, a final amount equal to Concessionaire Actual Damages not otherwise previously received from Contractor.
- (ii) Without limiting the generality of Section 12.3(h)(i)(B)(1), Concessionaire’s Losses associated with termination of this Contract for a Contractor Default will include:
- (A) Concessionaire’s costs and expenses in completing the Work including:
 - (1) all costs and expenses that Concessionaire has incurred or will incur in completing all of the Work, less the remaining balance of the Contract Price;
 - (2) all Losses and expenses (including attorney and other advisor fees and expenses) incurred by Concessionaire in connection with any re-procurement of the Work; and
 - (3) all costs and expenses (including attorney and other advisor fees and expenses) incurred by Concessionaire defending claims arising from the Contractor’s performance or non-performance (including any Claims by Concessionaire); and
 - (B) subject to Section 8, losses that have or will be incurred by Concessionaire for any reasonable delay or projected delay to the timely achievement of all Contract Times that remain outstanding on the date of termination of this Contract (calculated at the same rate as the applicable Delay Liquidated Damages under Section 5.5).

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- (i) *Improper Termination for Contractor Default.* If it is finally determined, pursuant to Section 11, that Concessionaire incorrectly terminated this Contract for a Contractor Default:
 - (i) Concessionaire will be deemed to have terminated this Contract for convenience under Section 12.1; and
 - (ii) Contractor's sole relief for such improper termination will be the applicable termination compensation under and in accordance with Section 12.1(e).

Section 13 Equivalent Project Relief

13.1 *Equivalent Project Relief.*

- (a) *Concessionaire Rights.* Concessionaire has certain rights, entitlements, remedies and defenses available to it under the Comprehensive Agreement that relate to the ARCA Work or to the rights or obligations of the Contractor under this Contract (such rights, entitlements, remedies and defenses, "Concessionaire Rights"), including, without limitation, Concessionaire Rights in respect of:
 - (i) any compensation, damages or payment of any kind;
 - (ii) any relief (including any extension of time or limitation of liability applicable to liabilities owed to VDOT under the Comprehensive Agreement) or excuse from the performance of Concessionaire's obligations under, or from termination of, the Comprehensive Agreement;
 - (iii) any entitlement of Contractor under this Contract in respect of which any provision of this Contract states that:
 - (A) this Section 13 or the provisions generally relating to Equivalent Project Relief shall apply; or
 - (B) Contractor may make an Equivalent Claim or issue an Equivalent Claim Notice;
 - (iv) any certificate, consent or approval provided for under this Contract, the Comprehensive Agreement or any other agreement, statute, by law or regulation in regard to any matter relating to the Work, including any entitlement of Concessionaire to request or apply for such certificate, consent or approval from VDOT or any other Person; and
 - (v) any Delay Event.

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In accordance with and subject to the provisions of this Section 13, Contractor is entitled hereunder to the benefit of Concessionaire Rights in connection with the Work (“Equivalent Project Relief” or “EPR”).

- (b) *Entitlement.* Except as expressly stated otherwise in this Contract, Contractor shall be entitled to any Equivalent Project Relief only to the extent that Concessionaire is or becomes entitled under the Comprehensive Agreement, as provided in, and subject to, this Section 13, but in any event to no greater extent than the Concessionaire Rights in accordance with the Comprehensive Agreement including, without limitation:
 - (i) a written agreement between Concessionaire and VDOT entered into in accordance with the terms thereof; or
 - (ii) a determination made pursuant to the ARCA Dispute Resolution Procedures which is binding upon Concessionaire and VDOT.
- (c) *Equivalent Claim Notice.* If an event or circumstance occurs which entitles Contractor to any Equivalent Project Relief, Contractor may upon the occurrence of such event or circumstance give notice (an “Equivalent Claim Notice”) of the same to Concessionaire. Such Equivalent Claim Notice shall include full details of the relevant event or circumstance in accordance with the terms of this Contract, and must include such supporting documentation and information as Concessionaire may reasonably require.
- (d) *Equivalent Claim Notice Timing.* Contractor shall give the relevant Equivalent Claim Notice to Concessionaire as soon as reasonably practicable after it becomes aware of the fact that an event or circumstance gives rise to the relevant claim for Equivalent Project Relief (having regard to any time limit for submission of such claim for Equivalent Project Relief by Concessionaire to VDOT under the Comprehensive Agreement).
- (e) *Equivalent Claim Process.* If Contractor gives an Equivalent Claim Notice to Concessionaire, then, having regard to the controlling time limits provided for in the Comprehensive Agreement and to any other time limits, including statutory and legal time limits established by a Governmental Authority, for submission of such claim or action necessary for Equivalent Project Relief:
 - (i) Unless Concessionaire elects to inform Contractor under Section 13.1(e)(ii)(B), Section 13.1(e)(ii)(C) or Section 13.1(e)(ii)(D), Concessionaire shall, promptly following receipt of such Equivalent Claim Notice, submit to VDOT, as applicable, a claim (each an “Equivalent Claim”) reflecting Contractor’s Equivalent Claim Notice.

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- (ii) *Concessionaire Options Following Receipt of Equivalent Claim Notice.* Concessionaire shall, at its option, elect one of the following:
- (A) subject to Section 13.2(d), to pursue the Equivalent Claim with VDOT, in which case Concessionaire shall use reasonable efforts to diligently and in Good Faith pursue such Equivalent Claim with VDOT, provided that (a) Contractor shall be obliged to provide all assistance which Concessionaire, acting reasonably, considers necessary to substantiate any Equivalent Claim, including the collection of information and details relating to the relevant Equivalent Claim and the making available of personnel to assist Concessionaire in the pursuit of the Equivalent Claim and (b) the Parties shall keep each other informed at all times of any matter relevant to the pursuit of the Equivalent Claim of which the other Party becomes aware, whether in meetings between VDOT and Concessionaire or otherwise. Concessionaire shall (a) consult with Contractor before formally commencing the pursuit of an Equivalent Claim in order to discuss the strategic approach to the pursuit of such claim and, taking the potential risks, obligations and liabilities of both Parties into account, give due consideration to Contractor's reasonable recommendations and suggestions in respect of the Equivalent Claim and (b) provide Contractor copies of all correspondence relating to such Equivalent Claim to be given or made to VDOT or any relevant expert or mediator within any time period set out in a communications protocol agreed by Contractor and Concessionaire. Any time limits in the Comprehensive Agreement and other applicable time limits, including statutory and legal time limits established by a Governmental Authority for submission of a claim or action for an Equivalent Claim will take precedence over any conflicting time requirements provided for in this Section 13.1(e);
- (B) to authorize Contractor to manage the relevant Equivalent Claim with VDOT, except to the extent prohibited by VDOT (a written request having been made, if required, to VDOT at the time of submitting an Equivalent Claim pursuant to Section 13.1(e)(i) to acknowledge the status of Contractor's representatives to prosecute such claim and, if VDOT so prohibits, Concessionaire will make an election under Section 13.1(e)(ii)(A), Section 13.1(e)(ii)(C), or Section 13.1(e)(ii)(D)), in the name and on behalf of Concessionaire, in which Concessionaire shall, so notify

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Contractor in writing; provided that Contractor shall: (a) consult with Concessionaire before formally commencing the pursuit of an Equivalent Claim in order to discuss the strategic approach to the pursuit of such claim and Contractor shall, taking the potential risks, obligations and liabilities of both Parties into account (including Concessionaire's equity return), give due consideration to Concessionaire's reasonable recommendations and suggestions in respect of the Equivalent Claim; (b) subject to Section 13.2(d) bear all costs and expenses relating to the pursuit of such Equivalent Claim, including reimbursing Concessionaire for any costs and fees of the ARCA Dispute Resolution Procedures; (c) keep Concessionaire informed at all times (including providing: (i) copies of all correspondence to be given or made to VDOT or any relevant expert or mediator as soon as reasonably practicable prior to delivery to the intended recipient or within any time period set out in a communications protocol agreed by Contractor and Concessionaire; and (ii) any other documentation reasonably requested by Concessionaire of the progress and outcome of such Equivalent Claim); and (d) comply with all applicable provisions of the Comprehensive Agreement and this Contract; or

(C) to inform Contractor that Concessionaire does not wish to pursue all or a portion of such Equivalent Claim, but that Contractor shall be entitled to recover from Concessionaire all or portion of the benefit, as applicable, (or reasonable equivalent thereof) of the relevant Equivalent Project Relief; or

(D) to inform Contractor in writing, setting forth its reasons therefor in reasonable detail that Concessionaire will not pursue or authorize Contractor to manage the Equivalent Claim, which, except as provided in Section 13.1(e)(ii)(C), Concessionaire shall not elect unless:

(1) in Concessionaire's view, acting reasonably, the event(s) or circumstance(s) referred to in the Equivalent Claim Notice does not or do not give rise to any right on the part of Contractor to claim or receive the benefit of any Equivalent Project Relief; or

(2) Concessionaire has actual knowledge that the Equivalent Claim, or a portion thereof, is a false or frivolous or abuse of process claim, is based on

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defective cost and pricing data or could otherwise expose Concessionaire or any Concessionaire Party to liability if submitted to VDOT; or

- (3) in Concessionaire's view, acting reasonably, a material fact alleged in an Equivalent Claim Notice excludes material pertinent information which renders it misleading,

provided, that, in each case, Concessionaire (i) has provided Contractor a reasonable opportunity to remedy the affected portion of such Equivalent Claim alleged to be false, frivolous or abuse of process, based on the defective data or otherwise could expose Concessionaire or any Concessionaire Party or the Contractor, Contractor Member or any Contractor Party to liability if submitted to VDOT, and to submit the revised Equivalent Claim to Concessionaire, and (ii) shall pursue or authorize Contractor to pursue other portions of the Equivalent Claim that are not, in Concessionaire's view, acting reasonably, false, frivolous, based on the defective data and could not otherwise expose Concessionaire or a Concessionaire Party to liability if submitted to VDOT, to the extent such portions can reasonably be segregated.

- (E) If it is subsequently determined pursuant to the Dispute Resolution Procedure that, as applicable, the event(s) or circumstance(s) give or gave rise to any such right or the Equivalent Claim was not a false claim, a frivolous claim or based on defective cost and pricing data and would not expose Concessionaire or any Concessionaire Party or their respective officers, directors or employees to liability if submitted to VDOT, then Concessionaire shall either (A) proceed with the Equivalent Claim in accordance with Section 13.1(e)(ii)(A), (B) authorize Contractor to pursue the Equivalent Claim in the name of Concessionaire pursuant to Section 13.1(e)(ii)(B), or (C) elect to pay Contractor the compensation amount in connection with the Final Payment or early termination of this Contract (whichever occurs first).

(iii) *Concessionaire Managed Equivalent Claim.* If Concessionaire elects to pursue the Equivalent Claim pursuant to Section 13.1(e)(ii)(A):

- (A) Contractor shall provide such additional details and/or information as may be reasonably requested by Concessionaire or by VDOT through Concessionaire in relation to the Equivalent Claim;
- (B) unless VDOT expressly refuses to permit representatives of Contractor to attend meetings between VDOT and Concessionaire at which the Equivalent Claim is to be

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discussed, representatives of Contractor shall be entitled, and may be required by Concessionaire, to attend any meetings between VDOT and Concessionaire at which the Equivalent Claim is to be discussed and Contractor may, at its sole cost and expense, appoint its own counsel and technical advisors for such purpose;

- (C) subject to Section 13.1(d), Concessionaire shall consult with and use reasonable efforts to agree with Contractor with respect to the appointment of counsel (other than Contractor's own counsel and technical advisors appointed by Contractor pursuant to Section 13.1(e)(iii)(B)) and other third party advisors by Concessionaire; provided that in all cases the Parties will use reasonable efforts to agree upon a plan and scope of work and a reasonable budget estimate for the services of such counsel and advisors; provided further that Concessionaire shall have sole discretion in such appointments after such consultation and reasonable efforts to agree;
- (D) Concessionaire shall not be entitled to settle any Equivalent Claim or waive any the Concessionaire Right related to an Equivalent Claim without the prior written consent of Contractor, provided that Contractor's consent to any written offer or proposal of settlement shall not be unreasonably withheld or delayed;
- (E) if (a) Contractor unreasonably withholds its consent or does not provide a response to Concessionaire within 10 Business Days of receipt of a written offer or proposal of settlement of an Equivalent Claim or waiver of the Concessionaire Right related to an Equivalent Claim in accordance with Section 13.1(e)(iii)(D), and (b) the pursuit of such Equivalent Claim (i) ultimately results in a benefit or relief to Concessionaire that is less favorable to Concessionaire than the settlement or agreement foregone or (ii) otherwise proves unsuccessful, then, in addition to Contractor's obligations under Section 13.2(d), Contractor shall indemnify and compensate Concessionaire in connection with the Final Payment or early termination of this Contract (whichever occurs first) for any Direct Losses resulting therefrom, provided always that Concessionaire shall not be entitled to double recovery; and
- (F) if Concessionaire (a) fails to seek Contractor's consent as required pursuant to Section 13.1(e)(iii)(D) or (b) proceeds to agree to such settlement or agreement or waiver despite

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Contractor reasonably withholding its consent thereto, then where the settlement does not satisfy Contractor's Equivalent Claim in full, Section 13.1(f) shall apply.

(iv) *Contractor Managed Claim.* If Concessionaire authorizes Contractor to pursue the Equivalent Claim in the name and on behalf of Concessionaire pursuant to Section 13.1(e)(ii)(B):

(A) Concessionaire shall provide such additional details and/or information as may be reasonably requested by Contractor or by VDOT through Contractor in relation to the Equivalent Claim;

(B) Concessionaire shall be entitled to attend any meetings between VDOT and Contractor at which the Equivalent Claim is to be discussed and Concessionaire may, at its sole cost and expense, appoint its own counsel and technical advisors for such purpose;

(C) Contractor shall only refer a Dispute to the ARCA Dispute Resolution Procedure (including initiating a court proceeding) after it has, as soon as practicable but in any event no later than five (5) Business Days prior to the issuance or initiation of any such action, convened and held a joint meeting either in person or through other accepted electronic means of the executive committees of Contractor and Concessionaire in order to (a) discuss the strategic approach to the pursuit of such Equivalent Claim, (b) discuss with the intention to agree on a communications and consultation protocol between such executive committees, Contractor and Concessionaire for any such Equivalent Claim, which shall include agreed processes for the exchange of information and drafts of all relevant documents relating to such Equivalent Claim in a manner that grants Concessionaire and its counsel and advisors an opportunity to review and comment on such documents prior to their delivery or submission to their intended recipient and (c) only in respect of any such Equivalent Claim for which Contractor wishes to take steps to commence litigation against VDOT and only if Concessionaire wishes to either directly pursue the relevant Equivalent Claim pursuant to Section 13.1(e)(ii)(A) or to exercise its rights under Section 13.1(e)(ii)(C) in respect of the relevant Equivalent Claim, discuss the strategic value of such options, which options may only be exercised in respect of such Equivalent Claim if both of the executive committees of Contractor and Concessionaire separately approve in writing either such

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option in accordance with their respective constating documents (in which case the provisions of Section 13.1(e)(ii)(A) or 13.1(e)(ii)(C), as applicable, shall apply in respect of the relevant Equivalent Claim from the date of such decision);

- (D) Contractor shall not be entitled to settle any Equivalent Claim, or waive any the Concessionaire Right related to an Equivalent Claim under the Comprehensive Agreement without the prior written consent of Concessionaire, provided that Concessionaire's consent to any written offer or proposal of settlement shall not be unreasonably withheld or delayed; and
- (E) if (a) Concessionaire unreasonably withholds its consent to a written offer or proposal of settlement of an Equivalent Claim or waiver of a Concessionaire Right related to an Equivalent Claim in accordance with Section 13.1(e)(iv)(D) or does not provide a response to Contractor within ten (10) Business Days of receipt of Contractor's request for such consent, and (b) the pursuit of such Equivalent Claim (i) ultimately results in a benefit or relief to Contractor that is less favorable to Contractor than the settlement or agreement foregone or (ii) otherwise proves unsuccessful, Concessionaire shall compensate Contractor for any Direct Losses upon issuance of Final Payment or early termination of this Contract (whichever is sooner) resulting therefrom, provided always that Contractor shall not be entitled to double recovery.
- (v) *ARCA Dispute Resolution Procedure Generally.* Concessionaire shall, on receipt of any reasonable request to do so from Contractor, invoke the ARCA Dispute Resolution Procedure in respect of matters relating to the Work; provided, that Contractor shall (a) participate and cause any relevant Contractor Party to participate (to the extent reasonably possible), in such ARCA Dispute Resolution Procedure and any related litigation as reasonably required by Concessionaire, (b) agree to be bound by any final determination made under such ARCA Dispute Resolution Procedure, and (c) bear all costs and expenses relating to such ARCA Dispute Resolution Procedure (including Concessionaire's out-of-pocket costs, mediator costs and fees and reasonable legal fees).
- (f) *EPR Relief Received from VDOT.* Contractor shall not be entitled to any Equivalent Project Relief under this Section 13.1 unless and until Concessionaire has received the entitlement, benefit, payment or relief corresponding to such Equivalent Project Relief from VDOT pursuant to

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the Comprehensive Agreement. In addition, Contractor's entitlement to any Equivalent Project Relief under this Section 13.1 shall be a fair and reasonable proportion of the corresponding Concessionaire Rights, it being acknowledged between Concessionaire and Contractor that, subject to the relevant party(ies) complying with their obligations to mitigate under this Contract, the relevant party(ies)'s entitlement shall be based on the nature and scope of the entitlement, benefit, payment or relief granted by VDOT and, if applicable, any indicative breakdown provided by VDOT relating to amounts received by Concessionaire, and the amount the relevant party is actually entitled to claim and has properly claimed. Where the agreement or determination referred to in Section 13.1(c) expressly separately identifies the amount, nature or extent of Concessionaire's entitlement attributable to Contractor or the Work, such allocation shall be taken into account when determining Contractor's entitlement to the corresponding Equivalent Project Relief.

- (g) *EPR Entitlements.* Following agreement or final determination of Contractor's Equivalent Project Relief as provided in Sections 13.1(a) through (f):
 - (i) where such Equivalent Project Relief consists of relief from performance of obligations under the Comprehensive Agreement, Contractor shall be relieved from the performance of its corresponding obligations under this Contract to the same extent;
 - (ii) where such Equivalent Project Relief consists of an extension of time under the Comprehensive Agreement, Contractor shall be entitled to a corresponding extension of time under this Contract; and
 - (iii) where such Equivalent Project Relief consists of compensation to Concessionaire under the Comprehensive Agreement, Contractor shall be entitled to corresponding compensation in accordance with Pay-When-Paid Principles or on such other basis as Concessionaire and Contractor may agree.
- (h) *Performance During an Equivalent Claim.*
 - (i) Pending the determination, agreement or resolution of Contractor's entitlement to Equivalent Project Relief, each Party shall continue to perform its obligations under this Contract and shall take no steps to enforce any right under this Contract whether by set-off against sums otherwise payable to the other Party, by commencing proceedings of any kind, by counterclaiming in any proceedings or otherwise howsoever, to the extent that, pursuant to the terms of this Contract, such right depends upon or is related to the relevant agreement or determination of Equivalent Project Relief.

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Notwithstanding the foregoing, the Parties agree that nothing contained in this Section 13.1(h) will preclude either Party from exercising its rights under Section 11 if such proceedings are necessary to preserve any rights or remedies subject to being time barred by an applicable limitation period or where Contractor's entitlement arises other than with respect to Equivalent Project Relief.

(ii) Upon final determination, agreement or resolution of Contractor's entitlement to the benefit of any Equivalent Project Relief, Contractor shall be conclusively deemed to have waived any rights under or in connection with such Equivalent Claim in excess of those arising from such determination, agreement or resolution. Contractor shall not take any steps under the Dispute Resolution Procedure or otherwise to claim that Contractor is entitled under or in connection with this Contract or the Comprehensive Agreement to any benefit or relief arising out of the Equivalent Claim other than Contractor's entitlement to the benefit of any Equivalent Project Relief according to such final determination, agreement or resolution, and Contractor waives any right to make such a claim.

(i) *Exclusive Rights.* Without prejudice to the rights and remedies available to Contractor in respect of any Concessionaire Act, the provisions of this Section 13.1 set out the sole and exclusive rights and remedies of Contractor and Concessionaire in relation to the subject matter of any claim for Equivalent Project Relief, and Contractor shall not be entitled to any other right or remedy of any kind whatsoever (whether in contract, tort, breach of statutory duty or under any other theory of law or equity) in respect of the same. Accordingly, Contractor shall not take any steps, under the Dispute Resolution Procedure or otherwise, to claim that Contractor is entitled under or in connection with this Contract to any benefit or relief arising out of an Equivalent Claim other than Contractor's entitlement to the benefit of any Equivalent Project Relief according to a final determination, agreement or resolution thereof, and Contractor hereby waives any right to make such a claim, in each case, subject to the terms and conditions of the other provisions of this Section 13.1.

13.2 *VDOT Proceedings.*

(a) This Section 13.2 applies where VDOT asserts or exercises any right against Concessionaire under, or in connection with, the Comprehensive Agreement, relating to any matter in respect of which Concessionaire asserts or exercises a corresponding right or claim against Contractor pursuant to this Contract arising out of the same facts and circumstances, including breaches of this Contract, reductions in, or deductions from, payments under the Comprehensive Agreement, claims for indemnification and claims for damages for breach of such agreement (an assertion or

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exercise of such rights by VDOT being referred to in this Section 13.2 as a “VDOT Claim”).

- (b) If a VDOT Claim is made Concessionaire shall promptly notify Contractor of such VDOT Claim and provide Contractor with a copy of such VDOT Claim (including supporting documentation received from VDOT) and where Contractor disputes in Good Faith a VDOT Claim:
 - (i) subject to Section 13.2(b)(iii), Concessionaire shall challenge and defend such VDOT Claim under, and in accordance with, the Comprehensive Agreement and the provisions of this Section 13.2;
 - (ii) Contractor shall prepare, and each of Contractor and Concessionaire shall endeavor in Good Faith to agree, to a protocol for challenge to, and/or defense of, any VDOT Claim, which shall conform to the principles set out in this Section 13.2(c) and shall comply, and be consistent, with the provisions of the Comprehensive Agreement, and Contractor and Concessionaire will observe any protocol so agreed;
 - (iii) notwithstanding anything else in this Section 13.2(b), Concessionaire may, in writing, on terms to be mutually agreed, authorize Contractor to challenge or defend a VDOT Claim, or manage the challenge and defense of the same, for and on behalf of and in the name of Concessionaire, giving due consideration to the interests of Concessionaire;
 - (A) if:
 - (1) Contractor unreasonably withholds its consent to any compromise or admission in respect of a VDOT Claim to which Concessionaire is willing to consent, so that Concessionaire is required to continue to defend or challenge such VDOT Claim; and
 - (2) the defense or challenge to such VDOT Claim (A) ultimately results in a resolution that is less favorable to Concessionaire than the compromise or agreement foregone or (B) otherwise proves unsuccessful,

then, in addition to Contractor’s obligations under Section 13.2(d), Contractor shall, upon the earlier of the issuance of the Final Payment or early termination of this Contract, compensate Concessionaire for all Direct Losses resulting therefrom, provided always that (i) Concessionaire shall not be entitled to double recovery and (ii) where continuing litigation without a settlement will materially and adversely impair Concessionaire’s interests under the Comprehensive Agreement and Contractor has failed to provide any reasoned written response within ten days of Concessionaire’s request for consent, Concessionaire may settle any such claim without

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Contractor's consent, where such settlement will not be adverse to Contractor or its ability to perform the Work;

- (iv) where Contractor is authorized to challenge or defend any VDOT Claim pursuant to the provisions of Section 13.2(b)(iii), Contractor shall consult with Concessionaire regarding any proposal to make any compromise or admission in relation to any VDOT Claim, and shall not make any such compromise or admission without first obtaining written consent from Concessionaire, such consent not to be unreasonably withheld or delayed (and any disputes relating to the reasonableness of withholding or delaying any such consent shall be resolved pursuant to the Dispute Resolution Procedure);
 - (v) Concessionaire and Contractor shall keep each other informed as to the progress of the relevant VDOT Claim and shall provide each other with copies of all the documents relating thereto; and
 - (vi) Contractor shall, and shall cause each Contractor Party to, provide Concessionaire with such information as is in the control or possession of Contractor, a Contractor Party (or is reasonably obtainable by any Contractor Party) and as Concessionaire may reasonably require to defend a VDOT Claim, including providing information and making available relevant personnel (and if Concessionaire authorizes representatives of Contractor to challenge or defend a VDOT Claim on its behalf pursuant to Section 13.2(b)(iii), Concessionaire shall, and shall cause Concessionaire Parties to, provide such information and make available relevant personnel to Contractor).
- (c) *Contractor VDOT Claim Liability.* Subject to Concessionaire complying in all material respects with its obligations under Section 13.2(b) and Contractor's right to seek Equivalent Project Relief, and without prejudice to Contractor's right to dispute under the Dispute Resolution Procedure whether Contractor is liable for VDOT Claim, any determination or agreement made or reached under the Comprehensive Agreement as to the amount, nature and extent of Concessionaire's liability in relation to any VDOT Claim shall be binding on Concessionaire and Contractor, and Contractor shall bear and discharge on a current basis and shall indemnify Concessionaire against its actual losses, costs, expenses, liabilities, penalties due to VDOT or any third-party under the Comprehensive Agreement (without limiting Concessionaire's ability to recover other amounts under any applicable insurance policies required under **Exhibit Q**). If, in respect of any VDOT Claim, the amount recovered by Concessionaire pursuant to applicable insurance policies and the amount paid by Contractor pursuant to Section 13.2(c) results in double recovery by Concessionaire, Contractor will be reimbursed an amount equal to such double recovery.

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- (d) *Concessionaire's Damages.* Contractor shall bear, pay and discharge on a current basis, and shall indemnify Concessionaire against, all Direct Losses reasonably incurred or borne by Concessionaire in complying with Section 13.1 or 13.2, as the case may be, in connection with any Equivalent Claim or VDOT Claim, not including the internal costs of Concessionaire's own personnel (but including any out of pocket expenses of such personnel and including costs and expenses of VDOT, mediator or other Persons where Contractor or Concessionaire becomes liable to pay the same, including Concessionaire's third-party advisors and attorneys) arising from operation of Section 13.1 or 13.2, except:
- (i) to the extent that they arise from any Concessionaire Act; or
 - (ii) to the extent that the benefit of an Equivalent Claim or the liability for a VDOT Claim will be shared by the Parties, in which case each Party shall bear a fair and reasonable proportion of the related costs and expenses commensurate with the benefit it will receive and/or the liability for which it was or will be responsible; or
 - (iii) any amounts to be paid by Concessionaire to the Contractor pursuant to an express provision of Section 13.1 or 13.2.

Section 14 Legal Responsibilities

Contractor shall keep fully informed of federal, state, and local laws, bylaws, ordinances, orders, decrees, and regulations of governing bodies, courts, and agencies having any jurisdiction or that affects those engaged or employed on the Work, the conduct of the Work, or the execution of any documents in connection with the Work. The Contractor shall comply with all Laws applicable to the Project, including the applicable Federal Requirements described on **Exhibit C**. Contractor shall execute and file the documents, statements, certifications, and affidavits required under any applicable federal or state law or regulation required by or affecting the Contract or prosecution of the Work thereunder. Contractor shall permit examination of any records made subject to such examination by any federal or state law or by regulations promulgated thereunder by any state or federal agency charged with enforcement of such law.

Section 15 Project Management and Reporting Provisions

- 15.1 *Initial Baseline Schedule.* The Initial Baseline Schedule, attached hereto as **Exhibit O**, shall be used to manage the Work until such time it is replaced by the approved Baseline Schedule.
- 15.2 *Baseline Schedule.* Within fifteen (15) days of the date of this Contract, Contractor shall submit to Concessionaire, for its review and approval, a Baseline Schedule in accordance with Section 1.4 of the Technical Requirements.
- 15.3 *Schedule Updates.* Contractor shall submit updates to the Baseline Schedule in accordance with Section 1.4 of the Technical Requirements. Concessionaire

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reserves the right to withhold approval for all or part of Contractor's Applications for Payment until such time Contractor furnishes an approved update to the Baseline Schedule.

- 15.4 ***Revised Baseline Schedule.*** Contractor shall submit a revised Baseline Schedule when required in accordance with Section 1.4 of Technical Requirements. Concessionaire reserves the right to withhold approval of all or part of Contractor's Applications for Payment until such time Contractor furnishes an approved revised Baseline Schedule.
- 15.5 ***Other Information and Alteration.*** Contractor shall, whenever required by Concessionaire, provide in writing a general description of the arrangements and methods which Contractor proposes to adopt for the execution of the Work. No significant alteration to the Baseline Schedule, or to such arrangements and methods, shall be made without informing Concessionaire and any alterations made shall reflect the requirement for coordination of the Work with the actions and obligations of Concessionaire and the work to be carried out by Contractor and the TMS Contractor. If any alteration affects any such actions, obligations or Work, it shall not be made without the prior approval of Concessionaire. If the progress of the Work does not conform to the Baseline Schedule, as updated herein, Concessionaire may instruct Contractor to revise the Baseline Schedule, showing the modifications necessary to achieve completion within the Contract Times.
- 15.6 ***Use of Disadvantaged Business Enterprises, Small, Women-Owned and Minority-Owned Businesses Requirements.*** During performance of the Work for the Project, Contractor shall achieve the following goals with respect to small and minority business participation: Disadvantaged Business Enterprise (DBE) participation equal to thirteen percent (13%) of the Contract Value plus Small, Women, and Minority (SWaM) firm participation equal to nineteen percent (19%) of the Contract Value. For clarity, the total DBE/SWaM percentage is thirty-two (32%) of the Contract Value, and no funds paid to qualified firms shall be double counted toward this goal. Contractor shall comply with all requirements of **Exhibit C** in meeting these obligations.

Section 16 Miscellaneous

- 16.1 ***Representations and Warranties of Concessionaire.*** Concessionaire represents and warrants, as of the Contract Date, that:
- (a) ***Existence and Powers.*** Concessionaire is a limited liability company duly organized, validly existing and in good standing under the laws of the State of Delaware, and has the authority to do business in the Commonwealth of Virginia and in any other state in which it conducts its activities, with the full legal right, power and authority to enter into and perform its obligations under this Contract.

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- (b) *Due Authorization and Binding Obligation.* This Contract has been duly authorized, executed and delivered by Concessionaire, and constitutes a legal, valid and binding obligation of Concessionaire, enforceable against Concessionaire in accordance with its terms, except to the extent that its enforceability may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights from time to time in effect and equitable principles of general application.
- (c) *No Conflict.* To the best of its knowledge, neither the execution and delivery by Concessionaire of this Contract nor the performance by Concessionaire of its obligations in connection with the transactions contemplated hereby or the fulfillment by Concessionaire of the terms or conditions hereof:
 - (i) Conflicts with, violates or results in a breach of any constitution, law or governmental regulation, by-laws or certificates of incorporation applicable to Concessionaire; or
 - (ii) Conflicts with, violates or results in a material breach of any term or condition of any order, judgment or decree, or any contract, agreement or instrument, by which Concessionaire's properties or assets are bound, or constitutes a material default under any of the foregoing.
- (d) *No Approvals Required.* No additional approval, authorization, order or consent of, or declaration, registration or filing with, any Governmental Authority is required for the valid execution and delivery by Concessionaire of this Contract except otherwise as such have been duly obtained or made.
- (e) *No Litigation Affecting Concessionaire.* Except as disclosed in writing to Contractor, to the best of its knowledge, there is no Legal Proceeding before or by any Governmental Authority pending or, to the best of Concessionaire's knowledge, overtly threatened or publicly announced against Concessionaire, in which an unfavorable decision, ruling or finding could reasonably be expected to have a material and adverse effect on the execution and delivery of this Contract by Concessionaire or the validity, legality or enforceability of this Contract against Concessionaire, or any other agreement or instrument entered into by Concessionaire in connection with the transactions contemplated hereby or on the ability of Concessionaire to perform its obligations hereunder or under any such other agreement or instrument.
- (f) *Intellectual Property.* Concessionaire owns or has express rights to use or can acquire on reasonable terms, all Intellectual Property necessary for the performance of its obligations without any known material conflict with the rights of others.

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

- (g) *Information Supplied by Concessionaire.* The information supplied and representations and warranties made by Concessionaire in this Contract are true, correct and complete in all material respects.

16.2 *Representations and Warranties of Contractor.*

Contractor, and each Contractor Member, solely with respect to itself and Contractor, represents and warrants, as of the date of this Contract, that:

- (a) *Existence and Powers.* Contractor is a limited liability company, validly existing and in good standing under the laws of the Commonwealth of Virginia, and has the authority to do business in Virginia and in any other state in which it conducts its activities, with the full legal right, power and authority to enter into and perform its obligations under the Contract Documents and has or will have when necessary, all required licenses to carry on its present and proposed activities. Contractor affirms that it is properly registered and owes no outstanding reports with the Virginia Secretary of State in accordance with applicable Law.
- (b) *Due Authorization and Binding Obligation.* This Contract has been duly authorized, executed and delivered by all necessary action of Contractor and each Contractor Member and constitutes a legal, valid and binding obligation of Contractor and each of its members, enforceable against Contractor and each Contractor Member in accordance with its terms, except to the extent that its enforceability may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights from time to time in effect and equitable principles of general application.
- (c) *No Conflict.* To the best of Contractor's knowledge and each of its members' knowledge, neither the execution nor delivery by Contractor or each such Contractor Member of this Contract nor the performance by Contractor or each Contractor Member of its obligations in connection with the transactions contemplated hereby or the fulfillment by Contractor or Contractor Member of the terms or conditions hereof:
 - (i) Conflicts with, violates or results in a breach of any constitution, law, governmental regulation, by-laws or certificates of incorporation applicable to Contractor or each Contractor Member; or
 - (ii) Conflicts with, violates or results in a material breach of any order, judgment or decree, or any contract, agreement or instrument to which Contractor, each Contractor Member or any of their Affiliates is a party or by which Contractor, each Contractor Member or any of their Affiliates or any of their properties or assets are bound, or constitutes a default under any of the foregoing.

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

- (d) *No Approvals Required.* No approval, authorization, order or consent of, or declaration, registration or filing with, any Governmental Authority is required for the valid execution and delivery of this Contract by Contractor or any Contractor Member except as such have been duly obtained or made.
- (e) *No Litigation Affecting Contractor.* Except as disclosed in writing to Concessionaire, to the best of their knowledge, there is no Legal Proceeding, at law or in equity, before or by any court or Governmental Authority pending or, to the best of Contractor's and each Contractor Member's knowledge, overtly threatened or publicly announced against the Contractor, each Contractor Member or any of their Affiliates, in which an unfavorable decision, ruling or finding could reasonably be expected to have a material and adverse effect on the execution and delivery of this Contract by Contractor and Contractor Member or the validity, legality or enforceability of this Contract against Contractor and each Contractor Member, or any other agreement or instrument entered into by Contractor or any Contractor Member in connection with the transactions contemplated hereby, or on the ability of Contractor or Contractor Member to perform their obligations hereunder or under any such other agreement or instrument.
- (f) *No Litigation Affecting the Subcontractors.* Except as disclosed in writing to Concessionaire, to the best of its knowledge, there is no Legal Proceeding, at law or in equity, before or by any court or Governmental Authority pending or, to the best of Contractor's knowledge, overtly threatened or publicly announced against Contractor or any Subcontractor, in which an unfavorable decision, ruling or finding could reasonably be expected to have a material and adverse effect on the execution and delivery of the Contractor or any Subcontractor by Contractor or respective Subcontractor or the validity, legality or enforceability of this Contract or any subcontract against the Subcontractor that is party to the subcontract, or on the ability of Contractor or any Subcontractor to perform its obligations under its respective subcontract.
- (g) *Intellectual Property.* Contractor owns, or has express rights to use or can acquire on reasonable terms, all Intellectual Property necessary for the performance of the Work without any known material conflict with the rights of others.
- (h) *Information Supplied by Contractor.* The information supplied and representations and warranties made by Contractor in all submittals made to Concessionaire or VDOT in connection with its proposal and in all post-proposal submittals with respect to Contractor (and to Contractor's knowledge, all information supplied in such submittals with respect to the Subcontractors) are true, correct and complete in all material respects.

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

- (i) *Contractor Reviews.* Contractor has carefully reviewed the whole of the Contract Documents and has taken all steps it considers reasonably necessary to satisfy itself that nothing contained herein inhibits or prevents Contractor from performing and completing the Work in accordance with the Contract Documents.
- (j) *Compliance with Applicable Law Generally.* Contractor and each Contractor Member are in compliance in all material respects with applicable Laws pertaining to Contractor's and each Contractor Member's business and services.
- (k) *Contractor Members.* The only "Contractor Members" are Shirley Contracting Company, LLC and each such member is duly formed under the laws under the state of its organization, is qualified to conduct business in the Commonwealth of Virginia, has the requisite power and all required licenses to carry on its present and proposed activities, and has full power, right and authority to execute and perform each and all of its obligations under this Contract.
- (l) *Ownership of the Site.* Contractor acknowledges VDOT's ownership interest in the Site as described in the Comprehensive Agreement.
- (m) *Environmental Stipulations.* The Contractor hereby stipulates that during the term of this Contract any facility used in the performance of the Contract is not listed on the EPA's List of Violating Facilities pursuant to 40 C.F.R. 15.20.

16.3 ***Continuing Accuracy of Contractor Representations and Warranties.*** During the term of this Contract, Contractor and each Contractor Member, as applicable, shall not take any action, or omit to perform any act, that results in a representation and warranty made in Sections 16.2(a), 16.2(b), 16.2(c), 16.2(d), 16.2(g), 16.2(h), 16.2(i), 16.2(j), 16.2(k), 16.2(l) and 16.2(m) becoming untrue. Contractor shall promptly notify Concessionaire if any such representation and warranty becomes untrue. From time to time, Contractor shall provide Concessionaire, upon Concessionaire's request, with information reasonably requested by Concessionaire to substantiate the continuing accuracy of these representations and warranties.

16.4 Contractor confirms its obligation to comply with all applicable clauses in the Contract Documents, and all applicable Laws. Contractor will ensure that all clauses and obligations of the Contract Documents are included in all Lower Tier subcontracts and purchase orders as required by the Contract Documents. Contractor will comply with the Federal Requirements and Civil Rights Requirements set forth on **Exhibit C** and in addition will comply with all such policies promulgated by any Governmental Authority.

16.5 ***Administrative Requirements***

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

- (a) Foreign Professional Corporations and Foreign Professional Limited Liability Companies must possess a Commonwealth of Virginia Certificate of Authority from the State Corporation Commission to render professional services. Any business entity other than a professional corporation, professional limited liability company or sole proprietorship must be registered in the Commonwealth of Virginia with the Department of Professional & Occupational Regulation, Virginia Board for Architects, Professional Engineers, Land Surveyors, Certified Interior Decorators and Landscape Architects (http://www.dpor.virginia.gov/dporweb/ape_reg.pdf). Board regulations require that all professional corporations and business entities that have branch offices located in Virginia which offer or render any professional services relating to the professions regulated by the Board be registered with the Board. Registration involves completing the required application and submitting the required registration fee for each and every branch office location in the Commonwealth. All branch offices that offer or render any professional service must have at least one full-time resident professional in responsible charge that is licensed in the profession offered or rendered at each branch. All firms involved that are to provide professional services must meet this criteria prior to a contract being executed by Contractor.
- (b) Concessionaire will not consent to Contractor's subcontracting any portions of the Contract to any subconsultants in violation of the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.
- (c) Contractor must have internal control systems in place that meet federal requirements for accounting. These systems must comply with requirements of 48 CFR 31, "Federal Acquisition Regulations, Contract Cost Principles and Procedures," and 23 CFR 172, "Administration of Engineering and Design Related Service Contracts."
- (d) Contractor assures compliance with Title VI of the Civil Rights Act of 1964, as amended. The Contractor and all Subcontractors shall submit a Title VI Evaluation Report (EEO-D2) when requested by the Concessionaire. This requirement applies to all consulting firms with fifteen (15) or more employees.
- (e) All subcontractors shall be prequalified by VDOT prior to performing any Work on the Contract.
- (f) The required services may involve the handling of VDOT Critical Infrastructure Information/Sensitive Security Information (CII/SSI) material. Personnel handling CII/SSI material, visiting Critical Infrastructure (CI) facilities or performing bridge/tunnel inspections are required to sign CII/SSI Non-Disclosure Agreements and pass a fingerprint-based Criminal History Background Check (CHBC). Contractor will be

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

allowed to replace those individuals who fail to successfully pass the fingerprint-based CHBC. VDOT reserves the right to conduct fingerprint-based CHBC on all employees of Contractor's team members, or on any proposed replacements during the term of the contract who will be involved in the Project. All costs associated with the fingerprint-based CHBC are the responsibility of Contractor. A VDOT issued photo-identification badge is required for each employee of the Contractor's team who will need access to VDOT's CI facilities or who will be performing bridge/tunnel inspections. Based upon the results of the fingerprint-based CHBC, VDOT reserves the right to deny access to CII/SSI material and issuance of a VDOT security clearance or a VDOT issued photo-identification badge.

- 16.6 All notices, consents, requests or other communications will be in writing, unless otherwise expressly provided to the contrary and will be deemed to have been made or given on the date sent when e-mailed (to the extent permitted by the Contract Documents), hand-delivered, or transmitted as electronic facsimile to the other party, at the address noted in this Contract. If notice is sent by first class mail or by overnight or similar services, it will be deemed made three (3) Business Days after mailing or upon receipt, whichever is first. Either party may designate a different address by written notice given to the other.
- 16.7 If any provision of this Contract is determined to be illegal, invalid or unenforceable under present or future laws, the parties intend the remainder to be unaffected and enforceable. In place of each clause or provision that may be determined to be illegal, invalid, or unenforceable, and to the full extent permitted by law, the court or arbitrator is authorized to add a legally permissible clause or provision as similar as possible to that found unenforceable.
- 16.8 This Contract has been reviewed, negotiated, and accepted voluntarily and after due consideration, with advice from counsel as the parties deemed appropriate, and represents the entire agreement of the parties. This Contract may be amended only by Work Order signed by the parties. No part of this Contract may be assigned by Contractor without Concessionaire's written consent. Concessionaire may assign this Contract to VDOT or a non-profit special purpose entity established by the Commonwealth of Virginia to deliver the Project, or any or all of its rights under this Contract and the other Contract Documents without Contractor's consent. If VDOT (or an entity established by the Commonwealth of Virginia) succeeds to Concessionaire's rights under the Contract (by assignment or otherwise), then Contractor agrees that it will (A) maintain usual and customary books and records for the type and scope of operations of business in which it is engaged, (B) permit audit thereof by VDOT and (C) allow VDOT to assume the benefit of the Concessionaire's Contract rights and the work performed thereunder, with liability only for those remaining obligations accruing after the date of assumption, but excluding any monetary claims or obligations that Concessionaire may have against such Contractor that existed prior to VDOT's assumption of this Contract.

CONSTRUCTION CONTRACT TERMS AND CONDITIONS

- 16.9 Except as required by law, Concessionaire's sureties have no greater or different obligation to pay Contractor than does Concessionaire, and further are entitled to enforce this Contract. Concessionaire's surety is an express third-party beneficiary of this Contract. VDOT is a third party beneficiary to the extent required by the Contract Documents. There are no other third-party beneficiaries.
- 16.10 The persons executing this Contract, and any Work Orders, claims, and lien or claim waivers or releases on behalf of Contractor, have actual authority to execute those documents.
- 16.11 Without limiting any other provision of this Contract, and notwithstanding any provision of this Contract to the contrary, this Contract shall be deemed to incorporate by reference, the contract provisions required under Sections 24.02(f), (g), (h), and (i), and 8.11 (to the extent applicable to the Contractor's Work under this Contract) of the Comprehensive Agreement (including imputation of any required representation or warranty upon Contractor). Contractor shall cause the foregoing provisions to be included in each Subcontract at every tier. VDOT shall be a third party beneficiary of this Section 16.11.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have caused this Contract to be executed by their duly authorized representatives on the day and year first above written.

95 EXPRESS LANES LLC

By: _____
Name:
Title:

Address for Notices:

95 Express Lanes LLC
6440 General Green Way
Alexandria, VA 22312
Attention: Group General Manager
Facsimile: (571) 419-6101

with a copy to:

95 Express Lanes LLC
6440 General Green Way
Alexandria, VA 22312
Attention: Legal Counsel

**SHIRLEY CONTRACTING COMPANY,
LLC**

By: _____

Name: Gregory S. Smith

Title: Division President

Address for Notices:

8435 Backlick Road

Lorton, VA 22079

Attention: Gregory S. Smith, Division President

with a copy to:

CT Corporation System

4701 Cox Road, Suite 285

Glen Allen, VA 23060

Exhibit A

Definitions

“Abandon” means to abandon all or a material part of the Work, which will be deemed to have occurred if:

(a) Contractor demonstrates through statements, acts or omissions an intent not to continue (for any reason other than a Delay Event that materially interferes with its ability to continue) to perform all or a material part of the Work; or

(b) no significant Work (taking into account the Baseline Schedule and any Delay Event) on the Project or a material part of the Project is performed for a continuous period of more than 30 days.

“Affiliate” means, when used to indicate a relationship with a specified Person, a Person that: (a) directly or indirectly, through one or more intermediaries has a 10% or more voting or economic interest in such specified Person or (b) controls, is controlled by or is under common control with such specified Person, and a Person is deemed to be controlled by another Person, if controlled in any manner whatsoever that results in control in fact by that other Person (or that other Person and any Person or Persons with whom that other Person is acting jointly or in concert), whether directly or indirectly and whether through share ownership, a trust, a contract or otherwise.

“Aggregate Liability Cap” is defined in Section 8.2.

“Application for Payment” is defined in Section 3.1(a).

“ARCA Dispute Resolution Procedures” means the procedures for resolving disputes in the Comprehensive Agreement.

“ARCA Work” has the meaning given to the term “Work” in the Comprehensive Agreement.

“Authorized Representative” is defined in Section 4.2.

“Baseline Schedule” means (a) the Initial Baseline Schedule identifying the major Work activities in sufficient detail to enable Concessionaire to monitor and evaluate construction progress until such time as the Baseline Schedule is approved by Concessionaire pursuant to the Technical Requirements and (b) the Baseline Schedule thereafter as updated according to the Technical Requirements.

“Books and Records” is defined in Section 3.4.

“Business Day” means any day on which VDOT is officially open for business.

“Claim” is defined in Section 7.2.

“Compensation Event” means a “Compensation Event” (as such term is defined in the Comprehensive Agreement) arising out of, related to or in connection with the Project.

“Comprehensive Agreement” means the “Third Amended and Restated Comprehensive Agreement Relating to the I-95/395 HOV/HOT Lanes Project”, dated as of August __, 2022, between VDOT and Concessionaire, as amended.

“Concessionaire” is defined in the preamble.

“Concessionaire Act” means (a) a failure to comply in any material respect with any of its obligations under this Contract by Concessionaire, other than (i) any such failure that arises from an act or omission of VDOT, Contractor or Contractor Party or (ii) in respect of any failure to comply that is otherwise excused or waived under the terms of this Contract (including as determined pursuant to the Dispute Resolution Procedures) or by Law; or (b) negligent acts or omissions, fraud or willful misconduct of Concessionaire or any Concessionaire Party.

“Concessionaire Actual Damages” is defined in Section 12.3(h).

“Concessionaire Estimated Damages” is defined in Section 12.3(h).

“Concessionaire Damages” means “Concessionaire Damages” (as such term is defined in the Comprehensive Agreement) arising out of, related to or in connection with the Project.

“Concessionaire Party” means Concessionaire and any Affiliate and any agents, Representatives, officers, directors, employees, contractors, suppliers and materialmen of Contractor or any Affiliate.

“Concessionaire Rights” is defined in Section 13.1(a).

“Concessionaire Termination Notice” is defined in Section 12.3(f).

“Construction Notice to Proceed” or **“Construction NTP”** is defined in Section 5.1.

“Contract” is defined in the preamble.

“Contract Change Directive” or **“CCD”** is defined in Section 10.2(a).

“Contract Date” is defined in the preamble.

“Contract Documents” is defined in Section 2.1.

“Contract Price” is Fifty-nine million, one hundred twenty-seven thousand, six hundred seventy-five dollars and eighty-four cents (\$59,127,675.84).

“Contract Times” is defined in Section 5.3.

“Contractor” is defined in the preamble.

“Contractor Default” is defined in Section 12.3(a).

“**Contractor Default Notice**” is defined in Section 12.3(b).

“**Contractor Member**” is defined in Section 16.2(k).

“**Contractor Party**” means Contractor and any Affiliate and any agents, Representatives, officers, directors, employees, contractors, suppliers and materialmen of Contractor or any Affiliate.

“**Day**” or “**day**” means a calendar day.

“**Defect**” means a deterioration in the condition or performance of an asset, whether by construction, installation, damage or wear, affecting the condition, use, functionality or operation of any Project Asset, which would cause or have the potential to cause one or more of the following:

- (a) a hazard, nuisance or other risk to public or worker health or safety, including the health and safety of road users;
- (b) a structural deterioration of the affected Project Asset;
- (c) damage to a third party’s property or equipment;
- (d) damage to the Environment; or
- (e) failure of the affected Project Asset to meet a performance requirement.

“**Definitions**” means the definitions set forth on this **Exhibit A**.

“**Delay Event**” means a “Delay Event” (as such term is defined in the Comprehensive Agreement) arising out of, related to or in connection with the Project.

“**Delay Liquidated Damages**” is defined in Section 5.5.

“**Differing Site Conditions**” means any:

- (a) threatened or endangered species whose habitat is protected by Law on the Project Right of Way;
- (b) archaeological, paleontological or cultural resources on the Project Right of Way;
- (c) Unknown Pre-Existing Hazardous Substances;
- (d) Utilities in the Project Right of Way (excluding known potential adjustments to Utilities that are identified in this Contract, including, for the avoidance of doubt, the Technical Requirements and **Exhibit B-2** (Design Plans));

provided, however, that to qualify as a Differing Site Condition, such condition:

(i) was not known or discovered by the Contractor, or could reasonably have been known or discovered by the Contractor using Good Industry Practices, prior to the Contract Date, as applicable; and

(ii) has a material impact on the Contractor's performance of the Work pursuant to the terms of this Contract.

“Direct Losses” means:

(a) any loss, damage, cost, expense, charge, fee, injury, liability, obligation, judgement, penalty or fine, in each case including attorneys', accountants' and expert witnesses' fees and expenses (including reasonable costs for demobilization and re-mobilization of Subcontractors where applicable),

(b) any increase in the cost to Concessionaire to perform its obligations under any Contract Document to the extent such increase is not caused by Concessionaire; and

(c) any reduction in amounts received or receivable by Concessionaire under the Comprehensive Agreement arising out of, related to or in connection with the Project, as may be updated from time to time in accordance with the Comprehensive Agreement, to the extent such reduction is not caused by Concessionaire.

“Dispute” means any Claim, dispute, disagreement or controversy between Concessionaire and the Contractor concerning their respective rights and obligations under the Contract Documents, including concerning any alleged breach or failure to perform and remedies.

“Dispute Resolution Procedures” means the dispute resolution procedures set forth in Section 11.

“Emergency” means any unplanned event within the Project Right of Way that:

(a) presents an immediate or imminent threat to the long term integrity of any part of the infrastructure of the Project, to the Environment, to property adjacent to the Project or to the safety of road users or the traveling public; or

(b) has jeopardized the safety of road users or the traveling public.

“Environment” means soil, surface waters, groundwaters, land, stream sediments, surface or subsurface strata and ambient air.

“Environmental Management Plan” means the plan developed by the Contractor that sets forth the Contractor's approach to environmental management, as described in more detail in the Technical Requirements.

“Equipment” means machinery, tools and other apparatuses, together with the necessary supplies for upkeep and maintenance thereof, that are necessary for the completion of the Work.

“Equivalent Claim” is defined in Section 13.1(e)(i).

“Equivalent Claim Notice” is defined in Section 13.1(c).

“Equivalent Project Relief” or **“EPR”** is defined in Section 13.1.

“Equivalent Project Relief Provisions” means the provisions set forth in Section 13.

“Federal” means of or relating to the central government of the United States of America.

“Federal Requirements” means the provisions required to be part of federal-aid contracts relating to highway projects and applicable to the Project, including the provisions set forth in **Exhibit C**.

“Final Completion” means the “Final Completion” for the Project as set forth in Section 5.2(b).

“Final Completion Date” is defined in Section 5.2(b).

“Final Completion Recovery Plan” is defined in Section 5.2(c).

“Final Payment” is defined in Section 3.10(b).

“Float” means the amount of time that any given activity or logically connected sequence of activities shown on the Initial Baseline Schedule or Baseline Schedule, as applicable, may be delayed before it will affect the Contractor’s ability to achieve the Service Commencement Date by the Scheduled Service Commencement Date, or Final Completion by the Scheduled Final Completion Date or the Long Stop Date. Such Float is generally identified as the difference between the early completion date and late completion date for all activities as shown on the Initial Baseline Schedule or Baseline Schedule, as applicable.

“Good Faith” means the observance of reasonable commercial standards of fair dealing in a given trade or business.

“Good Industry Practice” means the industry practices and standards that would be exercised by a prudent and experienced concessionaire, engineer, contractor, operator or maintenance provider engaged in the same kinds of undertakings and under similar circumstances as those applying to the Work.

“Governmental Approvals” means all local, regional, state and Federal agreements, studies, findings, permits, approvals, authorizations, certifications, consents, decisions, exemptions, filings, leases, licenses, registrations, rulings and other governmental authorizations required to be obtained or completed under Law prior to undertaking any particular activity contemplated by this Contract, Contract Documents or a Work Order.

“Governmental Authority” means any court, Federal, state, or local government, department, commission, board, bureau, agency or other regulatory or governmental authority.

“Hazardous Environmental Condition” means the presence of any Hazardous Substances on, in, under or emanating from the Project Right of Way that is present at

concentrations or in quantities that: (a) may present an imminent or substantial safety or health hazard for VDOT the Contractor or their respective employees, agents, representatives or independent contractors, the general public or the surrounding Environment or (b) are required to be removed or remediated as a matter of Law or in accordance with the requirements of any Governmental Authority.

“Hazardous Substances” means, but is not limited to, any solid, liquid, gas, odor, heat, sound, vibration, radiation or other substance or emission which is or could be considered a contaminant, pollutant, dangerous substance, toxic substance, Hazardous Waste, solid waste, or hazardous material which is or becomes regulated by Laws or which is classified as hazardous or toxic under Laws.

“Hazardous Waste” means a waste that is (a) listed as a hazardous waste in 40 CFR Section 261.31 to 261.33, and (b) exhibits one of the following characteristics: ignitability, corrosivity, reactivity or toxicity, or is otherwise defined as a hazardous waste by Law.

“Health, Safety and Security Plan” means the plan developed by the Contractor that defines the health, safety and security activities required during the construction of the Project, as described in more detail in **Exhibit E**.

“Indemnified Party” and **“Indemnified Parties”** is defined in Section 7.1.

“Indirect Losses” means punitive, exemplary, indirect or consequential losses or damages (including loss of profit, future revenue, increased cost of capital or loss of business opportunity), excluding Direct Losses.

“Initial Baseline Schedule” means the initial construction schedule, proposed by Contractor and approved by Concessionaire, which is attached as **Exhibit O**.

“Insolvency Event” means:

(a) Contractor or Contractor Member commences a voluntary case seeking liquidation, reorganization, or other relief with respect to Contractor or Contractor’s debts under any U.S. or foreign bankruptcy, insolvency, or other similar law; seeking the appointment of a trustee, receiver, liquidator, custodian, or other similar official of its, or any substantial part of its, assets; becomes insolvent, or generally does not pay its debts as they become due; provides notice of its inability to pay its debts; makes an assignment for the benefit of creditors; or takes any action to authorize any of the foregoing;

(b) an involuntary case is commenced against Contractor or Contractor Member seeking liquidation, reorganization, dissolution, winding up, a composition or arrangement with creditors, a readjustment of debts or other relief with respect to such Contractor or Contractor Member’s debts under any U.S. or foreign bankruptcy, insolvency or other similar law; seeking the appointment of a trustee, receiver, liquidator, custodian, or other similar official of it or any substantial part of its assets; seeking the issuance of a writ of attachment, execution, or similar process; or seeking like relief, and such involuntary case shall not be contested by it in Good Faith or shall remain undismissed and unstayed for a period of 50 days;

(c) in any voluntary or involuntary case seeking liquidation, reorganization or other relief with respect to Contractor or Contractor Member or their debts under any U.S. or foreign bankruptcy, insolvency or other similar law, this Contract is rejected, including a rejection under Title 11 U.S.C. §365 or any successor statute; or

(d) any voluntary or involuntary case or other act or event described in paragraphs (a) or (b) occurs (and in the case of an involuntary case is not contested in Good Faith or remains undismissed and unstayed for a period of 55 days) with respect to any member of Concessionaire.

It shall not be an “Insolvency Event” where a Person owing to Contractor or Contractor Member has fully met all financial obligations owing to Contractor or Contractor Member, as the case may be, in the form of a committed investment and payments or transfers of money or property previously made to or for the benefit of Contractor or Contractor Member are not subject to §544, §547, §548, or §550 of the Bankruptcy Code, or any similar Law respecting the avoidance or recovery of preferences or fraudulent transfers, including any applicable enactment of the Uniform Fraudulent Transfer Act.

“Insurance Policies” is defined in Section 9.2.

“Insurance Requirements” is defined in Section 9.2.

“Intellectual Property” means the electronic toll and traffic management books and records, copyrights (including moral rights), trademarks (registered and unregistered), designs (registered, including applications, and unregistered), patents (including applications), circuit layouts, source code and source code documentation, plant varieties, business and domain names, inventions, trade secrets, proposals, copyrightable works, customer and supplier lists and information, and other results of intellectual activity, copies and tangible embodiments of all of the foregoing (in whatever form or medium) and licenses granting any rights with respect to any of the foregoing (to the extent assignable), in each case, relating to the Project.

“Key Personnel Damages” is defined in Section 5.7.

“Lane Closure Damages” is defined in Section 5.6.

“Law” is defined in Section 2.2(a).

“LD Cap” is defined in Section 8.1.

“Legal Proceeding” means every action, suit, litigation, arbitration, administrative proceeding, and other legal or equitable proceeding having a bearing upon this Contract, and all appeals therefrom.

“Long Stop Date” means the date that is two hundred seventy (270) Days following the Scheduled Final Completion Date.

“Losses” means, with respect to any Person, any losses, liabilities, judgments, damages, fees, penalties, fines, sanctions, charges or out-of-pocket and documented costs or expenses

actually suffered or incurred by such Person, including as a result of any injury to or death of persons or damage to or loss of property.

“**Lower Tiers**” is defined in Section 2.4.

“**Materials**” means any substance that is used in the Work specified in this Contract.

“**Minor Changes**” is defined in Section 10.3.

“**Non-Permitted Closures**” is defined in Section 5.6(b).

“**Notice of Final Completion**” is defined in Section 5.2(b).

“**Notice of Termination**” is defined in Section 12.1(a).

“**Party**” and “**Parties**” are defined in the preamble.

“**Pay-When-Paid Principles**” means that payment to Contractor is dependent upon Concessionaire’s receipt of a corresponding payment from VDOT, any such payment will only become due and payable under this Contract to Contractor within fifteen (15) Business Days or such other period of time set out in this Contract or otherwise agreed by the Parties following Concessionaire’s actual receipt of any such corresponding payment from VDOT.

“**Payment Bond**” means a payment bond required by the Contract Documents.

“**Performance Bond**” means a performance bond required by the Contract Documents.

“**Person**” means any individual (including, the heirs, beneficiaries, executors, legal representatives or administrators thereof), corporation, partnership, joint venture, trust, limited liability company, limited partnership, joint stock company, unincorporated association or other entity or a Governmental Authority.

“**Pre-Existing Hazardous Substances**” means Hazardous Substances that exist in, on, or under the Site prior to the date Contractor gains access to the relevant portion of the Site.

“**Project**” means the development and construction, of the Project Assets, all as more particularly described in the Technical Requirements and in this Contract.

“**Project Assets**” means the Opitz Boulevard ramp and other assets constructed, maintained or held by Concessionaire as part of the Opitz Boulevard project (as further described in the Comprehensive Agreement) (or any applicable portion of such assets).

“**Project Right of Way**” means the real property identified in **Exhibit B-2** (Design Plans), including the parcels that are identified therein for acquisition.

“**Punch List**” means an itemized list of Work which remains to be completed with respect to the Project Assets after the Scheduled Service Commencement Date has been achieved and before Final Completion, the existence, correction and completion of which will have no material or adverse effect on the normal, uninterrupted and safe use and operation of the Project Assets.

“**QAM**” means the quality assurance manager of Contractor identified in **Exhibit B-1**.

“**Quality Management Plans**” means the Quality System Management Plan and the Construction Quality Management Plan developed by Contractor, as described in more detail in the Technical Requirements.

“**Remedial Action**” means any action to manage, treat, handle, store, monitor, remove, transport or dispose of Hazardous Substances.

“**Remedial Action Plan**” means the plan developed by Contractor with respect to Hazardous Substances encountered by Contractor within the Project Right of Way, as described in more detail in the Technical Requirements.

“**Remedial Plan**” is defined in Section 12.3(e)(i).

“**Representative**” means, with respect to any Person, any director, officer, employee, official, lender (or any agent or trustee acting on its behalf), partner, member, owner, agent, lawyer, accountant, auditor, professional advisor, consultant, engineer, contractor, other Person for whom such Person is, under Law, responsible or other representative of such Person and any professional advisor, consultant or engineer designated by such Person as its “Representative.”

“**Rules**” is defined in Section 11.2.

“**Schedule Impact Analysis**” or “**SIA**” is defined in Section 5.14(a).

“**Scheduled Final Completion Date**” is defined in Section 5.2(b).

“**Scheduled Service Commencement Date**” is defined in Section 5.2(a).

“**Service Commencement**” means “Service Commencement” for the Project as set forth in Section 5.2(a).

“**Service Commencement Date**” is defined in Section 5.2(a)(ii).

“**Site**” means the geographical area reasonably expected to be a part of the worksite for the Work.

“**Software**” means (a) computer instructions, including programs, routines and databases and applications supplied, procured or developed by Concessionaire, VDOT or Contractor in connection with the operation of the Project or in connection with Reserved Rights (as defined in the Comprehensive Agreement), including but not limited to that which monitors, controls or executes on electronic toll and traffic management equipment or Intelligent Transportation System equipment or hardware, and (b) all modifications, updates and revisions made to the matter described in clause (a) above, including those made to correct errors or to support new models of computer equipment and/or new releases of operating systems.

“**Source Code and Source Code Documentation**” mean Software written in programming languages, such as C and Fortran, including all comments and procedural code, such

as job control language statements, in a form intelligible to trained programmers and capable of being translated into object or machine readable code for operation on computer equipment through assembly or compiling, and accompanied by documentation, including flow charts, schematics, statements of principles of operations, architectural standards, and commentary, explanations and instructions for compiling, describing the data flows, data structures, and control logic of the software in sufficient detail to enable a trained programmer through study of such documentation to maintain and/or modify the Software without undue experimentation. Source Code and Source Code Documentation also include all modifications, additions, substitutions, updates, upgrades and corrections made to the foregoing items.

“Subcontract” means any contract, subcontract or other form of agreement between Contractor, a Subcontractor and any other Person to perform any part of the Work or provide any Materials, Equipment or supplies for any part of the Work, at all tiers.

“Subcontractor” means any Person with whom Contractor has entered into any contract to perform any part of the Work or provide any Materials, Equipment or supplies for the Project, on behalf of Contractor, and any other Person with whom any Subcontractor has further subcontracted any part of the Work, at all tiers.

“Technical Requirements” means the Technical Requirements included as part of **Exhibit B** (including all Attachments thereto), and as the same may be revised and updated from time to time in accordance with this Contract.

“Uniform Act” means the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

“Unknown Pre-Existing Hazardous Substances” means any Hazardous Substances present on the Project Right of Way or portion thereof as of the date that Concessionaire assumes responsibility of such Project Right of Way or portion that was not known, or could not reasonably have been known using Good Industry Practices, to Contractor prior to such date.

“Unknown Utility Relocation Work” is defined in Section 3.13.

“Utilities” means any and all utility installations whatsoever (including gas, water, sewer, electricity, telephone, chilled water and telecommunications), and all piping, wiring, conduit, and other fixtures of every kind whatsoever related thereto or used in connection therewith.

“VDOT” means the Virginia Department of Transportation, an agency of the Commonwealth of Virginia, and any other state agency succeeding to the powers, authorities and responsibilities of such department invoked by or pursuant to the Comprehensive Agreement.

“VDOT Claim” is defined in Section 13.2(a).

“VECP” is defined in Section 10.7.

“Warranty Period” is defined in Section 4.11(a).

“Work” is defined in Section 2.1.

“Work Order” is defined in Section 10.1(a).

“Work Product” means all the data, information, documentation and other work product produced, prepared, obtained or deliverable by or on behalf of Contractor for the Project or the Project Right of Way, including but not limited to drawings, plans and specifications, record and as-built plans and specifications, engineering documents, geotechnical soils and soil boring data, analyses, reports and records, property acquisition files, agreements and documents (including records of payment and related correspondence, title policies, parcel diaries and all construction documents relating to the Work), engineers’ and inspectors’ diaries and reports, s, right of way record maps and surveys, traffic and revenue studies, and other feasibility data, analyses, studies and reports, correspondence and memoranda relevant to construction decisions, contracting plans, air quality monitoring data, environmental reviews, studies and reports, mitigation studies and reports, data, assessments, studies and reports regarding Hazardous Substances investigations, testings, borings, monitoring and analyses, manifests regarding handling, storage or transportation of Hazardous Substances, correspondence and agreements relating to Governmental Approvals, Work Orders, final quantities, pile driving records, records of accidents and traffic management, field test records and reports, concrete pour records, surfacing depth check records, grade and alignment books, cross-section notes, drainage notes, photographs, false work and form plans, records of construction materials, and any other documents which can be reasonably described as technical or engineering documents. Work Product expressly excludes, however, documents and information which the Contractor and VDOT mutually agree in writing, or which a court determines, to be exempted or protected from public disclosure under Section 18.02 of the Comprehensive Agreement and which is not conceived or first reduced to practice for the purposes of the Project, such as proprietary financial and pricing information of Contractor.

EXHIBIT B-1

Technical Requirements

Includes:

Section 1: Project Management

Section 2: Public Information and Communications

Section 3: Construction Requirements

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Attachments

- 1 Contractor's Organization Chart from Statement of Qualifications
- 2 Transurban's Authority to Access (ATA) Contractor Procedure - PERMITTED
- 3 Process for Notification of Impacts to Existing Assets

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TECHNICAL REQUIREMENTS

ACRONYMS

Acronym	Definition
AACE	American Association of Cost Engineers
AFC	Approved for Construction
AMRL	AASHTO Material Reference Laboratory
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BMS	Building Management System
BPPS	Bridge Pier Protection System
CADD	Computer Aided Drafting and Design
CRM	Customer Relations Management
CTA	Cement Treated Aggregate
DBE	Disadvantaged Business Enterprise
DE	Design Exception
DMS	Dynamic Message Sign
DW	Design Waiver
EDMS	Electronic Document Management System
EPA	Environmental Protection Agency
ETTM	Electronic Tolling and Traffic Management
FDC	Field Design Change
FHWA	Federal Highway Administration
F.O.B.	Free on Board
GCS	Gate Control System
GP	General Purpose
HOT-OC	Express Lanes Operations Center
HPC	High Performance Concrete
HPS	High Performance Steel
HSE	Health, Safety and Environment
ICD	Interface Control Document
ID	Asset Identification
IDMS	Incident Detection and Monitoring System
IIM	VDOT Instructional and Informational Memorandum
IPPM	Internal Policy/Procedure Memorandum
JOMP	Joint Operating and Maintenance Protocols
KPI	Key Performance Indicators
LCAMS	Lane Closure Advisory Management System
LDR	Load-related Distress Rating
LPN	License Plate Number
LRFD	Load and Resistance Factor Design
MATOC	Metropolitan Area Transportation Operations Coordination
MLHCC	Modified Latex Hydraulic Cement Concrete
MOMS	Maintenance Online Management System

Acronym	Definition
MOT	Maintenance of Traffic
MPSTOC	McConnell Public Safety and Transportation Operations Center
MRP	Maintenance Rating Program
MSE	Mechanically Stabilized Earth
MUA	Master Utility Contract
NADR	Noise Abatement Design Report
NATR	Noise Analysis Technical Report
NBIS	National Bridge Inspection Standards
NCR	Non-Conformance Report
NDC	Notice of Design Change
NDR	Non Load-related Distress Rating
NRO	Northern Regional Operations
NTCIP	National Transportation Communications for ITS Protocol
O&M	Operations and Maintenance
OCR	Optical Character Recognition
ORT	Open Road Tolling
OSPS	Operating Speed Performance Standard
PDM	Precedence Diagram Method
PDP	Project Development Plan
PE	Professional Engineer
PIP	Public Information Plan
PS&E	Plans, Specifications, and Estimate
PVC	Polyvinyl Chloride
RWIS	Road Weather Information System
SPI	Schedule Performance Index
SWaM	Small, Women- and Minority-owned Business Enterprise
T&DI	Toll and Driver Information
TAMS	Turnkey Asset Maintenance Services
TCRO	Traffic Control Room Officers
TMP	Transportation Management Plan
TOC	Traffic Operations Center
TS&L	Type, Size, and Location
TTC	Temporary Traffic Control
UIT	Ultrasonic Impact Testing
VDEM	Virginia Department of Emergency Management
VECTOR	Virginia Evacuation Coordination Team for Operational Response
VES	Vehicle Enforcement System
VOS	Volume, Occupancy & Speed
VSLS	Variable Speed Limit Signs
WBS	Work Breakdown Structure

DEFINITIONS

Capitalized terms used but not otherwise defined have the respective meanings set forth in Exhibit A to the Contract. In addition, the following terms have the meanings specified below:

Design Exception is defined as a document required where it is either impractical or not economical to obtain the AASHTO minimum design criteria as shown in the Geometric Design Tables. In such a case, an exception shall be secured from the State Location and Design Engineer and FHWA (if applicable).

Design Waiver is defined as a document required when deviations from Department's design criteria occur. When design criteria meet or exceed AASHTO minimal design but fall short of Department's minimal design, a Design Waiver shall be required. Design Waivers will be applicable to all projects regardless of functional classification and funding and shall be documented and approved in accordance with the Design Waiver Request form LD-448.

Opitz TMS Contract means the contract between the Concessionaire and TMS Contractor for the design and construction of the traffic management systems for the Project Contract.

Opitz TMS Contractor means TRANSURBAN (USA) INC, a Delaware corporation.

Load-related Distress Rating (LDR) is a deduct-based index having a value of 100 when the pavement being evaluated has no discernible load-related distress.

Mainline is the primary roadway in which the traffic sensors for speed and other traffic data operate excluding auxiliary lanes, collector-distributor roads or ramps.

Monthly Progress Earning Schedule is as defined in Section 1.4.1.C of the Technical Requirements.

Noon is 12:00 p.m. Eastern.

Non Load-related Distress Rating (NDR) is a deduct-based index similar to the Load Rated Distress Rating (LDR) except that the distresses assigned to the index are non-load rated.

Notification Center is as defined in Section §56-265.15. of the Code of Virginia.

Peak Period is the period from 5:30 a.m. – 9:00 a.m. and/or 4:00 p.m. – 7:00 p.m., Monday through Friday, excluding holidays.

Permit to Work – means authorization or approval from the Concessionaire and/or its operating entities to perform specific activities within the limits of the 95 Express Lanes.

Potomac Formation (silts/clays) are silts/clays defined as such in the Geologic Map of Virginia published by the Virginia Division of Mineral Resources.

Project (or Opitz Project) solely for the purposes of this is used interchangeably with and has the same meaning as "Opitz Project".

Project Recovery Schedule is the schedule submitted by the Contractor to the Concessionaire whenever the Monthly Progress Report shows the Opitz Final Completion Date has 30 days of negative float.

Quality Assurance Manager (QAM) means the person reporting to the Contractor's Project Manager responsible for the independent process of determining conformance of work by examining the quality control data.

Residual Life means the calculated duration that any Asset of the Opitz Project, subject to the type of routine maintenance of the Asset which is normally included as an annually recurring cost in highway maintenance and repair budgets, will continue to comply with any applicable Performance Requirement or standard after the end of the Term, before Major Maintenance is required, determined through the application of Residual Life methodology and residual life inspections.

Secondary Settlement is as defined in AASHTO LRFD Bridge Design Specifications Section 10.6.2.4.

Standard of Care means using logical, rational, and common sense calculation and precaution in determining whether there is reason to believe that property to be acquired for rights of way may contain concealed or hidden wastes or other materials or hazards requiring remedial action or treatment.

Station is one or more traffic monitoring sensors at a single location used to collect traffic volume, lane occupancy, and speed data on the HOT Lanes.

Substandard Station is a Station whose weighted average speed over the a.m. or p.m. Peak Period falls below the minimum average operating speed defined for each degradation standard.

Substructure means the part of a structure that is below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with the back walls, wingwalls, and wing protection railings.

Superstructure means the portion of a structure that is not defined as substructure.

Transponder Transaction Performance means the percentage of vehicles with transponders that are correctly identified by the Tolling System.

1 Project Management

1.1 General Requirements

1.1.1 Organization and Key Personnel

- A. The Contractor's management approach shall provide all components of an effective and efficient management system, including: communication and reporting; documentation of Work; supervision of Work personnel and activities; all tools, facilities, and materials; environmental protection and mitigation; safety of Work personnel; and any other management elements needed to produce and document a quality, safe, efficient, and operable Opitz Project.
- B. The Contractor shall provide management in accordance with the organization chart, **Attachment 1**, set forth in its Statement of Qualifications. Contractor shall remove or replace, or have removed or replaced, any personnel performing on the project if Concessionaire has a reasonable objection to such person. The Contractor acknowledges the importance of its "Key Personnel". For this project, the following Key Personnel roles are required. The job duties and responsibilities of Key Personnel shall not be delegated to others.

1. Project Manager

- i. This position requires necessary expertise and experience to supervise and exercise full control of the Work on projects of similar scope and complexity as the Opitz Project. Work is comprised of all Contractor's construction, quality management, contract administration and other services required by the Contract, including procuring and furnishing all materials, equipment, services and labor reasonably inferable from the contract documents in a timely manner.
- ii. The Project Manager shall be responsible for meeting the Contractor's obligations under the Contract and avoiding and resolving any disputes between the Concessionaire and the Contractor.
- iii. This individual shall also coordinate and participate in any required public outreach, public meetings, and construction-related communications.
- iv. The designated Project Manager shall be dedicated solely to the Project and is required to be available to the Project on a full-time basis immediately upon Contract Award and remain in

place for the full duration of the Project (until Final Completion has been achieved).

2. Construction Manager

- i. This position requires necessary expertise to manage the overall construction process and activities including all QC activities to ensure the materials used and work performed meet contract requirements and the “approved for construction” plans and specifications.
- ii. The designated Construction Manager shall be an individual who is dedicated solely to the Project and is required to be available to the Project on a full-time basis immediately upon Contract Award and present on the Project site full time for the duration of construction operations, including pre-construction activities and Final Completion close-out.

3. Health, Safety and Environment (HSE) Manager

- i. The HSE manager shall meet the following minimum requirements:
 - Seven years of experience as a safety supervisor in the roads and highway construction industry, five of which shall include full-time on-site safety experience.
 - Successful completion of OSHA 30-Hour Construction Safety or OSHA 500 Construction Outreach Training Course.
 - Demonstrated ability in creating and managing a safe work environment in accordance with local, state and federal regulations.
 - Working knowledge of safety regulations and hazard control measures.
 - Demonstrated ability to conduct safety training.
 - Demonstrated ability to facilitate incident investigations and effective causal analysis.
 - Working knowledge of safety specific contract hazardous work procedures.
 - Valid driver’s license.

- Physically able to perform the job.
 - Approved by the Concessionaire.
- ii. Duties of the HSE Manager shall include maintenance of the Offerer's HSE Program, compliance with same, adherence to applicable components of the Concessionaire's HSE Management System, enforcement of safe work practices, and use of safety equipment and personal protective equipment, and other such activities as required by the Concessionaire to maintain job safety and incident prevention.
 - iii. The designated Construction Contractor's HSE Manager shall be an individual who is dedicated as a .25 FTE.
 - iv. The HSE Manager will be responsible to identify Construction Contractor's HSE-responsible individual located on the Project site whenever work is being performed. The HSE Manager will be available at all times to respond to any Project HSE issues or incidents.
 - v. All unforeseeable vacancies in the position shall be filled within two weeks of the vacancy occurring.
4. Quality Assurance Manager
- i. This individual shall be from an independent firm that has no contractual relationship and no involvement in construction operations (to include QC inspection and testing) for the Project, and shall be responsible for the quality assurance (QA) inspection and testing of all materials used and work performed on the Project, to include monitoring of the Contractor's quality control (QC) program.
 - ii. The designated Quality Assurance Manager shall be an individual who is dedicated solely to the Project and is required to be available to the Project on a full-time basis immediately upon Contract Award and present on the Project site full time during the duration of construction operations.
 - iii. The Quality Assurance Manager will ensure that all work and materials, testing, and sampling are performed in conformance with the Construction Contract requirements, and the "approved for construction" plans and specifications. This individual shall be a registered, licensed, Professional Engineer in the Commonwealth of Virginia.
5. ITS Construction Manager

- i. This individual shall have relevant expertise and experience and serve as the Contractor's lead ITS manager during construction and shall be responsible for the installation and testing of ITS and TMS equipment that is the Contractor's responsibility (including, but not limited to, the fiber optic network, electrical power, wiring and splicing, ITS and TMS device installation, inspection, and testing) and ensuring that all ITS and TMS elements are delivered in accordance with the approved designs and the Contract.
 - ii. The ITS Construction Manager shall also be responsible for managing the necessary interfaces with Transurban as the TMS Contractor that are required to complete integration of the TMS.
 - iii. The designated ITS Construction Manager shall be an individual who is required to be available to the Project on an as-needed basis immediately upon award of the Contract and present on the Project site while all ITS and TMS construction activities are completed, including Final Completion closeout.
- C. The Contractor certified in its Statement of Qualifications (SOQ) that each individual in designated in the Key Personnel roles in the organization chart in Attachment 1 will be available throughout the project as required. The Contractor shall not change or substitute any Key Personnel except due to voluntary or involuntary termination of employment, disability, incapacity or as otherwise approved by Concessionaire. No Key Personnel may be withdrawn from the project without prior written approval of Concessionaire, with this being understood and agreed that Contractor will provide Concessionaire with at least forty-five (45) days written notice of any request to withdraw any Key Personnel. Concessionaire will have the right to review the qualifications of each individual to be appointed to a Key Personnel position and to approve or disapprove use of such individual. Any change in Key Personnel identified in **Attachment 1** is subject to liquidated damages in accordance with the Contract.

1.2 Project Administration

1.2.1 General Requirements

- A. The Contractor acknowledges that Concessionaire review, concurrence, approvals, inspections, variations, and acceptance of the Work is subject to VDOT review, concurrence, approvals, inspections, variations, and acceptance of the Work. The Contractor also acknowledges that Concessionaire review, concurrence, approvals, inspections, variations, and acceptance of the Work may be subject to third-party review, concurrence, approvals, inspections, variations, and acceptance. Third-parties may include, but not be limited to FHWA and other appropriate governmental agencies.

- B. All prospective contractors, subcontractors, lower tier subcontractors, and prime contractors of joint ventures shall prequalify with VDOT and shall have received a certification of qualification prior to undertaking Work on the Opitz Project. This restriction does not apply to consultants, manufacturers, suppliers, or haulers.
- C. Subcontracting or otherwise delegating any portion of the Work shall not relieve the Contractor of any responsibility for the fulfilment of the Contract. Further, delegation or subcontracting of the Contractor's responsibilities shall not diminish the Contractor's obligation to report directly to the Concessionaire, unless the Concessionaire expressly agrees to accept reports or communications from third parties.

1.2.2 Concessionaire Staffing and Points of Contact

- A. The Concessionaire will provide an Opitz Project specific management structure with a combination of dedicated and shared resources to manage and oversee the Concessionaire's rights or interest in the Opitz Project.
- B. Authority of the Concessionaire Representative:
 - 1. Inspection by the Concessionaire Representative shall not relieve the Contractor of any obligation to furnish acceptable materials or complete construction in accordance with the Contract.
 - 2. The Concessionaire Representative is authorized to conduct independent inspection and oversight of all Work performed and materials furnished, in accordance with the Contract. The Concessionaire and VDOT have the right at all times during the Project to carry out oversight services with respect to all aspects of the development, construction, and operations of the Opitz Project.

1.2.3 Workers

- A. Each party shall notify the other party, in writing, if they believe any person employed by VDOT, the Concessionaire, the Contractor, TMS Contractor, or any subcontractor:
 - 1. Is not performing his or her work in a proper or skillful manner;
 - 2. Is intemperate or disorderly; or
 - 3. Is acting in an unsafe manner.
- B. The party receiving the notice will immediately investigate the specifics of the notification and provide a response to the party initiating the notification, within 5 days, detailing a plan of action to resolve the written concerns. If the employees' actions create an unsafe environment for any party's

personnel or travelling public, the notified party will immediately stop the operations to resolve safety issues in accordance with the Contract.

1.2.4 Not Used

1.2.5 Submittals

- A. The Contractor shall or shall cause to be coordinated, delivered, and processed, all submittals to the Concessionaire as required by the Contract.
- B. The Contractor shall cause all draft, revised, and final submittals to be accurate, complete, and in a form and at a level of detail to enable the Concessionaire to satisfactorily discharge its review and approval obligations.
- C. All submittals shall be prepared in US Customary Units.
- D. The Contractor shall deliver all electronic submittals using the Opitz Project Electronic Document Management System (EDMS), unless otherwise directed. E-mail may be used to notify the Concessionaire of the availability of submittals.
- E. All submittals shall be submitted electronically in *.pdf format. The Concessionaire may request the Contractor provide CADD *.dgn files, as applicable, of any submittal to facilitate its review. The Contractor shall provide hard copies of any submittals upon request by the Concessionaire.
- F. Submittals will be deemed “received” by the Concessionaire (thereby triggering the applicable timeframe for review) upon receipt of the complete package of electronic files, inclusive of all required information necessary to perform a complete review. Packages received after 3:00pm will be deemed received the following business day. The Concessionaire will notify the Contractor within three (3) business days if the package is incomplete and will include the basis for the submittal being deemed incomplete. Unless another time period is specified, the Concessionaire shall review and provide written comments, if applicable, to the Contractor within seventeen (17) days following receipt of the submittal.
- G. Whenever the Contractor is obligated to make a submittal, the Contractor shall include with such submittal the signed cover sheets described below.
 - 1. A cover sheet, signed by the Contractor’s Representative, that includes the following certification:
 - i. The Contractor certifies or has caused to be certified that [description of submittal] was prepared by professionals having the requisite qualifications, certifications, credentials, skills, and experiences needed to prepare the submittal in accordance with the requirements of the Contract.

- ii. The Contractor certifies or has caused to be certified that it has reviewed the submittal for completeness; the submittal accurately depicts the Work to be undertaken or performed; and the submittal was prepared in accordance to, and otherwise complies with:
 - the Contract
 - the Technical Requirements;
 - the approved QMSP;
 - applicable Law; and
 - Governmental Approvals.
2. A cover sheet, signed by the subcontractor, supplier or consultant who prepared or is otherwise in responsible charge of the submittal, that includes the following certification:
 - i. [The name of subcontractor, supplier or consultant], which is under contract with the Contractor to perform services related to the Contract, certifies that it prepared or is otherwise in responsible charge of the [description of submittal].
 - ii. The [description of submittal] was prepared by professionals having the requisite qualifications, certifications, credentials, skills, and experiences needed to prepare the submittal in accordance the requirements of the applicable contract documents.
 - iii. The [description of submittal] is complete and accurately depicts the Work to be undertaken or performed; and the submittal was prepared in accordance with, and otherwise complies with:
 - the applicable contract documents;
 - the Technical Requirements;
 - the approved QMSP;
 - applicable Law; and
 - Governmental Approvals.
- H. The Concessionaire's review of the Contractor's submittals will relate only to conformance to and compliance with the requirements of the Contract. Any deviation from the requirements of the Contract must be specifically described

and accompanied by explicit supporting justification. The Concessionaire's review shall not relieve the Contractor of responsibility for errors and/or omissions in the submittals.

- I. Subject to applicable confidentiality requirements as required by Law, the Contractor shall provide to the Concessionaire through its Electronic Document Management System (EDMS) or other type of approved electronic storage and retrieval system, electronic copies of all correspondence, meeting minutes, and other external documents (including emails) constituting any and all material Opitz Project communications with:
 1. Governmental Authorities;
 2. Business and Opitz Project stakeholders;
 3. Landowners;
 4. News media;
 5. Utilities;
 6. Railroads or transit entities; and
 7. Community stakeholders.

1.2.6 Working Drawings

- A. The Contractor shall furnish detailed working drawings to the extent and with the details required by the Contract unless otherwise indicated in the Contract. Working drawings and submittals shall be identified by the complete state project and job designation number, as well as the federal project number if applicable. Items or component materials shall be identified by the specific Contract item number and Specification reference in the Contract. Any changes from the requirements of the Contract shall be specifically denoted, together with justification, and submitted to the Concessionaire for review. Working drawings shall be submitted in sufficient time to allow for review, discussion and correction prior to the beginning of the work they reference and avoid causing any delay to the Work.
- B. The Concessionaire's review of the Contractor's working drawings will be limited to evaluation for conformance with the Contract requirements. The Concessionaire's review will not relieve the Contractor from responsibility for errors in the working drawings or from complying with the Contract requirements for a fully functional finished work item as specified or designed.
- C. Deviations from the Contract requirements initiated by the Contractor shall be requested in writing and clearly identified on the working drawings. Explicit supporting justification shall be furnished specifically describing the reason for the requested deviations, as well as any impact such deviations shall have

on the schedule of work. Failure to address time or other impacts associated with the Contractor's request will be cause for rejection of the Contractor's request. Deviations from the Contract requirements shall not be made unless authorized by the Engineer. Such authorization shall not relieve the Contractor from the responsibility for complying with the Contract requirements for a fully functional finished work item as specified or designed.

- D. The Contractor shall submit as-built working drawings upon completion of the Work.
- E. The Contractor may authorize the fabricator in writing to act for him in matters relating to working drawings. Such authorization shall have the force and effect of any other representative of the Contractor's organization.
- F. Provide working drawings according to the VDOT 2020 Road and Bridge Specifications, Section 105.10, Items 1-5. The Contractor shall furnish working drawings to the Concessionaire as required or requested.
- G. Plans and drawings shall not incorporate any deviations from the Technical Requirements unless the changes are specifically denoted, together with justification, and are approved in writing by the Concessionaire.
- H. The Contractor shall identify working drawings and submittals by the complete State project and job designation numbers. Items or component materials shall be identified by the specific item number and specification reference.
- I. Prior to manufacture of non-standard items, the Contractor shall furnish to the Concessionaire a certification of the acceptability of the design of such non-standard item, as determined from a review which shall be made on behalf of the Contractor by a Professional Engineer licensed in the Commonwealth. Such certification shall cover all design data, supporting calculations and materials. Non-standard designs previously certified or approved by the VDOT will not require recertification.
- J. The Concessionaire's review of the Contractor's plans and drawings will relate only to conformance to and compliance with the requirements of the Contract. Any proposed deviation from the requirements of the Contract must be specifically described and accompanied by explicit supporting justification. The Concessionaire's review shall not relieve the Contractor of responsibility for errors and/or omissions in the plans and drawings.
- K. The plans and working drawings shall be appropriately signed and sealed by a professional licensed in the Commonwealth, as applicable.

1.2.7 Location of Offices and Accommodations for VDOT's and Concessionaire's Staff during the Project

- A. The Concessionaire encourages co-location of its key staff with the Contractor during the construction period.
- B. The Contractor shall establish one primary field office or dedicated Class C or better office space, the location of which is to be determined and mutually agreed to by the Contractor and the Concessionaire, but which is expected to be within the Project corridor. This work shall consist of locating, procuring, furnishing, erecting, equipping, maintaining, cleaning (weekdays), and removing and restoring property upon completion of use of the field office. The Contractor has the option to provide either modular trailers or to rent office accommodations to satisfy the Project office requirements. The Opitz Project field office shall be located in Prince William County within reasonable proximity of the Opitz Project.
- C. Contractor shall provide, maintain and manage fully outfitted, furnished and networked office space for Contractor, VDOT and Concessionaire use, including at a minimum insurance, lease Contracts, Utility connections, Utility service, internet service, maintenance, janitorial, security and other services necessary to provide the required office facilities.
- D. Contractor shall provide parking facilities sufficient for the number of Contractor, VDOT and Concessionaire personnel assigned to the location plus visitor parking.
- E. Contractor shall be responsible for loss to VDOT, Concessionaire and visitor property as a result of fire, theft, malicious acts, and other human activity or related causes.
- F. The field office shall include the following:

Space	Quantity	Minimum Size (SF)
Office (VDOT)	2	100
Workstation Cubicle (VDOT & Concessionaire combined)	10	64
Conference Room (Shared)	2	250
File Room (Shared)	1	100
Storage Room (Shared)	1	100
Kitchen (Shared)	1	---
Washroom (Shared)	1	---

Work spaces provided for Concessionaire and VDOT personnel shall be available for their exclusive use at any time during the construction of the Opitz Project.

- G. Contractor shall provide VDOT and Concessionaire continuous access and maintain, at a minimum, the following systems and equipment at the field office location:
1. High-speed internet connection with minimum 100 Mbps download/100Mbps upload with static IP address;
 2. Network connected color printer/scanner/copier/fax, minimum 600 dpi and 30 pages per minute, staple, duplex and paper handling up to 11"x17";
 3. Computer network wiring for each office, desk and conference room to support VDOT-provided file server (for VDOT's dedicated use) and all other networked devices.
- H. Contractor shall provide field office site and floor plans for review and comment no less than 30 calendar days prior to occupancy.
- I. The field office shall be available and operational from 30 days after the latter of Financial Close or Construction Notice to Proceed to 30 days after Final Completion. Furnishings and equipment specified shall be in sound and functional condition throughout the duration of the project.
- J. The field office and equipment as required herein shall remain the property of the Contractor.
- K. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of its employees, as well as the employees or agents of VDOT and the Concessionaire, as may be needed to comply with the requirements of applicable Law.
- L. The field office shall be weatherproof, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground

and anchored against movement. The floor-to-floor ceiling height shall be at least 7 feet 6 inches. The inside walls and ceilings shall be constructed of, Masonite, gypsum board, or other similarly suitable materials as permitted by fire and building codes. The exterior walls, ceiling and floor shall be insulated.

- M. Lighting, Heating, and Air Conditioning: The field office shall have satisfactory functional lighting, electrical outlets, heating equipment, an exhaust fan, and air conditioner connected to an operational power source. At least one of the light fixtures shall be a fluorescent light situated over the plan and drafting table. There shall also be at least one 100 watt exterior light fixture at each exterior doorway. Electrical power and fuel for heating equipment shall be furnished by the Contractor.

1.2.8 Document Management System

- A. The Concessionaire shall establish and maintain an Electronic Document Management System (EDMS) to store and record all material documents generated on the Opitz Project, including those records required under Law.
- B. In the provision of an EDMS, the Concessionaire will:
 - 1. use data systems, standards, and procedures with consistent naming and searching protocols;
 - 2. ensure document retention for any minimum statutory period(s);
 - 3. provide a secure EDMS, such that only authorized users have access and that it is protected from theft, damage, unauthorized or malicious use;
 - 4. provide a mechanism for the electronic transfer of metadata along with the associated document in standard business file format; and
 - 5. provide the Contractor with written procedures and training of staff who will be required to access all relevant documents generated under the Contract. All electronic information submitted to the Concessionaire shall be searchable and legible, to the extent practical.
- C. Contractor shall ensure:
 - 1. All documents issued by the Contractor are uniquely coded and retrievable in a user-friendly format;
 - 2. All electronic information submitted to the Concessionaire is searchable and legible, to the extent practical; and

3. Upon completion of the Opitz Project, the transfer of files such that the Concessionaire has a complete set of material project documentation in electronic format and written documentation on the contents of the data.

1.2.9 Project Meetings

- A. Authorized Representatives and other pertinent representatives of the parties shall meet within 10 days after any Notice to Proceed issued in accordance with the Contract to discuss issues affecting the administration of the Work and to implement the necessary procedures, including those relating to submittals and approvals, to facilitate the ability of the parties to perform their obligations under the Contract.
- B. Within 14 days (or other period of time as mutually agreed by the parties) after the satisfaction of the conditions precedent to begin construction as set forth in the Contract and prior to the start of construction, the parties and their respective representatives shall conduct a pre-construction meeting to discuss the Contractor's planned construction operations. At the pre-construction meeting, the parties shall discuss, among other things, safety, the sequence of the Work, scheduling, constructability issues, coordination with Separate Contractors, Governmental Authorities and Utilities, and work zone impacts to traffic.
- C. The Contractor shall participate in monthly joint progress meetings with the Concessionaire and VDOT. During such meetings, progress during the prior month, Work to be undertaken during the next month, and encountered or anticipated issues shall be reviewed, and the Contractor shall collect information from any subcontractors responsible for Work completed during the specified duration and Work scheduled during the upcoming reporting duration. These meetings shall be attended by the Contractor Representative and other personnel as requested by the Concessionaire, including relevant subcontractors. Meetings will occur monthly beginning the month after the initial Notice to Proceed is issued. The Concessionaire shall be responsible for preparing, maintaining and distributing minutes of the meetings to all attendees for review. The meeting minutes shall be provided within three days after the monthly progress meeting or such other timeframe as mutually agreed. The parties may cancel a monthly progress meeting from time to time if they mutually agree that such meeting is not necessary.
- D. As part of, and in conjunction with, the monthly progress meetings required by the Contract, the Contractor shall provide the Concessionaire with any proposed updates of the Baseline Schedule for the Concessionaire's review, and, if required by the Technical Requirements, approval, and a progress narrative in accordance with Section 1.4.4.
- E. The Contractor and the Concessionaire shall agree to other meetings as appropriate and mutually agreed.

1.2.10 Not Used

1.2.11 Not Used

1.3 Project Management Plans

1.3.1 General

- A. The Contractor shall develop and implement Project Management Plans (PMPs) as defined in this section and shall submit the PMPs for review and approval by Concessionaire. Such PMPs shall address the activities of the Contractor and shall not obligate the Concessionaire to perform any activity unless agreed to in writing by the Concessionaire.
- B. The Concessionaire may audit and monitor the activities described in the PMPs to assess the Contractor's compliance. Any audit findings shall be adequately addressed within 30 days of the Concessionaire's audit report.

1.3.2 Project Management Plan Updates

- A. The Contractor shall annually, if requested by the Concessionaire, update the PMPs and have mechanisms in place to monitor progress and identify opportunities for improvement. A PMP or procedure shall be updated if such PMP or procedure:
 - 1. does not adequately address the matters it is intended to address;
 - 2. does not conform or is otherwise necessary to comply with the Contract;
 - 3. has to be changed because of an audit;
 - 4. no longer represents current or appropriate practice; or
 - 5. is required by the Contract to be updated.

1.3.3 Quality Management Plans

- A. The Contractor shall develop and implement a Quality Management System Plan (QMSP) and a Construction Quality Management Plan (CQMP) that is fully compliant with the VDOT *Minimum Requirements for Quality Assurance & Quality Control on Design-Build & Public-Private Transportation Act Projects (July 2018)* (VDOT QA/QC Manual). All references to Design-Builder in the VDOT QA/QC Manual shall be read to say Contractor. The requirement to prepare a Design Quality Management Plan does not apply; however, to the extent any design is undertaken by Contractor for the Project, the quality processes described in the VDOT QA/QC Manual must be performed in accordance with the requirements of the manual.

- B. The QMSP shall include in its inspection plan the identification of elements of the Project which the geotechnical engineer or record or its qualified designated representative is required to monitor/inspect during construction.

1.3.4 DBE/SWaM Plan

- A. The Contractor shall develop and implement a DBE/SWaM plan which defines the approach to meeting the DBE/SWaM participation goals and shall address:
 - 1. the proposed method to achieve the DBE/SWaM participation goal or demonstrate a good faith effort to meet the goal;
 - 2. a proactive DBE/SWaM outreach program for DBE/SWaM participation;
 - 3. on-going tracking of efforts and corrective actions required and how they have been met;
 - 4. reporting and documentation mechanism.

1.3.5 Health, Safety and Security Plan

- A. The Contractor shall develop and implement a Health, Safety and Security Plan the conforms to the requirements in Exhibit E, Health, Safety and Security Requirements, of the Contract.

1.3.6 Environmental Management Plan

- A. The Contractor shall develop and implement an Environmental Management Plan which shall include:
 - 1. procedures and a contingency plan (emergency response plan) for reporting, immediate actions, and Remedial Actions to be taken in the event of a potential environmental permit violation, dump, discharge, or spill of Hazardous Substances, including, as required by Law, the development and implementation of a Spill Prevention, Control and Countermeasures (SPCC) plan(s);
 - 2. plans for investigation, handling, monitoring, discharge, release, storage, removal, remediation, transportation, tracking, reporting, and other disposition of any Hazardous Substance encountered or used on the Project, whether or not the presence of such Hazardous Substances constitutes a Hazardous Environmental Condition;
 - 3. plans for initiating Remedial Actions in respect of any Hazardous Substances encountered on or used on the Project that constitute or could reasonably be expected to constitute a Hazardous Environmental Condition;

4. procedures for coordination with the Concessionaire and other emergency response-related agencies and organizations; and
5. procedures for submission of “incident” reports for releases of Hazardous Substances.

1.4 Schedules

1.4.1 Opitz Project Schedules

A. Schedule Purpose, Format, and Content:

1. The purpose of the Opitz Project Schedule is to ensure that adequate planning, scheduling, and resource allocations occur to provide a reasonable and executable work plan, cash flow projections, and continuous monitoring and reporting for Work performed or remaining. The Baseline Schedule and the monthly updates to the Project Schedule shall be used for coordinating the Work, monitoring the progress of Work performed, identifying Work to be performed, evaluating changes, and a tool for measuring progress.
2. The Opitz Project Schedule shall consist of the Initial Opitz Baseline Schedule, the Baseline Schedule, updates to the Opitz Project Schedule, any revised Baseline Schedules or the As-Built Schedule as applicable.
3. Opitz Project Schedules will be reviewed in accordance with the VDOT Post-Award Scheduling Guide and the American Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 53-06 as appropriate. Acceptance by the Concessionaire of the Opitz Project Schedule will not relieve the Contractor from its responsibility to complete all Work within the Opitz Project Schedule. In addition, the Concessionaire’s acceptance of any Opitz Project Schedule creates neither a warranty, expressed or implied, nor an acknowledgment of the reasonableness of the activities, logic, durations, or cost loading of the Contractor’s Opitz Project Schedule. Furthermore, acceptance of the Opitz Project Schedule will not relieve the Contractor from complying with all the requirements of the Contract.
4. Terms not defined herein, in the Contract shall have the same meanings ascribed to them in the AACE International Recommended Practice No. 10S-90 (“Cost Engineering Terminology”).

B. General Requirements:

In the Opitz Project Schedule, the Contractor shall:

1. ensure that the actual number of activities in the schedule is sufficient to assure adequate planning of the Work and to permit monitoring and evaluation of progress and perform the analysis of alleged time impacts;
2. apply the Critical Path Method (CPM) of network calculation to generate the Opitz Project Schedule (the critical path shall be based on the longest network path through the Opitz Project) and prepare the Opitz Project Schedule using the Precedence Diagram Method (PDM) to establish relationships and interdependencies between the individual activities required to complete the Opitz Project;
3. ensure that activity identification numbers, textual descriptions, and codes are consistently applied in the Opitz Project Schedule and are unique for each specific activity;
4. divide all Work prior to Opitz Final Completion Date into activities with appropriate logic ties to show the Contractor's overall approach to sequencing, include logical relationships between activities reflecting the Contractor's actual intended sequence of Work; and logically tie all activities to avoid open ends;
5. show the Opitz Project milestones, including the issuance of any Notices to Proceed, any agreed interim milestones, the Opitz Project Service Commencement Date, and the Opitz Project Final Completion Date;
6. show phasing of the Work as detailed in the plans, subcontractor work, procurement, fabrication, delivery, installation, testing of materials and equipment, commissioning of systems, and any long-lead time orders for major or significant materials and equipment;
7. allocate an estimated cost to the appropriate lowest level elements (activities) of the Work Breakdown Structure (WBS) by use of labor, material and equipment resources;
8. reflect the required coordination with other contractors working within or adjacent to the Project Site, utility owners, Governmental Agencies, engineers, the TMS Contractor, subcontractors, and suppliers;
9. identify regulatory approvals required and the dates by which such approvals are necessary;
10. be fully compliant with the Contract;
11. conform to the Work Restrictions and Maintenance of Traffic requirements;

12. reflect the ROW required and the dates by which such acquisition or Rights of Entry are needed;
13. reflect the utility relocation activities; and
14. reflect the requirements of the TMS Interface Plan for completing all work necessary to commence systems (TMS and ETTM) operations prior to set testing periods (stand alone, central, and in-service burn).

C. Monthly Progress Earnings

1. General

- i. The Monthly Progress Earning Schedule will be based on cost data generated from the Opitz Project Schedule. The progress earnings schedule shall depict planned progress based on anticipated earnings and shall depict monthly comparisons of actual versus planned progress, including: (1) illustrating the schedule variance graphically by plotting the budgeted cost of work performed (BCWP) and the budgeted cost of work scheduled (BCWS); and (2) reporting the schedule performance index (SPI), defined as the ratio of BCWP divided by BCWS for the Opitz Project to date and the monthly projections through Final Completion.
- ii. The Schedule of Values (SOV) is a detailed, itemized list of payment activities for which the Contractor desires to be paid and establishes the value or cost of each detailed part of the Work. An initial SOV shall be derived from the cost-loaded, Approved Initial Baseline Schedule, and a complete SOV shall be derived from the cost-loaded, Approved Baseline Schedule. The Contractor shall allocate the Contract Amount in the SOV consistent with the Price Proposal.
- iii. The Contractor shall submit an initial SOV for Approval with the Initial Baseline Schedule and a Baseline SOV for Approval with the Baseline Schedule. Each SOV shall be generated by the corresponding schedule file through the use of assigned labor, material and equipment resources.
- iv. The purpose of cost-loading the Project Schedule is to tie activities with payment activities in order to monitor progress for making payment.

2. Payment Activities

- i. The Contractor shall attach costs to those activities in the Initial Baseline Schedule and Baseline Schedule for which the

Contractor desires to be paid. The Contractor shall not assign costs to activities for which it is not ultimately responsible, i.e. the Concessionaire, or Third-Party activities.

- ii. The SOV shall include payment activities for the items identified on the Price Proposal. The SOV shall show the purchase and delivery costs for materials and permanent equipment for which the Contractor anticipates it will request payment prior to installation.
- iii. The SOV shall include payment activities for punch-list work leading to Final Completion.
- iv. The Concessionaire shall meet with the Concessionaire to demonstrate its conversion of the Price Proposal to the SOV structure as part of its development of the Baseline Schedule.
- v. Except for mobilization and the continuing activities, the SOV shall be prepared to a level of detail so that the average value of the payment activities is greater than \$50,000, and no payment activity value shall be less than \$10,000 or greater than \$1,000,000 without prior Approval.
- vi. Each payment activity shall include a directly proportional amount of Contractor overhead and profit. The Contract Price shall be allocated to accurately reflect the Concessionaire's cost for such activity and shall not artificially inflate, unbalance, or front-load payment activities.
- vii. When requested, the Contractor shall substantiate payment activity values with data that will validate their accuracy. The sum of the individual values shown on the SOV shall equal the total Contract Price.
- viii. The SOV shall include payment activities sufficient to cover all efforts necessary to meet all Contract requirements and successfully complete the Work for the following continuing activities utilizing Level of Effort:
 - Project Management and staffing;
 - Production of As-Built documentation;
 - Scheduling;
 - Environmental Compliance;
 - Quality Control;

- Quality Assurance
- Project Office and Associated Equipment;
- Maintenance during Construction.

3. Measurement of Progress

- i. For any activity where partial payment for partial completion may be requested by the Contractor, sufficient detail shall be provided to clearly define the work elements included and demonstrate the level of completion.
 - ii. For continuing activities, payment shall be made based on the total project percent completion for the month payment is being requested.
- D. The scheduling software employed by the Contractor shall be compatible with the Concessionaire's scheduling software. The Contractor's scheduling software must have the capability to import and export data in the Primavera proprietary exchange format (*.xer). As of the date of the Contract, the Concessionaire's scheduling software is the latest version of Primavera's Project Management software (P6).
- E. Float available in the Opitz Project Schedule, at any time, shall not be considered for the exclusive use of either the Concessionaire or the Contractor. During the course of the Work, any Float generated is not for the sole use of the party generating the Float; rather it is a shared commodity to be reasonably used by either party. A schedule showing work completing in advance of the Opitz Final Completion Date, and accepted by the Concessionaire, will be considered to have Opitz Project Float. Opitz Project Float will be a resource available to both the Concessionaire and Contractor.
- F. Use of Float suppression techniques, such as; preferential sequencing, lag logic restraints, zero total or free float constraints, extending activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of any Project schedule or its updates.
- G. If the parties cannot agree to a Opitz Project Schedule, either party may refer to the dispute resolution procedures set forth in the Contract.
- H. The Contractor shall maintain at all times, at its office, a minimum of one complete set of all schedule reports shown above. All schedule reports shall be available to the Concessionaire for inspection and audit. Additional reports may be required as future needs dictate, and the reports listed above may be deleted (by mutual consent of the parties).

- I. The Contractor shall exercise reasonable resequencing logic to minimize any Delay Event before requesting any extension of time.

1.4.2 Initial Opitz Baseline Schedule

- A. The Initial Opitz Baseline Schedule is the Contractor's conceptual plan for the design and construction of the Opitz Project. This schedule shall be used to monitor performance of the Work until the Baseline Schedule is approved by the Concessionaire.
- B. The schedule submitted with the Contractor's Proposal shall be the Initial Opitz Baseline Schedule.
- C. The Initial Opitz Baseline Schedule, which shall outline the Contractor's proposed plan to accomplish the Work, shall be a Gantt Chart showing the sequencing of major operations and shall include a detailed narrative.
- D. Within 15 days of the Notice to Proceed Date, the Contractor shall submit to the Concessionaire for its review and approval a proposed Baseline Schedule, which shall include the Contractor's detailed plan for construction of the Opitz Project. The Contractor shall develop its proposed Baseline Schedule from the Initial Opitz Baseline Schedule. The Contractor shall submit to the Concessionaire an electronic version of the proposed Baseline Schedule created in the Primavera proprietary exchange format (*.xer). Hard copies shall be provided upon request.
- E. Within 28 days of the Concessionaire's receipt of the proposed Baseline Schedule, the Concessionaire shall notify the Contractor in writing of its approval or disapproval of the proposed Baseline Schedule, and of any comments it has or amendments it wishes the Contractor to make. The Contractor shall give due consideration to the Concessionaire's suggested amendments or comments and, to the extent it deems appropriate, revise the proposed Baseline Schedule and re-submit the same within 14 days to the Concessionaire for the Concessionaire's approval. Within fourteen days of the Concessionaire's receipt of the re-submitted proposed Baseline Schedule, the Concessionaire shall notify the Contractor in writing of its approval or disapproval. Upon approval by the Concessionaire, the proposed Baseline Schedule will become the Baseline Schedule. If the parties cannot agree to a mutually acceptable Baseline Schedule, either party may refer to the dispute resolution procedures set forth in the Contract. Until such time as the dispute is resolved, the Initial Opitz Baseline Schedule will be used for the construction of the Opitz Project. The Baseline Schedule shall include a well-organized WBS, the development of which is based on a methodology that captures all the Opitz Project activities. The WBS shall allow schedule summarization at a minimum of four hierarchical WBS Levels to which the individual schedule activities are assigned their WBS code.

- F. Activities in the Baseline Schedule shall be assigned Opitz Project-specific activity codes.

1.4.3 Baseline Schedule

- A. The Baseline Schedule shall include separate activities for major submittals proposed by the Contractor, if any, together with appropriate activities for the Concessionaire's review or approval, provided that such review and/or approval times by the Concessionaire shall be no less than the time provided for such reviews in the Contract.
- B. The Baseline Schedule shall be broken down into activities generally completed in not less than one but no more than 30 days, or as mutually agreed (unless such deliverable is a procurement or other non-construction activity), and with dollar value (price) of each appropriate lowest level element of the WBS identified. The total cost loaded into the Baseline Schedule shall be equal to the total cost of the Opitz Contract.
- C. The Work shall be broken down in sufficient details to identify the phase, stage, feature, type of Work, deliverable, and specific location in which the Work occurs, including as applicable:
 - 1. Opitz Project milestones, including the anticipated issuance of any Notices to Proceed, the commencement of construction activities, the Opitz Project Service Commencement Date, and the Opitz Project Final Completion Date;
 - 2. Administrative activities such as key submittals, notifications, and review by the Concessionaire;
 - 3. Need dates of ROW acquisition for each parcel;
 - 4. Utility relocations and adjustments, including all specific types and locations;
 - 5. Procurement, fabrication, and delivery activities of materials;
 - 6. Construction start-up activities such as mobilization, staging areas, surveying, clearing and grubbing, and construction access;
 - 7. Maintenance of Traffic (MOT)/traffic control activities;
 - 8. Construction activities broken down by phase stage, feature, type of work, and specific location, as applicable;
 - 9. ETTM System and Traffic Management System (TMS) infrastructure construction, procurement of equipment, device installation, systems commissioning, integrations, testing and in-service equipment burn period prior to Final Completion;

10. Other necessary miscellaneous activities that consume time, for example, installation and removal of temporary systems or structures such as shoring, load tests, curing, demolition, testing and acceptance periods including all activities necessary for the complete testing and inspection of all Work as necessary to achieve proper activation and use of the Work, punch list, clean-up, and demobilization.
- D. Activity calendars shall be assigned using project-level calendars. Use of global calendars is not allowed and shall be cause for rejecting the Opitz Project Schedule. Activity codes shall be defined and assigned to the individual activities to allow for filtering, grouping, and sorting of activities by project phase, responsibility, area, phase, stage, feature, work type, Change Orders, Disadvantage Business Enterprise, and other major work category, as applicable. Activity codes shall be assigned using project-level activity codes. Use of global activity codes is not allowed and shall be cause for rejecting the Opitz Project Schedule.
 - E. Constraints shall be used sparingly and on a case-by-case basis, as necessary. Constraints such as “Mandatory Start” or “Mandatory Finish” that violate network logic are not allowed and shall be cause for rejecting the Opitz Project Schedule. If the Opitz Contract includes a specified “start-no-earlier than” milestone, then the Opitz Contract milestone activity shall be constrained with a “Start On or After” constraint, with a date equal to the date specified in the Opitz Contract. If the Opitz Contract includes a specified Intermediate Milestone or Final Completion milestone, then the Opitz Contract intermediate completion milestone activity or Final Completion milestone activity shall be constrained with a “Finish On or Before” constraint, with a date equal to the date specified in the Opitz Contract.
 - F. The Opitz Project Schedule software settings shall be defined according to the following Primavera (P6) settings:
 1. Duration type for all activities shall be specified as “Fixed Duration & Units.”
 2. Percent Complete type for all activities shall be specified as “Physical % Complete”.
 3. The “Drive activity dates by default” checkbox in the Opitz Project Details Resources tab shall be marked.
 4. The “Link Budget and At Completion Cost for not started activities” checkbox in the Project Details Calculation tab shall be marked.
 5. The “Reset Remaining Cost and Units to Original” in the Project Details Calculation tab shall be specified.

6. The “Subtract Actual from At Completion” under “When updating actual units or costs” in the Project Details Calculation tab shall be specified.
 7. The “Update units when costs changes on resource assignments” checkbox in the Project Details Calculation tab shall be marked.
 8. The “Link Actual and Actual This Period Units and Cost” checkbox in the Project Details Calculation tab shall be marked.
 9. Specify “Retained Logic” in the Scheduling Options dialog box for scheduling progressed activities.
 10. Specify “Longest Path” in the Scheduling Options dialog box for defining critical activities.
 11. Specify “Finish Float = Late Finish – Early Finish” in the Scheduling Options dialog box as the schedule calculation option to compute total float.
- G. The Opitz Project Schedule shall use “Stored Period Performance” with Financial Periods to commence on the first day of a month and end on the last day of a month.
- H. The Opitz Project Schedule shall be calculated using the precedence diagram network logic method and the CPM. The use of resource-leveling to determine sequence, order, or timing of the activities is not allowed and shall be cause for rejecting the Opitz Project Schedule.

1.4.4 Monthly Progress Reports and Project Schedule Updates

- A. Opitz Project Schedule Updates
1. The Contractor shall update the Opitz Project Schedule no less than monthly to reflect actual progress to date and to forecast progress going forward (the “Opitz Project Schedule Updates”). The Data Date used to calculate the schedule shall be the first day following the last day of the reporting period. Opitz Project Schedule Updates shall comply in all respects with the schedule requirements set forth in this section.
 2. The Approved Initial Opitz Baseline Schedule will be the basis for Opitz Project Schedule Updates until such time as the Baseline Schedule is approved by the Concessionaire. Thereafter the Baseline Schedule shall be the basis for Opitz Project Schedule Updates.
 3. Opitz Project Schedule Updates shall depict activities that have started, are on-going, or completed as of the new data date; show actual start dates for activities that have started; and actual finish dates for completed activities.

4. Opitz Project Schedule Updates shall depict percent complete for on-going activities. Activity percent complete for work-in-place shall be based on the amount of work completed relative to the total amount of work planned for the activity.
 5. Opitz Project Schedule Updates shall depict remaining duration for on-going activities. Remaining duration for unfinished activities shall be based on the amount of time required to complete the remaining work as of the new data date.
 6. Activity relationships for the remaining activities shall be modified as necessary to correct out-of-sequence progress for on-going activities or to reflect the Contractor's current plan for completing the remaining Work.
- B. The Opitz Project Schedule will be kept current, reflecting actual progress at the time of submittal to the Concessionaire and will be submitted as a component of the Monthly Progress Report. The Opitz Project Schedule Update submitted with the last Monthly Progress Report will be identified by the Contractor as the As-Built Schedule.
- C. Monthly Progress Reports shall have a reporting period ending on the last day of each calendar month and shall be submitted by the Contractor on or before the 15th of the month following the reporting period. An electronic working copy of the Opitz Project Schedule Update (in xer file format) shall be included with the submission. Each submission shall have a unique file name to indicate the type and order of submission.
- D. The Concessionaire will notify the Contractor of any comments within five days of receipt of an acceptable submission of a Monthly Progress Report. If the Concessionaire requests that the Monthly Progress Report needs a specific revision, the Contractor shall make the requested changes within five (5) days after receiving the Concessionaire's request or such other time frame as mutually agreed between the parties. If the Contractor objects to the Concessionaire's request for revisions, the Contractor may refer the matter to dispute resolution pursuant to the Contract.
- E. The Contractor's Monthly Progress Report shall include the following:
1. Document control certification sheet (verification that all field documentation is being maintained);
 2. Specific construction activities and deliverables occurring during the reporting period;
 3. Specific construction activities and deliverables planned for the next two reporting periods;

4. Progress narrative of the schedule update that describes, at a minimum:
 - i. Current status of the Project
 - ii. Critical path analysis
 - iii. Deviations from scheduled performance and the causes and effects
 - iv. Actions taken or proposed to avoid or mitigate schedule slippages
 - v. Float consumption, if any, and the reasons for such consumption
 - vi. Details of schedule changes, including but not limited to: additional, revised or deleted activities; durations; calendar assignments; logic ties; resource changes; or other relevant changes
 - vii. Plan for accomplishing remaining work to meet the milestone dates
 - viii. Discussion of problems encountered and proposed solutions thereof
 - ix. Any pending delay analysis or SIAs;
5. Opitz Project Schedule Update that includes:
 - i. Time-scaled logic diagram indicating the critical path, early start and early finish dates, total float, sorted and grouped by the WBS;
 - ii. Tabular schedule reports grouped by WBS and sorted by Start indicating for each WBS, activity, the activity number, description, original duration, remaining duration, physical percentage completion, cost percentage complete, original budgeted cost, cost this period, cost to date, and cost to complete;
 - iii. A comparison of actual and planned progress including (1) illustrating schedule variance graphically by plotting and budgeted cost of work performed (BCWP) and the budgeted cost of work scheduled (BCWS), and (2) reporting the scheduled performance index (SPI), defined as the ratio of BCWP divided by BCWS;

6. Identification of activities requiring Concessionaire, VDOT and/or FHWA input or assistance, to the extent reasonably known;
7. Action items/outstanding issues;
8. Opitz Project cost summary;
9. Quality management reporting, as defined within the Contractor's QMSP, including quality inspection reports and daily inspection reports;
10. A statement by the Contractor that the Baseline Schedule is the schedule being executed to perform the Work;
11. Non-Conformance Reports and resolution reports;
12. Disadvantage Business Enterprise (DBE), Small, Women-owned, and Minority-owned Business (SWaM), quarterly usage;
13. Safety activities;
14. Digital photographs of the progress of the Opitz Project.

1.4.5 Weekly Reporting

During the performance of the Work, the Contractor shall provide a weekly report, which shall include the following:

- A. Specific design and construction schedule activities, including locations for the week concluding and the upcoming week;
- B. Rolling 3-week forward-looking inspection notice, which shall include the fabrication schedule and planned construction activities; and
- C. MOT weekly update regarding any scheduled lane closures and identification of work areas for the ensuing two weeks.

1.4.6 Revisions To Baseline Schedule

- A. If the Concessionaire believes in its reasonable discretion that the Baseline Schedule needs a specific revision either in logic, activity duration, WBS, manpower, or cost, the Concessionaire will request the Contractor in writing to make such revisions. The Contractor shall give due consideration to the Concessionaire's suggested revision and, upon consultation with the Concessionaire, if determined appropriate, make such revisions within ten days after receiving the Concessionaire's request or such other timeframe as mutually agreed between the parties. Once approved, this update shall then become the Baseline Schedule. At no time shall the Contractor continue to reflect an item of non-concurrence from the Concessionaire in the updates to

the Baseline Schedule; provided that if an item of non-concurrence has been referred to dispute resolution, then the Contractor shall continue to perform its Work in accordance with the then current Baseline Schedule in effect, until such time as the dispute is resolved and an updated Baseline Schedule is agreed to. If the Contractor objects to the Concessionaire's request for revisions, the Contractor may refer the matter to dispute resolution pursuant to the Contract.

- B. In the event of a Delay Event for which the Concessionaire grants relief for the Scheduled Service Commencement Dates or the Scheduled Final Completion Date to the Contractor in accordance with the terms of the Contract, the Baseline Schedule will be revised to reflect the relief granted and submitted to the Concessionaire for approval in accordance with the Contract.

1.4.7 Project Recovery Schedule

- A. Pursuant to the Contract, whenever the Monthly Progress Report shows either of the Service Commencement Date or the Opitz Final Completion Date has 30 days of negative float, the Contractor shall submit a Opitz Project Recovery Schedule to the Concessionaire for approval. Opitz Project Recovery Schedule submittals shall include a list of all activities changed, added or deleted along with all logic changes, and an accompanying narrative explaining the nature of the changes.
- B. Once a Opitz Project Recovery Schedule is reviewed and approved by the Concessionaire, it shall become the Baseline Schedule and be used as the basis for subsequent Monthly Progress Reports. The Contractor shall archive all approved Opitz Project Schedules.
- C. Submission of a Project Recovery Schedule does not waive any rights under the Contract.

1.4.8 Schedule Impact Analysis (SIA)

- A. Schedule Impact Analysis (SIA) for Proposed Extensions of Time (Prospective) (Also referred to as Time Impact Analysis or TIA).

In conjunction with the submission of a proposed change, the Contractor shall submit any proposed schedule impact as a result of impacts it claims to the Critical Path, if any, that the proposed change will create, in the TIA format, as prescribed in ACE Recommended Practice 52R-06 and submitted as outlined herein.

The following shall apply if a TIA is required by the Contract:

1. The TIA shall be based on the date on which the alleged Delay Event is claimed to have occurred, or, in the event of a proposed change, the date on which the implementation of such change is proposed to be commenced.

2. The TIA shall show the current status of the Work using the current Baseline Schedule. The time computation of all affected activities shall be detailed in the TIA along with a demonstration of steps used to mitigate impacts. Cost of mitigation measures shall be fully documented within the TIA, if applicable.
3. Each TIA shall include a Fragmentary Network (“fragnet”) demonstrating how the Contractor proposes to incorporate the impact into the Baseline Schedule. A fragnet is defined as the sequence of new activities and/or activity revisions, logic relationships, and resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The Contractor understands it has a duty to mitigate any and all alleged delay events, whether prospective or retrospective, and such analysis will take advantage of the factual events leading to the alleged delay impacts; take into consideration all possible mitigation methods, techniques, and available resources, including but not limited to logic changes, resource allocations, activity durations, and consideration of calendar changes. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall insert the fragnet into the Baseline Schedule, run the schedule calculations, and submit the impacted schedule in accordance with this section. The Contractor shall include a narrative report describing the effects of new activities and relationships to milestones and the Opitz Final Completion Date with each TIA.
4. The TIA report and an electronic file (in XER file format) of the Opitz Project Schedule impact analysis shall be submitted to the Concessionaire in accordance with the Contract.
5. Upon approval, a copy of the TIA signed by the Concessionaire will be returned to the Contractor and incorporated into the next update to the Baseline Schedule. The TIA will be reviewed by the Concessionaire in accordance with AACE International Recommended Practice No. 52R-06 “Time Impact Analysis As Applied in Construction”.
6. A TIA will be approved or disapproved by the Concessionaire in its reasonable discretion within 28 days following receipt thereof, unless subsequent meetings or negotiations are necessary. The approved TIA related to a Change shall be incorporated into, and attached to the applicable Change Order. A disapproved TIA will be returned to the Contractor with appropriate comments for revisions or the Concessionaire’s basis for denying the alleged Delay Event. If no Contract is reached, either party may refer the matter to dispute resolution pursuant to the Contract.

1.4.9 Delay Event Claim Analysis (Non-Prospective)

In the event of a claimed delay event that the Contractor alleges has impacted the Critical Path of the Opitz Project, the claim analysis shall use a retrospective observational analysis format as prescribed by the AACE 29R-03 Recommended Practice for Forensic Schedule Analysis. Such analysis will take advantage of the factual events leading to the alleged delay impacts; take into consideration all possible mitigation methods, techniques, and available resources; and minimize any prospective analysis or conclusions. The Concessionaire in its reasonable discretion will approve or reject such claim within 28 days following receipt thereof, unless subsequent meetings or negotiations are necessary. A rejected claim will be returned to the Contractor with appropriate comments for revisions or the Concessionaire's basis for denying the alleged Delay Event. If no Contract is reached, either party may refer the matter to dispute resolution pursuant to the Contract.

1.5 Requirements for the Work

1.5.1 General Requirements

- A. All Work shall comply with the Contract and these Technical Requirements, including all applicable Exhibits and Attachments. Requirements for the Work and order of precedence are as set forth in the Contract. A requirement occurring in one shall be as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete and compliant Opitz Project. Calculated dimensions, unless obviously incorrect, will govern over scaled dimensions. Except when specified in the main body of the Contract or in these Technical Requirements, when a provision of Division I – General Provisions of the Road and Bridge Specifications is applicable, the Contract shall apply. Use of the term “Design-Builder” or “Design-Build Contractor” shall be read to mean Contractor, and any submittals noted in Exhibit D, Supplemental Specifications, Road and Bridge Specifications or Design Plans to be made to the Department or VDOT shall be made to Concessionaire.

- B. The Work shall also be performed in accordance with the following:
 - 1. VDOT's Minimum Requirements for Quality Assurance & Quality Control on Design-Build & Public-Private Transportation Act Projects (July 2018)
 - 2. VDOT Traffic Engineering Division Numbered Memoranda (Traffic Engineering and Mobility Management) including announcements from the Northern Region of the Virginia Department of Transportation
 - 3. ITS Documents:

- i. Institute of Electrical and Electronics Engineer (IEEE) 802.3 Local and Metropolitan Area Networks
 - ii. National Electric Manufacturers Association (NEMA) TS-4 Hardware Standards for Dynamic Message Signs (DMS) with NTCIP Requirements
 - iii. IEEE 1512-2006 - IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers, IEEE 1512.1-2006 – IEEE Standard for Common Traffic Incident Management Message Sets for Use by Emergency Management Centers
 - iv. National Transportation Communications for ITS Protocol (NTCIP)
 - v. VDOT Northern Region Operations ITS Architecture
 - vi. National Electrical Manufacturers Association (NEMA) Standards
 - vii. Telecommunications Industry Association (TIA) and Electronic Industries Alliance (EIA) Standards and Specifications
 - viii. Underwriters Laboratories (UL) Standards
- C. Each party shall promptly notify the other party if it discovers an obvious and plain error or omission in the text of the Technical Requirements attributable to a word processing, administrative or similar oversight. The parties will then coordinate to make such corrections as are necessary to restore the intent of the language.
- D. The standards and specifications, special provisions, and reference guides, including all supplements, errata, revisions, and interims, applicable for the Construction Period shall be the version of those documents as listed herein or those in effect as of the Proposal submission date for the Opitz Contract.

1.6 Right of Way

- A. The Concessionaire will acquire all permanent right-of-way and permanent or temporary easements as required by the Design Plans as well as any property rights needed for utility relocations not yet identified, if any. The Contractor's Initial Baseline Schedule includes coordination with the Concessionaire regarding the schedule for acquisitions shown on the Design Plans, and the Contractor will mitigate any schedule delays to such acquisitions to the extent possible.

- B. The Contractor is responsible for all aspects of acquisition of Temporary Construction Easements which are for the Contractor's convenience due to its chosen means and methods.

1.7 Utilities

1.7.1 Coordination Requirements

- A. This is a VDOT sanctioned project and the Contractor shall enjoy all of the benefits and responsibilities of VDOT as it pertains to prior rights, statutory rights, or any other right relating to Utility Relocations, subject to VDOT's ability to assign those rights.
- B. It was identified during the Utility Field Inspection meeting on March 24, 2022 that utility conflicts may exist between proposed project construction and existing utility facilities at the following locations. The Concessionaire will conduct utility test hole investigations prior to Notice to Proceed to determine if these facilities are in conflict. The utility facilities owned and operated by Verizon Virginia, LLC and Cox Communications may need to be adjusted in conjunction with project construction.
 - Plan sheet 9 between 95 XBL Stations 732+00 and 733+00, possible conflicts exist between existing Cox Communication and Verizon Virginia LLC cables and the proposed installation of 18" storm drains between drainage structures 9-4 and 9-5.
 - Plan sheet 9 between 95 XBL Stations 732+00 and 733+00, possible conflicts exist between existing Cox Communication cables and the proposed grading of the SWM Facility along the NB outside shoulder of I-95.
 - Plan sheet 11 between Opitz Blvd Stations 71+00 and 72+00, possible conflicts exist between existing Verizon Virginia LLC cables and the proposed installation of 18" storm drains between drainage structures 11-2 and 11-3.
- C. Additionally, at proposed sign installation locations along Opitz Boulevard at approx. stations 57+90 Rt and 76+75 Lt, the Concessionaire will conduct utility test hole investigations prior to Notice to Proceed to determine if the designated utility facilities in this area are in conflict.
- D. The eight Trailblazer sign locations depicted on Plan Sheets 16(17) through 16(21) lie outside the initial project survey area. The Concessionaire will provide topographic and right-of-way survey, and utility designation for sign sites 1702/36, 1701/38, 2001/38, and 2102/36 prior to Notice to Proceed to determine if these facilities are in conflict. Sign sites 1703/37, 1801/37, 2002/36, and 2101/37 are less sensitive to right-of-way and sign placement. Survey and utility designation for these sites will be delivered after Notice to Proceed. If horizontal depiction of utilities indicates potential conflict, the

Concessionaire will recommend alternate sign location, or will provide utility test hole investigations at conflict locations.

- E. If conflicts are found to exist at any of the above locations, the Contractor shall coordinate the relocation of the utilities with the respective owner(s).
- F. The Concessionaire is not responsible for any construction delays resulting from known potential utility adjustments identified in the Contract.
- G. The Contractor shall be responsible for causing all necessary utility (including the VDOT and Concessionaire's communications and power cables and conduits) relocations or adjustments identified in the Contract Documents to occur in accordance with the accepted Baseline Schedule.
- H. The Contractor shall be responsible for new Utility service connections, including full coordination with the Utility Owners and payment of connection fees. The Contractor shall also be responsible for paying the monthly utility bills associated with new service panels, up to and including the Opitz Final Completion Date. Service shall be transferred to either VDOT or Concessionaire, as applicable, upon the Opitz Final Completion Date.
- I. If the Contractor desires the temporary or permanent adjustment of utilities (including the Concessionaire's or VDOT's communications and power cables and conduits) for its own benefit, it shall conduct all negotiations with the Utility Owners and pay all costs in connection with the adjustment.
- J. The Contractor shall ensure the Utility Owners submits as-built drawings and Land Use Permit applications upon completion of its relocation and (or) adjustments. VDOT will issue an as-built permit to the Utility Owners within 21 days of receipt of as-built drawings and Land Use Permit applications.
- K. The Contractor shall be responsible for ensuring the appropriate abandonment or removal of all abandoned Utilities (including the VDOT and Concessionaire's communications and power cables and conduits) within the Opitz Project ROW.
- L. At the time that the Contractor notifies the Concessionaire that the Contractor deems the Opitz Project to have reached Final Completion, the Contractor shall certify to the Concessionaire that all Utilities have been identified and conflicts have been resolved.
- M. The Contractor shall accurately show the final location of all Utilities (including the VDOT and Concessionaire's communications and power cables and conduits) on the As-built documents in accordance with Section 3.18 of these Technical Requirements.
- N. The Contractor shall be responsible for ensuring that each utility owner that is subject to the requirements of Section 313 of Title 23 United States Code, MAP-21 S.1518 Buy America provides written certification to the Contractor

that they are in compliance with this requirement. If the Contractor or its subcontractors are installing the utility relocations then the Contractor shall provide the certification pre-installation, along with any other Contractor installed items for the Project; if the utility owner/company is installing the utility relocation then the certification shall be provided post-installation. For any utility betterments where Project funds are being applied, the Work must meet the Buy America requirements.

1.7.2 Contractor's Responsibility for Utility Property and Services

- A. At points where the Contractor's operations are on or adjacent to the properties of any utility, including railroads, (including VDOT's and the Concessionaire's communications and power cables and conduits), and damage to which might result in expense, loss, or inconvenience, Work shall not commence until arrangements necessary for the protection thereof have been completed. The Contractor shall cooperate with owners of utilities so that:
 - 1. removal and adjustment operations may progress in a timely, responsible, and reasonable manner,
 - 2. duplication of adjustment work may be reduced to a minimum, and services rendered by those parties will not be unnecessarily interrupted.
- B. If any utility (including VDOT's and the Concessionaire's communications and power cables and conduits) service is interrupted as a result of accidental breakage or of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate fully with the authority in the restoration of service. If utility service is interrupted, repair work shall be continuous until service is restored.
- C. VDOT's and the Concessionaire's facilities including roadway lighting cable and conduit, traffic management systems cable and conduit as well as VDOT and Concessionaire owned TMS fiber optic communication lines and associated electrical distribution lines are located throughout the Opitz Project limits; these utilities will not be marked by the Miss Utility. Therefore for the VDOT and Concessionaire facilities within the VDOT right-of-way, the Contractor may either elect to use, at its own discretion and cost, the VDOT on-call consultant or alternatively use a different, competent contractor/consultant familiar with VDOT/Concessionaire owned utilities to mark such facilities. It is the Contractor's sole responsibility to have these utilities marked, maintain the markings throughout the life of the Opitz Project as well as assume physical and financial arrangements to have these utilities marked/re-marked. The Contractor will be responsible for all cost necessary for these utility markings.

- D. The Contractor shall exercise care to prevent damage or disruption to the TMS. However, in the event the Contractor and/or its subcontractor(s) damage the TMS due to its operations, the Contractor shall immediately notify the McConnell Public Safety and Transportation Operations Center (PSTOC) as well as the Concessionaire Project Manager and cease all construction operations until repairs are completed and the system is fully operational. Except as set forth in the Contract, the Contractor will be responsible for all cost necessary for repair and any time impact to the Opitz Project.
- E. The Contractor shall comply with all requirements of the Virginia Underground Utility Damage Prevention Act (the Miss Utility law).

1.7.3 Restoration of Work Performed by Others

- A. VDOT may construct or reconstruct any Utilities within the limits of the Opitz Project or grant a permit for the same at any time.
- B. Subject to any relief to which the Contractor may be entitled to in the Contract, when authorized by the Concessionaire, the Contractor shall allow any person, firm, or corporation to work in the highway within the limits of the Opitz Project upon presentation of a duly executed permit from VDOT or any municipality for sections within its corporate limits.

1.8 Work Restrictions

1.8.1 General Requirements

1. The Contractor is responsible for the safety of the work zone. The Contractor shall appoint a single point of contact to address traffic control requirements for the work zone in accordance with Section 1.9.1.
2. The Contractor shall conduct all work necessary to provide safe and efficient traffic operations during construction, including provisions for the movement of people, goods, and services through and around the Opitz Project while minimizing impacts to pedestrians, bicyclists, local residents, businesses, and commuters. In no event shall sidewalks or shared use paths be closed unless first approved by the Concessionaire.
3. The Contractor is responsible for lane closure coordination and notification to all stakeholders.
4. The Contractor shall coordinate construction and traffic control activities that impact transit services with the impacted transit agencies.

1.8.2 Work Hours

- A. The Contractor is advised that its general operations may proceed seven days a week, 24 hours a day, except as may be modified herein.
- B. This is contingent upon the Contractor obtaining a variance or waiver of all applicable noise restrictions, as stated in the Contract.

1.8.3 Temporary Roadway Closures

- A. Anticipated and proposed temporary lane and/or shoulder closures shall be reviewed and approved by the Concessionaire (for the Express Lanes) or VDOT (for the General Purpose lanes and other state roadways). The Contractor shall restore all lanes of traffic per the times specified in this section. Restoration of traffic shall mean the completion of all construction work, the removal of all temporary traffic control devices, signs, workers, materials, and equipment from the roadway. To facilitate construction and minimize inconvenience to the public, the Contractor is advised of the closure limitations listed in the Contract. The Concessionaire reserves the right to modify the closure limitations in the Contract, and any modification shall be handled under Section 1.8.6 – Allowance for Additional Lane Closure Restriction by the Concessionaire and/or Contractor Request for Additional Lane Closures.
- B. Allowable Lane Closure Hours

INTERSTATE 395 & INTERSTATE 95					
WEEKDAY		Northbound			
		Single-Lane Closures or Shoulder	Two-Lane Closures	Multiple-Lane Closures	Complete Road Closure
Segment 1	14 th St. Bridge to Springfield Interchange	10:00AM to 3:00PM	10:00PM to 5:00AM	11:00PM to 5:00AM	12:00AM to 4:00AM
		9:00PM to 5:00AM			
Segment 2	Springfield Interchange to Rt.123	9:30AM to 3:30PM	10:00PM to 5:00AM	11:00PM to 5:00AM	12:00AM to 4:00AM
		9:00PM to 5:00AM			
Segment 3	Rt.123 to Prince William / Stafford County line	9:30AM to 3:30PM	10:00PM to 4:30AM	11:00PM to 4:00AM	12:00AM to 4:00AM
		9:00PM to 5:00AM			
Segment 4	Prince William / Stafford County line to Rt.3 Exit 130	9:30AM to 3:30PM	10:00PM to 4:30AM	n/a	12:00AM to 4:00AM
		9:00PM to 4:30AM			
Segment 5	Rt.3 Exit 130 to Caroline / Hanover County line	9:00AM to 3:30PM	10:00PM to 4:30AM	n/a	12:00AM to 4:00AM
		9:00PM to 5:30AM			
All lanes open at 12:00 noon on Friday					
WEEKDAY		Southbound			
		Single-Lane Closures or Shoulder	Two-Lane Closures	Multiple-Lane Closures	Complete Road Closure
Segment 1	14 th St. Bridge to Springfield Interchange	10:00AM to 2:30PM	10:00PM to 5:00AM	11:00PM to 5:00AM	12:00AM to 4:00AM
		9:30PM to 5:00AM			
Segment 2	Springfield Interchange to Rt.123	9:00AM to 2:00PM	10:00PM to 5:00AM	11:00PM to 5:00AM	12:00AM to 4:00AM
		9:30PM to 5:00AM			
Segment 3	Rt.123 to Prince William / Stafford County line	9:00AM to 2:00PM	10:00PM to 5:00AM	11:00PM to 5:00AM	12:00AM to 4:00AM
		9:30PM to 6:00AM			
Segment 4	Prince William / Stafford County line to Rt.3 Exit 130	9:00AM to 2:00PM	10:00PM to 5:30AM	n/a	12:00AM to 4:00AM
		9:30PM to 6:00AM			
Segment 5	Rt.3 Exit 130 to Caroline / Hanover County line	9:00AM to 3:00PM	10:00PM to 5:30AM	n/a	12:00AM to 4:00AM
		9:30PM to 6:00AM			
All lanes open at 11:00am on Friday					

INTERSTATE 395 & INTERSTATE 95			
WEEKEND	Northbound/Southbound*		
	Single-Lane Closures or Shoulder	Multiple-Lane Closures	Complete Road Closure
Friday to Saturday	10:00PM to 7:00AM	11:00PM to 6:00AM	12:00AM to 5:00AM
Saturday to Sunday	10:00PM to 7:00AM	11:00PM to 6:00AM	12:00AM to 5:00AM
Sunday to Monday	10:00PM to 5:00AM	11:00PM to 4:00AM	12:00AM to 4:00AM

* For special operations, depending on time of year, additional hours may be allowed with proper ADA/ROD approval.

REVERSIBLE LANES (HOV & EXPRESS LANES)*		
WEEKDAY	Single-Lane Closures or Shoulder	Complete Road Closure**
	WEEKDAY	9:30PM (Sunday to Thursday) to 4:00AM (Monday to Friday)
WEEKEND	11:00PM (Friday to Saturday) to 9:00AM (Saturday to Sunday)	11:00PM to 4:00AM

* Direction of traffic control for all lane closures in reversible lanes will need to be adjusted as necessary to face direction of traffic.
 ** Complete Road Closure on Express Lanes limited to 30 minutes or less.

Single-Lane Closures* or Shoulder					
ARTERIAL	WEEKDAY		WEEKEND		
	Monday to Thursday	Friday	Friday to Saturday	Saturday to Sunday	Sunday to Monday
Major Arterials**	9:30AM to 3:00PM	9:30AM to 2:00 PM	10:00PM to 9:00AM	10:00PM to 8:00AM	10:00PM to 5:00AM
	10:00PM to 5:00AM				
All Other Roadways	9:00AM to 3:30PM	9:00AM to 2:00 PM	10:00PM to 9:00AM	9:00PM to 9:00AM	10:00PM to 5:00AM
	9:00PM to 5:00AM				

Multiple-Lane Closures					
ARTERIAL	WEEKDAY		WEEKEND		
	Monday to Thursday	Friday	Friday to Saturday	Saturday to Sunday	Sunday to Monday
Major Arterials**	10:00PM to 5:00AM	Not allowed until 11:00PM	11:00PM to 5:00AM	11:00PM to 6:00AM	11:00PM to 5:00AM
All Other Roadways	9:00PM to 5:00AM	Not allowed until 10:00PM	10:00PM to 6:00AM	10:00PM to 6:00AM	10:00PM to 5:00AM

*Single-lane closures only permitted for multiple-lane roadways.

**Major Arterials defined as Primary Roads, high volume Secondary Roads, and all other routes that connect directly to Interstates.

- C. The allowable hours shall be applicable to both stationary and mobile lane closures, as well as shoulder closures.
- D. Both left and right shoulders on I-95 GP lanes shall not be closed at the same time.
- E. Lane Closure Request Procedure
 1. Multi-lane closures of I-95 for any Work will require coordination with appropriate Governmental Authorities, stakeholders and public notice. The Contractor shall provide a minimum of three (3) weeks advance notice to the Concessionaire. This advance notice will allow the Concessionaire and VDOT to coordinate on a public outreach campaign and/or advertising to reach affected motorists and target audiences. Alternate dates can be advertised in the event of inclement weather.
 2. Total closures of I-95 for any surface, overhead, or underground work will require coordination with appropriate Governmental Authorities, stakeholders and public notice. Total roadway closures shall be limited to no more than 30 minutes maximum. Closures beyond 30 minutes shall require approval by the Concessionaire, subject to review of any required TTC plans and/or detour plans. The Contractor shall provide a minimum of six (6) weeks advance notice to the Concessionaire. This advance notice will allow the Concessionaire and VDOT to coordinate on a public outreach campaign and/or advertising to reach affected motorists and target audiences. Alternate dates can be advertised in the event of inclement weather.
 3. The Contractor shall be responsible for submitting all lane and/or shoulder closures into LCAMS at least ten (10) days in advance of

the proposed lane and/or shoulder closure(s) and no later than close of business Wednesday the week prior to the closure stating the location, purpose, specific lane(s) to be closed, time and duration of closure. Any conflicts generated from LCAMS shall be resolved no later than close of business Thursday the week prior to the closure to avoid cancellation of the lane closure request. The Contractor shall also be responsible for entering lane closure requests in VDOT systems such as VaTraffic, LCAMS, and VA511.

4. The Contractor is responsible for providing advance notification via variable message and required static signing for lane and/or shoulder and complete road closures in accordance with the *Virginia Work Area Protection Manual* and the *Manual on Uniform Traffic Control Devices* (MUTCD). Once a lane or shoulder closure is in place, Work shall commence immediately and shall progress on a continuous basis to completion or to a designated time.
- F. Refer to the Liquidated Damages in Section 5 of the Contract, for situations where the Contractor is unable to remove the lane and/or shoulder closure by the stipulated time.
- G. The Concessionaire reserves the right to monitor traffic conditions impacted by the Work and to make necessary restrictions as may be warranted or as emergency situations dictate. Additional restrictions for other holidays or special local events may also be necessary, however, in these situations the Concessionaire will endeavor to inform the Contractor of any additional restrictions as early as practicable and in no case less than forty-eight (48) hours prior to the holiday or special local event.
- H. Confirmation shall be made 24 hours before any scheduled lane closure and shall include a written reiteration of the proposed tasks and a listing of materials, labor, and major equipment to be used. Complete road closures require a 72-hour advance confirmation for coordination. The Contractor is responsible for providing adequate advance notification via variable message and required static signing for lane closures in accordance with the *Virginia Work Area Protection Manual* (VWAPM) and the *Manual on Uniform Traffic Control Devices* (MUTCD). Once a closing is in place, Work shall begin immediately and shall progress on a continuous basis to completion or to a designated time. The closure may be delayed if excessive traffic backup or queuing is already present at the scheduled start of Work and will be adjusted in accordance with the Contract.
- I. Traffic backups must dissipate before successive closings can be implemented.
- J. The minimum clear distance between two separate lane closings, that is, from the last traffic cone of the first closing to the first traffic cone of the second closing in the same roadway, shall be two miles.

1.8.4 Reversible Facilities

A. Hours of Operations

The existing reversible facility hours of operations shall remain in place during of the Construction Period, unless otherwise specified by the Concessionaire with adequate advance notice to the Contractor. During the Construction Period, Transurban USA Operations Inc. shall be responsible for the operation of the existing reversible facility, including gate operations and reversal of the flow of traffic. The Contractor shall be responsible for scheduling all Work to accommodate the reversal schedule. This shall include adjustment of all temporary traffic controls as necessary to be consistent with the direction of traffic.

1.8.5 Lane Closure Types

A. All lane closures shall be identified as one of the following types:

1. Type 1 – A lane closure resulting in a significant impact on traffic, such as stopping traffic completely, closing two or more lanes, any lane closures in the existing reversible facility, closing an exit or entrance ramp at freeway interchanges or changing traffic patterns. This type of closure would require extensive media and stakeholder notification and coordination among various local and state agencies.
2. Type 2 – A lane closure resulting in minor or no impact on the flow of traffic, such as closing one lane on a four-lane roadway during off-peak traffic hours.
3. Type 3 – A lane closure that would close a shoulder (right or left) on a roadway or ramp.

1.8.6 Allowance for Additional Lane Closure Restriction by the Concessionaire and/or Contractor Request for Additional Lane Closures

- A. At the Concessionaire's reasonable discretion and approval, the Contractor may submit a request to Work outside the stated lane closure hours by providing adequate justification (including traffic analysis) demonstrating the viability of the request.
- B. Closures of longer durations than those specified in the Contract will require a review of plans, implementation of detours, and public outreach.
- C. The Concessionaire reserves the right to monitor traffic conditions affected by the Work and to make additional restrictions as may be necessary, such as terminating a lane closure early or adjusting the Opitz Project's allowable lane closure hours.
- D. General Requirements:
 - 1. The Concessionaire will track any additional lane closure time granted outside of time allowed in the Contract.
 - 2. Any additional time granted must comply with all the requirements set forth in the Contract.
 - 3. The Contractor acknowledges that there will be instances where the Contractor may not be allowed to implement an approved lane closure during events that are beyond the Concessionaire's control.
 - 4. The Concessionaire will track all instances where the Contractor is directed by the Concessionaire not to implement any lane closures for special events such as, but not limited to, the following list:
 - i. Presidential motorcades traveling through project limits
 - ii. Special events with regional impacts
 - iii. Special sport events with regional impacts
 - iv. Major accidents/Incidents with regional impacts
 - v. Seasonal traffic patterns
- E. Calculating Hours:
 - 1. Additional time (lane closures) – Any additional time requested by the Contractor and granted by the Concessionaire beyond the approved hours within the Contract will be added for every instance and every location at 15 minute intervals.

2. Additional Time (complete closures) – If a full closure of roadway not specified in the Contract is implemented in lieu of 30 minute total temporary closure, hours will be calculated in the same manner as the hours that were requested/approved for the specific closure.
3. Time Deducted – When the Contractor is not allowed by the Concessionaire to implement a lane closure during the approved hours within the Contract, the hours during which such lane closure is not allowed will be deducted from the total hours accumulated.

F. Documentation:

1. Within the first 60 days, the Concessionaire and Contractor will develop and agree on a format of documenting this information. The form should at least contain date, hours allowed, hours disallowed, impacted time and other agreed upon elements.
2. By the 10th of each month, the Concessionaire and Contractor will reconsolidate and agree on the resultant amount of hours allowed/disallowed.

G. Allowance:

1. At the end of the Opitz Project, the Concessionaire and the Contractor will reconcile the resultant impacted time or additional granted time by subtracting the additional time granted by the Concessionaire from the time Contractor was disallowed to implement the lane closures. The Concessionaire and Contractor will endeavor to maintain a neutral balance of resultant impacted and additional granted time throughout the duration of the Opitz Project.
2. Any lane closures affected by inclement weather, snow and snow removal process, Emergency VDOT or Concessionaire maintenance repairs safety shutdowns and from major accidents are not subject to above allowance and are excluded from the calculations and compensations.

H. General

Notwithstanding anything to the contrary, it is agreed that:

1. The Concessionaire will provide the Contractor with as much notice as is possible with respect to any lane closure request by the Contractor which is not approved by the Concessionaire.
2. The Contractor will provide the Concessionaire with as much notice as is possible with respect to any inability of the Contractor to implement lane closures which are otherwise allowed within the Contract.

3. At the end of the Opitz Project, the Concessionaire and the Contractor will reconcile the impacted time by subtracting the additional time granted by the Concessionaire from the time the Contractor was disallowed per the technical requirements to implement the lane closures. If the Concessionaire disapproves requests for lane closures from Contractor, or otherwise prevents Contractor from implementing lane closures which are otherwise permitted by the Contract, and the impact of such actions by the Concessionaire is more than 120 cumulative hours, such actions shall result in a Work Order.

1.8.7 Night Work

- A. In areas where Work is to be performed during the hours of dusk or darkness, the Contractor shall furnish, place, and maintain lighting facilities capable of providing light of sufficient intensity to facilitate good workmanship and proper inspection at all times. The lights shall be arranged so as not to interfere with or impede traffic approaching the work site(s) from either direction or produce undue glare to property owners.
- B. Lighting of work site(s) may be accomplished using any combination of portable floodlights, standard equipment lights, existing street lights, and temporary street lights that will provide the proper illumination.
- C. The Contractor shall furnish and place warning signs to alert approaching motorists of lighted construction area(s). These warning signs shall be four feet (1200 mm) x four feet (1200 mm). The Contractor's vehicles used on the Opitz Project shall be provided with amber flashing lights that shall be in operation while in the work area. The Contractor's equipment shall be provided with a minimum of three square feet of reflective sheeting that is visible to approaching motorists. The Contractor shall provide his personnel with proper Personal Protective Equipment (PPE), which shall be worn at all times while the workers are within the work area. The Contractor shall provide a light meter to demonstrate that the minimum light intensity is being maintained.
- D. The Contractor shall provide sufficient fuel, spare lamps, generators, and other necessary equipment to maintain the lighting of the work site. The Contractor shall utilize padding or shielding or locate mechanical and electrical equipment to minimize noise generated by lighting operations as directed by the Concessionaire. Noise generated by portable generators shall comply with all Law.
- E. For nighttime work zones within the I-95 travel lanes (including 95 Express Lanes and ramps), the Contractor shall provide sufficient Virginia State Police officers with a law enforcement vehicle equipped with a blue flashing light within the work zone in accordance with the VWAPM. For all other roadways and for daytime work, the use of law enforcement shall comply with the minimum VWAPM requirements. In the event the Virginia State Police have

been given sufficient notice of such request but are unable to provide coverage, the Contractor may utilize other law enforcement agencies.

1.8.8 Law Enforcement Utilization

- A. The Contractor shall be responsible for all costs and for coordinating directly with the Virginia State Police service during temporary traffic control operations involving lane closures and/or rolling lane closures, and any other operation as covered in Appendix C of the *Virginia Work Area Protection Manual*.

1.8.9 Size and Weight Limitations

- A. Hauling or Moving Material and Equipment on Public Roads Open to Traffic: The Contractor shall comply with legal size and weight limitations in the hauling or moving of material and equipment on public roads open to traffic unless the hauling or moving is covered by a hauling permit.
- B. Hauling or Moving Material and Equipment on Public Roads Not Open to Traffic: The Contractor shall comply with the legal weight limitations in the hauling or moving of material and equipment on public roads that are not open to traffic unless the hauling or moving is permitted elsewhere herein or is otherwise covered by a hauling permit. The Contractor shall be liable for damage that results from the hauling or moving of materials and equipment.
- C. The hauling or moving of material and equipment on the final road surface or across any structure during various stages of construction shall be subject to load rating and/or engineering analysis and approved by the Concessionaire.
- D. Furnishing Items in Component Parts of Sections: If the size or weight of fabricated or manufactured items together with that of the hauling or moving vehicle exceeds the limitations covered by hauling permit policies and other means of transportation are not available, permission will be given to furnish the items in component parts of sections with adequately designed splices or connections at appropriate points. Permission for such adjustments shall be requested in writing, and approval in writing shall be secured from the Concessionaire prior to fabrication or manufacture of the items. The request shall state the reasons for adjustment and shall be accompanied by supporting data, including working drawings where necessary.

1.8.10 Use of Explosives

- A. Explosives shall be stored and used in a secure manner. Prior to prosecuting the Work, the Contractor shall conduct an on-site review of the Work involved and develop a plan of operations for performing excavating work. Where feasible, the Contractor shall explore other means of loosening and or reducing the size of the excavation without blasting. When blasting becomes necessary, the Contractor's plan of operations shall include a blasting plan detailing the

blasting techniques to be used during excavation operations requiring the use of explosives. Both plans shall be submitted to the Concessionaire for review prior to commencing blasting operations.

- B. Explosives shall be purchased, transported, stored, used, and disposed of by a Virginia Certified Blaster in possession of a current criminal history record check and commercial driver's license with hazardous materials endorsement and a valid medical examiner's certificate.
- C. The Contractor shall be responsible for damage resulting from the use of explosives. The Contractor shall notify each property and utility owner having a building, structure, or other installation above or below ground in proximity to the site of the Work of its intention to use explosives. Notice shall be given sufficiently in advance of the start of blasting operations to enable owners to take steps to protect their property. The review of the Contractor's plan of operations, blasting plan, and notification of property owners shall in no way relieve the Contractor of its responsibility for damage resulting from its blasting operations.

1.8.11 95 Express Lanes

- A. For any Work within the 95 Express Lanes, access must be approved by Transurban USA Operations in advance in accordance with **Attachment 2**, Transurban's Authority to Access (ATA) Contractor Procedure - PERMITTED. Requests for an ATA (also referred to as a Work Authority Permit, WAP) must be submitted 10 business days in advance of the intended access date.

1.8.12 Holidays

- A. Moving/mobile, short duration, short-term stationary, or intermediate-term stationary temporary traffic control zone lane closures on mainline lanes, shoulders, or ramps shall not be performed during the following Holiday time periods without the written permission of the Concessionaire. Additionally, a long-term stationary temporary traffic control zone shall not be initially put in place, adjusted, or removed during the following Holiday time periods without the written permission of the Concessionaire:
 - **January 1:** From noon on the preceding day until noon on the following day, except as indicated in Section 1.8.12.B below.
 - **Inauguration Day:** From noon on the preceding day until noon on the following day.
 - **Martin Luther King, Jr. Day:** From noon on the preceding Friday to noon on the following Tuesday.

- **Presidents Day:** From noon on the preceding Friday to noon on the following Tuesday.
- **Easter:** From noon on the preceding Friday to noon on the following Monday.
- **Memorial Day:** From noon on the preceding Friday to noon on the following Tuesday.
- **Juneteenth:** From noon on the preceding day until noon on the following day, except as indicated in Section 1.8.12.B below.
- **July 4:** From noon on the preceding day until noon on the following day, except as indicated in Section 1.8.12.B below.
- **Labor Day:** From noon on the preceding Friday to noon on the following Tuesday
- **September 11:** No daytime closures.
- **Indigenous Peoples' Day:** From noon on the preceding Friday to noon on the following Tuesday.
- **Election Day** (the Tuesday following the first Monday in November): No daytime closures.
- **Veterans Day:** From noon on the preceding day until noon on the following day, except as indicated in Section 1.8.12.B below.
- **Thanksgiving Day:** From noon on the Wednesday preceding Thanksgiving Day until noon on the following Monday.
- **Christmas Day:** From noon on the preceding day until noon on the following day, except as indicated in Section 1.8.12.B below.

B. If the Holiday occurs on a Friday or Saturday, closures shall not be performed from noon on the preceding Thursday to noon on the following Monday. If the Holiday occurs on a Sunday or Monday, closures shall not be performed from noon on the preceding Friday to noon on the following Tuesday.

1.8.13 Not Used

1.8.14 Not Used

1.8.15 Not Used

1.9 Maintenance of Traffic/Traffic Control

1.9.1 General Requirements

- A. Temporary traffic control (TTC) plans development shall be consistent with the Contract.
- B. Work zone information shall be shared with VDOT's Northern Region Operations Advanced Traffic Management System (ATMS) and any other regional ATMS and shall be approved by the Concessionaire.
- C. The Contractor shall provide an MOT Manager to perform the following:
 - 1. Coordinate implementation of the Opitz Project TMP;
 - 2. Oversee the implementation of the TTC plans;
 - 3. Coordinate temporary traffic control activities with the public/community outreach staff and the Concessionaire and VDOT;
 - 4. Implement traffic management strategies; and
 - 5. Be continuously available during construction until Final Completion of the Opitz Project and elimination of all temporary traffic controls.
- D. The MOT Manager shall be Advanced Work Zone Safety certified and have completed the necessary training on the proper practices and methods for the installation, maintenance and removal of temporary traffic controls; and shall demonstrate traffic control implementation experience of similar project scope and complexity.
- E. Contractor shall have at least one person on the Project site during all work operations who is currently verified either by VDOT's Intermediate Work Zone Traffic Control training or by the American Traffic Safety Services Association (ATSSA) Virginia Intermediate Traffic Control Supervisor (TCS) training by a VDOT approved training provider. This person must have their verification card with them while on the Project site. This person shall be responsible for the oversight of Work zone traffic control within the Project limits in compliance with the Contract requirements, the VWAPM, and the MUTCD. This person's duties shall include the supervision of the installation, adjustment (if necessary), inspection, maintenance, and removal when no longer required, of all Work zone traffic control devices on the Project .

- F. If none of Contractor's on-site personnel responsible for the supervision of such work have the required verification with them or if they have an outdated verification card showing they are not currently verified as a Traffic Control Supervisor (TCS) either by VDOT in Intermediate Work Zone Traffic Control, or by the ATSSA, Concessionaire will suspend all work on the Project until the Work is appropriately supervised in accordance with the requirements herein.
- G. The Contractor shall prepare traffic analyses and modeling for all temporary traffic phases and stages, exclusive of closures identified in the Contract, in order to identify traffic impacts. The Contractor shall use analytical/deterministic (Highway Capacity Manual-based) or traffic simulation/optimization tools for the analyses. Traffic analyses and modeling shall also be required for all construction activities requiring a detour, requiring closure of multiple lanes, or deviating in any way from what is set forth in the Contract.
- H. Traffic analyses will vary depending on the magnitude of the closure, detour or other change. The scope of the traffic analyses and the assumptions to be used will be determined in a meeting held with the Concessionaire.
- I. All TTC plans and documents shall have a valid digital professional engineering stamp held by the TTC plans design engineer whom shall be licensed as a Professional Engineer in the Commonwealth of Virginia and shall demonstrate TTC plans design experience of similar project scope and complexity.

1.9.2 Maintenance of Traffic during Construction

- A. The MOT Manager shall be continuously available for traffic control related activities during construction until Final Completion and elimination of all temporary traffic controls.
- B. The construction activities will be completed in accordance with the Opitz Project TMP, as described in Section 1.9.3, and with the requirements of the Contract. VDOT's Instructional and Information Memorandum IIM-LD-241 (Work Zone Safety and Mobility) and Traffic Engineering Memorandum TE 350.1 (Work Zone Speed Analysis) will apply for work zones on the Opitz Project.
- C. The Contractor shall conduct daily and weekly MOT/traffic control inspections to ensure all traffic devices and traffic patterns are in compliance with the VWAPM and MUTCD standards. Provide a weekly MOT report to the Concessionaire to include the following:
 - 1. Date discrepancy was identified
 - 2. Description of discrepancy

3. Corrective action required
 4. Date corrective action should be taken
 5. Date corrective action was completed
- D. The Contractor shall develop TTC plans for each stage of construction that shows the Contractor's proposed construction staging and proposed traffic control devices consistent with the Opitz Project TMP.
- E. The Contractor will be required to provide a uniformed law enforcement officer with a marked law enforcement vehicle equipped with a blue flashing light during set-up and take-down of all daytime intersection closures involving two or more lanes of traffic.
- F. Contractor shall prosecute the Work so as to avoid obstructions to traffic to the greatest extent practicable. Contractor shall provide for the safety and convenience of the general public and residents along the roadway, and for the protection of persons and property.
- G. Highways closed to traffic shall be protected by barricades and other warning devices as required by the Contract, the VWAPM, and the MUTCD. Barricades and warning devices shall be illuminated where required during periods of darkness and low visibility. Contractor shall erect warning devices in advance of a location on the Project where operations or obstructions may interfere with the use of the road by traffic and at all intermediate points where the new work crosses or coincides with an existing roadway. Contractor shall maintain sign faces and reflective surfaces of warning devices in a clean and visible condition. Contractor shall cover or remove signs when the messages thereon are not applicable. Barricades, warning signs, lights, temporary signals, and other protective devices shall conform to Section 512 of the Road and Bridge Specifications.
- H. Detour plans shall be developed by the Contractor and presented to the Concessionaire for approval. The Contractor shall coordinate detour plans with local, state and federal agencies (as applicable), and submit the detour plan well in advance of any planned detour activity. The Contractor shall be responsible for all planning, consultation and coordination with impacted parties, design, implementation and monitoring, and maintenance of detours-whether within or outside the Opitz Project Right of Way. The provision of detours and marking of alternate routes will not relieve the Contractor of the responsibility for ensuring the safety of the public or from complying with any requirements of the Contract.
- I. The Contractor shall be responsible for design and construction of any additional improvements that may be needed on alternate routes based on the traffic analyses and coordination with the Concessionaire.

- J. Right of way for temporary highways, diversion channels, sediment and erosion control features or bridges required due to the the Contractor's plan for maintaining traffic will be planned, designed and provided by the Contractor.
- K. During any suspension of Work, the Contractor shall temporarily open to traffic such portions of the Opitz Project and temporary roadways as may be agreed upon by the Concessionaire and Contractor.
- L. Unless a design exception or design waiver is granted, the geometric design for temporary roadways and temporary traffic control shall be designed, at a minimum, to the existing posted speed limit.
- M. Two-way traffic shall be maintained at all times unless the Contract or Concessionaire permits one-way traffic. Contractor shall not stop traffic without Concessionaire's permission. If one-way traffic is permitted, Contractor shall provide certified flaggers to direct the traffic. Certified flaggers shall be provided in sufficient number and locations as necessary for control and protection of vehicular and pedestrian traffic in accordance with the requirements of the Virginia Work Area Protection Manual (VWAPM). Flaggers shall be able to communicate to the traveling public in English while performing the job duty as a flagger at the flagger station. Flaggers shall use sign paddles to regulate traffic in accordance with the requirements of the VWAPM. Flagger certification cards shall be carried by flaggers while performing flagging duties. Flaggers found not to be in possession of their certification card shall be removed from the flagging site and operations requiring flagging will be suspended. Further, flaggers performing duties improperly will have their certifications revoked.
- N. Restrictions on lane closures are defined in the Contract.
- O. Long-term closures of the shoulders adjacent to the general purpose lanes are allowable provided the closure is separated by concrete barrier as approved by the Concessionaire.
- P. Where concrete barriers are used to close the shoulder, the Contractor will be required to provide pull off areas in accordance with the Virginia Work Area Protection Manual.
- Q. Connections with roads and public and private entrances shall be kept in a reasonably smooth condition at all times. Stabilization or surfacing material shall be applied to connections and entrances.
- R. The Contractor shall schedule construction operations so that approved continuous access is provided for all roads and properties. Connections or entrances shall not be disturbed by the Contractor until necessary. Once connections or entrances have been disturbed, they shall be maintained and completed as follows:

1. Connections that had an original paved surface shall be brought to a grade that will smoothly and safely accommodate vehicular traffic through the intersection, using pavement. Connections that had an original unpaved surface shall be brought to a grade that will smoothly and safely accommodate vehicular traffic through the intersection, using either the required material or a temporary aggregate stabilization course that shall be placed as soon as practicable after connections are disturbed.
 2. Mainline connections shall have all lanes open during construction. If there are delays in prosecution of work for other connections, connections that were originally paved shall have at least two lanes maintained with a temporary paved surface. Those that were not originally paved shall be maintained with a temporary aggregate stabilization course.
 3. Mainline access/egress connections shall have all lanes open during construction unless otherwise agreed with the Concessionaire. Other entrances shall be graded concurrently with the roadway with which they intersect. Once an entrance has been disturbed, it shall be completed as soon as is practicable, including placing the required base and surface course or stabilization. If the entrance must be constructed in stages, such as when there is a substantial change in the elevation of the roadway with which it intersects, the surface shall be covered with a temporary aggregate stabilization course or other suitable salvaged material until the entrance can be completed and the required base and surface or stabilization course can be placed.
- S. When the Contractor elects to complete the rough grading operations for the entire Opitz Project or exceed the length of one full day's surfacing operations, the rough grade shall be machined to a uniform slope from the top edge of the existing pavement to the ditch line.
- T. When the surface is to be widened on both sides of the existing pavement, construction operations involving grading or paving shall not be conducted simultaneously directly opposite each other and the surface of pavement shall be kept free from soil and other materials that might be hazardous to traffic. Prior to opening of new pavement to traffic, shoulders shall be roughly dressed for a distance of three feet from the edge of the paved surface.
- U. Where the Contractor places obstructions such as suction or discharge pipes, pump hoses, steel plates or any other obstruction that must be crossed by vehicular traffic, they shall be bridged in accordance with plans submitted by the Contractor and approved by the Concessionaire. Traffic shall be protected by the display of warning devices both day and night. If operations or obstructions placed by the Contractor damage an existing traveled roadway, the Contractor shall cease operations and repair damages.

- V. Where existing hydraulic cement concrete pavement is to be patched, the operation of breaking and excavating old pavement shall extend for a distance of not more than two miles. Patching shall be coordinated with excavating so that an area of not more than one-half mile in which excavated patches are located shall be left at the end of any day's work. Necessary precautions shall be taken to protect traffic during patching operations.
- W. The Contractor shall construct, maintain, and remove temporary structures and approaches necessary for use by traffic. After new structures have been opened to traffic, temporary structures and approaches shall be removed. The proposed design of temporary structures shall be submitted to the Concessionaire.
- X. Only TL-3, Type I Re-Directive Impact Attenuators shall be used on interstates, limited access highways, major arterials, and its associated ramps unless otherwise approved by the Concessionaire in its sole discretion. TL-3, Type II Non-Redirective Impact Attenuators may only be used with movable barrier.
- Y. All stages and phases of construction, including installation and testing of the Electronic Toll and Traffic Management (ETTM) system, shall be covered by an approved TTC plan.
- Z. If any sidewalk or shared use path is requested to be closed, the alternative routes considered shall be covered by a TTC plan and/or detour plan and approved by the Concessionaire.

1.9.3 Transportation Management Plan

- A. The Concessionaire has prepared an initial Transportation Management Plan (the "Opitz Project TMP") in accordance with VDOT IIM-LD-241/TE-351 for Work associated with the Opitz Project. The Opitz Project is classified as a Type C, Category V in terms of the TMP requirements of IIM-LD-241/TE-351.
- B. The Contractor shall coordinate all Work in accordance with the Opitz Project TMP. The phases in the sequence of construction of the Opitz Project TMP have been approved and may be followed at the Contractor's option. The Contractor may choose to submit and obtain Concessionaire approval for a sequence which will both expedite construction while lessening the effect of such construction on the traveling public. In such case, the Contractor will be required to develop a revised Opitz Project TMP in accordance with the Contract, these Technical Requirements, and VDOT IIM-LD-241/TE-351. The revised Opitz Project TMP shall, at a minimum:
 - 1. include revised TTC plans detailing all phases of Work, proposed lane closures, temporary traffic controls through the work area, and all construction accesses for approval by the Concessionaire;

2. address safe and efficient operation of adjacent public transportation facilities and State Highways;
 3. include coordination with local agencies and other contractors performing work in the vicinity of I-95;
 4. accommodate safe and efficient snow removal operations and ensure proper drainage during all phases of construction.
- C. If additional traffic counts are required, it will be the responsibility of the Contractor to collect such data. The Contractor shall note that any proposed detour utilizing local neighborhood streets will require coordination with the applicable locality, as appropriate, and are subject to the terms and conditions of the Concessionaire's approval.
- D. Construction signs and pavement markings (temporary) shall be installed, maintained, adjusted, and removed by the Contractor throughout the duration of the Opitz Project. These items shall be shown on and coordinated with the Sign Sequencing Plan defined in Section 3.9.3 of these Technical Requirements. If the Contractor chooses to remove any existing pavement markings from any roadway to install temporary markings to facilitate his work, the Contractor shall resurface the roadway in accordance with the Contract.
- E. All entrances, intersections or pedestrian access points/routes that will be affected by the work zone or by the temporary traffic control devices shall be maintained or an acceptable alternate must be provided by the Contractor.
- F. Temporary barriers shall be shown in the TTC plans and shall be in accordance with the applicable standards and specifications. If Traffic Barrier Service Concrete is warranted based on the criteria for determining the application of barrier per the Virginia Work Area Protection Manual and a completed Engineering and Traffic Investigation-Work Zone Channelization/Barrier Analysis, the guidelines provided in the Roadway Design Manual and IIM-LD-93 shall be utilized.

1.10 Quality

1.10.1 General Requirements

- A. The Contractor is responsible for developing, implementing, and maintaining a quality management system that complies with the VDOT QA/QC Manual.
- B. The Contractor, subcontractors, suppliers and consultants shall adhere to the QMSP.
- C. Neither the Contractor nor any of its subcontractors, suppliers or consultants, shall be delegated quality management responsibility in any manner such that

the Contractor is relieved of any responsibility or liability for the performance of those entities. At all times, contractual and otherwise, and by all means, the Contractor shall be contractually responsible for the quality compliance of the Project no matter the provider of services or supplier of material.

- D. The Contractor and its subcontractors, suppliers, or consultants shall ensure that the quality records are available to enable the Concessionaire to monitor.

1.10.2 Construction Quality Management

- A. The Contractor shall have the overall responsibility for both the QA and QC activities and shall be responsible for all QA activities and QA sampling and testing for all materials used and Work performed on the Opitz Project. These QA functions shall be performed by an independent firm that has no involvement in the construction and QC program and activities. There shall be a clear separation between QA and construction, including separation between QA inspection and testing operations and construction QC inspection and testing operations, including testing laboratories. Two independent, AASHTO Material Reference Laboratory-certified testing laboratories will be required, one for QA testing and one for QC testing.
- B. The QAM shall have the responsibility to enforce the Opitz Construction Contract requirements when deficient materials or unsatisfactory finished products fail to conform to the requirements of the Opitz Construction Contract. The QAM, in accordance with his or her assignment, shall be responsible to observe the construction in progress and to ensure the QA/QC testing and inspection is being performed in accordance with the requirements of the Opitz Construction Contract.
- C. The Contractor shall establish and maintain a Quality Assurance Auditing and Non-Conformance Recovery Plan (AR Plan) for uniform reporting, controlling, correction and disposition, and resolution of non-conformance (including disputed non-conforming items) issues that may arise on the Opitz Project. The Contractor's AR Plan shall establish a process for review and disposition of non-conforming workmanship, material, equipment, or other construction and design elements of the Work, including the submittal of the design review process for field changes. All deficiencies (hereinafter referred to as a non-conformance), including those pertaining to rules, regulations, and permit requirements, shall be documented by the QAM. A NCR referenced by a unique number shall be forwarded to the Concessionaire within seven (7) days of discovery of the non-conformance. Non-conformance procedures are provided in the VDOT QA/QC Manual.
- D. The Contractor shall also be responsible for providing QA/QC testing for all materials manufactured off-site.
- E. The Contractor may use VDOT's resources for the following construction quality control activities where VDOT routinely provides these services:

1. Off-site programmatic inspection, including supplier plant acceptance inspections;
 2. Off-site programmatic testing, including supplier plant acceptance testing; and
 3. Items on the VDOT's pre-approved list.
- F. Any inspections by VDOT or Concessionaire representatives shall not relieve the Contractor of any obligation to furnish acceptable materials and complete construction in accordance with the Contract.

1.10.3 Materials Supply and Quality Requirements

- A. Unless otherwise specified in the Contract, materials, equipment, and components that are to be incorporated into the finished Work shall be new. The Contractor shall submit statements of the known origin, composition, and manufacture of all materials to be used in the Work, including optional or alternate items, using VDOT's Form C-25.
- B. All materials or equipment (excluding the equipment maintained and operated by the Contractor) physically installed, which will become part of the completed Work, whether it is permanent or temporary, must conform to the requirements of the Contract, and shall be furnished with valid test data required to document the quality of the material or equipment at least two (2) weeks prior to delivery. The Contractor shall change the source of supply and furnish material or equipment from other approved sources, if the requirements are not met, and shall notify the Concessionaire of this change, and provide the same identifying information noted in this section, at least two (2) weeks prior to delivery.

1.10.4 Inspection of Work

- A. The responsibility for quality control, quality assurance, and ensuring compliance with applicable specifications and testing requirements lies with the Contractor in accordance with the VDOT QA/QC Manual. All stages, materials, and details of the Work, including machines and plant equipment used in processing or placing materials, are subject to independent inspection by the Concessionaire in accordance with the Contract. The Concessionaire, at its discretion, may conduct testing and audits in its performance of oversight services.
- B. Unless reference is made to a specific dated specification or special provision, references in the Contract to AASHTO, ASTM, VTM, and other standard test methods and materials requirements shall refer to either the test specifications that have been formally adopted or the latest interim or tentative specifications that have been published by the appropriate committee of such organizations as of the date of the Price Proposal.

- C. If an inspection reveals that Work has not been properly performed, the Contractor shall promptly inform the Concessionaire of the schedule for correcting such Work and the time when an inspection of the corrected Work can be made.

1.10.5 Removal of Unacceptable or Unauthorized Work

- A. No Work shall be done until the Contractor establishes the applicable right of way, lines and grades. Work that is done beyond the lines shown on the Plans, unless otherwise agreed, will be considered unauthorized. Such Work shall be subject to review by the Concessionaire and may be ordered removed or replaced.
- B. Any Work that does not conform to the Contract will be considered unacceptable and must be promptly identified by the responsible party, as identified in the QMSP. Unacceptable work shall be remedied or removed immediately unless otherwise agreed by the Concessionaire, and replaced in manner acceptable to the Concessionaire.
- C. The Contractor shall abide by the QMSP in terms of correcting defective, deficient, or non-conforming Work. Any such defective, deficient, or non-conforming Work that is not completely replaced or otherwise remains in place, must be accepted by the Concessionaire prior to the addition of any new Work being constructed on or adjacent to the defective, deficient, or non-conforming Work, unless otherwise mutually agreed by all parties. Approval or disapproval of non-conforming Work shall be given by the Concessionaire within fourteen (14) days of submittal to the Concessionaire, or as otherwise mutually agreed.
- D. At the sole discretion of the Concessionaire, the Concessionaire may allow the Contractor to provide the Concessionaire with a credit to the Opitz contract value for the Concessionaire's acceptance of such non-conforming Work.
- E. If the Contractor fails to comply promptly with any order of the Concessionaire or the QAM made under the provisions of the QMSP, the Concessionaire or the QAM will have the authority to cause unacceptable or unauthorized Work to be remedied or removed and replaced. If the Contractor fails to exercise the appropriate management of the Work with regards to the remedy of defective, deficient, or non-conforming Work, or the prevention of such defective, deficient, or non-conforming Work from re-occurring, the Concessionaire shall have the right to stop or suspend the affected Work until such time the defective, deficient, or non-conforming Work is remedied.
- F. Contractor shall not perform destructive sampling or testing of the Work without written authorization of Concessionaire. Unauthorized destructive sampling or testing will cause the Work to be considered unacceptable.

- G. In the event Contractor is granted authorization to perform destructive sampling or testing, Contractor shall obtain the approval of Concessionaire for the method and location of each test prior to beginning such sampling or testing. In addition, destructive sampling and testing shall be performed in the presence of Concessionaire.

1.11 Third Parties

1.11.1 Not Used

1.11.2 Third Parties

- A. If any portion of the Opitz Project is located within the limits of a municipality or locality, military installation, or other federally owned property, the Contractor shall cooperate with the appropriate officials and agents in the prosecution of the Work to the same extent as with the Concessionaire.
- B. The Contractor shall coordinate its activities with municipalities and localities, and other contractors working in the area. As provided in the Contract, the Contractor's work program and schedule shall consider and coordinate with the work of other contractors involved with adjacent work, including maintenance, in the corridor.
- C. If other separate contracts are awarded by the Concessionaire or by other Governmental Authorities, including projects under the PPTA, that affect the Contractor's work, including work related to abutting roadways and connectors and work associated with a TAMS contract, the Contractor will coordinate its work with the work being performed by the other contractors. The Concessionaire will contractually require its separate contractors to cooperate with, and coordinate their activities with, the Contractor.
- D. The Contractor shall be responsible for contacting other contractors regarding their anticipated schedules to complete the associated projects or key milestones of the associated projects they are/will be working on. See Section 1.13 of these Technical Requirements.
- E. The Contractor shall not impede the access or progress of such work by other contractors, but shall cooperate and coordinate with other contractors for the timely completion of all construction activities. This shall include attendance at coordination meetings deemed necessary or advantageous by the Concessionaire or its contractors.

1.11.3 Fire Hydrants

- A. No Work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

- B. When the Contractor's Work requires the disconnection of "in service" fire hydrants, the Contractor shall notify the locality's fire department or communications center at least 24 hours prior to disconnection. In addition, the Contractor shall notify the locality's fire department or communications center no later than 24 hours after reconnection of such hydrants.

1.11.4 Not Used

1.11.5 Not Used

1.11.6 Not Used

1.12 Emergency Services

1.12.1 Liaison

The Contractor shall comply with the Concessionaire and VDOT requirements for participation in industry and statutory initiatives regarding Emergency management, where applicable.

1.12.2 Emergencies and Extraordinary Circumstances

- A. Subject to the Contract, the Contractor's response to Emergencies and extraordinary circumstances as part of the Opitz Project will be in accordance with the Contract and not inconsistent with the Concessionaire's or VDOT's Emergency evacuation plan and shall ensure that:
1. safety of motorists, pedestrians and workforce personnel shall be the primary objective for all decisions and actions;
 2. clearance of a travel lane for Emergency response vehicles shall be by the most expedient route whether GP Lanes or HOT Lanes (in such circumstances, the decision of the Concessionaire or the Emergency services in charge shall govern);
 3. military vehicles acting in an Emergency response capacity or in defense of the sovereign homeland of the United States of America shall be given free and unrestricted access to the HOT Lanes;
 4. if the U.S. Secret Service (USSS), in coordination with the Virginia State Police (VSP), determines movements of the President of the United States require use of the HOT Lanes, the Contractor shall cooperate and comply fully with USSS and VSP instructions with respect to Work activities, lane closures and traffic management;
 5. VDOT reserves the right, by direction of the Fredericksburg and Northern Virginia District Administrators or the NRO Director, to assume and exercise control of the HOT Lanes in part and/or in their

entirety, including all applicable systems and field devices via available interfaces, pursuant to the Contract; and

6. the Contractor will, as needed, participate in Emergency exercises conducted by Governmental Authorities.
- B. During special events that have significant impact on traffic flow, the Contractor shall designate a responsible party in charge to work with the VDOT's NRO Special Events and Incident Management Coordinator to develop traffic management plans for the event.
- C. Should the Contractor fail to respond to an Emergency or extraordinary circumstance in a timely manner in accordance with the requirements of the Contract, the Concessionaire shall have the right to take necessary and appropriate action to handle such Emergency or extraordinary circumstance.

1.13 Adjacent Project Coordination

1.13.1 General

- A. The timing of the Opitz Project will overlap with other projects, including VDOT's I-95 Southbound Auxiliary Lane Project in Prince William County. The Contractor shall coordinate and interface with the respective project team, including the VDOT and its associated consultants and contractors throughout the duration of the project to ensure that the respective projects are safely and properly coordinated and scheduled.
- B. In addition to the project listed above, the VDOT may conduct yearly structural and bridge inspection/maintenance and paving maintenance that may include work on Opitz Boulevard and I-95. The Contractor shall cooperate with these projects. In all cases, the existing projects that have been awarded for construction and any emergency maintenance projects and their respective contractors shall have priority in scheduling activities.
- C. The timing and scope of the Opitz Project will overlap with the Neabsco-Potomac Commuter Parking Garage Project by Prince William County. The Contractor shall coordinate and interface with the respective project team, including the County and its associated consultants and contractors throughout the duration of the Opitz Project to ensure that the respective projects are safely and properly coordinated and scheduled.

1.14 Sustainability

1.14.1 General

- A. The Contractor has acknowledged its commitment to sustainability and shall provide adequate resources to track and document all items as necessary to allow for verification of a "Silver" rating (using the Envision infrastructure

sustainability rating system) during the construction of the Project and in accordance with the Opitz Project Sustainability Special Provisions. Additional information on the Envision rating system can be found at: <http://sustainableinfrastructure.org/envision/>.

2 Public Information and Communications

- A. The Contractor shall deliver the Opitz Project in a manner consistent with building and maintaining effective working relationships with all stakeholders in the Opitz Project's success. The Concessionaire will serve as the sole source to the news media and community stakeholders on specific lane closures, delays, detours, and other construction-related impacts associated with the Opitz Project.
- B. The Contractor shall identify an Opitz Project communications lead through which all communication and public outreach activities on the Opitz Project on behalf of the Contractor will be coordinated.
- C. The Contractor will support the Concessionaire's work with the communities to identify specific concerns and strategies for mitigation. The Contractor and the Concessionaire shall maintain an open dialogue with the stakeholders and communities immediately surrounding the Opitz Project with the objective of building a long-term relationship based on trust and respect.
- D. Communication protocols shall be developed between the Contractor and the Concessionaire. These protocols shall detail:
 - 1. a regime of regular reporting to the Concessionaire on project activities that will change the experience of the public;
 - 2. processes for managing communications surrounding emergency management and recovery operations.
- E. The Concessionaire reserves the right to review and comment on any public communications concerning the Opitz Project, including publicity and branding.

3 Construction Requirements

3.1 General

- A. The Project shall be constructed pursuant to Contract requirements.
- B. Plans consisting of general drawings and showing such details as are necessary to give a comprehensive understanding of the work specified will be furnished by the Concessionaire. Except as otherwise shown on the plans, dimensions shown on the plans are measured in the respective horizontal or vertical planes. Dimensions that are affected by gradients or vertical curvatures shall be adjusted as necessary by the Contractor to accommodate actual field conditions and shall be specifically denoted as “field adjusted” on the working drawings. Failure on the part of the Contractor to so denote field adjustments on the working drawings shall not relieve the Contractor of the responsibility to accommodate and incorporate such existing conditions into the finished work.
- C. The Contractor shall take all reasonable efforts to ensure that the condition of existing buildings, structures, roadways, sidewalks, paths, trails, signs, lighting, TTMS and signal equipment, or other property that is to remain is not adversely affected by the performance of the Work. Prior to commencing Work, the Contractor shall perform property pre-condition surveys and monitor their condition during the Work period. The Contractor shall repair any damage caused by the Work to at least a condition comparable to that which existed immediately prior to the damage. The Concessionaire shall be given the opportunity to witness any pre-condition surveys and/or monitoring and the Contractor shall make the results available to the Concessionaire before commencing any Work that may affect the property.
- D. All materials used in the Work shall conform to the qualities, technical requirements, values or range of values specified in the Contract. Less than complete conformity may be permitted if obtaining exact or complete conformity would not be feasible and if authorized by the Department. If permissible tolerances are exceeded or if consistent deviations from the plans or abrupt changes in grade occur, even though within the tolerances, the affected areas shall be reconstructed to conform to the specified tolerance such that the Work is fit for its intended purpose. When the Contract requires the finished surface to tie into any structural item whose elevation is fixed, the elevation of the finished surface must coincide with the elevation of the structural item.
- E. The Opitz Project is considered part of the Strategic Highway Network (STRAHNET).
- F. The Contractor shall ensure that areas impacted by the Work are subject to continual and un-interrupted removal of rubbish, scrap material, and debris.

Work sites shall have a neat, safe and orderly appearance at all times. Prior to Final Completion, the Contractor shall remove its construction equipment, materials and debris from the Opitz Project Right of Way and other property used by or adjacent to the Opitz Project.

- G. When removal of mailboxes and newspaper boxes is made necessary by construction operations, the Contractor shall place them in temporary locations so that access to the boxes will not be impaired. Prior to Final Completion, boxes shall be placed in their permanent locations as agreed with the Concessionaire, upgraded to current criteria, and left in as good condition as when found.
- H. The Contractor shall take all reasonable efforts to preserve property and improvements along the boundary lines of and adjacent to the Work unless the removal or destruction is absolutely required and consistent with the Contract Documents. The Contractor shall use suitable precautions to prevent damage to such property. If property is damaged, the Contractor shall restore property to a condition similar or equal to that existing before such damage was done by repairing, rebuilding, or restoring, or making settlement with the property owner. Where property of third parties has been damaged and repaired by the Contractor, the Contractor shall secure from the owner a release from any claim against the Concessionaire. A copy of this release shall be furnished to the Concessionaire.
- I. If Rights of Entry are needed in advance of acquisition Contractor shall coordinate with Concessionaire in a manner to support the Contractor's schedule.

3.2 Not Used

3.3 Environmental

3.3.1 Not Used

3.3.2 Not Used

3.3.3 Water Pollution

- A. The Contractor shall exercise every reasonable precaution to prevent pollution of rivers, streams, and impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, paints, sedimentation, and other harmful material shall not be discharged into or alongside rivers, streams, or impoundments or into channels leading to them.
- B. Construction discharge water shall be filtered to remove deleterious materials prior to discharge into state waters. During specified spawning seasons, discharges and construction activities in spawning areas of state waters shall be restricted so as not to disturb or inhibit aquatic species that are indigenous

to the waters. Neither water nor other effluence shall be discharged onto wetlands or breeding or nesting areas of migratory waterfowl. When used extensively in wetlands, heavy equipment shall be placed on mats.

- C. Temporary construction fills and mats in wetlands and flood plains shall be constructed of approved non-erodible materials and shall be removed by the Contractor to natural ground upon completion of the Work in the wetlands or flood plains, unless specifically approved by the Concessionaire (in writing) to be left in place.
- D. If the Contractor dumps, discharges, or spills any oil or chemical that reaches or has the potential to reach a waterway, it shall immediately notify all appropriate jurisdictional state and federal agencies and shall take immediate actions to contain, remove, and properly dispose of the oil or chemical in accordance with the local, State and federal requirements.
- E. Excavation material shall be disposed of in approved areas above the mean high water mark shown on the plans in a manner that will prevent the return of solid or suspended materials to state waters. If the mark is not shown on the plans, the mean high water mark shall be considered the elevation of the top of stream banks.
- F. Constructing new bridge(s) and dismantling and removing existing bridge(s) shall be accomplished in a manner that will prevent the dumping or discharge of construction or disposable materials into rivers, streams, or impoundments in violation of Law. Construction operations in rivers, streams, or impoundments shall be restricted to those areas where channel changes are permitted and must be entered for the construction of structures. Rivers, streams, and impoundments shall be cleared of falsework, piling, debris, or other obstructions placed therein or caused by the performance of the Work.
- G. Stabilization of the streambed and banks shall occur immediately upon completion of Work if Work is suspended for more than 15 days. The Contractor shall prevent stream constriction that would reduce stream flows below the minimum, as defined by the State Water Control Board, during construction operations.
- H. If it is necessary to relocate an existing stream or drainage facility temporarily to facilitate construction, the Contractor is responsible to design and provide temporary channels or culverts of adequate size to carry the normal flow of the stream or drainage facility. Stabilization of the streambed and banks shall occur immediately upon completion of, or during the Work if the Work is suspended for more than 15 days.
- I. The Contractor shall submit a temporary relocation design to the Concessionaire for review and acceptance in sufficient time to allow for discussion and correction prior to beginning the Work the design covers. The

Temporary bridges or other structures shall be used wherever an appreciable number of stream crossings will be made.

3.3.4 Hazardous Substances

- A. Not Used
- B. Not Used
- C. The Contractor shall be responsible for the development of a Spill Prevention, Control, and Countermeasure Plan as required by regulation and for submission of any required plan to the Concessionaire prior to start of construction. In the event of spills or releases of petroleum products and other hazardous liquids or solid materials, the Contractor shall take immediate action to contain and eliminate the spill release, including the deployment of environmental protection measures to prevent the migration of the spill into the waters of the United States and of worker exposure protection measures. The Contractor shall notify the Concessionaire immediately of all instances involving the spill, discharge, dumping or any other releases or discovery of hazardous materials into the environment and shall provide all required notifications and response actions.
- D. The Contractor shall manage solid waste, hazardous waste, and hazardous materials in accordance with all applicable federal and state environmental regulations and shall implement good housekeeping, waste minimization and pollution prevention practices.
- E. Asbestos abatement and project monitoring shall be performed by individuals and firms licensed by the Virginia Department of Professional and Occupational Regulation. Asbestos abatements shall not be performed by an asbestos contractor who has an employee/employer relationship with, or financial interest in, the laboratory utilized for asbestos sample analysis nor shall the asbestos contractor have an employee/employer relationship with, or financial interest in, the asbestos inspector and project designer working on the Project. Copies of all asbestos inspection, monitoring and disposal records shall be provided to the Concessionaire.
- F. For any asbestos waste and other non-hazardous waste, the Contractor shall have the signatory responsibility for the waste shipping manifest(s) and/or bill(s) of lading. For hazardous waste, the Contractor shall be considered the co-generator and shall be responsible for preparing the hazardous waste shipping manifest(s) for the Concessionaire's signature and as otherwise consistent with the signatory requirement under Section 411 of the Road and Bridge Specifications.
- G. The Contractor shall retain copies of all documents prepared for containment, management, mitigation and/or remediation, asbestos-related records and any other construction-related Hazardous Substances records in accordance with

the requirements of the Contract. A final copy of all such records shall be submitted to the Concessionaire prior to Final Completion.

3.3.5 Environmental Monitoring

- A. Not Used
- B. The Contractor is responsible for the monitoring of compliance, in accordance with environmental permit requirements, with all applicable environmental laws and regulations. Should any non-compliant item(s) be identified by the Contractor or Concessionaire, continuous corrective action will be taken by the Contractor to bring the item(s) back into compliance. Notification of this circumstance shall be provided promptly by the Contractor to the Concessionaire.
- C. The Contractor will be responsible for complying with the Migratory Bird Treaty Act for recommended time of year restrictions.
- D. The Concessionaire reserves the right to perform quality assurance environmental monitoring of the Opitz Project to determine whether the Contractor is complying with environmental commitments to Governmental Authorities and is performing activities in accordance with Law and Concessionaire specifications.

3.3.6 Not Used

3.3.7 Not Used

3.3.8 Air Quality

- A. The Project has been assessed for potential air quality impacts and conformity with all applicable Federal and state air quality regulations and requirements. This project is located in a nonattainment area for the National Ambient Air Quality Standards (NAAQS) for 8-hour Ozone and is in attainment for all other NAAQS. The project is considered to be exempt from regional emissions analysis requirements for Ozone and all other transportation conformity requirements are not applicable. However, Virginia Department of Environmental Quality (VDEQ) air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions; and 9 Virginia Administrative Code 5-50, Article 1, Fugitive Dust precautions. The Contractor shall adhere to the limitations outlined in Special Provision 107E for Volatile Organic Compound Emissions Control Areas.
- B. The Contractor shall comply with the provisions of the Contract, all applicable Federal requirements, the State Air Pollution Control Law and Rules of the State Air Pollution Control Board, including notifications required therein.
- C. Burning shall be performed in accordance with all applicable state and local laws and ordinances and under the constant surveillance of watchpersons. Care

shall be taken so that the burning of materials does not destroy or damage property or cause excessive air pollution. The Contractor shall not burn rubber tires, asphalt, used crankcase oil, or other materials that produce dense smoke. Burning shall not be initiated when atmospheric conditions are such that smoke will create a hazard to the motoring public or airport operations. Provisions shall be made for flagging vehicular traffic if visibility is obstructed or impaired by smoke. At no time shall a fire be left unattended.

- D. Asphalt mixing plants shall be designed, equipped, and operated so that the amount and quality of air pollutants emitted will conform to the Rules of the State Air Pollution Control Board. Emission standards for asbestos incorporated in the EPA's National Emission Standards for Hazardous Air Pollutants apply to the demolition or renovation of any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof that contains friable asbestos.

3.3.9 Noise Mitigation

A. Construction Noise

1. The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall be not more than 80 decibels. Noise-sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose. Such activities include those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.
2. Contractor shall monitor its construction-related noise if requested by local agencies, the Concessionaire or neighboring property owners. If construction noise levels exceed 80 decibels during noise-sensitive activities, the Contractor shall take corrective action before proceeding with operations.
3. The Contractor shall be responsible for abatement of construction noise.
4. The Contractor is responsible for obtaining any necessary local noise ordinance variances prior to the scheduling of night time operations
5. Contractor shall determine whether certain portions of the Opitz Project that produce objectionable noise should be restricted or prohibited between 10 PM and 6 AM. If other hours are established by local ordinance, the local ordinance shall govern.
6. Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment. When feasible, the Contractor shall establish haul routes that direct his

vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.

7. These requirements are not applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

3.3.10 Forests

- A. The Contractor shall take all reasonable precautions to prevent and suppress forest fires in any area involved in construction operations or occupied by it or its contractors as a result of such operations.
- B. The Contractor shall cooperate with the proper authorities of the state and federal governments in reporting, preventing, and suppressing forest fires. Labor, tools, or equipment furnished by the Contractor upon the order of any forest official issued under authority granted the official by law shall not be considered a part of the Contract.
- C. The Contractor shall negotiate with the proper forest official for compensation for such labor, tools, or equipment.

3.3.11 Cultural Resources

- A. In the event that a previously unidentified historic property (prehistoric or historic district, archaeological site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places) is discovered once construction has begun, the Contractor shall immediately halt all construction work in the area of the resource and in surrounding areas where additional subsurface remains can reasonably be expected to occur. Work in all other areas of the Opitz Project may continue. The Contractor shall immediately notify the Concessionaire, which will in turn notify the FHWA. The Concessionaire and the FHWA, in cooperation with the Contractor, shall then address the discovery in accordance with one of the applicable processes described at 36 CFR 800.13. The Concessionaire shall be responsible for conducting any technical studies needed to determine whether the resource is eligible for inclusion on the National Register of Historic Places and whether the Opitz Project will affect the resource, and for implementing appropriate treatment as determined through FHWA's consultation with the Virginia State Historic Preservation Officer (SHPO). Pursuant to §10.1- 2302 of the Code of Virginia, prior to conducting any archaeological investigations on state-controlled lands (including state-owned highway right of way), the Concessionaire must first obtain a permit from the Director of the Virginia Department of Historic Resources.
- B. In the event fossils, meteorites, or other articles of paleontological or rare mineralogical interest are discovered once construction has begun, the

Contractor shall immediately suspend work at the site of the discovery and notify the Concessionaire. The Concessionaire will immediately notify the proper state authority charged with the responsibility of investigating and evaluating such finds. The Contractor shall cooperate and assist the Concessionaire in protecting, mapping, and removing the finds as determined necessary by the Concessionaire in consultation with the proper state authority.

- C. Any archaeological remains, fossils, meteorites, or other articles of paleontological or rare mineralogical interest found on state-controlled lands (including state-owned highway right of way) are the property of the Commonwealth of Virginia. Articles recovered from other than state-controlled lands are the property of the landowner unless other Contract is reached with the owner.
- D. Not Used

3.3.12 Not Used

3.3.13 Section 4(f) and Section 6(f) Resources

- A. The approved NEPA Document(s) concluded that there is no Use of Section 4(f) Resources on the Project, nor a Section 6(f) of the Land and Water Conservation Act of 1965 (54 U.S.C. § 200305) conversion associated with any planned or existing park or historic resource within the vicinity of the Project area.
- B. Any changes to the right-of-way or easements as shown on the Opitz Design Plans, proposed by the Contractor, may require additional technical studies and analysis to be performed by the Contractor. The Contractor shall be responsible for notifying the Concessionaire of plan revisions, right-of-way/easement changes, and providing any necessary studies and other necessary information to support the Contractor's completion of any required Section 4(f) documentation. The Concessionaire will be responsible for the coordination of any Section 4(f) documentation with FHWA. The Contractor shall then carry out any additional commitments that result from such coordination at its sole expense and no additional cost or time delays to the Project.

3.3.14 Threatened and Endangered Species

- A. The Categorical Exclusion (CE) document prepared for the Project determined that Threatened and Endangered (T&E) species are neither present nor will be impacted within the limits of the Project.
- B. The Contractor shall be advised that new and updated T&E information is continually added to agency databases. Contractor shall notify the Concessionaire of any observed or suspected T&E species. The Concessionaire shall be responsible for any subsequent coordination to obtain

updated information, requirements, and clearances from environmental regulatory agencies that provide T&E species oversight.

3.4 Geotechnical

3.4.1 Not Used

3.4.2 Not Used

3.4.3 Not Used

3.4.4 Not Used

3.4.5 Unsuitable Materials

- A. Unsuitable Material is defined as material used as embankment fill, and in cut areas to a depth of at least three (3) feet below subgrade directly beneath pavements and at least two (2) feet beneath the bedding of minor structures and laterally at least two (2) feet beyond the outside edge of the pavement shoulders and bedding limits of the minor structures that meets one or more of the following criteria: classifies as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS); contains more than five (5) percent by weight organic matter; exhibits aggressive soil properties as deemed by the Concessionaire's geotechnical engineer; exhibits a swell greater than five (5) percent as determined from the California Bearing Ratio (CBR) test using VTM-8; exhibits strength, consolidation, durability of rock or any other characteristics that are deemed unsuitable by the Concessionaire's geotechnical engineer for use in the Work. All materials within the uppermost three (3) feet of a pavement subgrade that exhibits a CBR value less than that stipulated in the pavement design shall also be considered unsuitable.
- B. Highly plastic clays and elastic silts mapped as Potomac Formation or Iredell, Jackland or Jackland-Haymarket complex (problem soils) shall not be chemically stabilized. Highly plastic clays or elastic silts may be used by compacting them in confined embankment fills and capping them with at least 2 feet of suitable subgrade fill material provided these fills are adequately engineered and constructed.
- C. Saturated or very dry and/or loose or very soft coarse- and fine-grained soils that exhibit excessive pumping, weaving or rutting under the weight of construction equipment are also considered unsuitable unless they can be moisture conditioned through either mechanical or chemical means to an acceptable moisture content that allows adequate compaction to meet project specifications, and classification testing indicates they are not otherwise unsuitable. Topsoil, peat, coal and carbonaceous shale shall also be considered unsuitable material. All unsuitable material shall be disposed of and/or treated as discussed in Section 106.04 of the VDOT 2020 Road and Bridge Specifications. Topsoil or other organic soils are also considered unsuitable for

use in embankment fill other than as a cover for slopes for the purpose of establishing vegetative cover. When used as cover for slopes, the thickness of topsoil shall not exceed twelve (12) inches.

3.4.6 Not Used

3.4.7 Not Used

3.4.8 Coordination and Review by Geotechnical Engineer

A. The Concessionaire's geotechnical engineer of record has identified the following elements of the Project which the geotechnical engineer or its qualified designated representative is required to monitor/inspect during construction:

- 1) Bridge Piles including dynamic load testing of test piles at each structures
- 2) Pavement subgrade undercut on Opitz
- 3) Pavement subgrade on Express Lanes
- 4) Retaining Wall Subgrade for gravity wall at South East Quadrant
- 5) Subgrade preparation and benching at North East Quadrant fill slope
- 6) MSE Wall Subgrade
- 7) Drilled shafts for SPL Walls at South West Quadrant

3.5 Materials

3.5.1 Rights for and Use of Materials Found on the Opitz Project

A. With approval of the Concessionaire, the Contractor may use in the Opitz Project any materials found in the excavation that comply with the Contract requirements. The Contractor shall replace at its own expense with other acceptable material the excavation material removed and used that is needed for use in embankments, backfills, approaches, or otherwise, unless used on the Opitz Project. The Contractor shall not excavate or remove any material from within the construction limits that is not within the grading limits, as indicated by the slope and grade lines. The Contractor shall not waste, bury, deposit, or abandon any material within the Opitz Project limits. Contractor shall not own and shall not have the right to sell, trade or exchange, any coal or other valuable materials uncovered during the prosecution of the work without Concessionaire's specific written authorization.

3.5.2 Not Used

3.5.3 Not Used

3.5.4 Not Used

3.5.5 Not Used

3.5.6 Material Delivery

The Contractor shall advise the Concessionaire at least two weeks prior to the delivery of any material from a commercial source. Upon delivery of any such material to the Opitz Project, the Contractor shall confirm that the material meets the requirements of the Contract and, if so, shall provide the Concessionaire with one copy of all invoices (prices are not required). The printed weights of each load of the following materials: asphalt concrete; dense graded aggregate, to include aggregate base, Subbase, and Select Material; fine aggregate; open graded coarse aggregate; crusher run aggregate; and Road stabilization aggregate shall accompany the delivery, and such information shall be furnished to the Lead QA Inspector at the Project. Materials shall not contain Hazardous Waste or be furnished from a source containing toxic, hazardous or regulated solid wastes.

3.5.7 Plant Inspections

If VDOT or the Concessionaire inspects materials at the source, the following conditions shall be met:

- A. VDOT/Concessionaire shall have the cooperation and assistance of the Contractor and producer of the materials.
- B. VDOT/Concessionaire shall have full access to parts of the plant that concern the manufacture or production of the materials being furnished.
- C. For Materials accepted under a quality assurance plan, Contractor or producer shall furnish equipment and maintain a plant laboratory at locations approved for plant processing of Materials. Contractor or producer shall use the laboratory and equipment to perform quality control testing.

The laboratory shall be of weatherproof construction, tightly floored and roofed, and shall have adequate lighting, heating, running water, ventilation, and electrical service. The ambient temperature shall be maintained between 68 degrees F and 86 degrees F and thermostatically controlled. The laboratory shall be equipped with a telephone, intercom, or other electronic communication system connecting the laboratory and scale house if the facilities are not in close proximity to each other. The laboratory shall be constructed in accordance with the requirements of local building codes.

Contractor or producer shall furnish, install, maintain, and replace, as conditions necessitate, testing equipment specified by the appropriate ASTM,

AASHTO method, or VTM being used and provide necessary office equipment and supplies to facilitate keeping records and generating test reports. Contractor or producer's technician shall maintain current copies of test procedures performed in the laboratory. Contractor shall calibrate or verify all balances, scales, and weights associated with testing performed as specified in AASHTO R18. Contractor or producer shall also provide and maintain an approved test stand for accessing truck beds for the purpose of sampling and inspection. Concessionaire may approve a single laboratory to service more than one plant belonging to the same Contractor or producer.

- D. For crushed glass, the plant equipment requirements are waived in lieu of an independent third-party evaluation and certification of crushed glass properties by an AASHTO Materials Reference Laboratory (AMRL)-accredited commercial soil testing Laboratory demonstrating that the supplied Material conforms to Section 203 requirements. Random triplicate samples will be evaluated and analyzed for every 1,000 tons of Material supplied to the Project . The averaged results will be used for evaluation purposes. Suppliers of crushed glass shall maintain third party certification records for a period of three years.
- E. Adequate safety measures shall be provided and maintained.

3.5.8 Storing Materials

- A. Materials shall be stored in a manner so as to ensure the preservation of their quality and fitness for the Work. When considered necessary by the QAM or the Concessionaire, materials shall be stored in weatherproof buildings on wooden platforms or other hard, clean surfaces that will keep the material off the ground. Materials shall be covered when directed by the Concessionaire. Stored material shall be located so as to facilitate its prompt inspection. Portions of the Opitz Project Right of Way approved by the Concessionaire may be used for storage of material and equipment and for plant operations. However, equipment and materials shall not be stored within the clear zone of the travel lanes open to traffic.
- B. Additional required storage space shall be provided by the Contractor. Private property shall not be used for storage purposes without the written permission of the owner. Copies of the written permission shall be furnished to the Concessionaire. Upon completion of the use of the property, the Contractor shall furnish to the Concessionaire a release signed by the property owner indicating that the property has been satisfactorily restored.
- C. Chemicals, fuels, lubricants, bitumens, paints, raw sewage, and other harmful materials as determined by the QAM or the Concessionaire shall not be stored within any floodplain unless no other location is available and only then shall the materials be stored in a secondary containment structure(s) with an impervious liner. Also, any storage of these materials in proximity to natural or man-made drainage conveyances or otherwise where the materials could

potentially reach a waterway if released under adverse weather conditions, must be stored in bermed or diked area or inside a container capable of preventing a release. Double-walled storage tanks shall meet the berm/dike containment requirement except for storage within flood plains. Any spills, leaks, or releases of such materials shall be addressed in accordance with the Contract. Accumulated rain water may also be pumped out of the impoundment area into approved dewatering devices.

- D. ETTM, electronic devices, network and computer gear shall be stored in an environmentally controlled space as might be required in accordance with manufacture's recommendation.

3.5.9 Handling Materials

Materials shall be handled in a manner that will preserve their quality and fitness for the Work. Aggregates shall be transported from storage to the Work in vehicles constructed to prevent loss or segregation of materials.

3.5.10 Unacceptable Materials

Materials that do not conform to the requirements of the Contract shall be considered unacceptable. Such materials, whether in place or not, will be rejected and shall be removed from the site of the Work. If it is not practical for the Contractor to remove rejected material immediately, the Contractor will mark the material for identification. Rejected material whose defects have been corrected shall not be used until approval has been given by the Concessionaire in accordance with the QMSP.

3.5.11 Not Used

3.5.12 Local Material Sources (Pits and Quarries)

- A. Local material sources, other than active commercial sand and gravel and quarry operations, opened by the Contractor or its subcontractors shall be concealed from view from the completed roadway and any existing public roadway. Concealment shall be accomplished by selectively locating the pit or quarry and spoil pile, providing environmentally compatible screening between the pit or quarry site and the roadway, or using the site for another purpose after removal of the material, or restoration equivalent to the original use (such as farm land, pasture, or turf).
- B. Should the Contractor wish to source construction materials from (non-commercial) new pits or quarries the Contractor shall furnish the Concessionaire a statement signed by the property owner in which the property owner agrees to the use of their property as a source of material for the Opitz Project. The use of Material from such sources will not be permitted until test results have been approved by Concessionaire and written authority for its use has been issued by the appropriate agency, organization or individual. Contractor shall acquire the necessary rights to take Material from sources he

locates and shall pay all related costs, including costs that may result from an increase in the length of the haul. Costs of exploring, sampling, testing, and developing such sources shall be borne by Contractor. Contractor shall obtain representative samples from at least two borings in parcels of 10 acres or less and at least three additional borings per increment of 5 acres or portion thereof to ensure that lateral changes in Material are recorded. Drill logs for each test shall include a soil description and the moisture content at intervals where a soil change is observed or at least every 5 feet of depth for consistent Material. Samples obtained from the boring shall be tested by an approved Laboratory for grading, Atterberg limits, CBR, maximum density, and optimum moisture. Concessionaire will review and evaluate the Material based on test results provided by Contractor. Concessionaire will reject any Material from a previously approved source that fails a visual examination or whose test results show that it does not conform to the Contract. Upon completion of the use of the property as a material source, the Contractor shall furnish the Concessionaire a release signed by the property owner indicating that the property has been satisfactorily restored. The requirements for a signed statement and release will not apply to commercial sources, sources owned by the Contractor, and sources furnished by the Concessionaire.

- C. Local material pits and quarries that are not operated under a local or State permit shall not be opened or reopened without authorization by the Concessionaire.

3.5.13 Materials Disposal

- A. Contractor shall remove, in accordance with the plans, fences, buildings, structures, or encumbrances within the construction limits. Materials so removed, including existing drains or pipe culverts, shall become the property of Contractor, with the exception of those materials to be stored or delivered to Concessionaire or others as designated in the Contract.
- B. Unsuitable or surplus material for disposal shall be disposed of by the Contractor off the Opitz Project Right of Way. The Contractor shall obtain the necessary rights to property to be used as an approved disposal area. An approved disposal area is defined as that which is owned privately, not operated under a local or State permit and has been approved by the Concessionaire for use in disposing unsuitable or surplus material.
- C. Prior to the Concessionaire approving a disposal area, the Contractor shall submit a site plan. The plan shall show:
 - 1. the location and approximate boundaries of the disposal area;
 - 2. procedures to minimize erosion and siltation;
 - 3. provision of environmentally compatible screening;

4. restoration;
 5. cover vegetation;
 6. other use of the disposal site;
 7. the drainage pattern on and away from the area of land affected, including the directional flow of water and a certification with appropriate calculations that verify all receiving channels are in compliance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations;
 8. location of haul roads and stabilized construction entrances if construction equipment will enter a paved roadway;
 9. constructed or natural waterways used for discharge;
 10. a sequence and schedule to achieve the approved plan; and
 11. the total drainage area for temporary sediment traps and basins shall be shown. Sediment traps are required if the runoff from a watershed area of less than three acres flows across a disturbed area. Sediment basins are required if the runoff from a watershed area of three acres or more flows across a disturbed area. The Contractor shall certify that the sediment trap or basin design is in compliance with the standards and specifications. Once a sediment trap or basin is constructed, the dam and all outfall areas shall be immediately stabilized.
- D. Disposal areas shall be cleared but need not be grubbed. The clearing work shall not damage grass, shrubs, or vegetation outside the limits of the approved area and haul roads thereto. After the material has been deposited, the area shall be shaped to minimize erosion and siltation of nearby streams and landscaped in accordance with the approved plan for such work or shall be used as approved by the Concessionaire. The Contractor's design and restoration shall conform to the requirements of the Contract.
- E. The Contractor shall furnish the Concessionaire a statement signed by the property owner in which the owner agrees to the use of their property for the deposit of material from the Opitz Project. The property owner will hold harmless the Concessionaire, their officers, their agents, and their employees. Upon completion of the use of the property as an approved disposal area, the Contractor shall furnish the Concessionaire a release signed by the property owner indicating that the property has been satisfactorily restored. This requirement will be waived for commercial sources and sources owned by the Contractor.

- F. The Contractor will obtain a VPDES Construction Permit as well as any other applicable permits for a disposal area, which shall be in compliance with the Contract.
- G. The Contractor shall dispose of all defunct TMS, ETTM, cable, devices, electric, and electronic equipment properly and provide documentation to the Concessionaire.

3.6 Drainage, Erosion and Siltation, and Stormwater Management

3.6.1 Drainage

- A. Prior to the commencement of construction Work, the Contractor will determine all existing drainage facilities that will be utilized and left in place for continued use. The Contractor shall perform such activities as may be necessary to cause such facilities to be completely clean and free of debris and silt prior to the commencement of construction Work on or near such existing drainage facilities. The Contractor shall be responsible for cleaning any debris or silt accumulation caused by performance of the construction Work from all (pre-existing and new) Opitz Express Lanes drainage facilities.
- B. As part of the Work, the Design Plans may require Contractor to tie in or connect new drainage assets it is constructing to existing drainage assets present along the I-95 Corridor as of the Contract Date. If there is an existing drainage asset the Design Plans show to tie in or connect to, and the Design Plans or the Pipe Condition Report provided during the Proposal period show physical damage to such existing drainage asset, the Contractor shall repair or replace the existing drainage asset in the immediate area of the proposed tie-in or connection so it can perform the proposed tie-in or connection. Any such repair or replacement work shall be completed in accordance with the standards and specifications.
- C. All existing culverts, storm sewer, and drainage appurtenances to be abandoned shall be removed and backfilled or filled and plugged with flowable fill.
- D. During the Work period the Contractor shall provide for positive drainage of all roadway facilities open to construction traffic. Construction activities shall not redirect or add drainage run-off to a private property.

3.6.2 Erosion and Siltation

- A. The Contractor shall exercise temporary and permanent measures, throughout the Term, to control erosion and prevent or minimize siltation of rivers, streams, lakes, and impoundments. Erosion and sediment control measures will be installed in accordance with applicable standards and specifications set forth in the Contract.

- B. Erosion and sediment control measures shall be applied to erodible material exposed by any activity associated with construction, including local material sources, stockpiles, disposal areas, and haul roads. Temporary measures shall be coordinated with the Work to ensure effective and continuous erosion and siltation control. Permanent erosion control measures and drainage facilities shall be installed and operational as the Work progresses before temporary measures are removed.
- C. Erosion and siltation control devices and measures shall be maintained in a functional condition at all times. The Contractor shall have, within the limits of the Opitz Project during all land disturbing activities, an employee certified by the VDOT in Erosion and Sediment Control who shall inspect erosion and siltation control devices and measures for proper installation and deficiencies immediately after each rainfall, at least daily during prolonged rainfall, and weekly when no rainfall event occurs. The Contractor shall make a daily review of the location of silt fences and filter barriers to ensure that they are properly located for effectiveness. Deficiencies shall be corrected immediately. Such employee shall also be certified through the Department of Environmental Quality Inspection Certification Program.
- D. Failure on the part of the Contractor to maintain appropriate erosion and siltation control devices in a functioning condition may result in the Concessionaire notifying the Contractor in writing of specific deficiencies. The Contractor shall correct or take appropriate actions to correct the specified deficiencies within 24 hours after receipt of such notification.
- E. Failure of the Contractor to maintain a VDOT-certified Erosion and Sediment Control employee within the Opitz Project Right of Way will result in a Opitz Project non-compliance and suspension of Work related to any land disturbing activity until such time as a certified Erosion and Sediment Control employee is present on the Opitz Project.
- F. Except as set forth in the Contract, the Contractor shall be responsible for all costs, fines, penalties, and delays associated with any non-compliant items.

3.6.3 Storm Water Pollution Prevention Plan and Virginia Stormwater Management Program General Permit for the Discharge of Stormwater from Construction Activities

- A. The Contractor shall be responsible for reading, understanding, and complying with all the terms, conditions and requirements of the permit and the SWPPP, including the following:
 1. **Opitz Project Implementation Responsibilities.** The Contractor shall be responsible for the installation, maintenance, inspection, and, on a daily basis, ensuring the functionality of all erosion and sediment control measures and all other stormwater and pollutant runoff control measures identified within or referenced within the SWPPP,

plans, specifications, permits, and elsewhere in the Contract, including these Technical Requirements. The Contractor shall take all reasonable steps to prevent or minimize any stormwater or non-stormwater discharge that will have a reasonable likelihood of adversely affecting human health or public and/or private properties.

2. **Certification Requirements.** In addition to satisfying the personnel certification requirements contained herein, the Contractor shall certify its activities by completing, signing, and submitting Form C-45 VDOT SWPPP Contractor and Subcontractor Certification Statement to the Concessionaire at least seven days prior to commencing any Opitz Project related land- disturbing activities, both on-site and off-site.
3. **SWPPP Requirements for Support Facilities.** The Contractor shall develop a SWPPP with an ESC Plan, a P2 Plan, and a SWM Plan for submission and acceptance by the Concessionaire prior to usage of any on-site or off-site support facilities, including borrow and disposal areas, construction and waste material storage areas, equipment and vehicle storage and fueling areas, storage areas for fertilizers or chemicals, sanitary waste facilities, and any other areas that may generate a stormwater or non-storm water discharge related to performance of the Work. Such plans shall document the location and description of potential pollutant sources from these areas and shall include a description of the controls to reduce, prevent and control pollutants from these sources including spill prevention and response. If the VPDES permit was previously applied for without including the Support Facilities, the Contractor will need to revise the SWPPP and may need to file a VPDES permit modification.
4. **Reporting Procedures**
 - i. **Inspection Requirements.** The Contractor shall be responsible for conducting inspections in accordance with the requirements herein. The Contractor shall document such inspections by completion of Form C-107, Construction Runoff Control Inspection Form and Continuation Sheet, in strict accordance with the directions contained within the form.
 - ii. **Unauthorized Discharge Requirements.** The Contractor shall not discharge into state waters sewage, industrial wastes, other wastes or any noxious or deleterious substances nor shall otherwise alter the physical, chemical, or biological properties of such waters that render such waters detrimental for or to domestic use, industrial consumption, recreational or other public uses.

- iii. **Notification of non-compliant discharges.** The Contractor shall immediately notify the Concessionaire upon the discovery of, or potential of, any unauthorized, unusual, extraordinary, or non-compliant discharge from the land disturbing activity. Where immediate notification is not possible, such notification shall be not later than 24 hours after said discovery.
 - iv. **Detailed report requirements for non-compliant discharges.** The Contractor shall submit to the Concessionaire within five days of the discovery of any actual or potential non-compliant discharge, a written report describing details of the discharge to include its volume, location, cause, and any apparent or potential effects on private and/or public properties and state waters or endangerment to public health, as well as steps being taken to eliminate the discharge. A completed Form C-107 shall be included in such reports.
5. **Changes, Deficiencies and Revisions**
- i. **Changes and Deficiencies.** The Contractor shall report to the Concessionaire when any planned physical alterations or additions are made to the land disturbing activity or deficiencies in the Opitz Project plans or the Contract, including these Technical Requirements are discovered that could significantly change the nature or increase the quantity of the pollutants discharged from the land disturbing activity to surface waters.
 - ii. **Revisions to the SWPPP.** Where site conditions or construction sequencing or scheduling necessitates revisions or modifications to the erosion and sediment control plan, storm water management plan, or any other component of the SWPPP for the land disturbing activity, such revisions or modifications shall be approved by the Concessionaire and shall be documented by the Contractor on a designated plan set. Such plans shall be kept on the Opitz Project site at all times and shall be available for review upon request. If a revision to the SWPPP results in a significant increase to the project Land Disturbance Area, the Contractor may need to file a VPDES permit modification.
6. The Contractor shall not proceed with work to be covered by the permit until permit coverage is secured and the Concessionaire releases the work in writing. The Contractor shall provide a completed SWPPP Certification form (LD-445E) before commencement of any land disturbing activity.
7. The Contractor shall be responsible for compliance with construction-related permit conditions and shall assume all

obligations and costs incurred by complying with the terms and conditions of the permit.

8. The Contractor shall also have on-site during any land disturbing operations an individual or individuals holding a VDEQ Inspector Certification, a VDEQ Responsible Land Disturber (RLD) Certification and a VDOT Erosion and Sediment Control Contractor Certification (ESCCC) to ensure compliance with all VDEQ and VDOT erosion and sediment control plan implementation requirements. It shall be the responsibility of the Contractor's certified ESCCC representative and the Contractor's VDEQ certified ESC Inspector to monitor Project compliance with the approved SWPPP. The Contractor's VDEQ certified ESC Inspector must represent the Quality Assurance firm for the Project. The inspections carried out by the Contractor's certified ESCCC representative and the Contractor's VDEQ certified ESC Inspector shall be in accordance with VDOT *Minimum Requirements for Quality Assurance & Quality Control on Design-Build & Public-Private Transportation Act Projects (July 2018)* and the Concessionaire's requirements. The inspections shall be documented and certified by both the Contractor's ESCCC representative and the Contractor's VDEQ certified ESC Inspector on the Construction Runoff Control Inspection Form (C-107 Part I).
9. Upon completion of the entire regulated land disturbing activity (including final stabilization of all disturbed areas), the Contractor shall provide the As-built documents in accordance with Section 3.1.8 and complete the VPDES Construction Permit Termination Notice form (LD-445D) and submit both documents (without signature) to the Concessionaire for processing.

3.7 Not Used

3.8 Pavement

3.8.1 Minimum Pavement Sections

- A. All existing paved shoulders and existing gore areas shall be cut with a smooth vertical face to expose the full depth of the existing mainline pavement structure, demolished and reconstructed with the mainline I-95 pavement section identified below. All underdrains beneath the existing paved shoulders shall be removed and replaced to the nearest available outlet.
- B. Pavement construction shall meet the requirements of the federal pavement policy, 23 CFR 626 (Chapter 1).
- C. The area surrounding pavements shall be graded to direct surface water away from paved areas. Any utility excavations or excavations for storm drains

within pavement areas shall be backfilled with compacted structural fill in accordance with applicable sections of the Road and Bridge Specifications and applicable special provisions.

3.8.2 Temporary Pavement

- A. The Contractor shall be responsible for any temporary pavement design and construction. Temporary pavements shall be designed in accordance with the AASHTO Guide for the Design of Pavement Structures (1993 edition) and the VDOT Materials Division's Manual of Instructions. All temporary pavement designs shall be submitted to the Concessionaire for review and approval. All temporary pavement designs for interstate mainline or ramp pavements shall have a minimum 6 inches of asphalt concrete and shall meet the following minimum design criteria:
- Design Life – 6 months minimum or such longer duration as may be required per the Contractor's construction sequencing
 - Reliability – eighty-five percent (85%) minimum
 - Initial Serviceability – 4.2 minimum
 - Terminal Serviceability – 2.8 minimum
 - Standard Deviation – 0.49 minimum
 - CBR value for subgrade soils determined through laboratory tests.
- B. Temporary pavement shall be required for all locations where the Contractor will shift traffic onto an existing shoulder. If the existing shoulder is currently paved, the pavement must either meet or be modified to meet the requirements in Section 3.8.2.A.
- C. Temporary pavement that is installed to strengthen the existing shoulder pavement to meet the requirements of Section 3.8.2.A. shall remain in place once the Work is complete. Temporary pavement that is installed outside the limits of the existing shoulder pavement shall be completely removed once it is no longer in service.
- D. The Contractor shall be responsible for maintenance of all temporary pavements and temporary pavement markings.
- E. Any paved shoulder areas used for temporary traffic shall be restored after any such temporary use for the Project has concluded. This restoration work must include the milling of two inches of existing asphalt and placement of a new two-inch asphalt concrete surface course (SM-12.5E) overlay, and the installation of rumble strips, pavement markings and/or raised markers in accordance with VDOT requirements.

3.9 Traffic Engineering

3.9.1 Not Used

3.9.2 Pavement Markings

- A. The Contractor shall provide and maintain pavement markings and reflective pavement markers meeting the applicable standards and specifications set forth in the Contract.
- B. On any pavement reconstruction undertaken by the Contractor, the Contractor shall tie in and match the existing permanent pavement marking systems.
- C. Temporary pavement markings and striping shall not be placed on the final surface course unless approved by the Concessionaire.
- D. All existing pavement markings and markers that do not conform to the final traffic patterns shall be eradicated and removed in accordance with the Contract.
- E. Permanent pavement markings (lane division lines, edge lines, ramp and gore markings) on the 95 Express Lanes and ramps and the I-95 General Purpose lanes and ramps shall be Type B, Class VI, patterned pre-formed tape. All other pavement markings shall conform to the Road and Bridge Specifications.
- F. High-Contrast Pavement Markings shall be used on all bridge decks and concrete pavements.
- G. The use of thermoplastic pavement markings and pavement marking tape shall conform to the applicable standards and specifications in the Contract.
- H. Channelizing posts used in the Emergency crossovers shall match existing channelizing posts on 95 Express Lanes and be yellow in color for reversible and opposing movement.
- I. Metal casing inlaid pavement markers shall not be used. Any existing metal casing inlaid pavement markers shall be removed and replaced when any lane shifts are implemented for construction sequencing or maintenance of traffic. New or replacement plastic inlaid markers shall meet the requirements of the Road and Bridge Standards PM-8 and other applicable standards and specifications set forth in the Contract.

3.9.3 Static Signs

- A. The Contractor shall relocate all signs within the construction limits that conflict with construction work. Signs that are not needed for the safe and orderly control of traffic during construction may be removed and stored in a manner that will preclude damage and reinstalled in their permanent locations prior to Service Commencement.

- B. The Contractor shall maintain all existing signs during construction, unless they are to be removed permanently or have been replaced as required by the Opitz Project. For any existing signs that require relocation due to construction, the Contractor shall present pertinent details, such as sign designs, mounting details, locations, and existing condition, for the Concessionaire's review and comment, prior to relocation.
- C. The Contractor shall prepare and submit for approval a Sign Sequencing Plan and a Sign Unveiling Plan. The Contractor may prepare separate sign unveiling plans for each of the respective openings of the Dale Boulevard Slip Ramp and the Opitz Boulevard Ramp. The Sign Sequencing Plan shall be coordinated with the Opitz Project TMP. The Sign Unveiling Plan shall be coordinated with the Opitz Project TMP and the opening schedule of the slip ramp and the completed lanes. Each plan shall be approved by the Concessionaire prior to implementation. These plans shall provide a detailed sequence for covering and removing the existing signs and unveiling the covered existing and completed proposed signs. The Sign Sequencing Plan shall be focused on signs during construction activities while the Sign Unveiling Plan shall be focused on opening the completed lanes to traffic. The Concessionaire will coordinate with the Contractor to provide a permitted timeframe to implement these plans. The respective Sign Unveiling Plan(s) shall be finalized no later than sixty (60) days prior to each of the Dale Boulevard Slip Ramp Opening and Service Commencement.

3.9.4 Traffic Signals

- A. The Contractor shall provide communications between all temporary and permanent traffic signals for the Opitz Project and the maintaining agency's traffic signal system. The communications medium shall be broadband and compatible with the maintaining agency's communication system or plan. The broadband connection from the service provider shall be hard wired.
- B. New traffic signals on the Opitz Project will be integrated with existing traffic signals using the following approach:
 - 1. Based on information provided by VDOT, the Contractor shall program, adjust controller timings, test, and commission the new signalized intersection(s) and existing impacted or modified signalized intersection(s) for coordinated operations in accordance with the maintaining agency's traffic signal coordination plans.
 - 2. For any existing signalized intersection(s) that are not impacted by the Contractor for the Opitz Project, the maintaining agency will test and commission for network operations with the existing traffic signal system(s) in accordance with the updated signal coordination plans and will re-time network signals, as needed, to accommodate network demand.

3. The maintaining agency will be responsible for optimizing traffic signal timing at intersections with Opitz Project entry and exit ramps and approaching roadways to ensure that traffic does not normally produce queues that create a safety hazard on either the Opitz Project or the approaching roadways.
- C. The Contractor shall keep the existing signalized intersections within the Rights of Way functional during the Work period. If signals must be shut down, the Contractor shall provide temporary signals or appropriate traffic controls. Temporary signal shut down without replacement shall not be permitted.
 - D. If the Contractor revises any temporary traffic control phase and impacts traffic signals, the Contractor shall develop signal timing plans for the Opitz Project and roadways designated as detours, if applicable, and submit the plans to the Concessionaire. The Contractor shall implement, test, and adjust signal timings to prevailing conditions.
 - E. The Contractor shall install and be responsible for all aspects of temporary and permanent traffic signal installation to include but not be limited to obtaining permits, installation, rehabilitation of disturbed areas, and acquiring dedicated SE-5 metered electric service power and hard wired broadband communication connections.
 - F. The Concessionaire shall install and connect dedicated SE-5 metered electric service power service for temporary and permanent traffic signals for the Opitz Project.
 - G. Conductor/communication cables shall be placed in buried conduit, embedded conduit, and structure and bridge-mounted conduit. The Contractor shall not open trench any existing pavement for the installation of conduit, except in areas that will be overlaid or rebuilt. For overlays over trench areas, the new pavement section shall match the existing pavement section.

3.9.5 Roadway Lighting

- A. Temporary and permanent lighting facilities for the project shall be installed to ensure lighting facilities meet current VDOT Lighting Design Standards and Guidelines (found in Chapter 2 of the VDOT Traffic Engineering Design Manual) and ANSI/IESNA RP-8 requirements.
- B. Light Emitting Diode (LED) luminaires shall be used for all new lighting.
- C. The Contractor shall preserve all existing lighting assets along the I-95 Corridor throughout the Construction Period in order to avoid a diminution of the existing lighting conditions for a period of more than thirty (30) days unless otherwise approved by the Concessionaire. If the necessary repair or replacement of an existing lighting asset cannot be completed within the 30

day period, the Contractor shall provide, prior to the expiration of the 30 day period, temporary lighting equipment until the completion of the repair or replacement Work.

- D. The Contractor shall install new or replacement roadway lighting as necessary to provide equal or better lighting conditions for any existing permanent roadway lighting that is impacted by the Contractor's Work.

3.9.6 Power

- A. The Contractor shall install and connect electrical power service to sustain all operations for the ETTM system, including all other facilities required for the Opitz Project.
- B. Junction boxes shall not be combined for Concessionaire and VDOT power facilities.
- C. The Contractor is responsible to perform or cause to be performed the supply, and installation of all new power feeds (from service panel to power source) necessary or feed modifications requiring service upgrade from the electric utility company as part of the Work.
- D. The Contractor shall install and have connected dedicated metered SE-5 power service for new or relocated traffic signals and separate dedicated metered power service for lighting (sign, roadway, and interchange) for the Opitz Project.
- E. The Contractor shall provide back-up electrical power service to support operations and maintenance work in emergency situations where the primary power source is not available, where practical.
- F. The power supply for the ETTM Equipment shall be metered independent from any non-ETTM Equipment. The power supply for any Opitz Project equipment (including lighting) shall be metered independent from any VDOT power supply. The power supplies for all (both Concessionaire and VDOT owned) existing roadside equipment and infrastructure must remain in service at all times.
- G. Phase taping of electrical conductors shall not be permitted. Electrical conductors shall have a continuous colored jacket between connection and termination points.
- H. Power infrastructure shall not share conduit or junction boxes with communications infrastructure.
- I. The minimum size of electrical junction boxes for lighting power shall be JB-S2 or JB-R2.

3.10 Fences and Barriers

- A. The Contractor shall be responsible for securing the Work and providing all temporary fencing necessary to ensure the safety of the work force and members of the public.
- B. Fencing on bridges and abutments, where applicable shall be black, vinyl coated, ClearVu, Beta, BearGrille mesh or equivalent. All fences and handrails shall be grounded in accordance with VDOT Road and Bridge Standards, and VDOT Road and Bridge Specifications, Sections 410, 504, and 507. The proposed fence and railing shall be grounded according to the National Electric Code (NEC).

3.11 Not Used

3.12 Not Used

3.13 Not Used

3.14 Bicycle and Pedestrian Facilities

- A. All existing pedestrian and bicycle facilities shall be maintained throughout construction until permanent facilities can be fully opened. Any temporary pedestrian or bicycle facility closure request shall be submitted in writing to the Concessionaire for review and comment.
- B. Opening of the new sidewalk shall be coordinated with the Concessionaire and the Neabsco-Potomac Commuter Parking Garage Project. The sidewalk shall not be put into service until approved by the Concessionaire.

3.15 Structures and Bridges

3.15.1 Bridges and Culverts

- A. General Requirements
 - 1. The Contractor shall comply with VDOT's Manual for the Structure and Bridge Division.
 - 2. Furnishing and placing hydraulic cement concrete for concrete elements whose minimum dimensions exceed five (5) feet shall be performed in accordance with the *Special Provision for Hydraulic Cement Concrete for Massive Construction*. Regardless of minimum concrete element dimensions, the maximum allowable thermal gradient between the core and skin temperature of a concrete pour is limited to 35° Fahrenheit and the maximum allowable temperature in any portion of the concrete pour shall be 170° Fahrenheit for slag

and cement mixes and 160° Fahrenheit for fly ash and cement mixes. For concrete elements where the minimum dimension is five (5) feet or less, and where the potential for exceeding the maximum allowable thermal gradient and maximum allowable temperature limits above may exist, it shall be the Contractor's responsibility to determine if the *Special Provision Hydraulic Cement Concrete for Massive Construction* should be used for furnishing and placing the hydraulic cement concrete for such elements.

B. Superstructure

1. The Contractor shall submit girder erection plans, procedures and calculations in accordance with the Contract.

C. Substructure

1. The Contractor shall ensure that all recommendations related to the suitability of foundation material for spread footings at the time of construction are confirmed in the field by the Concessionaire's Geotechnical Engineer registered and licensed by the Commonwealth of Virginia.

D. Existing Bridges

1. General Requirements

- a. It is the Contractor's responsibility to obtain and verify any required as-built field details and dimensions needed for any purpose, including but not limited to modifying or dismantling any existing bridge.
- b. To obtain copies of Bridge Safety Inspection Reports, the Contractor must complete a CII/SSI Non-Disclosure Contract as outlined in IIM- S&B-71 Critical Infrastructure Information (CII)/Sensitive Security Information (SSI).

2. Not Used

3. Additional Requirements

- a. Existing structural approach slabs shall be in accordance with File No. 06.07 of Part 2, of the Manual of the Structure and Bridge Division where the existing bridge is being widened or where the travel lanes are being modified unless otherwise approved.

- b. The location of any deck construction joint shall be over a girder and between shear connectors from the girder to the deck, unless otherwise approved.

4. Dismantling and Removing Existing Structures or Removing Portions of Existing Structures

With any demolition and temporary support over or adjacent to live traffic, the Contractor shall submit a plan for review and approval prior to the commencement of any demolition work. The demolition plan shall include, but is not limited to, details of protection of the underlying bridges, roadway, and users. The Contractor shall determine the effect of equipment loads on the bridge structure, and develop and submit plans that show the procedures for using the loaded equipment without exceeding the structure's design capacity. The Contractor's plans shall be signed and sealed by a Professional Engineer licensed by the Commonwealth of Virginia.

5. Not Used

E. Not Used

F. Not Used

G. Safety and Acceptance Inspection for Bridges

1. Acceptance of the bridge structure will require the following two independent inspections:
2. A satisfactory safety and inventory inspection as described below is required prior to opening the structure or portion of the structure to public traffic. This safety and inventory inspection by VDOT will serve as the initial inspection of the structure. Data gathered will include, at a minimum, location, date completed, alignment, description, horizontal and vertical clearances, structure element description and condition data, and traffic safety features. Such inspections will be required prior to opening any newly constructed portion or phase of the bridge to traffic.
3. A satisfactory final construction inspection by VDOT is required prior to acceptance of the structure. To facilitate inspection of the structure, the Contractor shall ensure that all structural elements are accessible and shall provide adequate resources including:
 - a. Man-lifts, bucket trucks, under bridge inspection vehicles, or other equipment necessary to inspect the structure, as well as properly trained staff of sufficient composition to support the inspections; and

- b. Plans, procedures, personnel, and equipment to implement traffic control measures.
4. The Contractor shall provide a minimum of thirty (30) days' notice to Concessionaire whenever it requires VDOT to undertake an inspection. The Contractor's notice shall include the latest version of the plans (including all field design changes), traffic control procedures, a description of the items to be inspected and an anticipated schedule for the inspections.
5. Unless otherwise approved, structures shall be substantially complete (i.e., roadway, slopes on the approaches, and slopes underneath the structure are already in place) before the final construction inspection will be performed.

H. Not Used

3.15.2 Retaining Walls

A. General Requirements

1. Should any standard for retaining walls not be in accordance with AASHTO LRFD, then the Contractor shall verify design and implement a modified version of the requirement such that it is in compliance with AASHTO LRFD.
2. Retaining walls at bridge abutments shall be designed for a minimum service life of 100 years.
3. Except for tie-backs required for the support of retaining walls, all components of the retaining walls shall be contained within VDOT's right-of-way. Tie-backs for retaining walls may be located within permanent underground easements provided that such easements are approved.
4. MSE walls that require traffic protection at the top shall use barriers or railings on moment slabs.
5. Parapets/railings and moment slabs located on top of MSE walls shall use Concrete Low Shrinkage Class A4 Modified.
6. Concrete paved ditches shall be used behind retaining walls, except where the top of the wall is located adjacent to a roadway shoulder in which case an approved concrete barrier system shall be used. Paved ditches shall extend to the back face of the retaining wall. For soldier pile retaining walls, where a post extends behind a retaining wall panel, the ditch shall be located adjacent to the post. The area between the edge of the ditch and the back of the retaining wall panel

shall be paved with 4 inches thick concrete, graded to drain away from the wall.

3.15.3 Traffic Structures

A. General

1. If required, Lane Use Management Signs (LUMS) shall be treated in the same manner as overhead sign structures that support variable message signs except that LUMS may be erected on cantilever structures.
2. Small (i.e., 48" x 48' max. size) regulatory type sign panels on bridge structures may be installed using brackets attached to bridge parapets and deck slabs. The edge of sign panels shall clear parapet or rail by a minimum of 12 inches.
3. Span type overhead sign structures shall not be supported on bridge deck blisters. Sign structures shall be supported on pier caps or independent foundations, unless prior written permission allows for mounting to a frame supported by the superstructure. The main bridge beams and girders shall be investigated for fatigue loading from wind loads of the sign structure. The minimum vertical clearance between the bridge deck and sign shall be in accordance with the VDOT Road and Bridge Standards. Cantilever overhead signs shall not be mounted on bridge superstructures or substructures.
4. All poles, including poles for lights, cameras, and microwave vehicle detectors, which are located within the clear zone shall be protected from vehicular impact by guardrail or barrier. Supports shall be configured such that the poles, baseplates and anchor bolts are not located within the Zone of Intrusion for Test Levels 2 and 3; and within the Truck Cab Zone of Intrusion for Test Level 4.

B. Existing Traffic Structures

1. Removed existing lighting poles shall not be reused (new lighting poles shall be required).
2. Existing overhead signs mounted to bridge fascia shall be completely removed, including frames, sign panels, hardware, and incidentals. Removed materials shall become the property of the Contractor and shall be properly disposed of off-site. Connection bolts anchored into concrete parapets shall be mechanically cut flush with the surface of the parapet, and then removed by mechanical drilling to a depth of one-half inch below the surface of the parapet. The holes shall be patched to match the color and texture of the existing parapet surface with hydraulic cement mortar or grout conforming to Section 218 of

the Road and Bridge Specifications. Connection bolts to steel beams shall be removed, and the affected areas of steel beams cleaned, primed, and painted in accordance with the requirements of Section 411 of the Road and Bridge Specifications to match the existing structure. Electrical service, where applicable, shall be disengaged at the nearest junction box, and all conductors shall be capped and sealed in place unless existing service is to be reused for lighting of replacement structures.

C. Inspection of Traffic Structures

1. Acceptance of new or modified traffic structures will require an initial safety inspection. The purpose of an initial inspection is to verify compliance with the requirements of IIM-S&B-82 *Traffic Structures* and to identify deficiencies, including incomplete work, and variances from approved plans and specifications and which must be rectified by the Contractor before the structure can be accepted.
2. The initial inspection shall be performed by VDOT. The Contractor shall provide Approved for Construction drawings and working drawings, including all revisions to the Concessionaire at least two weeks prior to scheduling the inspections.
3. During the initial inspection, data including but not limited to location, date completed, description, horizontal and vertical clearances, structure element description and condition, and traffic safety features will be gathered by the Contractor and verified by VDOT.
4. The Contractor shall ensure that all structural elements are accessible for inspection of all structures. This requirement may dictate that the Contractor provide man-lifts, barges, remote operated vehicles, bucket trucks, or other equipment necessary to inspect the structure and plans, personnel, and equipment to implement traffic control.
5. Upon completion of the initial inspection, Concessionaire will submit an inspection report to the Contractor within 10 days of the inspection either recommending acceptance of the structure or identifying deficiencies, including incomplete work, which must be rectified by the Contractor before the structure can be accepted. If a structure is not accepted, the Contractor shall rectify the deficiencies and certify in writing the deficiencies have been corrected. Within 5 days of receipt of such certification, a follow-up inspection may be performed to verify that the deficiencies have been corrected; upon such time, the Concessionaire will provide a written response to the Contractor as to whether the structure is acceptable or deficiencies still exist.

6. The final acceptance of traffic structures will occur when the initial inspection is completed and any necessary follow-up (verification) inspections are performed. The initial inspection may be accomplished through multiple inspections, as long as the inspection program is properly coordinated with all required participants.

3.15.4 Miscellaneous Requirements

- A. The parapet and barrier walls on structures may be constructed using slip forming after review and approval of a trial section.
- B. All temporary shoring and erection elements shall be dismantled and removed in their entirety following construction, unless otherwise approved.
- C. Where any part of a drilled shaft, footing, or any other stiff element is to be permanently located directly beneath any permanent pavement, there shall be a minimum clearance of five (5) feet from the top of finished grade to the top of drilled shaft, footing, or stiff element.
- D. Drilled shaft for support of bridges and retaining structures shall be constructed in accordance with the requirements of VDOT *Special Provision for Drilled Shafts Using Self-Consolidating Concrete* for Design-Build and PPTA Contracts.
- E. All structure and bridge working or shop drawings shall be reviewed prior to formal submittal. Each submitted working/shop drawing shall be individually annotated with the resulting disposition of the drawing after the review of each sheet. Supporting computations for shop drawings may be stamped on the cover sheet only. Annotation requirements apply to all structures, whether detailed by the supplier (e.g. MSE walls, noise barrier walls, etc.) or designed and detailed by the EOR (e.g. plate girders and prestressed beams).

3.16 Traffic Management System

3.16.1 General

- A. Definitions and abbreviations:
 1. ATMS – Advanced Traffic Management System
 2. Burn Period – The time duration required for the ITS devices to successfully operate over consecutive days in a real-world condition, without interruption due to device or system deficiencies or failures.
 3. Commissioning – The systematic verification of each component or system of the Opitz Project in question is physically complete, checked, calibrated, and safe for initial operation.
 4. HOT-OC – Express Lanes Operations Center

5. MPSTOC – McConnell Public Safety and Transportation Operations Center
6. NRO – VDOT Northern Region Operations
7. Roadside Equipment (RSE) – The Roadside Equipment is to include Dynamic Message Signs (DMS) to provide toll and driver information (T&DI) and general traffic management information; Pan-tilt-zoom (PTZ) CCTV and Automated Incident Detection (AID) cameras to provide video surveillance; traffic monitoring sensors to provide traffic volume, lane occupancy, and speed data; roadway gates (and all related systems) at all reversible access points, and all supporting electrical and communications equipment to support the Traffic Management System (TMS), including but not limited to service panels, generators and cabinets.
8. Traffic Management System – means any application of computer, electronics and/or telecommunications equipment and software and supporting fixtures and equipment whose function is to provide information, data and/or services to the traveling public, the Concessionaire or VDOT, or to manage and control traffic, and any future systems or services conceived or developed for the same or similar purposes.

3.16.2 Existing ITS Infrastructure

- A. Existing ITS roadside equipment and infrastructure is located within the Project limits. Portions of the ITS roadside equipment and infrastructure are owned and maintained by the VDOT while other portions are owned and maintained by the Concessionaire.
- B. Existing ITS roadside equipment may include, but is not limited to, the following equipment located within the Opitz Project Right of Way:
 1. Weather stations;
 2. DMS for the existing Express Lanes, and GP Lanes to provide general traffic management and Express Lanes regulatory information;
 3. Express Lanes access gates;
 4. CCTV and AID cameras;
 5. Traffic monitoring sensors (microwave vehicle detectors);
 6. Fiber optic cables;
 7. Generators and UPS; and

8. ITS and Electrical Cabinets.

- C. The Contractor shall relocate existing VDOT and Concessionaire ITS roadside equipment located within the Opitz Project Right of Way that is affected by construction, including power and communication service to the equipment, and shall ensure that loss of functionality is planned and minimized.
- D. The Concessionaire and VDOT will remain responsible for the operations and maintenance of the existing and relocated Concessionaire and VDOT ITS roadside equipment, respectively upon completion of construction.

3.16.3 Not Used

3.16.4 Not Used

3.16.5 Not Used

3.16.6 Not Used

3.16.7 Not Used

3.16.8 Not Used

3.16.9 Traffic Management System (TMS)

- A. The TMS is to comprise the following equipment and/or systems:
 - 1. ITS roadside equipment;
 - 2. Communications infrastructure between the ITS Roadside equipment and the HOT-OC; and
 - 3. TMS equipment and/or systems located in the HOT-OC and IRUs.
- B. The ITS roadside equipment is to include:
 - 1. DMS for the HOT Lanes to provide toll and driver information (T&DI) and general traffic management information;
 - 2. Pan-tilt-zoom (PTZ) CCTV cameras to provide video surveillance;
 - 3. traffic monitoring sensors to provide traffic volume, lane occupancy, and speed data;
 - 4. lane control devices, if applicable; and
 - 5. roadway gates (and all related systems) at all reversible access points.
- C. The TMS HOT-OC-based equipment and/or systems are to comprise:

1. Automatic Incident Detection (AID) subsystem
2. CCTV subsystem
3. CCCS

3.16.10 CCTV Video Coverage

- A. The Contractor shall replace the Concessionaire's cameras that are disturbed by the Work.
- B. All cameras installed by the Contractor shall meet the requirements of the Opitz Special Provision for Section 814 – Camera System.
- C. Where a Concessionaire camera is relocated from a mounting pole that also supports a VDOT camera, the Contractor shall modify the mounting pole upon relocation of Concessionaire camera to remove all defunct equipment to preserve functionality of the VDOT camera.

3.16.11 Not Used

3.16.12 Traffic Monitoring Sensors (Microwave Vehicle Detectors)

- A. Traffic monitoring sensors shall be installed on ITS poles based on the manufacturer's recommended mounting heights and roadway geometry.

3.16.13 Not Used

3.16.14 Not Used

3.16.15 Communications Infrastructure

- A. The Contractor shall furnish and install new ITS equipment cabinets for exclusive use to support the Opitz Project devices. Existing Concessionaire equipment cabinets shall not be used. The Contractor shall remove all defunct equipment.
- B. The Contractor shall furnish and install new conduit for exclusive use by the Express Lanes ITS equipment. Existing Concessionaire conduits shall not be used. The Contractor shall remove all defunct equipment.
- C. Where equipment is relocated or removed from an existing Concessionaire cabinet, the Contractor shall remove all non-operational equipment, and the cabinet must be kept in a manner that preserves the functionality of any remaining Concessionaire equipment.
- D. Locator Wire

1. All duct banks, trenches, and bores containing non-metallic conduits with non-locatable cable (fiber optic) shall have at least one locator wire installed between all junction boxes or cabinets.
2. At all locations where non-locatable conduit is installed in a common trench, and a non-locatable conduit diverges from the common trench, a locator wire shall be installed in both trenches.
3. All locator wires shall be installed inside of conduit and shall run continuously from junction box to junction box.
4. Locator wire shall be an insulated #8 AWG stranded copper wire. The insulation shall not be green in color.

3.16.16 Existing VDOT TMS Roadside Equipment

- A. Existing VDOT TMS roadside equipment or third-party TMS roadside equipment installed under permit with the VDOT may include the following equipment located within the Opitz Project Right of Way:
 1. weather stations;
 2. DMS for the existing GP Lanes to provide general traffic management and HOV regulatory information;
 3. CCTV cameras; and
 4. traffic monitoring sensors.
- B. The Contractor shall relocate existing Concessionaire TMS roadside equipment located within the Opitz Project Right of Way that is affected by construction, including power and communication service to the equipment, and shall ensure that loss of functionality is planned and minimized.
- C. Any third-party TMS roadside equipment located within the Opitz Project Right of Way that is affected by construction, including power and communication service to the equipment, shall be relocated by the third-party equipment owner under the direction of the Concessionaire at no cost to the Contractor. The Contractor shall provide notification of disturbance of equipment three weeks prior to commencing such activities.
- D. VDOT will remain responsible for the operations and maintenance of the existing and relocated VDOT TMS roadside equipment.
- E. Third-party equipment owners shall remain responsible for the operation and maintenance of their existing and relocated TMS roadside equipment.

3.16.17 Not Used

3.16.18 Not Used

3.16.19 Not Used

3.16.20 Security

- A. VDOT ITS and traffic signal cabinets shall be secured using Medeco XT Traffic Cabinet Locks and in accordance with the Virginia Information Technologies Agency (VITA) SEC-501 Information Security Standard.

3.16.21 Not Used

3.16.22 Not Used

3.16.23 Testing

- A. Testing shall be in accordance with the TMS Interface Plan.

3.16.24 Not Used

3.16.25 Not Used

3.16.26 Concessionaire Testing and Integration Obligations

- A. The Concessionaire will participate as necessary in the requirements for testing and integration as outlined above where such testing and integration involves the Concessionaire's or VDOT's equipment. The Contractor shall schedule adequate time for notification and testing by the Concessionaire.

3.16.27 Roadway Gates

- A. Gate cabinets shall be placed to ensure safe and unimpeded access by authorized personnel. Roadway gates shall be installed, including but not limited to tapered lengths and height above finished roadway, to fully close the ramps at all reversible access and egress points such that vehicles cannot go around a closed gate. Installed length of gates shall consider pavement markings, gore areas, and ramp widths.
- B. A gate cabinet shall be placed at locations where the technician and other authorized personnel can see the gates while working at the gate cabinet. All gates shall be viewable by at least one PTZ CCTV camera such that the gate open or close position can be visually confirmed by appropriate HOT-OC personnel.

3.16.28 Maintenance Access

- A. All RSE cabinets, foundations, concrete pads, and junction boxes shall be installed at elevations and locations that facilitate maintenance and provide safe access. Handrails shall be installed for protection at locations with fall hazards.
- B. Junction boxes shall not be installed in roadways, driveways, parking areas, ditches or public sidewalk curb ramps. The Contractor shall avoid placing junction boxes in low-lying locations with poor drainage. Electrical junction box length (long side) shall be parallel to the conduit run. When the conduit run is perpendicular to the roadway at the junction point, the junction box shall be parallel to the roadway. The maximum spacing between any two adjacent electrical junction boxes shall be 500 feet. The maximum spacing between any two adjacent communication junction boxes be 500 feet.

3.16.29 Specified New ITS Roadside Equipment

- A. New TMS Roadside Equipment used on the Opitz Project shall be as specified in the table below to ensure the equipment will be fully compatible with the existing 95 Express Lanes TMS and operating protocols.

Device	Equipment Make/Model	Firmware Version
Generator/Tank with PLC Comms from TS&T	**Cummins 35GG + Comm Cabinet	latest
Telemetry Remote Terminal Unit	Moxa ioLogic E4200	latest
Telemetry Remote Monitor	Cummins PowerCommand PCC500 (SNMP)	latest
Industrial Ethernet Access Switch	Cisco IE-4000-8T4G-E	latest
Industrial Ethernet Access Switch Power Supply	Cisco PWR-IE50W- AC	N/A
CCTV Pan-Tilt-Zoom Camera	CohuHD Costar 4260HD RISE 4260 Series Positioner	latest
CCTV Automatic Incident Detection Camera	Cohu 3430HD Series Fixed Barrel	latest
CCTV Pan-Tilt-Zoom Camera (VDOT)	CohuHD Costar 4220HD RISE 4260 Dome Positioner Series	latest
Microwave Vehicle Detection	Wavetronix Smart Sensor HD	latest
DMS Type 2	**Daktronics Vanguard VF-2420-64x192-20-RGB	latest
DMS Type 2A	**Daktronics Vanguard VF-2420-96x288-20-RGB	latest
Vertical Roadway Gate (Straight Arm Channel and Offset Arm)	B&B Roadway VW-4 Vertical Warning Gate	latest
Horizontal Roadway Gate	B&B Roadway HW-4 Horizontal Warning Gate	latest
Roadway Gate Controller	170E Controller with VDOT Firmware and 170 Ethernet Card	latest
Cabinet Power Strip	Digital Loggers Web Power Switch 7	latest
Uninterruptible Power Supply	ZincFive Ultra Power Stealth UPS with SNMP and 500W Battery	N/A
Traffic Cabinet Lock (VDOT)	Medeco XT Traffic Cabinet Lock	N/A

Device	Equipment Make/Model	Firmware Version
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Notes:

Firmware version indicates Equipment Make and Model Numbers required for seamless integration into existing TTMS software

***Indicates verification required based on project requirements*

DMS type and size shall be verified with the project requirements, design and specifications

Generator type and size shall be verified with the project requirements, design and specifications

Transurban Operations supplies gate firmware

Model numbers are subject to change based on product availability (successor model numbers shall be submitted to the Concessionaire for approval)

3.16.30 Maintenance of 95 Express Lanes Operating Systems

- A. No shutdown of the 95 Express Lanes System shall be permitted during the installation and testing of the Opitz Project elements.
- B. For any temporary impacts or isolated shut-down of system elements, the Contractor shall coordinate directly with the Concessionaire regarding any Work within the 95 Express Lanes or Concessionaire assets, or Work impacting any 95 Express Lanes facilities or equipment.

3.16.31 Notification of Impact (NOI) to Existing Concessionaire or VDOT Assets

- A. As part of the overall construction of the Project, a process for controlling the Work that will impact Concessionaire or VDOT traffic management system components (“the Assets”) is required. A significant portion of this work will depend on field conditions and the state of the system, neither of which can be determined during the design phase. The Impact of construction on the Assets shall be coordinated by the Contractor by the Notification of Impact (NOI) to the Concessionaire using the NOI process described in **Attachment 3**, Process for Notification of Impacts to Existing Assets. This notification process must begin a minimum of twenty-one (21) days prior to the proposed start of the Work impacting the Assets. This NOI process shall apply to all Assets that are impacted by the Contractor’s construction activities for the Project.
- B. The Work shall be governed by the general requirement that the impacted Assets shall be maintained or returned to a condition equal to or better than the condition at the start of construction unless otherwise indicated in the plans or approved by the Concessionaire. This shall include both the functionality and maintainability of the Asset.
- C. While this NOI process is intended to provide specific controls on work impacting the Asset, a number of factors both within and beyond the control of the Contractor may impact the Work. Specific elements of the proposed plan for the work involving the NOI, such as schedule or means and methods of completing the Work, may require revisions that are not consistent with these provisions in order to safely and effectively complete the Work. As such,

these provisions should be treated as a typical application and general framework for control of the Work. When deviations are required due to changing field conditions, no reasonable request for changes by the Contractor or the Concessionaire or VDOT may be denied without good cause.

- D. Plans related to the Assets have been prepared using a combination of original design drawings, as-built drawings, supplemental information provided by the Concessionaire or VDOT, and site visits. This NOI process recognizes that complete documentation of the existing Concessionaire or VDOT system is unavailable, the ability to field verify conditions as part of design is limited, and that conditions can change between the time of design and the time of construction. As part of the design development process, it has been agreed that certain information and decisions will be made during construction at such time that the elements of the system can be verified as to precise location and operational status. The Concessionaire and the Contractor shall work together to identify and coordinate those items that could not be addressed during design.
- E. The Concessionaire and the Contractor shall regularly work together to coordinate work that may impact the Assets. This coordination shall include, but not be limited to, Concessionaire staff and representatives attending regularly scheduled construction coordination meetings held by the Contractor.
- F. "Impact" is defined as any Work that will interrupt the normal operation of the Assets.
- G. No Work identified in the plans that impacts the Assets shall commence without prior notification to the Concessionaire per the provisions of this NOI process.
- H. The Contractor shall take all measures to protect the Assets during the course of the Work and maintain operation of the Assets. The means and methods for protecting the Assets shall be determined on a case-by-case basis appropriate to the scope of the work.
- I. The Concessionaire shall make staff available upon request to assist the Contractor in identifying existing system conflicts and operations; conducting Asset inspections; carrying out maintenance transfers; and testing and acceptance of completed work. The availability of Concessionaire staff shall be coordinated per the requirements of this NOI process. When unexpected conditions arise that requires the input of the Concessionaire, the Concessionaire shall make staff or authorized representatives available within forty-eight (48) hours of Concessionaire receipt of the Contractor's written request.
- J. The provisions of this NOI process shall apply to all Work impacting the Assets shown on the plans as well as to any of the Assets impacted during the

course of construction but not identified on the plans. When the Assets not identified on the plans are impacted, the Contractor shall follow the typical construction processes (such as RFI, FDC, and NDC) to identify and resolve the impact.

- K. The Concessionaire shall notify the Contractor of any impacts to operations that may be attributable to work at other sites that were not anticipated in the original notification. The Contractor and the Concessionaire shall coordinate as necessary for unanticipated impacts to operations.
- L. Unless specifically described on the plans or special provisions or directed by the Concessionaire in writing, means and methods for completing the Work related to impacted Assets shall be at the discretion of the Contractor. Means and methods shall be consistent with the requirements of the Contract.
- M. With the exception of the notification form, written correspondence may include e-mail to those parties listed as contacts in this NOI process or the notification form. Written correspondence shall reference the relevant notification ID number and phase of the process.
- N. Responsibility for maintenance of impacted Asset shall transfer to the Contractor per the approved schedule for start of the Work unless otherwise noted on the notification form. Responsibility for maintenance will transfer back to the Concessionaire or VDOT upon Final Completion of the work as detailed in the notification process. During the period when maintenance of the Asset has been transferred to the Contractor, events outside the control of the Contractor that impact the condition of the Asset shall be addressed by the Concessionaire including warranty claims and at-fault third parties. The Concessionaire shall be notified immediately of any damage to existing Assets.
- O. The Contractor shall be required to submit an amended NOI if work described in initial notification is performed at least forty-eight (48) hours after date stated in the NOI form.
- P. The Contractor shall document all changes to Concessionaire or VDOT infrastructure as a result of work in the NOI in the as-built documentation according to the as-built requirements set forth in the Technical Requirements. The as-built documentation will be required for all impacted Assets even if such Asset is not shown on the Design Plans.

3.17 Maintenance During Construction

- A. The Contractor shall prosecute the Work so as to avoid obstructions to traffic to the greatest extent practicable. The Contractor shall provide for the safety and convenience of the general public and residents along the roadway and the protection of persons and property.

- B. The Contractor shall maintain the Work from the beginning of construction operations until Final Completion.
- C. The Contractor shall keep the portions of the road being used by the public free from irregularities and obstructions that could present a hazard or annoyance to traffic.
- D. Existing VDOT Transportation Management System (TMS) devices in the general purpose lanes shall remain operational during construction unless otherwise approved by the Concessionaire and VDOT. These TMS devices include, but are not limited to: (i) closed-circuit television (CCTV) cameras; (ii) dynamic message signs (DMS); (iii) ramp metering; (iv) detection; (v) mile markers; (vi) the reversible gate system; (vii) roadway lighting; and (viii) weather stations.
- E. Existing detection (traffic sensors) shall remain in place during construction activities unless written approval is provided by the Concessionaire. Replacement detection shall be installed, operational, integrated, and collecting data before taking existing detection out of service.
- F. The existing continuous count stations shall remain in place and fully operational.
- G. The Concessionaire, or VDOT as applicable, will maintain all roadways and structures used by public, pedestrian and vehicular traffic at its expense, until such time as the paved surface and roadside appurtenances in the active construction work area are significantly impacted by the Contractor's construction activities. (Significant impacts include pavement marking eradication, traffic lane shifts, surface paving, placement of temporary traffic barrier service, or similar activities). The highway trucks hauling material on the paved surface are not considered significant impacts. Once the Contractor significantly impacts the active construction work area, the Contractor shall be responsible for that active construction work area until its Final Completion. The Contractor shall be responsible for all maintenance in significant impacted active construction work areas including repairs to the roadway surfaces (fixing holes in the hard surface, patching the potholes and providing smooth surface).
- H. The Contractor shall be responsible for the maintenance of the significant impacted assets in accordance with standard Concessionaire maintenance requirements. Significant impacted assets for which the owning authority is other than the Concessionaire shall be maintained by the Contractor until such time as they are no longer impacted by construction and accepted back by the owning authority.
- I. Where traffic will operate on surfaces other than final surface or final alignment, the Contractor shall be responsible for maintenance of these

roadways, including repair of any damage caused by its operations or use by public traffic.

- J. The existing drainage system will be maintained by the Concessionaire, or VDOT as applicable, until the Contractor or any of the Contractor's contractors start impacting the drainage system, at which time all drainage assets within the impacted drainage system will become the Contractor's responsibility.
- K. At no time shall the lights in GP Lanes and other roadways be put out of service, unless mutually agreed between the Parties for the purposes of cutover, testing or integration into the ETTM System or NRO PSTOC ATMS.
- L. The existing signal, lighting, and ITS systems will be maintained by the Concessionaire, or VDOT as applicable, until the Contractor or any of the Contractor's subcontractors begin impacting these assets, at which time impacted signal, lighting and impacted ITS assets within the Opitz Project limits will become the Contractor's responsibility. If there is an existing asset the Contractor desires to tie in or connect to, but is prevented from doing so because of physical damage to such existing asset the Contractor may perform the repair work at its sole cost and expense. Once the Contractor has completed the work, and the work is accepted by the Concessionaire, the maintenance activities will revert to the Concessionaire's responsibility.
- M. VDOT will perform snow and ice removal on all travel ways.
- N. The Contractor's maintenance of the active construction work area shall be to the level of quality condition existing in the relevant active construction work area at the time Contractor takes control of the active construction work area.

3.18 As-Built Documents

- A. As a condition to Final Completion, the Contractor shall provide to the Concessionaire As-built documents for the Project as described in this Section 3.18 and in accordance with the requirements set forth in the following:
 - 1. the Contract, including these Technical Requirements;
 - 2. VDOT CADD Manual;
 - 3. VDOT Road Design Manual;
 - 4. VDOT Survey Manual; and
 - 5. VDOT Post Construction Manual.
- B. The As-built documents to be provided by the Contractor throughout the Construction Period shall include a marked-up redline set of the Design Plans detailing the As-built conditions and a database of the As-built survey data for

the Work elements that deviate from the locations, dimensions, elevations, and/or conditions detailed in the Design Plans. Additionally, the Contractor shall provide As-built documents as detailed below for the TMS elements and drainage elements of the Work. The As-built survey data will serve as a permanent record of the actual location of all constructed elements.

C. The Concessionaire's Engineer of Record will be responsible for preparing the final As-built record plans based on the As-built documents provided by the Contractor.

D. Traffic Management System

1. The As-Built documents shall have Global Positioning System (GPS) location data of all installed devices, including but not limited to: junction boxes (electrical and communication), splice cabinets, CCTV and AID cameras, Dynamic Message Sign (DMS), Microwave Vehicle Detectors, gates, Lane Use Management System (LUMS), pole and ground mounted cabinets, roadway lighting and electrical service panel. A detailed list or spreadsheet of all installed or modified TMS field devices, including at least the device location, model number, serial number, and test acceptance date shall be part of the As-Built documents.
2. The As-built documents shall provide fiber optic splicing diagrams at every splice point (cabinet or underground) detailing all cable splices, terminations, equipment port assignments, and optical circuits within the communication network. Document the sequential cable length markings at each splice box and pull box wall that the cable passes through, and include the information in the As-built documents.
3. The As-built documents shall provide splicing details for all existing VDOT or Concessionaire cabinets that have had splicing altered. Splicing details shall include specific fiber numbers.
4. The As-built documents shall provide a complete set of marked plans showing all bores (successful and failed) on completing the work. Ensure that the plans are dimensionally correct copies of the Design Plans and include roadway plan and profile, cross-section, boring location and subsurface conditions. The plans must show appropriate elevations referenced to a permanent VDOT or Concessionaire feature (such as mast arm foundation, manhole inlet cover, or head wall). Plans must be same scale in black ink on white paper, of the same size and weight as the Design Plans. Specific As-built documents content requirements include but may not be limited to the following:

- i. The construction plan view shows the center line location of each facility installed, or installed and placed out of service, to an accuracy of 1 inch at the ends and other points physically observed in accordance with the bore path report.
 - ii. As directed by the Concessionaire, provide either a profile plan for each bore path, or a cross-section of the roadway at a station specified by the Concessionaire, or a roadway centerline profile. Show the ground or pavement surface and crown elevation of each facility installed, or installed and placed out of service, to an accuracy of within 1 inch at the ends and other exposed locations. On profile plans for bore paths crossing the roadway, show stationing of the crossing on the As-built documents. On the profile plans for the bore paths paralleling the roadway, show the Design Plans stationing. If the profile plan for the bore path is not made on a copy of one of the construction profile or cross-section sheets, use a 10 to 1 vertical exaggeration.
 - iii. If, during boring, an obstruction is encountered which prevents completion of the installation in accordance with the design location and specification, and the product is left in place and taken out of service, show the failed bore path along with the final bore path on the plans. Note the failed bore path as “Failed Bore Path - Taken Out of Service”. Also show the name of the Utility Owner, location and length of the drill head and any drill stems not removed from the bore path.
 - iv. Show the top elevation, diameter and material type of all utilities encountered and physically observed during the subsoil investigation. For all other obstructions encountered during a subsoil investigation or the installation, show the type of material, horizontal and vertical location, top and lowest elevation observed, and note if the obstruction continues below the lowest point observed.
 - v. Include bore notes on each plan stating the final bore path diameter, product diameter, drilling fluid composition, composition of any other materials used to fill the annular void between the bore path and the product, or facility placed out of service. Note if the product is a casing as well as the size and type of carrier pipes placed within the casing as part of the Contract.
5. The As-built documents shall show field surveyed locations of all junction boxes and roadside equipment and a coordinate table showing both the Project coordinates and latitudes/longitudes for each. These documents shall also show the field verified cabinet

numbers, service panel numbers and roadway lighting pole electrical identification numbers.

E. Drainage

1. The As-built documents shall include the following information:
 - i. Discharge structures – structure identification number, type, locations, dimensions and elevations of all weirs, bleeders, orifices, gates, pumps, pipes, and oil and grease skimmers;
 - ii. Side bank and underdrain filters, or exfiltration trenches – locations, dimensions, and elevations, including clean-outs, pipes, connections to control structures and points of discharge to receiving waters;
 - iii. Storage areas for treatment and attenuation – storage area identification number, dimensions, elevations, contours or cross-sections of all, sufficient for the Concessionaire to determine stage-storage relationships of the storage area and the permanent pool depth and volume below the control elevation for normally wet systems;
 - iv. System grading – dimensions, elevations, and final grades or cross-sections sufficient for the Concessionaire to determine contributing drainage areas, flow directions and conveyance of runoff to the system discharge point(s);
 - v. Wetland mitigation or restoration areas (if any) – Show the plan view of all areas, depicting a spatial distribution of plantings conducted by zone (if plantings are required by permit), with a list showing all species planted in each zone, numbers of each species, sizes, date(s) planted and identification of source of material; also provide the dimensions, elevations, contours and representative cross-sections depicting the construction.
2. The Contractor shall provide As-built survey of all storm water management facilities. The As-built survey shall show the actual finished ground contours, outlet structure dimensions and elevations as they exist at the completion of the Opitz Project. The survey information shall be signed and sealed by a Professional Land Surveyor licensed in the Commonwealth.
3. The Contractor shall provide certification from an independent source that the proposed BMP facilities were constructed in accordance with applicable and current industry standards, and the manufacturer's specifications.

3.19 Surveys

- A. The Contractor shall preserve all survey control monuments established by the Concessionaire and will notify the Concessionaire as soon as it is known that a monument is in a position that will interfere with new construction or with Contractor activities. If a monument is disturbed, or cannot be preserved in place, the Contractor shall set the new monument in accordance with the Contract.
- B. All surveying work during the Construction Period shall be performed by the Contractor in accordance with the VDOT's Survey Manual. All construction surveys shall be performed under the direct supervision of a land surveyor duly registered and licensed in the Commonwealth.
- C. The Contractor shall be fully responsible for examination and verification of any data made available by the Concessionaire.
- D. Immediately after or within 7 calendar days from receiving the Concessionaire's request notice, provided the information exists, the Contractor shall make available to the Concessionaire electronic files of all survey data, for existing and new conditions and infrastructure, which at a minimum include:
 - 1. Survey control data
 - 2. **Digital Terrain Model (DTM) and Construction Cross-Sections:** Compatible to the Concessionaire's current DTM format.
 - 3. **Borrow Pits:** All borrow pit DTM's or cross-sections, originals and finals.
 - 4. **Horizontal and Vertical Control for Bridges:** Certified plats, field notes, coordinates, and computations shall be furnished by the Contractor prior to the Contractor beginning work on these structures.
 - 5. **Pipes, Culverts, Ditches and Related Appurtenances:** Existing, newly installed control and as-built survey data for existing and new pipes, culverts and ditches which at a minimum include horizontal and vertical controls, type, size, materials and inlet/outlet control, catch basins and manhole and other related infrastructure.
 - 6. **Road Right of Way:** Existing, newly constructed/installed control and As-built survey data for right-of-way cross section showing roads, lane configuration, shoulders, access and egress ramps and connections, embankments, utilities, drainage and all infrastructure within the road right of way, and for areas where connecting roads and infrastructure are impacted by the work. The survey interval shall

not be farther than 100-foot intervals. The data prepared by the Contractor shall include coordinates, type, size, material and references.

- E. The Opitz Project Right of Way shall be staked by the Contractor in areas where work shall occur between the GP Lanes and the limits of the Opitz Project Right of Way if no limited access fence is present prior to the start of the work. Right of Way stakes shall be placed at a minimum of 100-foot intervals on each side of the roadway or as directed by the Concessionaire and the stakes shall be marked with both the station and offset back to centerline. All final boundary stakeouts shall be performed by the Contractor.
- F. Final right of way monumentation shall be performed by the Contractor in accordance with the following:
 - 1. RM-1: The Contractor shall furnish and install RM-1 right-of-way monuments in accordance with the Road and Bridge Standards.
 - 2. RM-2: The Contractor shall furnish and install RM-2 right-of-way monuments and optional locator posts, including the required caps, in accordance with the Road and Bridge Standards.
- G. The Concessionaire shall determine if an alternative form of permanent monumentation shall be used if RM-1 or RM-2 monuments are unsuitable for marking the right-of-way at various locations.
- H. The Contractor shall indicate this alternative monument usage on the final As-built plan in accordance with the VDOT's Survey Manual. Electronic data files along with paper sketches and drawings shall be furnished by the Contractor. All electronic data files furnished by the Contractor shall be in the format of the Concessionaire's current computer hardware and software.
- I. Additional surveying work and supplemental layout work shall be performed by the Contractor as needed to successfully complete the Work. The Contractor shall provide and protect all construction benchmarks within the construction limits. Construction benchmarks shall be located not farther than 500 feet apart for the total length of the Opitz Project. Construction benchmarks that are disturbed during construction operations shall be reestablished by the Contractor. All drawings, field notes, and computations from such survey work performed by the Contractor shall be submitted to the Concessionaire.

3.20 Security

3.20.1 General Requirements

- A. Subject to the requirements of the Contract, the Contractor shall adhere to the intent of the VDOT's policy on critical infrastructure information and sensitive

security information (CII/SSI) to the extent such information is directly related to the Contractor's performance of its obligations under the Contract. The Contractor shall ensure that relevant CII/SSI is protected and not disclosed to unauthorized persons. The Contractor shall ensure that all personnel having access to CII/SSI for the Contractor and all subcontractors have met the requirements of IIM-LD-236 Critical Infrastructure (CII) / Sensitive Security Information (SSI).

- B. The Concessionaire may request fingerprint-based criminal history background checks on contractors working on specific structures or functions.
- C. The Contractor shall review with the Concessionaire any information that should be designated as CII/SSI as specific design details become available. Any requirements for security review or other inspections will be mutually agreed to with the Concessionaire.

3.20.2 Not Used

3.21 Not Used

Attachment 1

Contractor's Organization Chart from Statement of Qualifications

Attachment 2

Transurban's Authority to Access (ATA)

Contractor Procedure - PERMITTED

Authority to Access (ATA) Contractor Procedure - PERMITTED

A Transurban Group procedure

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** When reviewing and updating the content of this document, please refer  [TU-BM-GU-001 Asset Management and Operations Controlled Documents Briefing Guideline.pdf](#)

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Authority to Access (ATA) Contractor Procedure - PERMITTED

1. Introduction

Authority to Access (ATA) is a process enabling internal and external parties to apply for access to Transurban Group (Transurban) Assets. The process ensures Transurban obtains information to know who is on site, the activities being performed and when and where the activities are taking place.

An ATA must be obtained for all parties requiring access to, and undertaking work, (including routine maintenance, maintenance closures and inspections), on Transurban Assets.

This procedure describes the process to obtain an ATA for Transurban Assets, including use of the Permitted system. Existing processes apply for those specific Transurban Assets not using the Permitted system (refer to section 5 Table 1).

2. Purpose

The purpose of this document is to provide guidance on how to apply for access to a Transurban Asset including information on the use of the Permitted system.

3. Scope

This procedure applies to internal and external parties required to apply for access to Transurban Assets. Note: Access to Assets to conduct Emergency Works is excluded from the scope of this procedure.

4. Terms, Definitions and Abbreviations

Terms/ Abbreviation	Definition
Applicant	The individual requesting access to the Asset in the Permitted system
Asset	Transurban roadside locations and their related office premises
ATA	Authority to Access
Closure-In	A process to sign workers into a particular closure event. Typically a second level of access validation following initial sign-in. Often required during tunnel closures
Closure-Out	To sign-out workers who were previously signed in via the Closure-in process
Emergency Access	Access for works that are required immediately for a road incident or road safety issue. These works fall outside the scope of this procedure. Speak to your Transurban site contact if you need additional information on Emergency Access.
HSE	Health, Safety and Environment
JHA	Job Hazard Analysis
Maximo	Work planning system

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Terms/ Abbreviation	Definition
Permitted	System used to obtain access to a Transurban asset
Routine Access	Access to part or all of an Asset to undertake day-to-day maintenance works
Sign-In	<p>The process to register commencement of access at a site and signifies an ATA has moved to "In Progress". Sign-in is available via the Permitted App/QR code or via notification to the Control Room. This action is required each time you attend site.</p> <p>Permitted/ QR code: The first part of the process to access a site using the QR code within the Permitted App</p> <p>Control room: The process to sign-in to access a site if the Permitted App is not being utilised</p>
Sign-Out	<p>The process to register departure from a site. Sign-out is available via the Permitted App/QR code or via notification to the Control Room. This action is required each time you are leaving site.</p> <p>Permitted/ QR code: The last part of the process to leave a site using the QR code within the Permitted App</p> <p>Control room The process to sign-out of access to a site if the Permitted App is not being utilised</p>
SWMS	Safe Work Method Statement
Transurban	The company operating and maintaining the Assets on which works will be undertaken
Tunnel closures	The closure of part or all of an Asset to undertake scheduled maintenance works
WAP	Work Access Permit. In Permitted, an ATA is referred to as a WAP.
Work Order	A document specifying work to be performed. The Work Order number is generated by Maximo.

Authority to Access (ATA) Contractor Procedure - PERMITTED

5. Procedure

This procedure describes the process to apply for access to Transurban sites, as depicted in Figure 1.

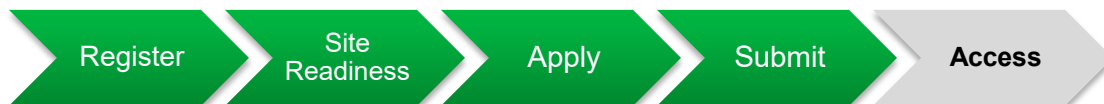


Figure 1 ATA Application Process

The application process used across the Transurban assets is provided in Table 1.

Table 1 ATA application process

Region	Asset		
<i>Use the Permitted system to apply for an ATA:</i>			
NSW	Cross City Tunnel	M2	Eastern Distributor
	M5 South West	NorthConnex	Lane Cove Tunnel
QLD	Gateway Motorway	Logan Motorway	Clem7
	Legacy Way	Inner City Bypass	AirportLink
	Gateway Motorway Extension	Go Between Bridge	
VIC	CityLink		
USA	i95 Express Lanes	i395 Express Lanes	i495 Express Lanes
<i>Continue to contact the Control Room directly for an ATA:</i>			
NSW	M4 West	M4 East	Westlink M7
Canada	Montreal A25		

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5.1 Register



Each individual completing an ATA registration must be attached to a company. If the company is not available for selection in Permitted, contact your company representative to set up the company. You will be unable to proceed until the required company is set up.

All individuals applying for an ATA are required to first register within the Permitted system via the following link:

Australia

<https://www.permitted.com.au>

Complete all the registration details which will include:

- Individual's email address (email addresses can only be used once for one individual. The system will not allow two people to use the same email address). We recommend using a company (work) email address rather than a personal email address.
- The ABN of the individual's company
- Individual's job title
- Personal information including; First name, last name, contact number, DOB, Street Address, City, State and Postcode.

Upon registration, log-in details will be emailed to the individual registering. Upon receipt of details, log-in to Permitted and complete profile information.

Registration is a one-off process for each individual.

USA

<https://www.permittedusa.com>

Complete all the registration details which will include:

- Individual's email address (email addresses can only be used once for one individual. The system will not allow two people to use the same email address). We recommend using a company (work) email address rather than a personal email address.
- The Transurban supplied unique company number
- Individual's job title
- Personal information including; First name, last name, DOB, contact number, state

Upon registration, log-in details will be emailed to the individual registering. Upon receipt of details, log-in to Permitted and complete profile information.

Registration is a one-off process for each individual

A Quick Reference Guide "Contractor Individual Registration and Asset Induction" is available to assist you.

Authority to Access (ATA) Contractor Procedure - PERMITTED

5.2 Site Readiness

All registered individuals are required to be 'site ready' for each Transurban site for which access is required. To be site ready, specific documentation is required to be uploaded to Permitted, as defined in Table 2. Individuals only need to upload the the documentation that is being requested.

Table 2 Site readiness requirements

Documentation Requirements	Details	Market
Photo Identification	→ The photo identification must be government issued	Australia: Transurban Employees & External Parties
	→ The photo identification must have an expiry date and identifiable number	
	→ The photo must be clear	USA: Transurban Employees Only
	→ Personal details such as home address, date of birth, etc. can be 'blacked out' for privacy if required	
Transurban Asset Induction (previously known as Transurban HSE Asset Induction)	→ If you have previously completed the Transurban Asset Induction, upload a copy of the certificate it to Permitted. Confirm the induction certificate is not expired.	Australia: Transurban Employees & External Parties
	→ If this is the first induction or induction has expired, log-in to Permitted and follow the steps to complete the induction.	
	→ Personnel have five days to complete the induction. Progress may be saved to allow completion of the induction over several days.	USA: Transurban Employees & External Parties
	→ This induction must be completed with a 100% score prior to applying for an ATA. Upon successful completion, the Transurban Asset Induction certificate is valid for 2 years from date of issue.	
Transurban Lane Reversal	→ If you have previously completed the Transurban Lane Reversal Video, upload a copy of the evidence to support this.	USA: Transurban Employees & External Parties
	→ If this is the first induction or induction has expired, log-in to Permitted and follow the steps to complete the induction including the Lane Reversal video	

Authority to Access (ATA) Contractor Procedure - PERMITTED

Documentation Requirements	Details	Market
Construction Industry White Card*	→ The White Card must be current. Ensure the date on the White Card has not expired. (If no expiry date is entered in Permitted, the expiry date is defaulted to 01/01/25)	Australia: Transurban Employees & External Parties
	→ A Certificate of Attainment is accepted if the White Card has not yet arrived. It will expire in Permitted 60 days from issue.	
	→ Once the qualification is verified, the photograph of the qualification will be removed for privacy and will not be visible again.	

*Note: Some individuals who require the ability to raise a permit request on behalf of other individuals but do not attend site, or who require access to an office location but not a Roadside location, may be exempt from providing a White Card where this is required by the application to get "Site Ready". Please speak to your Transurban Site Contact if you believe you may qualify for a White Card exemption.



Applicants will be notified via email when qualification documentation is expiring and required to be updated in Permitted.

Once all documentation is uploaded into Permitted and verification is completed, the 'qualification' icon will turn green to indicate the application process can commence.

A Quick Reference Guide "Contractor Individual Registration and Asset Induction" is available to assist you.

5.3 Apply



Ensure all site readiness documentation is uploaded and verified for all individuals to be listed on the ATA prior to applying for an ATA. Refer to Section 5.2.



Apply for an ATA at least 10 business days prior to the date required to access the Asset.

ATA applications are required every time you need to access any portion of any Transurban Asset. To apply for an ATA, the following mandatory information must be included and completed accurately in the application:

- The scope of work being performed
- Where the work will be conducted
- The date and time access to the Asset is required; select all dates required and start/ finish times
- The details of all individuals that will be attending the site
- The answers to the risk questions must align to the scope of work

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→ Safe Work Method Statement or Job Hazard Analysis (JHA/SWMS) related to the works being performed.

The ATA application is likely to be rejected if the above-mentioned information is not accurate and/or incomplete. If an ATA is rejected, the applicant will get a notification with any comments, and the applicant can edit the ATA and resubmit for approval.

Important notes to be considered prior to submitting the ATA are detailed in Table 3.

Table 3 ATA Application Rules

Information Type	Rules
Blanket applications	→ ATA applications should include the specific dates that site access is required and avoid including all dates in a month. Applications for a range of locations over an extended period of time (30+ days) are discouraged. Transurban may allow exceptions to this for certain types of work. Please discuss with your Transurban site contact where required.
Work orders	→ If a Work Order exists for the ATA, the Work Order number must be included when applying for the ATA
	→ Multiple Work Order numbers can be added to a single ATA
	→ Work Orders can be amended in Maximo (labour, craft, etc.) without an ATA being re-reviewed
	→ ATAs can be obtained without a work order where general access only is required (e.g. inspection only, no maintenance works)
Adding individuals to an ATA	→ Individuals with a verified Permitted account can be added to an ATA at any time
	→ Verified individuals are indicated by a 'green tick' icon.
	→ Individuals with 'red items' are required to supply all site readiness documentation to enable verification and cannot be added to an ATA until this is complete
	→ Adding verified individuals to an ATA will not require re-approval.
Removing individuals from an ATA	→ Individuals can be removed from an ATA at any time.

ATA applications will be reviewed to determine if the request to access the site is valid and all information provided is sufficient. Reviews can take up to 10 days.

A Quick Reference Guide “Requesting Authority to Access” is available to assist you.

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5.4 Submit

Once the ATA application is complete, the individual is able to submit the request for review and approval.

When submitting the ATA application, the terms and conditions must be accepted.

Upon submission of your application you will receive a confirmation email confirming your pending ATA request, with the accepted terms and conditions attached.

As the submission process progresses, the ATA status will change to reflect the stage of review. Table 4 explains the various stages attached to the ATA application process.



The approximate time for an ATA request to be reviewed is 10 days

Table 4 Application Status Details

Status	Description
Pending Approval	The ATA has been submitted. The applicant is still able to edit the ATA, however any reviews that have been completed will need to be done again. Reviewers can begin their review.
Pending Final Approval	All first level reviews of each expertise are complete. Final review can commence.
Approved	Workers can come to site at the designated date and time and sign into the ATA.
In Progress	Workers are currently signed into the ATA.
Completed	The dates and times have expired on the ATA and it can not be extended.
Cancelled	The applicant has cancelled the ATA.
Rejected	A reviewer has rejected the ATA and the applicant can correct the issue and re-apply.

5.5 Accessing Site

Once the ATA is Approved, the individuals listed on the ATA may attend site at the scheduled date and time. Signing in at site is dependent upon the type of work being conducted:

- Routine works: signing in to the site is managed by the Transurban control room. Refer Section 5.5.1.
- Tunnel closures: signing in to the site is managed using a QR code within the Permitted app. Refer Section 5.5.2.

5.5.1 Routine Works

To gain access to an Asset for routine work requirements the contractor must:

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- Contact the control room one (1) hour before arrival at the Asset, followed by a call to sign in when arriving at site
- Provide the ATA number and names of all individuals on site
- Contact the control room to sign out when leaving the site.

5.5.2 Tunnel Closures

To gain access to an Asset for tunnel closure works each individual must:

- Download the Permitted App on their mobile device and log-in as instructed to display the QR code. This code is unique to the email address of the individual signed in to the app. A printed copy of the QR code is also deemed acceptable.
- Use the QR code to sign in to the Asset, then 'closure in' to the Asset as directed by Transurban staff or their representatives

Once works are completed, each individual must:

- Use the QR code to 'closure out', followed by 'signing out' of the Asset as directed by Transurban staff or representatives

A Quick Reference Guide “Transurban Closure Access” is available to assist you.

5.5.3 Emergency Access

Each Asset has a process for managing Emergency Access that falls outside the scope of this ATA procedure. Emergency Access may be granted where works to resolve a safety or road incident need to be completed immediately. Speak to your Transurban site contact for more information about this process.

6. Help


Help is available to assist in applying for an ATA as follows:

- Permitted: for system-related assistance please contact the Transurban Service Desk team at TechnologyServiceDesk@transurban.com
- General: for process-related queries, refer to <https://www.transurban.com/suppliers/permitted-faq> to view frequently asked questions

1 Permitted Registration

1. Go to <https://www.permittedusa.com/> and click Register
2. Enter your login email address
3. Enter your unique company key. (Provided in the email from Transurban)
4. Complete your profile information (Full Name, Contact Number, State and DOB [Used for password resets])
5. Once you have completed registration, you will receive an email with login details

2 Get Site Ready

1. Login to Permitted and select the orange  button
2. Select begin induction for **"Transurban USA - Transurban Site Readiness"**
3. Read the privacy statement and select **"I Agree"**.
4. Upload a profile photo and emergency contact
5. If you have a copy of your Transurban Asset Induction Certificate (from Maximo / Litmos), then answer **"Yes"** to the question "Have you completed the Transurban Asset Induction previously on another system?". This will allow you to upload a copy of the Certificate.
6. If you don't have access to your Transurban Asset Induction Certificate or this is the first time doing a Transurban Asset Induction select **"No"** to perform the Transurban Asset Induction directly in Permitted.
7. Once you have uploaded your Asset Induction, your account will be sent for verification before becoming Site Ready. If you completed your Induction directly in permitted, you will automatically become Site Ready. Once your account is Site Ready you will be able to create an ATA and be added to other ATAs.

3 How to Confirm you are Site Ready

After completing steps 1 – 2, it can take up to 3 business days for your account to be verified.

1. Login to <https://www.permittedusa.com/>
2. From the home screen, select "Create" & "Create WAP"
3. If you are site ready, you will be able to see your site and all icons will be green.
4. If you can't see your site, check the "Show Unready Sites" box.
5. Here you can hover over each red icon to see what action is outstanding.



? Frequently asked questions

I can't see the site I need to gain access to, what do I need to do to see the Induction for that site?

If you can't see the Transurban USA site you require access to, it means the company ID registered with has not been added to Permitted. Please have a company representative contact the Transurban help desk via TechnologyServiceDesk@Transurban.com or **1 855 337 5880**.

What is my unique company key?

Each company when registering an individual account will use a unique company key provided by Transurban. Contact your Transurban contact or Transurban Helpdesk if you don't have a copy of this key

How do I know if my account has been verified?

All icons on your site will turn from red to green when you have completed all the requirements of the induction and Transurban have verified your account. You can check this by going to Create > Create WAP and viewing each of the sites available to your account.

Requesting Authority to Access

Quick reference guide



Raising a request for Authority to Access through Permitted is for access only. Works should be planned and approved before the access permit process begins.

Authority to Access (WAPs*) are required every time you need to access any portion of the site.



The mandatory requirements for an Authority to Access request (ATA) must contain:

- The scope of work being performed (including inspections)
- Where the work will be conducted
- The date and time required
- All individual(s) that will be attending site.

Authority to Access requests (WAPs*) will be reviewed to determine if the request to access site is valid and all information provided is sufficient.



Tip

Once you have created your first ATA, you can duplicate a new ATA from a previously approved one.

Navigate into your approved ATA and select the "More" option and then "Create from WAP". This will then copy all your details across (Scope of work, locations, attendees, attached documents and risk identification questions). You will just need to select the new dates and modify any details that have changed.



Support

Queries around the type of work, hazards, locations, dates/times can be raised with your Site Contact.

Queries around issues with Permitted (logging in, adding attendees, additional sites) are managed by the Transurban Service Desk.

Phone: 1 855 337 5880 **Email:** TechnologyServiceDesk@transurban.com

Request an Authority to Access

Any individual with a site ready permitted account can create an Authority to Access (ATA) request.

1. Select Create > Create WAP. Then select the Transurban USA Site
2. Select the zone from the "Select Zone" drop down list (I-95, I-395 or I-495)
3. Enter a description of the purpose of the access in the "Scope of Works" field. On the first line, provide a summary about what the works entail. Continue to provide more detailed information about what the works are for and where you will need access to.
4. Select all the dates access is required for using the "Select Dates" calendar. You can select up to 5 calendar days from the current date. Select the site arrival and finish time for each date and select Next. Please contact your Transurban contact if the dates/times you need are not shown.
5. Search for the names of attendees who will also need access as part of this ATA (additional attendees can be added to an ATA at a later stage)
6. Search and add all required locations you will need to access. Search for locations using terms like 'Mainline', 'Ramp', 'Tolling', 'VMS' etc. or select from your recently used locations below. Once all required locations have been added, scroll to the bottom and select next. (Refer to page 2 - for a list of all locations).
7. Enter the number of keys required and provide the Maximo Work Order number (if applicable).
8. Complete the Risk Identification questionnaire and answer all validation questions and upload any required documents.
9. Read and "Accept" the ATA Agreement and Confirmation statement and select next. After accepting the Agreement and Confirmation statement the ATA request will move to 'Pending Approval' and Transurban will review your permit.



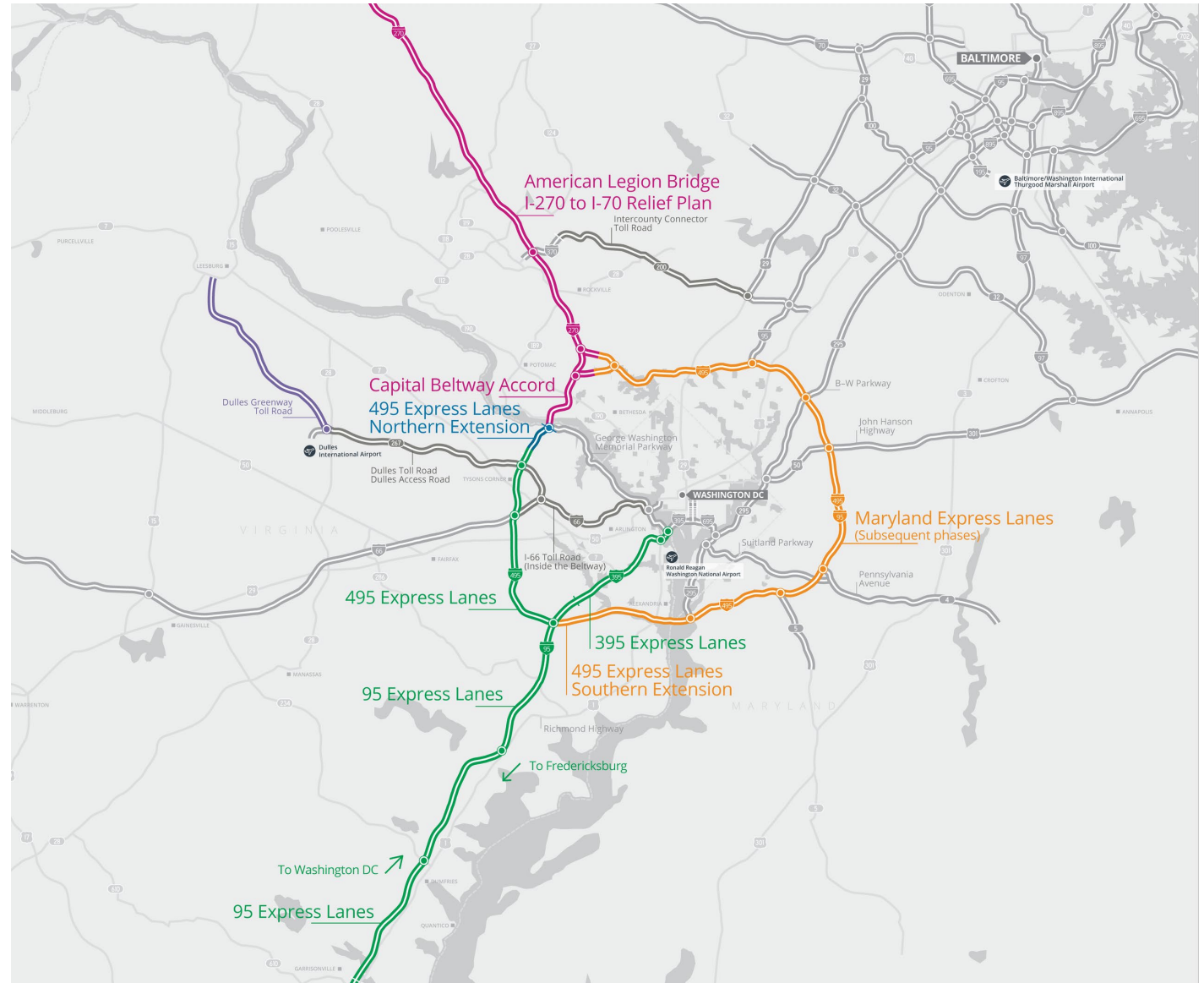
When arriving to site, contact the Traffic Control Room prior to the commencement of works. Contact the Traffic Control Room again when leaving site.

*WAPs – "Work Authority Permits" is the term used in Permitted for an Authority to Access.

Reviews can take up to 10 business days. Editing the ATA will reset this 10-day lead time.

USA Site Location Details

- [I-95 Express Lanes](#) - Pages 3 - 7
- [I-395 Express Lanes](#) - Pages 8 - 9
- [I-495 Express Lanes](#) - Pages 10 - 13



Requesting Authority to Access

Quick reference guide



(1 of 5)

I-95 Express Lane

Site: Transurban USA

Zone: I-95

Group	Location
TU Asset Network (TU Employees Only)	All Locations
Northbound	Entire Asset
Ramp - Southbound - Segment 1	Garrisonville Road Flyover Exit Ramp
Ramp - Northbound - Segment 1	Garrisonville Road On Ramp
Ramp - Southbound - Segment 1	Triangle - Quantico Flyover Exit Ramp
Ramp - Northbound - Segment 2S	Dumfries Road On Ramp
Ramp - Northbound - Segment 2S	Cardinal Drive On Ramp
Ramp - Southbound - Segment 2S	Cardinal Drive Exit Ramp
Ramp - Northbound - Segment 2N	Dale Boulevard On Ramp
Ramp - Southbound - Segment 2N	Dale Boulevard On Ramp
Ramp - Southbound - Segment 2N	Dale City Flyover Exit Ramp
Ramp - Northbound - Segment 2N	Opitz Boulevard On Ramp
Ramp - Northbound - Segment 2N	Opitz Boulevard Exit Ramp
Ramp - Northbound - Segment 2N	Prince William Parkway On Ramp
Ramp - Southbound - Segment 2N	Prince William Parkway Exit Ramp
Ramp - Southbound - Segment 3S	Gordan Boulevard Flyover Exit Ramp
Ramp - Northbound - Segment 3S	Gordan Boulevard Flyover On Ramp
Ramp - Southbound - Segment 3S	US 1 Exit Ramp from I-95 General Purpose Lanes
Ramp - Northbound - Segment 3S	US 1 On Ramp to I-95 General Purpose Lanes
Ramp - Southbound - Segment 3S	US 1 On Ramp
Ramp - Southbound - Segment 3S	US 1 Exit Ramp from I-95 Express Lanes
Ramp - Southbound - Segment 3N	Boudinot Drive On Ramp
Ramp - Northbound - Segment 3N	Boudinot Drive Exit Ramp
Ramp - Northbound - Segment 3N	DAR - FBNA Exit Ramp to I-95 General Purpose Lanes

Group	Location
Ramp - Southbound - Segment 3N	DAR - FBNA On Ramp to I-95 Express Lanes
Ramp - Southbound - Segment 3N	Backlick Road On Ramp
Ramp - Northbound - Segment 3N	Franconia Springfield Parkway - Eastbound
Ramp - Northbound - Segment 3N	Franconia Springfield Parkway - Westbound
Ramp - Northbound - Segment 3N	South Terminal On Ramp
Ramp - Northbound - Segment 3N	Newington On Ramp
Ramp - Northbound - Segment 3N	Franconia Springfield Parkway On Ramp
Ramp - Northbound - Segment 3N	Franconia Springfield Parkway Exit Ramp
Ramp - Northbound - Segment 3N	South Terminal Exit Ramp
Ramp - Southbound - Segment 3N	Franconia Road Exit Ramp
Ramp - Northbound - Segment 3N	Franconia Road On Ramp
Ramp - Southbound - Segment 4	I-95 Express Lanes Ramp A to I-495 East Baltimore
Ramp - Northbound - Segment 4	I-95 Express Lanes Ramp A to I-495 North Tysons Corner
Ramp - Northbound - Segment 4	I-495 Express Lanes Ramp to I-95 South / I-395 North Express Lanes On Ramp
Ramp - Northbound - Segment 4	NorthTurkey Cock On Ramp
Ramp - Southbound - Segment 4	South Turkey Cock On Ramp
Express Lanes - Northbound - STE	MM 143.1
Express Lanes - Northbound - STE	MM 143.2
Express Lanes - Northbound - STE	MM 143.3
Express Lanes - Northbound - STE	MM 143.4
Express Lanes - Northbound - STE	MM 143.5
Express Lanes - Northbound - STE	MM 143.6
Express Lanes - Northbound - STE	MM 143.7
Express Lanes - Northbound - STE	MM 143.8
Express Lanes - Northbound - STE	MM 143.9

Attachment 3

Process for Notification of Impacts to Existing Assets

NOTICE OF IMPACTS TO EXISTING TMS/ITS ASSETS

1. **First Notification:** 21 Days Prior to Work Start - The Contractor shall submit a complete Notification of Impact to Existing TMS/ITS Asset form (using provided template) to the Concessionaire. The form shall be provided a minimum of twenty-one (21) calendar days prior to the proposed start of the Work impacting the Asset.
2. **Notification Review:** 18 Days Prior to Work Start - The Concessionaire (and Department for Department TMS/ITS Assets) will review the form for conformance with the plans and the Agreement. Within 3 days of receipt of First Notification, the Concessionaire will respond to the submitted form with one of three responses:
 - a) **Approved** – *The form is found to be in conformance with all documented requirements and is approved as submitted. The process moves to the Inspection phase.*
 - b) **Revise and Resubmit** – *The form is conditionally approved with minor corrections or clarifications required as noted in the Concessionaire’s response. The process moves to the Inspection phase and the Contractor revises the form as needed for resubmittal prior to the second notification*
 - c) **Rejected** – *The form has significant elements that are not in conformance with the plans or the Agreement. The Concessionaire notes the specific elements of the form not in conformance and cites the controlling Agreement requirements not met. The Contractor shall submit the form again beginning at the first notification.*
3. **Inspection:** 14 Days Prior to Work Start - Following approval or conditional approval of the notification form, the Department and the Contractor shall conduct a joint field meeting at the Asset to be impacted. The Concessionaire and Department shall provide the Contractor access to the equipment and Assets to be impacted for general inspection and demonstrate the operational status of the equipment. If the proposed impact is not limited to a single site (e.g., impact to power or communications connecting multiple devices), the Concessionaire and Department shall also demonstrate operation at a remote location to establish the existing condition of all elements to be impacted by the Work. The Contractor shall document the condition of the site through field notes and photos as needed. The Contractor shall provide written notification to the Concessionaire of any site deficiencies within twenty-four (24) hours of the inspection. The Concessionaire shall assess deficiencies and provide a response to the Contractor within forty-eight (48) hours of receipt of the Contractor’s report. The response shall include one of the following:
 - a) **Concessionaire/Department Repair/Replace** – The Concessionaire or Department will repair or replace deficient equipment prior to the start of the Work. A second inspection shall be scheduled to document the existing condition of the Assets prior to the start of the Work.

- b) ***Proceed per Plan*** – The Concessionaire shall instruct the Contractor to carry out the Work as shown in the plans and proposed on the notification form accepting the condition of the Assets as is. The Contractor shall complete the Work as required by the Agreement and return the system to its existing condition at the time of the inspection, accounting for the deficiencies of the system noted in their report. For example, the Concessionaire may instruct the Contractor to relocate a camera as called for in the plans even if the camera is inoperative at the time of inspection. The Contractor will relocate the camera noting that it was inoperative prior to start and maintaining its current condition.
 - c) ***Request for Change*** – The Concessionaire shall request a change to the plans to address the deficient conditions. This may include requesting the Contractor to carry out repair or replacement or removal and disposal/salvage of the impacted Assets. This process shall follow the typical process for changes to the Agreement, accounting for any impacts to schedule and scope.
4. **Second Notification**: 10 Days Prior to Work Start - The Contractor shall provide a second notification to the Concessionaire for the start of the Work. If the notification form was required to be revised and resubmitted as part of a conditional approval, the Contractor shall provide the revised form with this notification. The Contractor may propose changes to the original request as part of the second notification. This may include minor changes to the schedule of the Work or revisions to the construction work plan. If no updates to the first notification are required, the Contractor shall provide only a written reaffirmation of the original notification. The Concessionaire shall approve or reject the updated form within forty-eight (48) hours of its receipt of the Contractor’s Second Notification. The response shall include one of the following:
- a) ***Approved*** – *The form is found to be in conformance with all documented requirements and is approved as submitted. The process moves to the Confirming Notification phase.*
 - b) ***Revise and Resubmit*** – *The form has elements that require minor corrections or clarifications required as noted in the Concessionaire’s response. The Contractor shall resubmit the form again beginning at the Second Notification.*
5. **Confirming Notification**: 24 Hours Prior to Work Start - The Contractor shall provide written confirmation of the planned Work a minimum of twenty-four (24) hours prior to the scheduled start of the Work. Minor deviations of the written notification form shall be allowed (e.g., minor changes in the specific start time; updated contact information, etc.).
6. **Final Notification**: 15 Minutes Prior to Work Start - The Contractor shall provide final notification fifteen (15) minutes prior to the start of the Work, if required by the Concessionaire as noted on the approved notification form. This notification shall be made for Assets identified by the Concessionaire as being of significant operational value. An Asset of “significant operational value” is one which must remain in operation until an unscheduled incident or condition is resolved. The Concessionaire shall identify these Assets on the notification form. The Contractor shall provide this final notification to either Concessionaire or Department staff as identified by the Concessionaire in the notification process.

7. Work: Start of Work - The Contractor shall carry out the Work in accordance with the Agreement and approved notification form. The Contractor should provide daily updates to the Concessionaire on the progress of the Work or as required on the notification form. The Contractor shall notify the Concessionaire of any events or issues that arise during the course of the Work that may impact the scheduled completion of the Work. The Contractor shall provide a plan for recovery of schedule as needed.
8. Notification of Completion: Completion of Work - The Contractor shall notify the Concessionaire immediately upon completing the Work. The Concessionaire shall verify the operation of the Asset as needed to ensure the basic scope of the Work is completed. The Concessionaire shall notify the Contractor immediately of any impact to normal operation of the Asset following completion of the Work.
9. Return of Maintenance: 48 Hours After Completion of Work - The Contractor and the Concessionaire (and Department for Department TMS/ITS Assets) shall conduct a return of maintenance inspection within forty-eight (48) hours of completion of the Work. The Concessionaire and Department shall inspect the Work on site and provide a written punch list or acceptance as appropriate. Maintenance of the Asset shall transfer back to the Concessionaire or Department upon completion of any punch list items and issuance of the written acceptance. Written acceptance shall be provided no less than forty-eight (48) hours following the final inspection.

Appendix A - Form of Notification of Impact to Existing ITS/TMS Assets

95 Express Lanes Opitz Boulevard Ramp Project

**EXISTING TRAFFIC MANAGEMENT SYSTEM ASSETS
NOTIFICATION OF IMPACT**

NOI # _____

Date Submitted (First Notification): _____ (Second Notification): _____

Approval Status (First Notification):

Approved Revise and Resubmit (Comments attached) Rejected (Comments attached)

Signature and date: _____

Approval Status (Second Notification):

Approved Revise and Resubmit (Comments attached)

Signature and date: _____

Asset Information:

Type: _____

Milepost: _____ Station and Offset: _____

Asset ID: _____ Plan Package ID: _____

Description:

Type / Description of Work:

Schedule:

Start Day / Time: _____ End Day/Time: _____

Interim Milestones:

Request for Waiver:

Impact Mitigation:

Contractor Contact Information:

Name: _____ E-mail: _____

Mobile Phone: _____

Asset Owner Contact Information:

Name: _____ E-mail: _____

Mobile Phone: _____

95 Express Lanes Opitz Boulevard Ramp Project

**EXISTING TRAFFIC MANAGEMENT SYSTEM ASSETS
NOTIFICATION OF IMPACT**

NOI # _____

Actions Required by Asset Owner:

To be completed by Contractor

Information to Contractor:

To be completed by Asset Owner

Documents Attached:

**Existing Traffic Management System Assets
Notification of Impact Form Instructions**

Field	Responsibility for data entry and instructions
NOI #	Contractor. Enter the appropriate Notification of Impact number. The Contractor shall assign each NOI a unique number to be used for tracking purposes and use in other correspondence.
Date Submitted	Contractor. For each of the First Notification and the Second Notification, enter the date the form is submitted to the Concessionaire. The form shall be submitted electronically. Forms sent after 3:00 p.m. shall indicate the next business day as the date submitted.
Approval Status	<p>Asset Owner. Following initial review indicate status and provide notes and comments as appropriate. Comments shall include specific items of the Form that are non-conforming with references to the appropriate plan or contract documents that control the work. Upon Approval, the Form will be signed by the Asset Owner in the Approval Status field.</p> <p>Revised and Resubmitted Forms will include the original comments. Upon final approval, Revised and Resubmit shall be changed to Approved and signed as noted above.</p> <p>Rejected Forms will be closed and upon resubmittal, a new submittal date will be entered.</p>
Asset Information/Type	Contractor. Enter the type of asset being impacted. E.g. Camera, gate, gate DMS, Advisory DMS, fiber, etc.
Asset Information/Location (General)	Contractor. Enter a description. E.g. Outside northbound GP lanes, just north of Old Dominion Intersection.
Asset Information/Location (Sta/Off)	Contractor. Enter the station and offset of the asset (or station range) from the plans.
Asset Information/Location (Asset ID)	Contractor. Enter the cabinet ID and/or device ID of the asset. (E.g. Cabinet B151, VMS 0990, etc.).
Type of Work	Contractor. Indicate the type of work to be completed. E.g. relocation/reconnection of power, relocation/reconnection of communications, relocation of device, HOV Loop impact, etc.
Description of Work	Contractor. Provide brief description on the work to be performed including any pertinent means and methods. If the work is sufficiently detailed on the plans, Standards, and special provisions, indicate "Per Plan".
Reference Documents	Contractor. Enter Plan Package (e.g. Segment 2 TMS Plans), sheet number, and special provision controlling the work. Provide other references or attach mark-ups that detail the work as needed.

**Existing Traffic Management System Assets
Notification of Impact Form Instructions**

Field	Responsibility for data entry and instructions
Mitigation of Operational Impacts	Contractor. Enter a description of the work to be done to mitigate impact to operational performance as required by the Turnover Plan (e.g. Temporary CCTV camera to be provided, temporary detection to be provided, manual operation of gates, etc.). Provide as much detail as possible in order to coordinate and integrate temporary operations with the Asset Owner's normal operations (device configuration parameters, etc.). Indicate pending information for ongoing coordination as appropriate.
Schedule of Work	Contractor. Enter proposed date and time for start of work/impact. Enter duration of time for the work to be substantially complete and normal operation returned.
Request for Waiver	Contractor. Enter any deviations from the requirements of the Turnover Plan and provide justification for the request. (e.g. request for longer duration outage, request for waiver to temporary detection/camera requirement, etc.)
Contractor Contact Information	Contractor. Enter phone and e-mail contact information. Enter primary contact information for person responsible for planning and directing the work. Enter secondary contact information as needed. Enter Field Contact information for the person that will be on-site at the time of the work with the authority to direct the work in the field as it is being done. Mobile number must be provided for Field Contact.
Asset Owner Contact Information	Asset Owner. Enter phone and e-mail contact information. Enter primary contact information for person responsible for coordinating the work and authority to approve work. Enter Secondary Contact information as needed. Enter Field Contact information for the person that will be on-site at the time of the work or at a remote location with the authority to provide final approval to commence work if required.
Actions Required by Asset Owner	Contractor. Enter any actions required by Asset Owner or additional information needed from Asset Owner in order to plan or complete the work.
Information/Instructions to Contractor	Asset Owner. Provide the Contractor any additional information or instructions to plan and coordinate the work.

EXHIBIT B-2

DESIGN PLANS

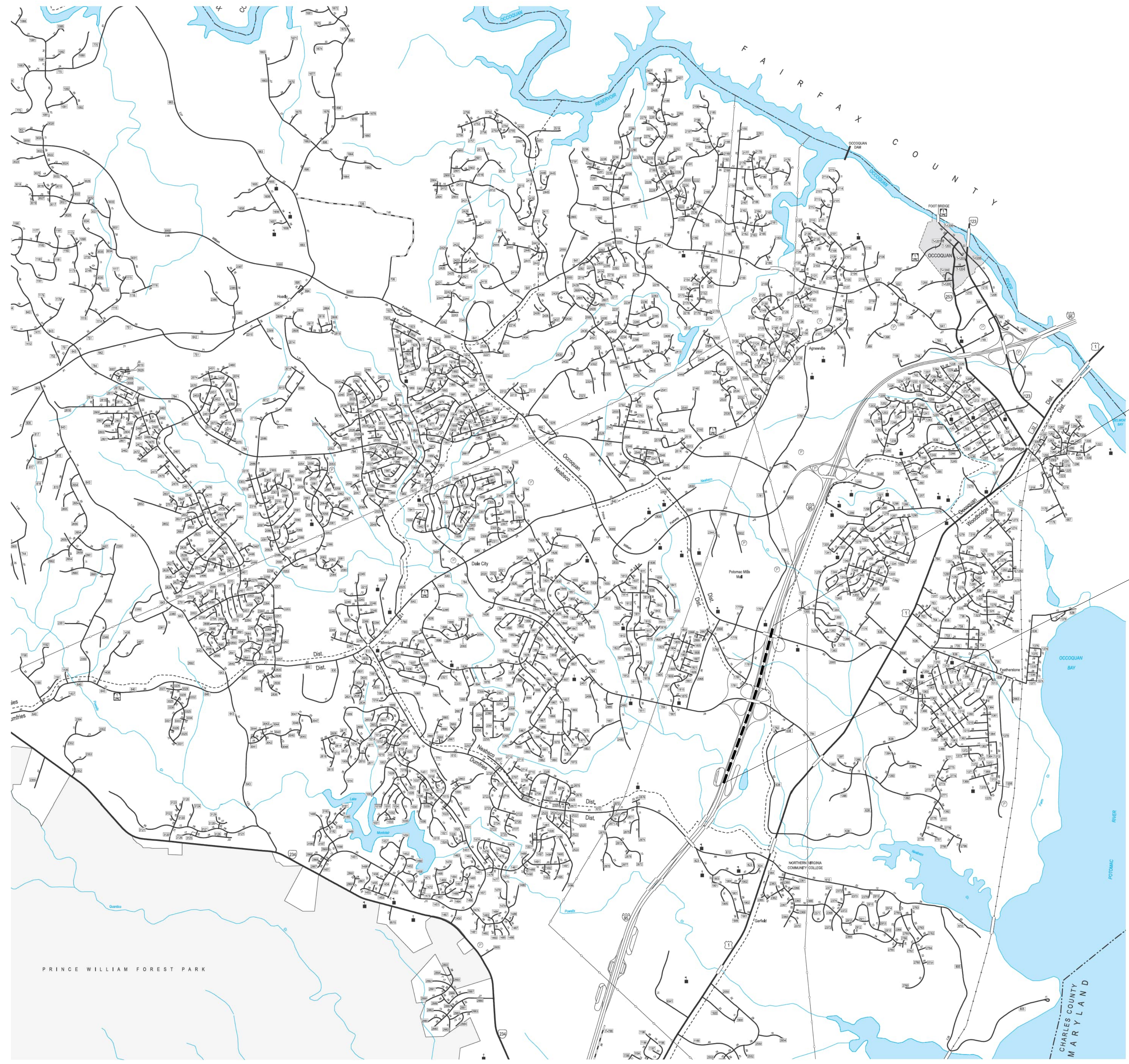
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

PROJECT LOCATION MAP

PRINCE WILLIAM COUNTY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	1A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PROPOSED PROJECT
0095-076-299, C-501

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOT TO SCALE

PROJECT	SHEET NO.
0095-076-299	1A

PROJECT MANAGER *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Requardt, & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *AccuMark, Inc. (804) 550-7740 07/07/2021*

INDEX OF SHEETS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	1B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

SHEET NO.	DESCRIPTION	STATIONS	SHEET NO.	DESCRIPTION	STATIONS
1	TITLE SHEET		11RW	R/W PLAN SHEET (OPITZ BLVD)	
1A	LOCATION MAP		12	PLAN SHEET (I-95)	738+25 TO 752+25
1B	INDEX OF SHEETS		13	PLAN SHEET (I-95)	752+25 TO 766+25
1C	PRELIMINARY RIGHT OF WAY DATA SHEET		14(1) thru 14(2)	DRAINAGE DESCRIPTION SHEETS	
* 1D	REVISION DATA SHEET		14(3) thru 14(9)	STORM SEWER PROFILES	
* 1E	STREAM FLOW HYDROGRAPH SHEET (IF APPLICABLE)		15(1) thru 15(13)	TRAFFIC MANAGEMENT SYSTEM (TMS) PLANS	
1F	SURVEY ALIGNMENT DATA SHEET		16(1) thru 16(21)	SIGNING AND PAVEMENT MARKING PLANS	
1G(1) thru 1G(6)	CONSTRUCTION ALIGNMENT DATA SHEET		17(1) thru 17(10)	LIGHTING PLANS	
* 1H	UNDERGROUND UTILITY TEST HOLE INFORMATION		18(1) thru 18(5)	SIGNAL PLANS	
* 1J	NOT USED		* 19(1) thru 19()	UTILITY PLANS	
1K(1) thru 1K(5)	SEQUENCE OF CONSTRUCTION NOTES AND TYPICAL SECTIONS				
1L(1) thru 1L(9)	TEMPORARY TRAFFIC CONTROL PLAN STAGE 1A				
1N(1) thru 1N(8)	TEMPORARY TRAFFIC CONTROL PLAN STAGE 2A				
1P(1) thru 1P(5)	TEMPORARY TRAFFIC CONTROL PLAN STAGE 3				
1Q(1) thru 1Q(3)	TEMPORARY TRAFFIC CONTROL PLAN STAGE 4				
2	GENERAL NOTES				
2A(1) thru 2A(12)	TYPICAL SECTIONS				
2B(1) thru 2B(4)	DETAIL SHEETS				
2B(5) thru 2B(8)	CURB RAMP STAKING DETAILS				
2B(9)	GENERATOR HI18A SITE GRADING PLAN				
2B(9A) thru 2B(9F)	GENERATOR HI18A SITE CROSS SECTIONS				
2B(10)	GENERATOR HI17A SITE GRADING PLAN				
2B(10A) thru 2B(10J)	GENERATOR HI17A SITE CROSS SECTIONS				
2C(1) thru 2C(4)	SWPPP SHEETS				
* 2D	ROADSIDE DEVELOPMENT SHEET				
2E	EXISTING DRAINAGE PIPE REHABILITATION SUMMARY				
3	PLAN SHEET (95 XBL)	640+25 TO 654+25			
4	PLAN SHEET (95 XBL)	654+25 TO 668+25			
4A	PROFILE SHEET (RAMP DBSR)	10+00 TO 17+50			
4B	E&S CONTROL PLAN PHASE 1 (95 XBL)	654+25 TO 668+25			
5	PLAN SHEET (95 XBL)	668+25 TO 682+25			
5A	PROFILE SHEET (RAMP DBSR)	17+50 TO 32+00			
5B	E&S CONTROL PLAN PHASE 1 (95 XBL)	668+25 TO 682+25			
6	PLAN SHEET (95 XBL)	682+25 TO 696+25			
6A	PROFILE SHEET (RAMP DBSR)	32+00 TO 44+00			
6B	E&S CONTROL PLAN PHASE 1 (95 XBL)	682+25 TO 696+25			
7	PLAN SHEET (95 XBL)	696+25 TO 710+25			
8	PLAN SHEET (95 XBL)	710+25 TO 724+25			
8A	PROFILE SHEET (RAMP OBTR)	15+00 TO 28+25			
8B	E&S CONTROL PLAN PHASE 1 (95 XBL)	710+25 TO 724+25			
9	PLAN SHEET (95 XBL AND OPITZ BLVD)	724+25 TO 738+25			
		64+00 TO 71+00			
9A	PROFILE SHEET (OPITZ BLVD)	64+00 TO 71+00			
9B	E&S CONTROL PLAN PHASE 1 (95 XBL AND OPITZ BLVD)	724+25 TO 738+25			
		64+00 TO 71+00			
9C	DETENTION BASIN MODIFICATION DETAILS				
10	PLAN SHEET (OPITZ BLVD)	56+00 TO 64+00			
10A	PROFILE SHEET (OPITZ BLVD)	56+00 TO 64+00			
10B	E&S CONTROL PLAN PHASE 1 (OPITZ BLVD)	56+00 TO 64+00			
10RW	R/W PLAN SHEET (OPITZ BLVD)				
11	PLAN SHEET (OPITZ BLVD)	71+00 TO 82+00			
11A	PROFILE SHEET (OPITZ BLVD)	71+00 TO 82+00			
11B	PROFILE SHEET (95 XBL NB LOOP)	50+00 TO 52+77.88			
11C	E&S CONTROL PLAN PHASE 1 (OPITZ BLVD)	71+00 TO 82+00			

TOTAL CROSS SECTION SHEETS 213 (SEE CROSS SECTION SHEET NUMBER 1 FOR INDEX OF SHEETS)

BRIDGE PLANS, B-688, PLAN NO. 257-38A (125 SHEETS)
 PROPOSED WIDENING ON OPITZ BOULEVARD OVER I-95, 95 EXPRESS LANES

* NOT INCLUDED IN THIS SUBMISSION

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
0095-076-299	1B

PROJECT MANAGER: *Bimbal Stah, P.E., (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE: *H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021*
DESIGN BY: *Waltman, Reardon, & Associates, LLP, (804) 272-8700*
SUBSURFACE UTILITY BY: DATE: *Accumark, Inc., (804) 550-7740, 07/07/2021*

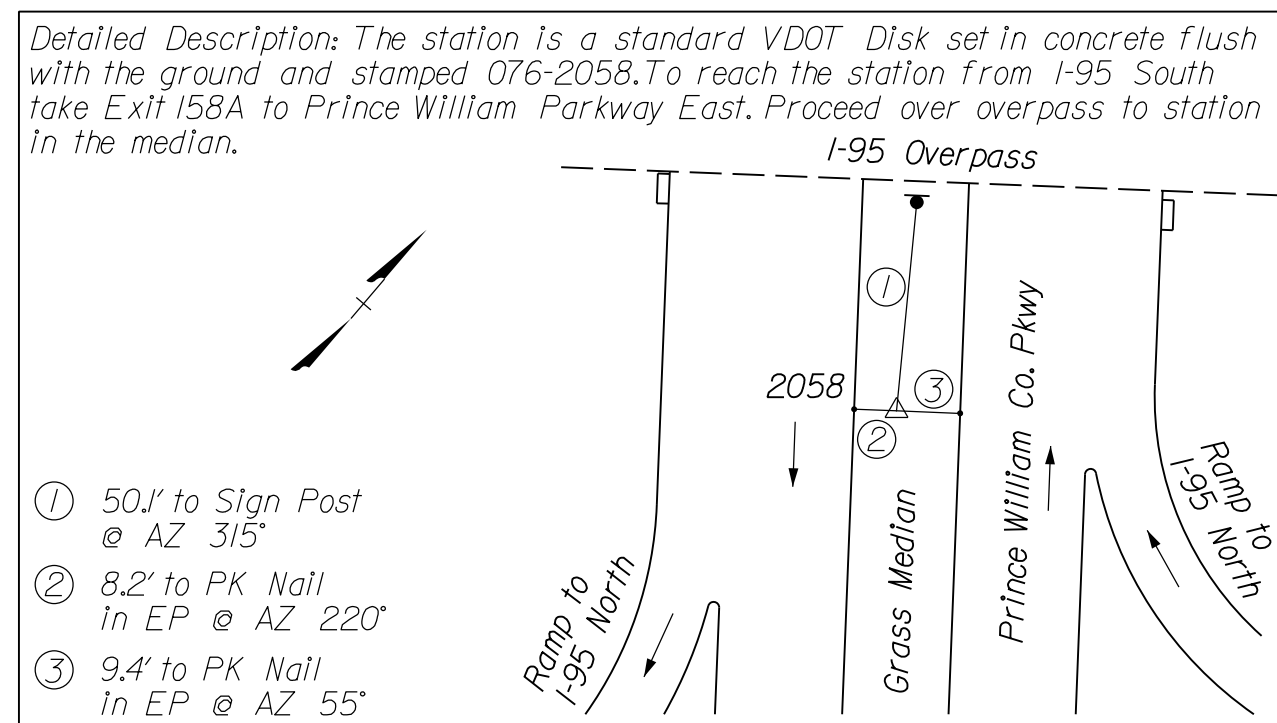
SURVEY ALIGNMENT DATA SHEET

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1F

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

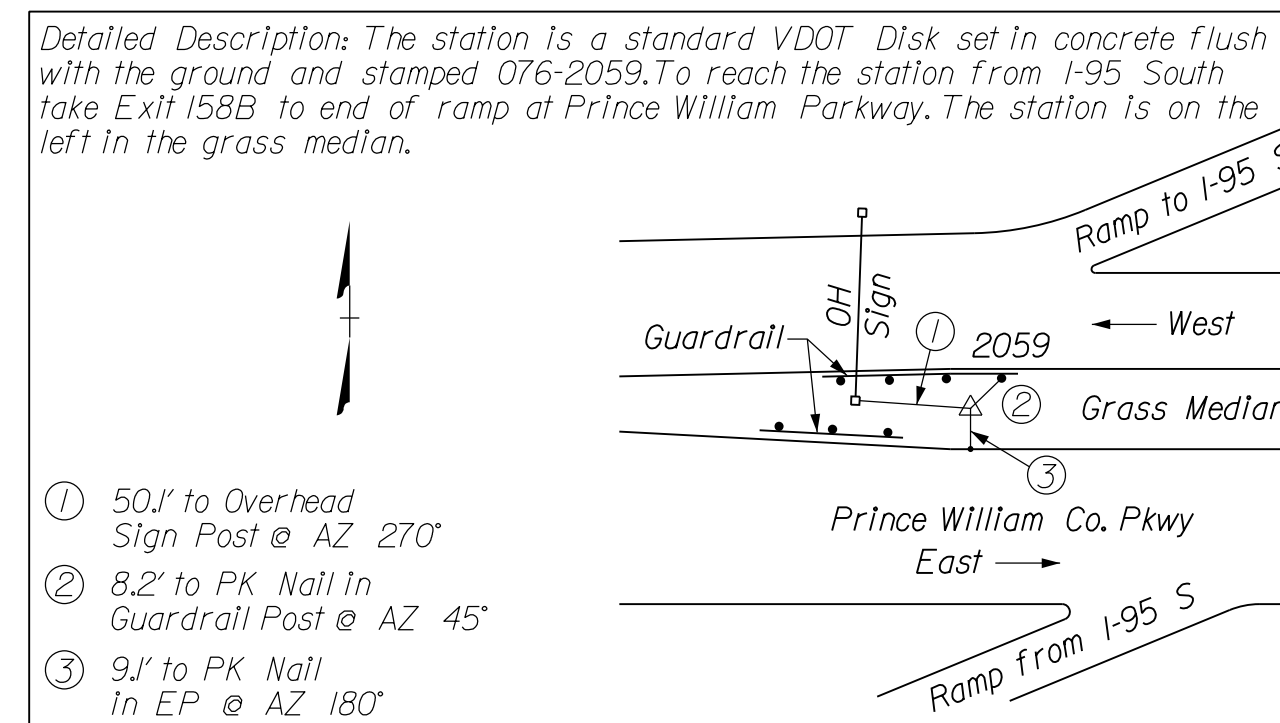
LD-200 (REV. 8/2000)
Virginia Department of Transportation Horizontal Control
Control Station I.D. 076 - 2058 Project 0095-96A-107, P101 V.D.O.T. Project Coordinates
Route: 95 City/County: Prince William Date: Sept. 2006
Established By B&N

Vertical Datum Based On NAD 88 Geoid 03 East (X) 3,629,994.2 ft.
North (Y) 3,627,464.6 ft.
Horizontal Datum Based On NAD 83(93) (circle one) Elevation 256.35 ft.
Azimuth to Station 076-2058: 282°23'39.59" 818.445' (Surface) Zone: North
Latitude: 38°39'22.7939" N (5 decimal places) Horizontal Closure:
Longitude: 77°16'43.29562" W (5 decimal places)
Geoid Separation (N): -32.1749
To convert state plane metric units to VDOT project values, use the following Formula:
Ellipsoid Height (h): 45.9618 m (NGS 84) 1. Reduce the Easting Metric Values By 2.5 Million Meters. The South and North Zone Northing Metric Values By 1 and 2 Million Respectively.
Control Based on: Station (name or PID) or DG4541
Project (monument no.): Order: B 2. Multiply These Values by the U.S. Survey Foot (3.280833333)
Virginia State Plane Coordinates - NAD 83 Metric Values
East (X) 3,606,298.6965 m Reverse This Procedure to Transform VDOT Project Coordinates to NAD 83 Metric Plane Coordinates
North (Y) 2,103,587.083 m
Ortho. Elevation 783.367 m
Sketch and Detailed Description on Other Side



LD-200 (REV. 8/2000)
Virginia Department of Transportation Horizontal Control
Control Station I.D. 076 - 2059 Project 0095-96A-107, P101 V.D.O.T. Project Coordinates
Route: 95 City/County: Prince William Date: Sept. 2006
Established By B&N

Vertical Datum Based On NAD 88 Geoid 03 East (X) 3,629,000.05 ft.
North (Y) 3,629,222.13 ft.
Horizontal Datum Based On NAD 83(93) (circle one) Elevation 242.16 ft.
Azimuth to Station 076-2058: 102°23'39.59" 818.445' (Surface) Zone: North
Latitude: 38°39'24.6399" N (5 decimal places) Horizontal Closure:
Longitude: 77°16'53.34215" W (5 decimal places)
Geoid Separation (N): -32.6394
To convert state plane metric units to VDOT project values, use the following Formula:
Ellipsoid Height (h): 416.405 m (NGS 84) 1. Reduce the Easting Metric Values By 2.5 Million Meters. The South and North Zone Northing Metric Values By 1 and 2 Million Respectively.
Control Based on: Station (name or PID) or DG4541
Project (monument no.): Order: B 2. Multiply These Values by the U.S. Survey Foot (3.280833333)
Virginia State Plane Coordinates - NAD 83 Metric Values
East (X) 3,606,055.0632 m Reverse This Procedure to Transform VDOT Project Coordinates to NAD 83 Metric Plane Coordinates
North (Y) 2,103,022.493 m
Ortho. Elevation 738.099 m
Sketch and Detailed Description on Other Side

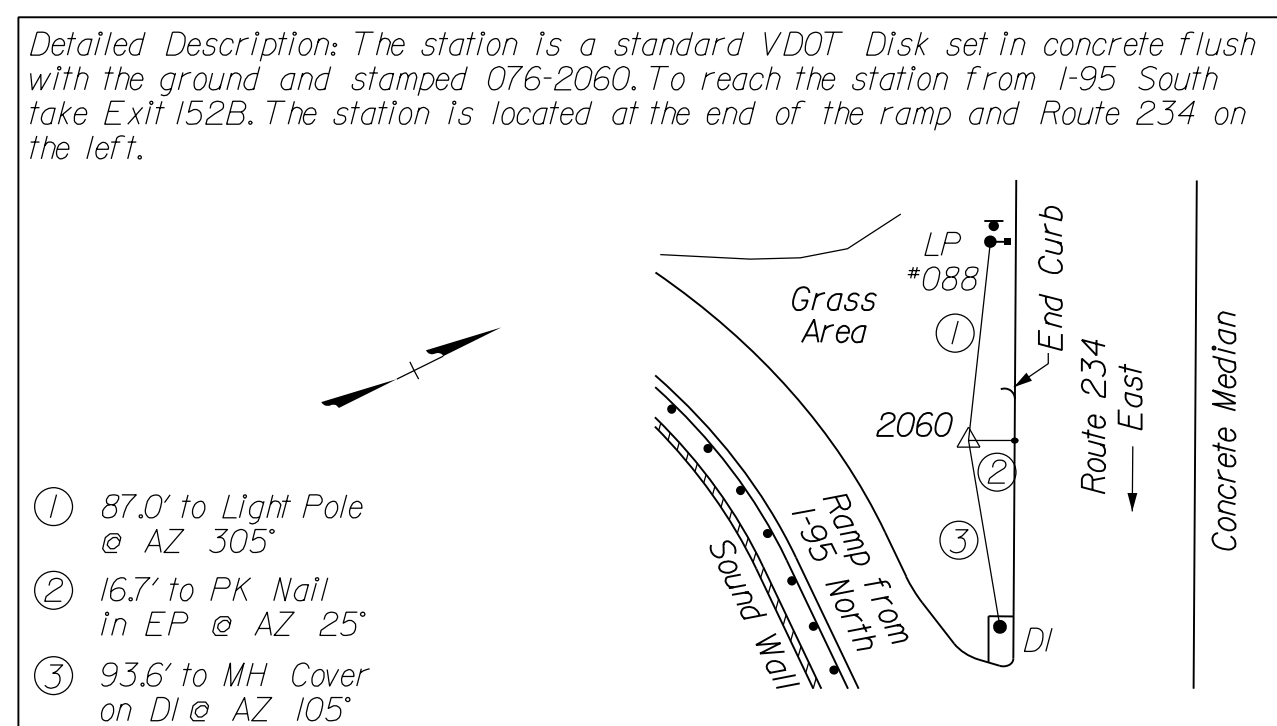


VDOT Project Coordinates : NAD 83 - Feet - Traverse #1

Point ID	Bearing & Distance	Northing	Easting	Elevation	Description
1		356,291.250	3,624,049.193	248.410	T-Bar
2	S 65°03'23" E 1,257.57'	355,760.899	3,625,189.456	225.618	T-Bar
10	S 70°56'35" E 279.14'	355,669.757	3,625,453.299	221.074	T-Bar
11	S 72°55'15" E 268.46'	355,590.911	3,625,709.923	213.952	T-Bar
12	S 70°31'51" E 246.62'	355,508.713	3,625,942.441	211.134	T-Bar
13	S 81°38'33" E 472.07'	355,440.096	3,626,409.503	217.051	T-Bar
5	S 73°22'17" E 277.75'	355,360.606	3,626,675.622	217.417	Drill Hole
14	S 72°00'24" E 209.79'	355,295.807	3,626,875.171	213.018	T-Bar
15	S 63°10'52" E 307.45'	355,157.094	3,627,149.549	202.426	T-Bar
16	S 75°19'17" E 307.06'	355,079.287	3,627,446.586	193.977	T-Bar
17	S 81°04'53" E 258.91'	355,039.148	3,627,702.368	188.236	Rod & Cap
3	S 81°46'07" E 378.66'	354,984.935	3,628,077.128	182.044	T-Bar
4	S 63°44'43" E 622.34'	354,709.656	3,628,635.229	170.936	T-Bar

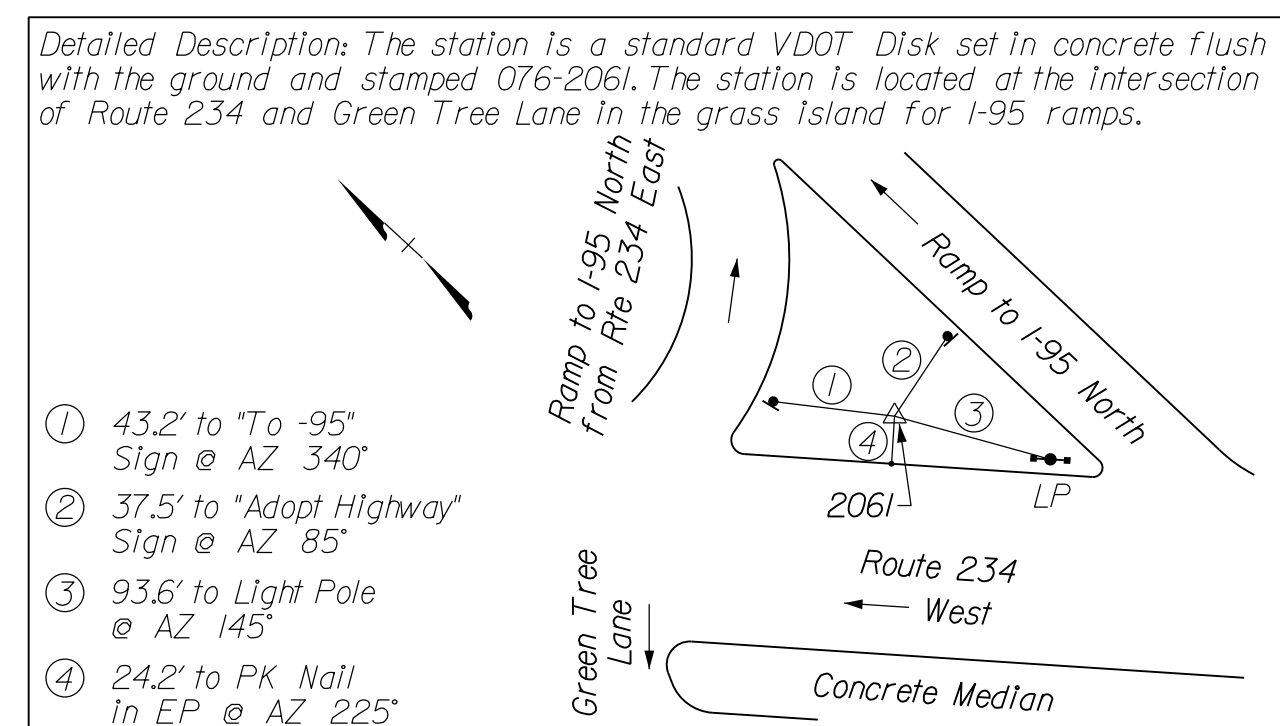
LD-200 (REV. 8/2000)
Virginia Department of Transportation Horizontal Control
Control Station I.D. 076 - 2060 Project 0095-96A-107, P101 V.D.O.T. Project Coordinates
Route: 95 City/County: Prince William Date: Sept. 2006
Established By B&N

Vertical Datum Based On NAD 88 Geoid 03 East (X) 3,617,760.44 ft.
North (Y) 3,345,773.33 ft.
Horizontal Datum Based On NAD 83(93) (circle one) Elevation 168.01 ft.
Azimuth to Station 076-2061: 108°27'02.75" 778.95' (Surface) Zone: North
Latitude: 38°34'45.3572" N (5 decimal places) Horizontal Closure:
Longitude: 77°19'19.60224" W (5 decimal places)
Geoid Separation (N): -32.2849
To convert state plane metric units to VDOT project values, use the following Formula:
Ellipsoid Height (h): 18.9246 m (NGS 84) 1. Reduce the Easting Metric Values By 2.5 Million Meters. The South and North Zone Northing Metric Values By 1 and 2 Million Respectively.
Control Based on: Station (name or PID) or DG4541
Project (monument no.): Order: B 2. Multiply These Values by the U.S. Survey Foot (3.280833333)
Virginia State Plane Coordinates - NAD 83 Metric Values
East (X) 3,602,629.4268 m Reverse This Procedure to Transform VDOT Project Coordinates to NAD 83 Metric Plane Coordinates
North (Y) 2,101,973.2546 m
Ortho. Elevation 51.2095 m
Sketch and Detailed Description on Other Side



LD-200 (REV. 8/2000)
Virginia Department of Transportation Horizontal Control
Control Station I.D. 076 - 2061 Project 0095-96A-107, P101 V.D.O.T. Project Coordinates
Route: 95 City/County: Prince William Date: Sept. 2006
Established By B&N

Vertical Datum Based On NAD 88 Geoid 03 East (X) 3,618,499.35 ft.
North (Y) 3,343,308.80 ft.
Horizontal Datum Based On NAD 83(93) (circle one) Elevation 154.65 ft.
Azimuth to Station 076-2060: 288°27'02.75" 778.95' (Surface) Zone: North
Latitude: 38°34'43.4053" N (5 decimal places) Horizontal Closure:
Longitude: 77°19'10.33816" W (5 decimal places)
Geoid Separation (N): -32.2907
To convert state plane metric units to VDOT project values, use the following Formula:
Ellipsoid Height (h): 148.479 m (NGS 84) 1. Reduce the Easting Metric Values By 2.5 Million Meters. The South and North Zone Northing Metric Values By 1 and 2 Million Respectively.
Control Based on: Station (name or PID) or DG4541
Project (monument no.): Order: B 2. Multiply These Values by the U.S. Survey Foot (3.280833333)
Virginia State Plane Coordinates - NAD 83 Metric Values
East (X) 3,602,854.6343 m Reverse This Procedure to Transform VDOT Project Coordinates to NAD 83 Metric Plane Coordinates
North (Y) 2,101,898.1188 m
Ortho. Elevation 47.1386 m
Sketch and Detailed Description on Other Side



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rajpal Shah, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	1G(1)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER				

CURVE DATA SUMMARY

Curve No. / POT	Location	Delta	R	T	L	Tangent Bearing		Begin Curve Station	Coordinates		PI Station	Coordinates		End Curve Station	Coordinates		V (mph)	SE (ft/ft)
						Back	Forward		North	East		North	East		North	East		
POB							N40°11'55.01"E				253+26.89	344239.3040	3621130.8380					
I-95 SBL-1	I-95 SB	20°09'59.04"	5729.58	1018.86	2016.64	N40°11'55.01"E	N20°01'55.97"E	287+10.38	346823.6536	3623314.6757	297+29.24	347601.8711	3623972.2882	307+27.02	348559.0906	3624321.2972		
I-95 SBL-2		5°09'37.02"	22861.51	1030.20	2059.00	N20°01'55.97"E	N14°52'18.96"E	342+58.68	351877.0841	3625531.0612	352+88.88	352844.9526	3625883.9529	363+17.68	353840.6381	3626148.3622		
I-95 SBL-3		7°55'19.06"	23030.99	1594.72	3184.36	N14°52'18.96"E	N22°47'38.02"E	380+45.43	355510.5136	3626591.8058	396+40.15	357051.8167	3627001.1065	412+29.79	358521.9992	3627618.9299		
POE						N22°47'38.02"E					478+83.61	364656.1780	3630196.7320					
POB							N40°11'55.00"E				251+32.85	344006.1510	3621242.7940					
I-95 NBL-1	I-95 NB	20°09'59.01"	5729.58	1018.86	2016.64	N40°11'55.00"E	N20°01'55.99"E	284+90.08	346570.4440	3623409.6830	295+08.94	347348.6612	3624067.2952	305+06.72	348305.8803	3624416.3041		
I-95 NBL-2		05°09'36.94"	23037.51	1038.12	2074.84	N20°01'55.99"E	N14°52'19.04"E	342+43.75	351816.8259	3625696.4201	352+81.87	352792.1416	3626052.0272	363+18.59	353795.4883	3626318.4713		
I-95 NBL-3		07°55'18.96"	22854.94	1582.53	3160.01	N14°52'19.04"E	N22°47'38.01"E	380+46.33	355465.3575	3626761.9141	396+28.86	356994.8735	3627168.0853	412+06.34	358453.8129	3627781.1839		
POE						N22°47'38.01"E					479+75.91	364694.7040	3630403.8300					
XBL-1	95XPL	18°00'43.49"	5729.58	908.10	1801.21	N39°06'00.29"E	N21°05'16.79"E	639+12.70	346784.4935	3623433.5218	648+20.79	347489.2170	3624006.2367	657+13.90	348336.4964	3624332.9707		
XBL-2		04°37'08.11"	22949.51	925.54	1850.08	N19°44'53.55"E	N15°07'45.43"E	695+65.08	351954.6879	3625652.1237	704+90.62	352825.7964	3625964.8528	714+15.16	353719.2594	3626206.4176		
XBL-3		07°24'54.68"	23200.00	1503.36	3002.53	N15°07'59.16"E	N22°32'53.84"E	733+35.98	355575.5833	3626699.9792	748+39.34	357026.8145	3627092.4510	763+38.51	358415.2573	3627668.9342		
OBTR-1	OBTR	00°45'01.98"	22925.51	150.16	300.31	N16°08'06.58"E	N15°23'04.61"E	6+99.66	353337.9389	3626074.7990	8+49.82	353482.1830	3626116.5288	9+99.97	353626.9613	3626156.3656	50	NC
OBTR-2		03°52'06.35"	6000.00	202.63	405.10	N15°23'04.61"E	N11°30'58.26"E	9+99.97	353626.9613	3626156.3656	12+02.60	353822.3281	3626210.1221	14+05.07	354020.8764	3626250.5756	50	0.0200
OBTR-3		02°37'50.62"	8000.00	183.69	367.32	N11°30'58.26"E	N14°08'48.87"E	14+05.07	354020.8764	3626250.5756	15+88.77	354200.8700	3626287.2487	17+72.39	354378.9908	3626332.1446	50	NC
OBTR-4		01°00'35.16"	8150.00	71.82	143.63	N14°08'48.87"E	N13°08'13.72"E	17+72.39	354378.9908	3626332.1446	18+44.21	354448.6313	3626349.6977	19+16.03	354518.5703	3626366.0208	50	NC
OBTR-5		01°44'05.24"	8175.00	123.77	247.52	N13°08'13.72"E	N14°52'18.96"E	19+16.03	354518.5703	3626366.0208	20+39.80	354639.1010	3626394.1515	21+63.55	354758.7248	3626425.9182	50	NC
PI						N14°52'18.96"E					22+00.00	354793.9557	3626435.2740					
PI							N14°52'18.96"E				22+00.00	354790.8758	3626446.8720					
POE						N14°52'18.96"E					28+13.77	355384.0841	3626604.4014					
POT	I-95 NB Ramp						S72°47'08.00"E				50+00.00	355239.1901	3626869.0413					
I-95 NB LOOP-1		25°30'10.63"	330.00	74.68	146.89	S72°47'08.00"E	S47°16'57.37"E	51+30.99	355200.4224	3626994.1678	52+05.67	355178.3209	3627065.5027	52+77.88	355127.6590	3627120.3710	35	0.0400
POB	DBSR						N19°59'16.79"E				10+00.00	348638.2830	3624418.7002					
DBSR-1		03°28'13.10"	6013.00	182.15	364.20	N19°59'16.79"E	N16°31'03.69"E	17+80.33	349371.6136	3624685.4368	19+62.49	349542.7956	3624747.7014	21+44.53	349717.4327	3624799.4899	50	0.0200
DBSR-2		02°49'01.91"	8166.00	200.80	401.52	N16°31'03.69"E	N19°20'05.60"E	21+44.53	349717.4327	3624799.4899	23+45.33	349909.9451	3624856.5793	25+46.05	350099.4189	3624923.0616	50	NC
PI						N19°20'05.60"E	N19°20'05.60"E				25+46.05	350094.1215	3624938.1592					
DBSR-3		02°40'34.53"	8166.00	190.75	381.43	N19°20'05.60"E	N16°39'31.06"E	30+18.75	350540.1665	3625094.6669	32+09.50	350720.1578	3625157.8221	34+00.18	350902.9017	3625212.5041	50	NC
DBSR-4		03°22'24.91"	6013.00	177.07	354.05	N16°39'31.06"E	N20°01'55.97"E	34+00.18	350902.9017	3625212.5041	35+77.26	351072.5443	3625263.2658	37+54.23	351238.9057	3625323.9224	50	0.0200
POE						N20°01'55.97"E					44+24.75	351868.8629	3625553.6092					
POB	OPITZ BLVD						S72°47'08.00"E				56+00.00	355719.3363	3625522.3424				50	
POE						S72°47'08.00"E					82+00.00	354949.8692	3628005.8722				50	

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	1G(2)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER				

SPIRAL CURVE DATA SUMMARY																		
Curve No. / PI	Location	Delta	Spiral Length	Long Tangent	Short Tangent	Tangent Bearing		Begin Spiral	Coordinates		Spiral PI Station	Coordinates		End Spiral Station	Coordinates		V (mph)	SE (ft/ft)
						Back	Forward		North	East		North	East		North	East		
PI	95XPL						N40°12'00.28"E				605+37.54	344205.6661	3621256.0809					
XBL-1		01°06'00.00"	220.00	146.67	73.34	N40°12'00.28"E	N39°06'00.29"E	636+92.70	346615.5560	3623292.6014	638+39.36	346727.5815	3623387.2705	639+12.70	346784.4935	3623433.5218		
XBL-1		01°06'00.00"	220.00	146.67	73.34	N21°05'16.79"E	N19°59'16.79"E	657+13.90	348336.4964	3624332.9707	657+87.24	348404.9210	3624359.3571	659+33.90	348542.7557	3624409.4921		
PI						N19°59'16.79"E	N20°04'31.30"E				676+07.12	350115.1875	3624981.4375					
PI						N20°04'31.30"E	N20°01'22.20"E				683+31.27	350795.3390	3625230.0060					
XBL-2		00°16'28.65"	220.00	146.67	73.33	N20°01'22.20"E	N19°44'53.55"E	693+45.08	351747.8656	3625577.1273	694+91.74	351885.6674	3625627.3452	695+65.08	351954.6879	3625652.1237		
XBL-2		00°16'28.65"	220.00	146.67	73.33	N15°07'45.43"E	N14°51'16.78"E	714+15.16	353719.2594	3626206.4176	714+88.49	353790.0511	3626225.5575	716+35.16	353931.8163	3626263.1582		
PI						N14°51'16.78"E	N14°53'10.08"E				723+79.37	354651.1510	3626453.9490					
XBL-3		00°14'49.07"	200.00	133.33	66.67	N14°53'10.08"E	N15°07'59.16"E	731+35.98	355382.3698	3626648.3218	732+69.31	355511.2283	3626682.5750	733+35.98	355575.5833	3626699.9792		
XBL-3		00°14'49.07"	200.00	133.33	66.67	N22°32'53.84"E	N22°47'42.91"E	763+38.51	358415.2573	3627668.9342	764+05.18	358476.8278	3627694.4984	765+38.51	358599.7473	3627746.1570		
PI						N22°47'42.91"E	N22°43'25.03"E				780+66.04	360007.9653	3628337.9801					
PI						N22°43'25.03"E					790+80.79	360943.9531	3628729.9657					

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
0095-076-299	1G(2)

PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

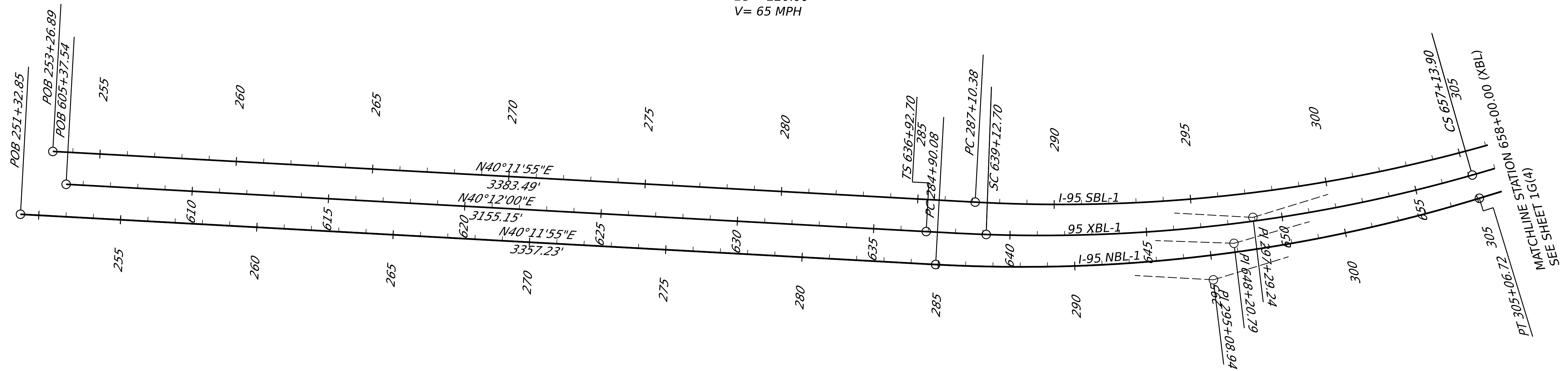
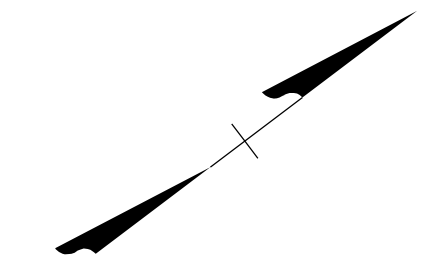
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1G(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER

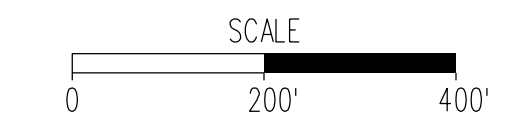
CONSTRUCTION ALIGNMENT DATA SHEET

<p>CURVE I-95 SBL-1 PI = 297+29.24 DELTA = 20°09'59.04" (LT) D = 01°00'00" T = 1,018.86' L = 2,016.64' R = 5,729.58' PC = 287+10.38 PT = 307+27.02 V = 70 mph</p>	<p>CURVE 95 NBL-1 PI = 295+08.94 DELTA = 20°09'59.01" (LT) D = 01°00'00" T = 1,018.86' L = 2,016.64' R = 5,729.58' PC = 284+90.08 PT = 305+06.72 V = 70 mph</p>	<p>CURVE 95 XBL-1 PI = 648+20.79 DELTA = 18°00'43.49" (LT) D = 01°00'00" T = 908.10' L = 1,801.21' R = 5,729.58' PC = 639+12.70 PT = 657+13.90 Ls = 220.00 Θs = 01°06'00" P = 0.35 K = 110.00 Xs = 219.99 Ys = 1.41 LT = 146.67 ST = 73.34 LC = 220.00 V = 65 MPH</p>
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PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT: 0095-076-299
SHEET NO.: 1G(3)

PROJECT MANAGER: *Bimbal Stah, P.E.* (703) 259-2362 (NOVA District)
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
DESIGN BY: *Whitman, Reardon & Associates, LLP* (804) 272-8100
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc.* (804) 550-7740, 07/07/2021

CONSTRUCTION ALIGNMENT DATA SHEET

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IG(4)

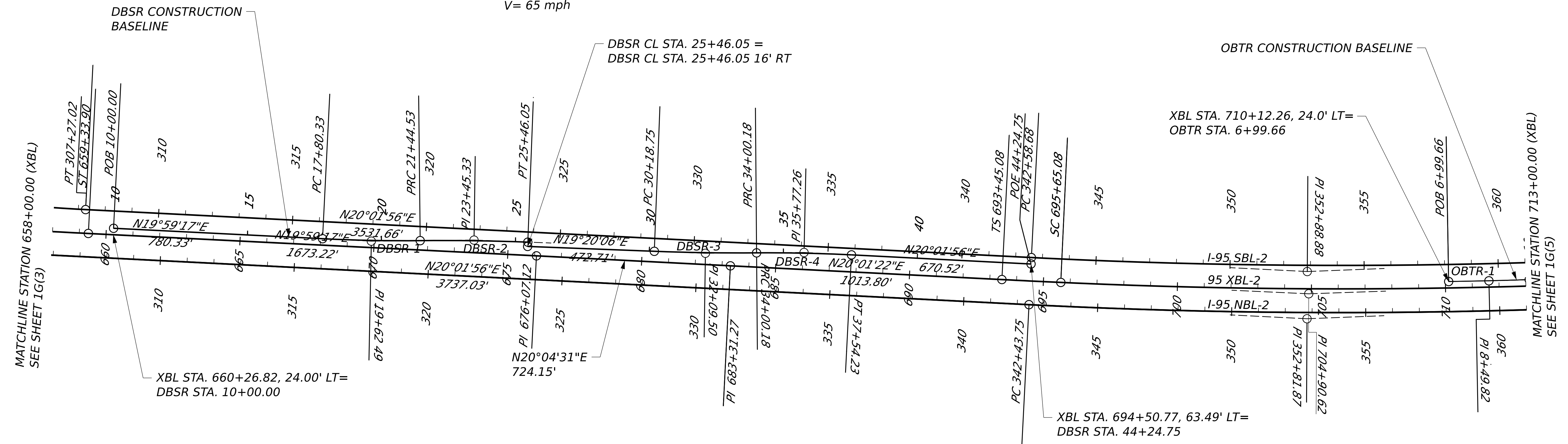
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
Richmond, Virginia
ROADWAY ENGINEER

CURVE I-95 SBL-2
 PI = 352+88.88
 DELTA = 05°09'37.02" (LT)
 D = 00°49'20"
 T = 1,030.20'
 L = 2,059.00'
 R = 22,861.51'
 PC = 342+58.68
 PT = 363+17.68
 V = 70 mph

CURVE I-95 NBL-2
 PI = 352+81.87
 DELTA = 05°09'36.94" (LT)
 D = 00°48'57"
 T = 1,038.12'
 L = 2,074.84'
 R = 23,037.51'
 PC = 342+43.75
 PT = 363+18.59
 V = 70 mph

CURVE 95 XBL-2
 PI = 704+90.62
 DELTA = 04°37'08.11" (LT)
 D = 00°14'59"
 T = 925.54'
 L = 1,850.08'
 R = 22,949.51'
 PC = 695+65.08
 PT = 714+15.16
 Ls = 220.00
 Os = 00°16'29"
 P = 0.88
 K = 110.00
 Xs = 220.00
 Ys = 0.35
 LT = 146.67
 ST = 73.33
 LC = 220.00
 V = 65 mph



CURVE DBSR-1
 PI = 19+62.49
 DELTA = 03°28'13.10" (LT)
 D = 00°57'10"
 T = 182.15'
 L = 364.20'
 R = 6,013.00'
 PC = 17+80.33
 PT = 21+44.53
 e = 2.0%
 V = 50 MPH

CURVE DBSR-2
 PI = 23+45.33
 DELTA = 02°49'01.91" (RT)
 D = 00°42'06"
 T = 200.80'
 L = 401.52'
 R = 8,166.00'
 PC = 21+44.53
 PT = 25+46.05
 e = NC
 V = 50 MPH

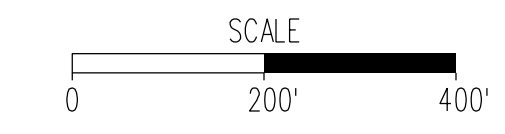
CURVE DBSR-3
 PI = 32+09.50
 DELTA = 02°40'34.53" (LT)
 D = 00°42'06"
 T = 190.75'
 L = 381.43'
 R = 8,166.00'
 PC = 30+18.75
 PT = 34+00.18
 e = NC
 V = 50 MPH

CURVE DBSR-4
 PI = 35+77.26
 DELTA = 03°22'24.91" (RT)
 D = 00°57'10"
 T = 177.07'
 L = 354.05'
 R = 6,013.00'
 PC = 34+00.18
 PT = 37+54.23
 e = 2.0%
 V = 50 MPH

CURVE OBTR-1
 PI = 8+49.82
 DELTA = 00°45'01.98" (LT)
 D = 00°15'00"
 T = 150.16'
 L = 300.31'
 R = 22,925.51'
 PC = 6+99.66
 PT = 9+99.97
 e = NC
 V = 50 MPH

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IG(4)

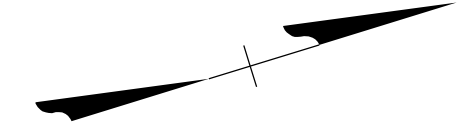
PROJECT MANAGER: *Bimbal Stah, P.E.* (703) 259-2362 (NOVA District)
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
DESIGN BY: *Whitman, Requardt & Associates, LLP* (804) 272-8700
SUBSURFACE UTILITY BY: DATE *Accumark, Inc.* (804) 550-7740, 07/07/2021

CONSTRUCTION ALIGNMENT DATA SHEET

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IG(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

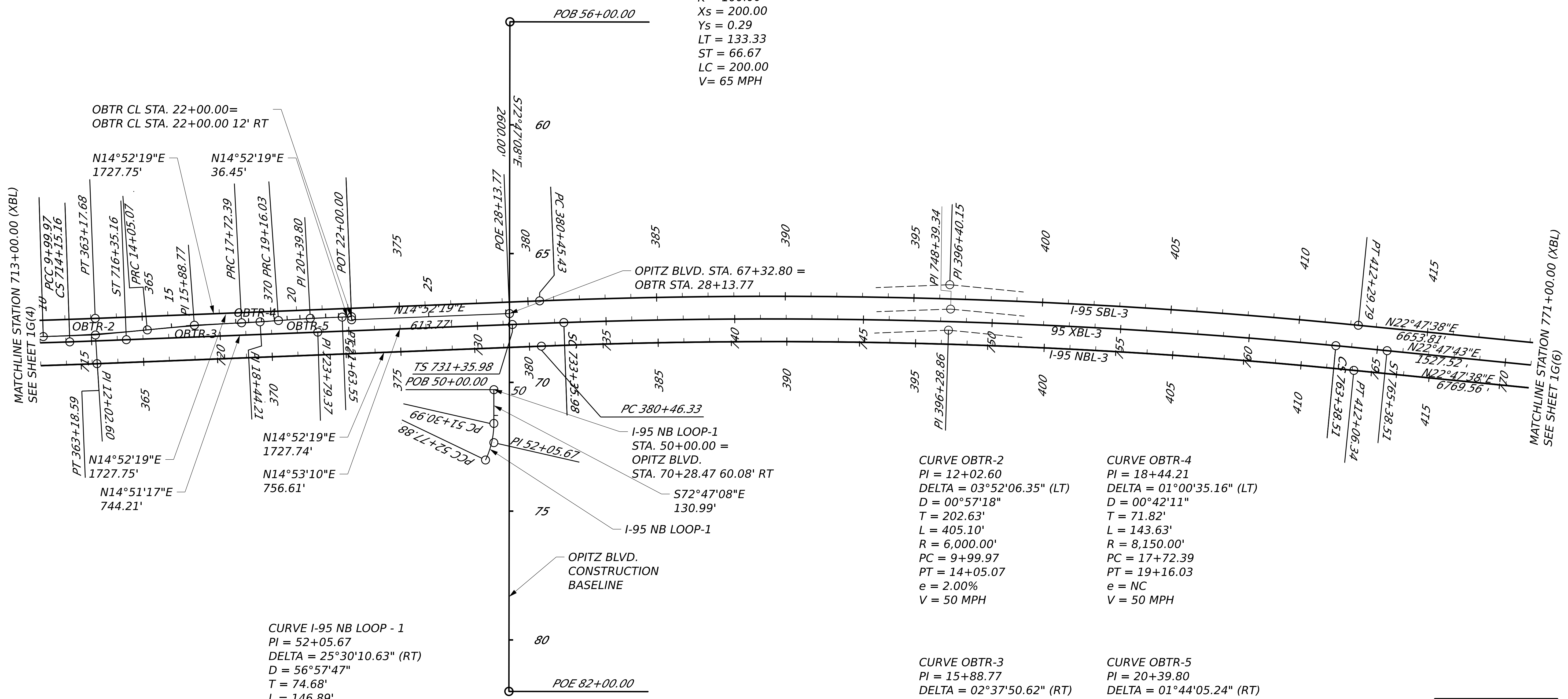
Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER



CURVE I-95 SBL-3
 PI = 396+40.15
 DELTA = 07°55'19.06" (RT)
 D = 00°14'56"
 T = 1,594.72'
 L = 3,184.36'
 R = 23,030.99'
 PC = 380+45.43
 PT = 412+29.79
 V = 70 mph

CURVE I-95 NBL-3
 PI = 396+28.86
 DELTA = 07°55'18.96" (RT)
 D = 00°15'03"
 T = 1,582.53'
 L = 3,160.01'
 R = 22,854.94'
 PC = 380+46.33
 PT = 412+06.34
 V = 70 mph

CURVE 95 XBL-3
 PI = 748+39.34
 DELTA = 07°24'54.68" (RT)
 D = 00°14'49"
 T = 1,503.36'
 L = 3,002.53'
 R = 23,200.00'
 PC = 733+35.98
 PT = 763+38.51
 Ls = 200.00
 θs = 00°14'49"
 P = 0.07
 K = 100.00
 Xs = 200.00
 Ys = 0.29
 LT = 133.33
 ST = 66.67
 LC = 200.00
 V = 65 MPH



CURVE I-95 NB LOOP - 1
 PI = 52+05.67
 DELTA = 25°30'10.63" (RT)
 D = 56°57'47"
 T = 74.68'
 L = 146.89'
 R = 330.00'
 PC = 51+30.99
 PT = 52+77.88
 e = 4.00%
 V = 35 MPH

CURVE OBTR-2
 PI = 12+02.60
 DELTA = 03°52'06.35" (LT)
 D = 00°57'18"
 T = 202.63'
 L = 405.10'
 R = 6,000.00'
 PC = 9+99.97
 PT = 14+05.07
 e = 2.00%
 V = 50 MPH

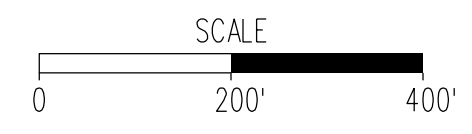
CURVE OBTR-4
 PI = 18+44.21
 DELTA = 01°00'35.16" (LT)
 D = 00°42'11"
 T = 71.82'
 L = 143.63'
 R = 8,150.00'
 PC = 17+72.39
 PT = 19+16.03
 e = NC
 V = 50 MPH

CURVE OBTR-3
 PI = 15+88.77
 DELTA = 02°37'50.62" (RT)
 D = 00°42'59"
 T = 183.69'
 L = 367.32'
 R = 8,000.00'
 PC = 14+05.07
 PT = 17+72.39
 e = NC
 V = 50 MPH

CURVE OBTR-5
 PI = 20+39.80
 DELTA = 01°44'05.24" (RT)
 D = 00°42'03"
 T = 123.77'
 L = 247.52'
 R = 8,175.00'
 PC = 19+16.03
 PT = 21+63.55
 e = NC
 V = 50 MPH

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IG(5)

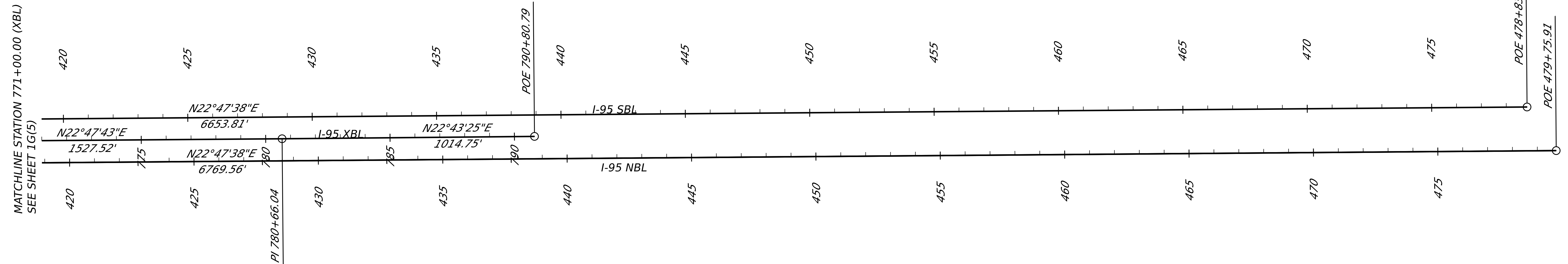
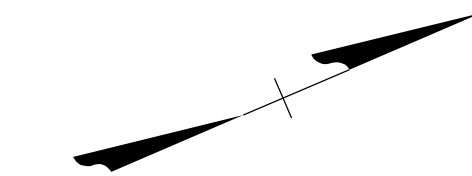
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITIES BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CONSTRUCTION ALIGNMENT DATA SHEET

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	IG(6)

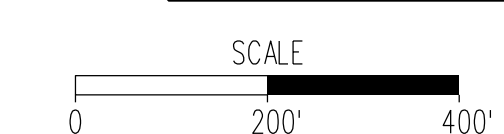
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IG(6)

PROJECT MANAGER: *Blmpal Stab, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

TRANSPORTATION MANAGEMENT PLAN & SEQUENCE OF CONSTRUCTION

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	1K(1)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER				

TRANSPORTATION MANAGEMENT PLAN (TMP)

THIS TRANSPORTATION MANAGEMENT PLAN HAS BEEN DEVELOPED IN ACCORDANCE WITH VDOT IM-LD-241.5 REQUIREMENTS FOR A TYPE C, CATEGORY V PROJECT.

TRANSPORTATION OPERATIONS PLAN

THIS TRANSPORTATION OPERATIONS PLAN CONTAINS PROCEDURES AND PROCESSES TO RESPOND TO INCIDENTS IN THE WORK ZONE, AND TO MODIFY TEMPORARY TRAFFIC CONTROL PLANS TO IMPROVE OPERATIONS IF NECESSARY. PROCESSES FOR PUBLIC OUTREACH, INCLUDING COORDINATION WITH THE VDOT NORTHERN REGION OPERATIONS TRAFFIC OPERATIONS CENTER (NRO TOC) ARE FOUND IN THE PUBLIC COMMUNICATIONS PLAN SECTION.

INCIDENT MANAGEMENT PLAN

- 1) TIMELY RESPONSE TO AN INCIDENT IS EXTREMELY IMPORTANT TO ACHIEVE SWIFT EMERGENCY RESPONSE AND TO RESTORE TRAFFIC OPERATIONS. IN THE EVENT OF A TRAFFIC CRASH OR OTHER EMERGENCY SITUATION IN THE PROJECT AREA, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE EMERGENCY RESPONSE AGENCIES NOTED BELOW. THE CONTRACTOR SHALL ASSIST IN MAKING THE INCIDENT AREA ACCESSIBLE TO EMERGENCY VEHICLES, AND SHALL FOLLOW DIRECTIONS OF THE POLICE IN ORDER TO RESTORE NORMAL OPERATIONS.
- 2) VDOT HAS THE RIGHT TO DIRECT THE CONTRACTOR TO MODIFY, ADJUST, OR REMOVE LANE CLOSURES AT ANY TIME. THE VDOT CONSTRUCTION MANAGER MAY NOTIFY ADDITIONAL VDOT PERSONNEL AND AGENCIES OF THE INCIDENT AND THE RESULTING TRAFFIC DELAYS AS APPROPRIATE. DURING INCIDENTS THAT CLOSE ONE OR MORE LANES ON INTERSTATE 95, ALL LANE CLOSURES SHALL BE REMOVED AND ALL TRAVEL LANES FULLY OPENED TO TRAFFIC IN THE SAME DIRECTION AS THE INCIDENT ON INTERSTATE 95, 95 EXPRESS LANES, AND THE INTERCHANGE RAMP. AN INCIDENT SHALL BE DEFINED AS ANY CONDITION INCLUDING CONTRACTOR WORK OPERATIONS THAT CAUSE A TRAFFIC QUEUE EXTENDING GREATER THAN FIVE (5) MILES ON INTERSTATE 95 BETWEEN THE HOURS OF 5:00AM TO 9:00PM OR GREATER THAN SIX (6) MILES ON INTERSTATE 95 DURING ALL OTHER HOURS. THE QUEUE LENGTH SHALL BE MEASURED STARTING AT THE ROAD WORK AHEAD SIGNS.

THE CONTACT LIST FOR LOCAL EMERGENCY RESPONSE AGENCIES IS AS FOLLOWS:

- A. EMERGENCY - 911
- B. NON-EMERGENCY - *77 OR 112
- C. VA STATE POLICE - DISPATCH (540) 829-7766
- D. VA STATE POLICE - AREA 11 (703) 791-3101
- E. PRINCE WILLIAM COUNTY SHERIFF'S OFFICE (703) 792-6070
- F. PRINCE WILLIAM COUNTY FIRE AND RESCUE (703) 792-6800
- G. NOVA TRAFFIC OPERATIONS CENTER (800) 367-7623
- H. NORTHERN VIRGINIA TRAFFIC OPERATIONS CENTER (703) 877-3449
- I. TRANSURBAN'S EXPRESS OPERATIONS CENTER (571) 419-6046

WRECKER SERVICE

THE CONTRACTOR SHALL COORDINATE WITH THE STATE POLICE CONCERNING THE DESIGNATED WRECKER SERVICE COMPANY ASSIGNED TO THE WORK AREA. THIS COORDINATION SHALL TAKE PLACE UPON COMMENCEMENT OF THE CONSTRUCTION OPERATIONS, AND AT MINIMUM 3 MONTH INTERVALS, IN ORDER TO ENSURE PROMPT DISABLED VEHICLE REMOVAL SERVICE DURING ACTUAL INCIDENT AND EMERGENCY SITUATIONS.

INCIDENT REVIEW AND TRAFFIC CONTROL PLAN MODIFICATION

APPROPRIATE ACCIDENT REPORTS WILL BE COMPLETED IN ACCORDANCE WITH THE CONTRACTOR'S HEALTH, SAFETY, AND WELFARE PLAN, STATE POLICE PROCEDURES, OR STANDARD VDOT PROCEDURES. THE ACCIDENT REPORT SHALL BE THOROUGHLY REVIEWED BY STAKEHOLDER'S FOR THE PURPOSES OF MODIFYING THE TEMPORARY TRAFFIC CONTROL PLANS TO REDUCE THE FREQUENCY AND SEVERITY OF FUTURE INCIDENTS. RECOMMENDATIONS MADE SHALL BE IMPLEMENTED BY THE CONTRACTOR.

PUBLIC COMMUNICATIONS PLAN

A PROACTIVE COMMUNICATIONS AND OUTREACH PLAN IS IMPERATIVE TO KEEP ALL STAKEHOLDERS AWARE OF CHANGING ROADWAY CONDITIONS AND ROADWAY DISRUPTIONS (SUCH AS LANE CLOSURES OR TEMPORARY STOPPAGES). IN ORDER TO ATTAIN THIS AWARENESS, NOTIFICATION PROCESSES NEED TO BE IMPLEMENTED BETWEEN ALL PARTIES. THESE STAKEHOLDERS INCLUDE TRANSURBAN, THE CONTRACTOR'S WORK ZONE TRAFFIC CONTROL COORDINATOR, VDOT CONSTRUCTION MANAGER, VDOT TRAFFIC OPERATIONS, VDOT PUBLIC AFFAIRS, FHWA, LOCAL GOVERNMENT, COUNTY POLICE, STATE POLICE, FIRE AND RESCUE, SCHOOLS, TRANSIT AGENCIES, LOCAL BUSINESSES, LOCAL RESIDENTS, AND LOCAL AND LONG DISTANCE TRAVELERS.

CONTRACTOR'S NOTIFICATION PROCESS

1. BEFORE IMPLEMENTING COMPLETE ROADWAY CLOSURES, CHANGING TRAFFIC PATTERNS, OR ANY OTHER ACTIVITY ANTICIPATED TO HAVE A SIGNIFICANT IMPACT TO TRAFFIC, THE CONTRACTOR SHALL PLACE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) ON AFFECTED ROADWAYS A MINIMUM OF SEVEN (7) DAYS PRIOR TO THE EVENT.
2. TWO-LANE CLOSURES AND TOTAL CLOSURES OF I-95 FOR SUCH WORK AS INSTALLATION AND REMOVAL OF OVERHEAD SIGN PANELS AND STRUCTURES WITH SUBSTANTIATION OF NEED BY THE CONTRACTOR WILL REQUIRE COORDINATION WITH APPROPRIATE STAKEHOLDERS AND PUBLIC NOTICE. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF FOUR (4) WEEKS ADVANCE NOTICE TO VDOT. THIS ADVANCE NOTICE WILL ALLOW THE CONTRACTOR AND VDOT TO COORDINATE ON A PUBLIC OUTREACH CAMPAIGN AND/OR ADVERTISING TO REACH AFFECTED MOTORISTS AND TARGET AUDIENCES. ALTERNATE DATES CAN BE ADVERTISED IN THE EVENT OF INCLEMENT WEATHER.

PUBLIC NOTIFICATION PROCESS

THE FOLLOWING PROACTIVE STRATEGIES WILL BE USED IN ORDER TO KEEP THE PUBLIC INFORMED OF LANE CLOSURES AND CHANGING TRAFFIC PATTERNS THROUGHOUT CONSTRUCTION:

1. THE CONTRACTOR WILL COORDINATE WITH VDOT ON THE USE OF THE DEPARTMENTS EXISTING PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) WITHIN THE PROJECT LIMITS TO COMMUNICATE CONSTRUCTION RELATED INFORMATION TO TRAVELERS AS DESCRIBED IN THE CONTRACTOR'S NOTIFICATION PROCESS. IN THE EVENT THE DEPARTMENTS PCMS ARE NOT AVAILABLE, OR AT THE DIRECTION OF VDOT, THE CONTRACTOR SHALL PROVIDE ADDITIONAL PCMS FOR USE IN PROVIDING CONSTRUCTION RELATED INFORMATION TO TRAVELERS AS DESCRIBED IN THE CONTRACTOR'S NOTIFICATION PROCESS. IT IS ALSO SUGGESTED THAT VDOT TRAFFIC OPERATIONS CENTER USE ITS INTELLIGENT TRANSPORTATION SYSTEM DEVICES TO COMMUNICATE CONSTRUCTION RELATED INFORMATION TO TRAVELERS.

RESTRICTION OF OPERATIONS

EXPRESS LANES

- 1) FOR WORK WITHIN THE 95 EXPRESS LANES, THE CONTRACTOR IS REQUIRED TO COORDINATE DIRECTLY WITH THE CONCESSIONAIRE AND COMPLY WITH THE CURRENT PERMIT TO WORK PROCESSES IN PLACE FOR THE EXPRESS LANES, INCLUDING THE USE OF ELECTRONIC FORMS AND SUBMITTALS. AN APPROVED PERMIT TO WORK WILL BE REQUIRED PRIOR TO COMMENCING ANY WORK WITHIN THE 95 EXPRESS LANES, INCLUDING TRAFFIC CLOSURES, AND/OR WORK IMPACTING ANY 95 EXPRESS LANES FACILITIES OR EQUIPMENT. ALL PERMIT TO WORK REQUESTS SHALL BE SUBMITTED A MINIMUM OF FIVE (5) BUSINESS DAYS PRIOR TO THE INTENDED WORK START DATE.

HOLIDAY

- 1) IN ADDITION TO THE SUNDAY OR HOLIDAY WORK LIMITATIONS, MOBILE, SHORT DURATION, SHORT-TERM STATIONARY, OR INTERMEDIATE-TERM STATIONARY TEMPORARY TRAFFIC CONTROL ZONE LANE CLOSURES ON MAINLINE LANES, SHOULDERS, OR RAMPS SHALL NOT BE PERFORMED DURING THE FOLLOWING HOLIDAY TIME PERIODS WITHOUT THE WRITTEN PERMISSION OF THE ENGINEER. ADDITIONALLY, A LONG-TERM STATIONARY TEMPORARY TRAFFIC CONTROL ZONE SHALL NOT BE INITIALLY PUT IN PLACE, ADJUSTED, OR REMOVED DURING THE FOLLOWING HOLIDAY TIME PERIODS WITHOUT THE WRITTEN PERMISSION OF THE ENGINEER (VDOT 2020 ROAD AND BRIDGE SPECIFICATIONS):
 - A. JANUARY 1: FROM 5:00 A.M. ON THE PRECEDING DAY UNTIL NOON ON THE FOLLOWING DAY, EXCEPT AS INDICATED BELOW.
 - B. INAUGURATION DAY: FROM 3:30 P.M. ON THE PRECEDING DAY UNTIL 9:30 A.M. ON THE FOLLOWING DAY.
 - C. MARTIN LUTHER KING, JR. DAY AND LEE JACKSON DAY: FROM 5:00 A.M. ON THE PRECEDING THURSDAY TO NOON ON THE FOLLOWING TUESDAY.
 - D. PRESIDENTS DAY: AS INDICATED BELOW.
 - E. EASTER: AS INDICATED BELOW.
 - F. MEMORIAL DAY: AS INDICATED BELOW.
 - G. JULY 4: FROM 5:00 A.M. ON THE PRECEDING DAY UNTIL NOON ON THE FOLLOWING DAY, EXCEPT AS INDICATED BELOW.
 - H. LABOR DAY: AS INDICATED BELOW.
 - I. SEPTEMBER 11: NO DAYTIME CLOSURES.
 - J. COLUMBUS DAY: AS INDICATED BELOW.
 - K. VETERANS DAY: FROM 5:00 A.M. ON THE PRECEDING DAY UNTIL NOON ON THE FOLLOWING DAY, EXCEPT AS INDICATED BELOW.
 - L. THANKSGIVING DAY: FROM 5:00 A.M. ON THE WEDNESDAY PRECEDING THANKSGIVING DAY UNTIL NOON ON THE MONDAY FOLLOWING THANKSGIVING DAY.
 - M. CHRISTMAS DAY: FROM 5:00 A.M. ON THE PRECEDING DAY UNTIL NOON ON THE FOLLOWING DAY, EXCEPT AS INDICATED BELOW.
- 2) IF THE HOLIDAY OCCURS ON A FRIDAY OR SATURDAY: FROM 5:00 A.M. ON THE PRECEDING THURSDAY TO NOON ON THE FOLLOWING MONDAY.
- 3) IF THE HOLIDAY OCCURS ON A SUNDAY OR MONDAY: FROM 5:00 A.M. ON THE PRECEDING FRIDAY TO NOON ON THE FOLLOWING TUESDAY.

PAC PLANS

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AND ARE NOT TO BE USED FOR
ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Bhupal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

TRANSPORTATION MANAGEMENT PLAN & SEQUENCE OF CONSTRUCTION

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	1K(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER

ALLOWABLE LANE CLOSURE HOURS

INTERSTATE 95					
WEEKDAY	NORTHBOUND				
	SINGLE-LANE CLOSURES OR SHOULDER**	TWO-LANE CLOSURES	MULTIPLE-LANE CLOSURES	COMPLETE ROAD* CLOSURE	
	9:30AM TO 3:30PM	10:00PM TO 4:30AM	11:00PM TO 4:00AM	12:00AM TO 4:00AM	
9:00PM TO 5:00AM					
WEEKDAY	SOUTHBOUND				
	SINGLE-LANE CLOSURES OR SHOULDER**	TWO-LANE CLOSURES	MULTIPLE-LANE CLOSURES	COMPLETE ROAD* CLOSURE	
	9:00AM TO 2:00PM	10:00PM TO 5:00AM	11:00PM TO 5:00AM	12:00AM TO 4:00AM	
9:30PM TO 6:00AM					
WEEKEND	NORTHBOUND/SOUTHBOUND****				
	SINGLE-LANE CLOSURES OR SHOULDER**	MULTIPLE-LANE CLOSURES		COMPLETE ROAD* CLOSURE	
	FRIDAY TO SATURDAY	10:00PM TO 7:00AM	11:00PM TO 6:00AM	12:00AM TO 5:00AM	
	SATURDAY TO SUNDAY	10:00PM TO 7:00AM	11:00PM TO 6:00AM	12:00AM TO 5:00AM	
	SUNDAY TO MONDAY	10:00PM TO 5:00AM	11:00PM TO 4:00AM	12:00AM TO 4:00AM	
**** FOR SPECIAL OPERATIONS, DEPENDING ON THE TIME OF YEAR, ADDITIONAL HOURS MAY BE ALLOWED WITH PROPER ADA/ROD APPROVAL.					
SINGLE-LANE CLOSURES OR SHOULDER**					
ARTERIAL	WEEKDAY		WEEKEND		
	MONDAY TO THURSDAY	FRIDAY	FRIDAY TO SATURDAY	SATURDAY TO SUNDAY	SUNDAY TO MONDAY
	9:30AM TO 3:00PM	9:30PM TO 2:00AM	10:00PM TO 9:00AM	10:00PM TO 8:00AM	10:00PM TO 5:00AM
10:00PM TO 5:00AM					
ALL OTHER ROADWAYS	9:00AM TO 3:30PM	9:00AM TO 2:00PM	10:00PM TO 9:00AM	9:00PM TO 9:00AM	10:00PM TO 5:00AM
	9:00PM TO 5:00AM				
MULTIPLE-LANE CLOSURES					
ARTERIAL	WEEKDAY		WEEKEND		
	MONDAY TO THURSDAY	FRIDAY	FRIDAY TO SATURDAY	SATURDAY TO SUNDAY	SUNDAY TO MONDAY
	10:00PM TO 5:00AM	NOT ALLOWED UNTIL 11:00PM	11:00PM TO 5:00AM	11:00PM TO 6:00AM	11:00PM TO 5:00AM
ALL OTHER ROADWAYS	9:00PM TO 5:00AM	NOT ALLOWED UNTIL 10:00PM	10:00PM TO 6:00AM	10:00PM TO 6:00AM	10:00PM TO 5:00AM
*COMPLETE ROAD CLOSURES: 20 MINUTES MAXIMUM OR A TIME FRAME APPROVED BY VDOT TO FACILITATE THE ERECTION OR REMOVAL OF BRIDGE BEAMS AND OVERHEAD SIGN PANELS. ** SINGLE - LANE CLOSURES ARE ONLY PERMITTED FOR MULTIPLE - LANE ROADWAYS; LONG - TERM CLOSURES OF THE SHOULDERS ADJACENT TO THE GP LANES ARE ALLOWABLE PURSUANT TO VDOT APPROVAL. ***OTHER ROADWAY CLOSURES WILL REQUIRE COORDINATION AND POSSIBLY PERMITTING WITH THE AGENCY HAVING JURISDICTION OVER THE ROADWAY. MAJOR ARTERIALS ARE DEFINED AS PRIMARY ROUTES AND ALL OTHER ROUTES THAT CONNECT DIRECTLY TO INTERSTATE I-95.					

95 EXPRESS LANES - ALLOWABLE LANE CLOSURE TIMES*		
REVERSIBLE LANES (95 EXPRESS LANES)		
DAY	SINGLE-LANE CLOSURES OR SHOULDER	COMPLETE ROAD CLOSURE**
WEEKDAY	9:30PM (SUNDAY TO THURSDAY) to 4:00AM (MONDAY TO FRIDAY)	11:00PM to 4:00AM
WEEKEND	11:00PM (FRIDAY TO SATURDAY) to 9:00AM (SATURDAY TO SUNDAY)	11:00PM to 4:00AM
* DIRECTION OF TRAFFIC CONTROL FOR ALL LANE CLOSURES IN REVERSIBLE LANES WILL NEED TO BE ADJUSTED AS NECESSARY TO FACE DIRECTION OF TRAFFIC. ** COMPLETE ROAD CLOSURE ON EXPRESS LANES LIMITED TO 30 MINUTES OR LESS.		

- THESE ALLOWABLE HOURS SHALL BE APPLICABLE TO BOTH STATIONARY AND MOBILE LANE CLOSURES, AS WELL AS SHOULDER CLOSURES. VDOT WILL CONSIDER CHANGES TO THE ALLOWABLE LANE CLOSURE HOURS ONLY IF THE CONTRACTOR CAN DEMONSTRATE WHY THE PROPOSED WORK CANNOT BE COMPLETED WITHIN THE CONTRACT ALLOWABLE LANE CLOSURE HOURS. ALL REQUESTS SHALL INCLUDE AN ASSESSMENT OF THE WORK ZONE TRAFFIC IMPACTS USING A SKETCH PLANNING TRAFFIC ANALYSIS TOOL AND/OR AN OPERATIONAL LEVEL TRAFFIC ANALYSIS SOFTWARE PROGRAM AS APPROPRIATE FOR APPROVAL BY VDOT AT LEAST 30 DAYS PRIOR TO THE OPERATION IMPACTING THE LANES.
- TWO-LANE CLOSURES AND TOTAL CLOSURES OF I-95 FOR SUCH WORK AS INSTALLATION AND REMOVAL OF OVERHEAD SIGN PANELS AND STRUCTURES WITH SUBSTANTIATION OF NEED BY THE CONTRACTOR WILL REQUIRE COORDINATION WITH APPROPRIATE STAKEHOLDERS AND PUBLIC NOTICE. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF FOUR (4) WEEKS ADVANCE NOTICE TO VDOT. THIS ADVANCE NOTICE WILL ALLOW THE CONTRACTOR AND VDOT TO COORDINATE ON A PUBLIC OUTREACH CAMPAIGN AND/OR ADVERTISING TO REACH AFFECTED MOTORISTS AND TARGET AUDIENCES. ALTERNATE DATES CAN BE ADVERTISED IN THE EVENT OF INCLEMENT WEATHER.
- THE CONTRACTOR SHALL SUBMIT ALL LANE AND/OR SHOULDER CLOSURE REQUESTS TO THE VDOT TOC AND VDOT PROJECT MANAGER FOR COORDINATION PURPOSES (FOR DETERMINATION OF CONFLICTS WITH OTHER PROJECTS, FOR INSTANCE) AT LEAST SEVEN (7) DAYS IN ADVANCE OF THE PROPOSED LANE AND/OR SHOULDER CLOSURE AND NO LATER THAN CLOSE OF BUSINESS WEDNESDAY THE WEEK PRIOR TO CLOSURE, STATING THE LOCATION, PURPOSE, DATE, TIME, AND DURATION OF THE CLOSURE. THE CONTRACTOR SHALL CONFIRM AT LEAST TWENTY-FOUR (24) HOURS BEFORE ANY SCHEDULED LANE AND/OR SHOULDER CLOSURE AND SHALL INCLUDE A WRITTEN REITERATION OF THE PROPOSED TASKS AND A LISTING OF MATERIALS, LABOR, AND EQUIPMENT TO BE UTILIZED, IN ORDER FOR TOC TO POST THE INFORMATION ON THE VDOT WEBSITE AND VA511 SYSTEM.
- THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADVANCE NOTIFICATION VIA VARIABLE MESSAGE AND REQUIRED STATIC SIGNING FOR LANE AND/OR SHOULDER AND COMPLETE ROAD CLOSURES IN ACCORDANCE WITH THE 2011 (REVISION 2.1, NOVEMBER 1, 2020) VIRGINIA WORK AREA PROTECTION MANUAL AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). ONCE A CLOSING IS IN PLACE, WORK SHALL COMMENCE IMMEDIATELY AND SHALL PROGRESS ON A CONTINUOUS BASIS TO COMPLETION OR TO A DESIGNATED TIME.
- IF THE CONTRACTOR IS UNABLE TO REMOVE THE LANE AND/OR SHOULDER CLOSURE BY THE STIPULATED TIME, THE CONTRACTOR WILL NOT BE ALLOWED FURTHER LANE CLOSURES UNTIL THE REASONS FOR THE FAILURE ARE EVALUATED AND THE CONTRACTOR CAN PROVIDE ASSURANCE THAT THE CAUSES HAVE BEEN CORRECTED. A FORMAL SUBMISSION AS TO THE REASONS FOR THE FAILURE TO RESTORE TRAFFIC LANES WITHIN THE CONTRACT LANE CLOSURE RESTRICTIONS AND THE PROPOSED CORRECTIVE MEASURES IS TO BE PROVIDED TO THE VDOT CONSTRUCTION MANAGER WITHIN TWO (2) DAYS OF THE OCCURRENCE. VDOT WILL RESPOND TO THE ADEQUACY OF THE SUBMISSION WITHIN TWO (2) WORKING DAYS OF RECEIPT. NO CONSIDERATION FOR EXTENSION OF TIME AND NO ADDITIONAL COMPENSATION WILL BE GRANTED FOR THESE DAYS.
- VDOT RESERVES THE RIGHT TO MONITOR TRAFFIC CONDITIONS IMPACTED BY THE WORK AND TO MAKE RESTRICTIONS FOR OTHER HOLIDAYS OR SPECIAL LOCAL EVENTS MAY BE NECESSARY, HOWEVER, IN THESE SITUATIONS VDOT WILL ENDEAVOR TO INFORM THE CONTRACTOR AT THE EARLIEST AND IN NO CASE LESS THAN FORTY-EIGHT (48) HOURS PRIOR TO THE EVENT.
- PROJECT PERSONNEL MUST HAVE SUFFICIENT MANPOWER AND RESOURCES AVAILABLE TO RESPOND TO ANY ONSITE EMERGENCY, INCLUDING ANY WORK ZONE INCIDENTS.

PAC PLANS

THESE PLANS ARE UNFINISHED
AND ARE NOT TO BE USED FOR
ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER *Bimpal Shah, P.E. (703) 259-2362 INQA District*
SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY *Whitman, Reardon & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

TRANSPORTATION MANAGEMENT PLAN & SEQUENCE OF CONSTRUCTION

SEQUENCE OF CONSTRUCTION

STAGE 1A: SHEETS IL(1) - IL(9)

RAMP DBSR

- PRIOR TO STAGE 1A CONSTRUCTION, MILL AND OVERLAY SBL OUTSIDE SHOULDER RUMBLE STRIP FOR THE ENTIRE LENGTH OF BARRIER AND LANE TAPER IN THIS STAGE (WITH TTC-16.2) AND SHOULDER STRENGTHEN SBL INSIDE SHOULDER (WITH TTC-17.2).
- SHIFT VEHICULAR TRAFFIC ONTO THE OUTSIDE SHOULDER OF I-95 SB GP LANES AND WESTERN SHOULDER OF I-95 EXPRESS LANES (WITH TTC-7.1 (SHOULDER CLOSURE WITH BARRIER AND LANE SHIFT OPERATION).
- CONSTRUCT MEDIAN DRAINAGE.
- CONSTRUCT RAMP DBSR. CONSTRUCT SIGNING, LIGHTING, AND ITS ITEMS.

OPITZ BOULEVARD

- STRENGTHEN OPITZ BOULEVARD WB SHOULDER TO A MINIMUM OF 6" ASPHALT SECTION. CONTRACTOR SHALL CUT BACK AND REMOVE EXISTING SHOULDER UNTIL A MINIMUM OF 6" ASPHALT DEPTH IS REACHED. THIS WORK SHALL BE COMPLETED USING A SINGLE OUTSIDE LANE CLOSURE ON OPITZ BLVD WB.
- SHIFT OPITZ BOULEVARD WB LANES ONTO EXISTING SHOULDER. REDUCE WB LANES FROM THREE TO TWO LANES. HOLD EXISTING OUTSIDE EDGE OF TRAVELED WAY.
- DEMOLISH EXISTING RAISED MEDIAN. CONSTRUCT NEW MEDIAN BARRIER WITH ITS GATES ON EAST SIDE OF OPITZ BRIDGE AND BOULEVARD (SEE ROADWAY, BRIDGE, AND ITS PLANS FOR LOCATIONS). INSTALL IMPACT ATTENUATOR ON EAST END. REMAINING RAISED MEDIAN SHALL BE CONSTRUCTED IN STAGE 4 (CANNOT BE INSTALLED IN STAGE 1A DUE TO TEMPORARY LANE WIDTH REQUIREMENTS OF STAGE 2).
- CONSTRUCT ROADWAY MEDIAN PAVEMENT AND MEDIAN APPROACH SLABS FOR OPITZ BRIDGE.
- DEMOLISH AND RECONSTRUCT MEDIAN NOSE NEAR STATION 60+50 IN PREPARATION FOR PEDESTRIAN CROSSING IN STAGE 2.

(NOTE: TURN LANE TO RAMP OBTR MUST REMAIN CLOSED UNTIL EB OPITZ BOULEVARD AND RAMP OBTR IS COMPLETED AND READY FOR OPERATION AS DETERMINED BY THE ENGINEER. USE GROUP 2 DEVICES FOR CLOSURE.)

STAGE 1B:

RAMP DBSR (NOT OPERATIONAL THIS STAGE)

- RESTORE ORIGINAL LANE MARKINGS ON I-95 GP AND EXPRESS LANES (USING TTC-16.2, TTC-17.2, OR TTC 18.2) AND RESUME NORMAL OPERATION OF TRAVELED WAY. MOVE TEMPORARY TRAFFIC CONTROL BARRIER TO SHOULDER TO BLOCK TRAFFIC FROM ENTERING RAMP DBSR UNTIL ALL SIGNAGE, LIGHTING, AND ITS DEVICES REQUIRED FOR RAMP DBSR OPERATION HAVE BEEN CONSTRUCTED. ANY BARRIER TERMINATED WITHIN CLEAR ZONE SHALL HAVE IMPACT ATTENUATOR MOUNTED TO ITS END.
- CONSTRUCT OVERHEAD SIGN LOCATIONS 2, 4, 6, 7, 9, AND 12 USING VARIOUS CLOSURES DESCRIBED ON THIS PAGE.
- CLOSE I-95 SB CD LANE OUTSIDE SHOULDER (WITH TTC-6.2 (SHOULDER CLOSURE WITH BARRIER OPERATION)) TO INSTALL GENERATOR SITE H118A. SEE ITS PLANS FOR DETAILS.

STAGE 2A: SHEETS IN(1) - IN(8)

RAMP DBSR

- OPEN RAMP DBSR TO TRAFFIC. CLOSE EXISTING I-95 SB OPITZ BOULEVARD SLIP RAMP TO EXPRESS LANES.

(NOTE: ALL SIGNING, LIGHTING, AND ITS FOR RAMP DBSR SHALL BE INSTALLED AND IN PLACE PRIOR TO OPENING THE NEW RAMP. THE EXISTING I-95 SB SLIP RAMP AT OPITZ BLVD. MAY NOT BE CLOSED UNTIL RAMP DBSR IS FULLY OPERATIONAL).

RAMP OBTR

- PRIOR TO STAGE 2A CONSTRUCTION, MILL AND OVERLAY SBL OUTSIDE SHOULDER RUMBLE STRIP FOR THE ENTIRE LENGTH OF BARRIER AND LANE TAPER IN THIS STAGE (WITH TTC-16.2).
- SHIFT VEHICULAR TRAFFIC ONTO THE OUTSIDE SHOULDER OF I-95 SB GP LANES AND EASTERN SHOULDER OF I-95 EXPRESS LANES.
- CONSTRUCT MEDIAN DRAINAGE, MSE WALL, AND RAMP OBTR BRIDGE ABUTMENT.
- CONSTRUCT REMAINING PAVEMENT FOR RAMP OBTR, AND ALL SIGNING, LIGHTING, AND ITS ITEMS REQUIRED ALONG I-95 EXPRESS LANES FOR THE OPERATION OF RAMP OBTR AND OPITZ BOULEVARD. SIGNING, LIGHTING, AND ITS ITEMS MAY USE VARIOUS TTC'S DESCRIBED ON THIS PAGE.
- CONSTRUCT MEDIAN GUARDRAIL, AND BARRIER REQUIRED ALONG I-95.
- CONSTRUCT GENERATOR SITE H117A (SEE ITS PLANS FOR LOCATION).

OPITZ BOULEVARD

- SHIFT OPITZ BOULEVARD WB LANES TOWARD INSIDE OF ROADWAY.
- DEMOLISH EXISTING BRIDGE AS INDICATED IN BRIDGE PLANS. RECONSTRUCT EXISTING DECK AND APPROACH SLABS.

STAGE 2A: SHEETS IN(1) - IN(8) (CONT'D)

- CLOSE EXISTING SIDEWALK TO PEDESTRIAN TRAFFIC EAST OF RIGHT TURN LANE FROM OPITZ BLVD TO TELEGRAPH ROAD (RIGHT TURN LANE) UP TO I-95 NB GP ENTRANCE RAMP FROM OPITZ WB. USE OVERNIGHT CLOSURES OF RIGHT TURN LANE/SLIP RAMP TO DEMOLISH AND RECONSTRUCT ADA RAMPS ON NORTHWEST QUADRANT OF TELEGRAPH ROAD INTERSECTION, TO INSTALL PEDESTRIAN PUSH BUTTONS AND SIGNAL, AND TO DEMOLISH AND RECONSTRUCT CURB LINE PER PLANS. RIGHT TURNING TRAFFIC WILL BE SHIFTED TO OUTER THROUGH LANE OF OPITZ BLVD TEMPORARILY DURING OVERNIGHT CLOSURE CONSTRUCTION PERIODS.

DEMOLISH AND RECONSTRUCT REMAINING EXISTING SIDEWALK ON EACH SIDE OF BRIDGE APPROACH, CONSTRUCT CURB LINE AND RAMP ON EAST SIDE OF BRIDGE, AND INSTALL GUARDRAIL AND REMAINING PEDESTRIAN PUSH BUTTONS/SIGNALS AS SHOWN ON PLANS. DURING RIGHT TURN LANE CLOSURE, A PCMS MAY BE USED TO GUIDE TRAFFIC TO SIGNAL FOR RIGHT TURN TO TELEGRAPH ROAD NORTH.

(NOTE: SIDEWALK EAST OF TELEGRAPH ROAD TURN LANE NORTHERN RAMP UP TO I-95 NB GP ENTRANCE RAMP FROM OPITZ WB SHALL NOT BE OPENED TO PEDESTRIAN TRAFFIC UNTIL ALL ASPECTS OF SIDEWALK ARE FULLY CONSTRUCTED AND ACCEPTED BY THE ENGINEER. SIDEWALK NORTH AND WEST OF TELEGRAPH ROAD SLIP RAMP SHALL OPEN UPON COMPLETION AND ACCEPTANCE BY THE ENGINEER TO REESTABLISH EXISTING PEDESTRIAN ACCESS ROUTE.)

STAGE 2B:

I-95 NB CD ROAD

- CLOSE I-95 NB GP OUTSIDE SHOULDER AND I-95 NB CD LANE INSIDE SHOULDER USING VARIOUS TTC'S DESCRIBED ON THIS PAGE FOR SIGNING INSTALLATIONS. CONSTRUCT NEW SIGN BLISTER IN BARRIER AND RELOCATE OVERHEAD SIGN AT LOCATION 8.

STAGE 3: SHEETS IP(1) - IP(5)

OPITZ BOULEVARD

- OPITZ BOULEVARD WB LANES RESUME NORMAL OPERATIONS. ENTRANCE TO RAMP OBTR WILL BE CLOSED UNTIL COMPLETION OF CONSTRUCTION. RAMP OBTR WILL REMAIN BEHIND BARRIER UNTIL CONCLUSION OF STAGE 4.
- CONSTRUCT OPITZ BOULEVARD EB BRIDGE WIDENING INCLUDING ITS COMPONENTS, RAMP OBTR BRIDGE CONNECTION, EB LANE DRAINAGE AND ROADWAY WIDENING, I-95 NB ENTRANCE RAMP REALIGNMENT, AND RETAINING WALLS ON THE SE AND SW QUADRANTS OF THE INTERCHANGE. CONTRACTOR MAY USE OVERNIGHT OUTSIDE LANE CLOSURES FOR DRAINAGE STRUCTURE INSTALLATION PRIOR TO INSTALLATION OF BARRIER SERVICE.

(NOTE: TURN LANE TO RAMP OBTR MUST REMAIN CLOSED UNTIL RAMP OBTR IS COMPLETED AND READY FOR OPERATION AS DETERMINED BY THE ENGINEER.)

OPITZ BRIDGE

- USING SHOULDER CLOSURE ON I-95 SB CD LANE INSIDE SHOULDER AND I-95 SB GP OUTSIDE SHOULDER CLOSURE, CONSTRUCT PIER 1, BRIDGE PIER PROTECTION SYSTEM, AND NEW GUARDRAIL APPROACH.
- USING SHOULDER CLOSURE ON I-95 EXPRESS LANES EASTERN SHOULDER AND I-95 NB GP LANES INSIDE SHOULDER, CONSTRUCT PIER 2 AND BRIDGE PIER PROTECTION SYSTEM.

OVERHEAD SIGN LOCATIONS 1, 3, AND 5

- INSTALL SIGN LOCATIONS 1, 3, AND 5 USING VARIOUS TTC'S SHOWN ON THIS PAGE.

STAGE 4: SHEETS IQ(1) - IQ(3)

OPITZ BOULEVARD

- USING OVERNIGHT SINGLE LANE CLOSURES ON OPITZ BOULEVARD EB AND WB, PERFORM FINAL CONSTRUCTION OPERATIONS INCLUDING MILL AND OVERLAY OF BRIDGE DECK, CONSTRUCT REMAINING MEDIAN CURB ON BRIDGE NOT CONSTRUCTED IN STAGE 1, RECONSTRUCT BRIDGE JOINTS, REMOVE PIER 3 JOINT, AND CONSTRUCT ABUTMENT MODIFICATIONS (SEE BRIDGE PLANS FOR ALL DETAILS OF BRIDGE CONSTRUCTION).
- MILL AND OVERLAY FINAL PAVING ON OPITZ BOULEVARD. PROVIDE FINAL PROJECT PAVEMENT MARKINGS.
- OPEN RAMP OBTR.

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	1K(4)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER				

INSTALLATION & REMOVAL OF SIGNING, LIGHTING, AND ITS ITEMS

- ALL PROPOSED SIGNING, LIGHTING, AND ITS EQUIPMENT WITHIN THE CLEAR ZONE AND NOT LOCATED BEHIND TEMPORARY BARRIER OR GUARDRAIL SHALL BE INSTALLED PER TTC 4.2 (STATIONARY OPERATION ON A SHOULDER). IF PROPOSED GUARDRAIL OR BARRIER IS SHOWN, THEN IT SHALL BE INSTALLED PRIOR TO INSTALLATION OF PROPOSED SIGN OR LIGHT FOUNDATION OR ITS STRUCTURE AND SHALL BE FULLY FUNCTIONAL AT THE END OF EACH WORK DAY. OTHERWISE TEMPORARY BARRIER SHALL BE PLACED AND PROPOSED PER THE CONTRACTOR'S APPROVED TRAFFIC CONTROL PLAN FOR THE ITEM TO BE INSTALLED. SIGN LOCATIONS WHERE THIS MAY APPLY INCLUDE SIGN LOCATIONS 1-12 AS SHOWN ON SIGNING PLANS.
- ALL PROPOSED OVERHEAD SIGN STRUCTURE/PANEL INSTALLATION OR REMOVAL THAT REQUIRES SINGLE OR MULTIPLE LANE CLOSURES ALONG I-95 GENERAL PURPOSE LANES SHALL BE INSTALLED PER TTC-16.2 (OUTSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY), TTC-17.2 (INSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY), OR TTC-18.2 (MULTI-LANE CLOSURE OPERATION). LOCATIONS WHERE THIS MAY APPLY INCLUDE SIGN LOCATIONS 1-9 AND 11-12 AS SHOWN ON SIGNING PLANS.
- ALL PROPOSED OVERHEAD SIGN STRUCTURE INSTALLATION OR REMOVAL THAT REQUIRE COMPLETE CLOSURE OF I-95 GENERAL PURPOSE LANES SHALL UTILIZE POLICE ASSISTANCE FOR A ROLLING CLOSURE THAT SHALL NOT EXCEED 20 MINUTES. CONTRACTOR SHALL COORDINATE CLOSURE WITH VDOT AT LEAST 4 WEEKS IN ADVANCE AS OUTLINED IN THE "ALLOWABLE LANE CLOSURE HOURS". SIGN LOCATIONS WHERE THIS MAY APPLY INCLUDE LOCATIONS 1-5 AND 7-8.
- ALL SIGNAL EQUIPMENT AND PAVEMENT MARKING INSTALLATIONS AT THE INTERSECTION OF OPITZ BOULEVARD AND TELEGRAPH ROAD SHALL BE INSTALLED USING TTC-16.2 (OUTSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY), TTC-17.2 (INSIDE LANE CLOSURE OPERATION ON A FOUR-LANE ROADWAY), TTC-18.2 (MULTI-LANE CLOSURE OPERATION), TTC-26.2 (LANE CLOSURE OPERATION - NEAR SIDE OF AN INTERSECTION), TTC-27.2 (LANE CLOSURE OPERATION - FAR SIDE OF AN INTERSECTION), TTC-29.2 (TURN LANE CLOSURE OPERATION), OR TTC-30.2 (FLAGGING OPERATION AT A SIGNALIZED INTERSECTION) AS NECESSARY TO PERFORM SIGNAL AND PAVEMENT MARKING WORK AT THAT INTERSECTION.

NOTE: ALL PROPOSED SIGNING, LIGHTING, AND ITS EQUIPMENT INSTALLED OR REMOVED ALONG THE EXISTING EXPRESS LANES SHALL BE INSTALLED DURING NB EXPRESS LANES OPERATION AS DETAILED IN "RESTRICTION OF OPERATIONS" AND "ALLOWABLE LANE CLOSURE HOURS". SEE SIGNING, LIGHTING, AND ITS PLANS FOR LOCATIONS OF ALL ITEMS TO BE CONSTRUCTED AND/OR REMOVED FROM THE PROJECT LIMITS.

NOTICE TO CONTRACTOR: PRINCE WILLIAM COUNTY HAS AN ADJACENT PROJECT CONSTRUCTED BY OTHERS (PRINCE WILLIAM COUNTY NEABSCO / POTOMAC COMMUTER PARKING GARAGE) THAT WILL CONSTRUCT PEDESTRIAN AND LIGHTING FEATURES ALONG THE NORTH SIDE OF OPITZ BLVD EAST OF THE I-95 NB GP ENTRANCE RAMP. THAT PROJECT WILL INSTALL ALL PEDESTRIAN AND LIGHTING FEATURES IN THAT PROJECT AREA. THE LIGHTING WILL BE INSTALLED BY THAT PROJECT; HOWEVER, IT WILL NOT BE ACTIVATED. ACTIVATION OF ELECTRICAL SERVICE AND COMMISSIONING WILL BE THE RESPONSIBILITY OF THE CONTRACTOR FOR THE OPITZ BLVD PROJECT (THIS CONSTRUCTION PROJECT).

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT 0095-076-299	SHEET NO. 1K(4)
-------------------------	--------------------

PROJECT MANAGER: *Bimpa Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1K(5)

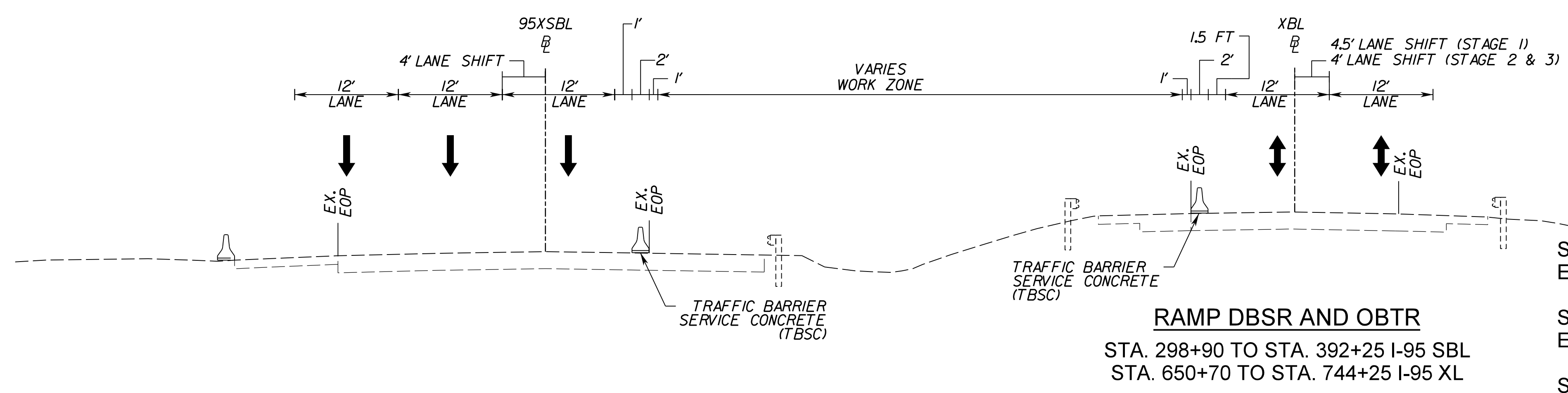
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER

TEMPORARY TRAFFIC CONTROL PLANS TYPICAL SECTIONS

PAC PLANS

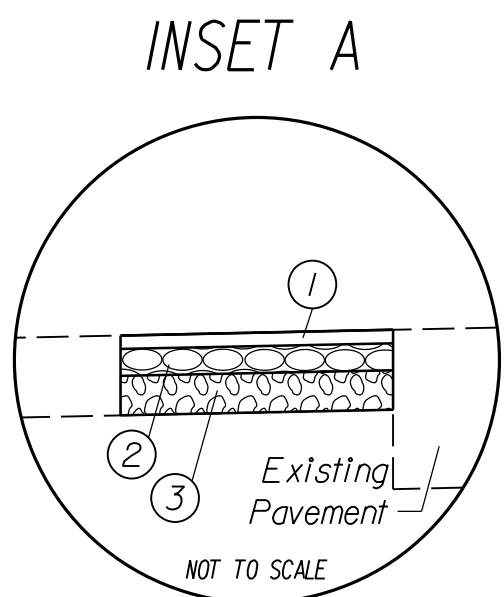
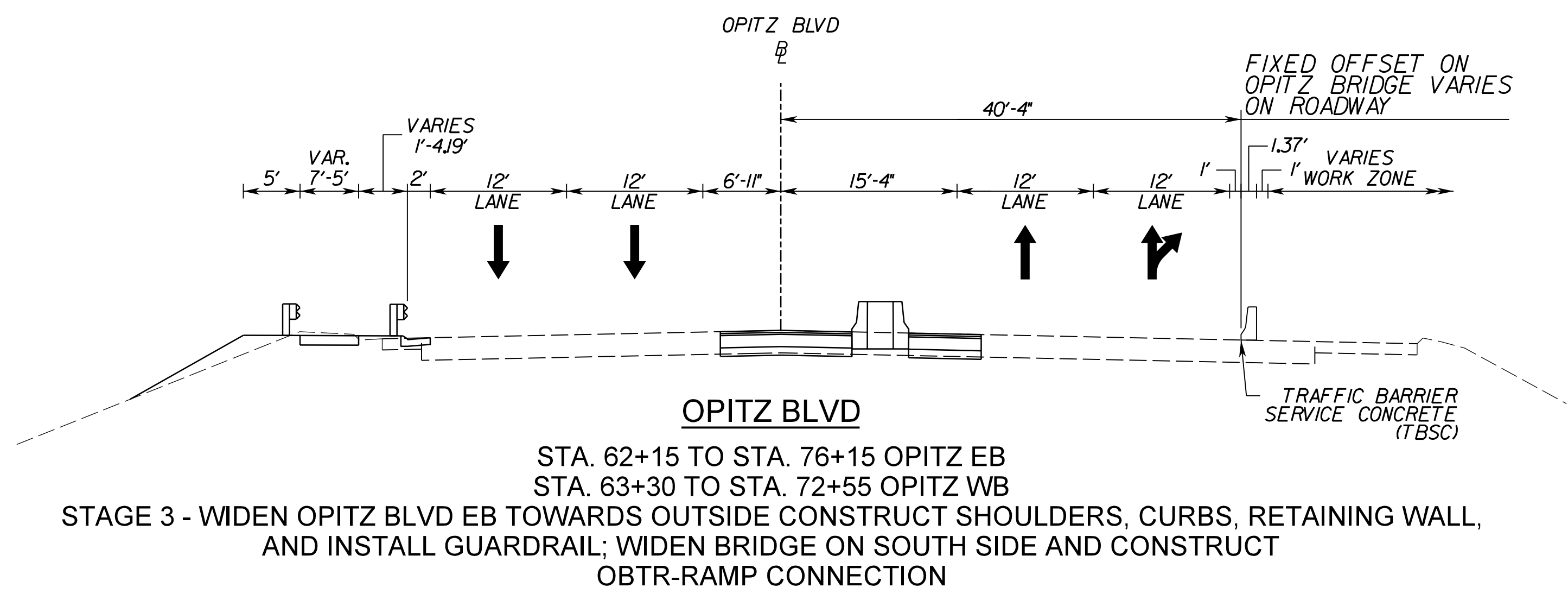
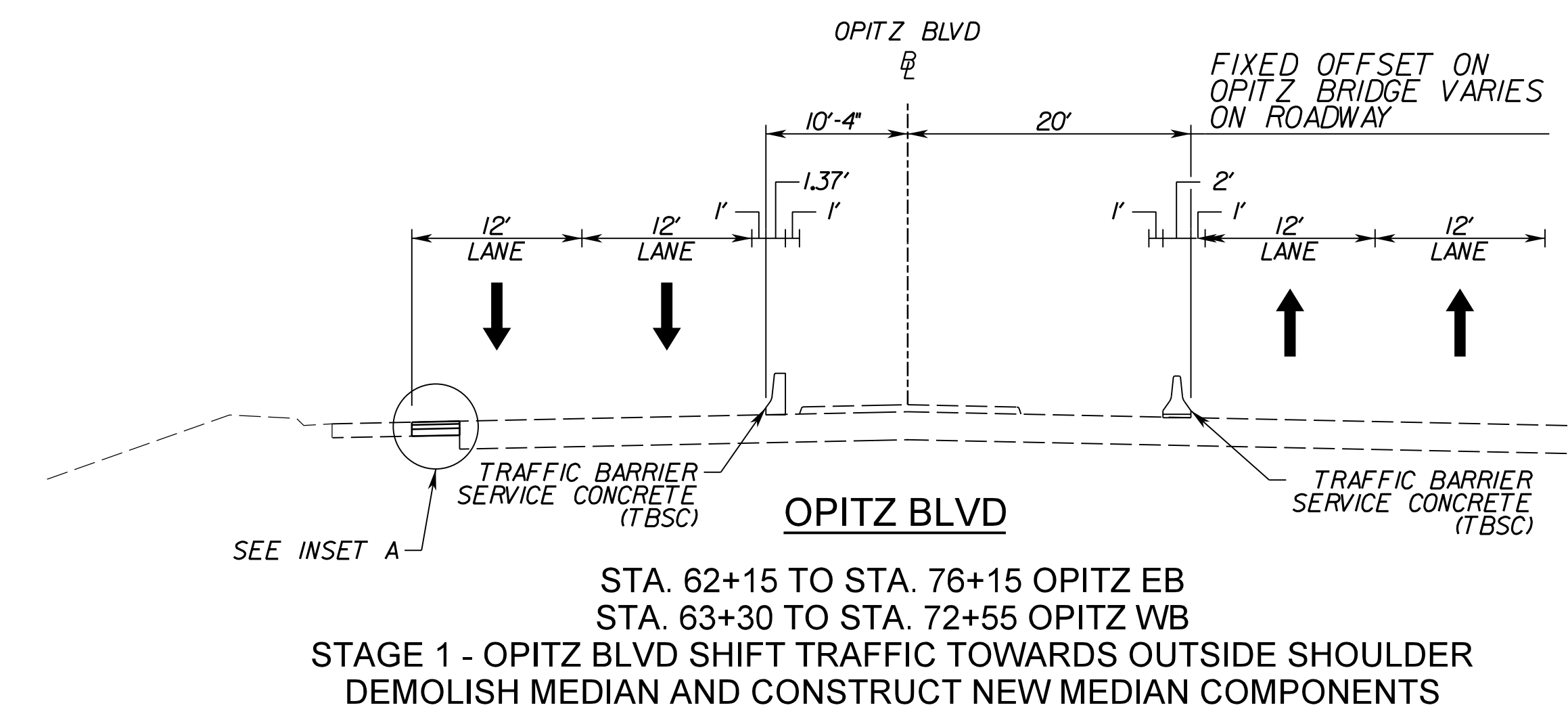
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



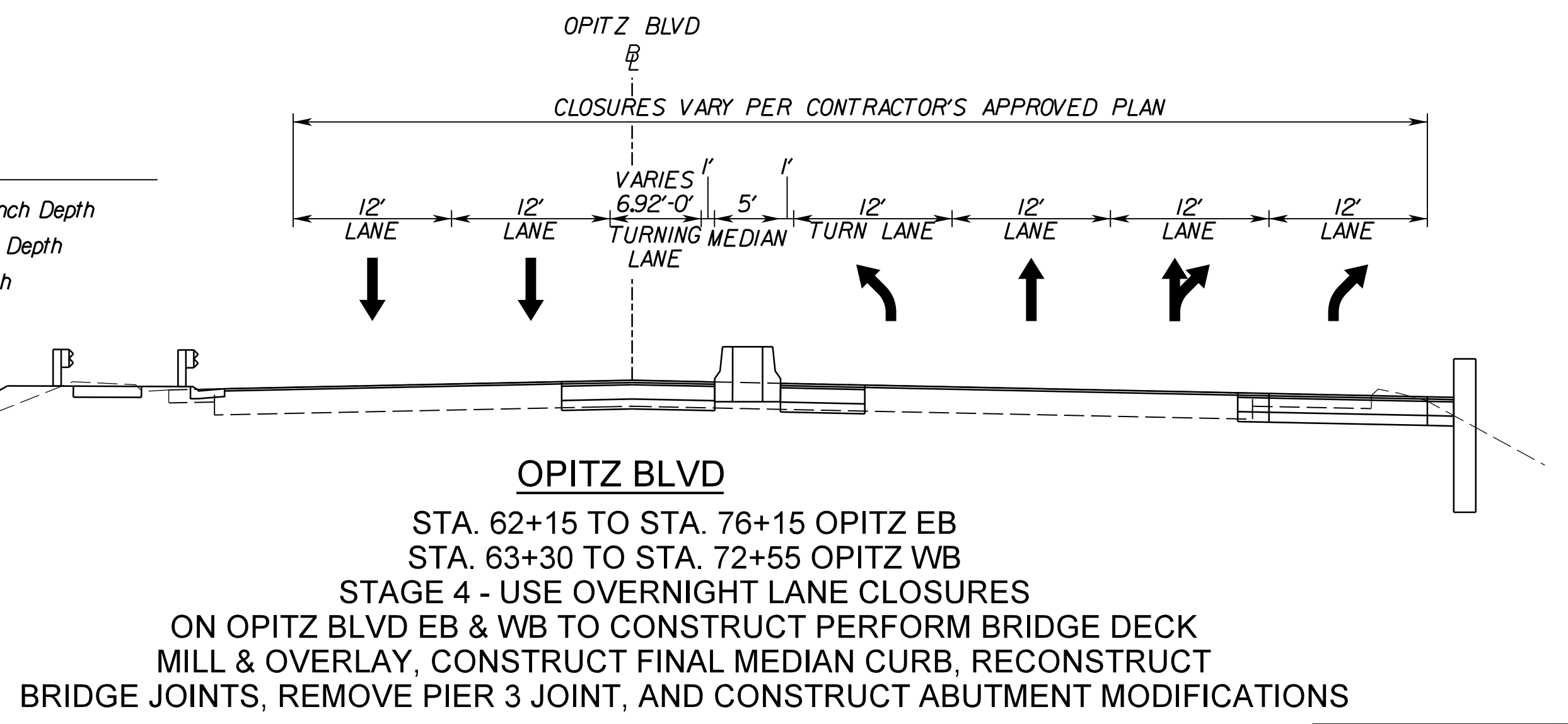
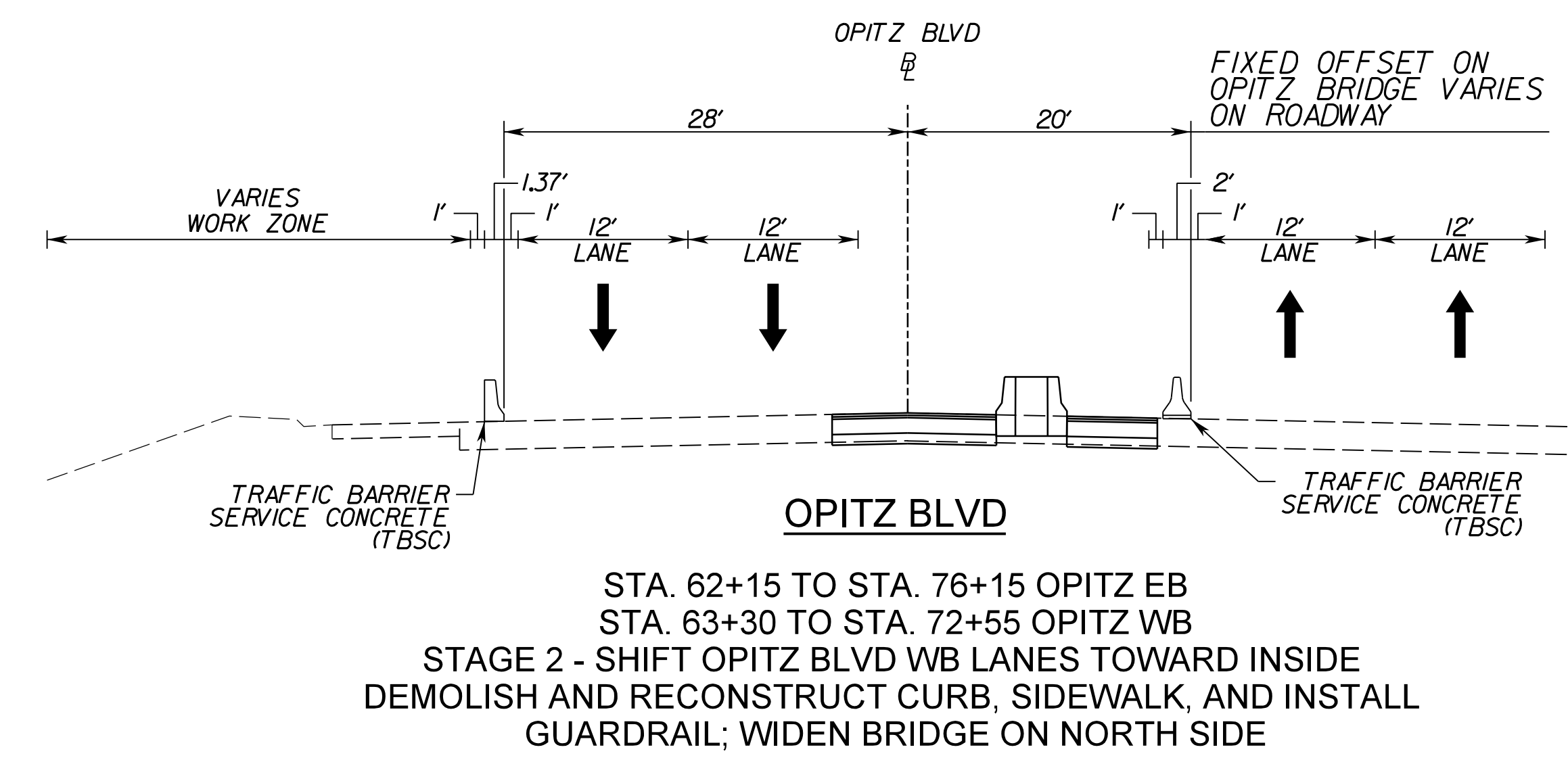
STAGE 1 - I-95 SBL INSIDE SHOULDER CLOSURE WITH 4' LANE SHIFT & EXPRESS LANE RIGHT SHOULDER CLOSURE WITH 4' LANE SHIFT, CONSTRUCT RAMP DBSR.

STAGE 2 - I-95 SBL INSIDE SHOULDER CLOSURE WITH 4' LANE SHIFT & EXPRESS LANE RIGHT SHOULDER CLOSURE WITH 4' LANE SHIFT, CONSTRUCT RAMP OBTR.

STAGE 3 - SHOULDER CLOSURES AS PER SEQUENCE OF CONSTRUCTION NOTES.



- Pavement Legend**
- ① Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth
 - ② Asphalt Concrete Base Course, Type BM-25.0A - 4 Inch Depth
 - ③ Aggregate Base Material, Type 1, No. 21B - 6 Inch Depth



NOT TO SCALE

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

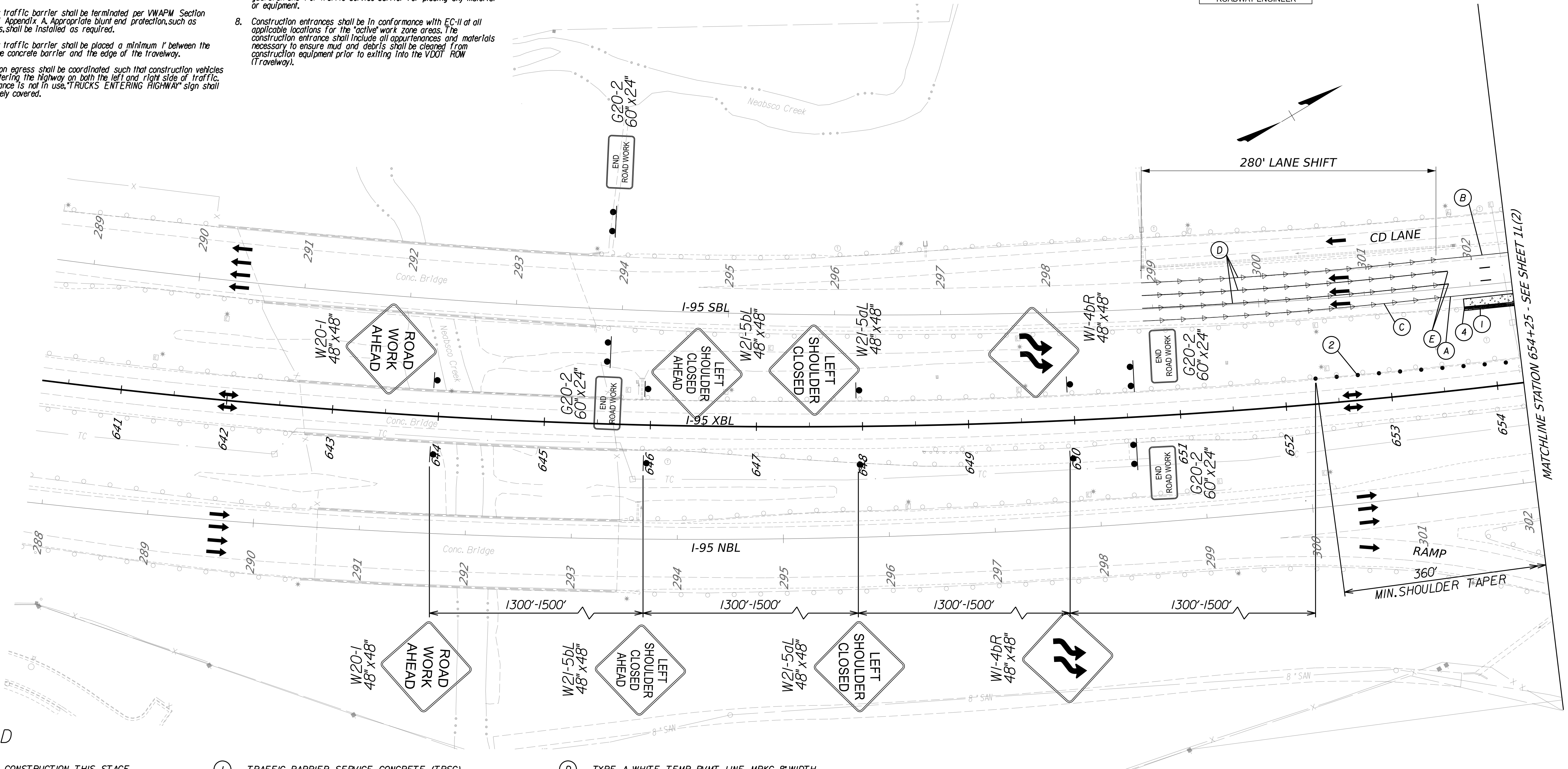
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299,C-501	1L(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
- Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-II at all applicable locations for the active work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

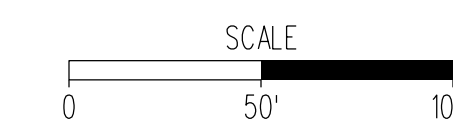


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY.I | (F) | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. P.V.M.T. LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. P.V.M.T. LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	1L(1)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

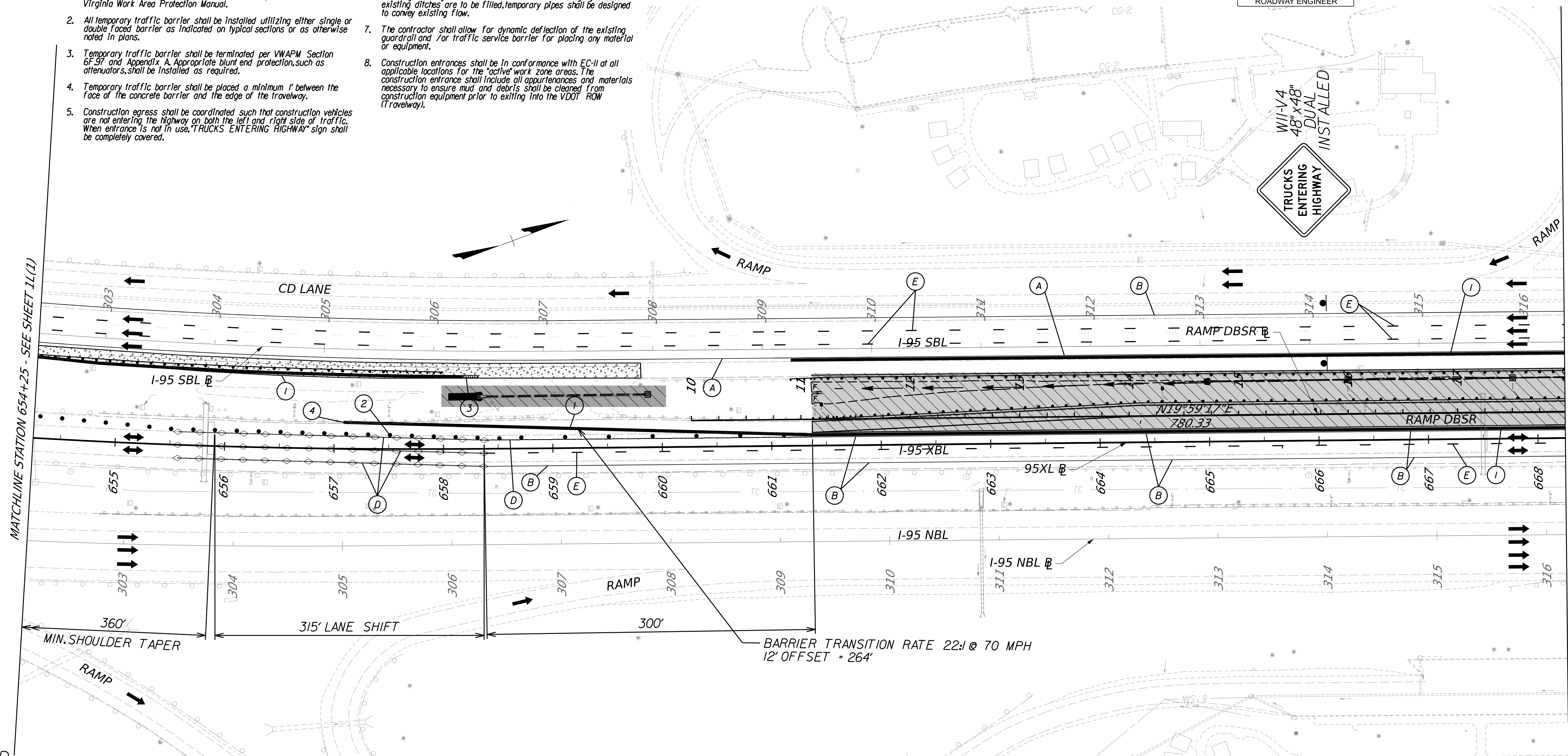
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1L(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
- Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-II at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).



MATCHLINE STATION 654+25 - SEE SHEET 1L(1)

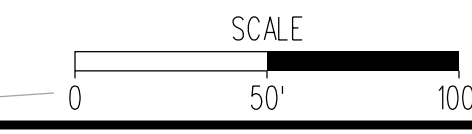
MATCHLINE STATION 668+25 - SEE SHEET 1L(3)

LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6' WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8' WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	1L(2)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

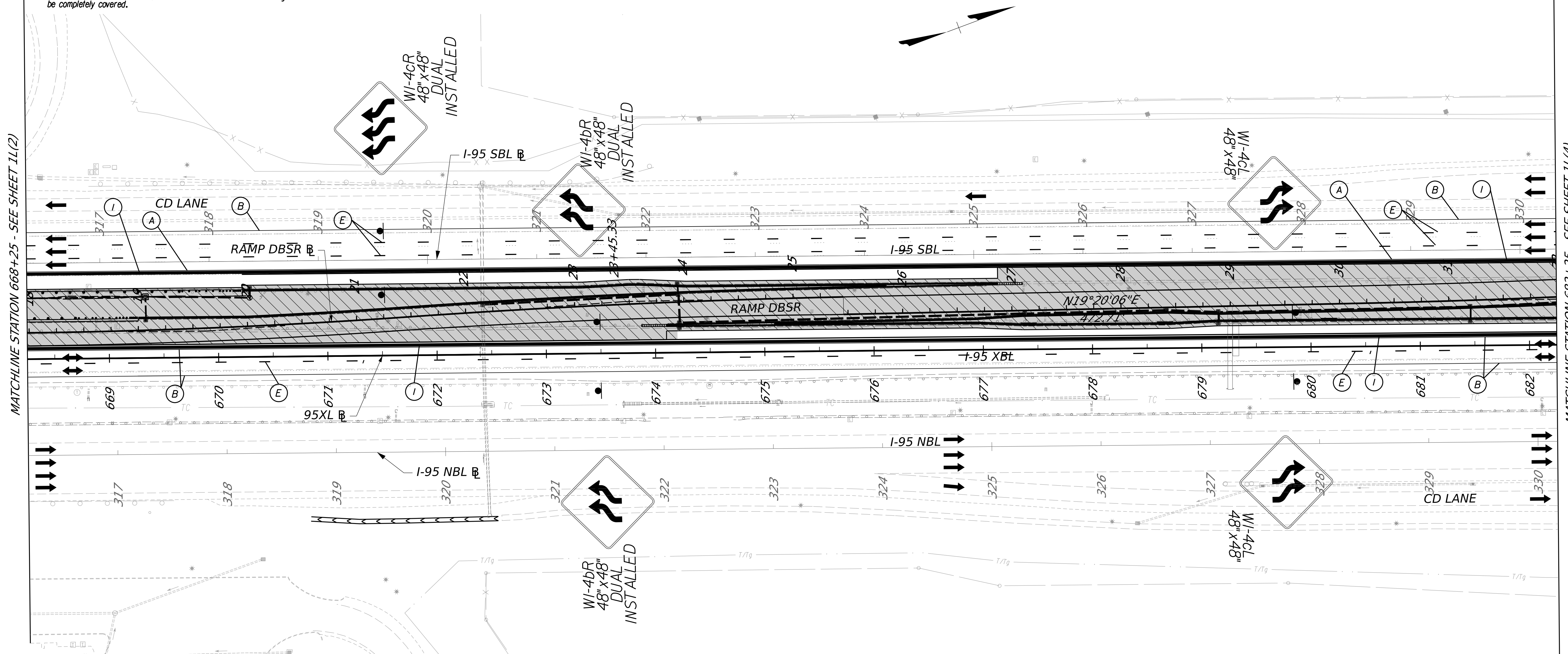
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	1L(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F-3F and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, TRUCKS ENTERING HIGHWAY sign shall be completely covered.
- Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-11 at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

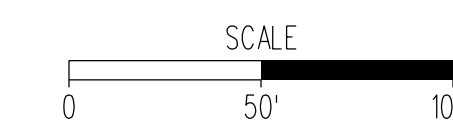


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	1L(3)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

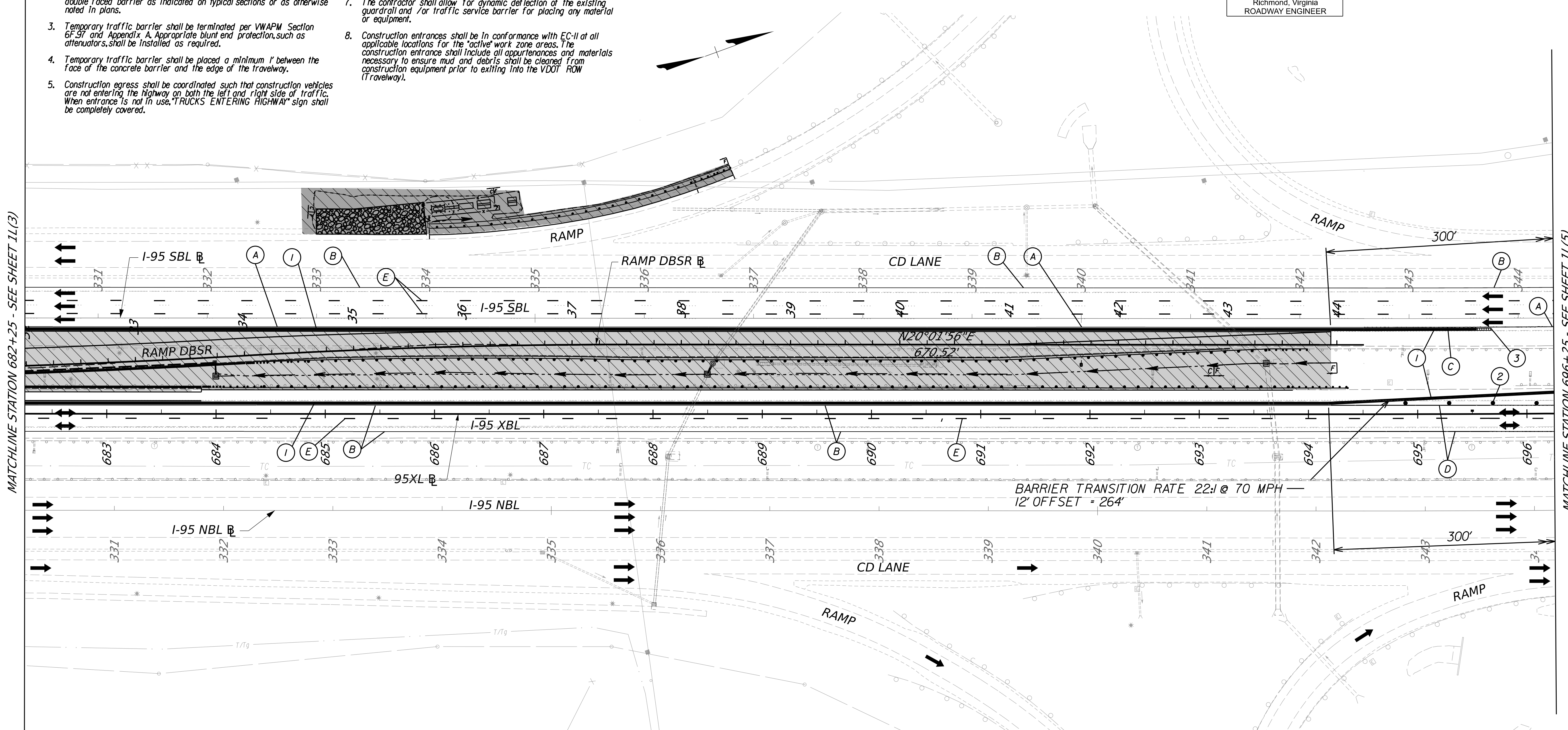
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299,C-501	1L(4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F-37 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
- Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-II at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

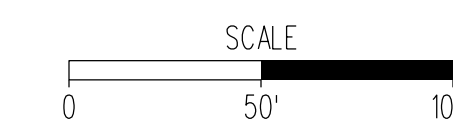


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT
 0095-076-299

SHEET NO.
 1L(4)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

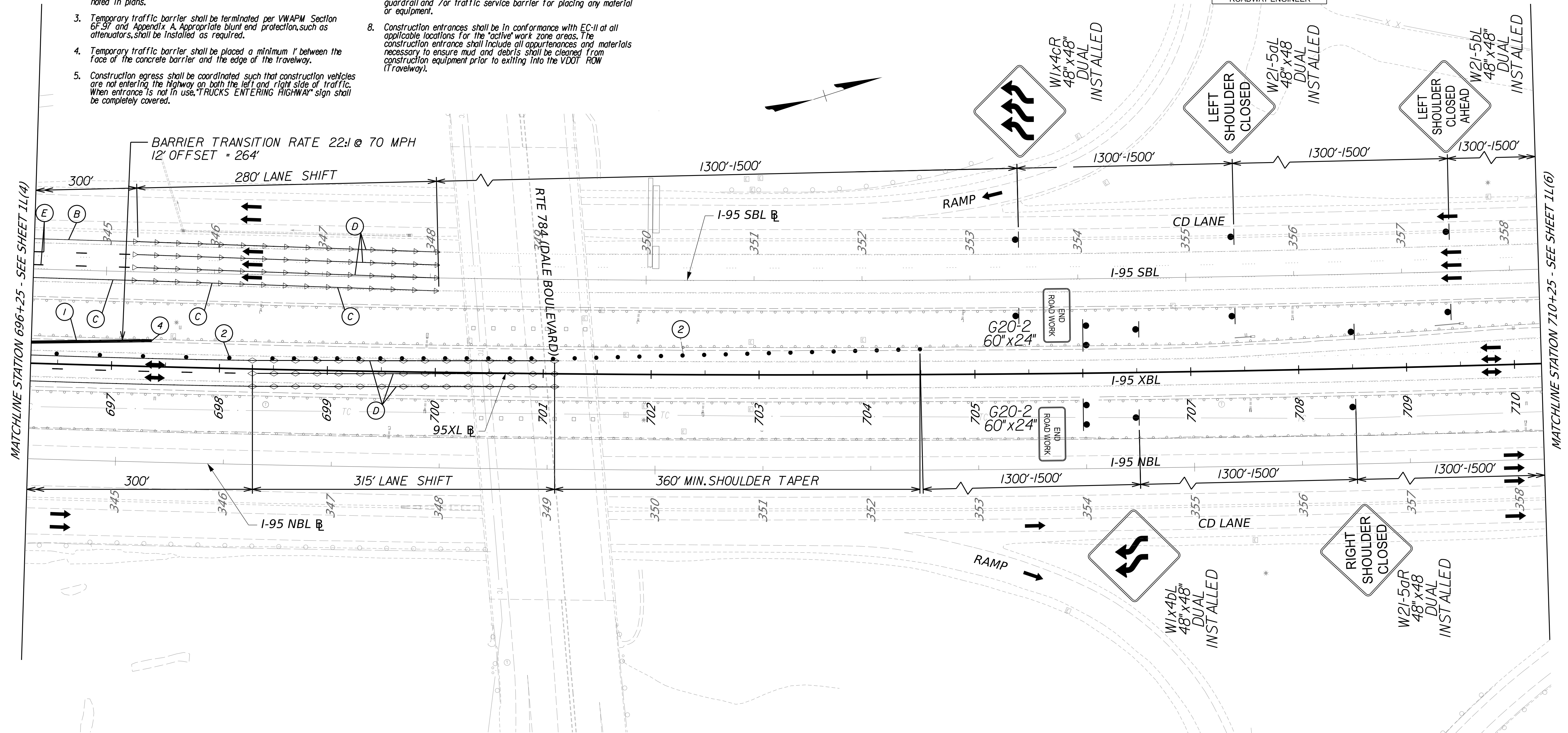
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1L(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
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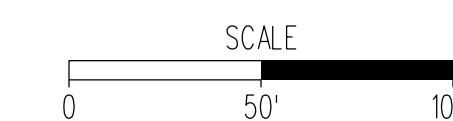


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY.1 | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | ◁ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ≡≡≡ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

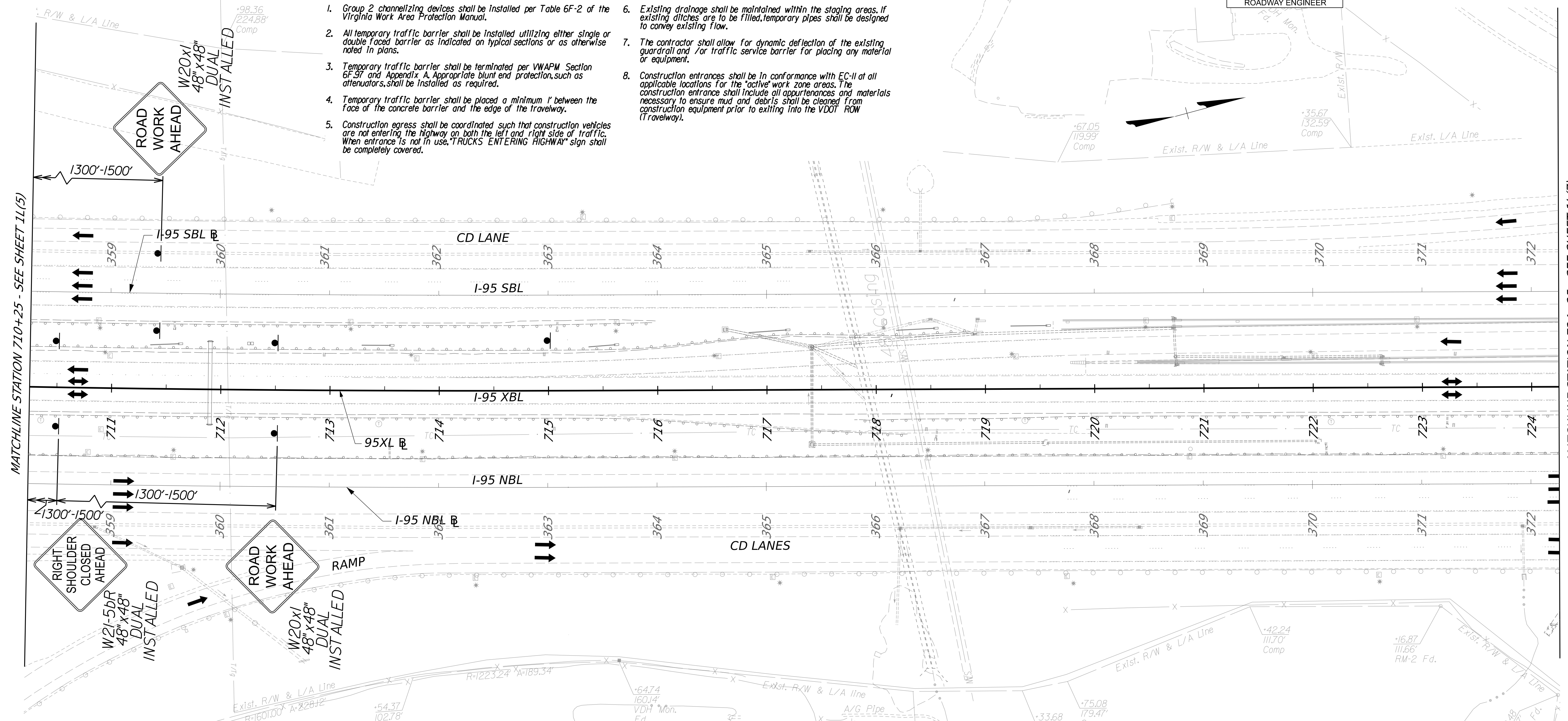
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1L(6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
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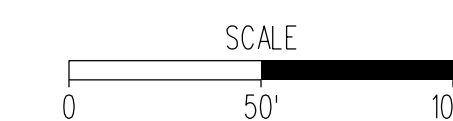


LEGEND

- | | | | | | |
|--|-----------------------------|--|---|--|--|
| | CONSTRUCTION THIS STAGE | | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | | GROUP 2 CHANNELIZING DEVICES | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | | IMPACT ATTN. SERVICE TY.1 | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | | FIXED OBJECT ATTACHMENT (TEMPORARY) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6' WIDTH | | TEMPORARY STOP LINE |
| | | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8' WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299,C-501	1L(7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

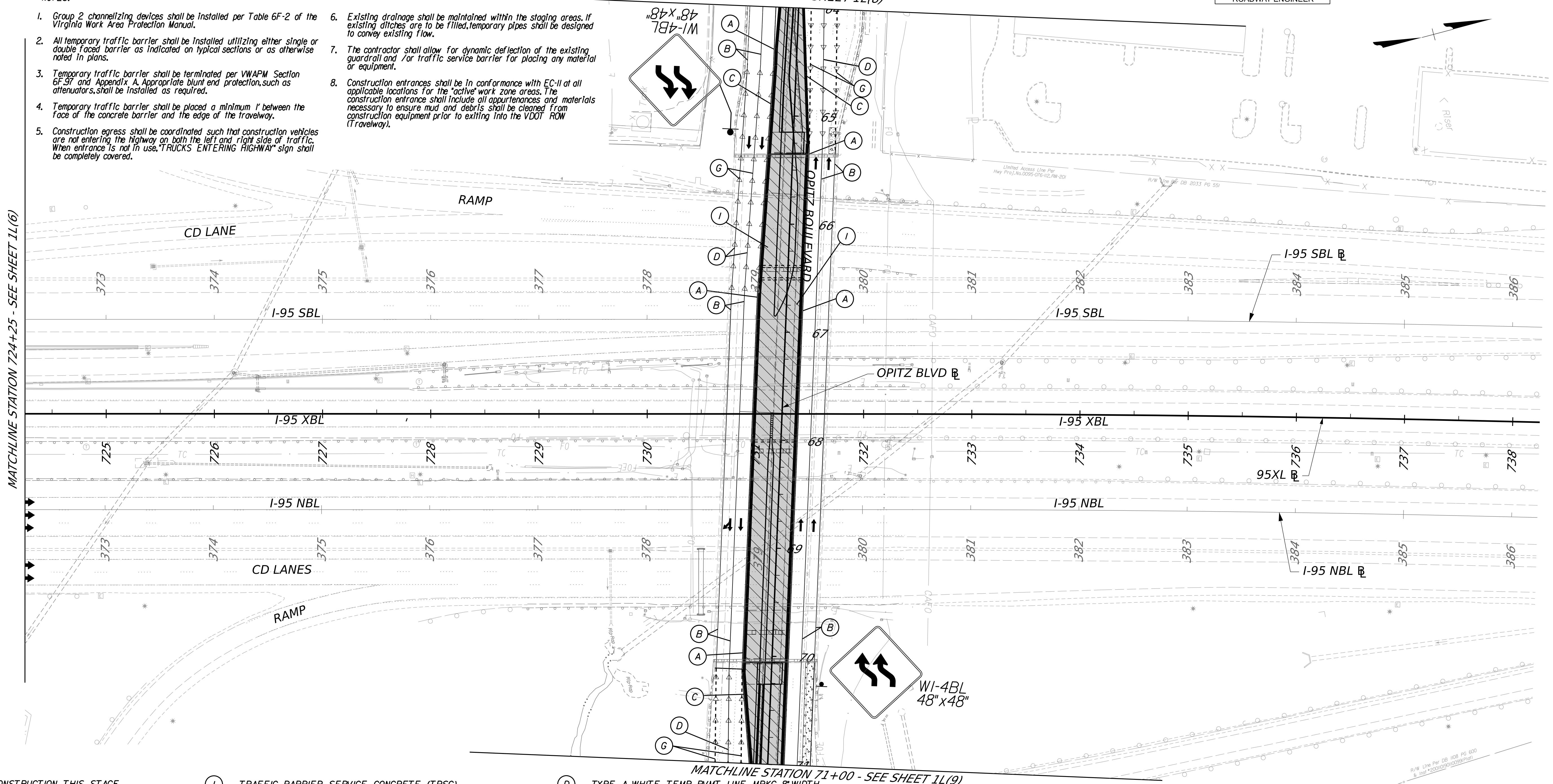
NOTES:

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MATCHLINE STATION 64+00 - SEE SHEET 1L(8)

MATCHLINE STATION 724+25 - SEE SHEET 1L(6)

MATCHLINE STATION 71+00 - SEE SHEET 1L(9)



LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | ◁ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ▨ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT 0095-076-299 SHEET NO. 1L(7)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 1A

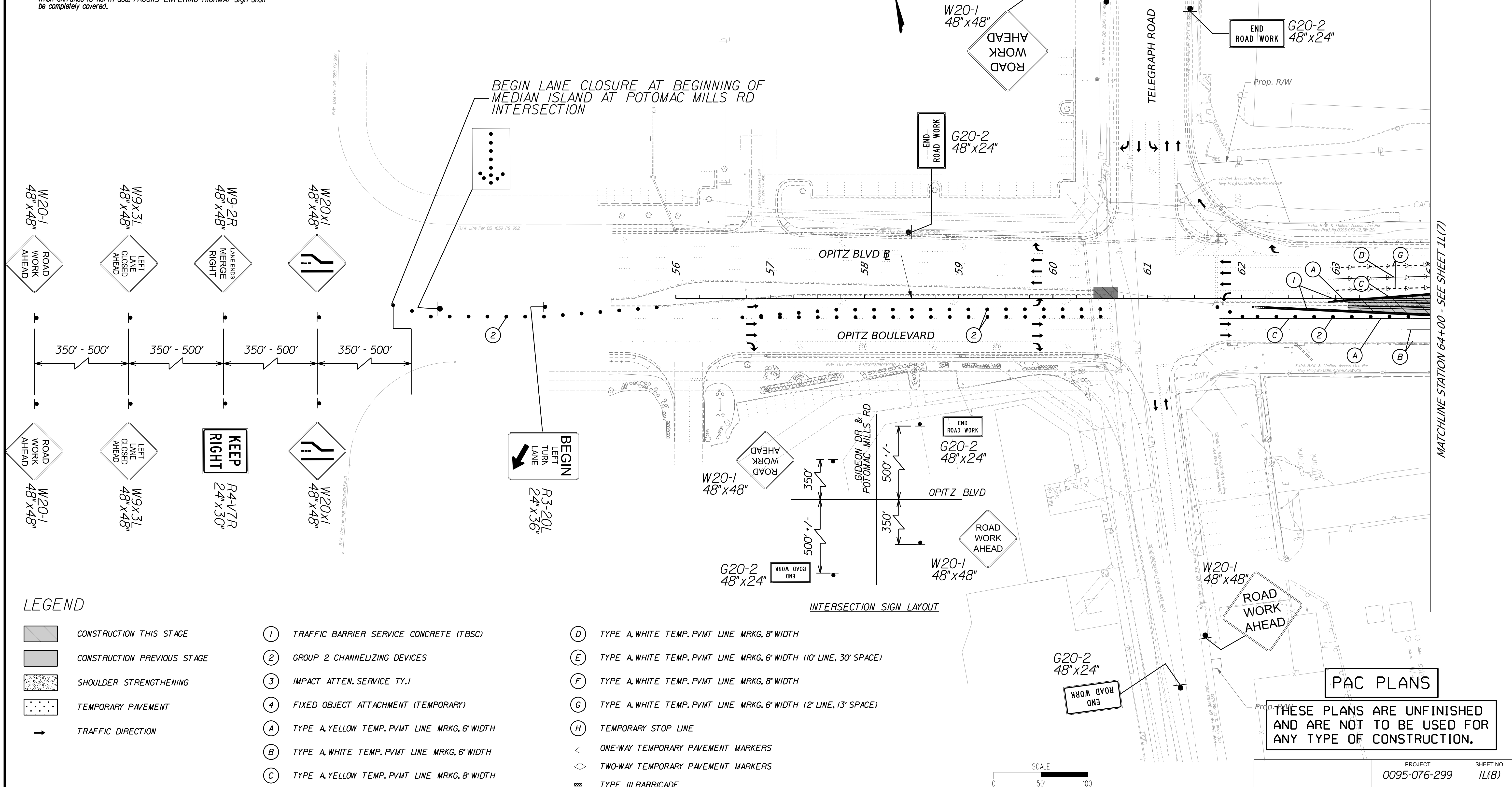
NOTES:

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- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1L(8)

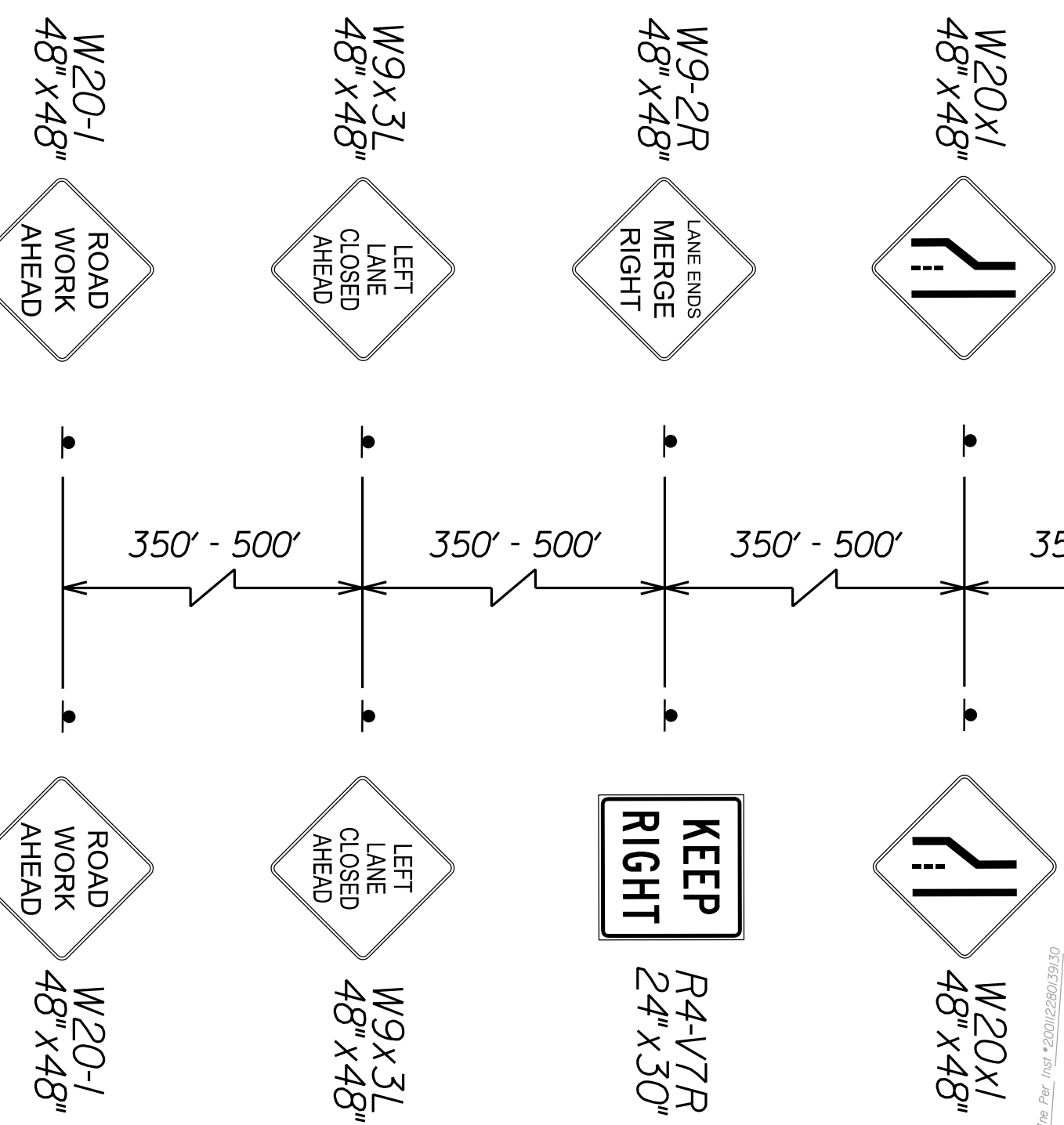
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



BEGIN LANE CLOSURE AT BEGINNING OF
 MEDIAN ISLAND AT POTOMAC MILLS RD
 INTERSECTION

INTERSECTION SIGN LAYOUT



LEGEND

- | | | | | | |
|--|-----------------------------|-----|--|-----|---|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBS) | (D) | TYPE A, WHITE TEMP. PVT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY.1 | (F) | TYPE A, WHITE TEMP. PVT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVT LINE MRKG, 6' WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVT LINE MRKG, 6' WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
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| | | | | | TYPE III BARRICADE |

THESE PLANS ARE UNFINISHED
 AND ARE NOT TO BE USED FOR
 ANY TYPE OF CONSTRUCTION.

PAC PLANS

MATCHLINE STATION 64+00 - SEE SHEET 1L(7)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

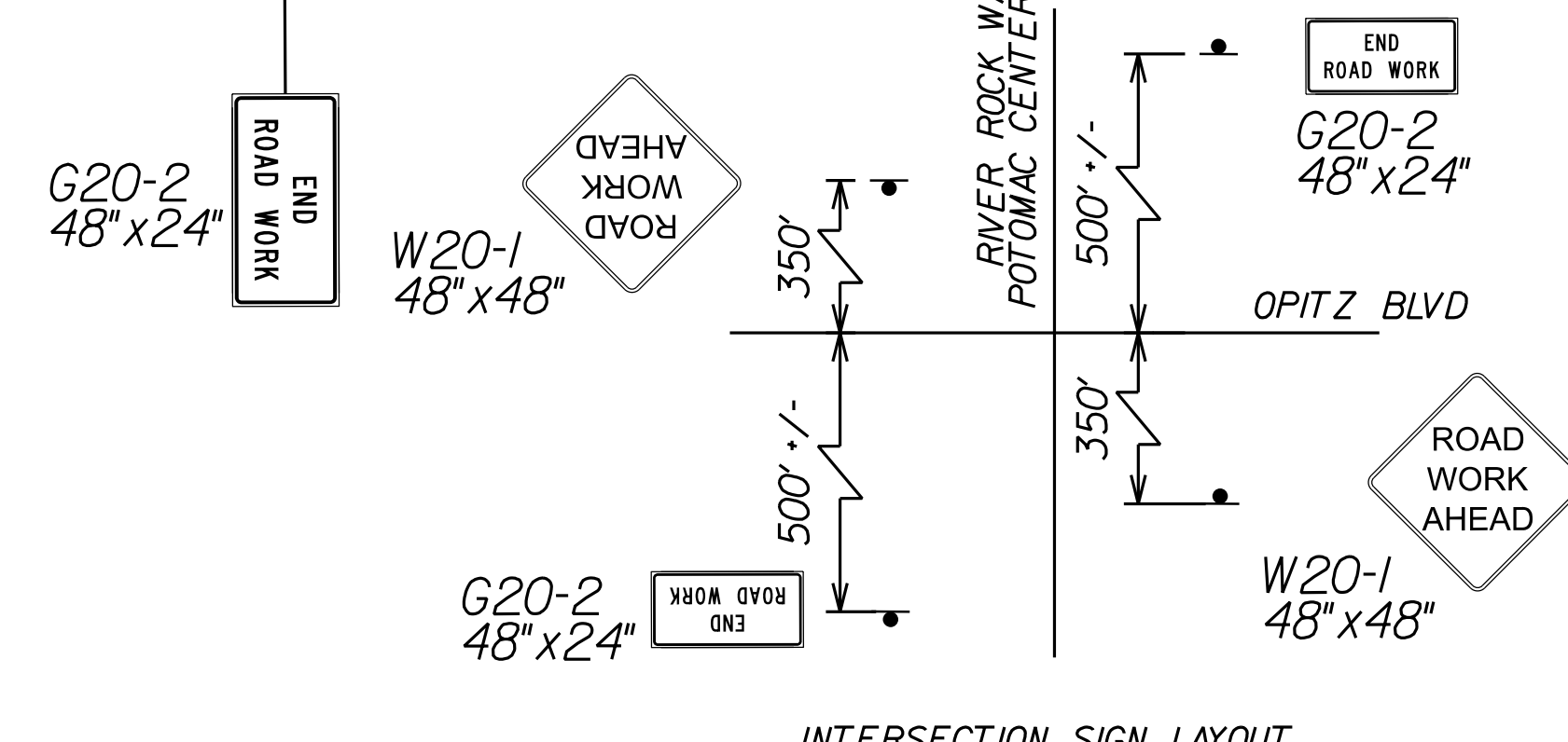
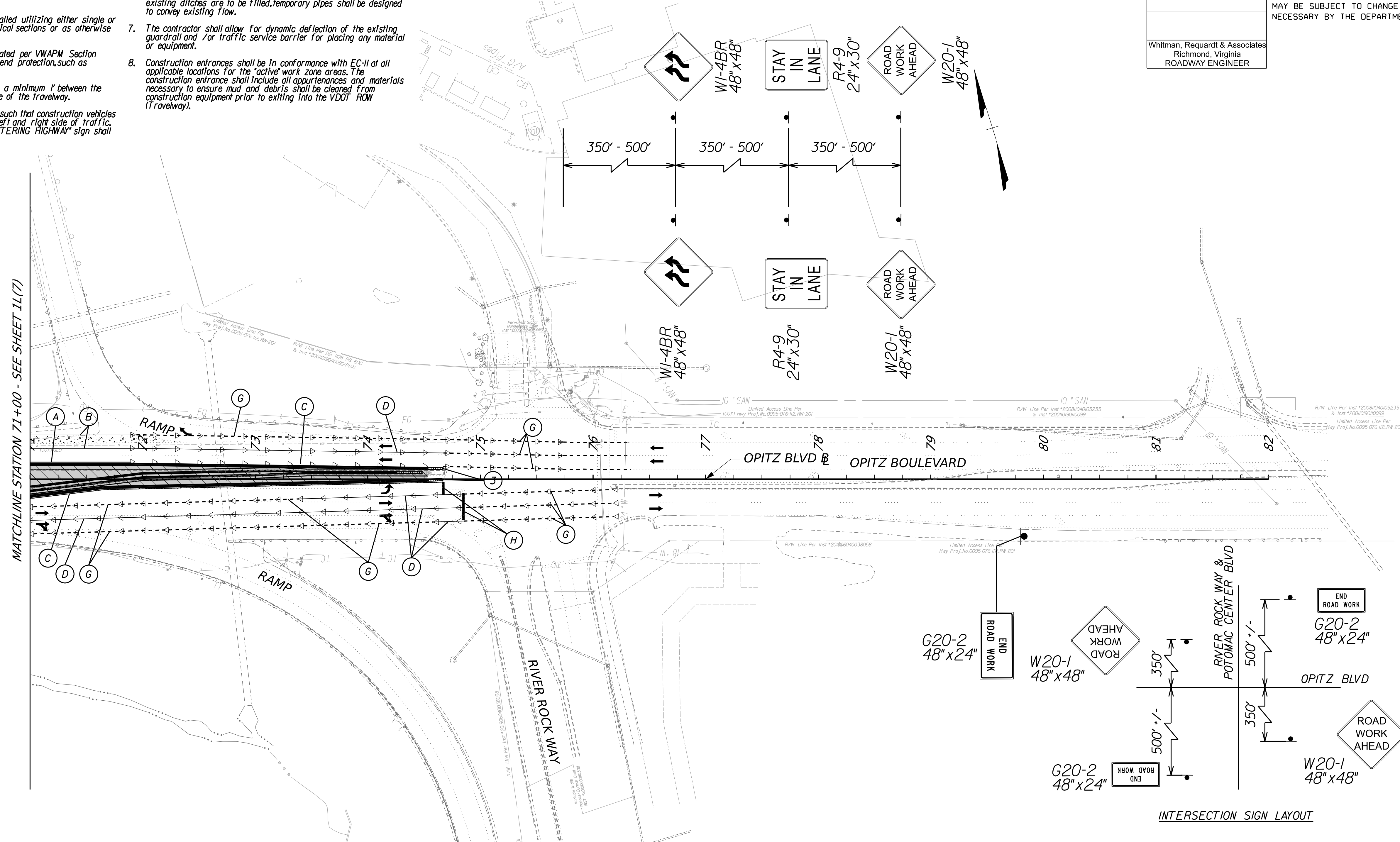
STAGE 1A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1L(9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

- NOTES:**
- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
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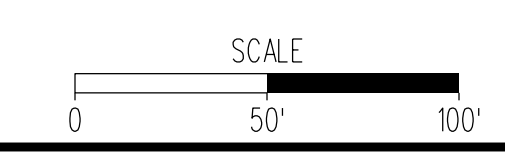


LEGEND

- | | | |
|-----------------------------|---|--|
| CONSTRUCTION THIS STAGE | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| CONSTRUCTION PREVIOUS STAGE | GROUP 2 CHANNELIZING DEVICES | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| SHOULDER STRENGTHENING | IMPACT ATTN. SERVICE TY.1 | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| TEMPORARY PAVEMENT | FIXED OBJECT ATTACHMENT (TEMPORARY) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| TRAFFIC DIRECTION | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | TEMPORARY STOP LINE |
| | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | TYPE III BARRICADE |

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	1L(9)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 2A

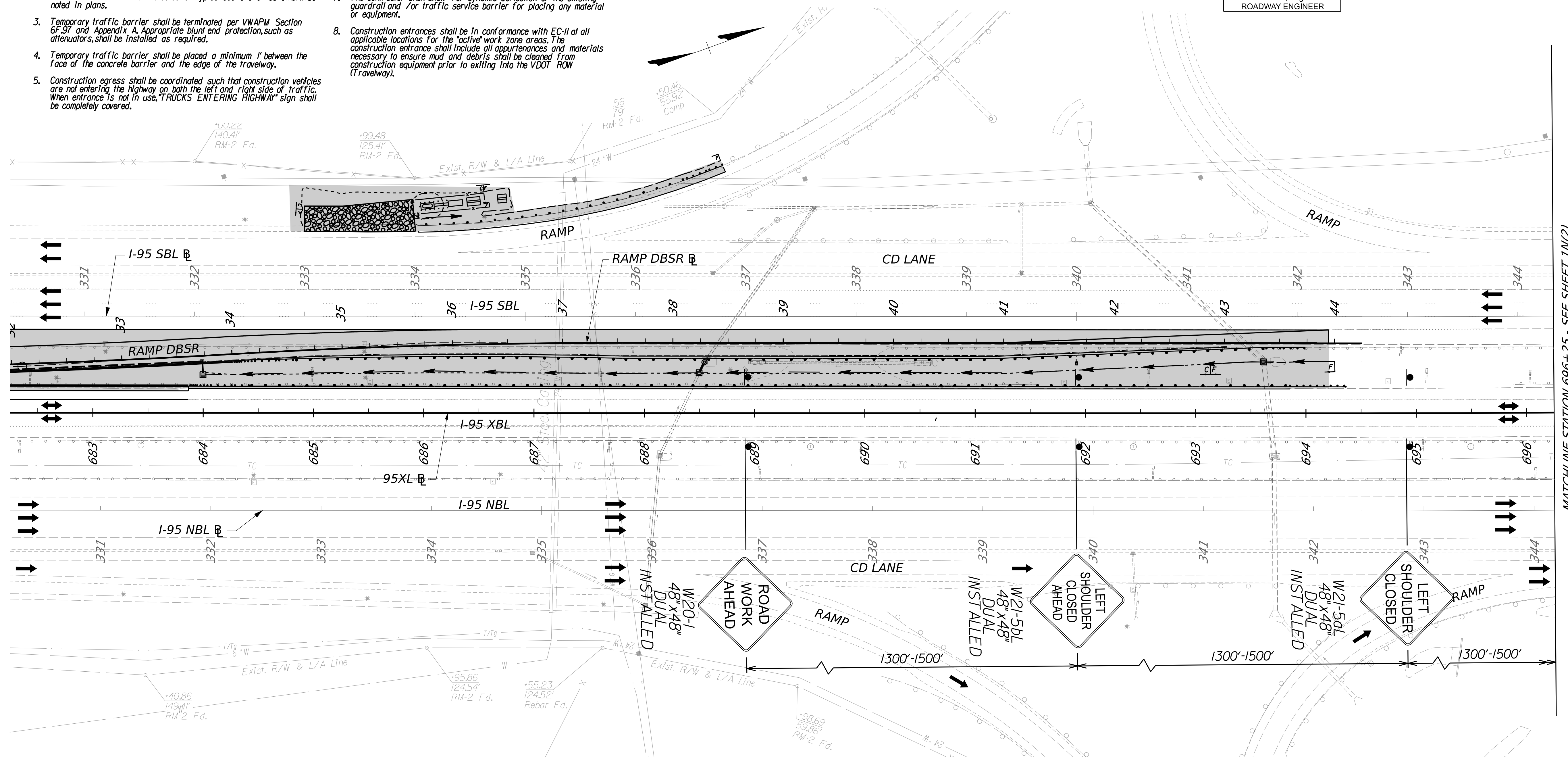
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	IN(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

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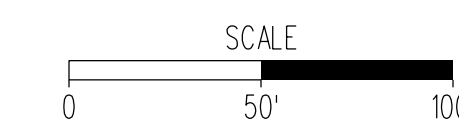


LEGEND

- | | | | | | |
|--|-----------------------------|--|---|--|--|
| | CONSTRUCTION THIS STAGE | | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | | GROUP 2 CHANNELIZING DEVICES | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | | IMPACT ATTEN. SERVICE TY. I | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | | FIXED OBJECT ATTACHMENT (TEMPORARY) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | | TEMPORARY STOP LINE |
| | | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



MATCHLINE STATION 696+25 - SEE SHEET IN(2)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 2A

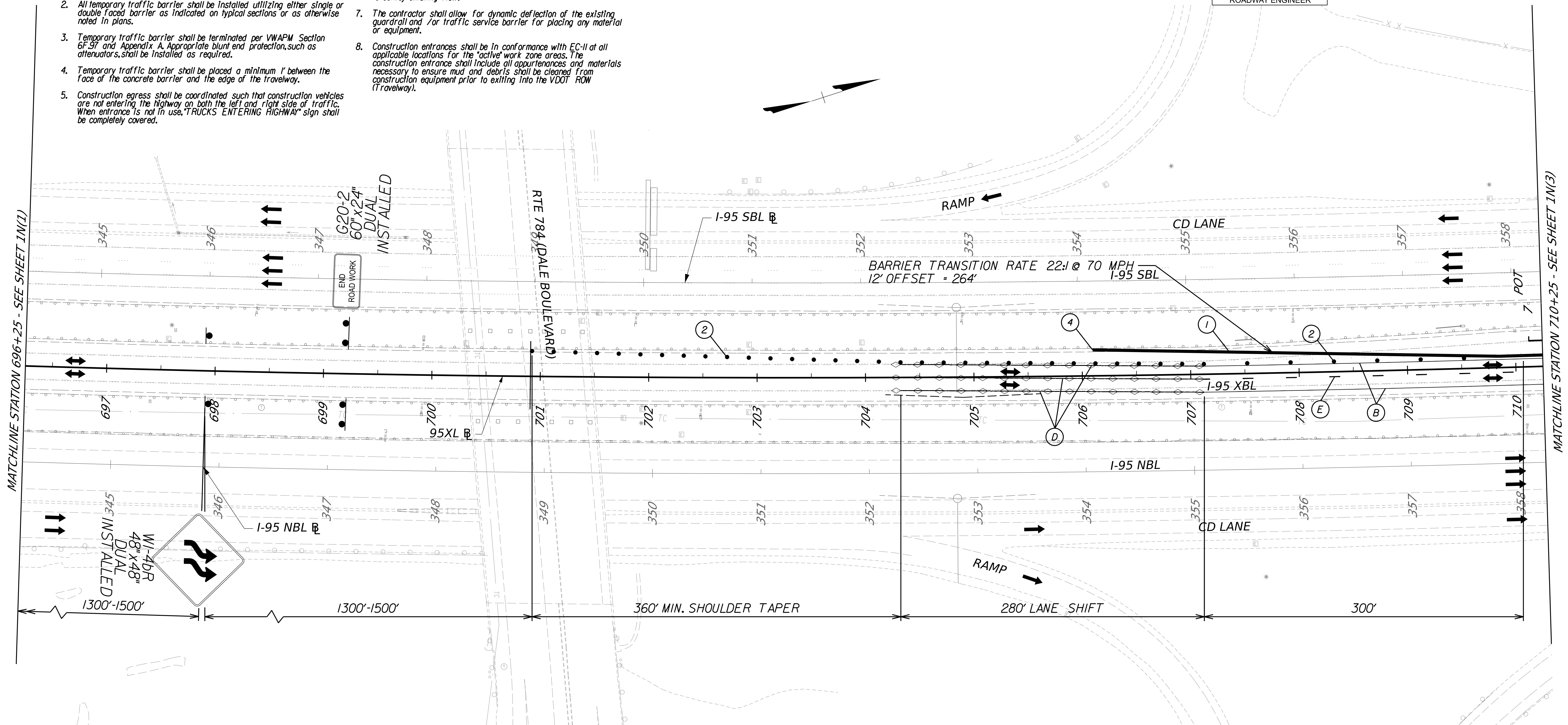
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IN(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F.37 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, TRUCKS ENTERING HIGHWAY sign shall be completely covered.
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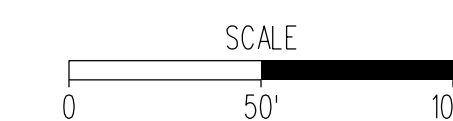


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 2A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	IN(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

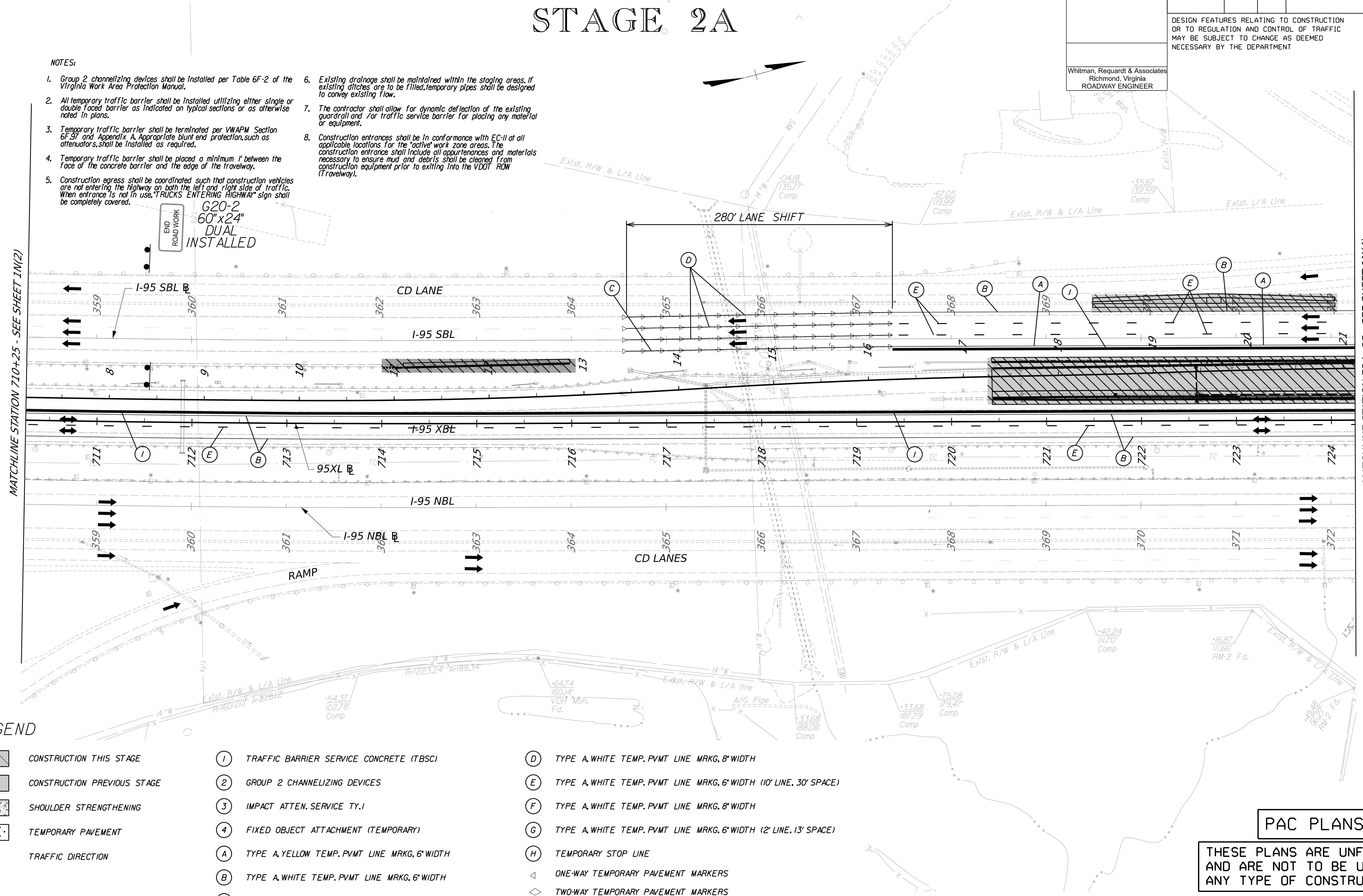
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

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MATCHLINE STATION 710+25 - SEE SHEET IN(2)

MATCHLINE STATION 724+25 - SEE SHEET IN(4)



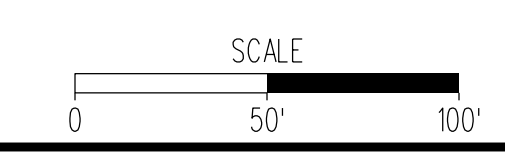
G20-2
 60"x24"
 DUAL
 INSTALLED

LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6' WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8' WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IN(3)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

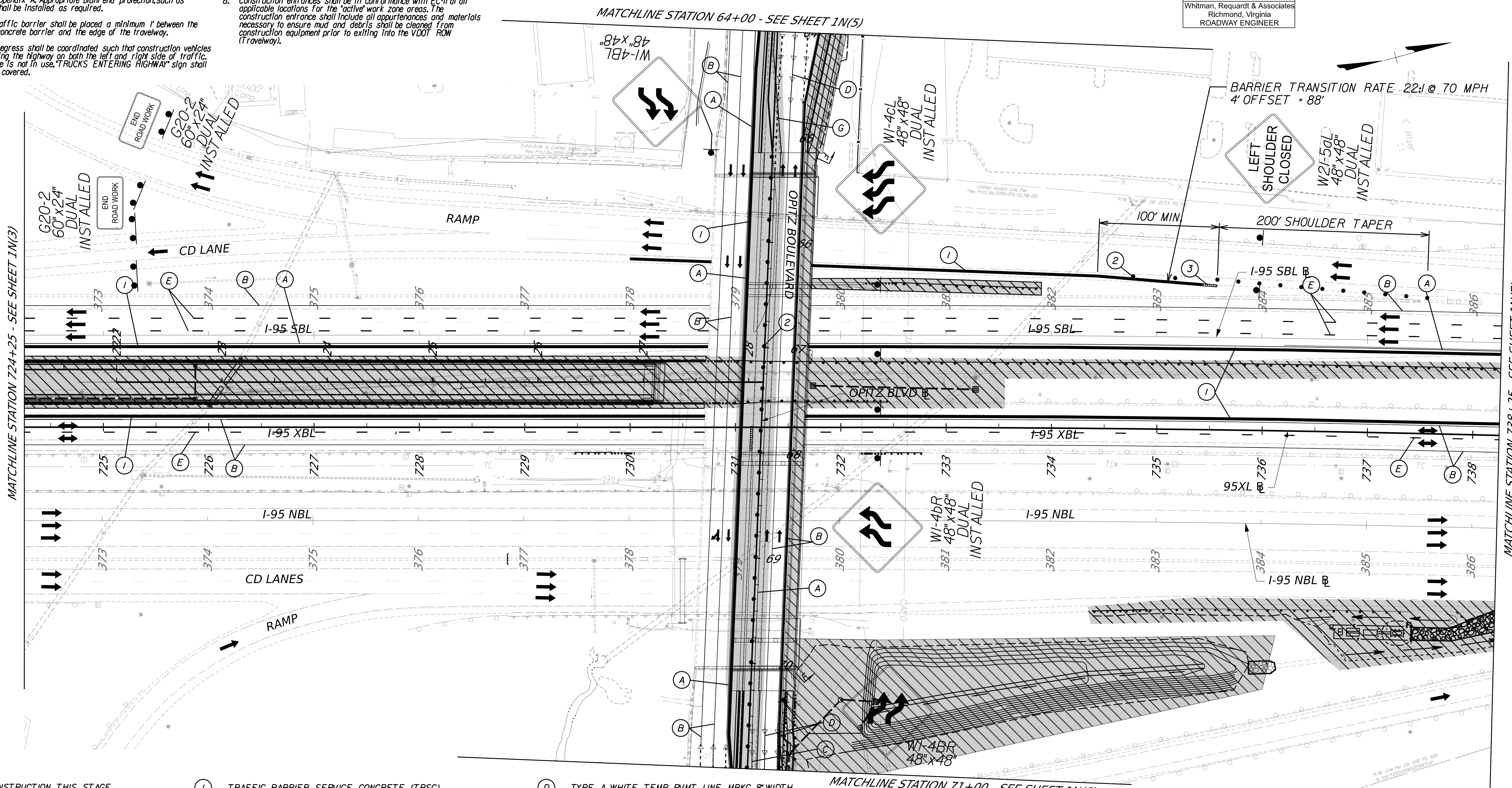
STAGE 2A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299,C-501	IN(4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

- NOTES:
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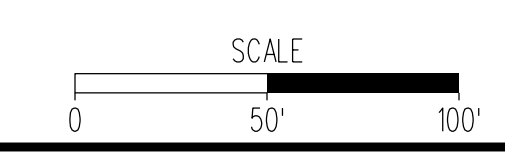


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBCS) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY.1 | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	IN(4)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

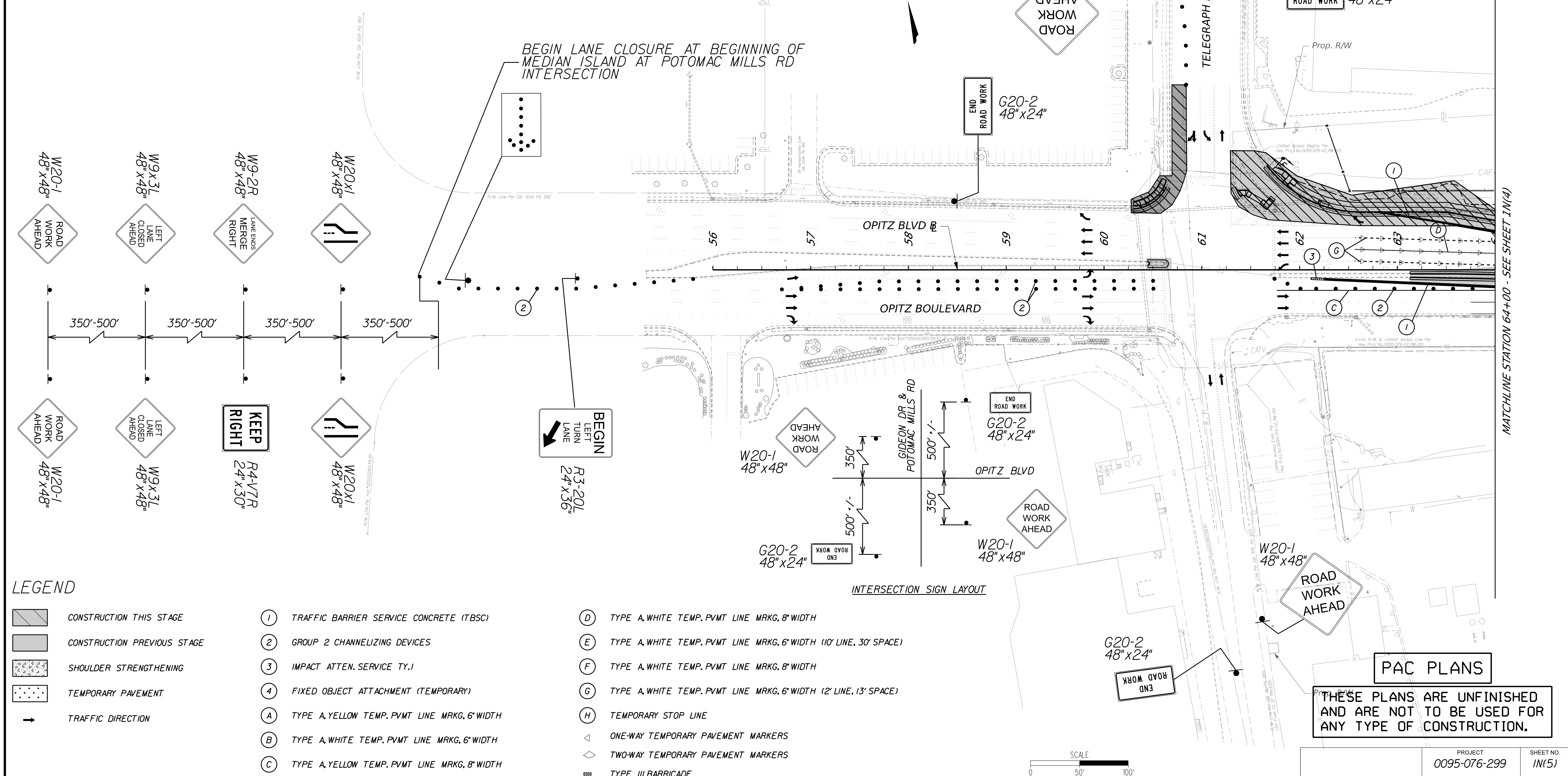
STAGE 2A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IN(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

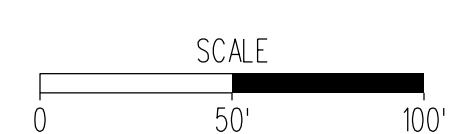
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

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LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |



PAC PLANS
 THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

MATCHLINE STATION 64+00 - SEE SHEET IN(4)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

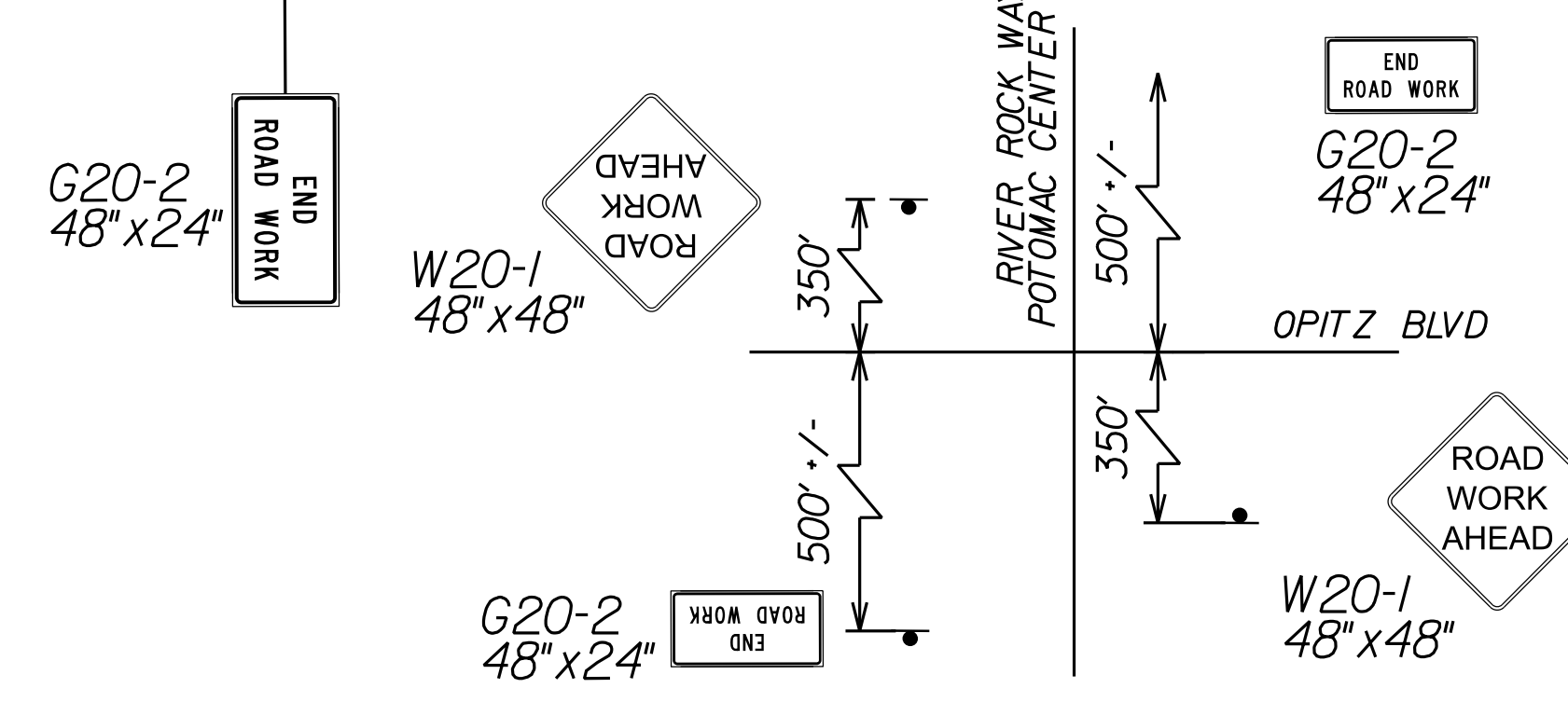
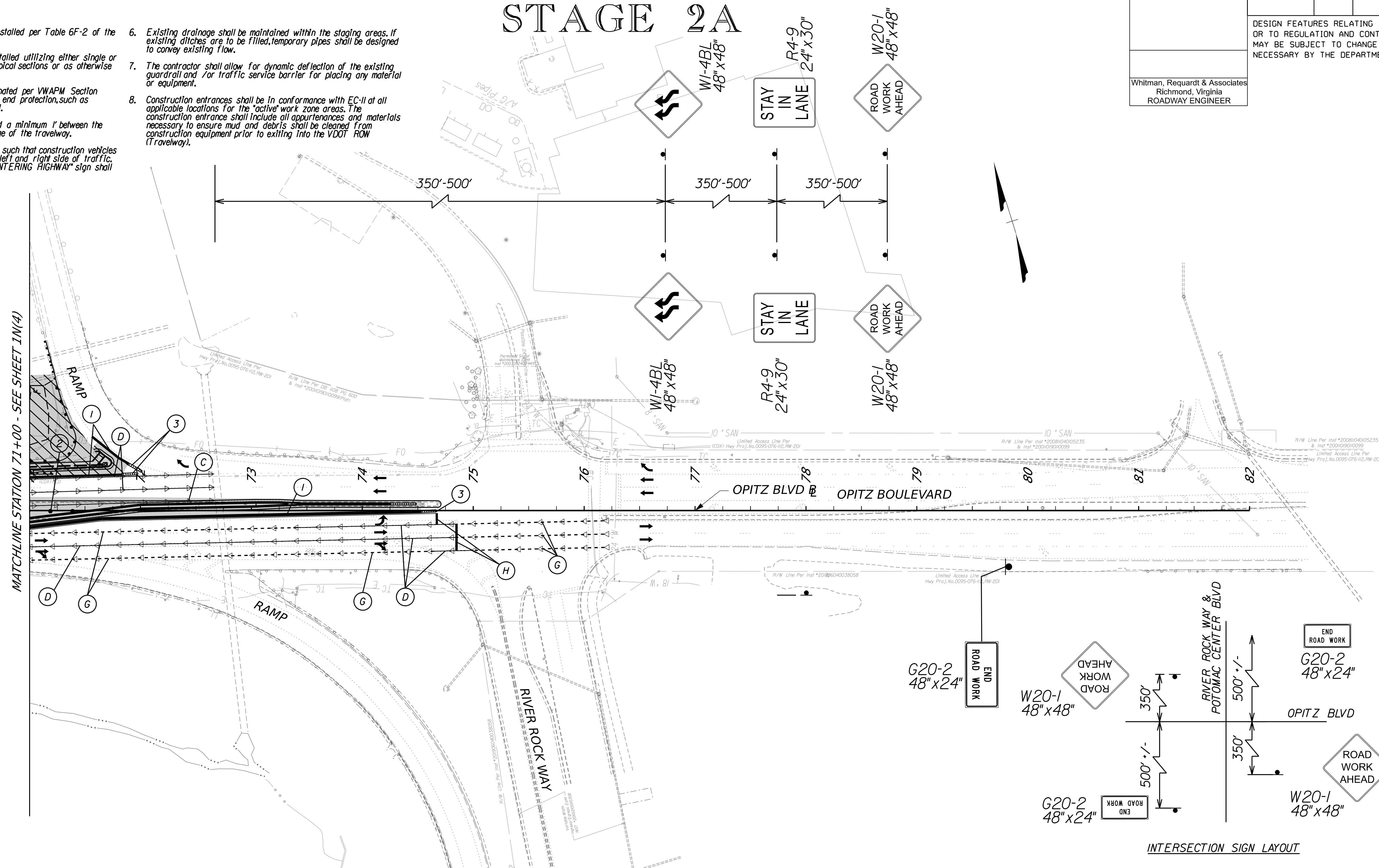
STAGE 2A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IN(6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

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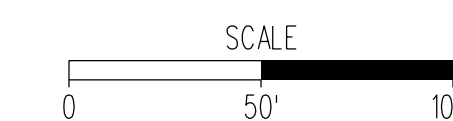


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBS) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
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| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | △ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ≡≡≡ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	IN(6)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS STAGE 2A

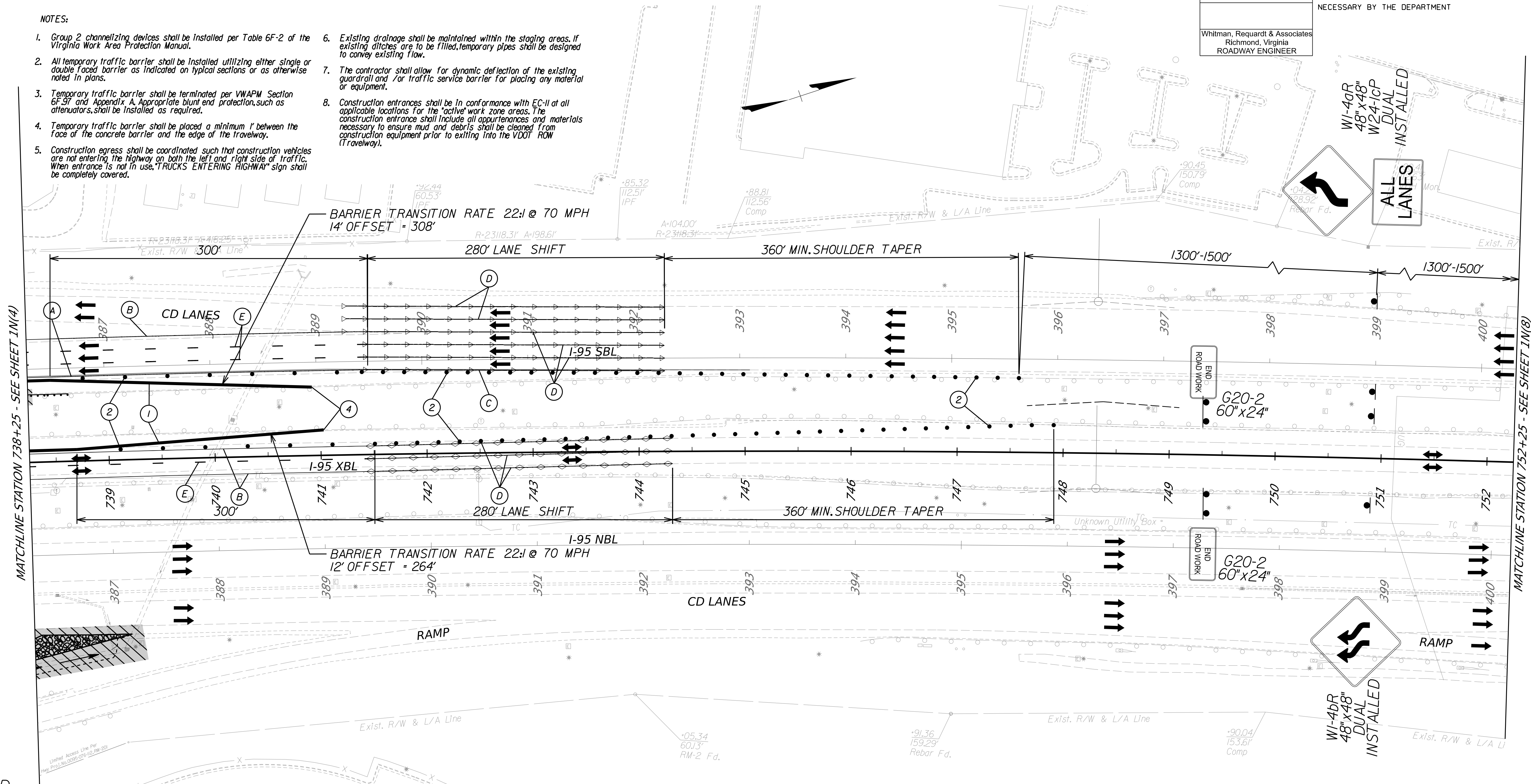
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	IN(7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

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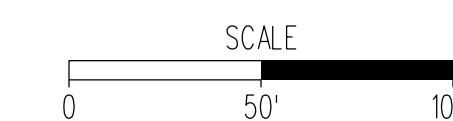


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
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| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
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| | | | | ▩ | TYPE III BARRICADE |

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IN(7)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 2A

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299,C-501	IN(8)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

PCMS #1 - PLACE ON OUTSIDE SHOULDER APPROX. 200' BEYOND EXIT 156B "FOOD" GUIDE SIGN. FIELD ENGINEER SHALL DECIDE FINAL LOCATION.

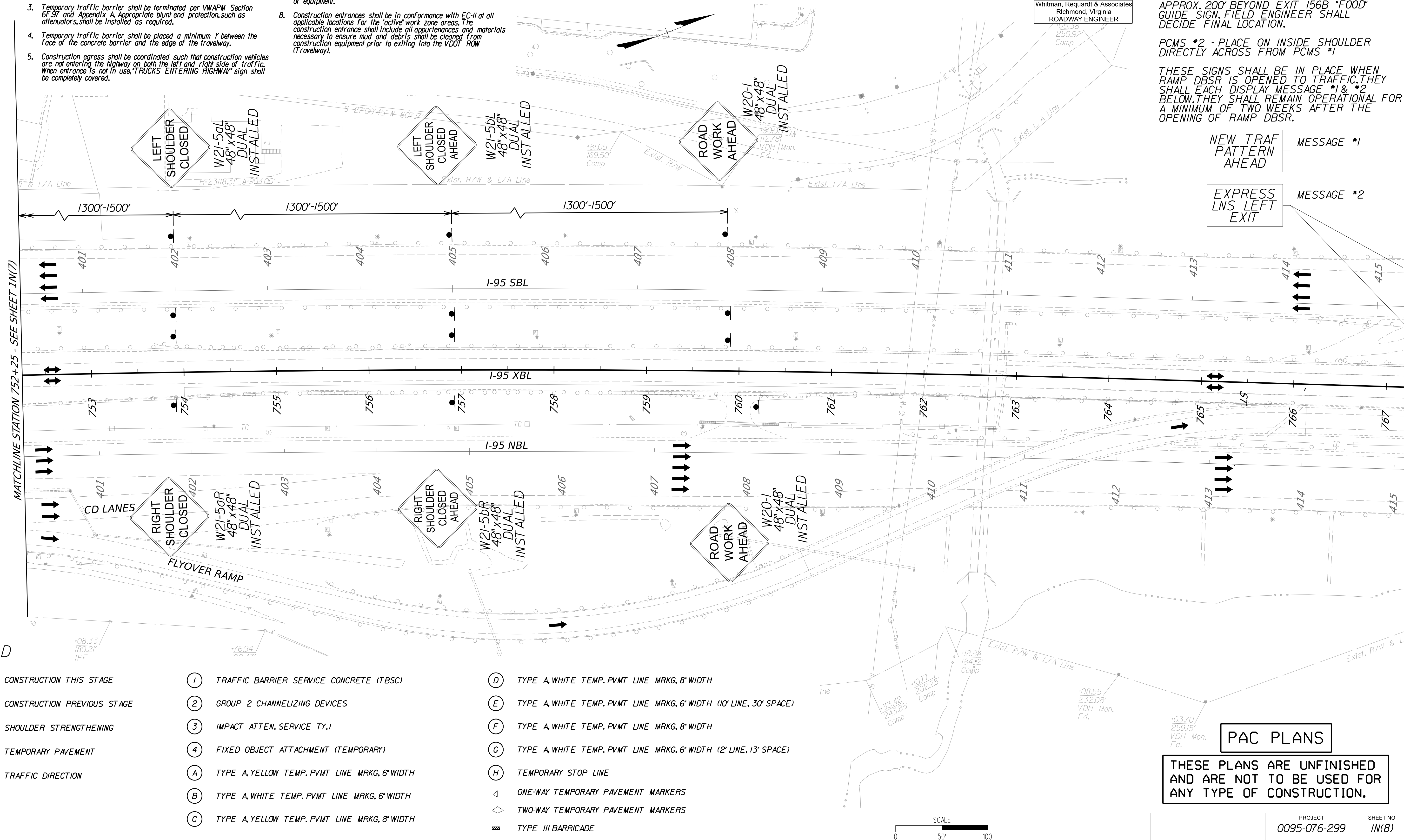
PCMS #2 - PLACE ON INSIDE SHOULDER DIRECTLY ACROSS FROM PCMS #1

THESE SIGNS SHALL BE IN PLACE WHEN RAMP DBSR IS OPENED TO TRAFFIC. THEY SHALL EACH DISPLAY MESSAGE #1 & #2 BELOW. THEY SHALL REMAIN OPERATIONAL FOR A MINIMUM OF TWO WEEKS AFTER THE OPENING OF RAMP DBSR.

NEW TRAF PATTERN AHEAD MESSAGE #1
 EXPRESS LNS LEFT EXIT MESSAGE #2

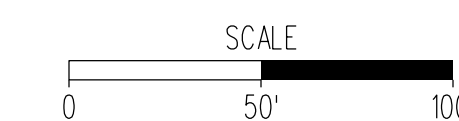
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LEGEND

- | | | | | | |
|--|-----------------------------|--|---|--|--|
| | CONSTRUCTION THIS STAGE | | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | | GROUP 2 CHANNELIZING DEVICES | | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | | IMPACT ATTN. SERVICE TY. I | | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | | FIXED OBJECT ATTACHMENT (TEMPORARY) | | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | | TYPE A, YELLOW TEMP. P.V.M.T. LINE MRKG, 6" WIDTH | | TEMPORARY STOP LINE |
| | | | TYPE A, WHITE TEMP. P.V.M.T. LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | | TYPE A, YELLOW TEMP. P.V.M.T. LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
0095-076-299	IN(8)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

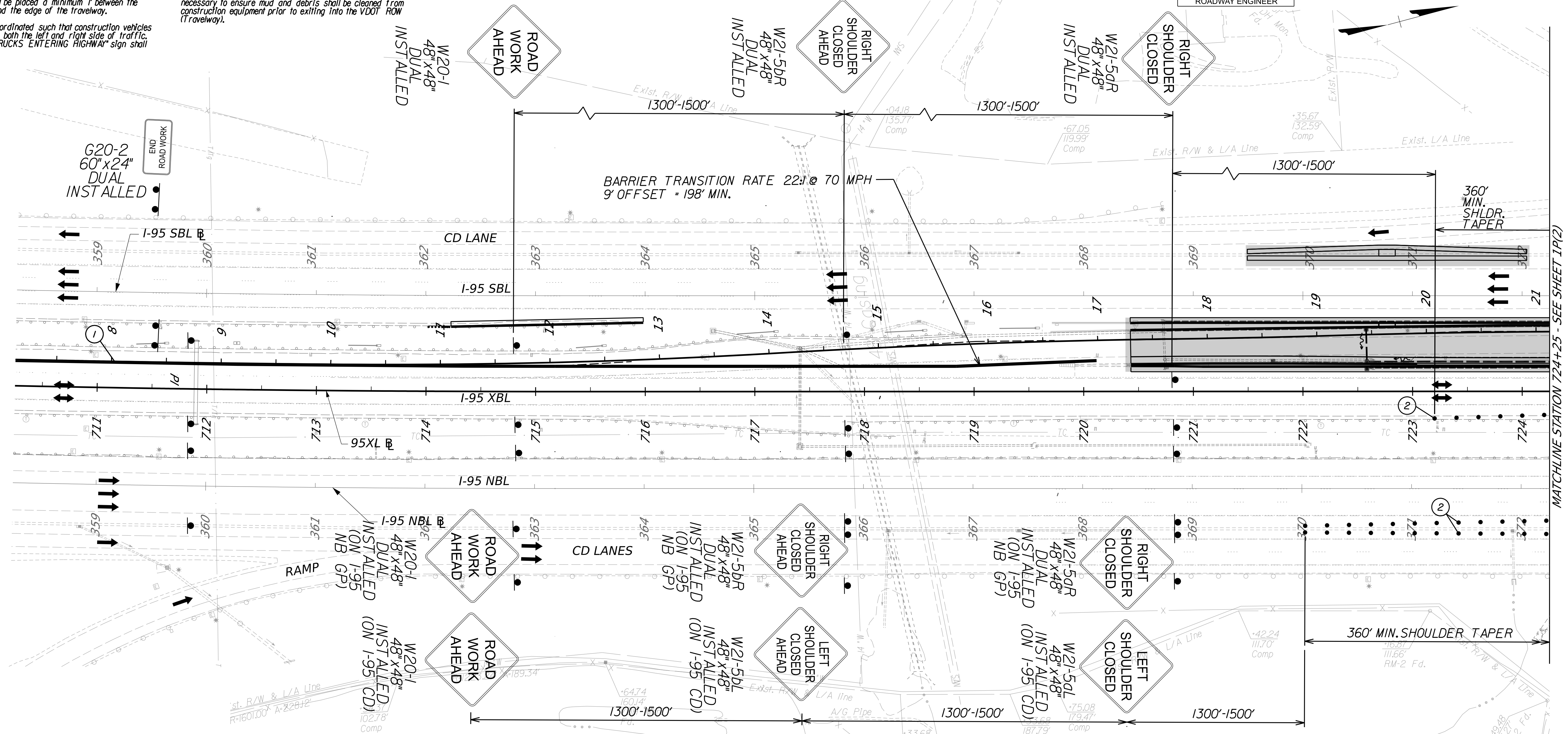
STAGE 3

- NOTES:**
- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
 - All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
 - Temporary traffic barrier shall be terminated per VWAPM Section 6F-9F and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
 - Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
 - Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, TRUCKS ENTERING HIGHWAY sign shall be completely covered.
 - Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
 - The contractor shall allow for dynamic deflection of the existing guardrail and/or traffic service barrier for placing any material or equipment.
 - Construction entrances shall be in conformance with EC-11 at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IP(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | △ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ≡ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT 0095-076-299 SHEET NO. IP(1)

MATCHLINE STATION 724+25 - SEE SHEET IP(2)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 3

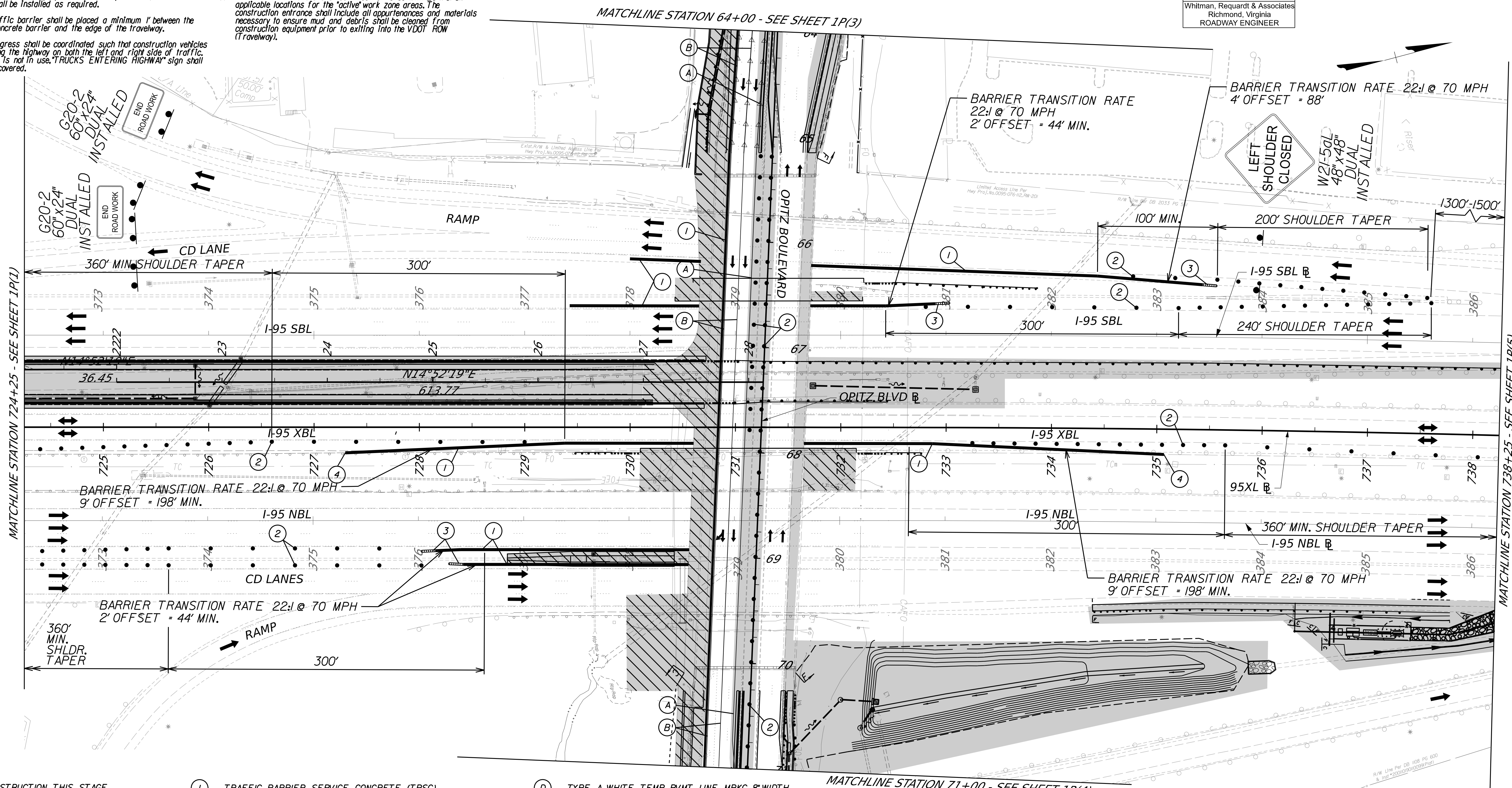
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1P(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VMAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
- Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
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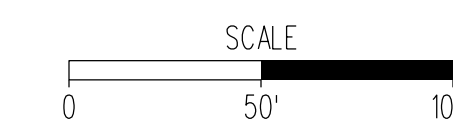


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | ◁ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ▩ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	1P(2)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

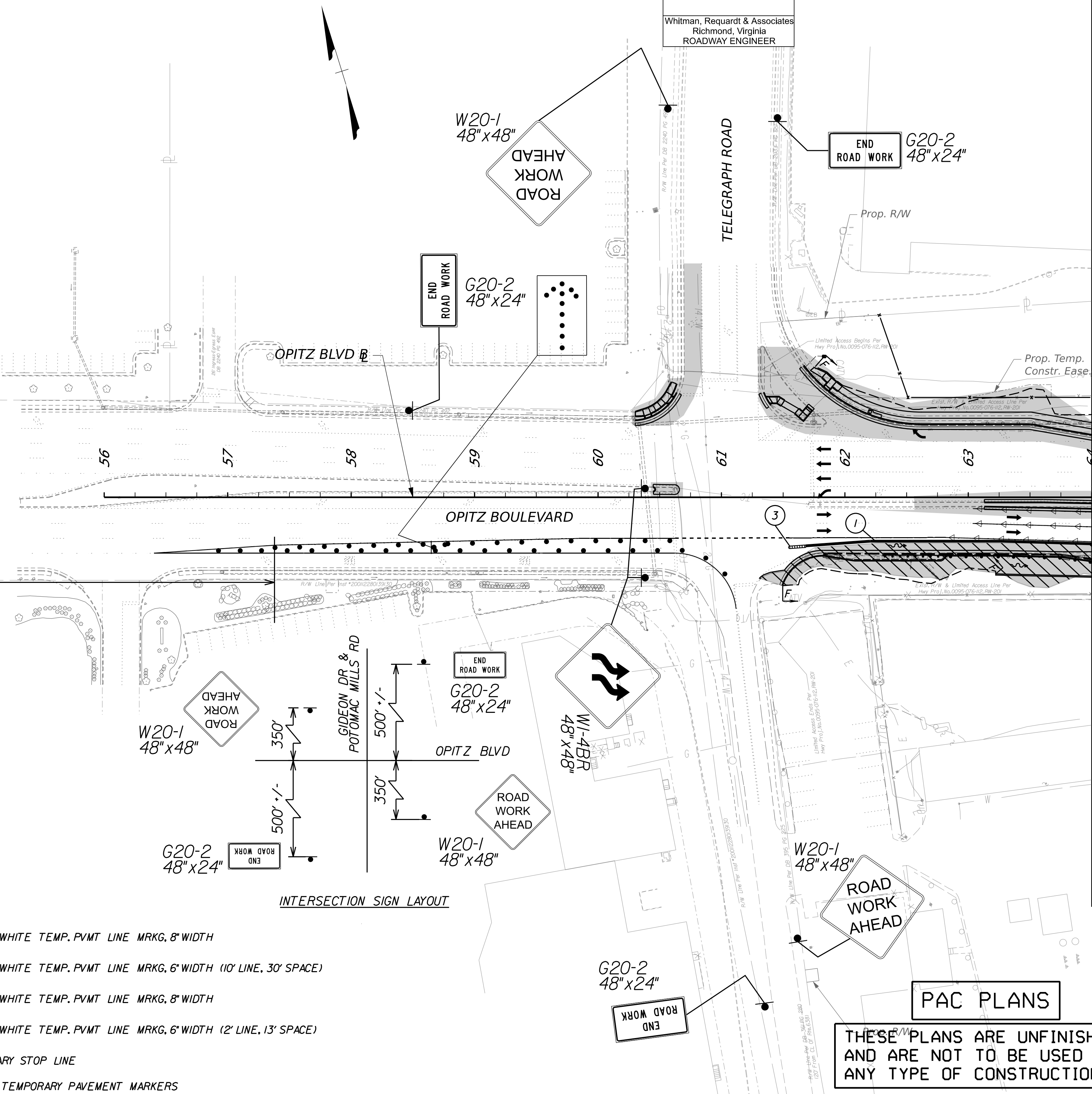
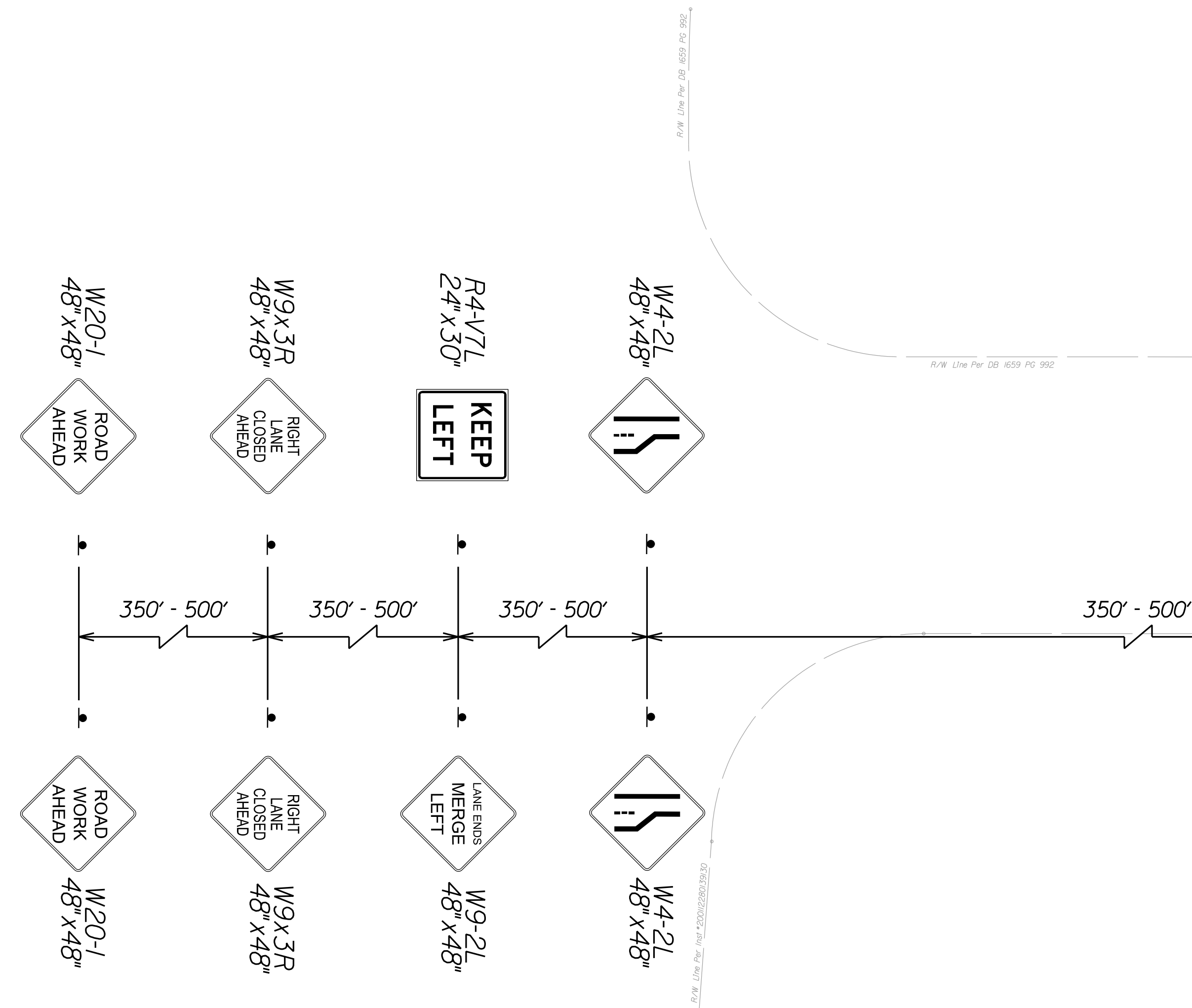
STAGE 3

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1P(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

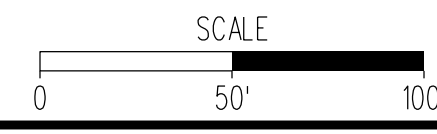
- NOTES:**
- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
 - All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
 - Temporary traffic barrier shall be terminated per VWAPM Section 6F.37 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
 - Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
 - Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
 - Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
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LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBCS) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

INTERSECTION SIGN LAYOUT



PAC PLANS
 THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
0095-076-299	1P(3)

MATCHLINE STATION 64+00 - SEE SHEET 1P(2)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 3

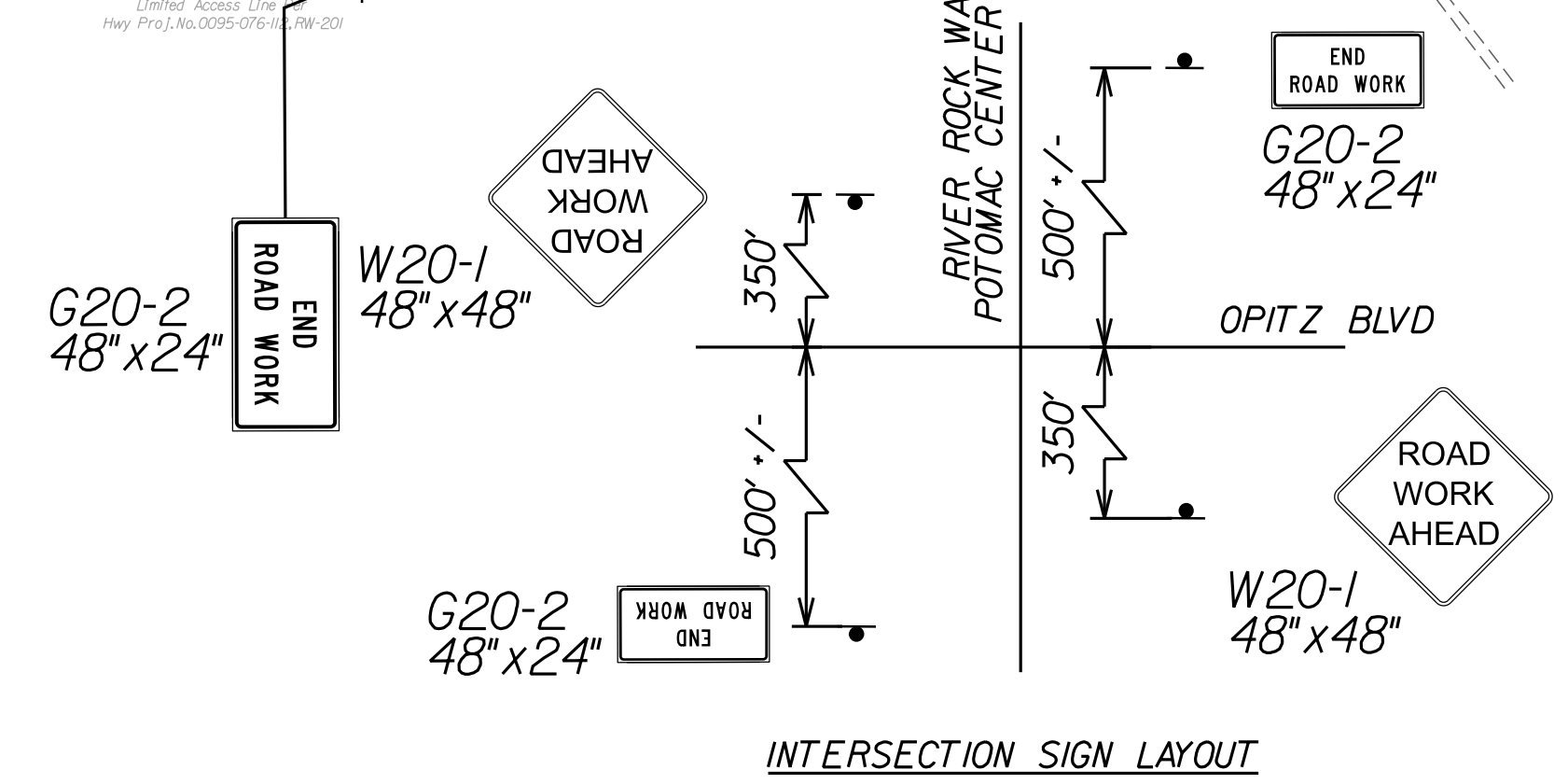
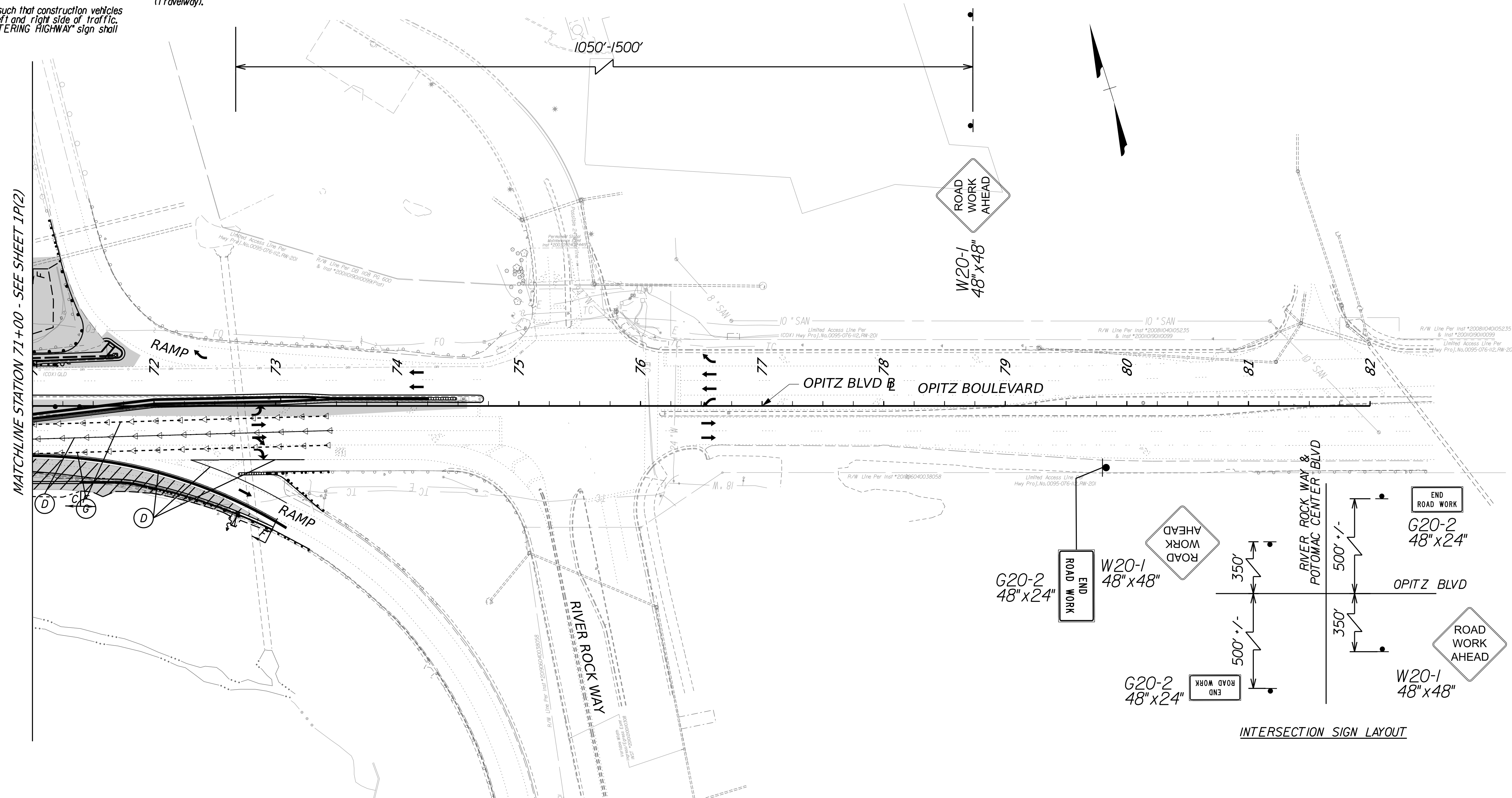
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IP(4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
- Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, TRUCKS ENTERING HIGHWAY sign shall be completely covered.
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- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-11 at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

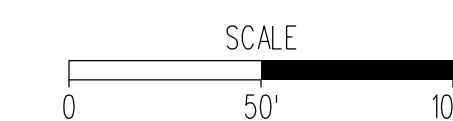


LEGEND

- | | | | | | |
|--|-----------------------------|--|---|--|--|
| | CONSTRUCTION THIS STAGE | | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | | GROUP 2 CHANNELIZING DEVICES | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | | IMPACT ATTEN. SERVICE TY.I | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | | FIXED OBJECT ATTACHMENT (TEMPORARY) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6' WIDTH | | TEMPORARY STOP LINE |
| | | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8' WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	IP(4)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

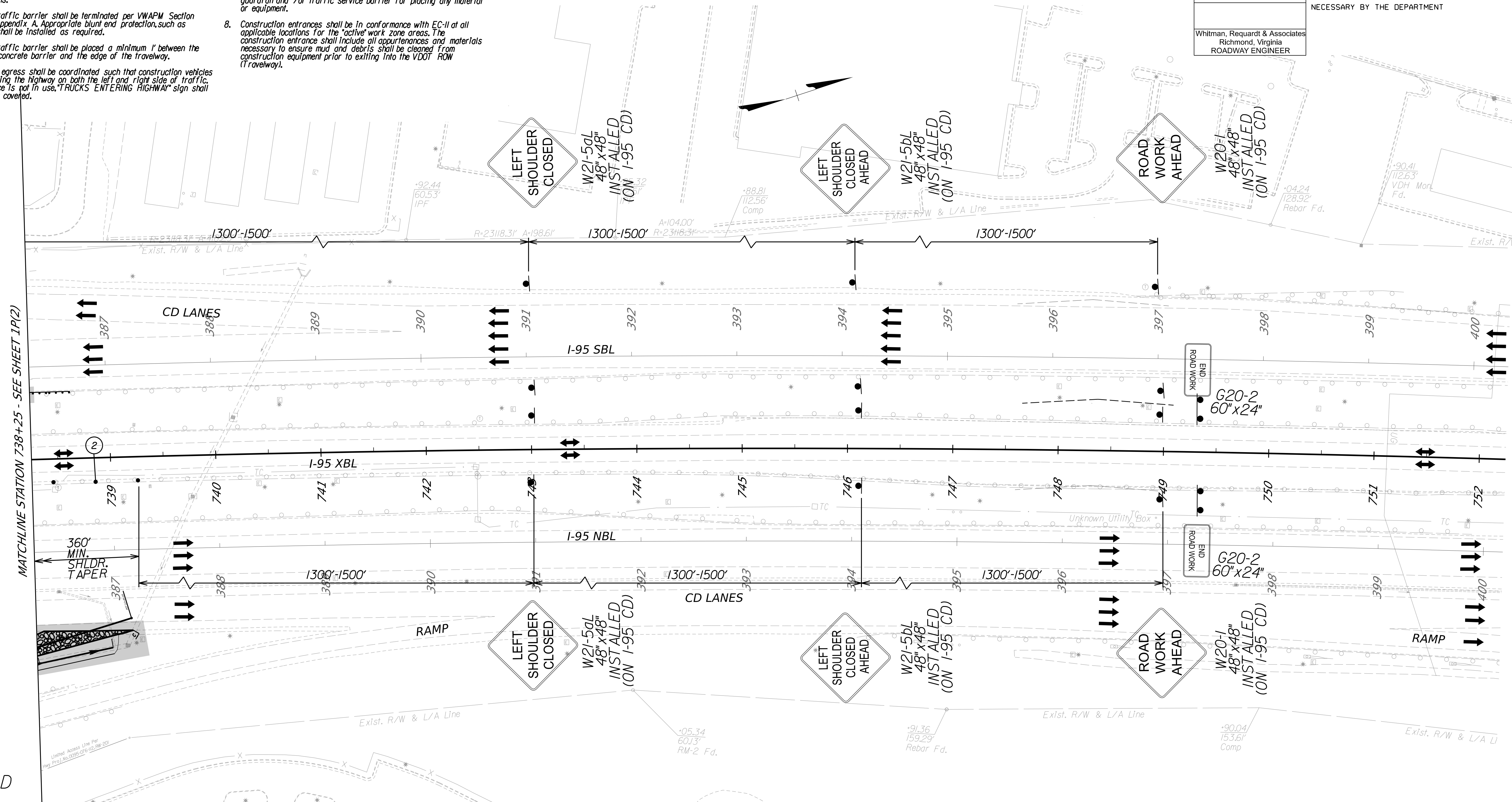
STAGE 3

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	IP(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

- NOTES:**
- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
 - All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
 - Temporary traffic barrier shall be terminated per WAPM Section 6F.97 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
 - Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
 - Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
 - Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
 - The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
 - Construction entrances shall be in conformance with EC-II at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).

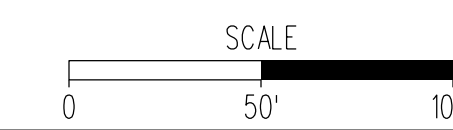


LEGEND

- | | | | | | |
|--|-----------------------------|--|---|--|--|
| | CONSTRUCTION THIS STAGE | | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | | GROUP 2 CHANNELIZING DEVICES | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | | IMPACT ATTEN. SERVICE TY. I | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | | FIXED OBJECT ATTACHMENT (TEMPORARY) | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | | TEMPORARY STOP LINE |
| | | | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	IP(5)

PROJECT MANAGER: *Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY: DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY: DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 4

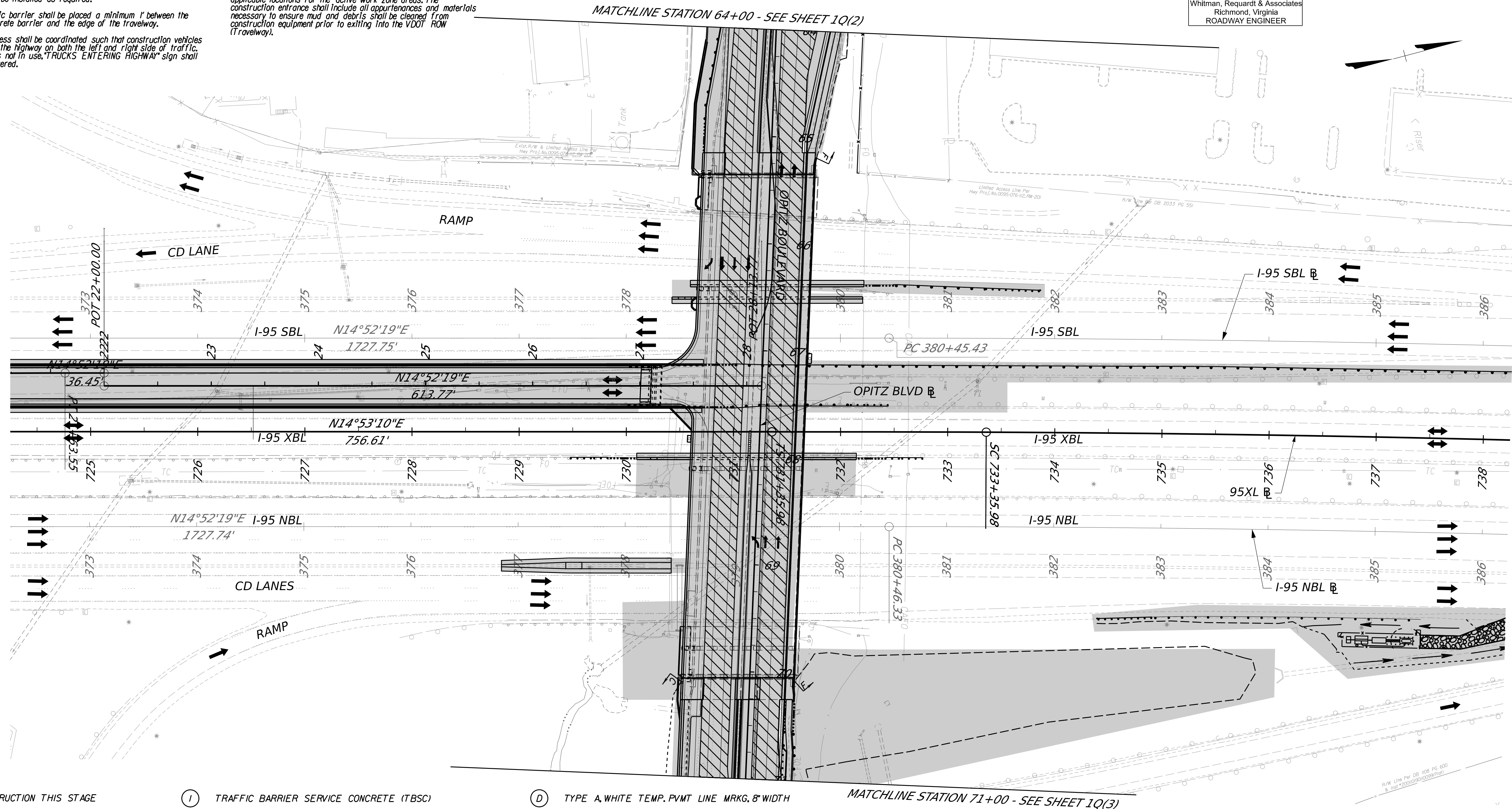
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	10(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

- NOTES:
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 - Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
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- Existing drainage shall be maintained within the staging areas, if existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
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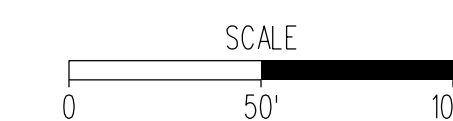


LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8' WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6' WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6' WIDTH | ◁ | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8' WIDTH | ◇ | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | ▨ | TYPE III BARRICADE |

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT: 0095-076-299
 SHEET NO: 10(1)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 4

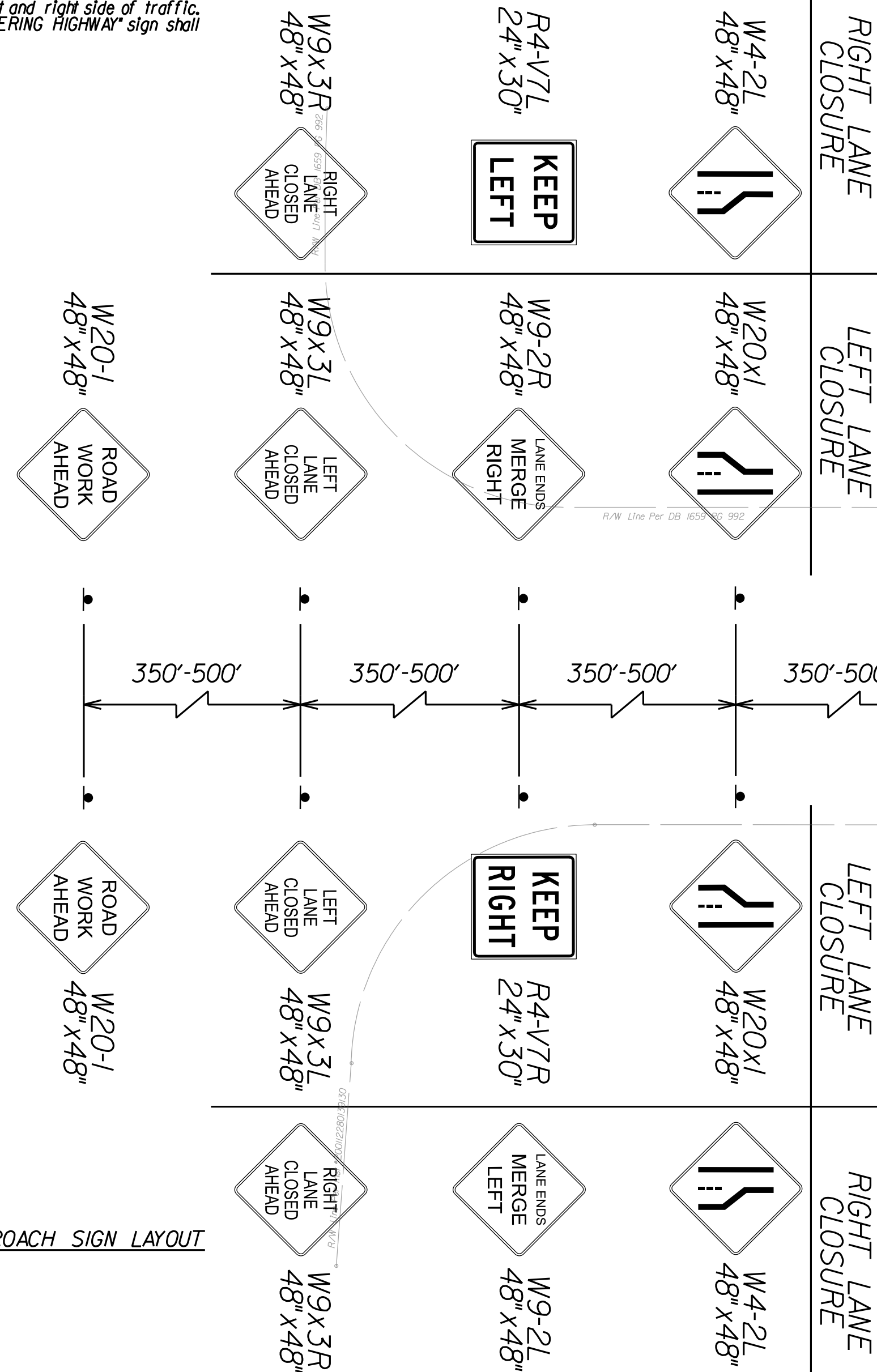
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	10(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

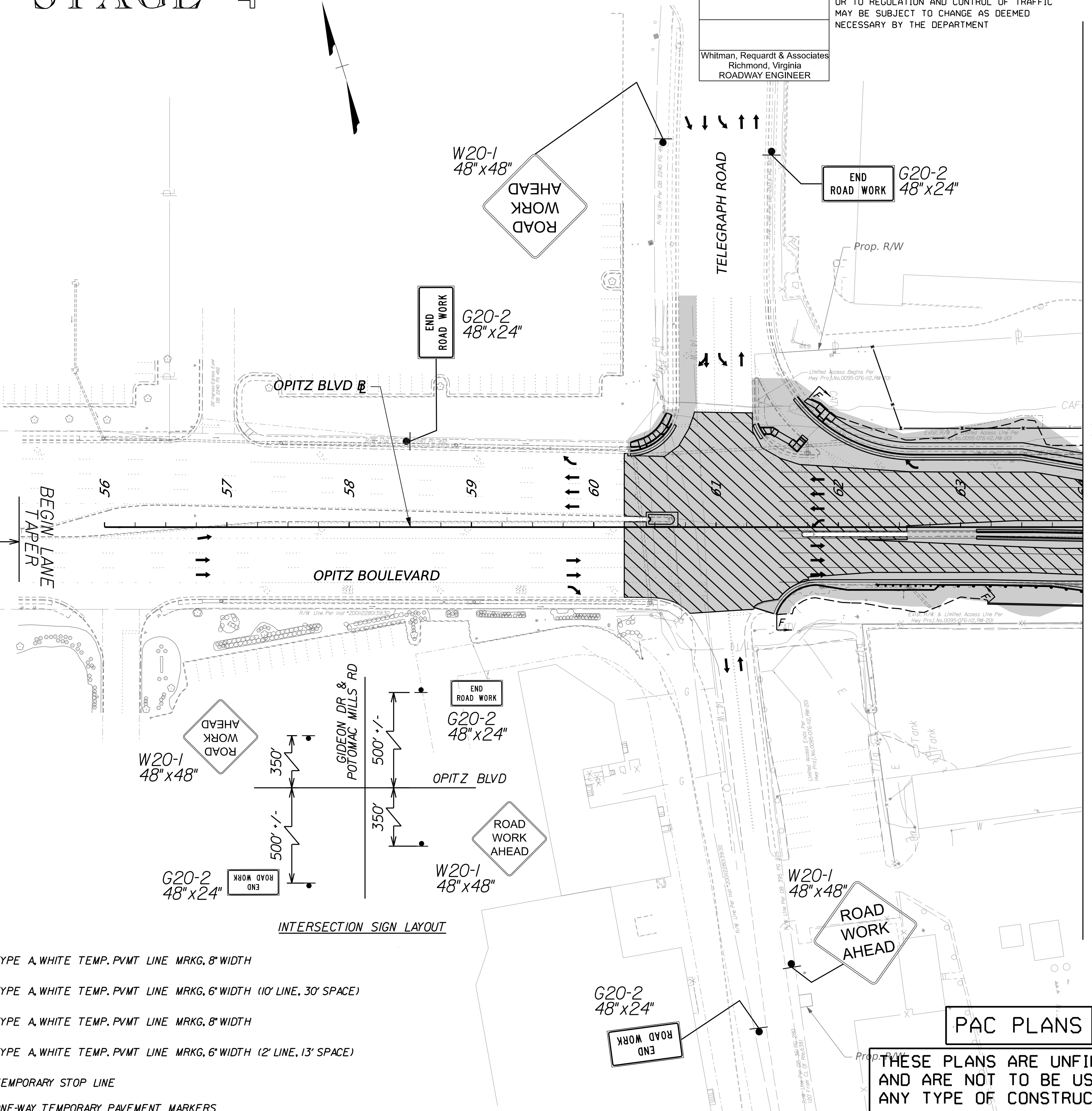
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NOTES:

- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
- All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
- Temporary traffic barrier shall be terminated per VWAPM Section 6F-3F and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
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- Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, TRUCKS ENTERING HIGHWAY sign shall be completely covered.
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- The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
- Construction entrances shall be in conformance with EC-11 at all applicable locations for the "active" work zone areas. The construction entrance shall include all opportunities and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).



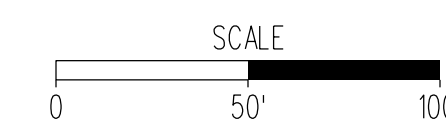
TYPICAL APPROACH SIGN LAYOUT



INTERSECTION SIGN LAYOUT

LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTN. SERVICE TY.1 | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |



PAC PLANS
 THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

MATCHLINE STATION 64+00 - SEE SHEET 10(1)

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

TEMPORARY TRAFFIC CONTROL PLANS

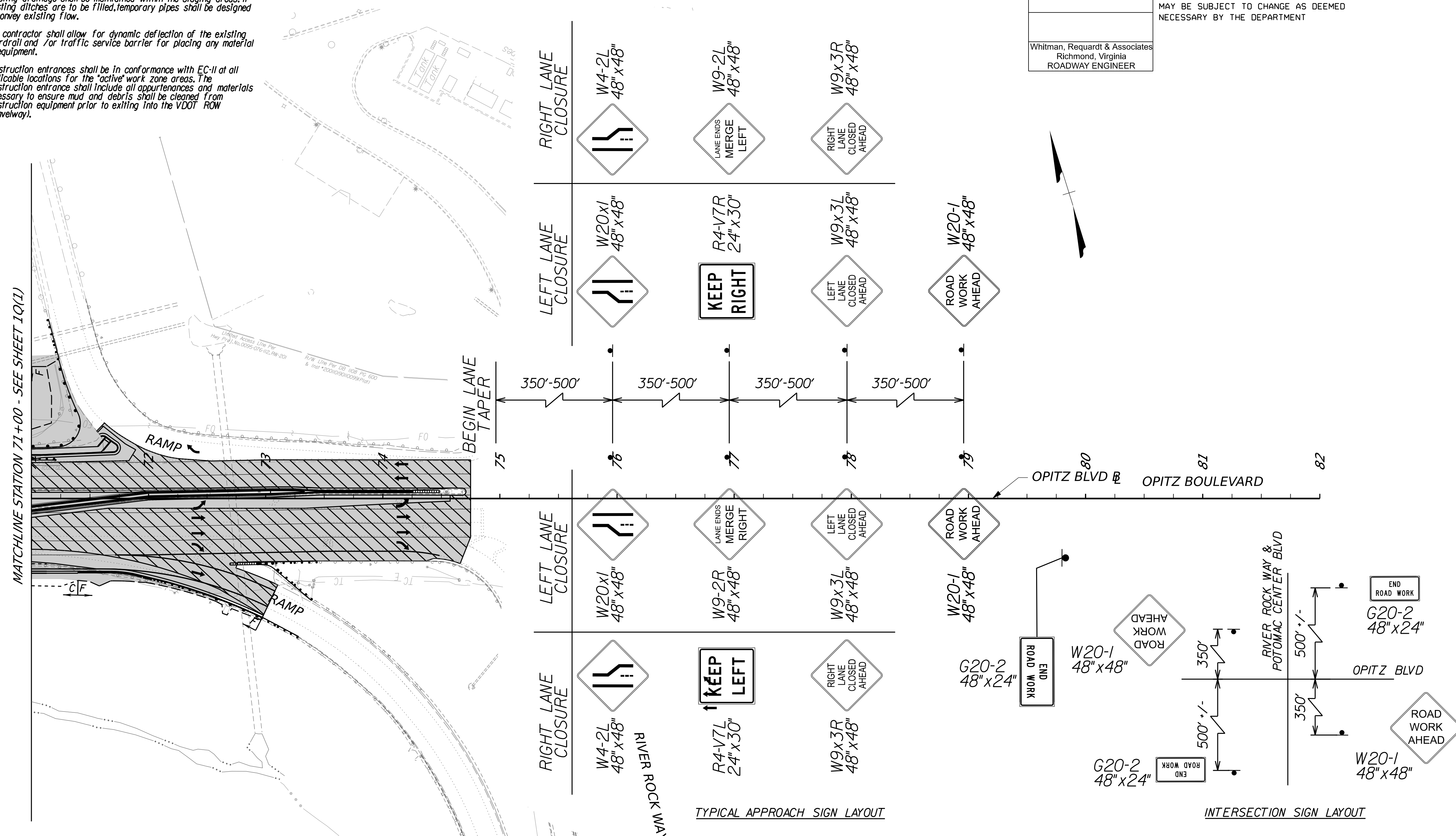
STAGE 4

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	10(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

- NOTES:**
- Group 2 channelizing devices shall be installed per Table 6F-2 of the Virginia Work Area Protection Manual.
 - All temporary traffic barrier shall be installed utilizing either single or double faced barrier as indicated on typical sections or as otherwise noted in plans.
 - Temporary traffic barrier shall be terminated per VWAPM Section 6F.37 and Appendix A. Appropriate blunt end protection, such as attenuators, shall be installed as required.
 - Temporary traffic barrier shall be placed a minimum 1' between the face of the concrete barrier and the edge of the travelway.
 - Construction egress shall be coordinated such that construction vehicles are not entering the highway on both the left and right side of traffic. When entrance is not in use, "TRUCKS ENTERING HIGHWAY" sign shall be completely covered.
 - Existing drainage shall be maintained within the staging areas. If existing ditches are to be filled, temporary pipes shall be designed to convey existing flow.
 - The contractor shall allow for dynamic deflection of the existing guardrail and /or traffic service barrier for placing any material or equipment.
 - Construction entrances shall be in conformance with EC-II at all applicable locations for the "active" work zone areas. The construction entrance shall include all appurtenances and materials necessary to ensure mud and debris shall be cleaned from construction equipment prior to exiting into the VDOT ROW (Travelway).



LEGEND

- | | | | | | |
|--|-----------------------------|-----|---|-----|--|
| | CONSTRUCTION THIS STAGE | (1) | TRAFFIC BARRIER SERVICE CONCRETE (TBSC) | (D) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | CONSTRUCTION PREVIOUS STAGE | (2) | GROUP 2 CHANNELIZING DEVICES | (E) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (10' LINE, 30' SPACE) |
| | SHOULDER STRENGTHENING | (3) | IMPACT ATTEN. SERVICE TY. I | (F) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 8" WIDTH |
| | TEMPORARY PAVEMENT | (4) | FIXED OBJECT ATTACHMENT (TEMPORARY) | (G) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH (2' LINE, 13' SPACE) |
| | TRAFFIC DIRECTION | (A) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 6" WIDTH | (H) | TEMPORARY STOP LINE |
| | | (B) | TYPE A, WHITE TEMP. PVMT LINE MRKG, 6" WIDTH | | ONE-WAY TEMPORARY PAVEMENT MARKERS |
| | | (C) | TYPE A, YELLOW TEMP. PVMT LINE MRKG, 8" WIDTH | | TWO-WAY TEMPORARY PAVEMENT MARKERS |
| | | | | | TYPE III BARRICADE |



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
0095-076-299	10(3)

PROJECT MANAGER *Ritupal Shah, P.E., (703) 259-2362, (NOVA District) -----*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC, (804) 330-3281, 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP, (804) 272-8700 -----*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc., (804) 550-7140, 07/07/2021*

GENERAL NOTES

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

GRADING

- G-1 The grade line denotes top of finished pavement unless shown otherwise on typical sections or plans.
- G-3 Earthwork quantities on this project are based on anticipated settlement and may require adjusting during construction. Payment will be made only for quantities actually moved.
- G-4 The cost of removal of all existing concrete items located in the area to be graded, including, but not limited to the following, shall be included in the price bid for regular excavation: concrete curb and gutter, concrete ditches, pipes, headwalls and end sections.
- G-6 The borrow material for this project shall be a minimum CBR 5 or as approved by the Materials Engineer.
- G-7 Material from regular excavation which is suitable for stabilization with hydraulic cement (lime) shall be placed in the top portion of the subgrade.

DRAINAGE

- D-1 The horizontal location of all drainage structures shown on these plans is approximate only, with the exception of structures showing specific stations, special design bridges and storm sewer systems.
- D-2 The horizontal location and invert elevations shown for proposed culverts and storm sewer outfall pipes are based on existing survey data and required design criteria. If during construction, it is found that the horizontal location or invert elevations shown on the plans differ significantly from the horizontal location or elevations of the stream or swale in which the culvert or storm sewer outfall pipe is to be placed, the Engineer shall confer with, and get approval from, the applicable District Drainage Engineer before installing the culvert or storm sewer outfall pipe.
- D-3 The "H" dimensions shown on plans for drop inlets and junction boxes and the "L.F." dimensions shown for manholes are for estimating purposes and are based on the proposed invert elevations shown for the structure and the anticipated top (rim) elevation based on existing or proposed finished grade. The actual "H" or "L.F." dimensions are to be determined by the contractor from field conditions.
- D-6 Pipes shall conform to any of the allowable types shown on sheet number 14(2), within the applicable height of cover limitations. For strength, sheet thickness, or class designation; available sizes; height of cover limitations; and other restrictions for a particular pipe type or height of cover, see the VDOT Road and Bridge Standard PC-1. Structural plate pipe may be substituted for corrugated pipe of the same size, provided the substitution complies with the applicable sections of the VDOT Road and Bridge Standards PC-1.
- D-10 The proposed riprap may be omitted by the Engineer if the slope designated for placement of riprap is found to be comprised of solid rock or closely consolidated boulders with soundness, size and weight equal to, or exceeding, the specifications for the proposed riprap.
- D-12 All existing drainage facilities labeled "To Be Abandoned" shall be left in place, backfilled and plugged in accordance with the VDOT Road and Bridge Standard PP-1. Basis of Payment will be C.Y. of Flowable Backfill.
- D-14 Proposed drop inlets with a height (H) less than the standard minimum shown in the VDOT Road and Bridge Standards shall be considered and paid for as Standard Drop Inlets for the type specified. Pipes with less than standard minimum finished height of cover shall be noted as such in the drainage description for the pipe. Specific pipe bedding and cover requirements are provided in the applicable PB-1 and PC-1 standard drawings of the VDOT Road and Bridge Standards.
- D-16 When CG-6 or CG-7 is specified on a radius (such as at a street intersection), the Engineer may approve a decrease in the cross slope of the gutter to facilitate proper drainage.
- D-17 St'd. SL-1 Safety Slab locations are based on the assumed use of precast structures. If cast-in-place structures are utilized, and the interior chamber dimensions (length and width, or diameter) are less than 4 feet, the safety slabs shall not be installed.
- D-A In addition to the visual inspection performed by the Department during the initial installation of storm sewer pipes and pipe culverts, a post installation visual/video camera inspection shall be conducted by the Contractor in accordance with the requirements of this specification and VTM 123 on all storm sewer pipe and a selected number of pipe culverts.

PAVEMENT

- P-2 The pavement materials on this project will be paid for on a tonnage basis. The weight will vary in accordance with the specific gravity of the aggregates and the asphaltic content of the mix actually used to secure the design depth. The weight of the asphalt concrete is based on 95% of the theoretical maximum density.

INCIDENTALS

- I-4 All trees located within a minimum of 30 feet of the edge of pavement, within the limits of the right of way or construction easement, unless otherwise noted on plans or directed by the Engineer, shall be removed, as provided for a Section 301 of the applicable VDOT Road and Bridge Specifications.
- I-9 When no centerline alignment is shown for a proposed entrance, the entrance shall be constructed in the same location as the existing entrance.
- I-16 The "underground utilities" survey data on this project has been provided by consultant and copies are available from the Department.
- I-18 All pavement markings and traffic flow arrows shown on the roadway construction plans are schematic only. The actual location and application of pavement markings shall be in accordance with Section 704 of the applicable VDOT Road and Bridge Specifications, MUTCD, sequence of construction/traffic control plans and as directed by the Engineer.
- I-19 The following sources, under contract with VDOT, have provided information on this project:
 - Hydraulic Design - Whitman Requardt & Associates
 - Roadway Design - Whitman Requardt & Associates
 - Traffic Design - Whitman Requardt & Associates
 - Survey - H&B Surveying & Mapping LLC
 - MOT - Whitman Requardt & Associates

If questions or problems arise during construction, please contact the Area Construction Engineer. DO NOT CONTACT THE OUTSIDE SOURCES.

- I-20 The Official Electronic PDF Version of the plans will override the paper copies or prints of specific layers.

Portions of this plan assembly have been CADD generated. To assist in the preparation of the bid and construction of the project, MicroStation format (.dgn) files will be made available to the prime contractor during bids and after award of the contract.

- I-21 All electronic plan assemblies will include the construction plans in two formats: .pdf files and MicroStation format (.dgn) files. Only the .pdf files will be considered as part of the official plan assembly.

The MicroStation format (.dgn) files are furnished only as information for the contractor. These plans are developed in layers (levels) to aid in readability. (See the VDOT CADD Manual for CADD level structure). However, the construction items may or may not be in the proper layering scheme as described in the VDOT CADD Manual. The MicroStation files will only match the scanned files if all required levels are turned on. A MicroStation Software license is required to be able to read these files.

STORMWATER MANAGEMENT

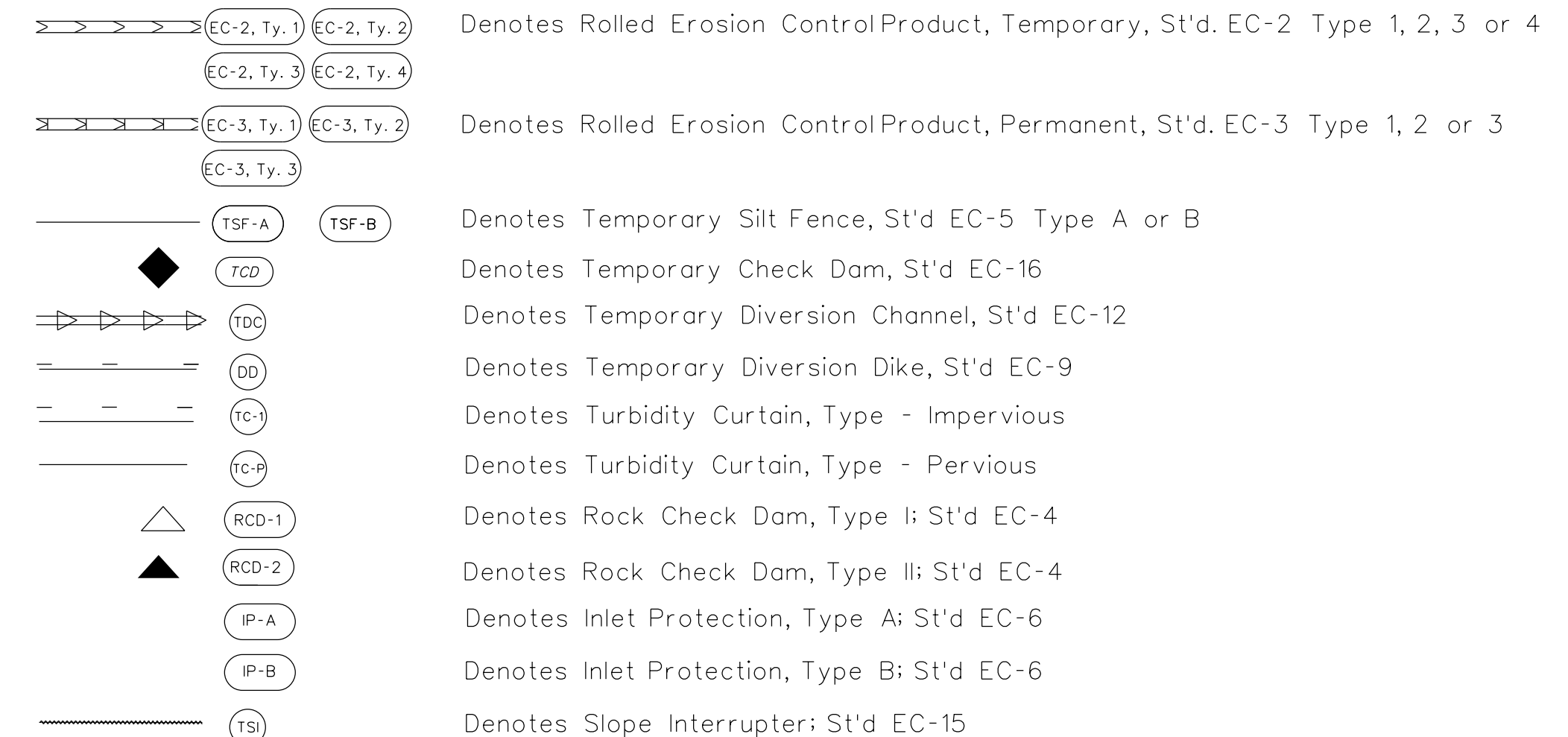
- S-1 CLEARING AND GRUBBING OF SWM BASIN SITE - The area where the dam is to be constructed and the area upstream of the dam, to an elevation equal to the crest of the dam (maximum ponded water elevation), shall be cleared and grubbed in accordance with Section 301 of the applicable VDOT Road and Bridge Specifications.
- S-2 SWM BASIN DAM CONSTRUCTION - The dam for detention basins (no permanent pool) shall conform to the details contained in the plans and shall be constructed in accordance with Section 303 of the applicable VDOT Road and Bridge Specifications. The native material on which the dam will set shall meet the specifications for AASHTO Type A-4 or finer material. Where the native material does not meet this requirement, the area beneath the dam is to be excavated a minimum of 4' and backfilled with a material meeting the AASHTO Type A-4 or finer classification unless otherwise specified in the plans. The material used for the embankment of the dam shall be AASHTO Type A-4 or finer or otherwise specified in the plans. Dams with foundation and embankment material not meeting the above requirements or dams greater than 15' in height, or dams for retention basins (permanent pool) shall incorporate a membrane-lined trench, a homogenous embankment with seepage controls, a zoned embankment or other such approved designs as specified in the plans.
- S-3 SWM BASIN OUTLET PIPE - The pipe culvert under or through the dam for detention basins (no permanent pool) shall be reinforced concrete pipe with rubber gaskets in accordance with Section 232 and 212 of the applicable VDOT Road and Bridge Specifications.

The connection between the pipe culvert and the SWM-1 Drainage Structure (or other control structure) shall be made watertight as approved by the Engineer and the cost shall be included in the price bid for pipe.

- S-4 The SWM-1 Drainage Structure (or other control structure) shall have 4" high numbers and 1" wide stripes painted at 1' intervals as shown on the Standard Drawings or detail sheets. The numbers and stripes are to be installed at the time of the initial installation of the SWM-1 Drainage Structure (or other control structure). Paint and application shall be in accordance with Section 231 and 411 of the applicable VDOT Road and Bridge Specifications and the cost is to be included in the price bid for the applicable structure.
- S-5 All SWM Basins designated for use as temporary sediment basins shall be constructed during the initial phase of earth moving activities or as specified by the plans or directed by the Engineer. During project construction, the SWM-1 Drainage Structure (or other control structure) shall be modified in accordance with the Standard Drawings or plan details in order to provide a temporary sediment basin with both a "wet" storage volume (permanent pool) and a "dry" storage volume. Sediment accumulated in the basin shall be removed when the volume of the "wet" storage (permanent pool) has been reduced by 50%. Sediment shall be disposed of in accordance with Section 106.04 of the applicable VDOT Road and Bridge Specifications. When project construction is complete to a stage where no additional sediment from the project is expected to enter the basin, as determined by the Engineer, the basin shall be cleaned out and restored to the original design elevations, the area stabilized and all temporary modifications to the SWM-1 Drainage Structure (or other control structure) removed.

EROSION AND SEDIMENT CONTROL (ESC)

- E-1 If the removal of Brush Silt Barrier is specified by the plans or required by the Engineer, the cost of removal and disposal of brush shall be in accordance with Section 109 of the applicable VDOT Road and Bridge Specifications.
- E-2 Rock for Check Dams, Inlet Protection, Erosion Control Stone and Riprap shall be in accordance with Section 203 and Section 414 of the applicable VDOT Road and Bridge Specifications.
- E-3 The following symbols are used to depict Erosion Control items in the plan assembly:



- E-4 Permanent vegetation shall be established on all denuded areas not otherwise stabilized with non-erodible materials. See the Roadside Development Sheet for details on permanent vegetation establishment.

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	2

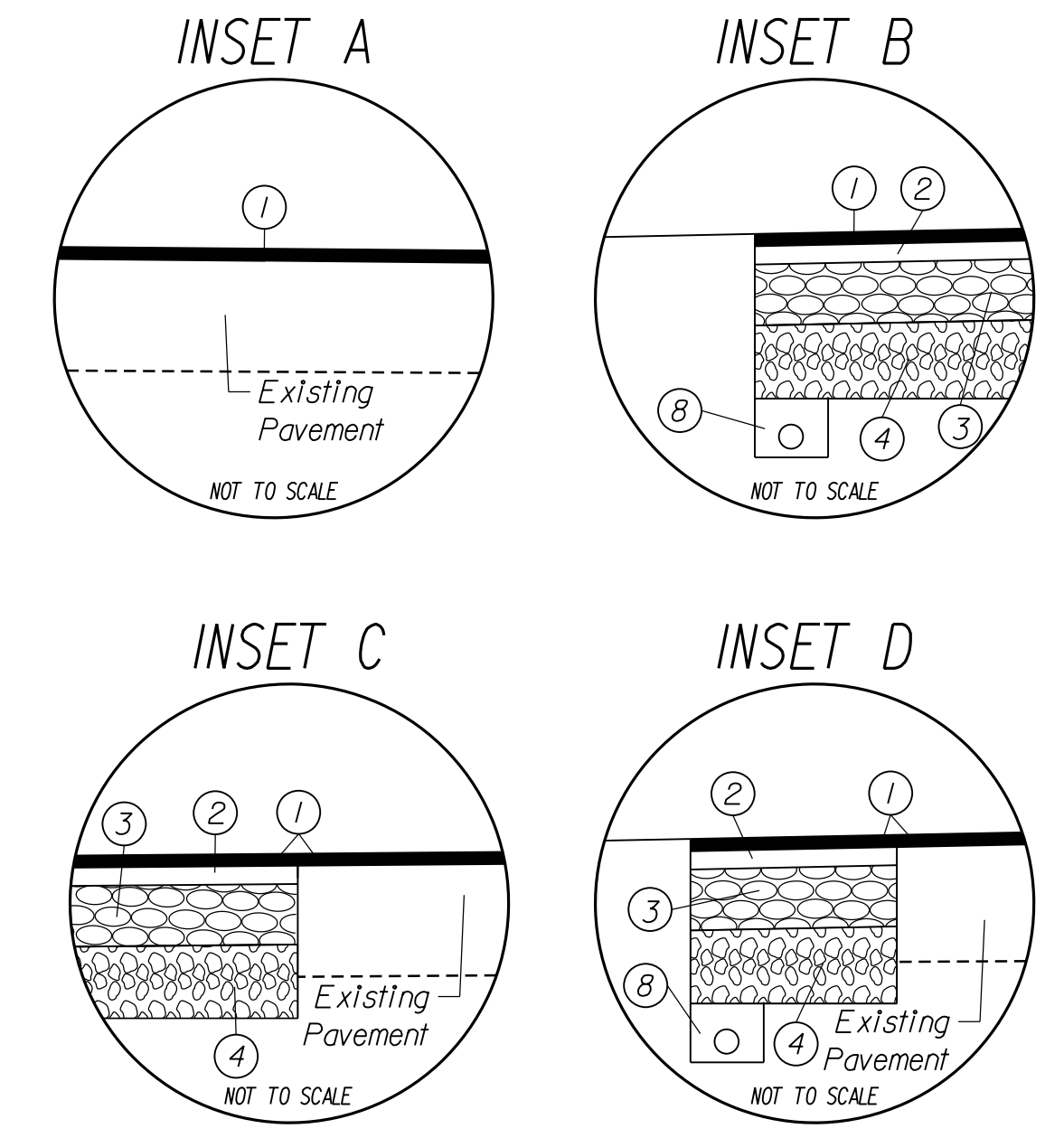
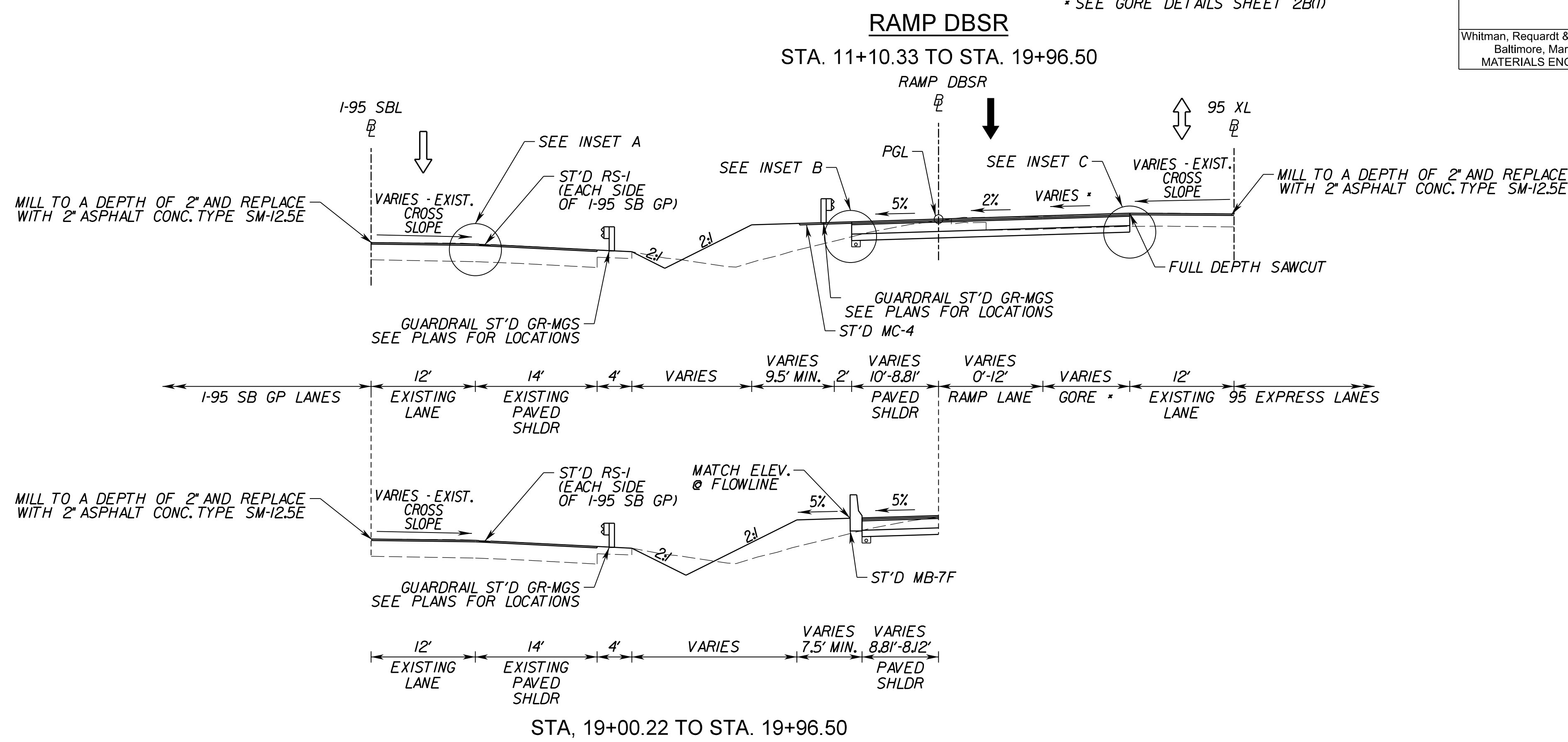
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates Baltimore, Maryland MATERIALS ENGINEER	Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER
---	--



- Pavement Legend*
- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
 - ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
 - ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
 - ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
 - ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
 - ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
 - ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Optiz Blvd. widening on the high side of exist. pavement, 6\" 21B will be replaced with 6\" CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
 - ⑧ ST'D UD-4 Underdrain
 - ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
 - ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
 - ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

- NOTES:**
1. MEDIAN BARRIER SHALL BE ST'D MB-7E WHERE DISTANCE BETWEEN BACK OF BARRIERS IS LESS THAN OR EQUAL TO 8'. MEDIAN BARRIER SHALL BE ST'D MB-7F WHERE DISTANCE BETWEEN BACK OF BARRIERS IS GREATER THAN 8'. AND WILL HAVE 4\" CONCRETE CAP (2% MIN SLOPE, 50% MAX SLOPE). AREA BETWEEN BARRIERS SHALL BE BACKFILLED WITH COARSE AGGREGATE BACKFILL PER ST'D MB-7E AND GRADED TO DRAIN. CAP SHALL INCLUDE * 5X8\" DOWELLS @ 30\" C-C PER ST'D MB-7E.
 2. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.
 3. EXISTING UD-4 WITHIN WIDENING AREA SHALL BE DEMOLISHED AND REPLACED.

* SEE GORE DETAILS SHEET 2B(1)
 ** 14' to 12' SHOULDER, STA. 321+41.54 TO STA. 322+35.79 ON SHEET 5. SEE PLANS FOR ADDITIONAL INFORMATION.

PAC PLANS

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NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(1)
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PROJECT MANAGER: *Rampal Shah, P.E.* (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
 DESIGN BY: *Whitman, Requardt & Associates, LLP* (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc.* (804) 550-7740, 07/07/2021

TYPICAL SECTIONS

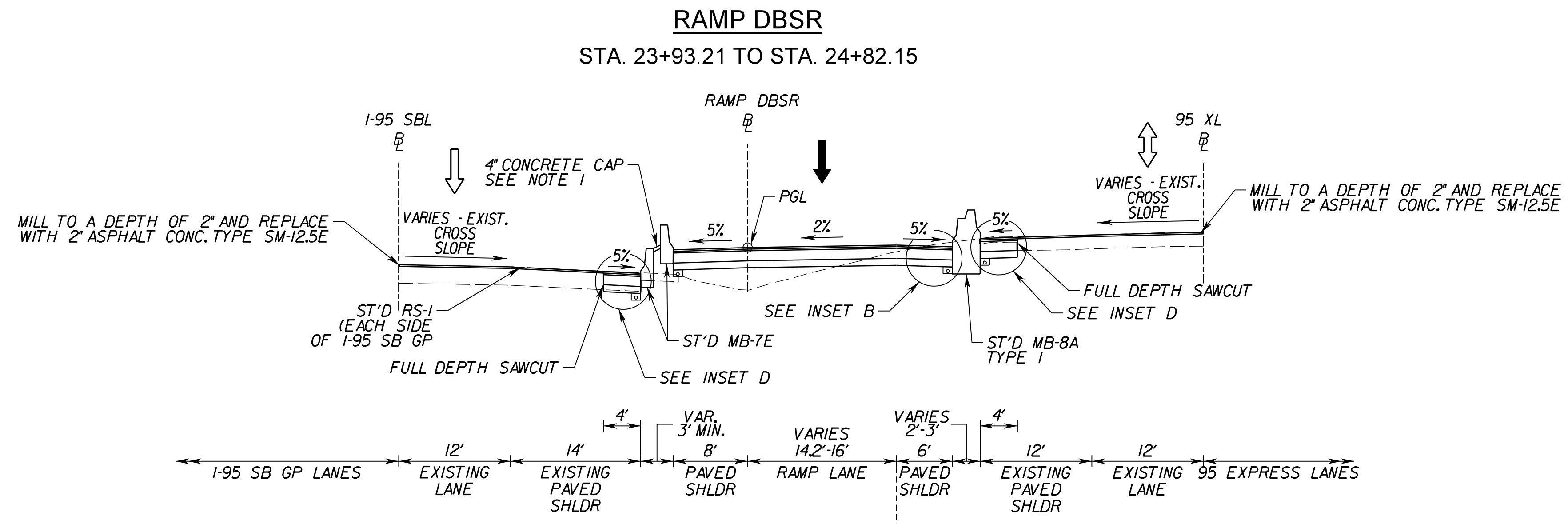
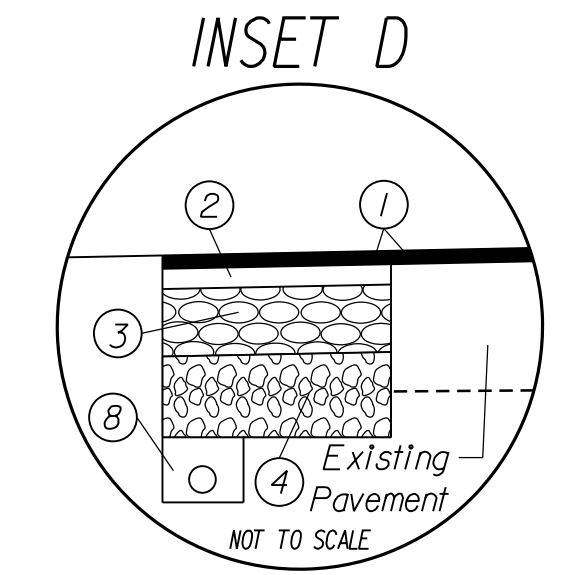
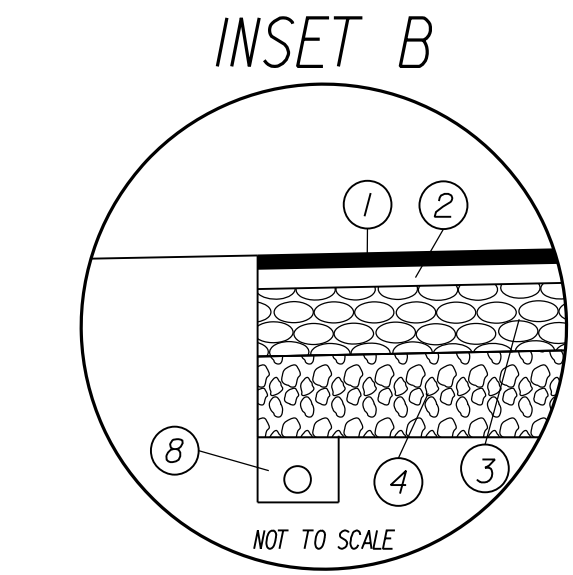
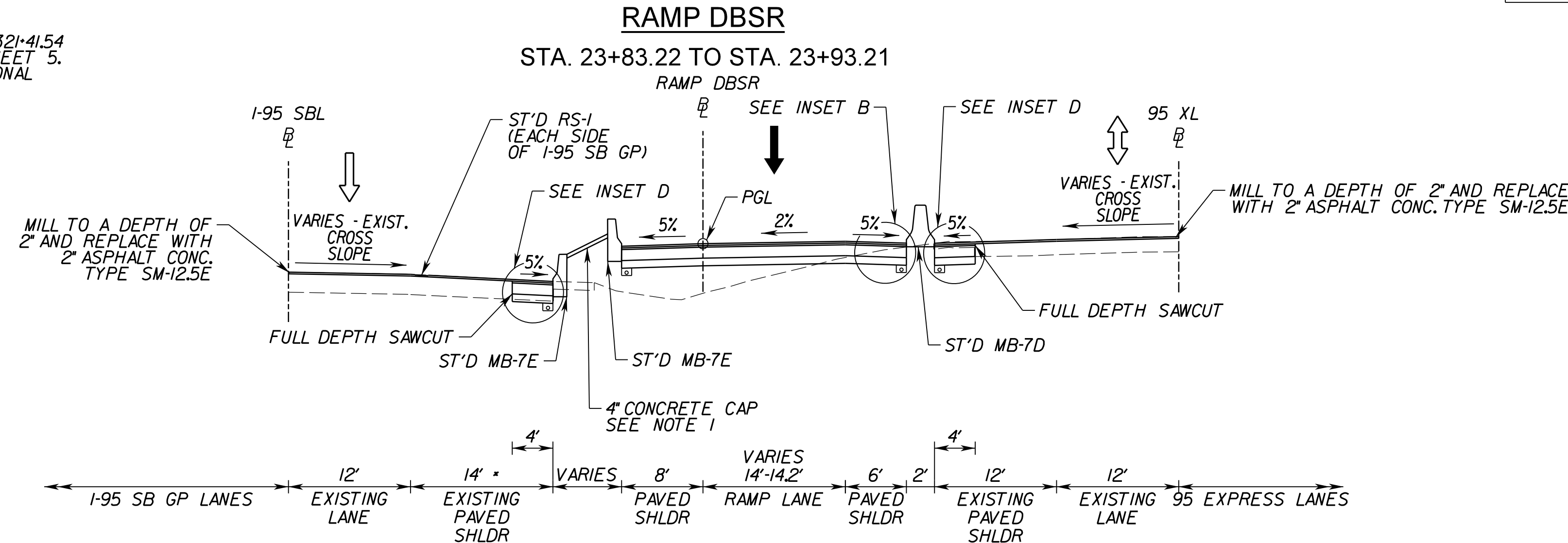
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2A(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 MATERIALS ENGINEER

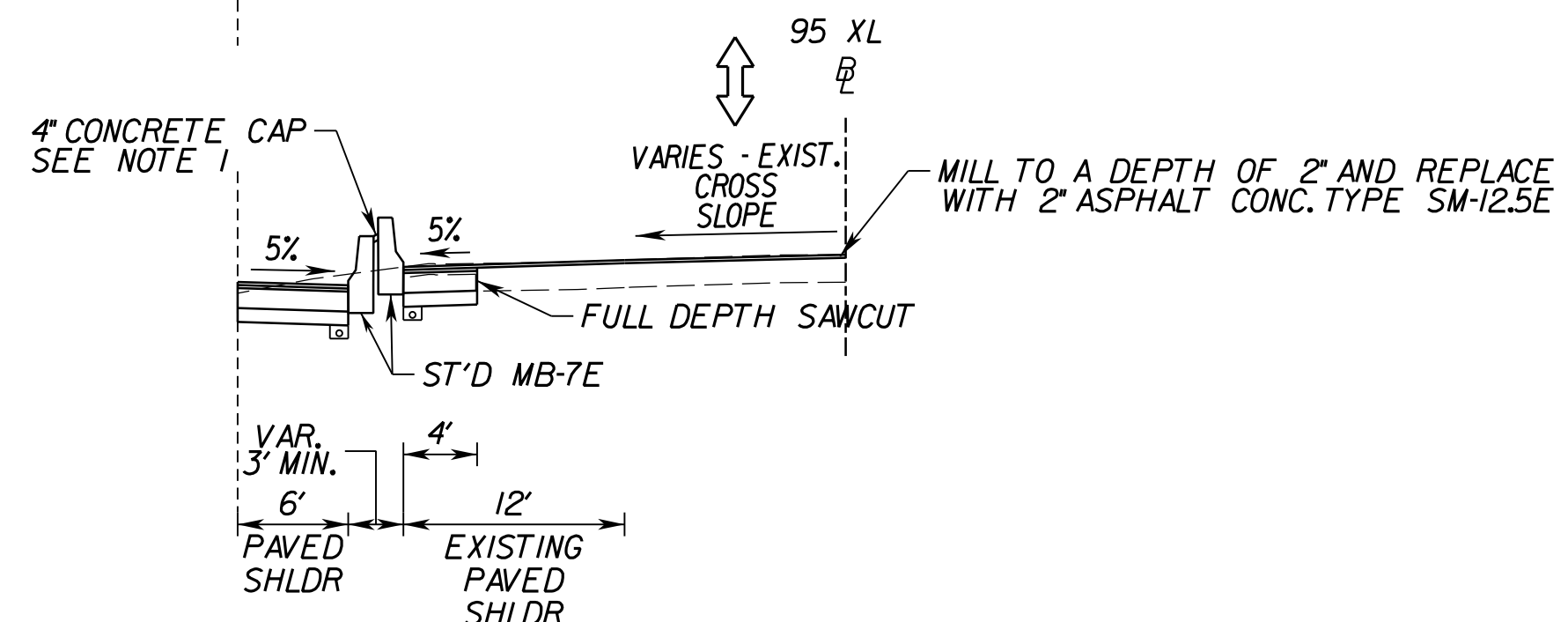
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

* 14' to 12' SHOULDER, STA. 321+41.54 TO STA. 322+35.79 ON SHEET 5. SEE PLANS FOR ADDITIONAL INFORMATION.



- Pavement Legend**
- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
 - ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
 - ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
 - ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
 - ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
 - ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
 - ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Optiz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.)
 - ⑧ ST'D UD-4 Underdrain
 - ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
 - ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
 - ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

- NOTES:**
- MEDIAN BARRIER SHALL BE ST'D MB-7E WHERE DISTANCE BETWEEN BACK OF BARRIERS IS LESS THAN OR EQUAL TO 8'. MEDIAN BARRIER SHALL BE ST'D MB-7F WHERE DISTANCE BETWEEN BACK OF BARRIERS IS GREATER THAN 8'. AND WILL HAVE 4" CONCRETE CAP (2% MIN SLOPE, 50% MAX SLOPE). AREA BETWEEN BARRIERS SHALL BE BACKFILLED WITH COARSE AGGREGATE BACKFILL PER ST'D MB-7E AND GRADED TO DRAIN. CAP SHALL INCLUDE * 5X8" DOWELLS @ 30" C-C PER ST'D MB-7E.
 - PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.
 - EXISTING UD-4 WITHIN WIDENING AREA SHALL BE DEMOLISHED AND REPLACED.



STA. 24+82.15 TO STA. 25+46.05

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(2)
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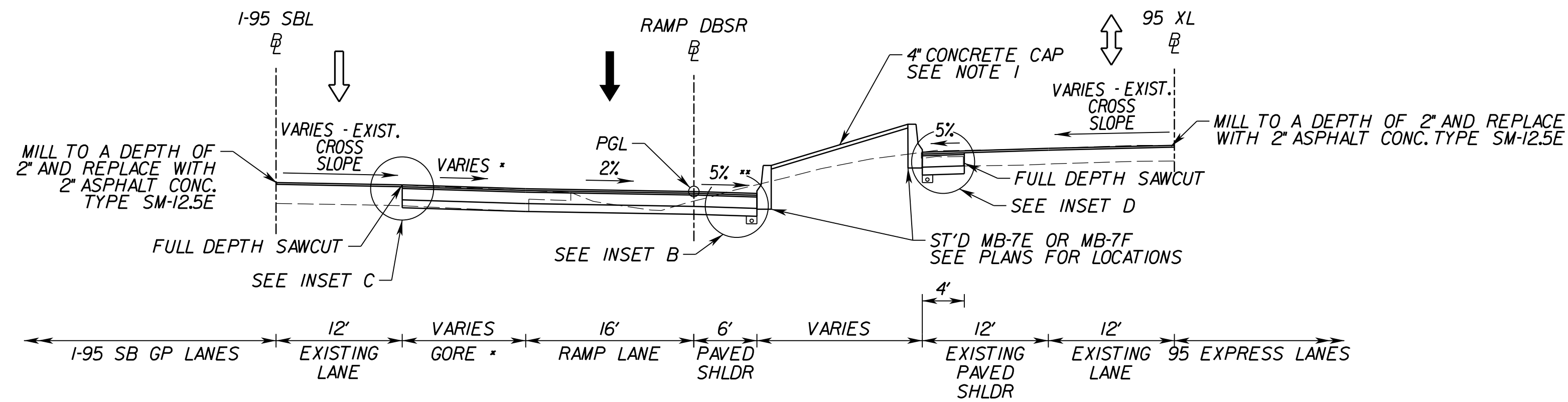
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(4)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Baltimore, Maryland MATERIALS ENGINEER		Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER		

RAMP DBSR

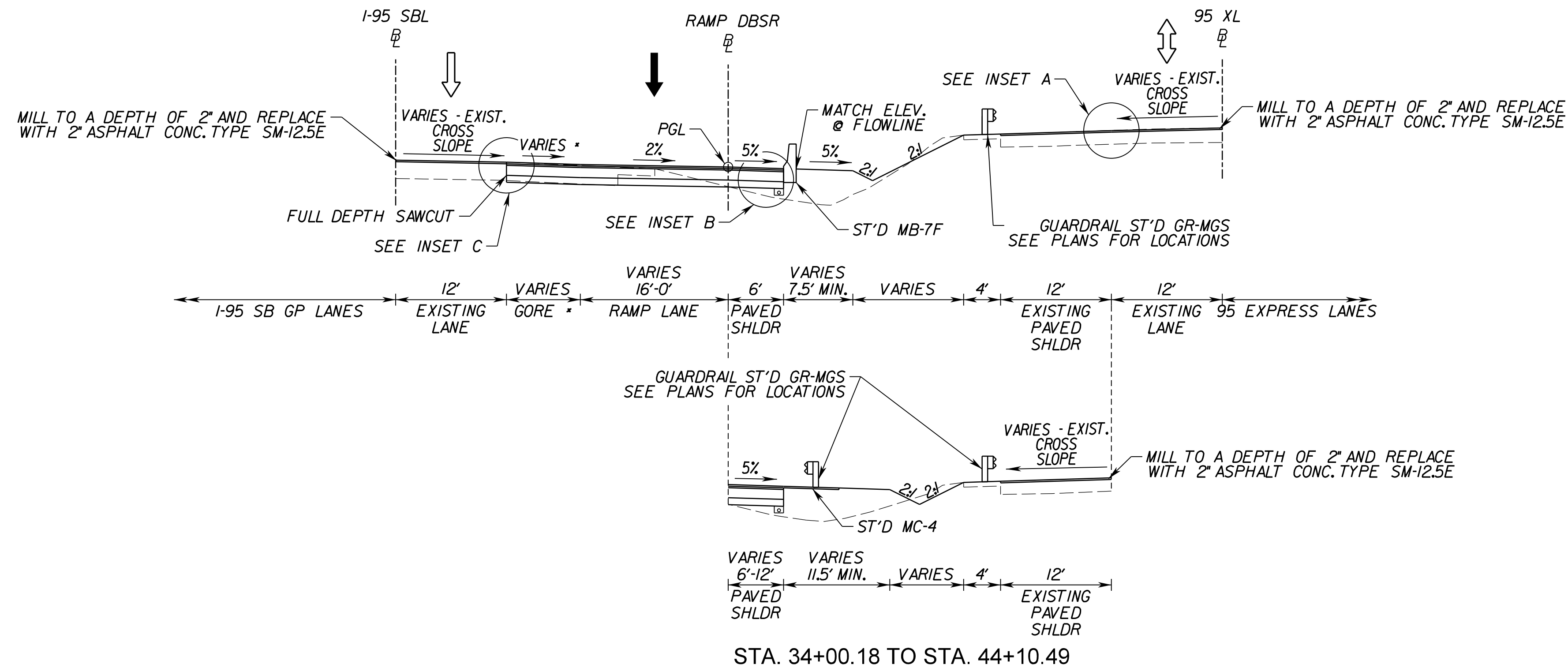
STA. 26+87.50 TO STA. 33+58.97



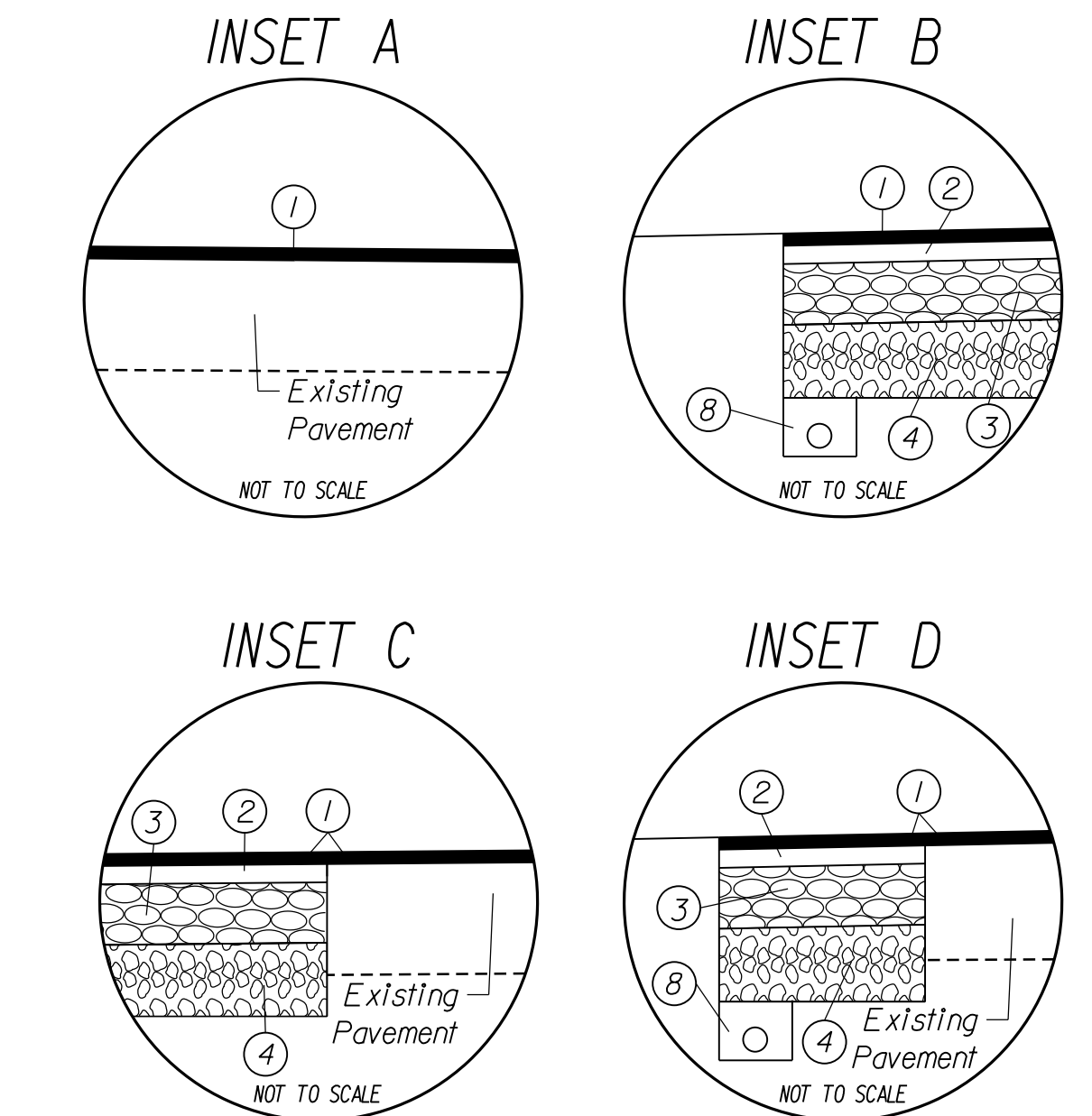
- * SEE SHEET 2B(2-3) FOR GORE DETAILS
- ** SEE SHEET 5A FOR SHOULDER TRANSITION

RAMP DBSR

STA. 33+58.97 TO STA. 34+00.18



- * SEE SHEET 2B(2-3) FOR GORE DETAILS



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
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- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Optiz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.)
- ⑧ ST'D UD-4 Underdrain
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1. MEDIAN BARRIER SHALL BE ST'D MB-7E WHERE DISTANCE BETWEEN BACK OF BARRIERS IS LESS THAN OR EQUAL TO 8'. MEDIAN BARRIER SHALL BE ST'D MB-7F WHERE DISTANCE BETWEEN BACK OF BARRIERS IS GREATER THAN 8'. AND WILL HAVE 4" CONCRETE CAP (2% MIN SLOPE, 50% MAX SLOPE). AREA BETWEEN BARRIERS SHALL BE BACKFILLED WITH COARSE AGGREGATE BACKFILL PER ST'D MB-7E AND GRADED TO DRAIN. CAP SHALL INCLUDE * 5X8" DOWELS @ 30" C-C PER ST'D MB-7E.
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3. EXISTING UD-4 WITHIN WIDENING AREA SHALL BE DEMOLISHED AND REPLACED.

PAC PLANS

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NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(4)
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PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

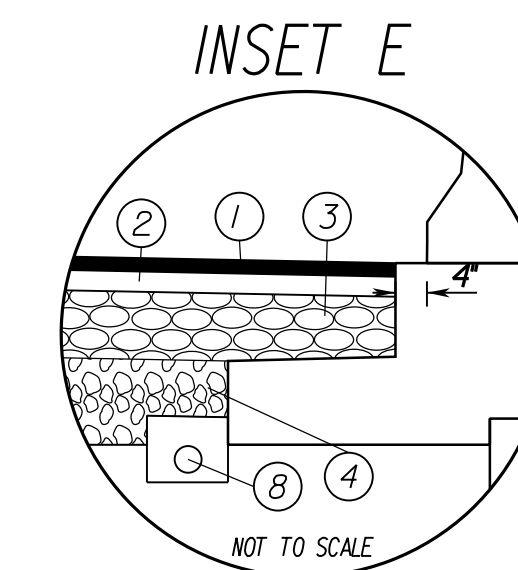
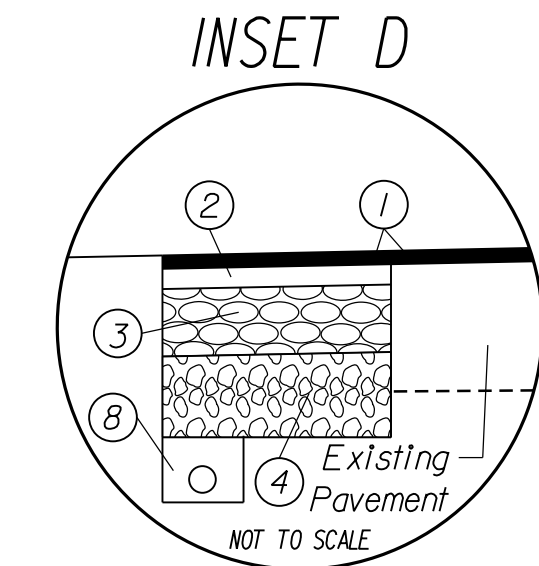
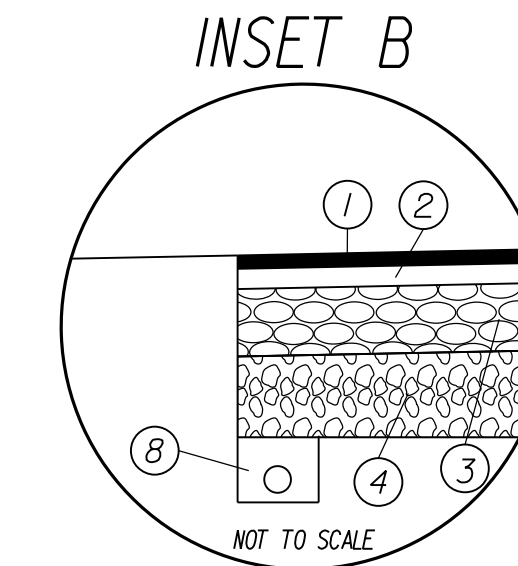
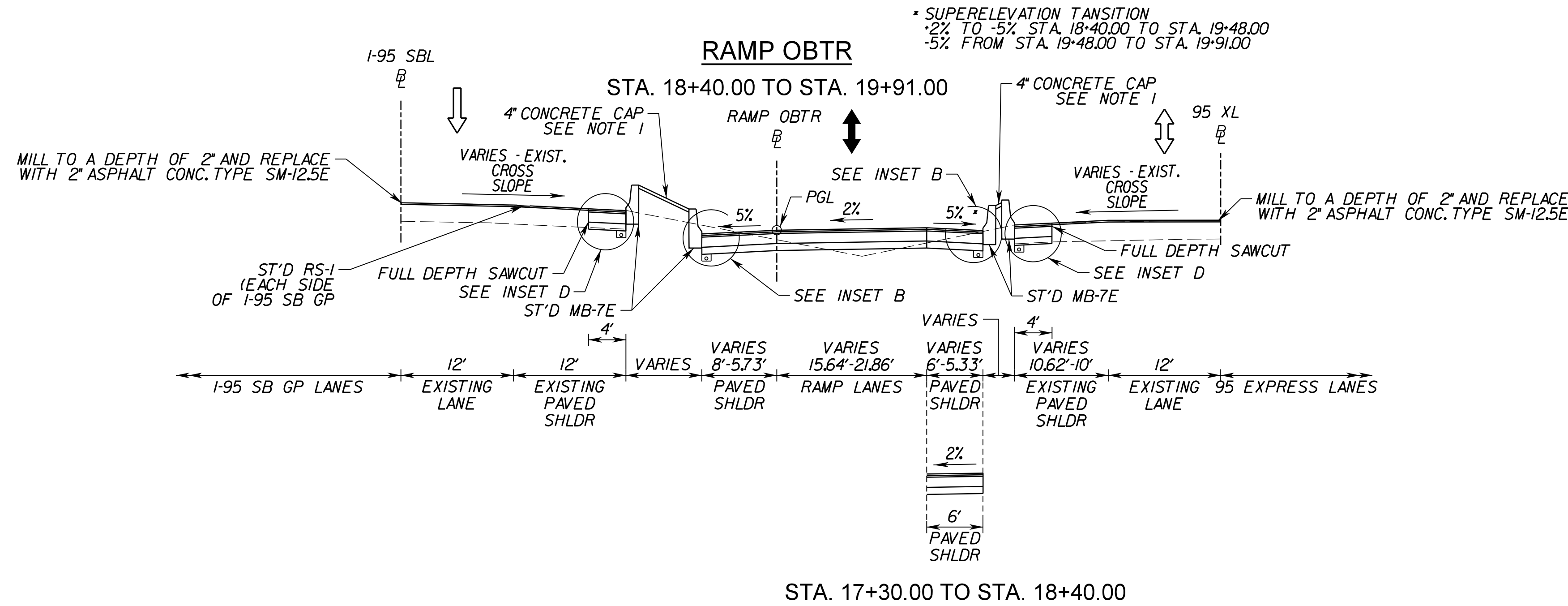
TYPICAL SECTIONS

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2A(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 MATERIALS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
- ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
- ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Optiz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.)
- ⑧ ST'D UD-4 Underdrain
- ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
- ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
- ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

- NOTES:
- MEDIAN BARRIER SHALL BE ST'D MB-7E WHERE DISTANCE BETWEEN BACK OF BARRIERS IS LESS THAN OR EQUAL TO 8'. MEDIAN BARRIER SHALL BE ST'D MB-7F WHERE DISTANCE BETWEEN BACK OF BARRIERS IS GREATER THAN 8'. AND WILL HAVE 4" CONCRETE CAP (2% MIN SLOPE, 50% MAX SLOPE). AREA BETWEEN BARRIERS SHALL BE BACKFILLED WITH COARSE AGGREGATE BACKFILL PER ST'D MB-7E AND GRADED TO DRAIN. CAP SHALL INCLUDE * 5X8" DOWELLS @ 30" C-C PER ST'D MB-7E.
 - PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.
 - EXISTING UD-4 WITHIN WIDENING AREA SHALL BE DEMOLISHED AND REPLACED.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(5)
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PROJECT MANAGER: Rimpal Shah, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

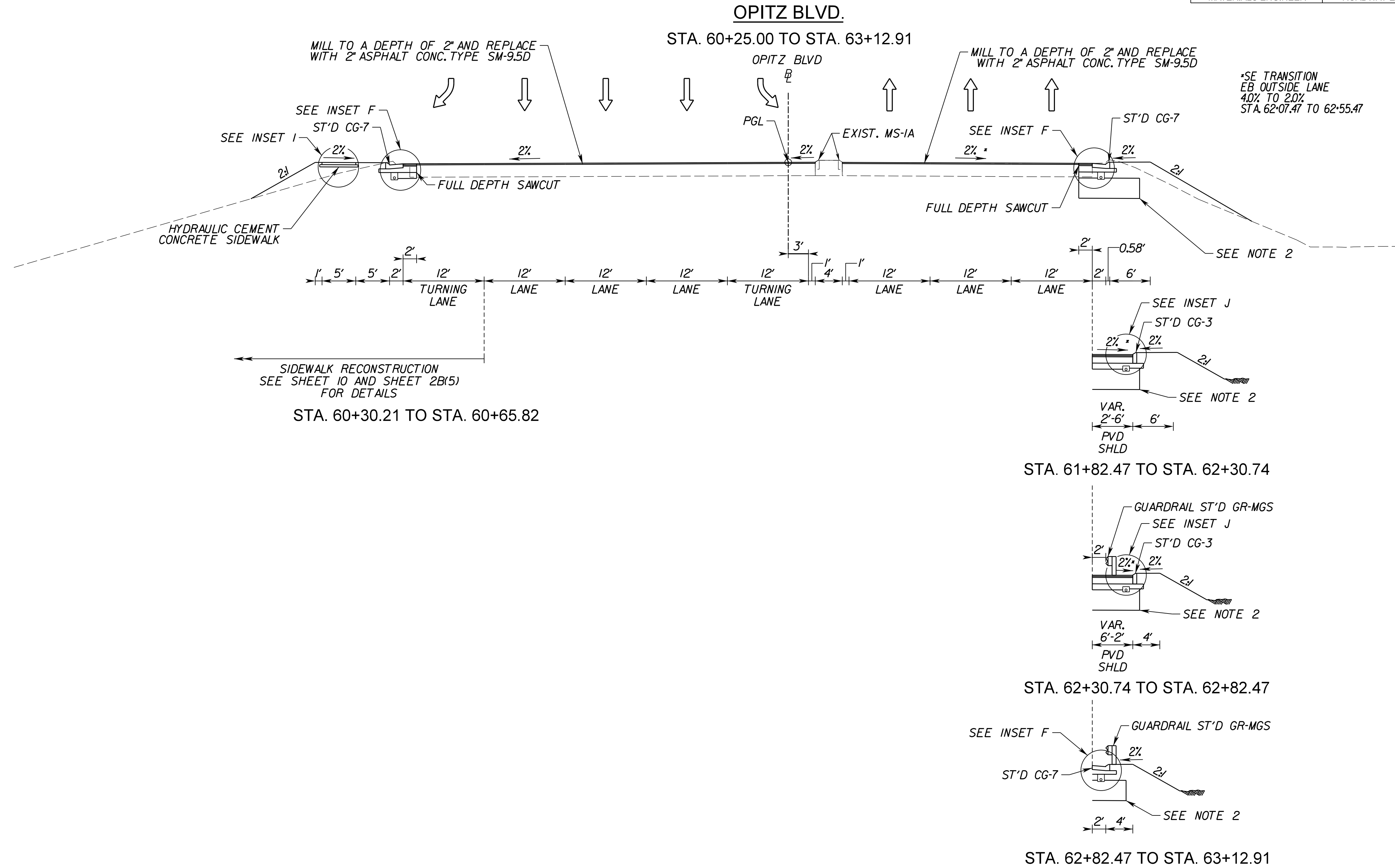
TYPICAL SECTIONS

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2A(7)

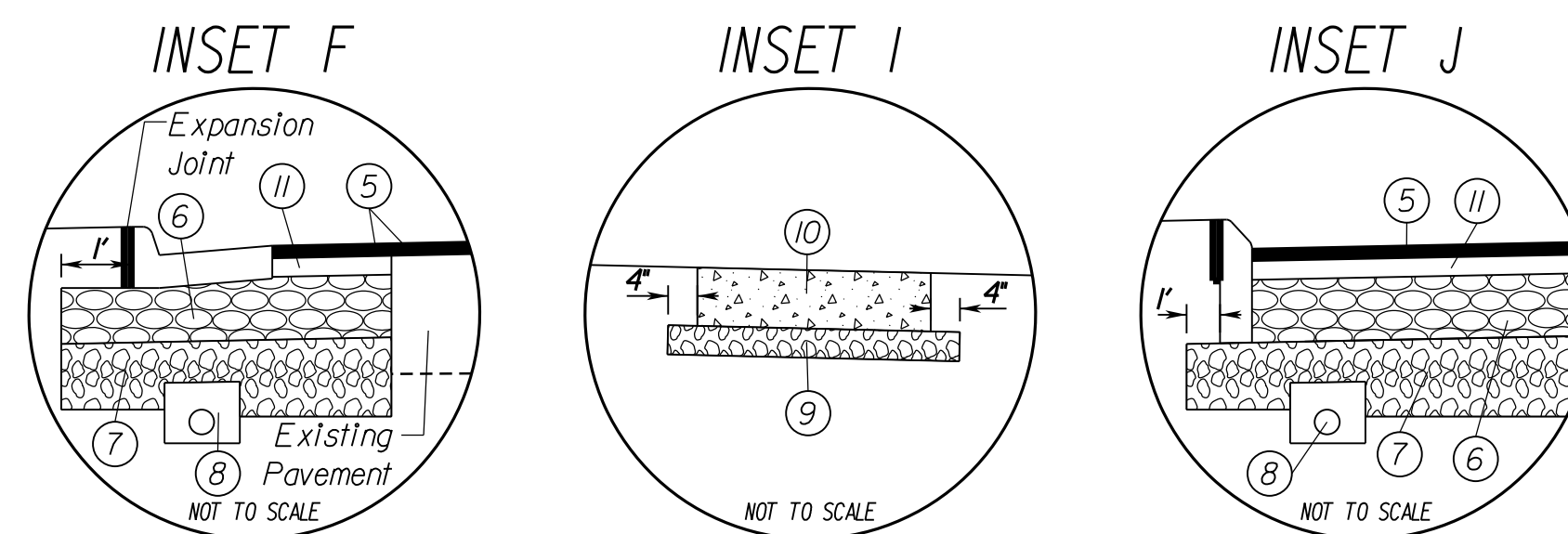
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 MATERIALS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



- Pavement Legend
- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
 - ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
 - ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
 - ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
 - ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
 - ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
 - ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
 - ⑧ ST'D UD-4 Underdrain
 - ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
 - ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
 - ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth



- NOTES:
1. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.
 2. UNDERCUT UNSUITABLE CH MATERIAL TO A DEPTH OF 3' AND REPLACE WITH A SELECT ICBR 30 MATERIAL SEE TABLE 10.5 IN GEOTECH REPORT FOR MORE DETAILS.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(7)
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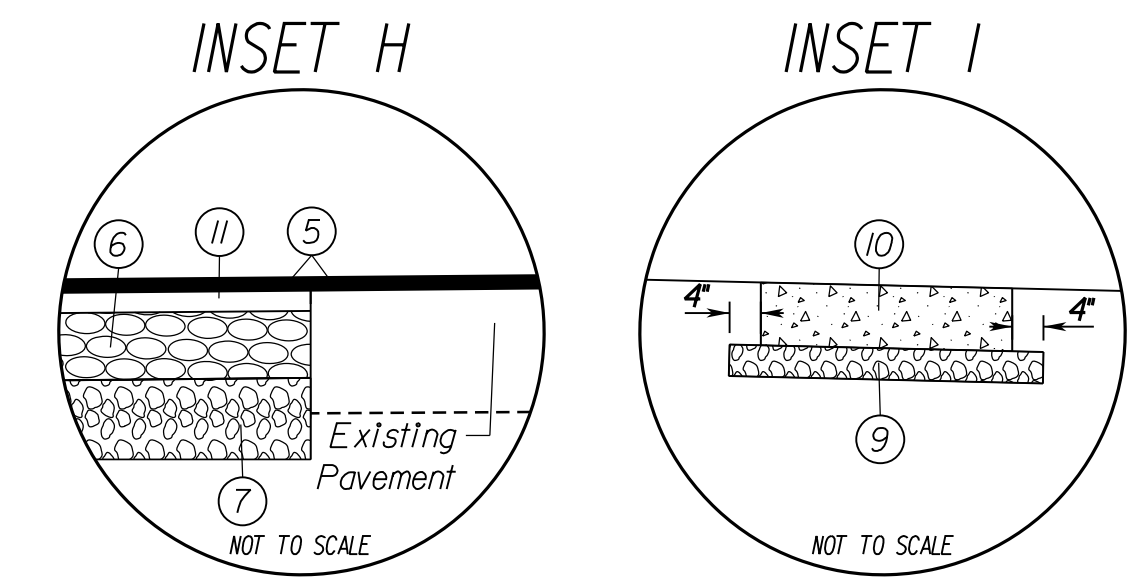
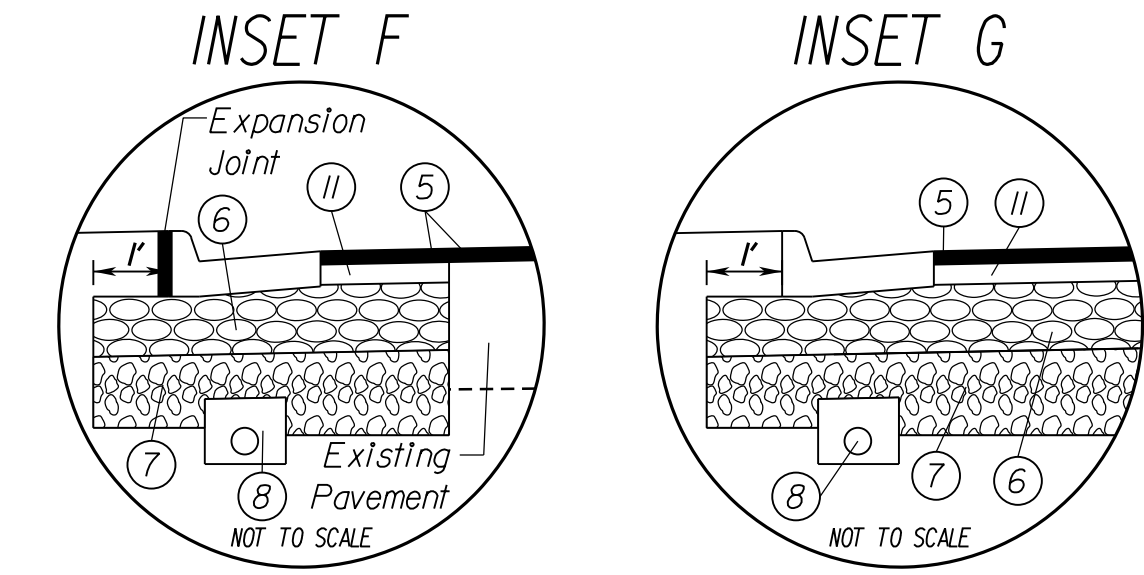
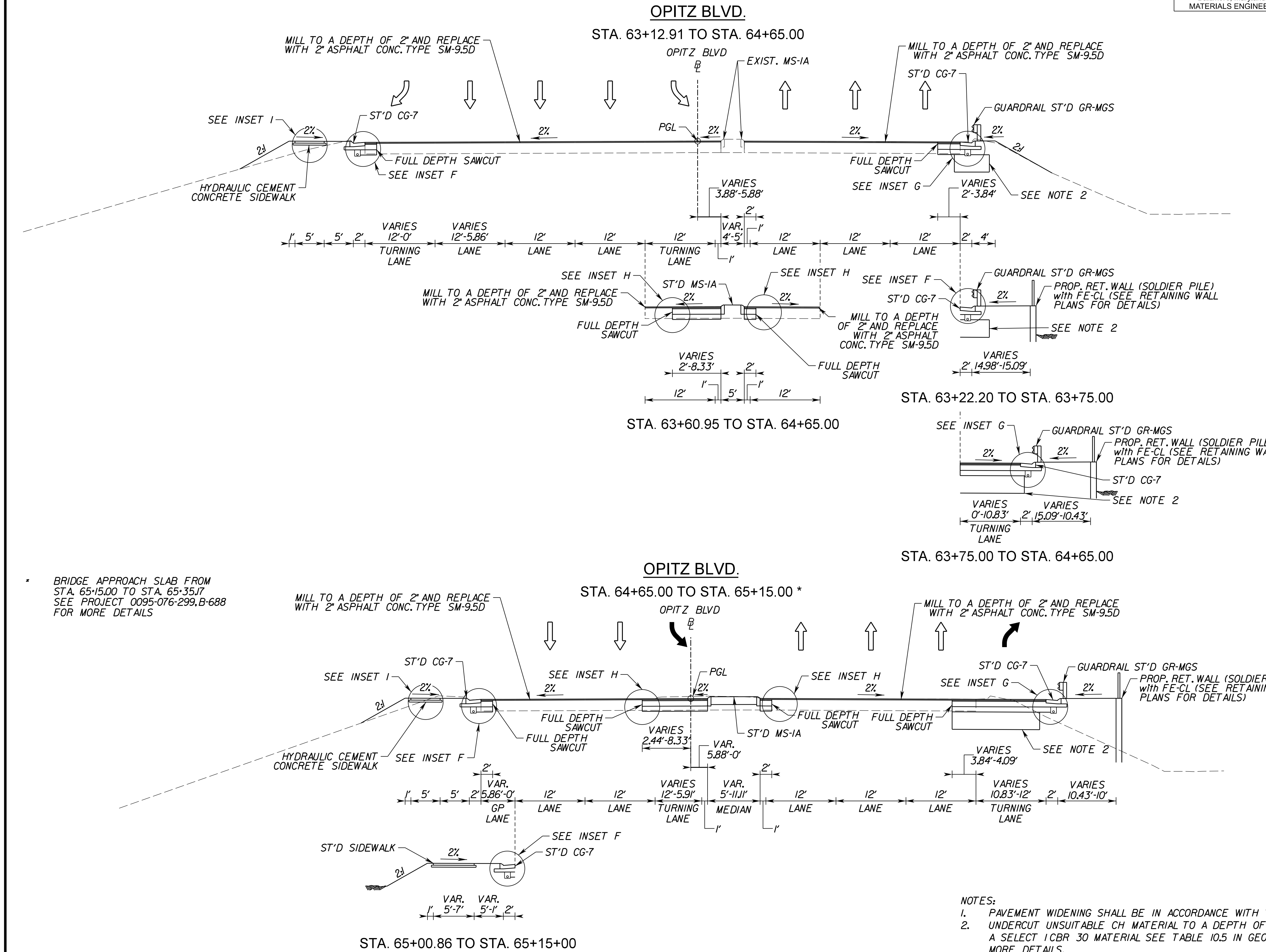
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140, 07/07/2021*

TYPICAL SECTIONS

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2A(8)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates Baltimore, Maryland MATERIALS ENGINEER	Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER
--	---



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
- ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
- ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
- ⑧ ST'D UD-4 Underdrain
- ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
- ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
- ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

- NOTES:
- PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.
 - UNDERCUT UNSUITABLE CH MATERIAL TO A DEPTH OF 3' AND REPLACE WITH A SELECT ICBR 30 MATERIAL SEE TABLE 10.5 IN GEOTECH REPORT FOR MORE DETAILS.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(8)
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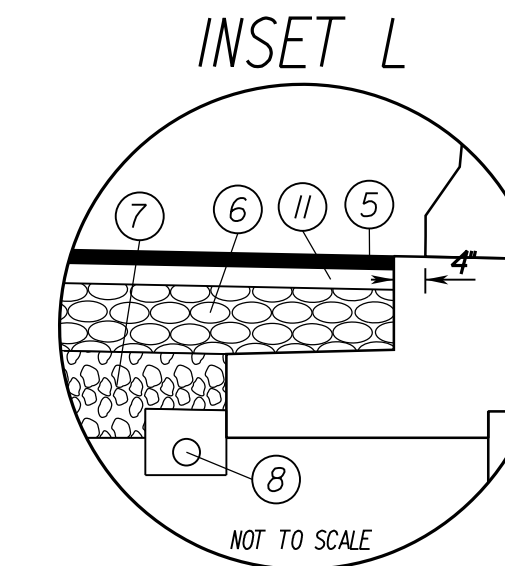
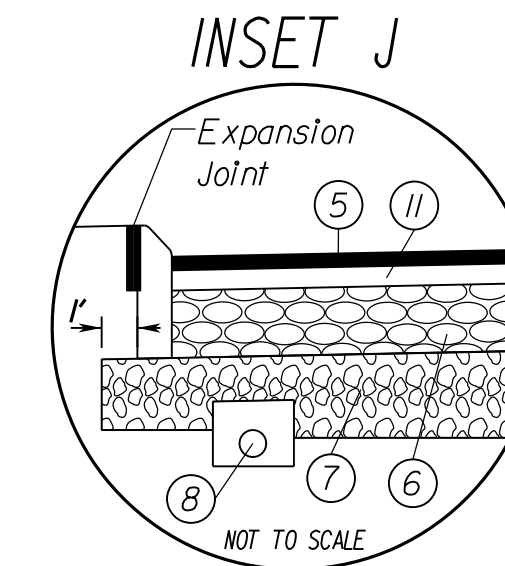
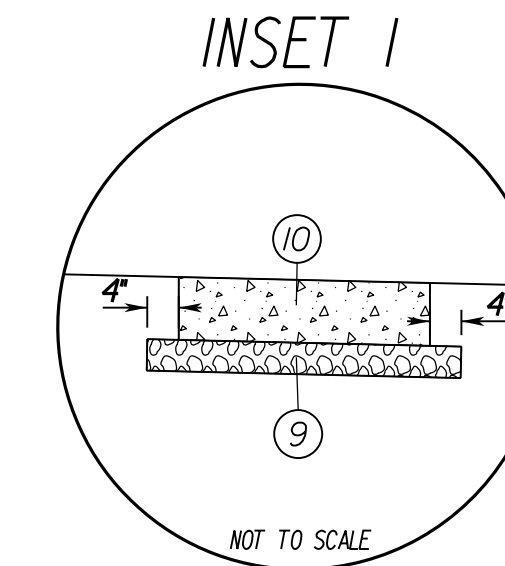
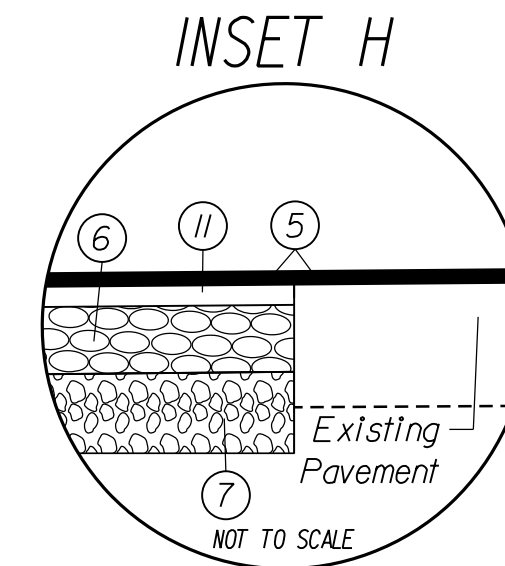
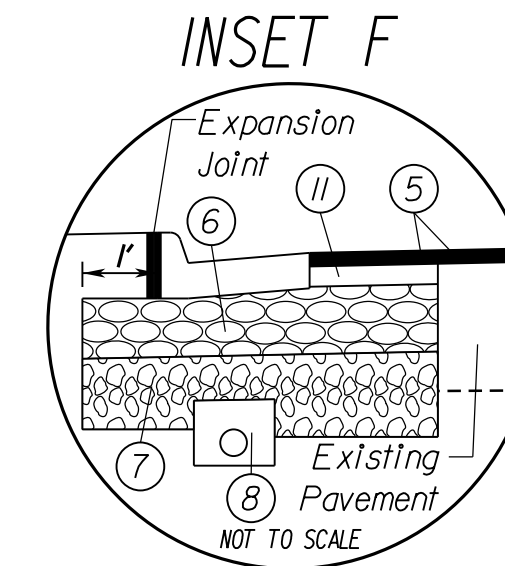
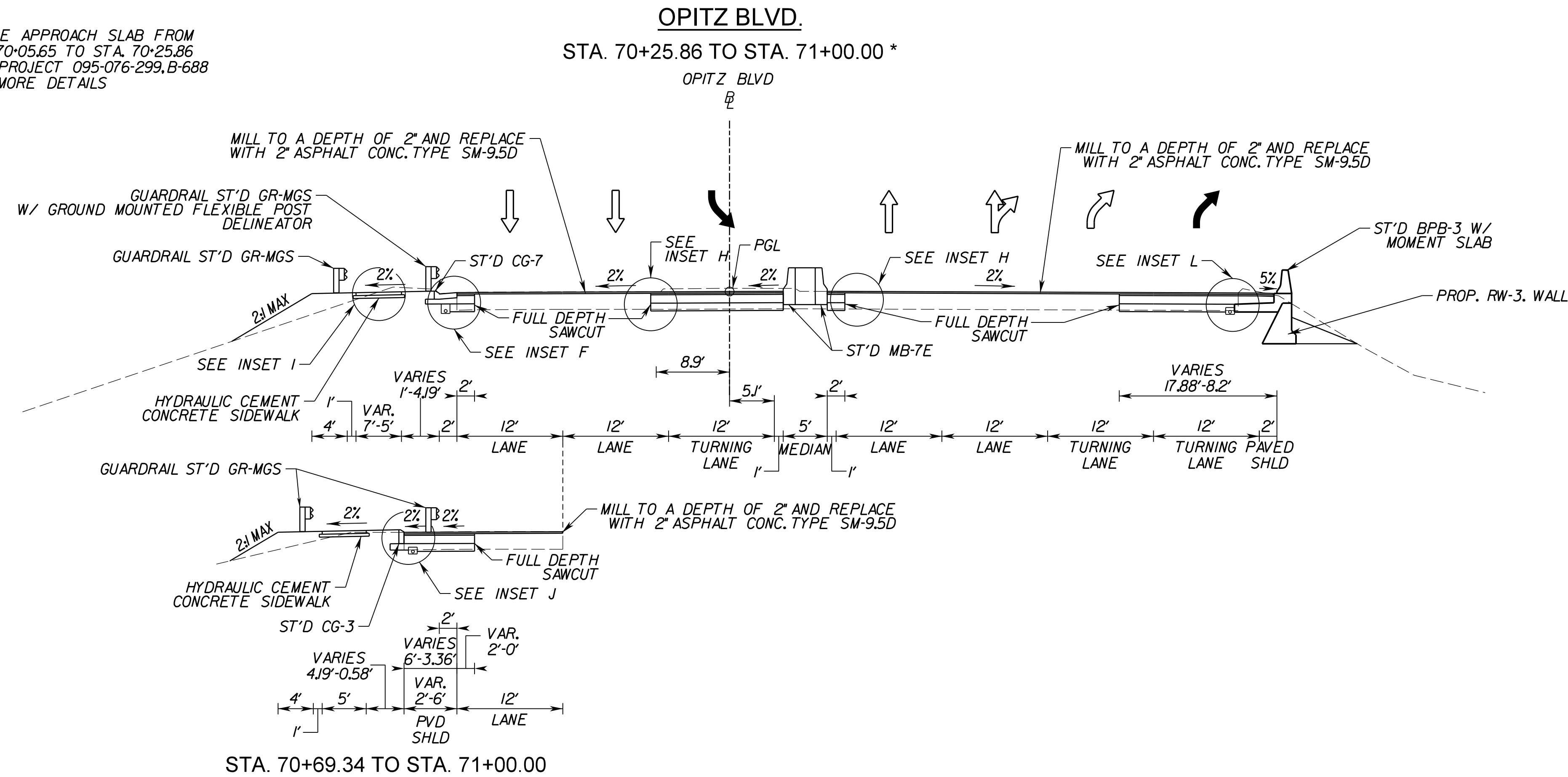
* BRIDGE APPROACH SLAB FROM STA. 65+15.00 TO STA. 65+35.17 SEE PROJECT 0095-076-299, B-688 FOR MORE DETAILS

PROJECT MANAGER: *Ritpal Shah, P.E.* (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
 DESIGN BY: *Whitman, Requardt & Associates, LLP* (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc.* (804) 550-7740, 07/07/2021

TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(9)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland MATERIALS ENGINEER		Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER		

* BRIDGE APPROACH SLAB FROM STA. 70+05.65 TO STA. 70+25.86
 SEE PROJECT 095-076-299, B-688 FOR MORE DETAILS



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
- ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
- ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.)
- ⑧ ST'D UD-4 Underdrain
- ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
- ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
- ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOTES:
 1. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(9)
--------------	-------------------------	--------------------

PROJECT MANAGER: *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

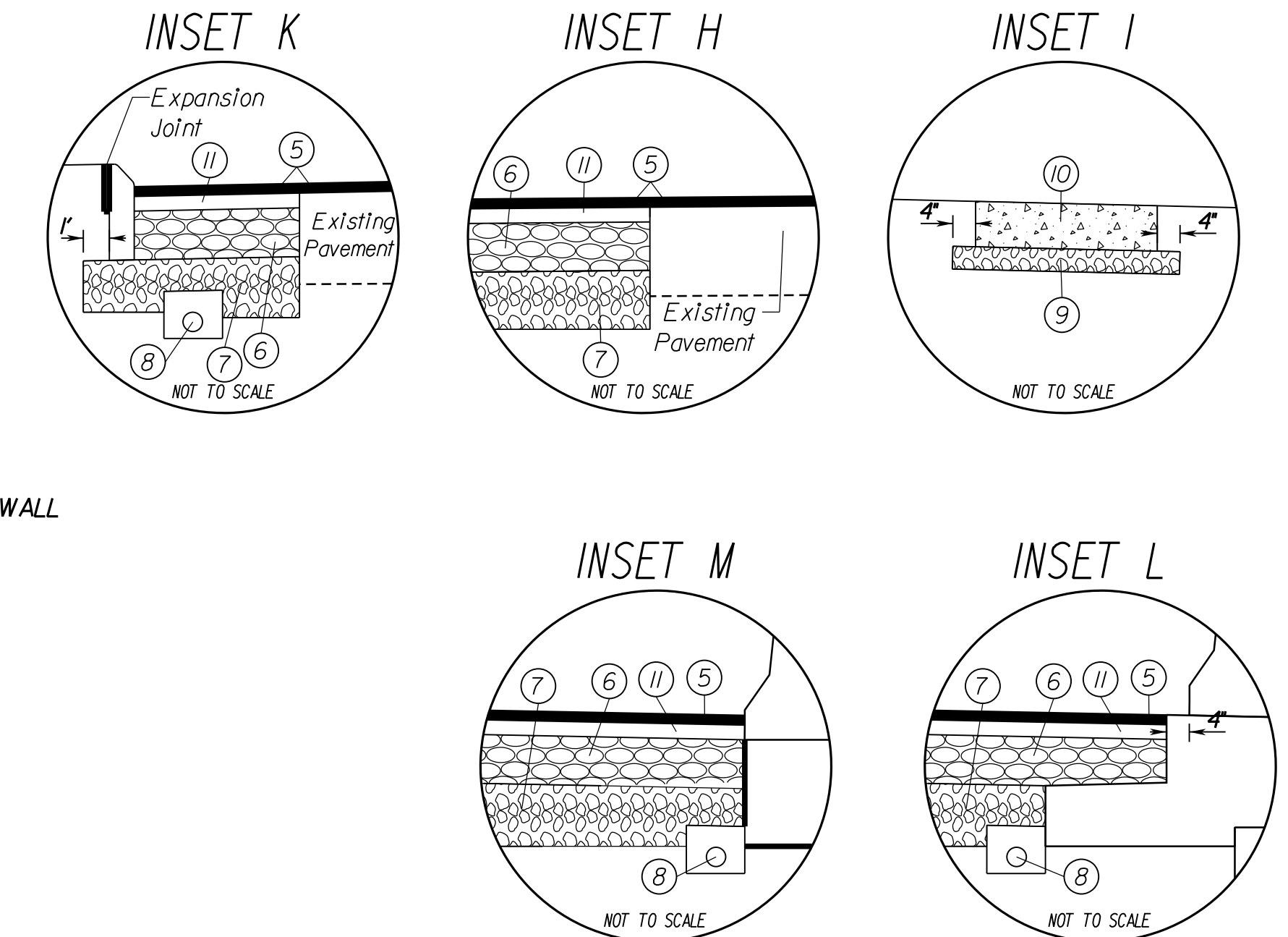
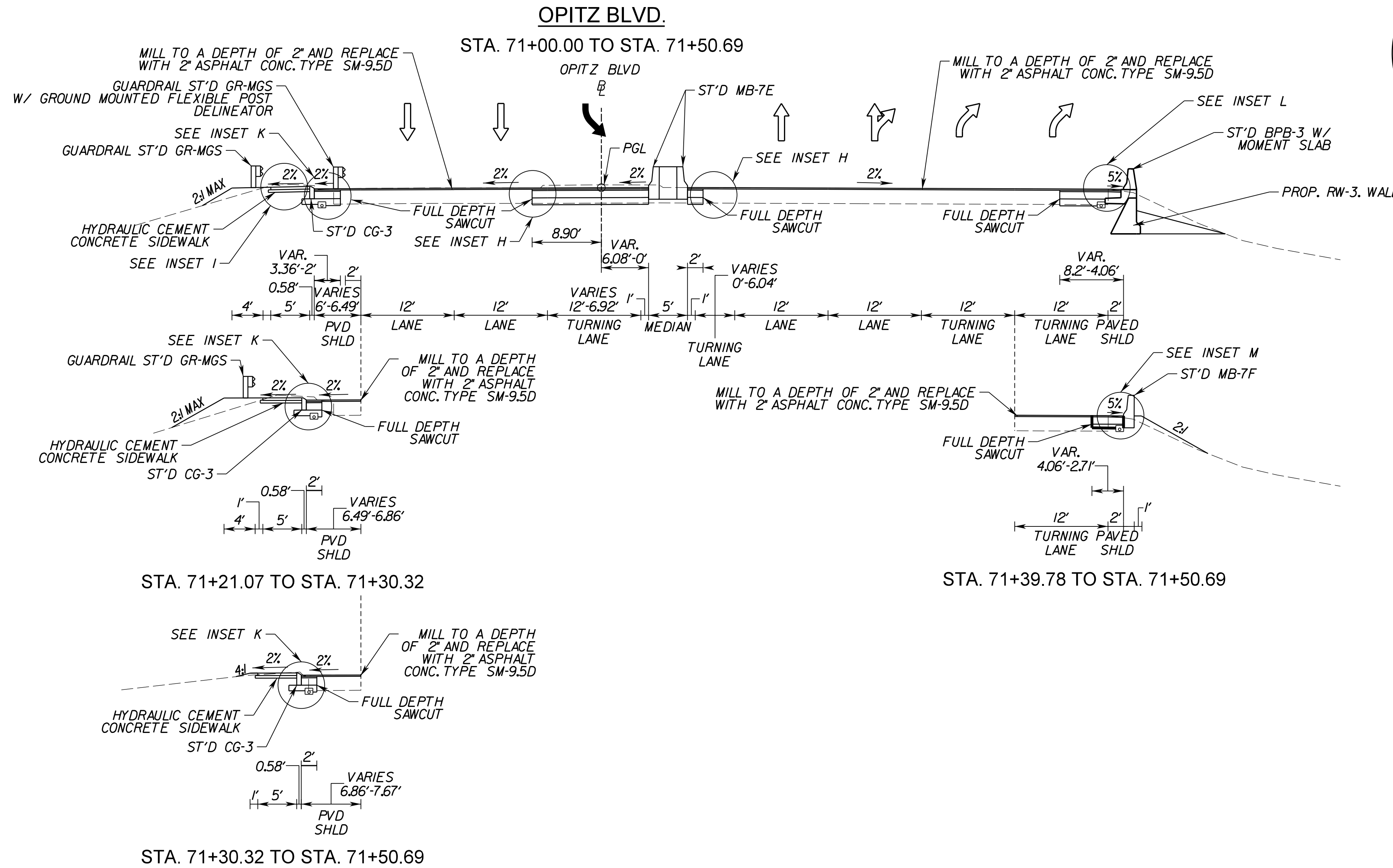
TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 MATERIALS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



- Pavement Legend**
- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
 - ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
 - ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
 - ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
 - ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
 - ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
 - ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd. widening on the high side of exist. pavement, 6' 21B will be replaced with 6' CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
 - ⑧ ST'D UD-4 Underdrain
 - ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
 - ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
 - ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOTES:
 1. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.

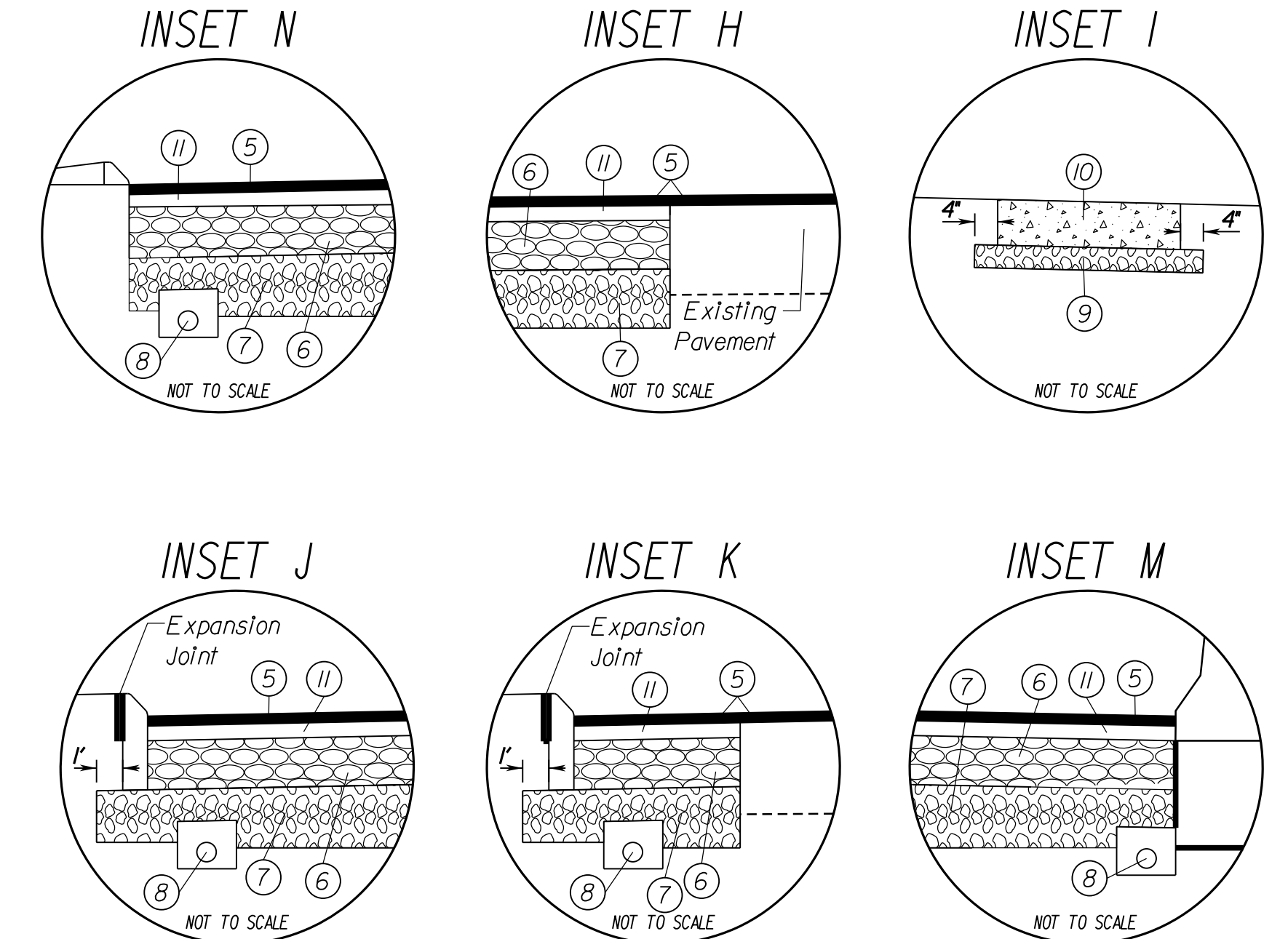
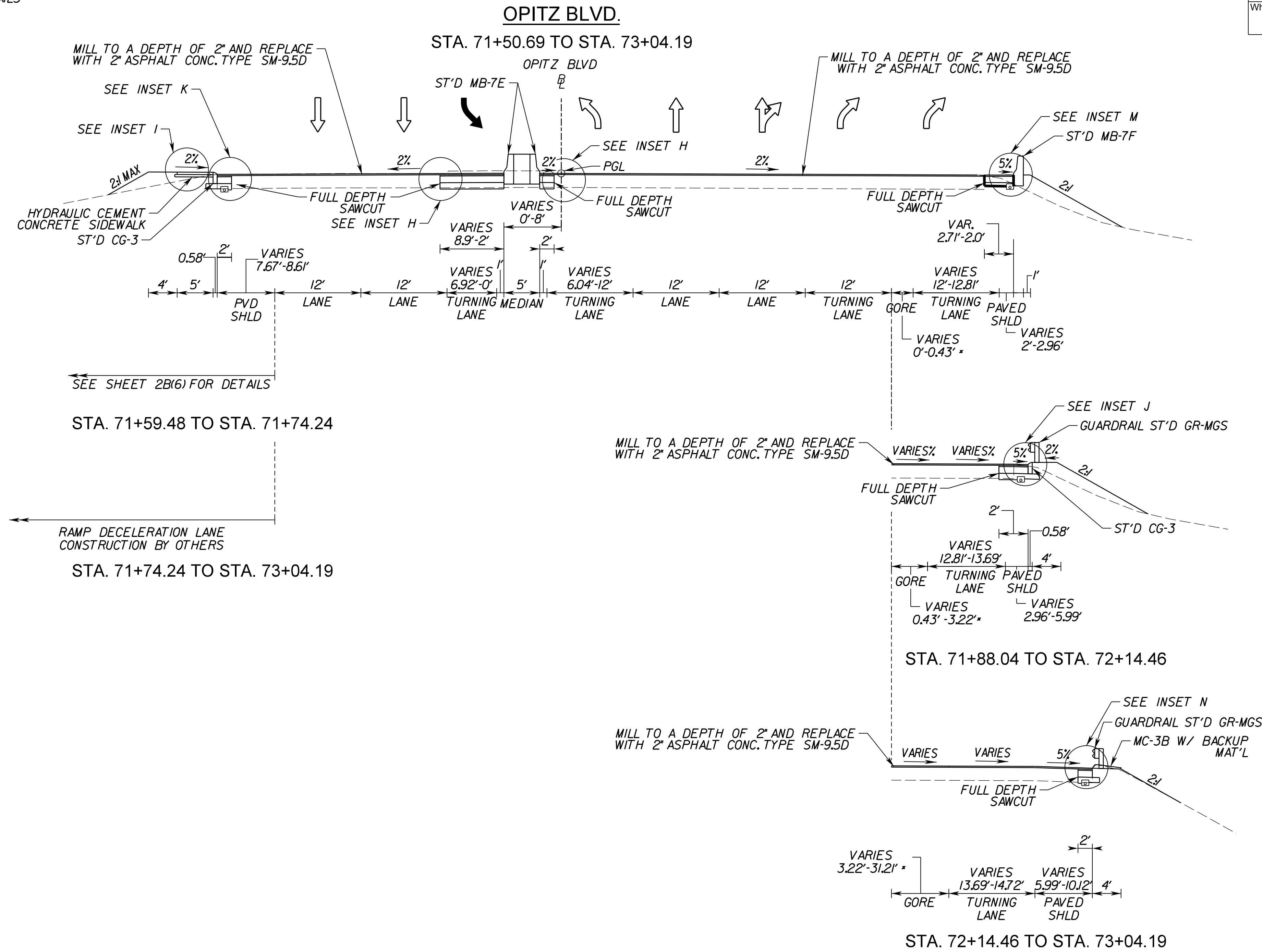
NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(10)
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PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(11)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland MATERIALS ENGINEER		Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER		

SEE SHEET 2B(4) FOR GORE DETAILS



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
- ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
- ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd. widening on the high side of exist. pavement, 6" 21B will be replaced with 6" CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
- ⑧ ST'D UD-4 Underdrain
- ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
- ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
- ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOTES:
 1. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(11)
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PROJECT MANAGER: *Rajpal Shah, P.E.* (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC* (804) 330-3781 (03/09/2021)
 DESIGN BY: *Whitman, Reardon & Associates, LLP* (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc.* (804) 550-7740 (07/07/2021)

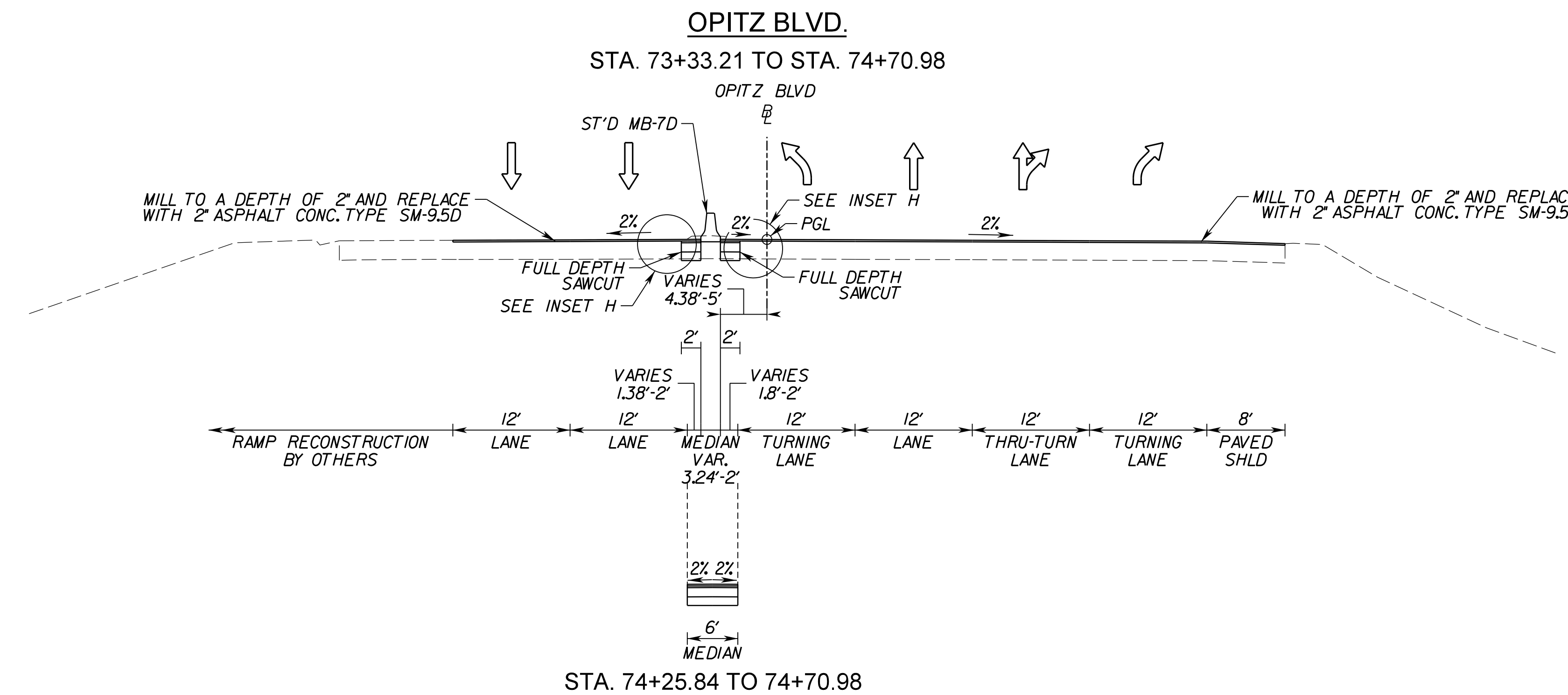
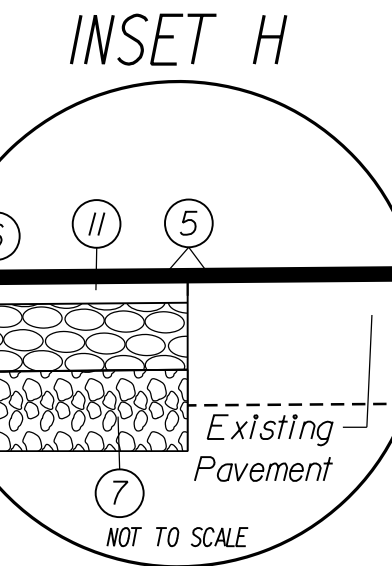
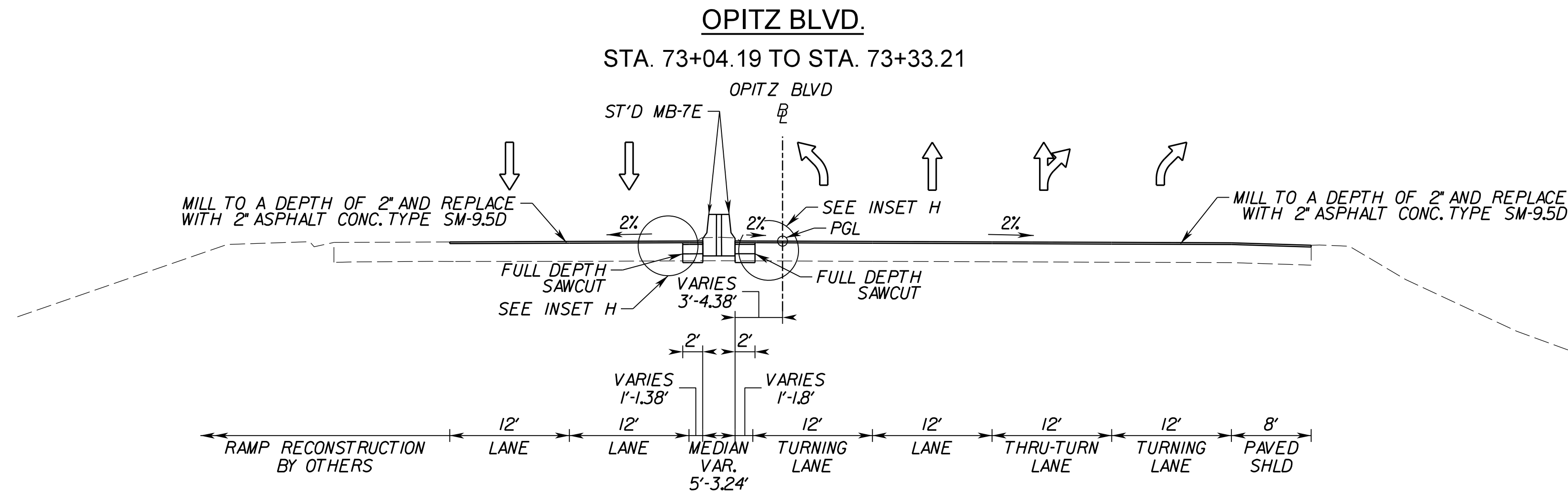
TYPICAL SECTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2A(12)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 MATERIALS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



Pavement Legend

- ① Asphalt Concrete Surface Course, Type SM-12.5E - 2 Inch Depth
- ② Asphalt Concrete Intermediate Course, Type 19.0D - 2 Inch Depth
- ③ Asphalt Concrete Base Course, Type BM-25.0A - 11 Inch Depth
- ④ Aggregate Base Material, Type 1, Size No. 21 B - 15 Inch Depth
- ⑤ Asphalt Concrete Surface Course, Type SM-9.5D - 2 Inch Depth
- ⑥ Asphalt Concrete Base Course, Type BM-25.0A - 8 Inch Depth
- ⑦ Aggregate Base Material, Type 1, Size No. 21 B - 6 Inch Depth (For Opitz Blvd. widening on the high side of exist. pavement, 6" 21B will be replaced with 6" CTA base, in accordance with VDOT Special Provision for cement treated aggregate (CTA) base.
- ⑧ ST'D UD-4 Underdrain
- ⑨ Aggregate Base Material, Type 1, Size No. 21 B - 4 Inch Depth
- ⑩ Hydraulic Cement Conc. Sidewalk, Class A3 - 4 Inch Depth
- ⑪ Asphalt Concrete Intermediate Course, Type 19.0A - 2 Inch Depth

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

NOTES:
 1. PAVEMENT WIDENING SHALL BE IN ACCORDANCE WITH VDOT STANDARD WP-2.

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2A(12)
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PROJECT MANAGER: *Impal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

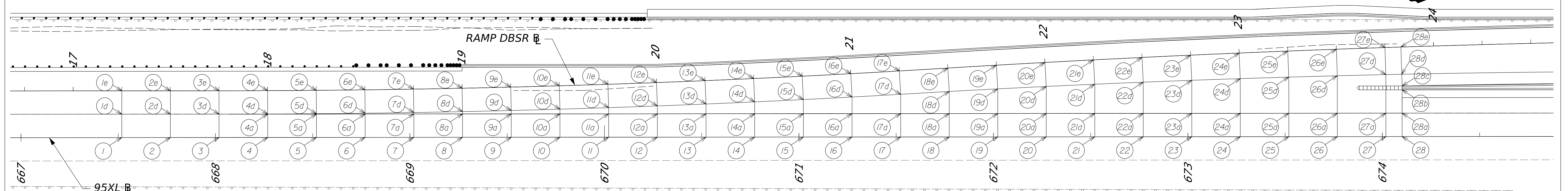
GORE RAMP DETAIL

I-95 NB EXPRESS LANES TO RAMP DBSR

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER



Existing I-95 Express Lanes								
EX-XBL-COMBINED Station	Point Number	Offset FT	Point Number	Existing Elevation	Shoulder Slope	Shoulder Width	Point Number	Shoulder Elevation
				FT	%	FT		FT
667+51.82	1	12.00	1d	137.54				
667+76.82	2	12.00	2d	138.23				
668+01.82	3	12.00	3d	138.96				
668+26.86	4	12.00	4a	139.69				
668+51.91	5	12.00	5a	140.37				
668+76.96	6	12.00	6a	141.06				
669+02.01	7	12.00	7a	141.76				
669+27.06	8	12.00	8a	142.47				
669+52.10	9	12.00	9a	143.15				
669+77.14	10	12.00	10a	143.86				
670+02.18	11	12.00	11a	144.52				
670+27.21	12	12.00	12a	145.20				
670+52.25	13	12.00	13a	145.90				
670+77.27	14	12.00	14a	146.61				
671+02.29	15	12.00	15a	147.31				
671+27.31	16	12.00	16a	147.99				
671+52.32	17	12.00	17a	148.64				
671+77.31	18	12.00	18a	149.26				
672+02.24	19	12.00	19a	149.89				
672+27.17	20	12.00	20a	150.51				
672+52.11	21	12.00	21a	151.12				
672+77.05	22	12.00	22a	151.72				
673+02.00	23	12.00	23a	152.35				
673+26.94	24	12.00	24a	152.95				
673+51.89	25	12.00	25a	153.51				
673+76.84	26	12.00	26a	154.05				
674+01.80	27	12.00	27a	154.62				
674+10.18	28	12.00	28a	154.80	-5.00%	12.00	28b	154.20

Gore			
Point Number	Gore Width	Elevations Difference	Gore Slope
	Ft	FT	%
4a-4d	0.03	0.00	-2.00%
5a-5d	0.17	0.00	-2.00%
6a-6d	0.40	-0.01	-2.00%
7a-7d	0.75	-0.01	-2.00%
8a-8d	1.19	-0.02	-2.00%
9a-9d	1.74	-0.04	-2.30%
10a-10d	2.40	-0.09	-3.75%
11a-11d	3.16	-0.10	-3.16%
12a-12d	4.02	-0.13	-3.23%
13a-13d	5.00	-0.17	-3.40%
14a-14d	6.06	-0.23	-3.80%
15a-15d	7.23	-0.27	-3.67%
16a-16d	8.51	-0.30	-3.53%
17a-17d	9.90	-0.29	-2.93%
18a-18d	11.35	-0.26	-2.29%
19a-19d	12.66	-0.26	-2.05%
20a-20d	13.88	-0.28	-2.02%
21a-21d	15.01	-0.31	-2.07%
22a-22d	16.04	-0.37	-2.31%
23a-23d	16.98	-0.48	-2.83%
24a-24d	17.83	-0.59	-3.31%
25a-25d	18.59	-0.68	-3.66%
26a-26d	19.26	-0.78	-4.05%
27a-27d	19.83	-0.94	-4.74%
28b-28c	2.00	-0.12	-6.00%

Ramp DBSR											
Point Number	Shoulder Elevation FT	Shoulder Slope %	Shoulder Width FT	Point Number	Edge Elevation	Pavement Slope	Pavement Width	Station	Point Number	Baseline Elevation	Forward Grade
					FT	%	FT			FT	FT
				1d	137.54	2.00%	12.00	17+25.00	1e	137.30	2.76%
				2d	138.23	2.00%	12.00	17+50.00	2e	137.99	2.92%
				3d	138.96	2.00%	12.00	17+75.00	3e	138.72	2.92%
				4d	139.69	2.00%	12.00	18+00.00	4e	139.45	2.71%
				5d	140.37	2.00%	12.00	18+25.00	5e	140.13	2.74%
				6d	141.05	2.00%	12.00	18+50.00	6e	140.81	2.77%
				7d	141.75	2.00%	12.00	18+75.00	7e	141.51	2.80%
				8d	142.45	2.00%	12.00	19+00.00	8e	142.21	2.66%
				9d	143.11	2.00%	12.00	19+25.00	9e	142.87	2.64%
				10d	143.77	2.00%	12.00	19+50.00	10e	143.53	2.60%
				11d	144.42	2.00%	12.00	19+75.00	11e	144.18	2.60%
				12d	145.07	2.00%	12.00	20+00.00	12e	144.83	2.64%
				13d	145.73	2.00%	12.00	20+25.00	13e	145.49	2.60%
				14d	146.38	2.00%	12.00	20+50.00	14e	146.14	2.64%
				15d	147.04	2.00%	12.00	20+75.00	15e	146.80	2.60%
				16d	147.69	2.00%	12.00	21+00.00	16e	147.45	2.64%
				17d	148.35	2.00%	12.00	21+25.00	17e	148.11	2.60%
				18d	149.00	2.00%	12.03	21+50.00	18e	148.76	2.52%
				19d	149.63	2.00%	12.17	21+75.00	19e	149.39	2.36%
				20d	150.23	2.00%	12.34	22+00.00	20e	149.98	2.32%
				21d	150.81	2.00%	12.51	22+25.00	21e	150.56	2.16%
				22d	151.35	2.00%	12.70	22+50.00	22e	151.10	2.04%
				23d	151.87	2.00%	12.91	22+75.00	23e	151.61	1.96%
				24d	152.36	2.00%	13.14	23+00.00	24e	152.10	1.84%
				25d	152.83	2.00%	13.38	23+25.00	25e	152.56	1.76%
				26d	153.27	2.00%	13.63	23+50.00	26e	153.00	1.60%
				27d	153.68	2.00%	13.91	23+75.00	27e	153.40	1.46%
28c	154.08	-4.64%	6.00	28d	153.80	2.00%	14.00	23+83.21	28e	153.52	1.19%

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

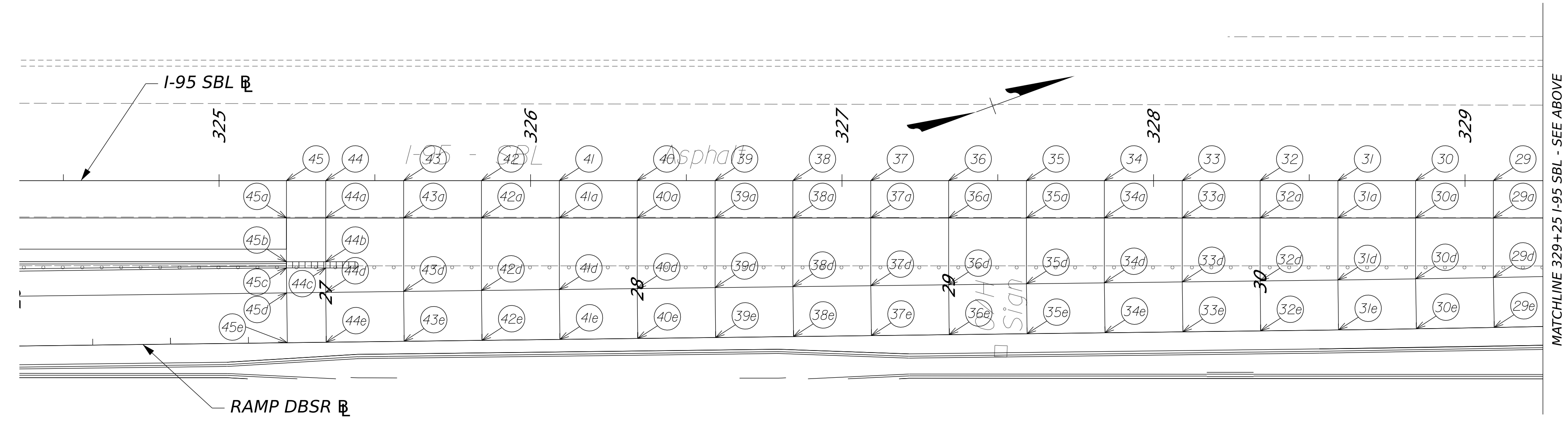
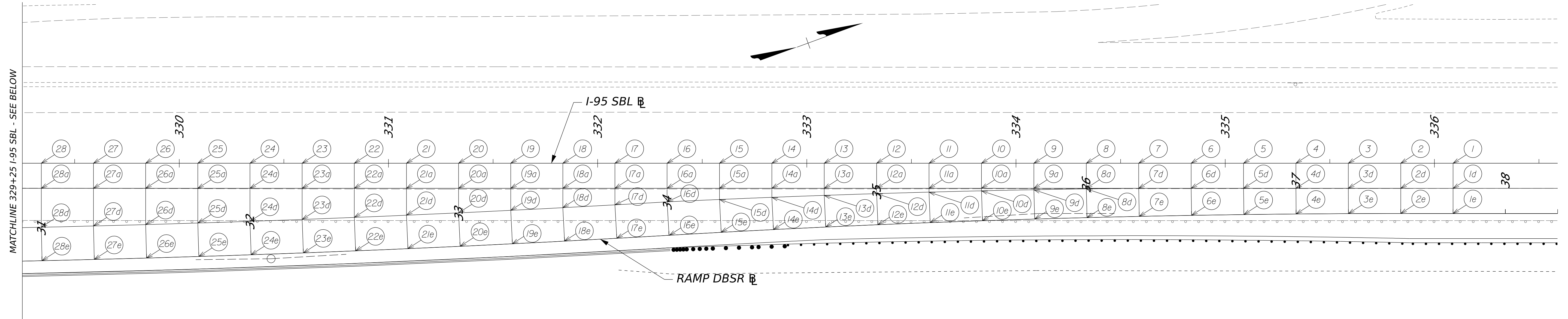
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

GORE RAMP DETAIL I-95 SBL TO RAMP DBSR

REVISED	STATE		STATE PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	2B(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

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NOTE: SEE POINT DETAILS ON SHEET 2B(3)

SCALE 	PROJECT 0095-076-299
SHEET NO. 2B(2)	

PROJECT MANAGER: *Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

GORE RAMP DETAIL

I-95 SBL TO RAMP DBSR

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2B(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

Existing I-95 SBL								
Existing SBL Centerline	Point Number	Offset FT	Point Number	Ex. Pavement FT	Shoulder Slope %	Shoulder Width FT	Point Number	Shoulder Elevation FT
335+83.92	2	12.00	2d	172.05				
335+58.87	3	12.00	3d	171.82				
335+33.82	4	12.00	4d	171.56				
335+08.76	5	12.00	5d	171.28				
334+83.71	6	12.00	6d	171.02				
334+58.65	7	12.00	7d	170.78				
334+33.59	8	12.00	8a	170.53				
334+08.53	9	12.00	9a	170.28				
333+83.48	10	12.00	10a	170.02				
333+58.42	11	12.00	11a	169.78				
333+33.37	12	12.00	12a	169.54				
333+08.32	13	12.00	13a	169.30				
332+83.27	14	12.00	14a	169.04				
332+58.23	15	12.00	15a	168.77				
332+33.19	16	12.00	16a	168.53				
332+08.28	17	12.00	17a	168.27				
331+83.36	18	12.00	18a	168.02				
331+58.45	19	12.00	19a	167.77				
331+33.52	20	12.00	20a	167.51				
331+08.60	21	12.00	21a	167.23				
330+83.67	22	12.00	22a	166.94				
330+58.74	23	12.00	23a	166.64				
330+33.80	24	12.00	24a	166.33				
330+08.86	25	12.00	25a	166.01				
329+83.92	26	12.00	26a	165.68				
329+58.98	27	12.00	27a	165.34				
329+34.04	28	12.00	28a	165.00				
329+09.09	29	12.00	29a	164.64				
328+84.15	30	12.00	30a	164.28				
328+59.20	31	12.00	31a	163.91				
328+34.21	32	12.00	32a	163.53				
328+09.21	33	12.00	33a	163.14				
327+84.22	34	12.00	34a	162.74				
327+59.22	35	12.00	35a	162.31				
327+34.22	36	12.00	36a	161.88				
327+09.22	37	12.00	37a	161.45				
326+84.22	38	12.00	38a	160.96				
326+59.22	39	12.00	39a	160.47				
326+34.23	40	12.00	40a	160.00				
326+09.23	41	12.00	41a	159.51				
325+84.23	42	12.00	42a	159.02				
325+59.23	43	12.00	43a	158.52				
325+34.23	44	12.00	44a	158.01	-3.50%	14.01	44b	157.5197
325+21.62	45	12.00	45a	157.75	-5.00%	14	45b	157.05

Gore			
Point Number	Gore Width Ft	Elevations Difference FT	Gore Slope %
9a-9d	0.66	-0.02	-3.03%
10a-10d	1.17	-0.03	-2.56%
11a-11d	1.79	-0.06	-3.35%
12a-12d	2.52	-0.09	-3.57%
13a-13d	3.35	-0.12	-3.58%
14a-14d	4.28	-0.13	-3.04%
15a-15d	5.32	-0.13	-2.44%
16a-16d	6.46	-0.16	-2.48%
17a-17d	7.89	-0.17	-2.15%
18a-18d	9.24	-0.19	-2.06%
19a-19d	10.52	-0.22	-2.09%
20a-20d	11.72	-0.25	-2.13%
21a-21d	12.84	-0.28	-2.18%
22a-22d	13.89	-0.31	-2.23%
23a-23d	14.86	-0.34	-2.29%
24a-24d	15.76	-0.38	-2.41%
25a-25d	16.58	-0.42	-2.53%
26a-26d	17.32	-0.45	-2.60%
27a-27d	17.99	-0.46	-2.56%
28b-28c	18.58	-0.48	-2.58%
29b-29c	19.09	-0.48	-2.51%
30a-30c	19.53	-0.48	-2.46%
31a-31d	19.89	-0.48	-2.41%
32a-33d	20.2	-0.49	-2.43%
33a-33d	20.5	-0.52	-2.54%
34a-34d	20.81	-0.55	-2.64%
35a-35d	21.11	-0.57	-2.70%
36a-36d	21.41	-0.61	-2.85%
37a-37d	21.72	-0.66	-3.04%
38a-38d	20.02	-0.64	-3.20%
39a-39d	22.33	-0.63	-2.82%
40a-40d	22.63	-0.64	-2.83%
41a-41d	22.9	-0.62	-2.71%
42a-42d	23.24	-0.56	-2.41%
43a-43d	23.54	-0.48	-2.04%
44b-44c	2	-0.06	-3.05%
45b-45c	2	0.08	4.00%

Ramp DBSR												
Point Number	Shoulder Elevation FT	Shoulder Slope %	Shoulder Width FT	Point Number	Edge Elevation FT	Pavement Slope %	Pavement Width FT	Station	Point Number	Baseline Elevation FT	Forward Grade %	
												1d
2d	172.05	2.00%	12	37+50.00	2e	171.81	-0.93%					
3d	171.82	2.00%	12.07	37+25.00	3e	171.58	-1.07%					
4d	171.56	2.00%	12.45	37+00.00	4e	171.31	-1.13%					
5d	171.28	2.00%	12.52	36+75.00	5e	171.03	-1.07%					
6d	171.02	2.00%	12.91	36+50.00	6e	170.76	-1.00%					
7d	170.78	2.00%	13.39	36+25.00	7e	170.51	-1.05%					
8d	170.53	2.00%	13.74	36+00.00	8e	170.25	-1.08%					
9d	170.26	2.00%	14.02	35+75.00	9e	169.98	-1.12%					
10d	169.99	2.00%	14.3	35+50.00	10e	169.70	-1.08%					
11d	169.72	2.00%	14.59	35+25.00	11e	169.43	-1.12%					
12d	169.45	2.00%	14.87	35+00.00	12e	169.15	-1.08%					
13d	169.18	2.00%	15.15	34+75.00	13e	168.88	-1.12%					
14d	168.91	2.00%	15.44	34+50.00	14e	168.60	-1.08%					
15d	168.64	2.00%	15.72	34+25.00	15e	168.33	-1.12%					
16d	168.37	2.00%	16	34+00.00	16e	168.05	-1.08%					
17d	168.10	2.00%	16	33+75.00	17e	167.78	-1.08%					
18d	167.83	2.00%	16	33+50.00	18e	167.51	-1.12%					
19d	167.55	2.00%	16	33+25.00	19e	167.23	-1.16%					
20d	167.26	2.00%	16	33+00.00	20e	166.94	-1.24%					
21d	166.95	2.00%	16	32+75.00	21e	166.63	-1.28%					
22d	166.63	2.00%	16	32+50.00	22e	166.31	-1.32%					
23d	166.30	2.00%	16	32+25.00	23e	165.98	-1.40%					
24d	165.95	2.00%	16	32+00.00	24e	165.63	-1.44%					
25d	165.59	2.00%	16	31+75.00	25e	165.27	-1.44%					
26d	165.23	2.00%	16	31+50.00	26e	164.91	-1.40%					
27d	164.88	2.00%	16	31+25.00	27e	164.56	-1.44%					
28d	164.52	2.00%	16	31+00.00	28e	164.20	-1.44%					
29d	164.16	2.00%	16	30+75.00	29e	163.84	-1.44%					
30d	163.80	2.00%	16	30+50.00	30e	163.48	-1.48%					
31d	163.43	2.00%	16	30+25.00	31e	163.11	-1.56%					
32d	163.04	2.00%	16	30+00.00	32e	162.72	-1.68%					
33d	162.62	2.00%	16	29+75.00	33e	162.30	-1.72%					
34d	162.19	2.00%	16	29+50.00	34e	161.87	-1.80%					
35d	161.74	2.00%	16	29+25.00	35e	161.42	-1.88%					
36d	161.27	2.00%	16	29+00.00	36e	160.95	-1.92%					
37d	160.79	2.00%	16	28+75.00	37e	160.47	-1.88%					
38d	160.32	2.00%	16	28+50.00	38e	160.00	-1.92%					
39d	159.84	2.00%	16	28+25.00	39e	159.52	-1.92%					
40d	159.36	2.00%	16	28+00.00	40e	159.04	-1.88%					
41d	158.89	2.00%	16	27+75.00	41e	158.57	-1.72%					
42d	158.46	2.00%	16	27+50.00	42e	158.14	-1.68%					
43d	158.04	2.00%	16	27+25.00	43e	157.72	-1.40%					
44c	157.46	-2.95%	7.84	27+00.00	44e	157.37	-1.28%					
45c	157.13	-5.00%	8	26+87.48	45e	157.21	-1.01%					

PAC PLANS

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NOTE: SEE POINTS ON PLAN VIEW ON SHEET 2B(2)

SCALE 0 25' 50'	PROJECT 0095-076-299	SHEET NO. 2B(3)
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PROJECT MANAGER: *Rampal Shaha, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7140 (07/07/2021)*

GORE RAMP DETAIL

OPITZ BLVD EB TO I-95 NB LOOP

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2B(4)

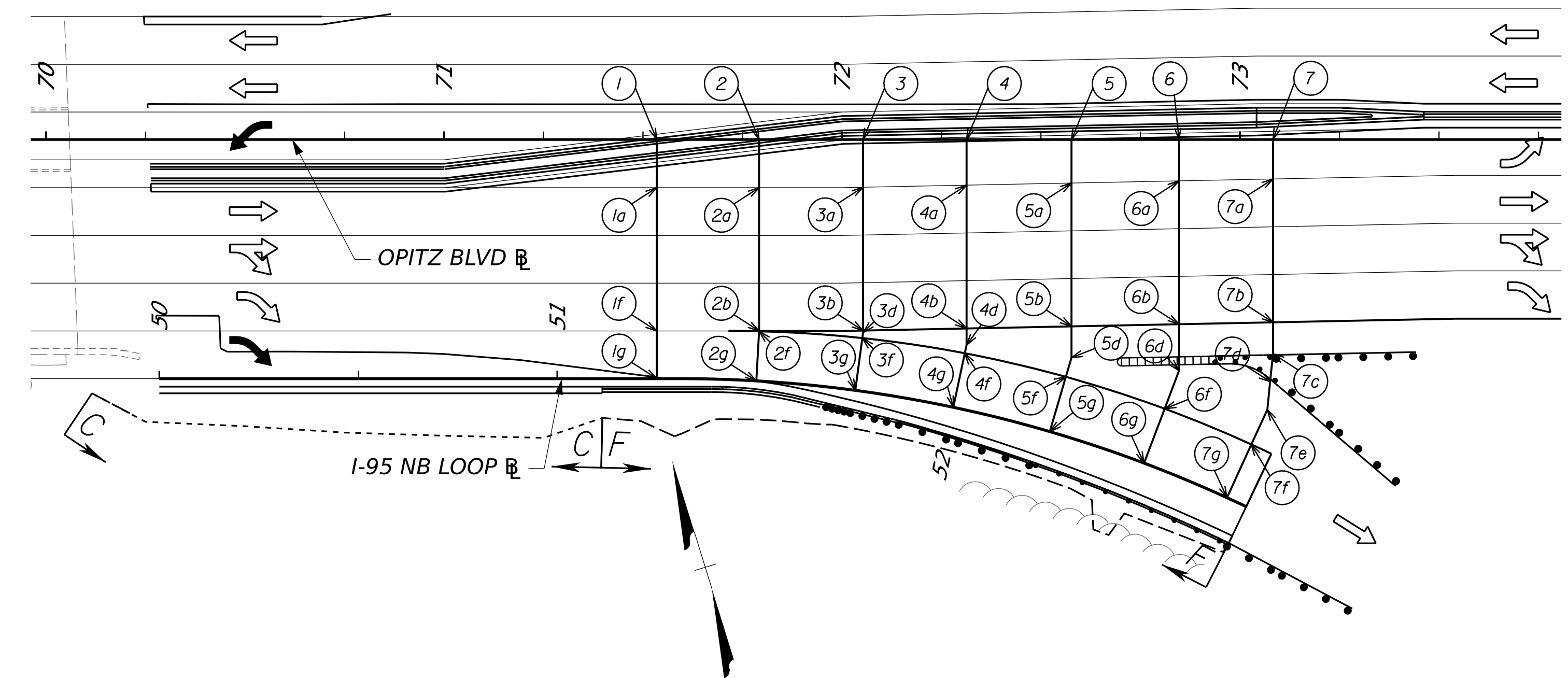
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

Opitz Blvd												
Opitz Blvd Station	Point Number	Offset FT	Point Number	Elevation FT	Pavement Slope %	Pavement Width FT	Point Number	Edge Elevation FT	Shoulder Width FT	Shoulder Slope %	Shoulder Elevation FT	Point Number
71+53.47	1	12.08	1a	208.55	-2.00%	36.00	1f	207.83				
71+79.18	2	12.08	2a	207.69	-2.00%	36.00	2b	206.97				
72+05.29	3	11.98	3a	206.81	-2.00%	36.00	3b	206.09				
72+31.29	4	11.46	4a	206.05	-2.00%	36.00	4b	205.33				
72+57.64	5	10.93	5a	205.29	-2.00%	36.00	5b	204.57				
72+84.67	6	10.39	6a	204.49	-2.00%	36.00	6b	203.77				
73+08.29	7	9.92	7a	203.83	-2.00%	36.00	7b	203.11	7.88	-2.00%	202.95	7c

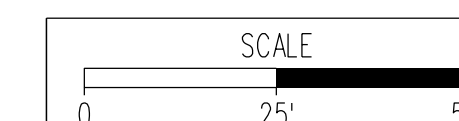
Gore									
Point Number	Gore Width Ft	Elevations Difference FT	Gore Slope %	Point Number	Elevation Ft	Point Number	Gore Width Ft	Elevations Difference FT	Gore Slope %
2b-2f	0.09	0.0019	-2.02%						
3b-3d	0.54	0.03	-2.00%	3d	206.08	3d-3f	1.3674	-0.04	-2.67%
4b-4d	4.19	-0.08	-2.00%	4d	205.25	4d-4f	2.10	-0.06	-2.66%
5b-5d	7.88	-0.16	-2.00%	5d	204.41	5d-5f	5.01	-0.15	-2.97%
6b-6d	11.68	-0.23	-2.00%	6d	203.53	6d-6f	10.23	-0.30	-2.93%
7c-7d	7.06	-0.14	-2.00%	7d	202.81	7d-7e	7.06	-0.40	-5.66%

NB Loop Ramp											
Point Number	Shoulder Elevation FT	Shoulder Slope %	Shoulder Width FT	Point Number	Edge Elevation FT	Pavement Slope %	Pavement Width FT	Station	Point Number	Baseline Elevation FT	Forward Grade %
				1f	207.83	3.08%	12.00	51+25.00	1g	207.46	-3.96%
				2f	206.97	4.00%	12.47	51+50.00	2g	206.47	-3.52%
				3f	206.12	4.00%	13.26	51+75.00	3g	205.59	-3.36%
				4f	205.31	4.00%	13.88	52+00.00	4g	204.75	-3.04%
				5f	204.56	4.00%	14.33	52+25.00	5g	203.99	-3.44%
				6f	203.83	4.81%	14.61	52+50.00	6g	203.13	-3.41%
7e	203.09	-1.25%	9.63	7f	203.21	5.75%	14.72	52+72.56	7g	202.36	-3.84%



PAC PLANS

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PROJECT
0095-076-299

SHEET NO.
2B(4)

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

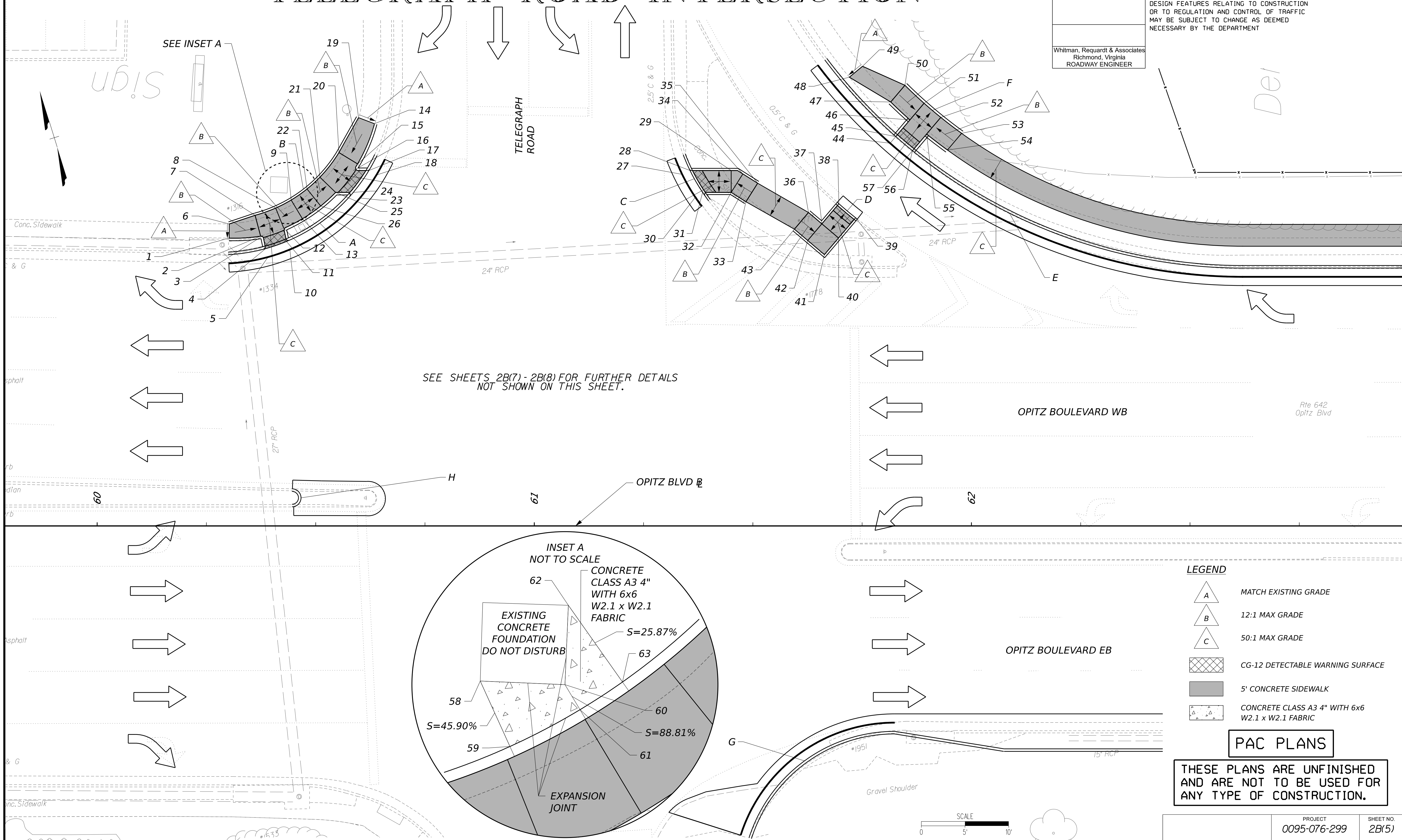
STAKING DETAILS

TELEGRAPH ROAD INTERSECTION

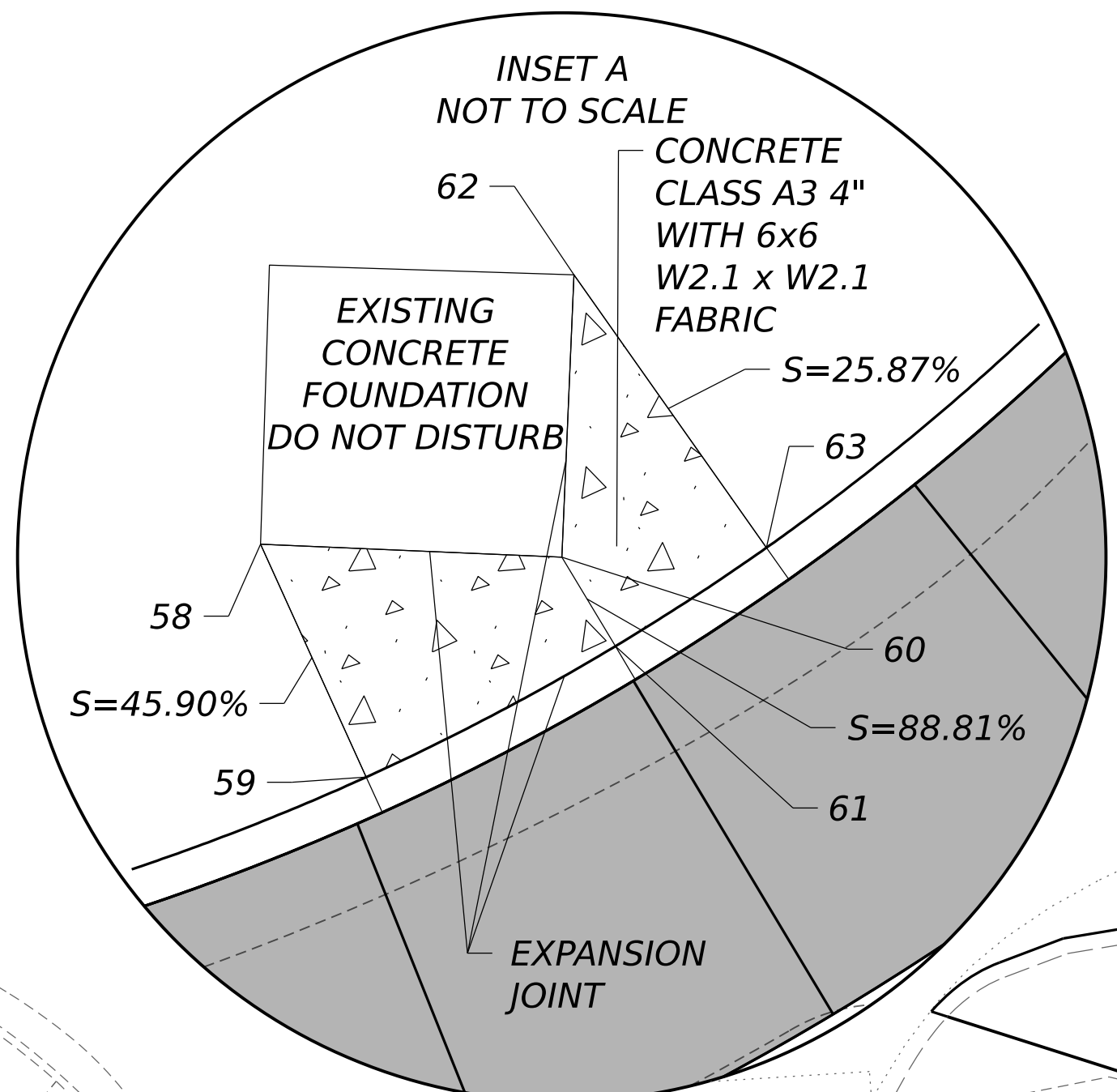
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2B(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



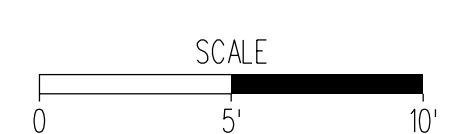
SEE SHEETS 2B(7) - 2B(8) FOR FURTHER DETAILS NOT SHOWN ON THIS SHEET.



- LEGEND**
- MATCH EXISTING GRADE
 - 12:1 MAX GRADE
 - 50:1 MAX GRADE
 - CG-12 DETECTABLE WARNING SURFACE
 - 5' CONCRETE SIDEWALK
 - CONCRETE CLASS A3 4\"/>

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

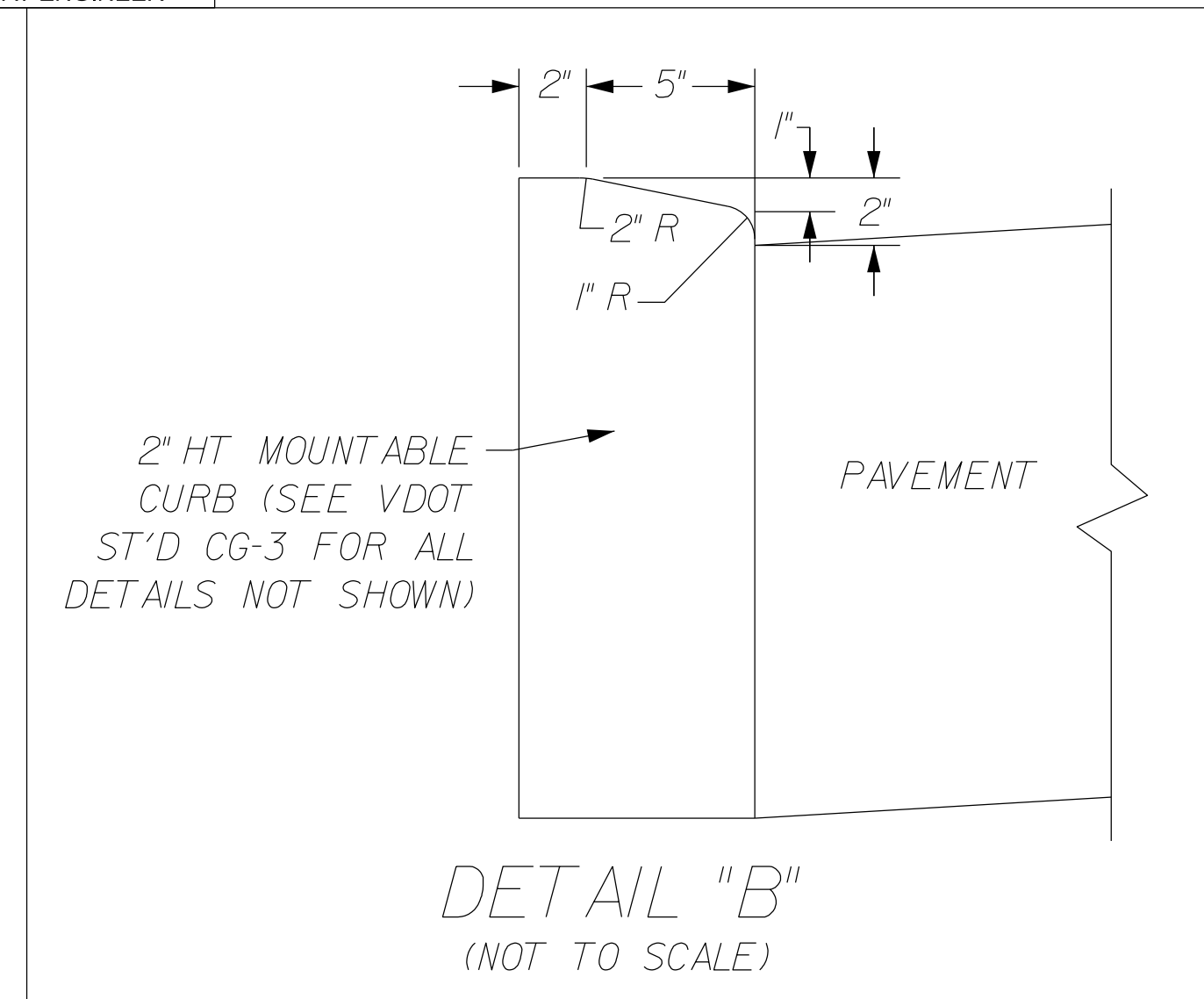
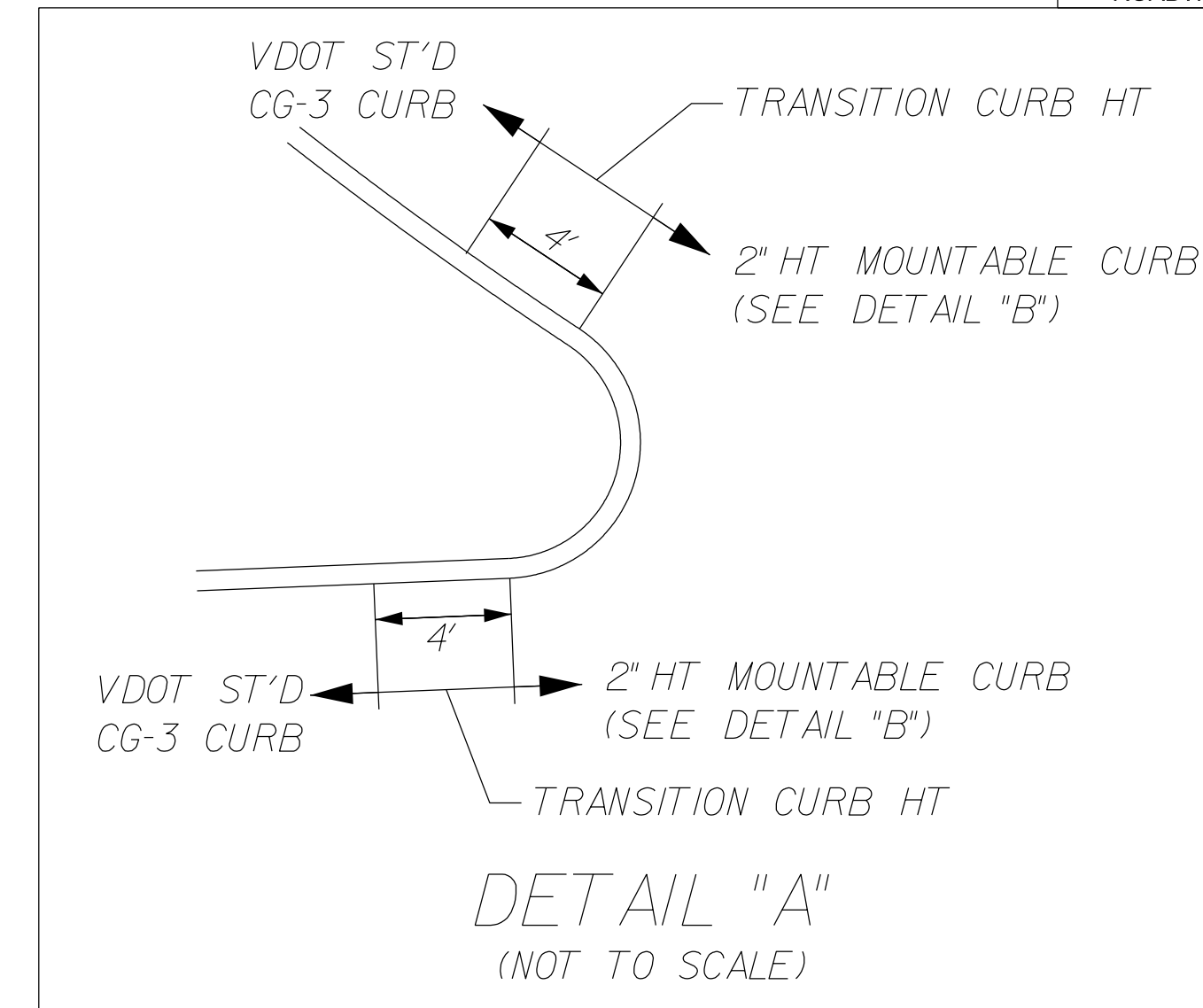
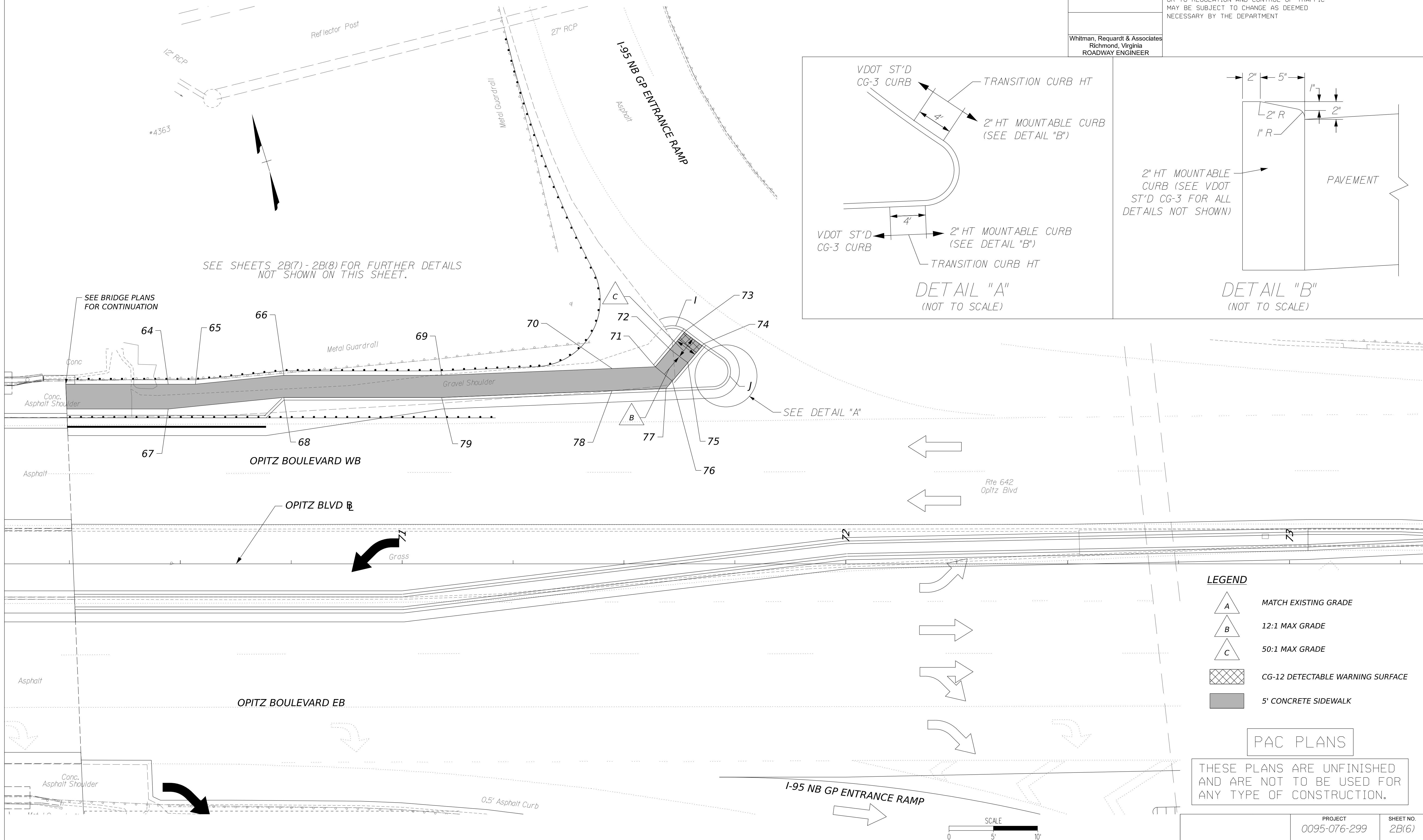
STAKING DETAILS

I-95 NB ENTRANCE RAMP

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2B(6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

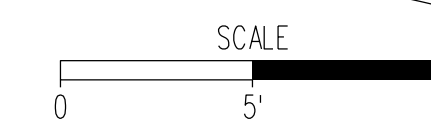


LEGEND

	MATCH EXISTING GRADE
	12:1 MAX GRADE
	50:1 MAX GRADE
	CG-12 DETECTABLE WARNING SURFACE
	5' CONCRETE SIDEWALK

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	2B(6)

PROJECT MANAGER: *Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	STATE		SHEET NO.
	VA.	ROUTE 95	PROJECT 0095-076-299, C-501	
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER				

STAKING POINT DETAILS

LOCATION				BASELINE				LOCATION				BASELINE			
Point	Station	Offset (ft)	Face of Curb/Sidewalk Elevation (ft)	Point	Station	Offset (ft)	Face of Curb/Sidewalk Elevation (ft)	Point	Station	Offset (ft)	Face of Curb/Sidewalk Elevation (ft)	Point	Station	Offset (ft)	Face of Curb/Sidewalk Elevation (ft)
1	60+30.21	65.86 LT	210.60	21	60+50.96	79.79 LT	210.41	41	61+66.37	62.08 LT	210.56	61	60+44.25	75.06 LT	211.16
2	60+37.40	66.30 LT	210.27	22	60+48.01	77.09 LT	210.74	42	61+62.55	65.31 LT	210.52	62	60+43.63	79.79 LT	212.31
3	60+37.95	66.39 LT	210.26	23	60+60.13	75.03 LT	210.37	43	61+59.50	67.90 LT	210.85	63	60+46.11	76.28 LT	211.20
4	60+38.55	63.45 LT	210.20	24	60+58.59	76.32 LT	210.27	44	61+81.40	87.56 LT	210.09	64	7047.27	40.51 LT	211.32
5	60+39.08	61.52 LT	210.30	25	60+54.56	76.32 LT	210.31	45	61+82.70	89.09 LT	209.99	65	7053.42	40.51 LT	211.23
6	60+30.22	69.09 LT	210.66	26	60+51.15	73.20 LT	210.64	46	61+85.94	92.90 LT	210.09	66	7073.34	42.50 LT	210.95
7	60+36.13	71.08 LT	210.30	27	61+33.84	80.44 LT	210.23	47	61+81.55	97.00 LT	210.59	67	7047.27	34.92 LT	211.43
8	60+40.85	72.73 LT	210.33	28	61+35.63	81.32 LT	210.13	48	61+72.07	102.67 LT	210.19	68	7073.34	37.50 LT	211.05
9	60+44.40	74.57 LT	210.66	29	61+45.05	81.32 LT	210.22	49	61+75.09	105.17 LT	210.38	69	7108.90	42.50 LT	209.78
10	60+44.09	63.24 LT	210.29	30	61+36.85	75.21 LT	210.24	50	61+84.79	100.82 LT	210.69	70	7147.31	44.04 LT	208.46
11	60+43.32	65.09 LT	210.22	31	61+38.51	76.32 LT	210.14	51	61+89.17	96.71 LT	210.19	71	7157.07	44.43 LT	208.12
12	60+42.70	68.09 LT	210.28	32	61+45.05	76.32 LT	210.27	52	6192.99	93.48 LT	210.27	72	7160.40	48.37 LT	207.96
13	60+46.97	70.28 LT	210.56	33	61+48.43	74.18 LT	210.60	53	61+97.76	89.83 LT	210.77	73	7164.00	52.64 LT	207.93
14	60+63.44	92.03 LT	210.85	34	61+47.72	80.55 LT	210.25	54	61+94.52	86.01 LT	210.67	74	7168.00	49.62 LT	207.83
15	60+59.58	82.84 LT	210.37	35	61+51.10	78.41 LT	210.58	55	61+89.75	89.67 LT	210.17	75	7164.39	45.35 LT	207.86
16	60+58.64	81.32 LT	210.34	36	61+62.73	71.71 LT	210.75	56	61+86.51	85.86 LT	210.07	76	7160.90	41.21 LT	208.06
17	60+62.17	81.32 LT	210.29	37	61+65.79	69.13 LT	210.42	57	61+85.22	84.33 LT	210.17	77	7159.48	38.94 LT	208.14
18	60+63.88	80.28 LT	210.35	38	61+69.68	73.73 LT	210.30	58	60+39.60	76.33 LT	212.37	78	7147.31	39.04 LT	208.56
19	60+59.80	93.41 LT	210.99	39	61+73.51	70.51 LT	210.36	59	60+40.96	73.33 LT	210.86	79	7108.90	37.50 LT	209.88
20	60+55.31	85.43 LT	210.45	40	61+69.60	65.89 LT	210.48	60	60+43.48	76.16 LT	212.35				

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT 0095-076-299	SHEET NO. 2B(7)
-------------------------	--------------------

PROJECT MANAGER: *Impal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2B(8)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER					

STAKING DETAIL RADIAL POINT DETAILS

LOCATION	OPITZ BASELINE											
	BEGIN RADIUS			MIDPOINT RADIUS			END RADIUS			RADIUS LENGTH (FEET)	CHORD LENGTH (FEET)	CURVE LENGTH (FEET)
Sheet Item	Station	Offset (ft)	Elevation (ft)	Station	Offset (ft)	Elevation (ft)	Station	Offset (ft)	Elevation (ft)			
A	60+30.02	62.07 LT	209.98	60+50.14	68.74 LT	210.24	60+64.02	84.75 LT	210.32	40.00	40.87	42.90
B	60+36.13	71.08 LT	210.30	60+47.11	76.39 LT	210.72	60+55.31	85.43 LT	210.45	32.00	23.95	24.54
C	61+34.08	84.91 LT	210.10	61+36.61	79.44 LT	210.12	61+39.89	74.38 LT	210.16	42.54	12.03	12.07
D	61+69.31	74.06 LT	210.29	61+71.57	72.09 LT	210.33	61+73.91	70.20 LT	210.37	70.12	6.00	6.00
E	61+66.45	106.63 LT	209.54	62+08.71	71.57 LT	210.35	62+62.17	59.00 LT	211.26	120.00	106.92	110.81
F	61+84.79	100.82 LT	210.69	61+91.06	95.07 LT	210.73	61+97.76	89.83 LT	210.77	110.00	17.00	17.02
G	61+49.12	71.38 RT	209.61	61+61.82	53.74 RT	209.96	61+82.47	47.00 RT	210.19	35.00	41.31	44.19
H	60+44.58	4.38 LT	211.51	60+46.64	6.43 LT	211.44	60+44.59	8.49 LT	211.36	2.06	4.11	6.46
I	71+59.15	53.38 LT	208.02	71+61.67	53.64 LT	207.98	71+64.00	52.64 LT	207.93	5.00	4.91	5.13
J	71+72.23	46.70 LT	207.74	71+73.87	42.29 LT	207.72	71+70.18	39.37 LT	207.44	4.00	7.61	10.07

*ALL POINTS TAKEN AT THE FACE OF CURB.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

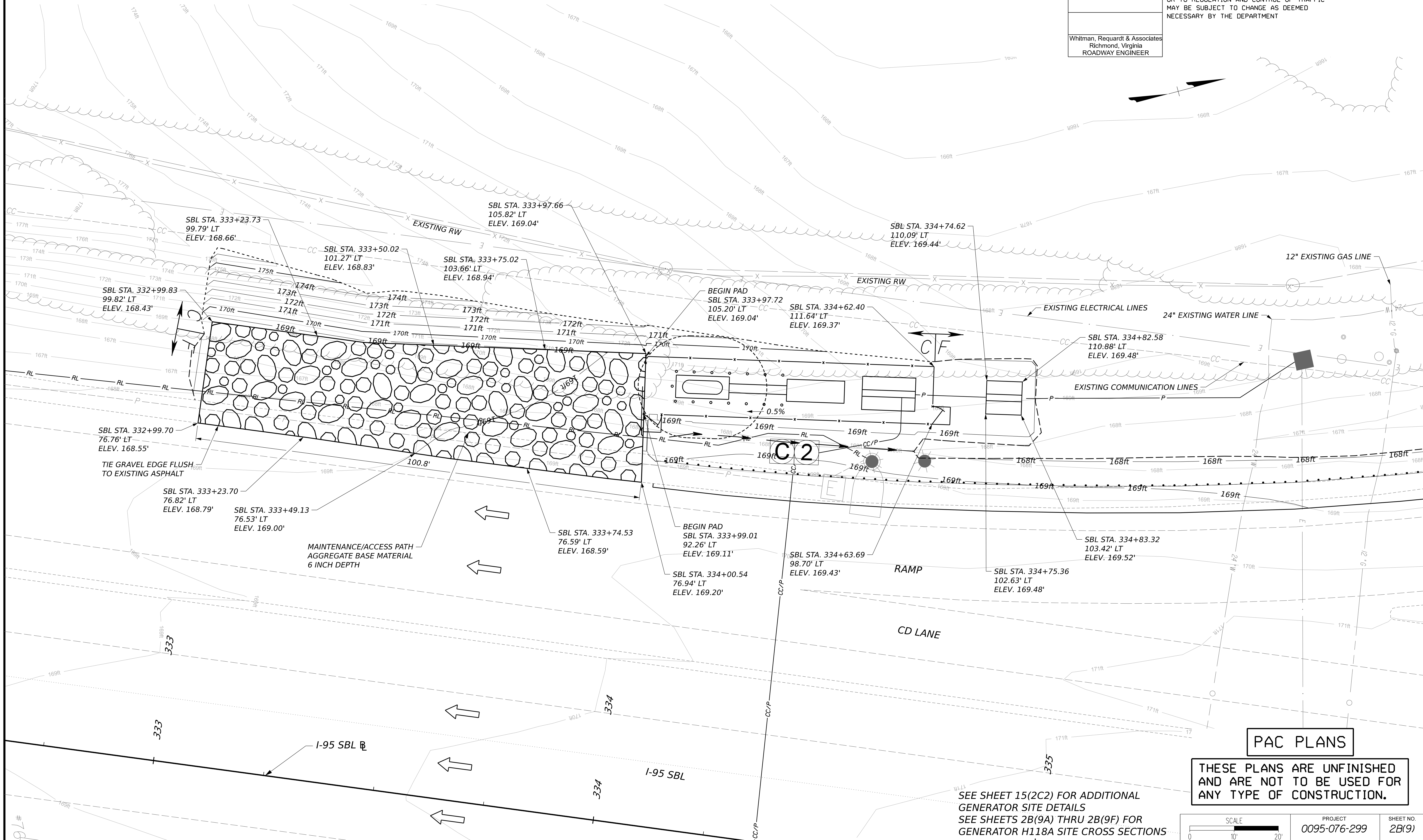
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140 07/07/2021*

GENERATOR H118A SITE GRADING PLAN

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	2B(9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

SEE SHEET 15(2C2) FOR ADDITIONAL GENERATOR SITE DETAILS
 SEE SHEETS 2B(9A) THRU 2B(9F) FOR GENERATOR H118A SITE CROSS SECTIONS

SCALE 0 10' 20'	PROJECT 0095-076-299	SHEET NO. 2B(9)
--------------------	-------------------------	--------------------

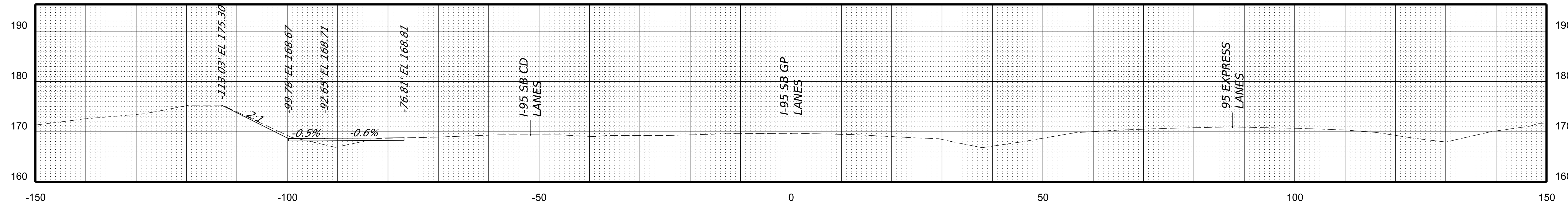
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

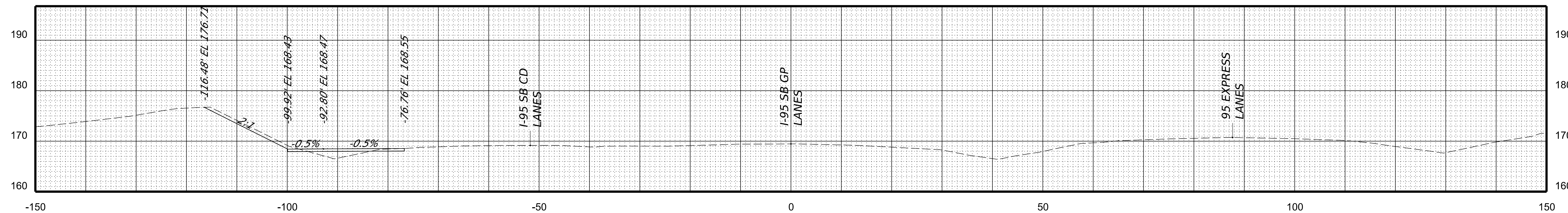
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (9A)

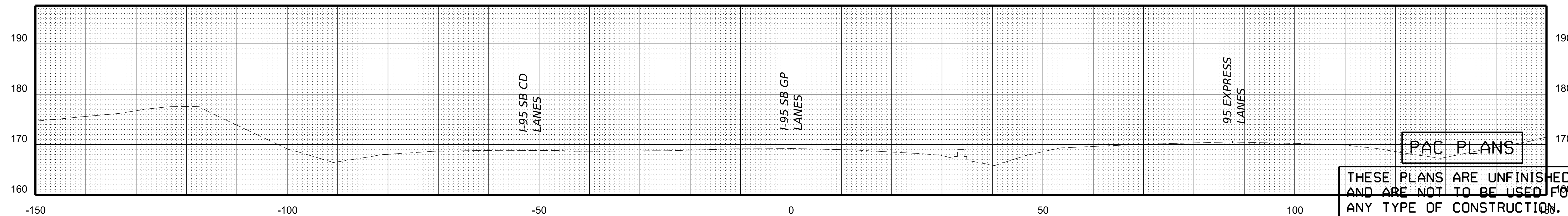
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 333+25.00



STA 333+00.00



STA 332+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

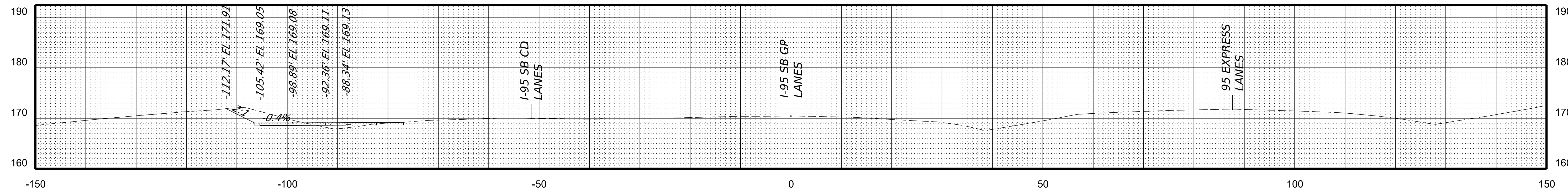
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

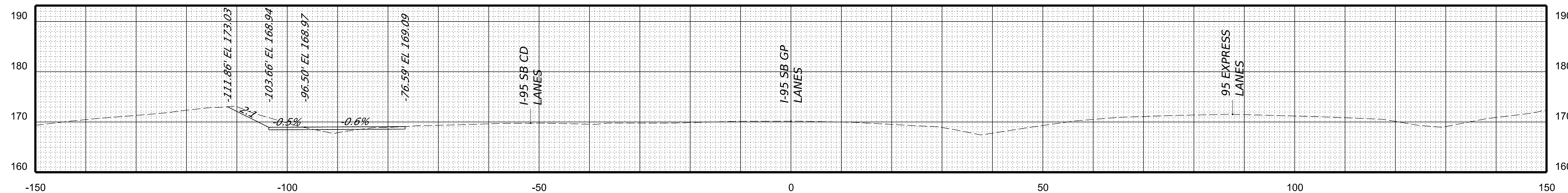
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (9B)

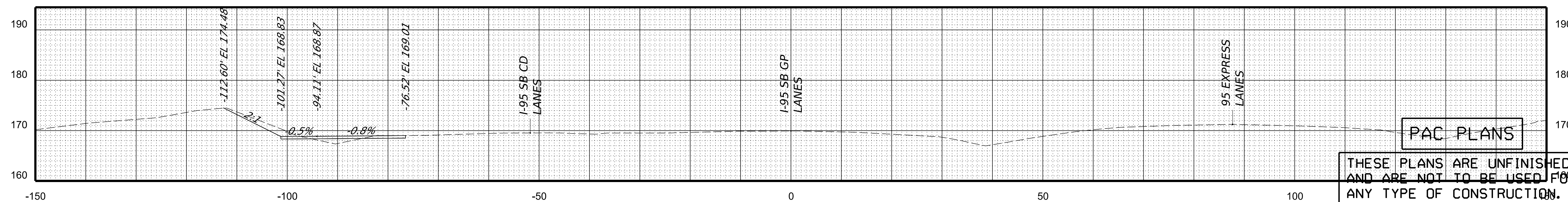
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 334+00.00



STA 333+75.00



STA 333+50.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

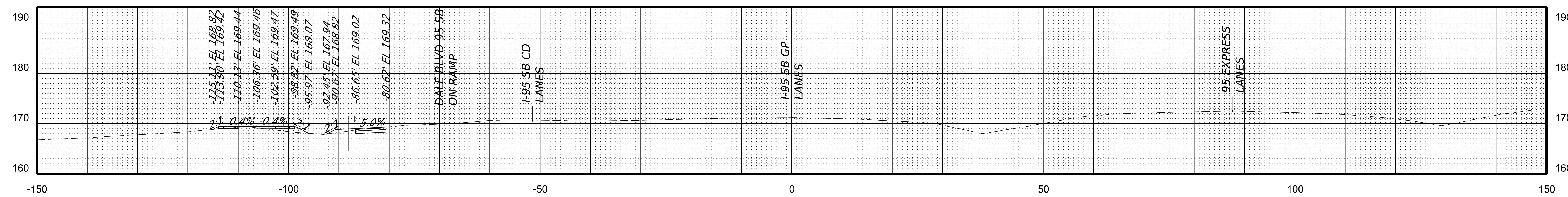
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

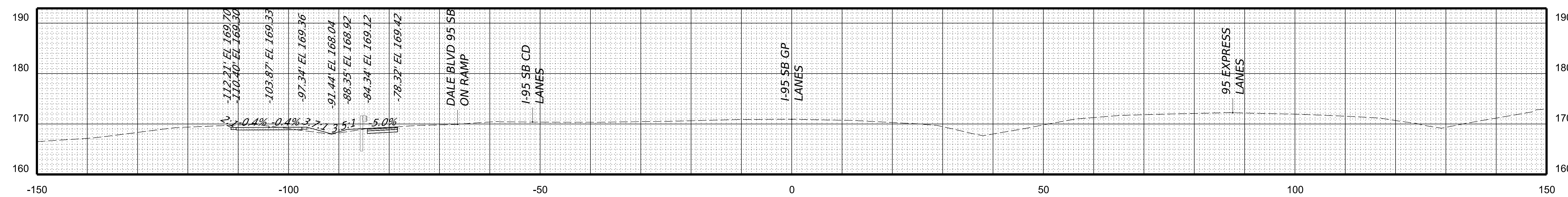
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (9C)

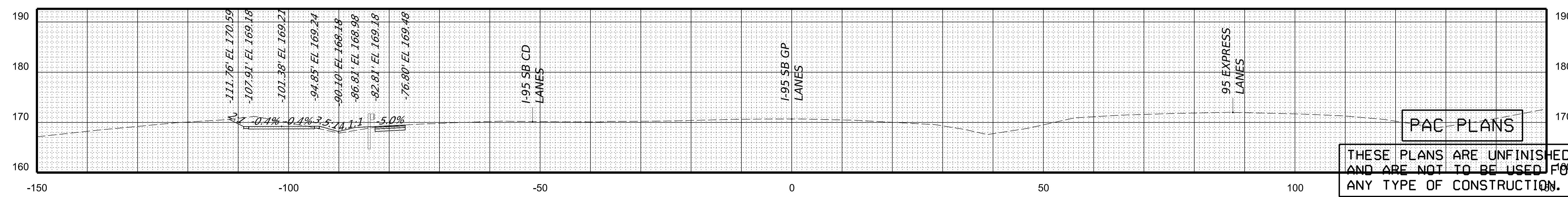
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 334+75.00



STA 334+50.00



STA 334+25.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

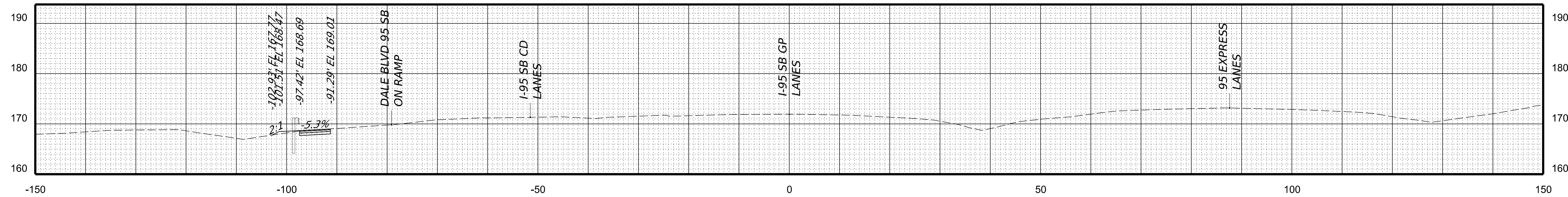
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

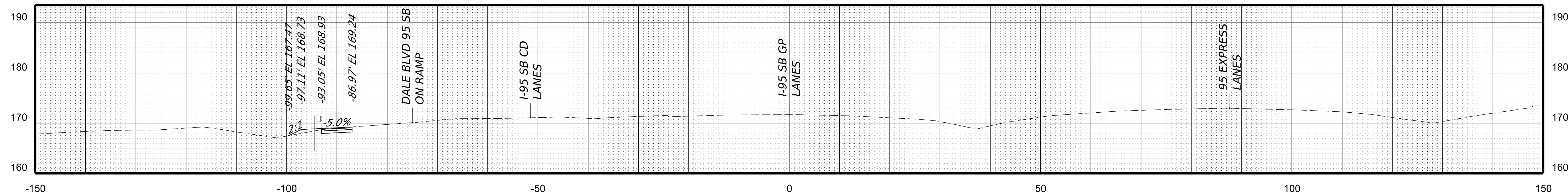
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (9D)

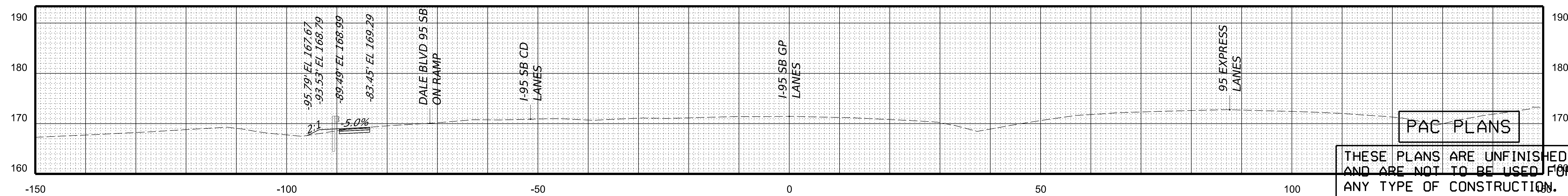
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 335+50.00



STA 335+25.00



STA 335+00.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

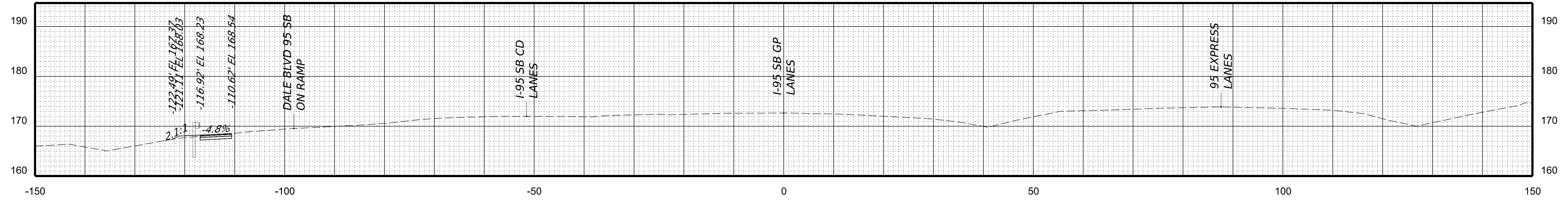
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

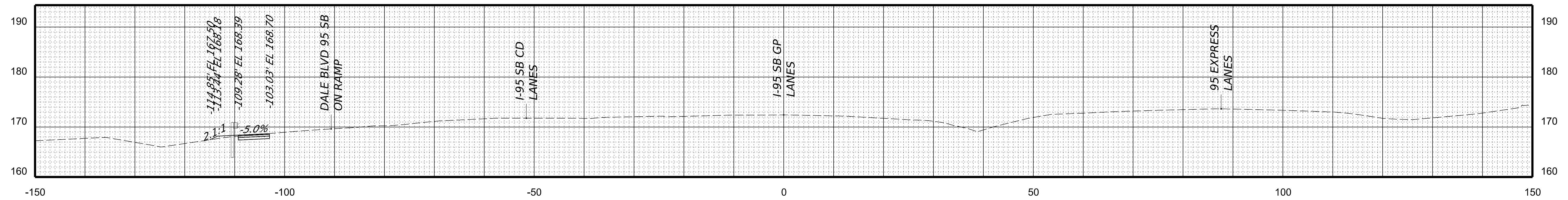
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (9E)

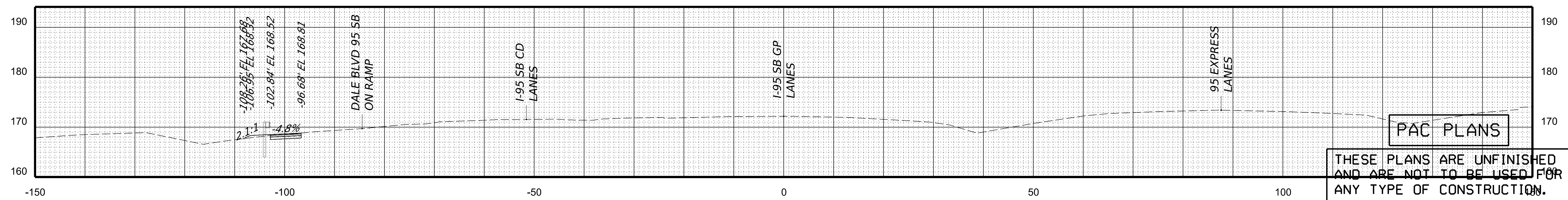
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 336+25.00



STA 336+00.00



STA 335+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

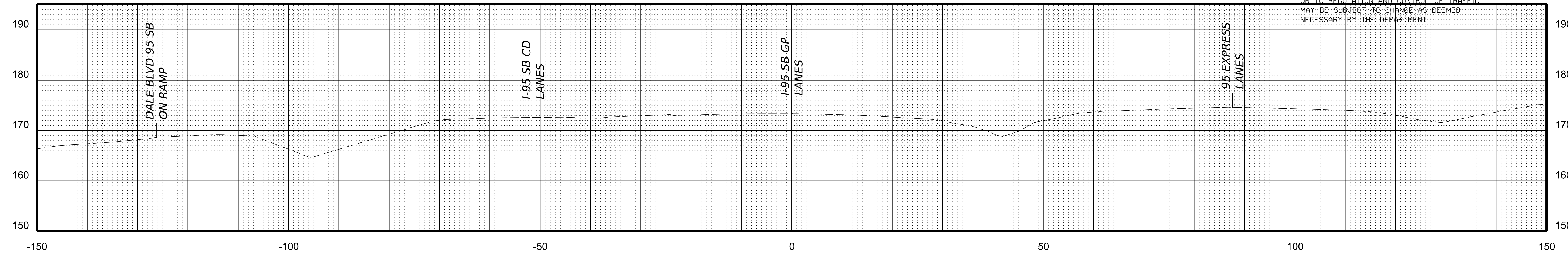
PROJECT MANAGER: Bipal Shah, P.E. (703) 259-2362 (NOVA District)
SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
DESIGN BY: Whitman, Requardt, & Associates, LLP (804) 272-8700
SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7740, 07/07/2021

CROSS SECTIONS

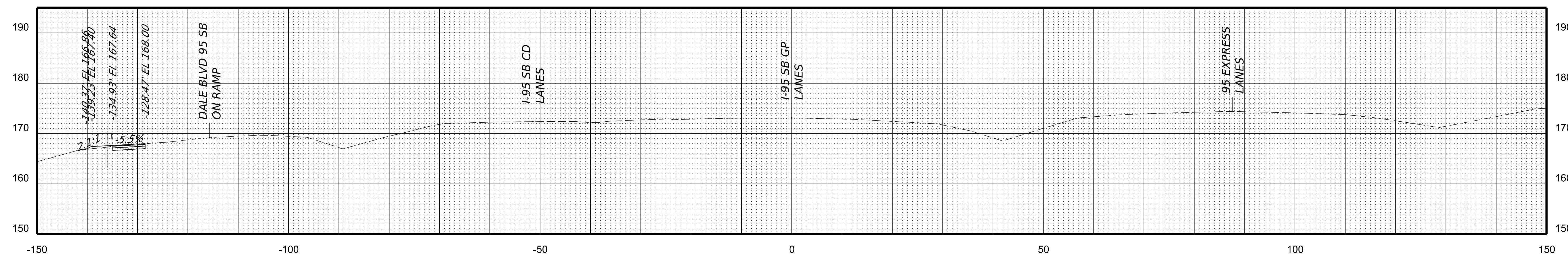
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2B (9F)

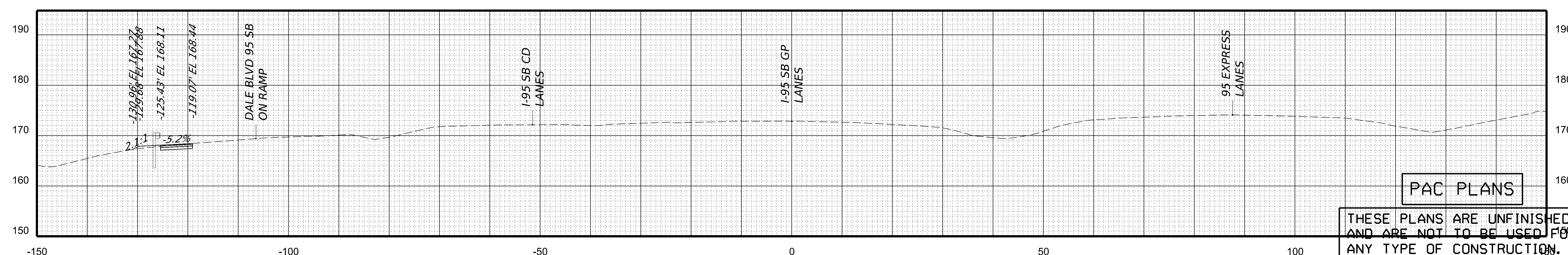
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 337+00.00



STA 336+75.00



STA 336+50.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

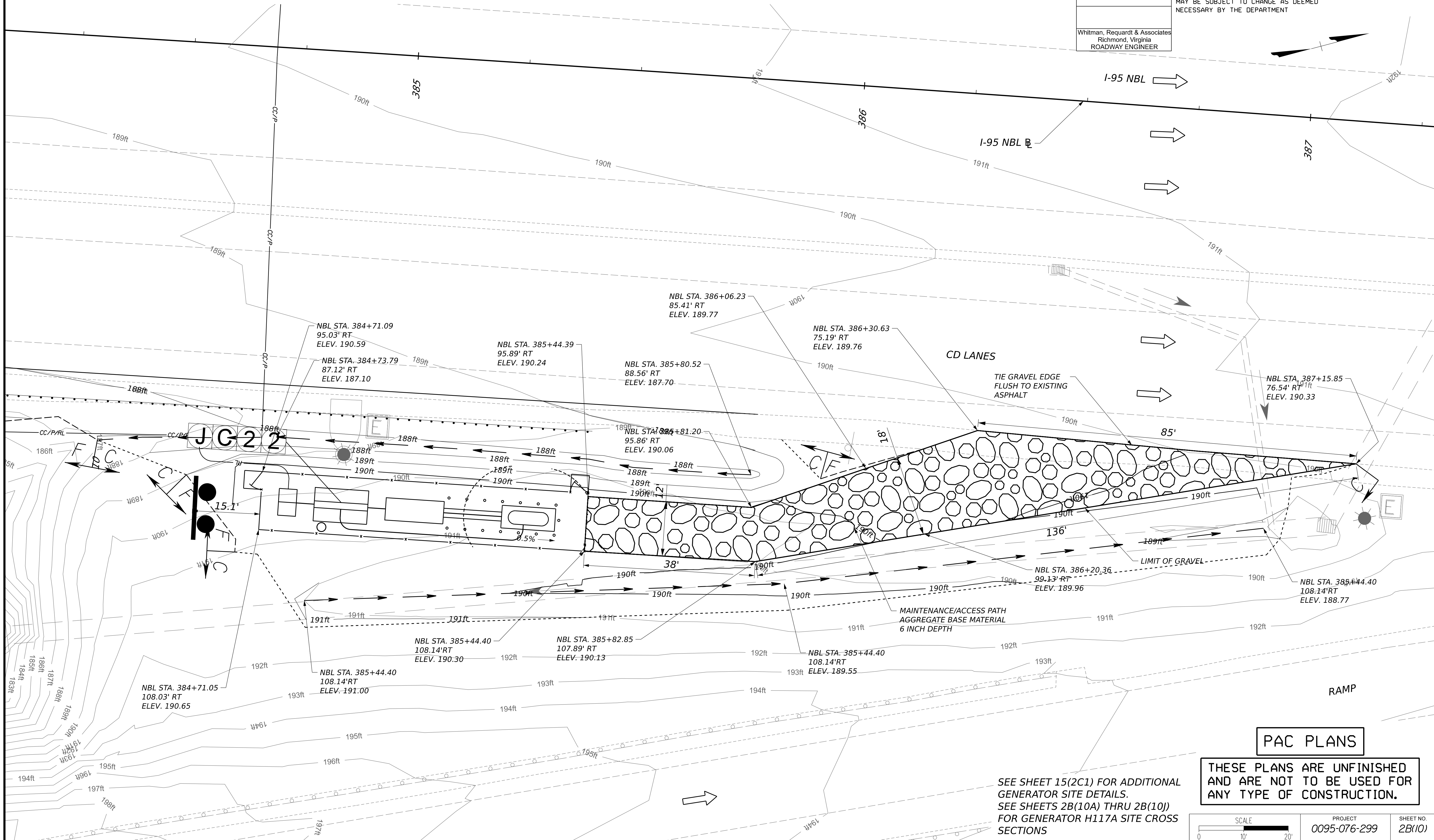
PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

GENERATOR H117A SITE GRADING PLAN

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299,C-501	2B(10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

SEE SHEET 15(2C1) FOR ADDITIONAL GENERATOR SITE DETAILS.
 SEE SHEETS 2B(10A) THRU 2B(10J) FOR GENERATOR H117A SITE CROSS SECTIONS

SCALE 0 10' 20'	PROJECT 0095-076-299	SHEET NO. 2B(10)
--------------------	-------------------------	---------------------

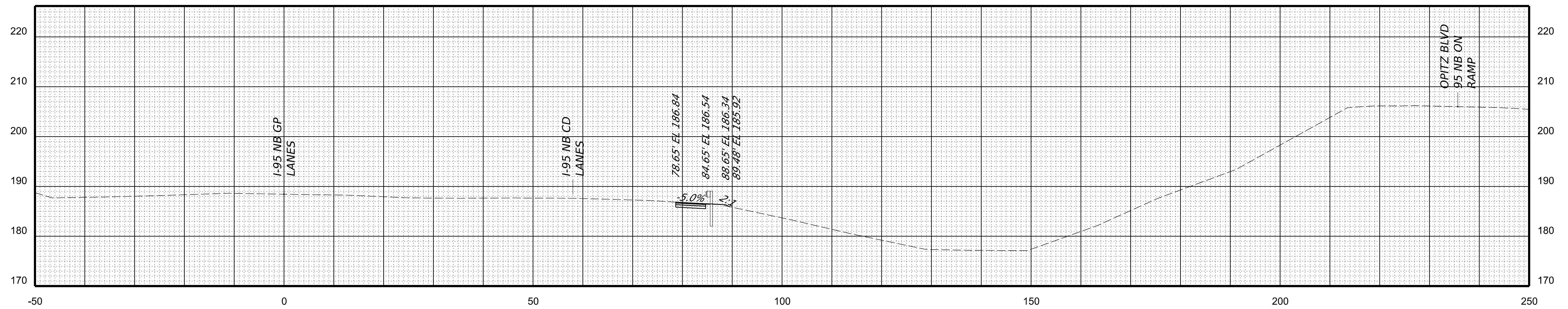
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

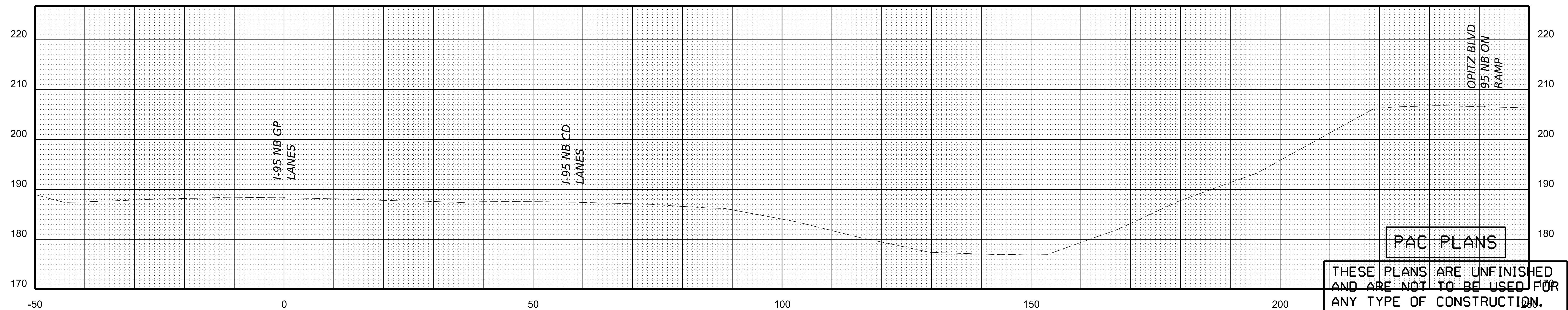
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10A)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 382+50.00



STA 382+25.00

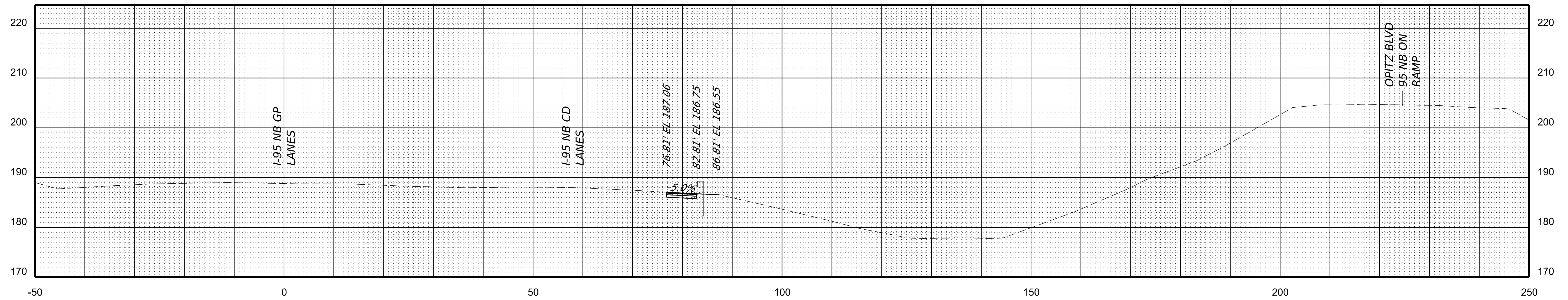
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

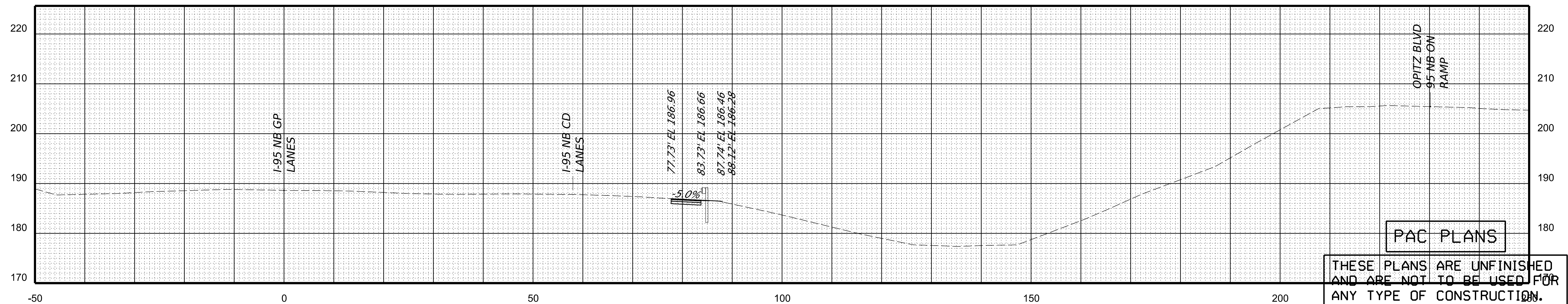
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10B)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 383+00.00



STA 382+75.00

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

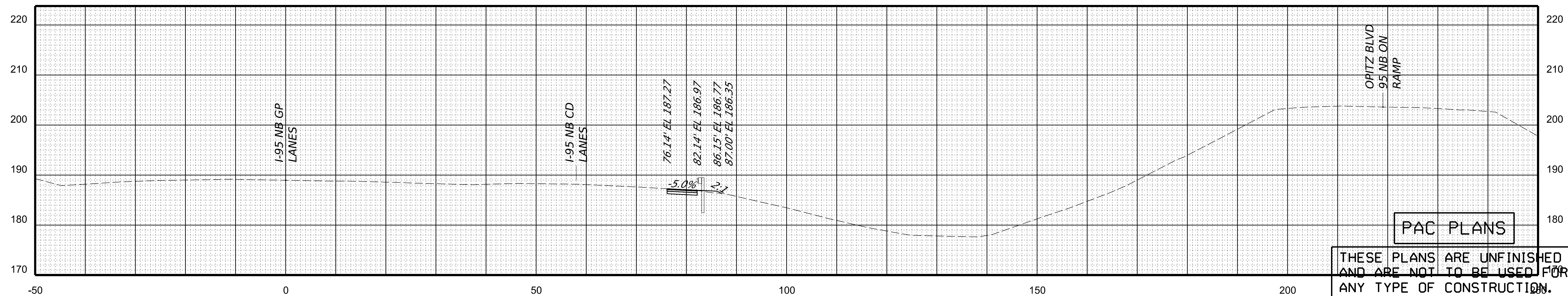
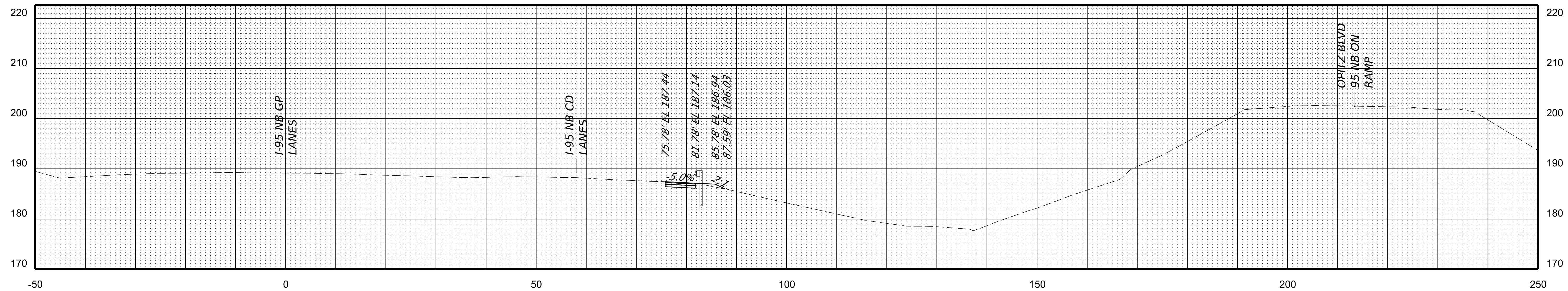
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2B (10C)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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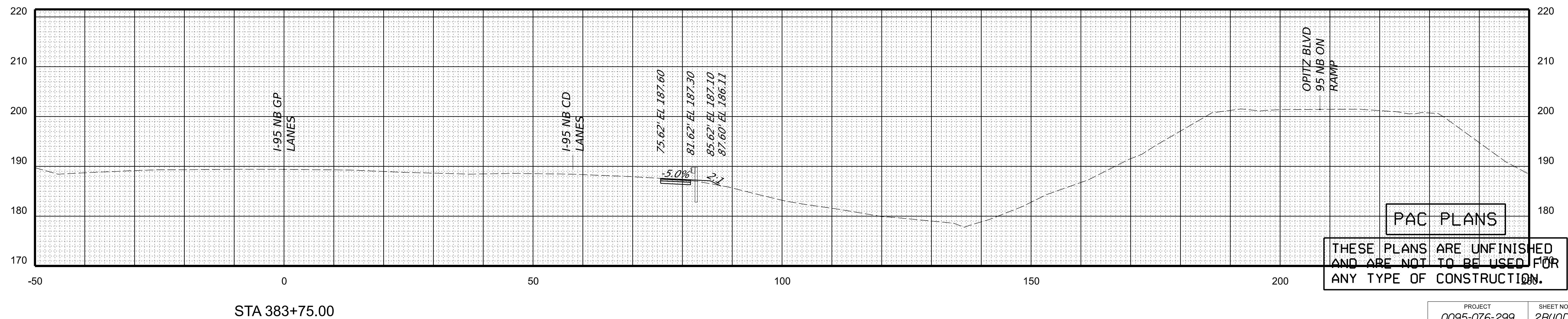
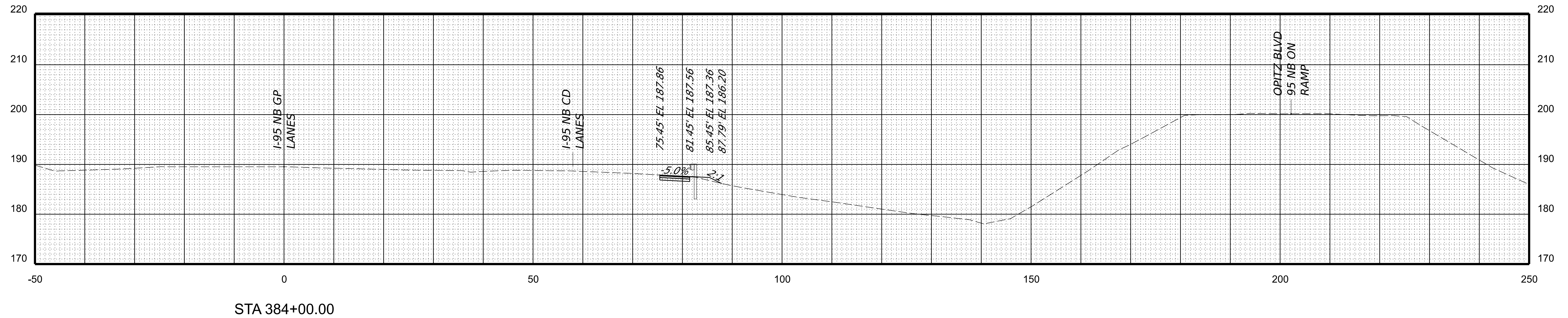
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10D)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



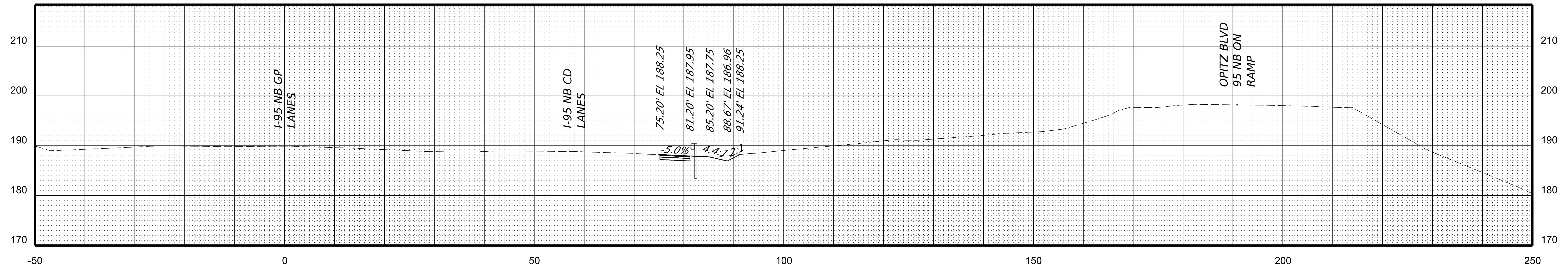
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

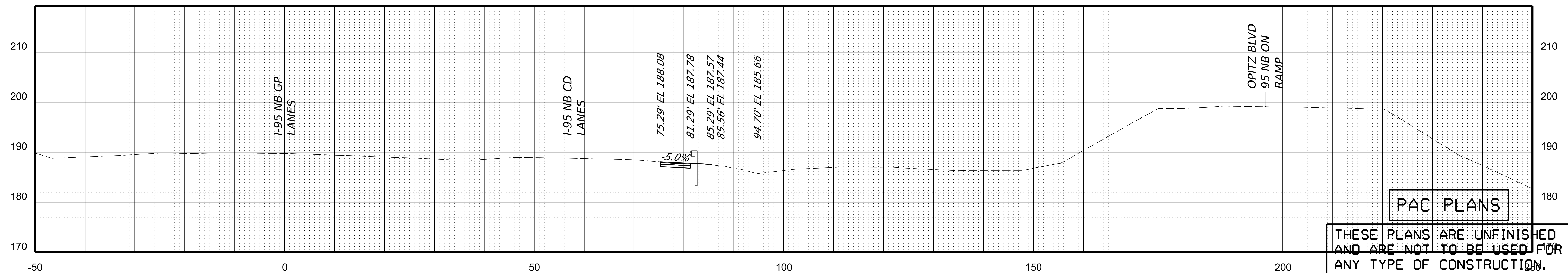
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10E)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 384+50.00



STA 384+25.00

PAC PLANS

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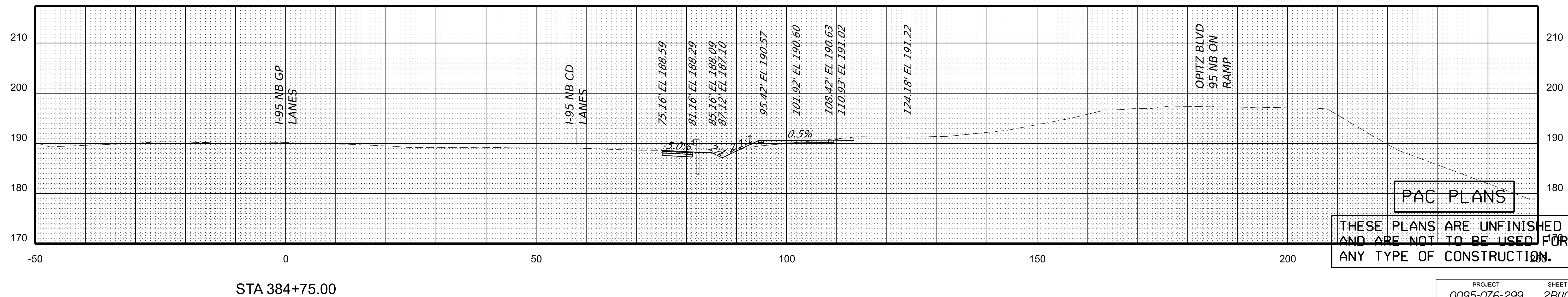
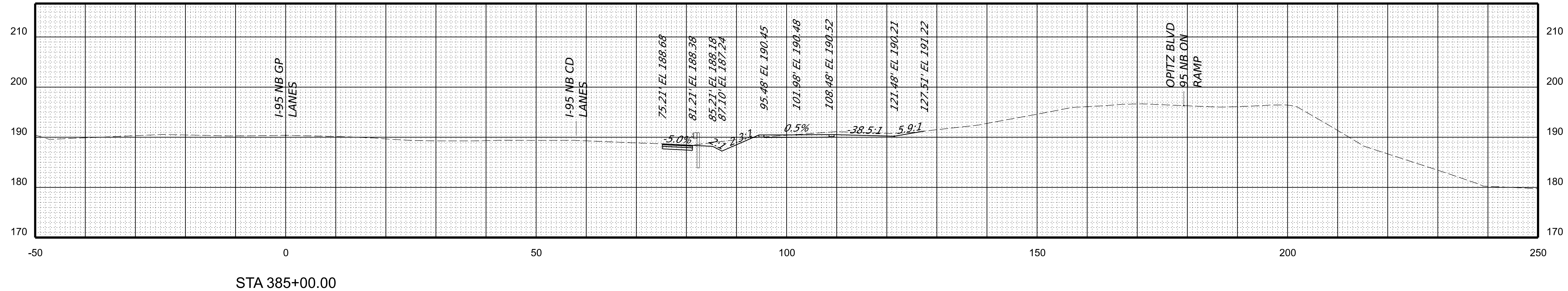
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10F)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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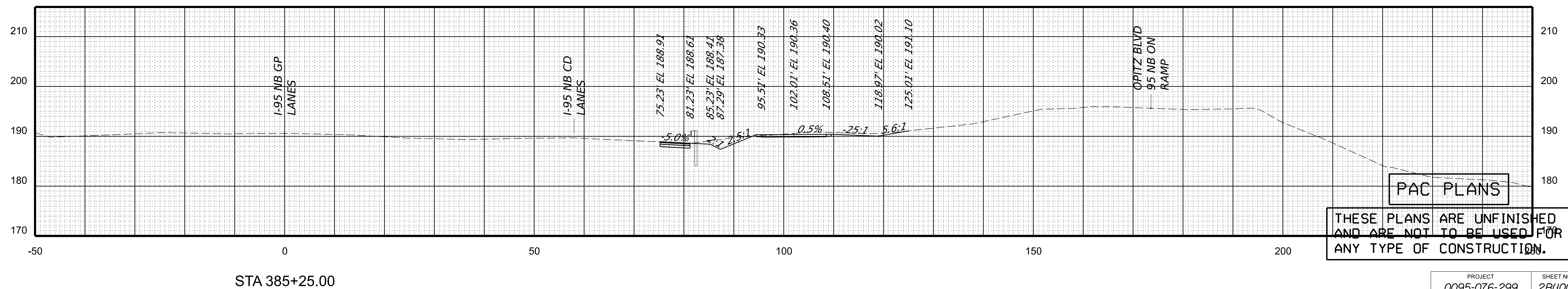
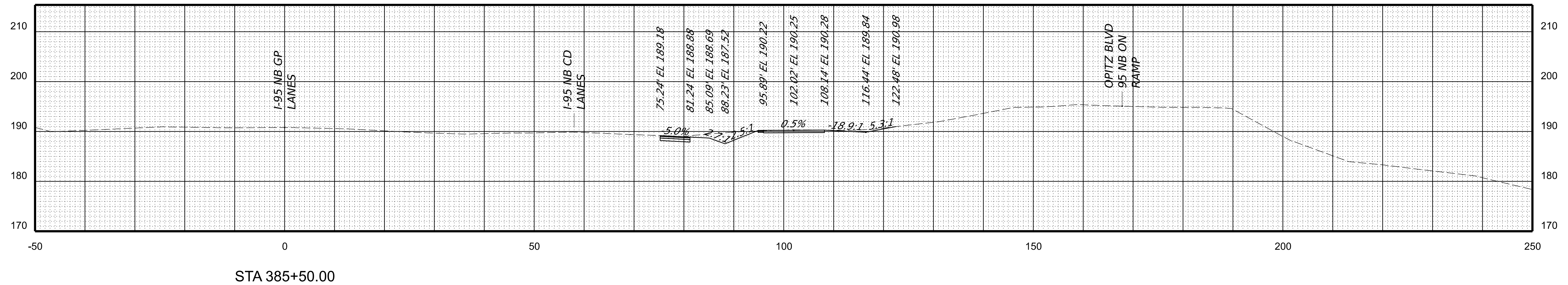
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10G)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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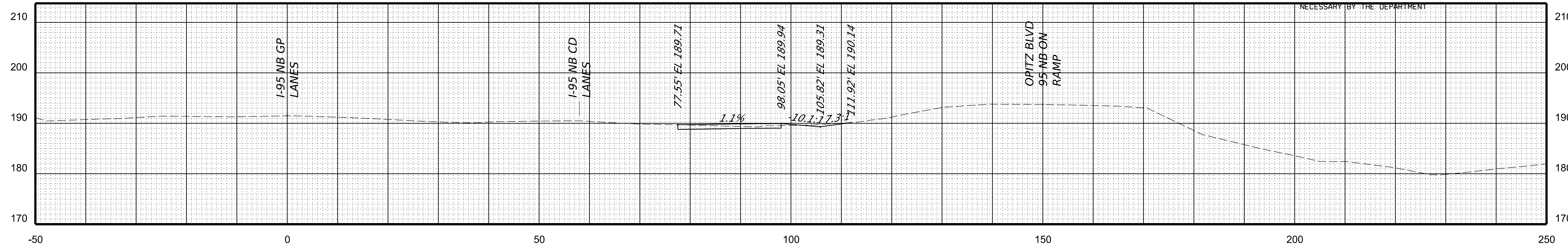
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 IN/VA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

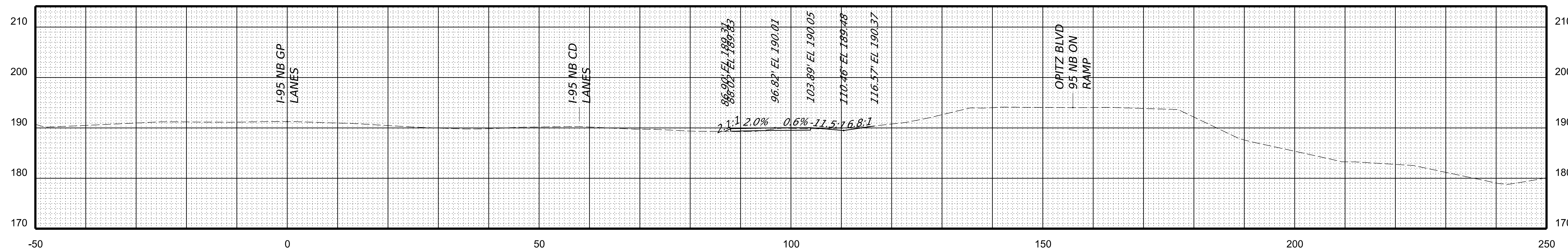
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2B (10H)

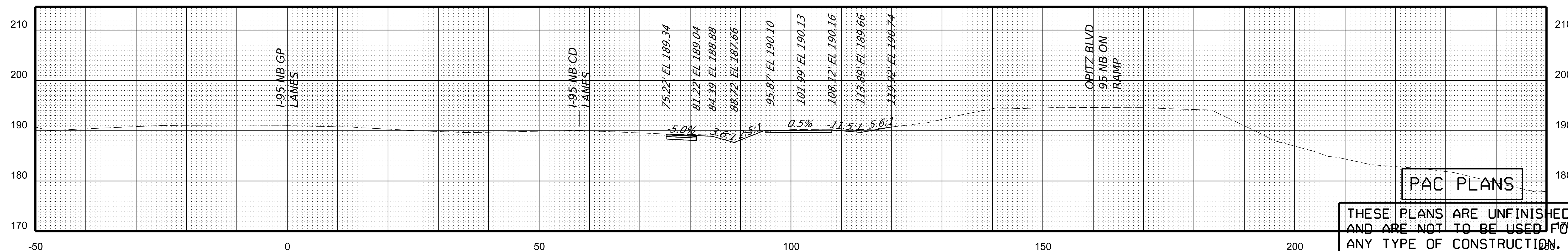
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 386+25.00



STA 386+00.00



STA 385+75.00

PAC PLANS

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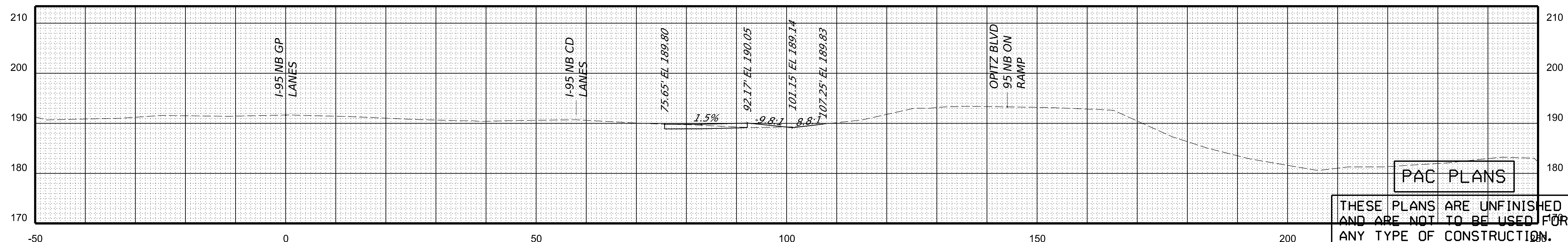
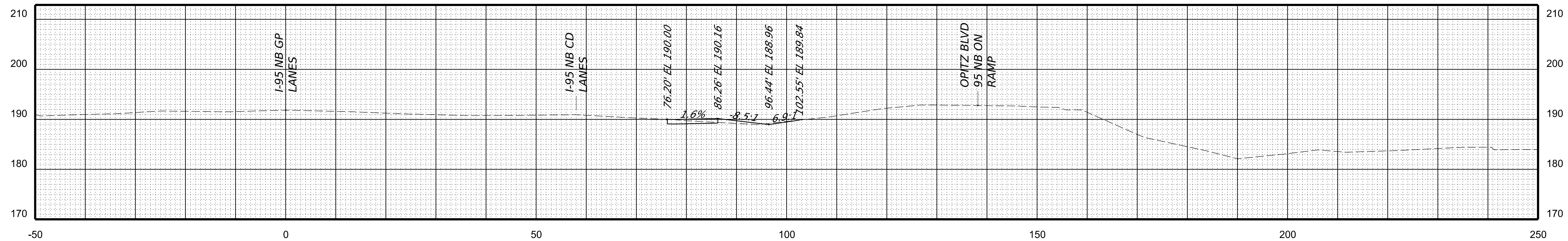
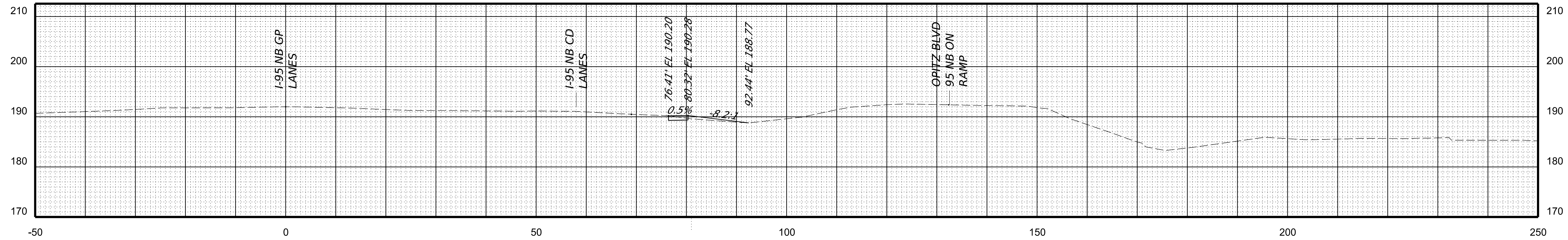
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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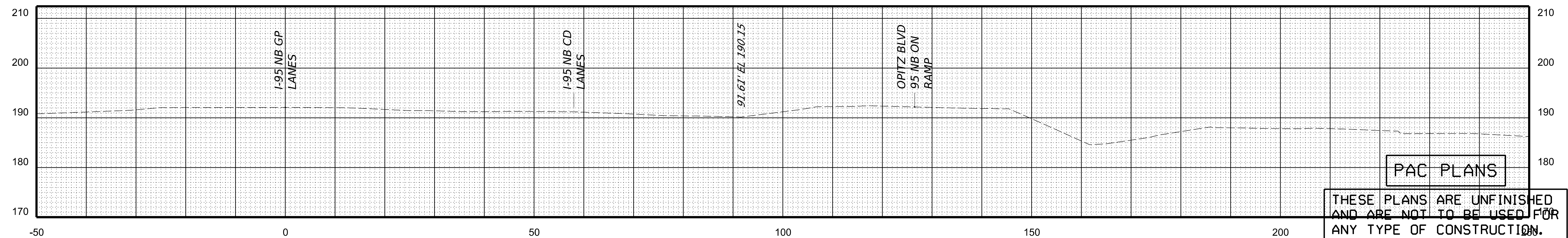
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	2B (10J)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 387+25.00

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E., (703) 259-2362, INOVA District*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt, & Associates, LLP, (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc., (804) 550-7140, 07/07/2021*

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) GENERAL INFORMATION SHEET

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	2C(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

The information contained in the SWPPP General Information sheets is intended to comply with the requirements of the VPDES General Permit For Discharges Of Stormwater From Construction Activities (the VPDES Construction Permit) issued July 1, 2019 and VDOT's approved Annual ESC and SWM Standards and Specifications.

The SWPPP General Information sheets are to be completed and included in the construction plan set (or other such documents) for land disturbance activities that disturb an area equal to or greater than 10,000 square feet outside the Chesapeake Bay Preservation Area, or equal to or greater than 2,500 square feet in the area defined as Tidewater, Virginia in the Virginia Chesapeake Bay Preservation Act.

The VDOT RLD (as defined in the latest IIM 242) will ensure that the information shown on the SWPPP General Information sheets is updated/revised as necessary in order to reflect changes that may occur during the construction phase of the land disturbing (construction) activity. The updated/revised sheets shall be maintained with the designated record set of plans (or other such documents) for the land disturbance (construction) activity.

✖✖ 4. The location of on-site support facilities that will be covered under the VPDES Construction Permit coverage for this land disturbance (construction) activity shall be provided by the contractor and identified on the record set of plans or in other appropriate contract documents. Support facilities shall include, but not be limited to, borrow and disposal areas, construction and waste material storage areas, equipment and vehicle washing, maintenance, storage and fueling areas, storage areas for fertilizers, fuels or chemicals, concrete wash out areas, sanitary waste facilities and any other areas that may generate a stormwater or non-stormwater discharge directly related to the construction site.

✖✖ 5. Written Evidence of permit coverage shall be provided by the contractor for all support activities located outside of VDOT right of way or easement in the form of the Construction General Permit coverage letter: (List VPDES Permit # or Letter from VSMP Authority stating coverage not needed)

6. List the surface waters that have been identified as impaired in the DEQ 2012 305(b)/303(d) Water Quality Assessment Integrated Report for sediment, total suspended solids, turbidity, Nitrogen or Phosphorus. These pollutants are considered benthic impairments: None

7. Identify the TMDL's where stormwater from construction activities discharges into a watershed with a TMDL waste load allocation established and approved by the State Water Control Board prior to July 1, 2016 for sediment, total suspended solids, turbidity, nitrogen or phosphorus: Chesapeake Bay - suspended solids, nitrogen, & phosphorus

8. This land disturbance activity discharges stormwater to the following surface waters that have been identified as exceptional in Section 9VAC25-260-30 A 3 c of the Virginia Administrative Code: Not Applicable

9. Locations of surface waters and locations where concentrated stormwater is discharged from this land disturbance (construction) activity are identified in the construction plan set (or other such documents) for this land disturbance (construction) activity. (List name of surface waters and locations here if not shown in construction plan or other such documents).

10. The ESC and SWM plans (where applicable) for this land disturbance (construction) activity have been developed in accordance with VDOT's Approved Annual Erosion and Sediment Control and Stormwater Management Standards and Specifications as approved by the DEQ.

11. List the RLD and other responsible parties for the land disturbance activity: (required for erosion and sediment control). The following individual(s) have "delegated authority" to sign all reports required by the construction permit including the SWPPP General Information Sheets and Inspection Reports (C-107). Reference form LD-445H for delegation of authority (form 445H for the project is hereby incorporated by reference into this SWPPP). These individual(s) has/have overall responsibility or the environmental matters for the project: (required only for permitted projects):

Name	Position	Responsibility
	RLD	Certify the SWPPP (with date & sig.)
	Certified Inspector	Sign (C-107) Inspection Form Part 1
	Certified Inspector	Sign (C-107) Inspection Form Part 2

✖ 12. The name of the VDOT individual(s) responsible for the oversight inspection in accordance with IIM-LD-256 on these land disturbance construction activities as identified on these SWPPP General Information Sheets. The names will be updated and maintained with the other SWPPP documents for this land disturbance activity.

VDOT Individuals	Position	Responsibility
Marion Carroll	NPDES	NPDES coordinator responsible for the oversight inspection in accordance with IIM-LD-256
Pawan Sarang	Dist. Hyd. Engineer	District Hydraulic Engineer or designee(s) responsible for the review & the coordination approval of ESC SWM plan modification(s).

✖ 13. The ESC and P2 inspections for this land disturbing (construction) activity shall follow (Select Schedule 1 or 2, if schedule #2 is used, void note #14) as defined in 2016 R&B Specifications except for Section 107.16(e) 4.an Inspection Requirements Rain gauge notes apply only to Inspection Schedule 1.

✖✖ 14. The location of the on-site rain gage that will be used to determine the occurrence of a measurable storm event for the purposes of ESC and Pollution Prevention inspections will be provided by the contractor and identified on the record set of plans or in other appropriate SWPPP documents for this land disturbance activity: (List location of rain gage).

The rain gage shall be observed daily at " " to determine the occurrence of a measurable storm event (i.e., 0.25 inches of rainfall or greater in a 24 hour period). A log book shall be maintained to record observation information which shall include (1) the date, (2) the time, (3) whether or not rainfall is occurring at the time of the observation, (4) the amount of accumulated rainfall in the gage, if any, and (5) whether or not an inspection is required based on the amount of accumulated rainfall in the gage. If there is no rainfall occurring at the time of the observation, the observation information shall be noted in the log book and the rain gage emptied and replaced. An inspection is required if there is 0.25 inches or more accumulation noted in the rain gage. If there is rainfall occurring at the time of the observation, the observation information is to be noted in the log book. The rain gage is not to be emptied but left to accumulate additional rainfall until the conclusion of the rainfall event. At the conclusion of the rainfall event, an observation of the rain gage shall be made and the observation information shall be noted in the log book and the rain gage emptied and replaced. An inspection is required if there is 0.25 inches or more accumulation noted in the rain gage.

15. The following VDOT documents are applicable to a) permitted projects b) non-permitted projects in Chesapeake Bay Preservation Areas (CBPA) with 2,500 S.F. to 1.0 acre of land disturbance c) non-permitted projects requiring a SWPPP and d) Non-permitted, Non-CBPA with BMP projects that have a water quantity BMP:

- VDOT LD-445: Permitted projects, CBPA projects and Non-permitted, Non-CBPA with BMP projects that have a water quantity BMP and ESC projects > 10,000 s.f. but <1 acre.
- VDOT LD-445A: Permitted projects only.
- VDOT LD-445C: Projects that require a permit, ESC Plan, or SWPPP.
- VDOT LD-445D: Permitted projects, CBPA projects and Non-permitted, Non-CBPA with BMP projects that have a water quantity BMP.
- VDOT LD-445F: Emergency work projects (when applicable).
- Water Quality Requirement (when applicable)
- VDOT LD-445H: Permitted projects only.
- VDOT C-107 Part I and Part II. All projects that require a permit or SWPPP.
- VDOT LD-445I: AS&S Approval Form (when applicable)

16. If there is an excessive loading of sediment from the project (i.e. more than to be expected from the project with an implemented ESC plan) that is discovered within a local watershed with a sediment TMDL that allocates a WLA to VDOT's MS4, (see note #7) the contractor shall investigate the area of concern at the site within 24 hours of discovery and ensure all erosion and sediment control best management practices are being implemented in accordance with the permits approved standards and specifications required by Part I.B of the current Construction General Permit. If corrective action is necessary, the contractor shall initiate corrective actions no later than 5 business days after the initial investigation.

17. If excessive loading of sediment from a land disturbing activity that is not the responsibility of the contractor is discovered discharging into a MS-4, the contractor shall notify the municipality with jurisdiction over erosion and sediment control activities.

- ✖ Denotes information that is to be provided/completed by the RLD.
- ✖✖ Denotes information that is to be provided/completed by the contractor.

I certify under penalty of law that I have read and understand this document and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that this document and all other documents related to the SWPPP, as identified on the SWPPP General Information Sheets, are maintained at the activity site, or at a location convenient to the activity site where no on-site facilities are available, and such documents will be made available for review upon request in accordance with the provisions of the General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10) when applicable. Where the SWPPP documents are not stored on-site, a copy of such documents shall be in the possession of those with day to day operational control over the implementation of the SWPPP whenever they are on site.

• or •• Delegated Authority Signature"

Signature: _____
 Printed Name: _____
 Date: _____

(1) See Section 1, Item 11 relating to delegation of authority, and form LD-445H (Delegation of Authority).

ACRONYMS

CBPA - Chesapeake Bay Preservation Act	SWPPP - Stormwater Pollution Prevention Plan
BMP - Best Management Practice	TMDL - Total Maximum Daily Load
DEQ - Department of Environmental Quality	VDOT - Virginia Department of Transportation
EPA - U.S. Environmental Protection Agency	VPDES - Virginia Pollutant Discharge Elimination System
ESC - Erosion and Sediment Control	VSMP - Virginia Stormwater Management Program
IIM - Instructional and Informational Memorandum	VESCP - Virginia Erosion and Sediment Control Program
R&B - Road and Bridge	WLA - Waste Load Allocation
RLD - Responsible Land Disturber	SWM - Stormwater Management

SECTION I GENERAL INFORMATION

1. Activity Description - This project will construct a new on/off ramp connecting Opitz Blvd. with the I-95 HOT Lanes. The ramp will be constructed on the Opitz Blvd. bridge over I-95 and will require widening and modification to the bridge and adjacent approaches. The proposed ramp will require the closure of a slip ramp from I-95 South into the HOT Lanes, and a new slip ramp will be constructed with this project south of the new on/off ramp.

2. This land disturbance construction activity site is located in Prince William County and approximately 7.04 acres will be disturbed by excavation, grading or other construction activities.

3. A. This proposed activity disturbs one acre or greater and requires coverage under the VPDES General Permit for Discharges Of Stormwater from Construction Activities (the VPDES Construction Permit) as issued by the DEQ. A copy of the VPDES Construction Permit (VAR10), the registration information (LD-445 & LD-445C forms) and the permit coverage letter received from DEQ shall be maintained with other SWPPP documents for this land disturbing activity.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

Revised 5/1/19

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2C(1)
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PROJECT MANAGER Rimpa Shah, P.E., (703) 259-2362, (NOVA District)
 SURVEYED BY, DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY Whitman, Reardon, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE Accurmark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2C(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

SECTION II EROSION AND SEDIMENT CONTROL

- XX 1. The intended sequence and timing of activities that disturb soils at the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation, etc.) shall be provided by the contractor in accordance with the current edition of Section 108.03 of the VDOT R&B Specifications and shall be included with the other SWPPP documents for this land disturbance (construction) activity.
2. Directions of stormwater flow and approximate slopes anticipated after major grading activities are identified in the construction plan set (or other such documents) for this land disturbance (construction) activity.
3. Areas of soil disturbance and areas of the site which will not be disturbed are identified in the construction plan set (or other such documents) for this land disturbance (construction) activity.
4. Locations of major structural and nonstructural ESC measures intended to filter, settle or similarly remove sediment are identified in the construction plan set (or other such documents) for this land disturbance (construction) activity.
5. Locations where stabilization practices are expected to occur are identified in the construction plan set (or other such documents) for this land disturbance (construction) activity.
6. A description of interim and permanent stabilization practices for the site are identified in the applicable sections of the documents identified in the Note 1 of Section IV.

- XX 7. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated will be provided by the contractor and maintained with the record set of plans or other SWPPP documents for this land disturbance (construction) activity: (List how this will be tracked and the location)

8. A description and schedule of procedures to maintain vegetation, erosion and sediment control measures and other protective measures in good and effective operating conditions are identified in the current edition of Sections 107.16 and 303.03 of the VDOT R&B Specifications.

9. Nutrients shall be applied in accordance with the current edition of Sections 603 and 604 of the VDOT Road and Bridge Specifications. Nutrients shall not be applied during rainfall events. Top soil shall be applied in accordance with the current edition of section 602 of the latest Road and Bridge Specifications.

10. All engineering calculations supporting the design of erosion and sediment control measures proposed for this land disturbance (construction) activity are contained in the project drainage file located in the NOVA District Hydraulics Section Office and will be made available for review upon request during normal business hours.

11. The temporary erosion and siltation control items shown on the ESC Plan for this land disturbing (construction) activity are intended to provide a general plan for controlling erosion and sediment within the project limits. The ESC Plan is based on field conditions at the time of plan development and an assumed sequence of construction for the project. The contractor, in conjunction with the VDOT Project Engineer and/or ESC Inspector, shall adjust the location, quantity and type of erosion and sediment control items required based on the actual field conditions encountered at the time of construction and the actual scheduling and sequencing of the construction activities. Significant changes to the proposed ESC Plan (e.g., those that require an engineering analysis, elimination of a perimeter control, change to ESC concept that would affect the quantity or direction of flow of water) shall be submitted to the applicable District Hydraulics Engineer for review and approval. Any changes to the proposed ESC Plan must be noted on the designated record set of plans which shall be retained on the project site and made available upon request during normal business hours.

12. The areas beyond the project's construction limits are to be protected from siltation. Perimeter controls such as silt fence, diversion dikes, turbidity curtains, etc. shall be installed prior to any grubbing operations or other earth moving activities.

13. Temporary earthen structures such as dikes and berms are to be stabilized immediately upon installation. Stabilization may include temporary or permanent seeding, riprap, aggregate, sod, mulching, and/or soil stabilization blankets and matting in conjunction with seeding.

14. All channel relocations are to be constructed during the earliest stage of construction and shall be constructed in accordance with all applicable permit requirements and shall be constructed in the dry wherever possible. Stabilization or vegetation shall be established before flow is redirected through the constructed area as directed by the Engineer.

15. The contractor shall plan and implement his land disturbance operations in order to:
- Control the volume and velocity of stormwater runoff within the site to minimize erosion.
 - Control the peak flow rates, volume and velocity of stormwater discharges to minimize erosion at outlets and in downstream channels.
 - Minimize the amount of soil exposed.
 - Minimize the disturbance of steep slopes.
 - Minimize sediment discharge from the site.
 - Provide and maintain natural buffers around surface waters, direct stormwater runoff to vegetated areas and maximize stormwater infiltration, unless infeasible.
 - Minimize soil compaction (except in those areas where compaction is required by the contract documents) and preserve topsoil where feasible.

- XX 16. The name of the individual(s) or contractor(s) responsible for the installation and maintenance of the erosion and sediment control measures shall be supplied by the contractor and maintained with the other SWPPP documents for this land disturbance (construction) activity.

17. Soil stockpiles temporarily placed within the project area or on VDOT right of way or easement shall be identified, stabilized, and protected with sediment trapping measures.

18. A construction entrance or other approved measure shall be installed at all locations where construction vehicular traffic access routes intersect a paved or a public road in order to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a paved or a public road surface, the road shall be cleaned thoroughly at the end of each work day by shoveling or sweeping. Removed sediment shall be disposed of in accordance with Section 106.04 of the R&B Specifications.

19. Any variance, exception or deviation approved by DEQ must be listed below and supporting documentation (exception/variance/deviation request and DEQ approval) must be maintained with the SWPPP.

The following exceptions to the Water Quantity criteria of the VSMP Regulation have been approved by the DEQ for this land disturbance (construction) activity: (list all approved exceptions and include a brief description of the exception, the date approved and the approving DEQ Office)

Type(1)	Regulation Modified(2)	Approval Date(3)	Description of Variance

- (1) Type of modification (Variance from ESC regulations, or Deviation from published guidance)
 (2) Section of Regulation or Guidance Document Modified (e.g. ESC Min. Std. 15)
 (3) Date that variance/exception/deviation was approved by DEQ.

SECTION III POST CONSTRUCTION STORMWATER MANAGEMENT

Choose the appropriate note 1A or 1B that is applicable to the proposed post construction SWM Plan for this land disturbance (construction) activity. (Delete, strikethrough or mark as NA those notes not applicable.)

1. (Include one of the following notes as appropriate)

~~XX A. This land disturbance activity is grandfathered under Section 9VAC25-870-48 of the VSMP Regulations and utilizes the Part IIC technical criteria (i.e., Performance or Technology Based, MS 19, etc.) in Section 9VAC25-870-93 et seq. of the VSMP Regulations.~~

XX B. This land disturbance activity utilizes the Part IIB technical criteria (i.e., Runoff Reduction Method, Energy Balance Equation, etc.) in Section 9VAC25-870-62 et seq. of the VSMP Regulations.

~~2. An exception for (number) pounds of phosphorus removal has been granted for this land disturbance activity by the DEQ in its letter dated (date).~~

3. Any variance, exception or deviation approved by DEQ must be listed below and supporting documentation (exception/variance/deviation request and DEQ approval) must be maintained with the SWPPP.

The following exceptions to the Water Quantity criteria of the VSMP Regulation have been approved by the DEQ for this land disturbance activity: (list all approved exceptions and include a brief description of the exception, the date approved and the approving DEQ Office)

Type(1)	Regulation Modified(2)	Approval Date(3)	Description of Waiver

- (1) Type of modification (Variance, or Exception from SWM Regulations or Deviation from published guidance)
 (2) Section of Regulation or Guidance Document Modified (e.g. ESC Min. Std. 15)
 (3) Date that variance/exception/deviation was approved by DEQ.

4. The permanent onsite SWM facilities or offsite strategies proposed to meet the water quality/quantity requirements for this land disturbance (construction) activity are listed in Section VI.

ACRONYMS

CBPA - Chesapeake Bay Preservation Act	SWPPP - Stormwater Pollution Prevention Plan
BMP - Best Management Practice	TMDL - Total Maximum Daily Load
DEQ - Department of Environmental Quality	VDOT - Virginia Department of Transportation
EPA - U.S. Environmental Protection Agency	VPDES - Virginia Pollutant Discharge Elimination System
ESC - Erosion and Sediment Control	VSMP - Virginia Stormwater Management Program
IIM - Instructional and Informational Memorandum	VESCP - Virginia Erosion and Sediment Control Program
R&B - Road and Bridge	WLA - Waste Load Allocation
RLD - Responsible Land Disturber	SWM - Stormwater Management

XX Denotes information that is to be provided/ completed by the RLD.

XX Denotes information that is to be provided/completed by the contractor.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

Revised 5/1/19

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2C(2)
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PROJECT MANAGER *Bimbal Shah, P.E. (003) 259-2362, INOVA, District*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7740, 07/07/2021*

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) GENERAL INFORMATION SHEET

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2C(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED

The information contained in the SWPPP General Information sheets is intended to comply with the requirements of the VPDES General Permit For Discharges Of Stormwater From Construction Activities (the VPDES Construction Permit) issued July 1, 2019 and VDOT's approved Annual ESC and SWM Standards and Specifications.

The SWPPP General Information sheets are to be completed and included in the construction plan set (or other such documents) for land disturbance (construction) activities that disturb an area equal to or greater than 10,000 square feet outside the Chesapeake Bay Preservation Area, or equal to or greater than 2,500 square feet in the area defined as Tidewater, Virginia in the Virginia Chesapeake Bay Preservation Act.

The VDOT RLD will ensure that the information shown on the SWPPP General Information sheets is updated/revised as necessary in order to reflect changes that may occur during the construction phase of the land disturbing (construction) activity. The updated/revised sheets shall be maintained with the designated record set of plans (or other such documents) for the land disturbance (construction) activity.

SECTION IV SWPPP

1. All documents related to the SWPPP for this land disturbance (construction) activity shall be maintained at the activity site and shall be readily available for review upon request during normal business hours. Such documents include, but are not limited to, the construction plans (or other such documents), the ESC Plan, the Pollution Prevention Plan, the post construction SWM Plan (if applicable), the VDOT R&B Standards and Specifications, Supplemental Specifications, Special Provisions and Special Provision Copied Notes. Documents related to stormwater pollution prevention which are not a part of those documents referenced above, such as copies of the VPDES Construction Permit coverage letter (when applicable) and the VPDES General Permit For Discharges Of Stormwater From Construction Activities (when applicable) and those required to be developed by the contractor for pollution prevention associated with any on-site support facilities being included in the VPDES Construction Permit coverage for this land disturbance (construction) activity are to be maintained at the activity site with the other SWPPP documents for this land disturbance (construction) activity. Where no facilities are available at the activity site to maintain the SWPPP documents, they are to be kept by or with the designated RLD at a location convenient to the activity site where they would be made available for review upon request during normal business hours.

2. The SWPPP and any subsequent amendments, modifications and updates shall be implemented from commencement of land disturbance until termination of VPDES Construction Permit coverage or completion of land disturbance (construction) activities where no VPDES Construction Permit coverage is required.

✖✖ 3. For all on-site support facilities that will be included in the VPDES Construction Permit coverage for this land disturbance (construction) activity, the contractor shall develop a SWPPP in accordance with, but not limited to, Section 106.08, 107.02 and 107.16 of the VDOT Road and Bridge Specifications. The SWPPP for the on-site support facilities shall be maintained with and become a component of the SWPPP for this land disturbance (construction) activity. Support facilities shall include, but not be limited to, borrow and disposal areas, construction and waste material storage areas, equipment and vehicle washing, maintenance, storage and fueling areas, storage areas for fertilizers, fuels or chemicals, concrete wash out areas, sanitary waste facilities and any other areas that may generate a stormwater or non-stormwater discharge directly related to the construction site.

4. For those land disturbing (construction) activities requiring coverage under the VPDES Construction Permit, the SWPPP shall be made available for review upon the request of the DEQ, the EPA, the VSMP Authority, the VESCP Authority, local government officials or the operator of a municipal separate storm sewer system (MS4) receiving discharge from the construction site.

✖ 5. For those land disturbing (construction) activities requiring coverage under the VPDES Construction Permit, the VDOT RLD shall post, or have posted, a copy of the General Permit coverage letter and a copy of a completed LD-445A form, noting the name and contact information for the VDOT person responsible for the land disturbing (construction) activity and its SWPPP, outside the project's construction office along with other Federal and State mandated information. Where there is no construction office (e.g., a maintenance activity), the permit coverage letter and the LD-445A form are to be maintained with the other SWPPP documents for the land disturbing (construction) activity.

6. The SWPPP shall be made available for review by the public upon request. Such reviews shall be at a time and publicly accessible location convenient to the VDOT and shall be scheduled during normal business hours and no less than once per month.

SECTION V - POLLUTION PREVENTION PLAN

- The following non-stormwater discharges from this land disturbing (construction) activity and any on-site support facilities are prohibited:
 - Wastewater from concrete washouts.
 - Wastewater from the washout and cleanout of stucco, paint, from release oils, curing compounds and other construction materials.
 - Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance.
 - Oils, toxic substances or hazardous substances from spills or other releases.
 - Soaps, solvents or detergents used in equipment and vehicle washing.
 - There shall be no discharge of floating solids or visible foam in other than trace amounts.
- The following non-stormwater discharges from this land disturbing (construction) activity and any on-site support facilities are allowed when discharged in compliance with the VPDES Construction Permit:
 - Discharges from firefighting activities.
 - Fire hydrant flushings.
 - Waters used to wash vehicles or equipment where soaps, solvents or detergents have not been used and the wash water has been filtered, settled or similarly treated prior to discharge.
 - Water used to control dust that has been filtered, settled or similarly treated prior to discharge.
 - Potable water sources including uncontaminated waterline flushings managed in a manner to avoid stream impacts.
 - Routine external building wash down where soaps, solvents or detergents have not been used and the wash water has been filtered, settled or similarly treated prior to discharge.
 - Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (or where all spilled or leaked material has been removed prior to washing), where soaps, solvents or detergents have not been used and where the wash water has been filtered, settled or similarly treated prior to discharge.
 - Uncontaminated air conditioning or compressor condensate.
 - Uncontaminated ground water or spring water.
 - Foundation or footing drains where flows are not contaminated with process materials such as solvents.
 - Uncontaminated excavation dewatering, including dewatering trenches and excavations that have been filtered, settled or similarly treated prior to discharge.
 - Landscape irrigation.

✖✖

- The contractor shall develop a Pollution Prevention Plan to address any of his on-site operations that have a potential to generate a pollutant that may reasonably be expected to affect the quality of stormwater discharges from this land disturbance (construction) activity. The Pollution Prevention Plan shall be developed in accordance with, but not limited to, Sections 106.08, 107.02 and 107.16 of the VDOT Road and Bridge Specifications and shall include a narrative with appropriate plan detail and shall be provided on standard 8.5 x 11 inch paper or larger and shall:
 - Identify the potential pollutant-generating activities and the pollutant that is expected to be exposed to stormwater.
 - Describe the location where the potential pollutant-generating activities will occur, or if identified on the record set of plans, reference the record set of plans.
 - Identify all non-stormwater discharges, as described in note two of this section, that are or will be commingled with stormwater discharges from the construction activity, including any on-site support activities.
 - Identify the person(s) or contractor(s) responsible for implementing and maintaining the pollution prevention practice or practices for each pollutant-generating activity.
 - Describe the pollution prevention practices and procedures that will be implemented to:
 - Prevent and respond to leaks, spills, and other releases, including procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases, and procedures for reporting leaks, spills, and other releases in accordance with Section 107.16 of the VDOT Road and Bridge Specifications and the requirements within the VPDES Construction Permit.

- Prevent the discharge of spilled and leaked fuels and chemicals from vehicle fueling and maintenance activities.
- Prevent the discharge of soaps, solvents, detergents, and wash water from construction materials, including procedures for the clean-up of stucco, paint, form release oils, and curing compounds.
- Minimize the discharge of pollutants from vehicle and equipment washing, wheel wash water, and other types of washing.
- Direct concrete wash water into a leak-proof container or leak-proof settling basin. The container or basin shall be designed so that no overflows can occur due to inadequate sizing or precipitation. Hardened concrete wastes shall be removed and disposed of in a manner consistent with the handling of other construction wastes. Liquid concrete wastes shall be removed and disposed of in a manner consistent with the handling of other construction wash waters and shall not be discharged to surface waters.
- Minimize the discharge of pollutants from storage, handling, and disposal of construction products, materials, and wastes including building products (such as asphalt sealants, copper flashing, roofing materials, adhesives, and concrete admixtures), pesticides, herbicides, insecticides, fertilizers, landscape materials, construction and domestic wastes (such as packaging materials), scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.
- Prevent the discharge of fuels, oils, and other petroleum products, hazardous or toxic wastes, waste concrete and sanitary wastes.
- Address any other discharge from any potential pollutant-generating activity not listed herein.
- Minimize the exposure of waste materials to precipitation by closing or covering waste containers during precipitation events and at the end of the business day, or implementing other similarly effective practices. Minimization of exposure is not required in case where the exposure to precipitation will not result in a discharge of pollutants.
- Describe and implement procedures for providing pollution prevention awareness (including but not limited to prevention practices, disposal practices and appropriate disposal locations) for all applicable wastes (including any wash water), to appropriate personnel.

✖ Denotes information that is to be provided/completed by the RLD.

✖✖ Denotes information that is to be provided/completed by the contractor.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

Revised 5/1/19

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2C(3)
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PROJECT MANAGER Ritpal Shah, P.E., (703) 259-2362, JNOVA District
 SURVEYED BY, DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY Whitman, Requardt, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE Accurmark, Inc. (804) 550-7740, 07/07/2021

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) GENERAL INFORMATION SHEET

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2C(4)

The information contained in the SWPPP General Information sheets is intended to comply with the requirements of the VPDES General Permit For Discharges Of Stormwater From Construction Activities (the VPDES Construction Permit) issued July 1, 2019 and VDOT's approved Annual ESC and SWM Standards and Specifications.

The VDOT RLD will ensure that the information shown on the SWPPP General Information sheets is updated/revised as necessary in order to reflect changes that may occur during the construction phase of the land disturbing (construction) activity. The updated/revised sheets shall be maintained with the designated record set of plans (or other such documents) for the land disturbance (construction) activity.

The SWPPP General Information sheets are to be completed and included in the construction plan set (or other such documents) for land disturbance (construction) activities that disturb an area equal to or greater than 10,000 square feet, or equal to or greater than 2,500 square feet in the area defined as Tidewater, Virginia in the Virginia Chesapeake Bay Preservation Act.

SECTION VI - PERMANENT BMP INFORMATION Δ

* Denotes information that is to be completed by the RLD.
 () See note referenced by number in parentheses.

INSTALLED BMP INFORMATION (VDOT Owned/Operated)

Plan Sheet(s)	Date BMP Made Functional	Type of BMP Installed (See Table A and C)	Geographic Location (County or City)	Latitude/Longitude (1)		VA 6th Order HUC (7)	Receiving Water (2)	Name of Impaired Water (9)	Acres Treated Per BMP (3)			* BMP Maintenance ID Number (10)	BMP Maintenance Manual (11)	BMP Inspection Manual (11)
				LAT	LONG				Impervious	Pervious	TOTAL			
9		Extended Detention Basin (Retrofit)	Prince William	38.6368	-77.2890	PL49	Unnamed Tributary Neabsco Creek		6.15	3.68	9.83	761002	Section 7	Section 7

ALTERNATIVE BMP INFORMATION

Plan Sheet(s)	Date	Type of BMP Installed (See Table B)	Geographic Location (County or City) (5)	Latitude/Longitude (1) (5)		VA 6th Order HUC (5) (7)	Receiving Water (2)	Name of Impaired Water (9)
				LAT	LONG			

Perpetual Nutrient Credits Acquired for Project

Name of Nutrient Credit Generating Entity (6)	Nutrient Credits (lbs./TP./year) Acquired (6) (12)
TBD	4.90

Δ Any changes to the proposed SWM Plan or BMPs necessitated during the construction phase of the project that affects the proposed construction details or potentially affects the information shown in the BMP Tables A and/or B shall be coordinated by the VDOT RLD with the appropriate VDOT District Hydraulics Engineer. The construction plans and the BMP Tables A and/or B are to be formally revised to reflect any authorized/approved changes to the proposed SWM Plan and/or the proposed BMP construction details. All plan revisions shall be completed in accordance with the Road Design Manual and the Construction Division IIM-CD-2013-12.01, signed and sealed in accordance with Department's sealing and signing policy IIM-LD-243 and filed with the construction record drawings maintained in the VDOT Central Office Plan File Room (ProjectWise). Prior to submitting for termination of coverage under the VPDES General Permit For The Discharge Of Stormwater From Construction Activities, the RLD shall have the District Maintenance Division review the BMPs installed with the project (BMP Table A) for acceptance of maintenance responsibility and to obtain a Maintenance ID number for each BMP listed in BMP Table A. The RLD shall use the information in BMP Tables A and B along with the assigned Maintenance ID number and the date that the BMP became functional as a permanent control measure (for BMPs in Table A only) to complete the LD-445D form when certifying the construction of the BMPs and submitting for termination of coverage under the VPDES General Permit For The Discharge Of Stormwater From Construction Activities.

Table A: Permanent BMP Types (1999 Va. SWM Handbook)

- Bio-retention Basin
- Bio-retention Filter
- Constructed Stormwater Wetlands
- Extended Detention Basin
- Extended Detention Basin Enhanced
- Grassed Swale
- Infiltration Basin
- Infiltration Trench
- Manufactured Treatment Device (MTD) (8)
- Retention Basin I
- Retention Basin II
- Retention Basin III
- Sand Filter
- Vegetated Filter Strip
- Other Approved Types (List Type)
- Detention Basin

Table C: Permanent BMP Types (BMP Clearing House)

- Sheet Flow to Vegetated Filter Strip
- Grass Channel
- Soil Compost Amendment
- Permeable Pavement (Level 1)
- Permeable Pavement (Level 2)
- Infiltration Practice (Level 1)
- Infiltration Practice (Level 2)
- Bioretention (Level 1)
- Bioretention (Level 2)
- Dry Swale (Level 1)
- Dry Swale (Level 2)
- Wet Swale (Level 1)
- Wet Swale (Level 2)
- Filtering Practice (Level 1)
- Filtering Practice (Level 2)
- Constructed Wetlands (Level 1)
- Constructed Wetlands (Level 2)
- Extended Detention Pond (Level 1)
- Extended Detention Pond (Level 2)
- Wet Pond (Level 1)
- Wet Pond (Level 2)
- Manufactured Treatment Device (MTD) (8)
- Other Approved Types (List Type)

NOTES:

- (1) In decimal degrees to the nearest one ten-thousandth of a degree.
- (2) For streams with no names, list "(Unnamed Tributary to downstream name)".
- (3) Show acres treated to the nearest one hundredths acre.
- (4) Include agreements with off-site BMP owners.
- (5) Information pertains to the alternative BMP option location, where applicable. Exception - Not required for nutrient credit purchase option.
- (6) Applies to the purchase of nutrient credits only.
- (7) Virginia 6th Order HUC (VAHU6) Example - Y030.
- (8) Final approved shop drawings of Manufactured Treatment Devices (MTDs) are to be included with the BMP information submitted with the LD-445D form.
- (9) List the name of any impaired water to which the BMP discharges. The determination of impaired water shall be based on those streams listed as impaired in the DEQ 2012 305(b)/303(d) Water Quality Assessment Integrated Report and shall be the first named waterbody to which the BMP discharges. The impaired waters are those impaired by sediment, total suspended solids, turbidity, nitrogen or phosphorus.
- (10) BMP Maintenance ID Number is to be assigned by the District Maintenance Division at permit termination or project completion. This ID number shall be assigned prior to the permit close out process and entered by the area construction engineer under this column, per IIM-LD-95

(11) Provide the section of each Maintenance manual that pertains to the type of BMP. Both manuals can be found at www.vdot.virginia.gov/business/manuals in the Maintenance selections. Example: Section 4 would be noted for both the maintenance and inspection manuals for a Bioretention Infiltration BMP.

(12) Nutrient credits purchased to the nearest one hundredth pound.

PAC PLANS

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Revised 5/1/19

NOT TO SCALE	PROJECT 0095-076-299	SHEET NO. 2C(4)
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PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Reardon, & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740 07/07/2021*

EXISTING DRAINAGE PIPE REHABILITATION SUMMARY

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	2E

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

I-95 Express Lanes Opitz Boulevard Connector EXISTING DRAINAGE PIPE REHABILITATION RECOMMENDATIONS																
Plan Sheet	Pipe Location			Existing Condition From Pipe Vision Inspection							Recommendations					
	Upstream ID	Downstream ID	Station	Baseline	Pipe Dia	Pipe Material	Standing Water in Culvert	Inspection Rating (Worst)	Controlling Defect	Additional Flow	Repair Required (Y/N)	Recommended Solution	Length To Be Lined	Comments		
					(inch)											(feet)
5	5-7	270	672+50	95 XBL	30	RCP	Trickle	3	Pipe wall cracks	Yes	Yes	Patch cracks with grout or two-part epoxy		Pipe Crosses SB I-95 and CD Lanes		
6	6-4	327	693+00	95 XBL	50	RCP	Flooded at outlet	3	Pipe wall cracks	Yes	Yes	Patch cracks with grout or two-part epoxy		Flooding Caused by standing water in SWM Basin; Pipe Crosses SB I-95 and CD Lanes		
6	6-3	311	689+00	95 XBL	24	RCP	None	4	Pipe wall cracks	Yes	Yes	Patch cracks with grout or two-part epoxy		Pipe Crosses SB I-95 and CD Lanes		
8	EX8-2	EX8-4	718+50 to 719+00	95 XBL	24	RCP	Trickle	5	Hole with soil visible	Yes	Yes	Patch cracks and hole with grout		Pipe Runs Adjacent to Existing Slip Ramp		
9	361	362	733+00	95 XBL	60	RCP	3 in	4	Pipe wall cracks	Yes	Yes	Patch cracks with grout or two-part epoxy		Pipe Crosses HOV Lanes		
9	353	9-1a	727+00	95 XBL	46	RCP	Trickle	3	Pipe wall cracks	Yes	Yes	Patch cracks with grout or two-part epoxy		Break-in pipe connection upstream of proposed inlet connection to pipe.		
9	355	356	725+00	95 XBL	48	RCP	20 in. at downstream end	3	Pipe wall cracks	Yes	Yes	Flexible Liner Type A,B,C, or D	204	Will need to dewater pipe for liner installation; Pipe Crosses SB I-95 and CD Lanes		
9/11	9-10	EX11-1	732+00	95 XBL	30	RCP	None	3	Pipe wall cracks	No	Yes	Flexible Liner Type A,B, or C	175	SWM Basin Outlet, Pipe Crosses NB I-95 Ramp		
10/9	10-1	7100	61+75 to 65+50	Opitz	24	RCP	None	5	Concrete Debris blockage	Yes	Yes	Flexible Liner Type A,B, or C	345	Concrete debris will need to be removed prior to pipe repair.		

NOTE: Recommendations provided herein are consistent with improving a pipe system to a level of service that is commensurate with an expected useful life for infrastructure. The pipe inspection reports provided by Pipe Vision are individual condition assessments for a pipe with comments about imperfections at specific locations. According to the reports no pipe, in total length is in poor condition, or in need of immediate attention (repair or replacement). All pipes in the inspection reports appear to be in repairable condition needing anywhere from minor two part epoxy repair and or patching to structural lining. Cleaning, which is required for all pipes, consists of pressure washing with enough pressure to remove grit, stains, moss and dirt. All debris needs to be removed. The proposed liner recommendations based on VDOT Drainage Manual Section 8.3.6.7. - Category A - Cured in Place Pipe (CIPP); Category B - Fold and Form Flexible Liner; Category C - HDPE, PVC, or Polypropylene (PP) slip liners; Category D - Spray-On Liner.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E.*, (703) 259-2362, INOVA District
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC*, (804) 330-3781, 03/09/2021
 DESIGN BY: *Whitman, Reardon & Associates, LLP*, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc.*, (804) 550-7140, 07/07/2021

See Sheet 10 For Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	3

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

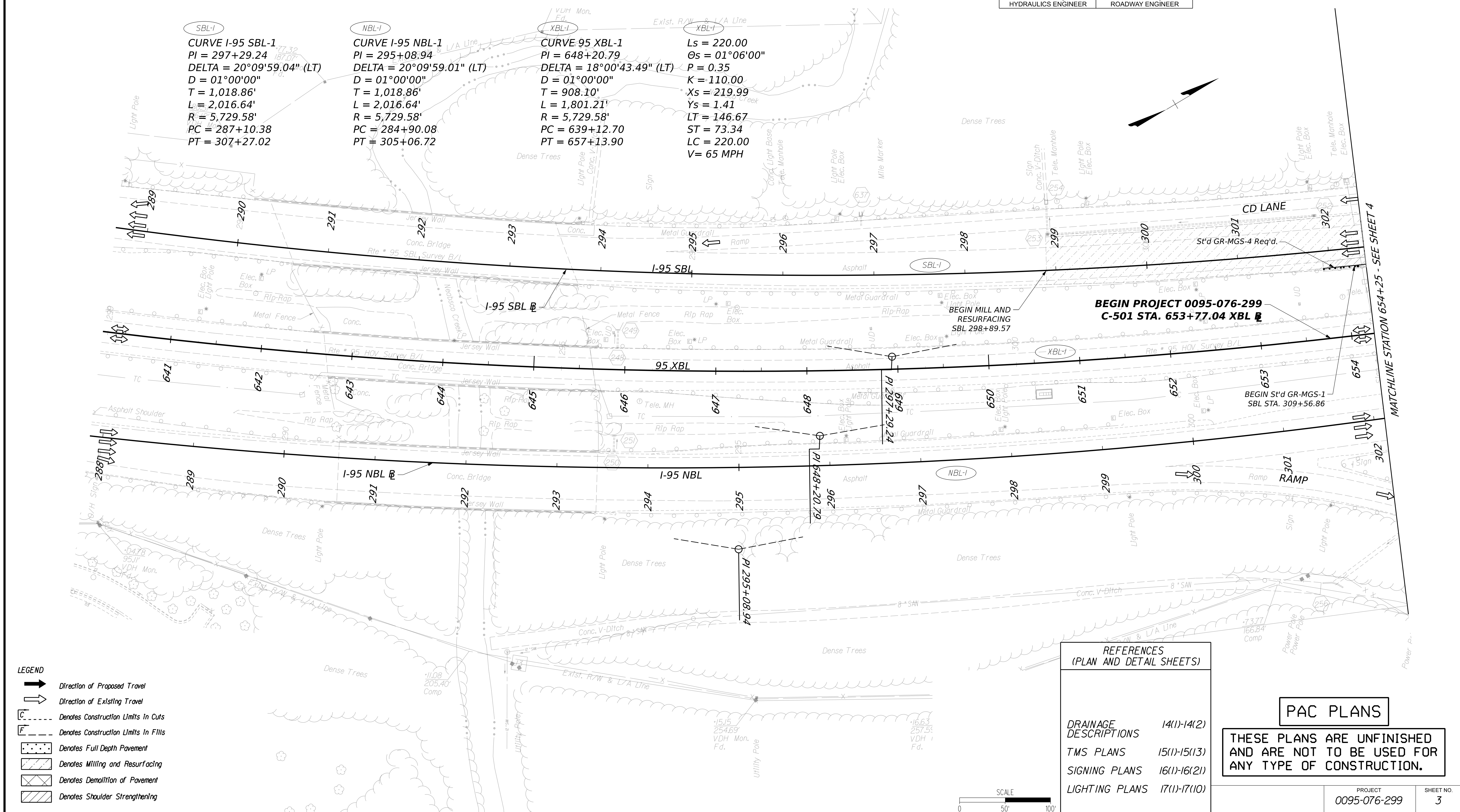
Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

SBL-1
 CURVE I-95 SBL-1
 PI = 297+29.24
 DELTA = 20°09'59.04" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 287+10.38
 PT = 307+27.02

NBL-1
 CURVE I-95 NBL-1
 PI = 295+08.94
 DELTA = 20°09'59.01" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 284+90.08
 PT = 305+06.72

XBL-1
 CURVE 95 XBL-1
 PI = 648+20.79
 DELTA = 18°00'43.49" (LT)
 D = 01°00'00"
 T = 908.10'
 L = 1,801.21'
 R = 5,729.58'
 PC = 639+12.70
 PT = 657+13.90

$L_s = 220.00$
 $\Theta_s = 01^\circ 06' 00''$
 $P = 0.35$
 $K = 110.00$
 $X_s = 219.99$
 $Y_s = 1.41$
 $LT = 146.67$
 $ST = 73.34$
 $LC = 220.00$
 $V = 65 \text{ MPH}$



**BEGIN PROJECT 0095-076-299
 C-501 STA. 653+77.04 XBL**

**BEGIN St'd GR-MGS-1
 SBL STA. 309+56.86**

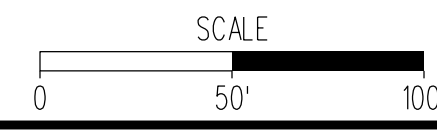
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes Shoulder Strengthening

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

- DRAINAGE DESCRIPTIONS 14(1)-14(2)
- TMS PLANS 15(1)-15(13)
- SIGNING PLANS 16(1)-16(21)
- LIGHTING PLANS 17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	3

PROJECT MANAGER: *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	4

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

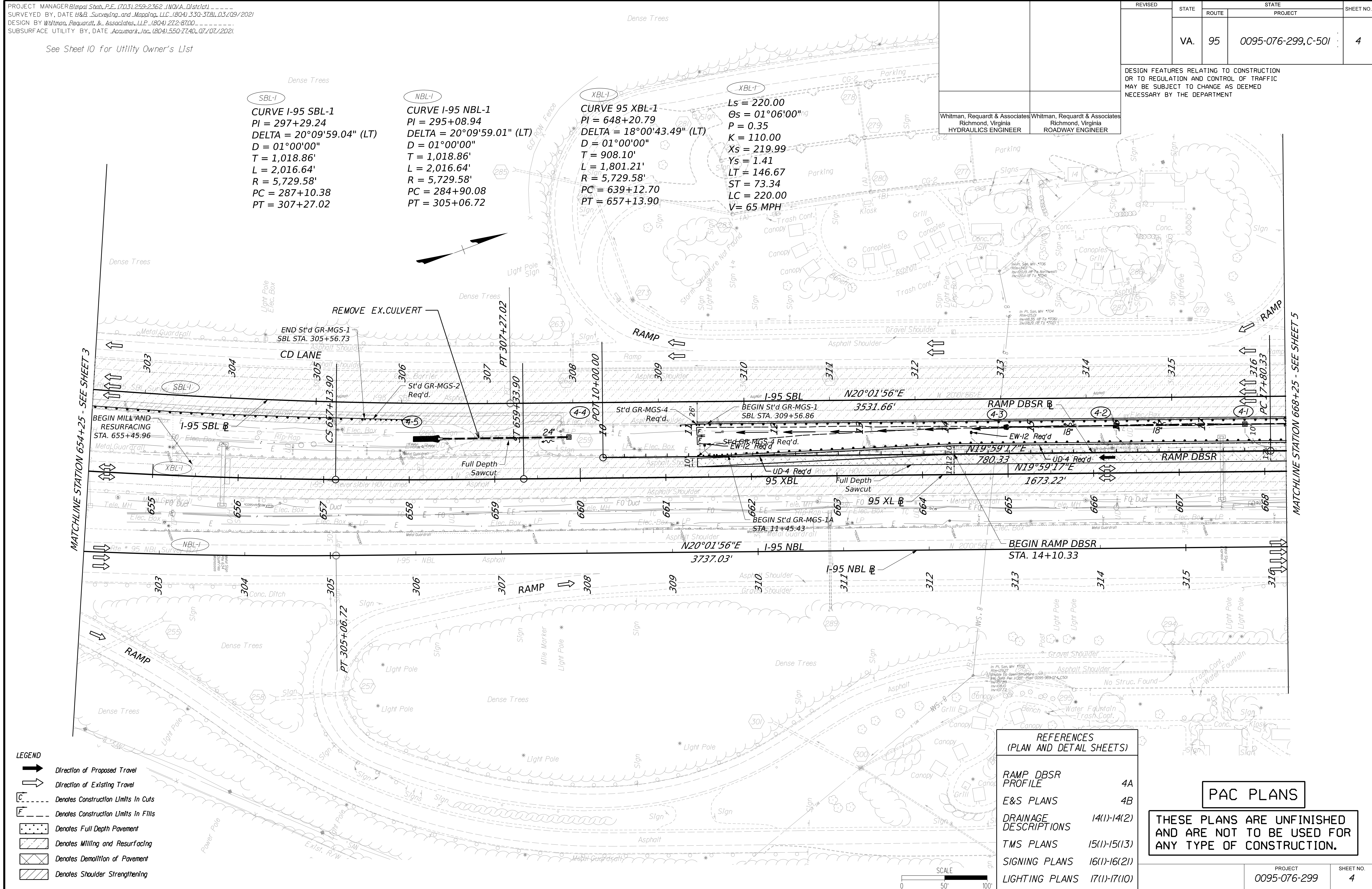
Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

SBL-1
 CURVE I-95 SBL-1
 PI = 297+29.24
 DELTA = 20°09'59.04" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 287+10.38
 PT = 307+27.02

NBL-1
 CURVE I-95 NBL-1
 PI = 295+08.94
 DELTA = 20°09'59.01" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 284+90.08
 PT = 305+06.72

XBL-1
 CURVE 95 XBL-1
 PI = 648+20.79
 DELTA = 18°00'43.49" (LT)
 D = 01°00'00"
 T = 908.10'
 L = 1,801.21'
 R = 5,729.58'
 PC = 639+12.70
 PT = 657+13.90

XBL-1
 Ls = 220.00
 Os = 01°06'00"mg
 P = 0.35
 K = 110.00
 Xs = 219.99
 Ys = 1.41
 LT = 146.67
 ST = 73.34
 LC = 220.00
 V = 65 MPH



MATCHLINE STATION 654+25 - SEE SHEET 3

MATCHLINE STATION 668+25 - SEE SHEET 5

- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes Shoulder Strengthening

REFERENCES (PLAN AND DETAIL SHEETS)

RAMP DBSR PROFILE	4A
E&S PLANS	4B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: *Rajpal Shah, P.E.* (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE *H&B Surveying and Mapping, LLC* (804) 330-3781_03/09/2021
 DESIGN BY: *Whitman, Reardon & Associates, LLP* (804) 272-8000 ---
 SUBSURFACE UTILITIES: DATE *Acumar, Inc.* (804) 550-7740_07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	4A

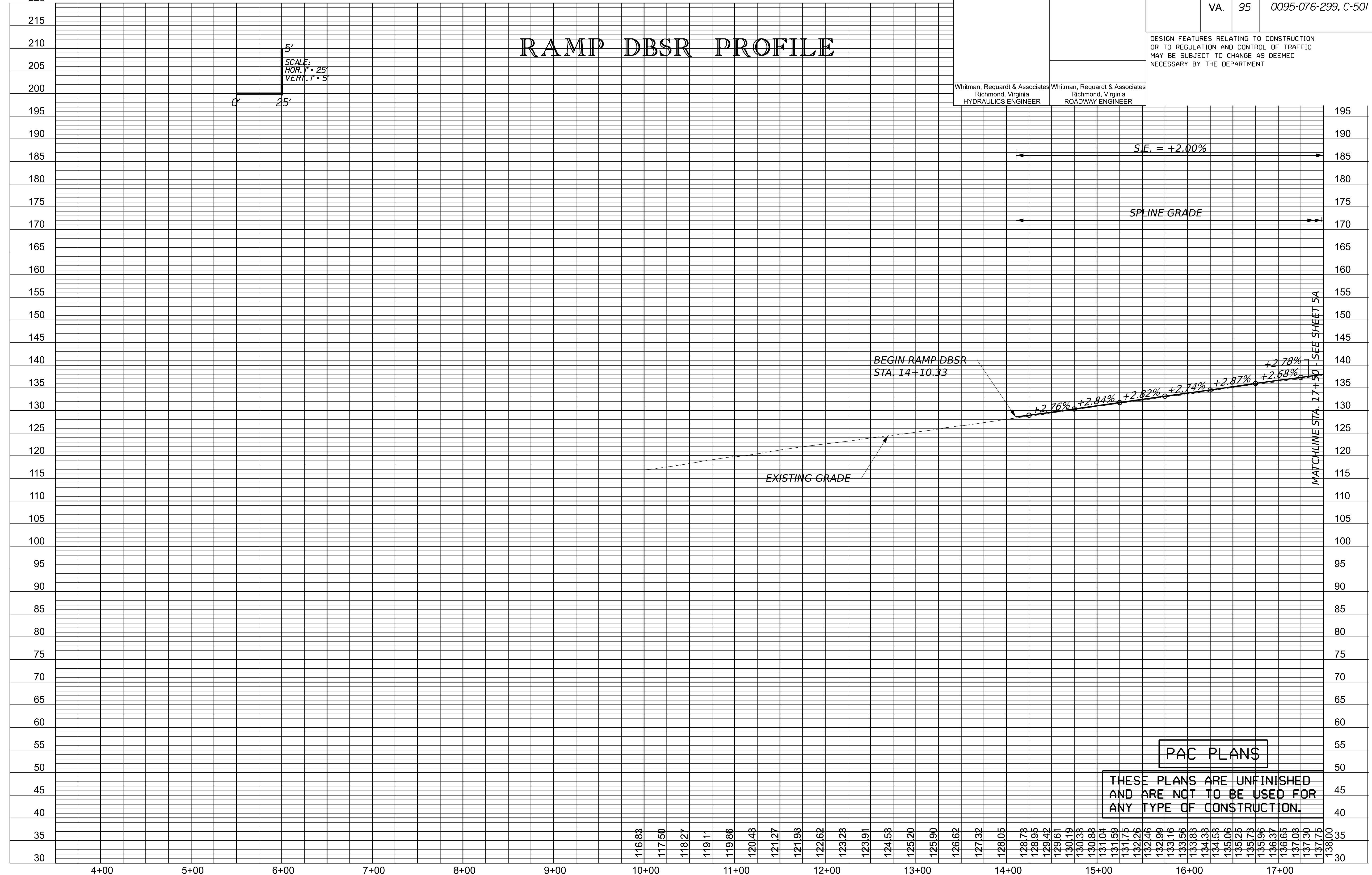
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

RAMP DBSR PROFILE

SCALE:
 HOR. 1" = 25'
 VERT. 1" = 5'



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

- 116.83
- 117.50
- 118.27
- 119.11
- 119.86
- 120.43
- 121.27
- 121.98
- 122.62
- 123.23
- 123.91
- 124.53
- 125.20
- 125.90
- 126.62
- 127.32
- 128.05
- 128.73
- 128.95
- 129.42
- 129.61
- 130.19
- 130.33
- 130.88
- 131.04
- 131.59
- 131.75
- 132.26
- 132.46
- 132.99
- 133.16
- 133.56
- 133.83
- 134.33
- 134.53
- 135.06
- 135.25
- 135.73
- 135.96
- 136.37
- 136.65
- 137.03
- 137.30
- 137.75
- 138.00

PROJECT MANAGER: *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140, 07/07/2021*

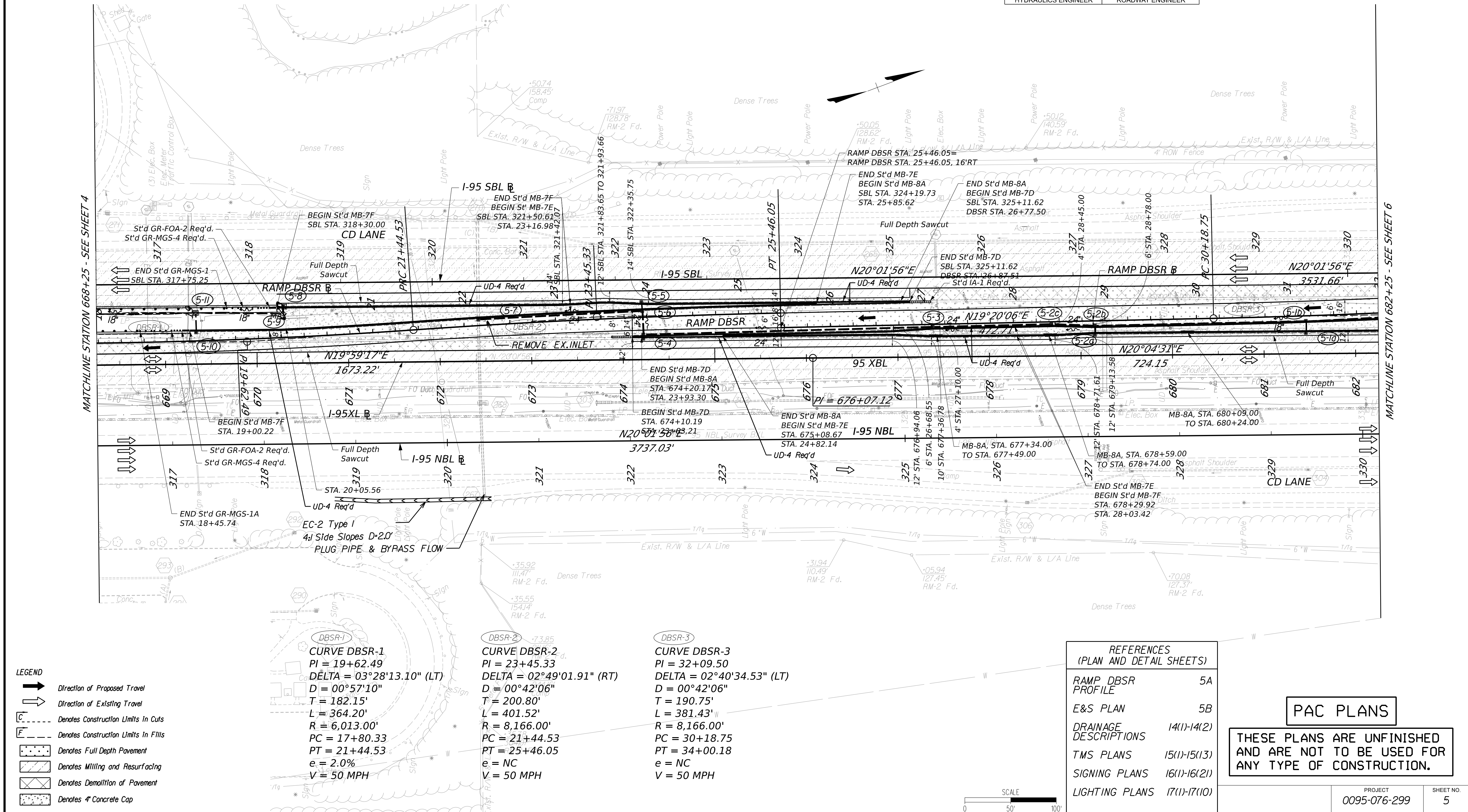
See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	5

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



LEGEND

- ➔ Direction of Proposed Travel
- ➔ Direction of Existing Travel
- Denotes Construction Limits In Cuts
- Denotes Construction Limits In Fills
- Denotes Full Depth Pavement
- Denotes Milling and Resurfacing
- Denotes Demolition of Pavement
- Denotes 4" Concrete Cap

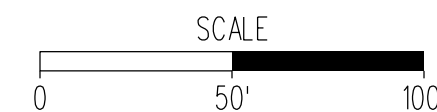
<p>CURVE DBSR-1 PI = 19+62.49 DELTA = 03°28'13.10" (LT) D = 00°57'10" T = 182.15' L = 364.20' R = 6,013.00' PC = 17+80.33 PT = 21+44.53 e = 2.0% V = 50 MPH</p>	<p>CURVE DBSR-2 PI = 23+45.33 DELTA = 02°49'01.91" (RT) D = 00°42'06" T = 200.80' L = 401.52' R = 8,166.00' PC = 21+44.53 PT = 25+46.05 e = NC V = 50 MPH</p>	<p>CURVE DBSR-3 PI = 32+09.50 DELTA = 02°40'34.53" (LT) D = 00°42'06" T = 190.75' L = 381.43' R = 8,166.00' PC = 30+18.75 PT = 34+00.18 e = NC V = 50 MPH</p>
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REFERENCES (PLAN AND DETAIL SHEETS)

RAMP DBSR PROFILE	5A
E&S PLAN	5B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: Rmpal Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITIES: DATE Accumar, Inc. (804) 550-7790, 07/07/2021

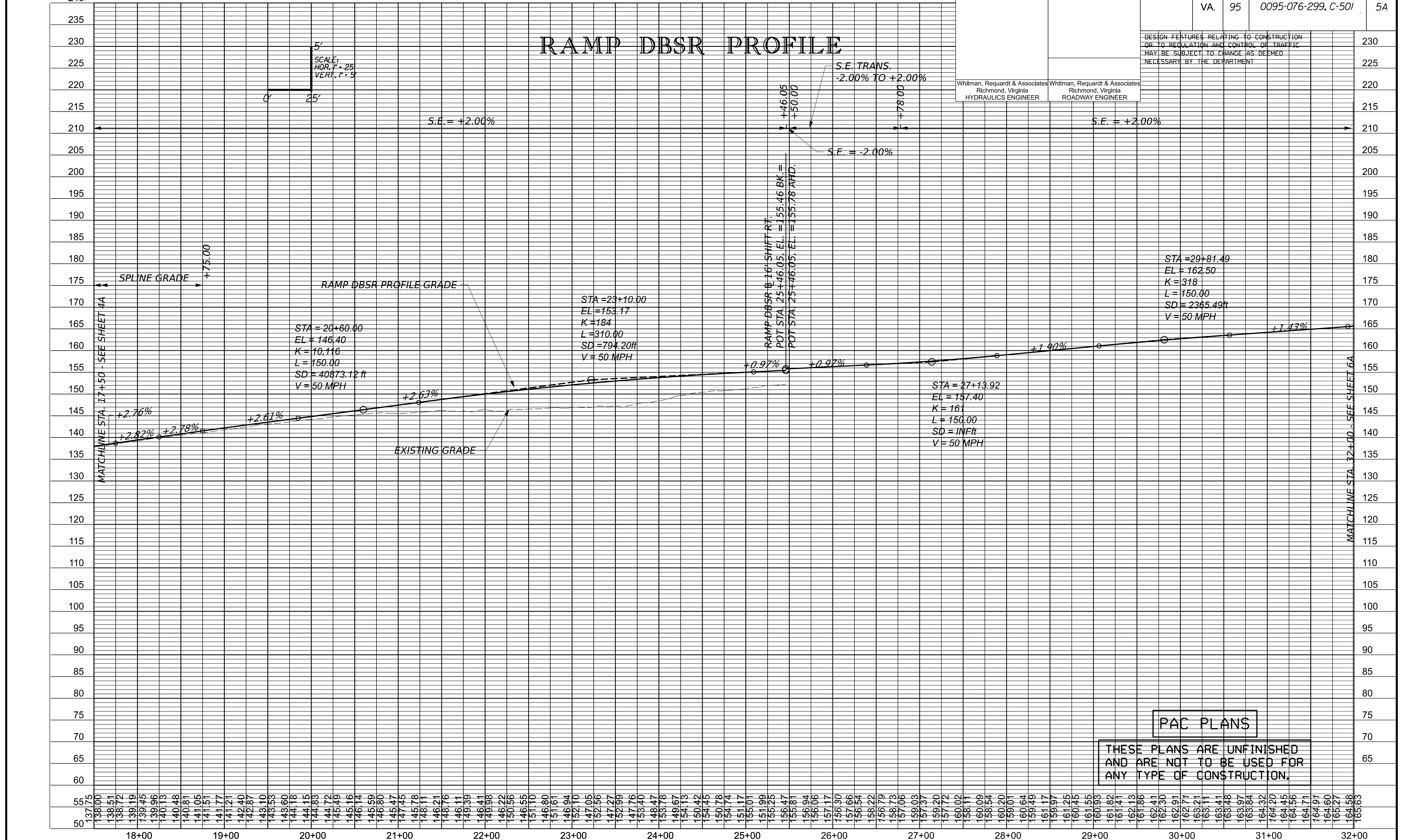
REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	5A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

RAMP DBSR PROFILE



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

STATION	ELEVATION
18+00	137.75
18+10	138.00
18+20	138.51
18+30	138.72
18+40	139.19
18+50	139.45
18+60	139.96
18+70	140.13
18+80	140.48
18+90	140.81
19+00	141.05
19+10	141.51
19+20	141.77
19+30	141.21
19+40	142.40
19+50	142.87
19+60	143.10
19+70	143.53
19+80	143.60
19+90	144.18
20+00	144.15
20+10	144.83
20+20	144.72
20+30	145.49
20+40	145.16
20+50	146.14
20+60	145.59
20+70	146.80
20+80	145.47
20+90	147.45
21+00	145.78
21+10	148.11
21+20	146.21
21+30	148.76
21+40	146.11
21+50	149.39
21+60	146.41
21+70	149.98
21+80	146.22
21+90	150.56
22+00	146.55
22+10	151.70
22+20	146.80
22+30	151.61
22+40	146.94
22+50	152.70
22+60	147.05
22+70	152.56
22+80	147.27
22+90	152.99
23+00	147.76
23+10	153.40
23+20	148.47
23+30	153.78
23+40	149.67
23+50	154.13
23+60	150.42
23+70	154.45
23+80	150.78
23+90	154.74
24+00	151.17
24+10	155.01
24+20	151.99
24+30	155.25
24+40	156.47
24+50	156.81
24+60	156.94
24+70	156.06
24+80	157.17
24+90	156.30
25+00	157.66
25+10	156.54
25+20	158.22
25+30	156.79
25+40	158.73
25+50	157.06
25+60	159.03
25+70	157.37
25+80	159.20
25+90	157.72
26+00	160.02
26+10	158.11
26+20	160.09
26+30	158.54
26+40	160.20
26+50	159.01
26+60	160.64
26+70	159.49
26+80	161.17
26+90	159.97
27+00	161.25
27+10	160.45
27+20	161.55
27+30	160.93
27+40	161.82
27+50	161.41
27+60	162.13
27+70	161.86
27+80	162.41
27+90	162.30
28+00	162.91
28+10	162.71
28+20	163.21
28+30	163.11
28+40	163.41
28+50	163.48
28+60	163.97
28+70	163.84
28+80	164.32
28+90	164.20
29+00	164.45
29+10	164.56
29+20	164.71
29+30	164.91
29+40	164.60
29+50	165.27
29+60	164.58
29+70	165.63

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140 07/07/2021*

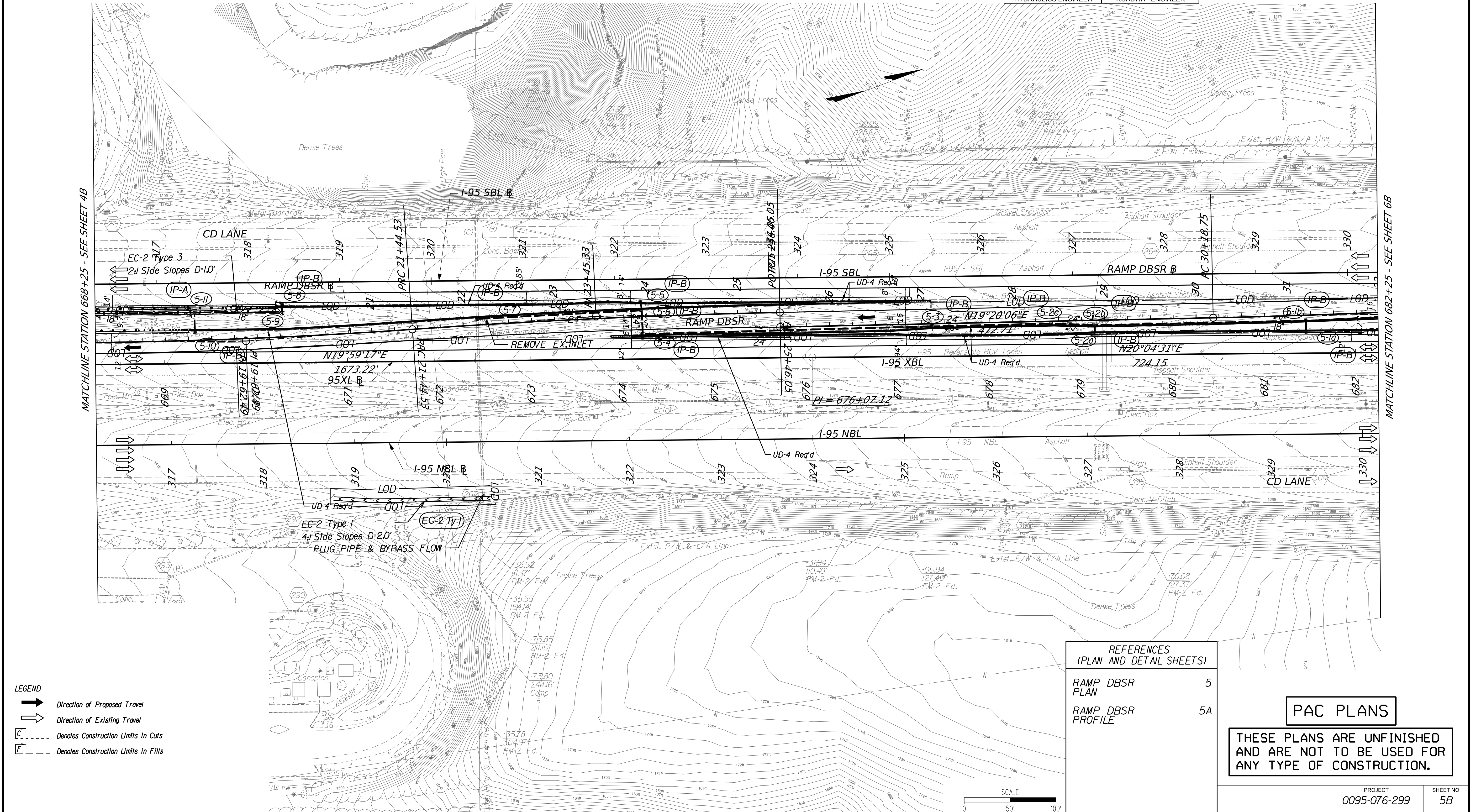
EROSION AND SEDIMENT CONTROL PLAN PHASE 1

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	5B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



MATCHLINE STATION 668+25 - SEE SHEET 4B

MATCHLINE STATION 682+25 - SEE SHEET 6B

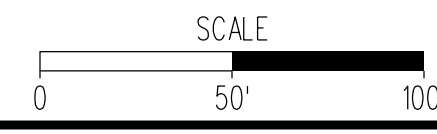
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

RAMP DBSR PLAN	5
RAMP DBSR PROFILE	5A

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT 0095-076-299	SHEET NO. 5B
-------------------------	-----------------

PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

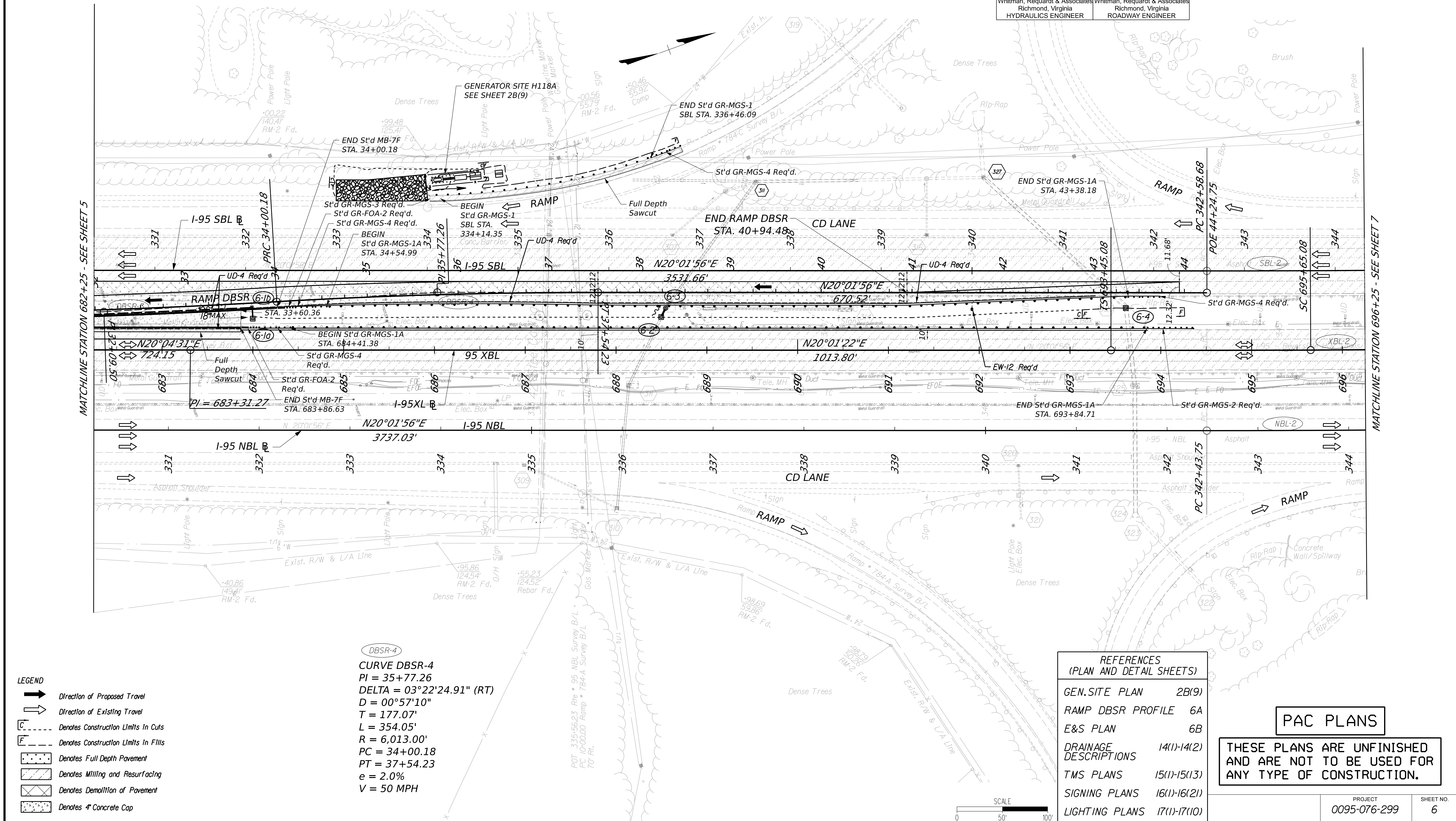
See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299,C-501	6

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes 4" Concrete Cap

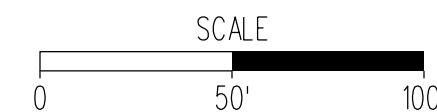
CURVE DBSR-4
 PI = 35+77.26
 DELTA = 03°22'24.91" (RT)
 D = 00°57'10"
 T = 177.07'
 L = 354.05'
 R = 6,013.00'
 PC = 34+00.18
 PT = 37+54.23
 e = 2.0%
 V = 50 MPH

REFERENCES (PLAN AND DETAIL SHEETS)

GEN. SITE PLAN	2B(9)
RAMP DBSR PROFILE	6A
E&S PLAN	6B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: Rmpal Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781_03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8000 ---
 SUBSURFACE UTILITIES: DATE Accumar, Inc. (804) 550-7790_07/07/2021

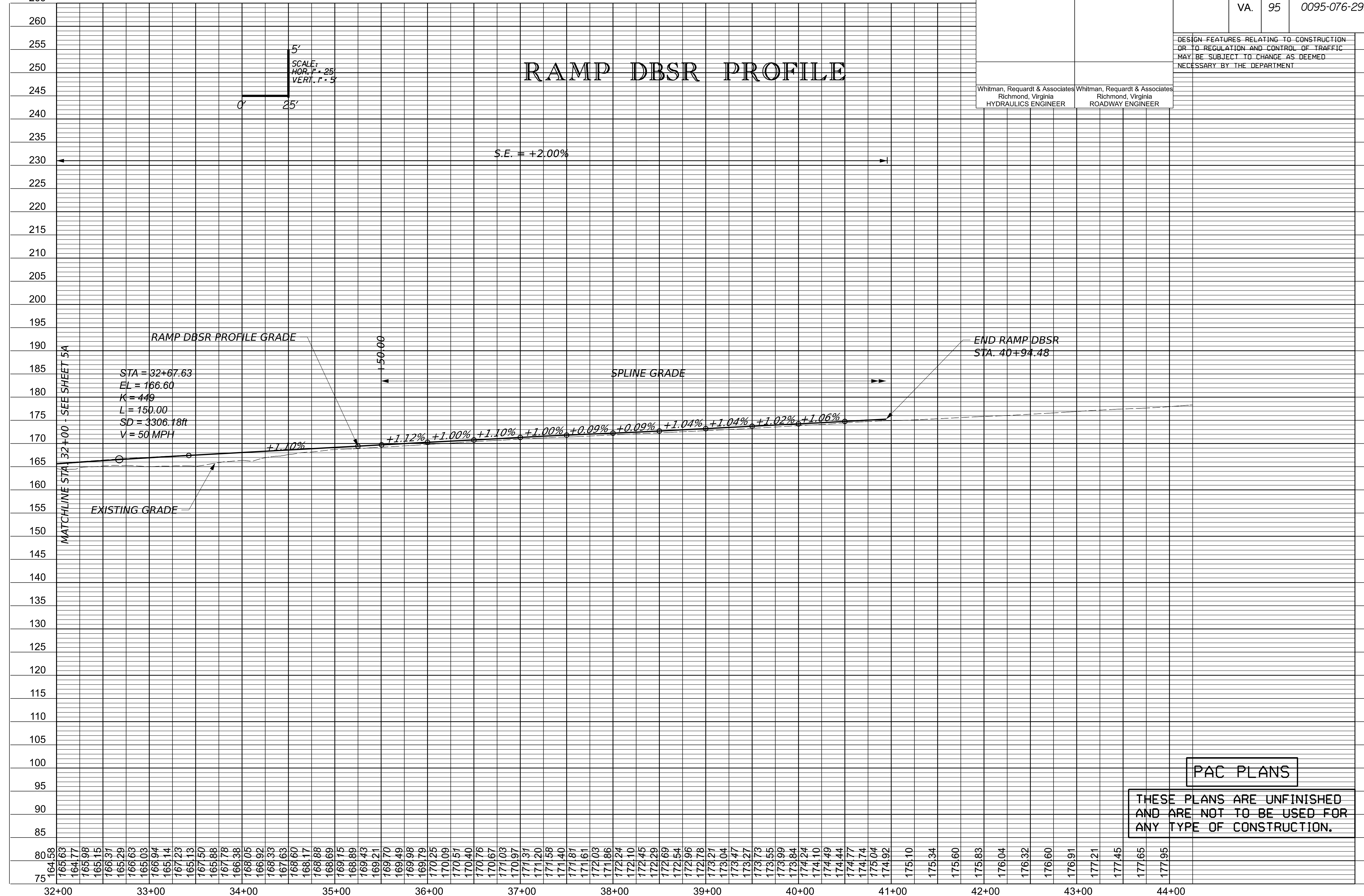
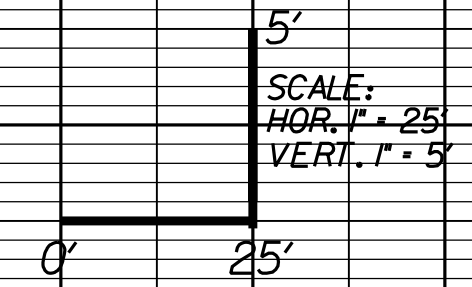
REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	6A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

RAMP DBSR PROFILE



MATCHLINE STA. 32+00 - SEE SHEET 5A

STA = 32+67.63
 EL = 166.60
 K = 449
 L = 150.00
 SD = 3306.18ft
 V = 50 MPH

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

164.58	165.63	164.77	165.98	165.15	166.31	165.29	166.63	165.03	166.94	165.14	167.23	165.13	167.50	165.88	167.78	166.38	168.05	166.92	168.33	167.63	168.60	168.17	168.88	168.69	169.15	168.89	169.43	169.21	169.70	169.49	169.98	169.79	170.25	170.09	170.51	170.40	170.76	170.67	171.03	170.97	171.31	171.20	171.58	171.40	171.81	171.61	172.03	171.86	172.24	172.10	172.45	172.29	172.69	172.54	172.96	172.78	173.21	173.04	173.47	173.27	173.73	173.55	173.99	173.84	174.24	174.10	174.49	174.44	174.77	174.74	175.04	174.92	175.10	175.34	175.60	175.83	176.04	176.32	176.60	176.91	177.21	177.45	177.65	177.95
32+00	33+00	34+00	35+00	36+00	37+00	38+00	39+00	40+00	41+00	42+00	43+00	44+00																																																																								

PROJECT MANAGER: *Bimal Shah, P.E.*, (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC*, (804) 330-3781, 03/09/2021
 DESIGN BY: *Whitman, Requardt & Associates, LLP*, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc.*, (804) 550-7140, 07/07/2021

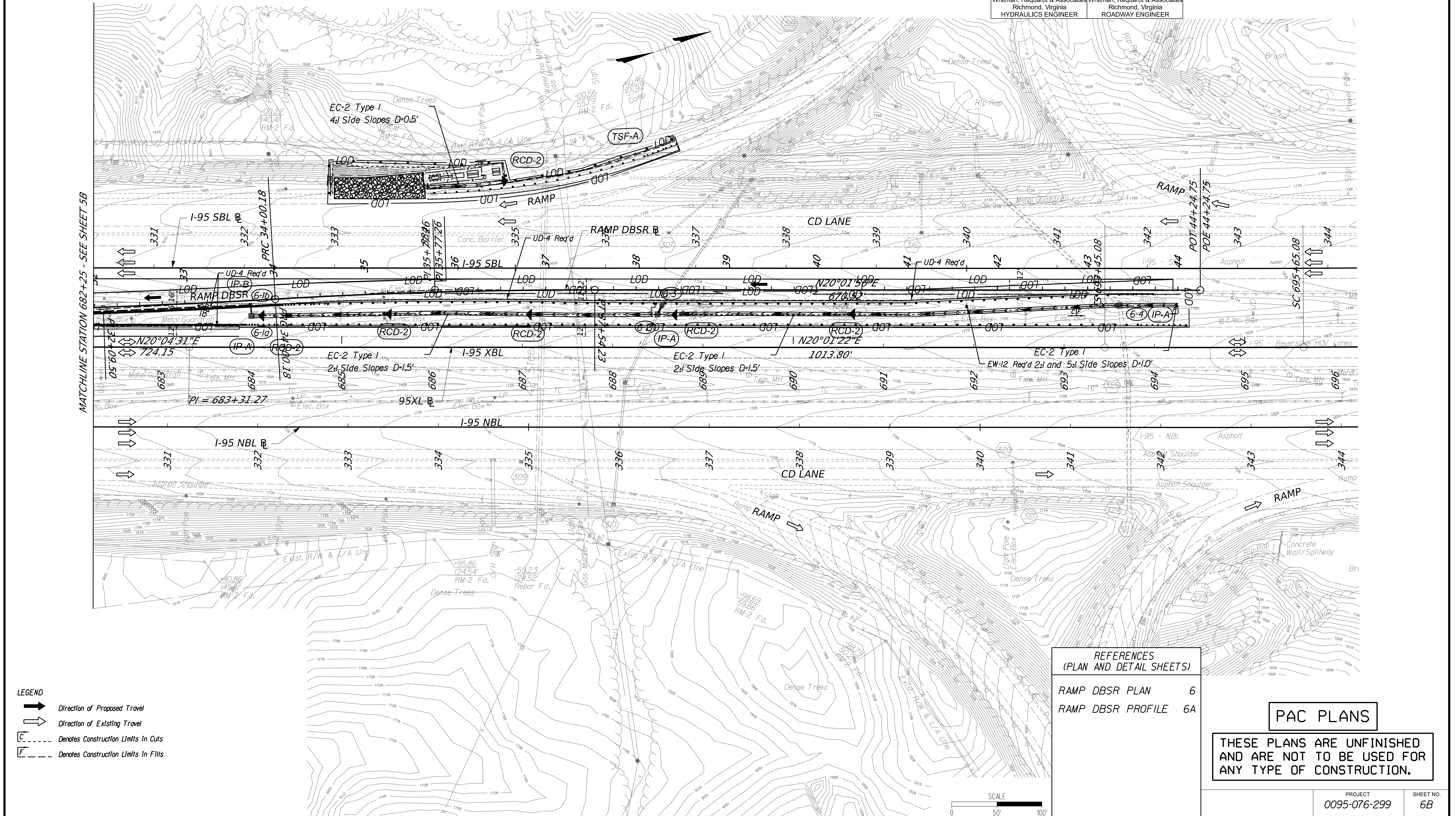
EROSION AND SEDIMENT CONTROL PLAN PHASE 1

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	6B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



MATCHLINE STATION 682+25 - SEE SHEET 5B

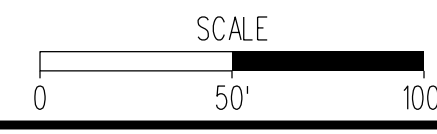
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

RAMP DBSR PLAN	6
RAMP DBSR PROFILE	6A

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Acumark, Inc. (804) 550-7140 07/07/2021*

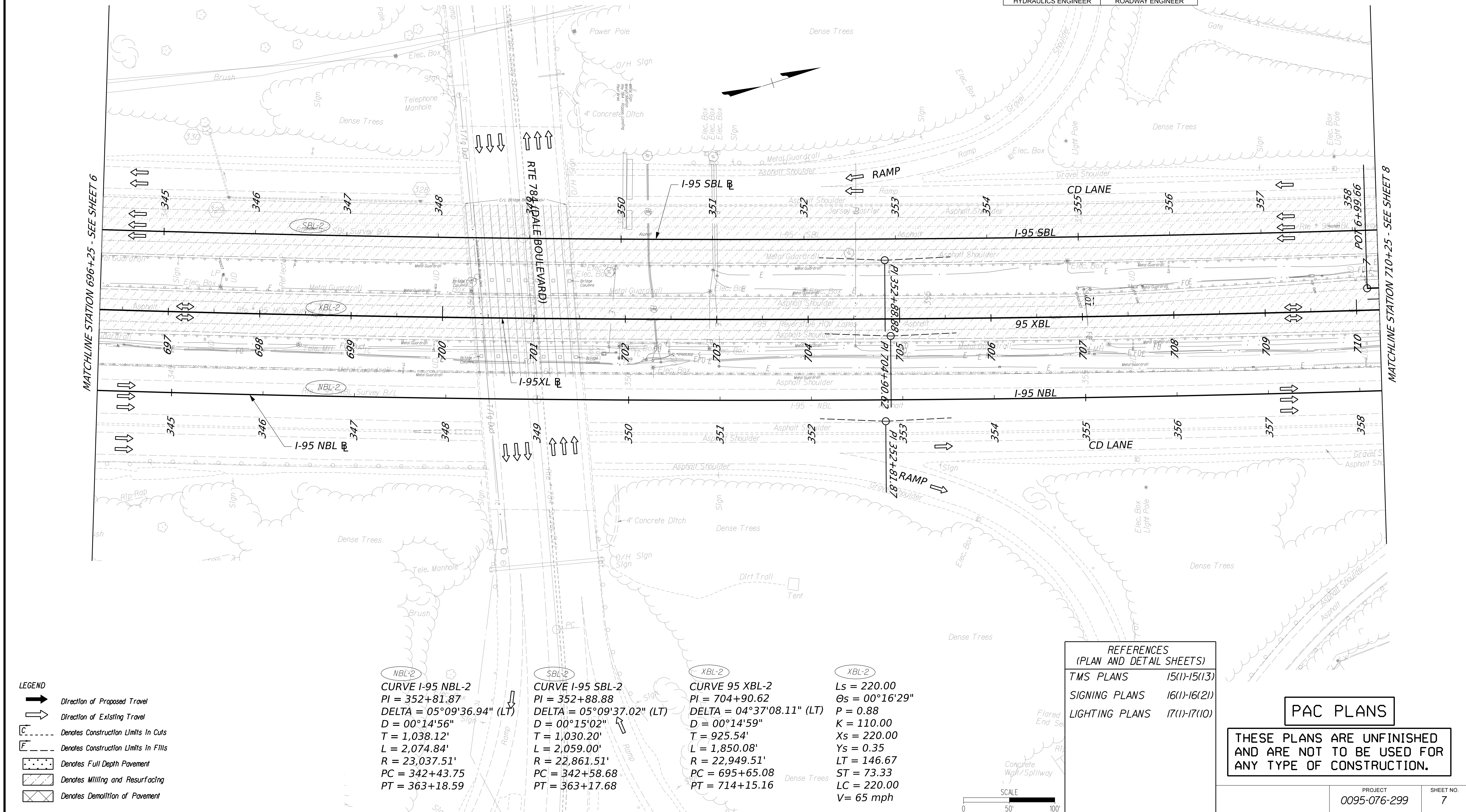
See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	7

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



MATCHLINE STATION 696+25 - SEE SHEET 6

MATCHLINE STATION 710+25 - SEE SHEET 8

- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement

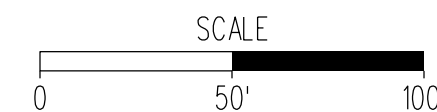
- | | | | |
|---|---|---|--|
| <p>NBL-2</p> <p>CURVE I-95 NBL-2
 PI = 352+81.87
 DELTA = 05°09'36.94" (LT)
 D = 00°14'56"
 T = 1,038.12'
 L = 2,074.84'
 R = 23,037.51'
 PC = 342+43.75
 PT = 363+18.59</p> | <p>SBL-2</p> <p>CURVE I-95 SBL-2
 PI = 352+88.88
 DELTA = 05°09'37.02" (LT)
 D = 00°15'02"
 T = 1,030.20'
 L = 2,059.00'
 R = 22,861.51'
 PC = 342+58.68
 PT = 363+17.68</p> | <p>XBL-2</p> <p>CURVE 95 XBL-2
 PI = 704+90.62
 DELTA = 04°37'08.11" (LT)
 D = 00°14'59"
 T = 925.54'
 L = 1,850.08'
 R = 22,949.51'
 PC = 695+65.08
 PT = 714+15.16</p> | <p>XBL-2</p> <p>Ls = 220.00
 Os = 00°16'29"
 P = 0.88
 K = 110.00
 Xs = 220.00
 Ys = 0.35
 LT = 146.67
 ST = 73.33
 LC = 220.00
 V = 65 mph</p> |
|---|---|---|--|

REFERENCES (PLAN AND DETAIL SHEETS)

TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	0095-076-299
SHEET NO.	7

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

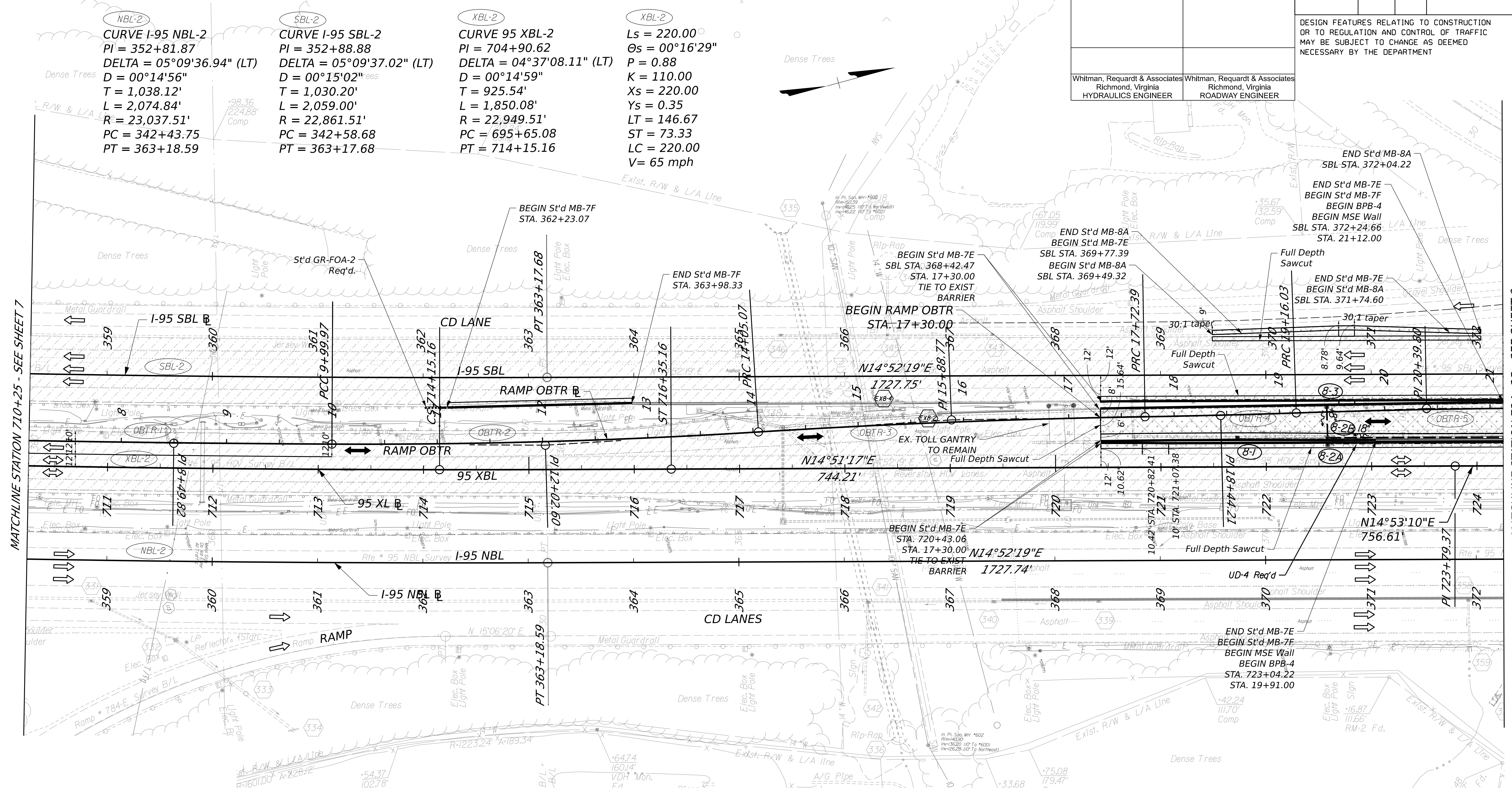
See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	8

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



MATCHLINE STATION 710+25 - SEE SHEET 7

MATCHLINE STATION 724+25 - SEE SHEET 9

NBL-2
 CURVE I-95 NBL-2
 PI = 352+81.87
 DELTA = 05°09'36.94" (LT)
 D = 00°14'56"
 T = 1,038.12'
 L = 2,074.84'
 R = 23,037.51'
 PC = 342+43.75
 PT = 363+18.59

SBL-2
 CURVE I-95 SBL-2
 PI = 352+88.88
 DELTA = 05°09'37.02" (LT)
 D = 00°15'02"
 T = 1,030.20'
 L = 2,059.00'
 R = 22,861.51'
 PC = 342+58.68
 PT = 363+17.68

XBL-2
 CURVE 95 XBL-2
 PI = 704+90.62
 DELTA = 04°37'08.11" (LT)
 D = 00°14'59"
 T = 925.54'
 L = 1,850.08'
 R = 22,949.51'
 PC = 695+65.08
 PT = 714+15.16

XBL-2
 Ls = 220.00'
 Os = 00°16'29"
 P = 0.88
 K = 110.00
 Xs = 220.00
 Ys = 0.35
 LT = 146.67
 ST = 73.33
 LC = 220.00
 V = 65 MPH

OBTR-1
 CURVE OBTR-1
 PI = 8+49.82
 DELTA = 00°45'01.98" (LT)
 D = 00°15'00"
 T = 150.16'
 L = 300.31'
 R = 22,925.51'
 PC = 6+99.66
 PT = 9+99.97
 e = NC
 V = 50 MPH

OBTR-2
 CURVE OBTR-2
 PI = 12+02.60
 DELTA = 03°52'06.35" (LT)
 D = 00°57'18"
 T = 202.63'
 L = 405.10'
 R = 6,000.00'
 PC = 9+99.97
 PT = 14+05.07
 e = NC
 V = 50 MPH

OBTR-3
 CURVE OBTR-3
 PI = 15+88.77
 DELTA = 02°37'50.62" (RT)
 D = 00°42'59"
 T = 183.69'
 L = 367.32'
 R = 8,000.00'
 PC = 14+05.07
 PT = 17+72.39
 e = NC
 V = 50 MPH

OBTR-4
 CURVE OBTR-4
 PI = 18+44.21
 DELTA = 01°00'35.16" (LT)
 D = 00°42'11"
 T = 71.82'
 L = 143.63'
 R = 8,150.00'
 PC = 17+72.39
 PT = 19+16.03
 e = NC
 V = 50 MPH

OBTR-5
 CURVE OBTR-5
 PI = 20+39.80
 DELTA = 01°44'05.24" (RT)
 D = 00°42'03"
 T = 123.77'
 L = 247.52'
 R = 8,175.00'
 PC = 19+16.03
 PT = 21+63.55
 e = NC
 V = 50 MPH

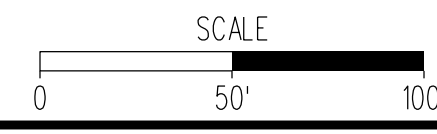
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement

REFERENCES (PLAN AND DETAIL SHEETS)

RAMP OBTR PROFILE	8A
E&S PLAN	8B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



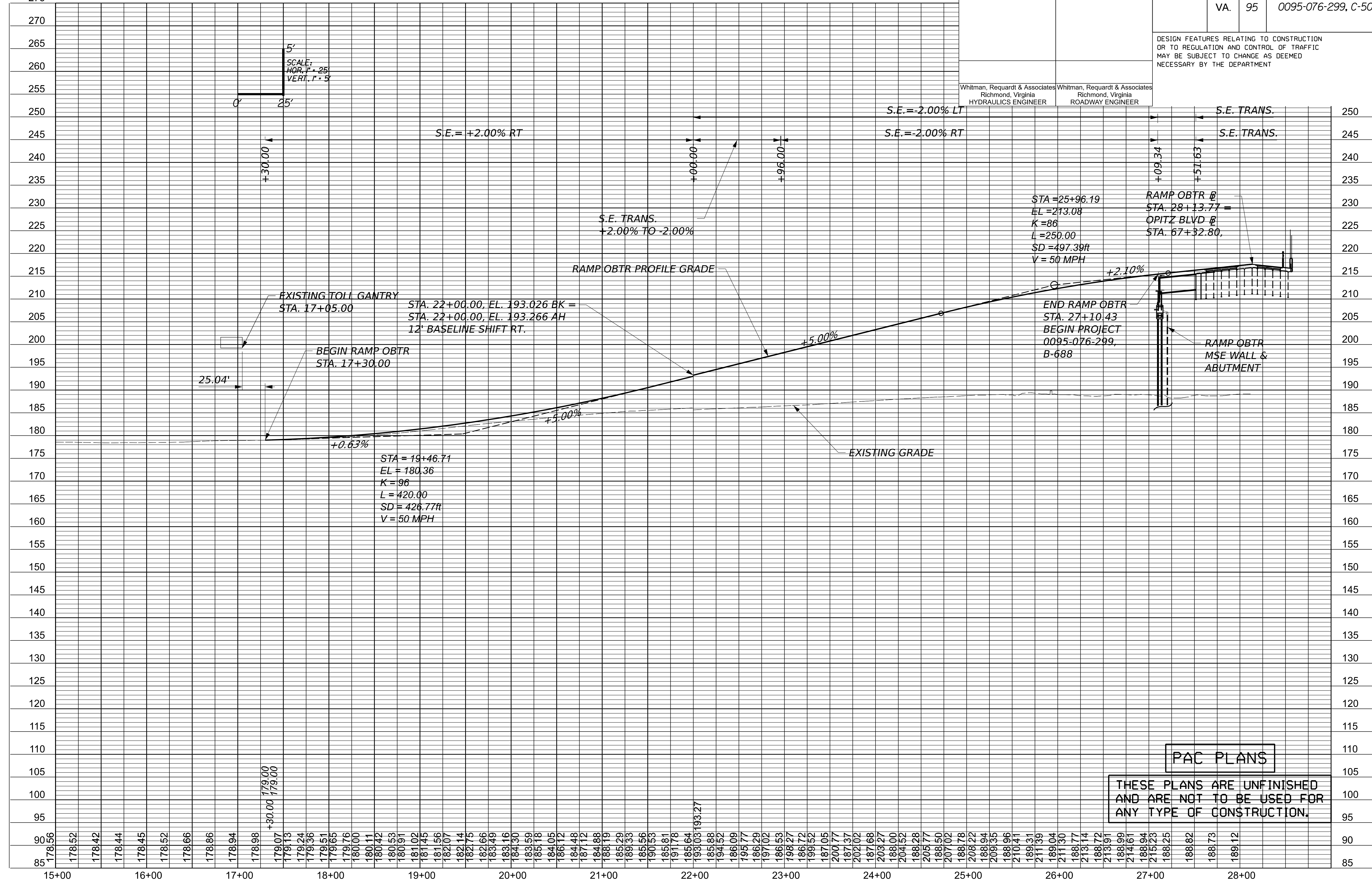
PROJECT MANAGER: Rmpal Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781_03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8000 ---
 SUBSURFACE UTILITIES: DATE Acumark, Inc. (804) 550-7790_07/07/2021

REVISED	STATE			SHEET NO.
	STATE	ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	8A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY: *DATE Acumark, Inc. (804) 550-7140 07/07/2021*

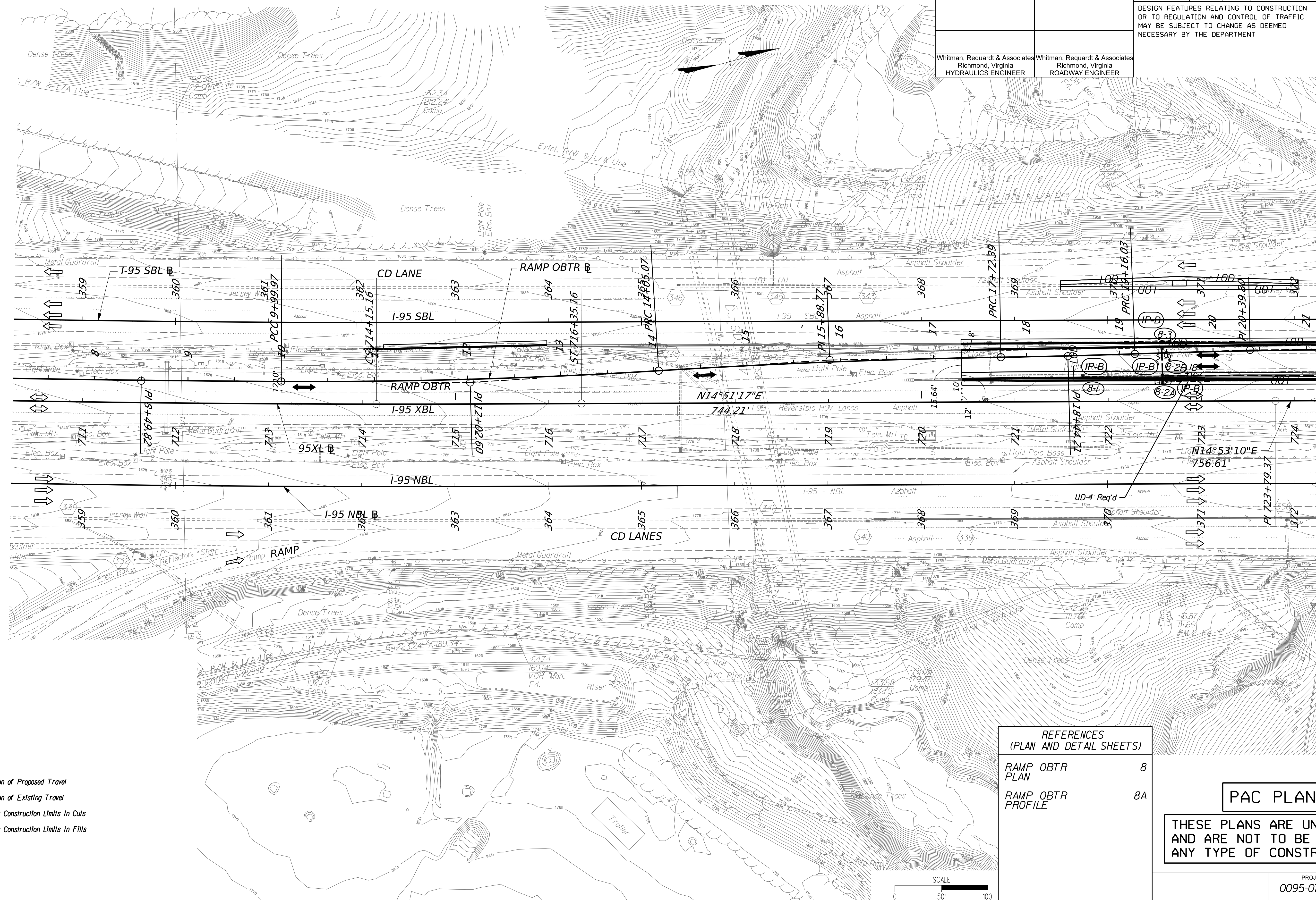
EROSION AND SEDIMENT CONTROL PLAN PHASE 1

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	8B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



MATCHLINE STATION 724+25 - SEE SHEET 9B

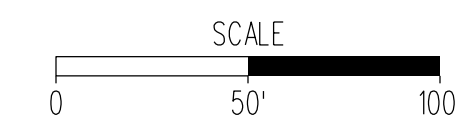
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

RAMP OBTR PLAN	8
RAMP OBTR PROFILE	8A

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: *Rampal Shah, P.E.*, (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: *H&B Surveying and Mapping, LLC*, (804) 330-3281, 03/09/2021
 DESIGN BY: *Whitman, Reardon & Associates, LLP*, (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: *AccuMark, Inc.*, (804) 550-7140, 07/07/2021

See Sheet 10 for Utility Owner's List

COMMONWEALTH OF VIRGINIA
 DEPARTMENT OF HIGHWAY

DB 395 PG 225
 R/W FILE *819(PLAT)
 GPIN 8291-76-9471
 3,745 AC (CALC)

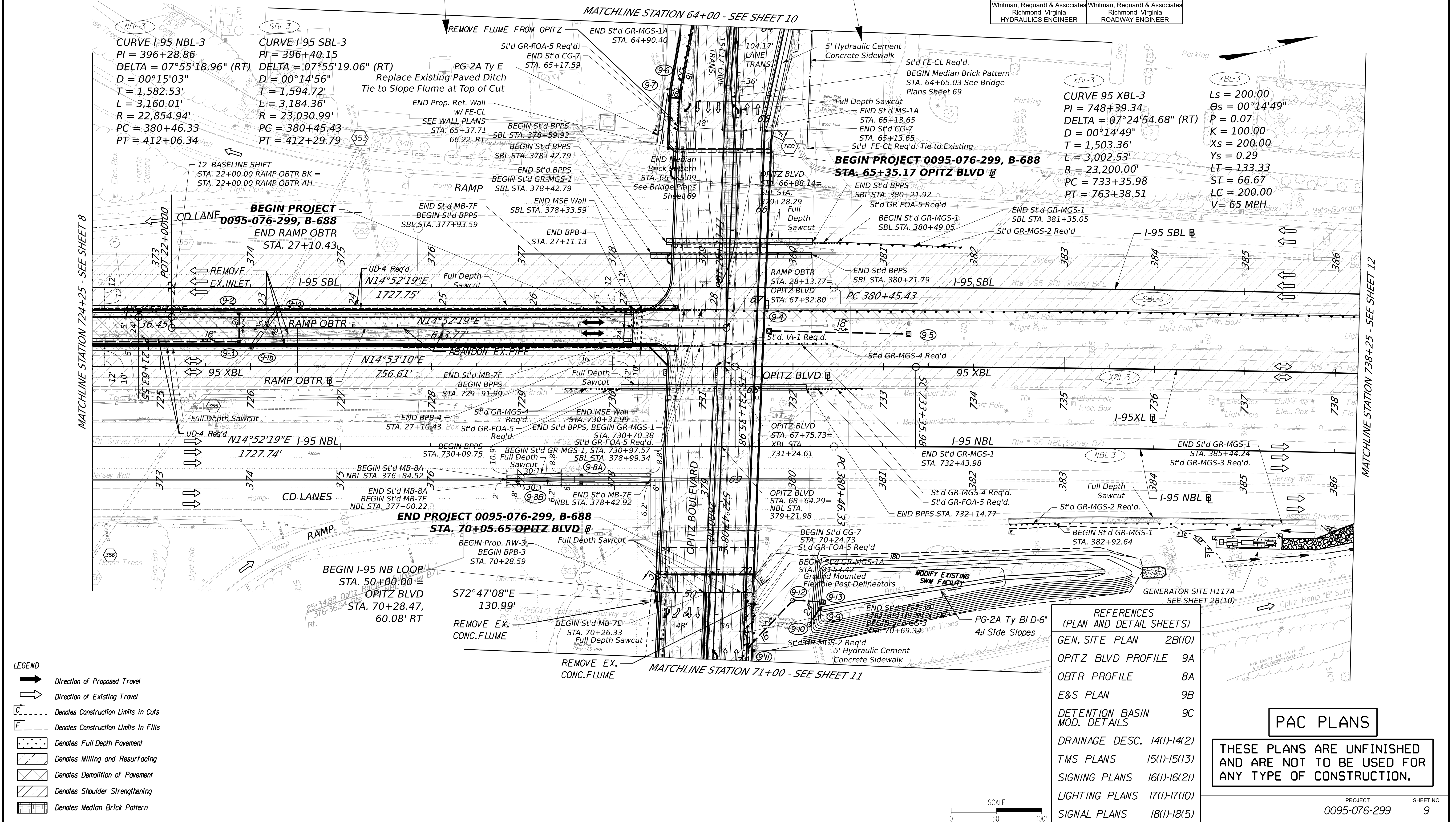
COMMONWEALTH OF VIRGINIA

DB 1250 PG 506
 HWY PB 9 PG 314
 NO GPIN ASSIGNED
 0.654 +/- AC (CALC)

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	9

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates Richmond, Virginia HYDRAULICS ENGINEER	Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER
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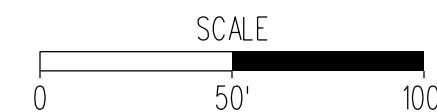
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes Shoulder Strengthening
 - Denotes Median Brick Pattern

REFERENCES (PLAN AND DETAIL SHEETS)

GEN. SITE PLAN	2B(10)
OPITZ BLVD PROFILE	9A
OBTR PROFILE	8A
E&S PLAN	9B
DETENTION BASIN MOD. DETAILS	9C
DRAINAGE DESC.	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)
SIGNAL PLANS	18(1)-18(5)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



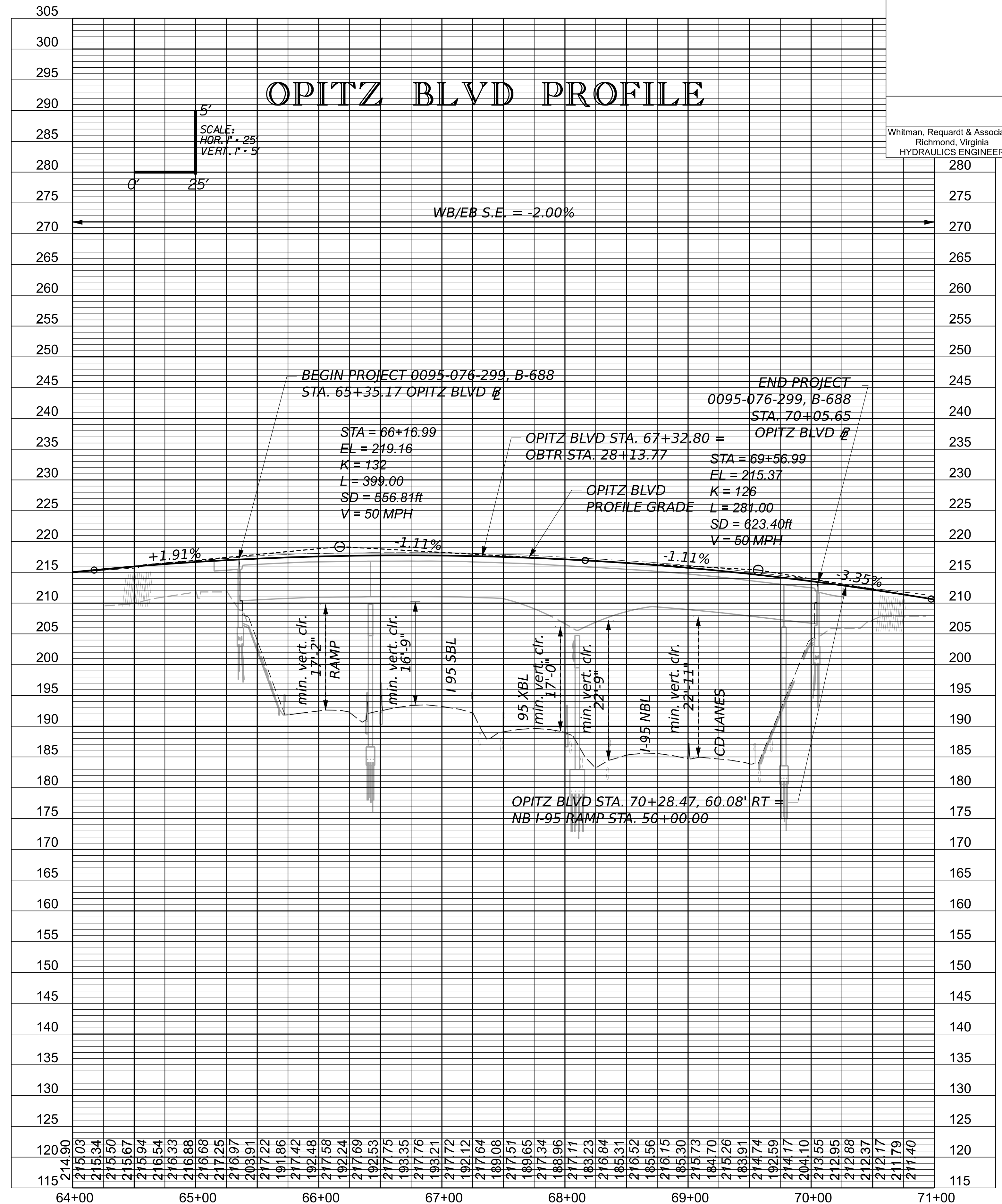
PROJECT MANAGER: Btupal Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781_03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Acumark, Inc. (804) 550-7740_07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	9A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E., (703) 259-2362, INOVA District*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP, (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc., (804) 550-7140, 07/07/2021*

EROSION AND SEDIMENT CONTROL PLAN PHASE 1

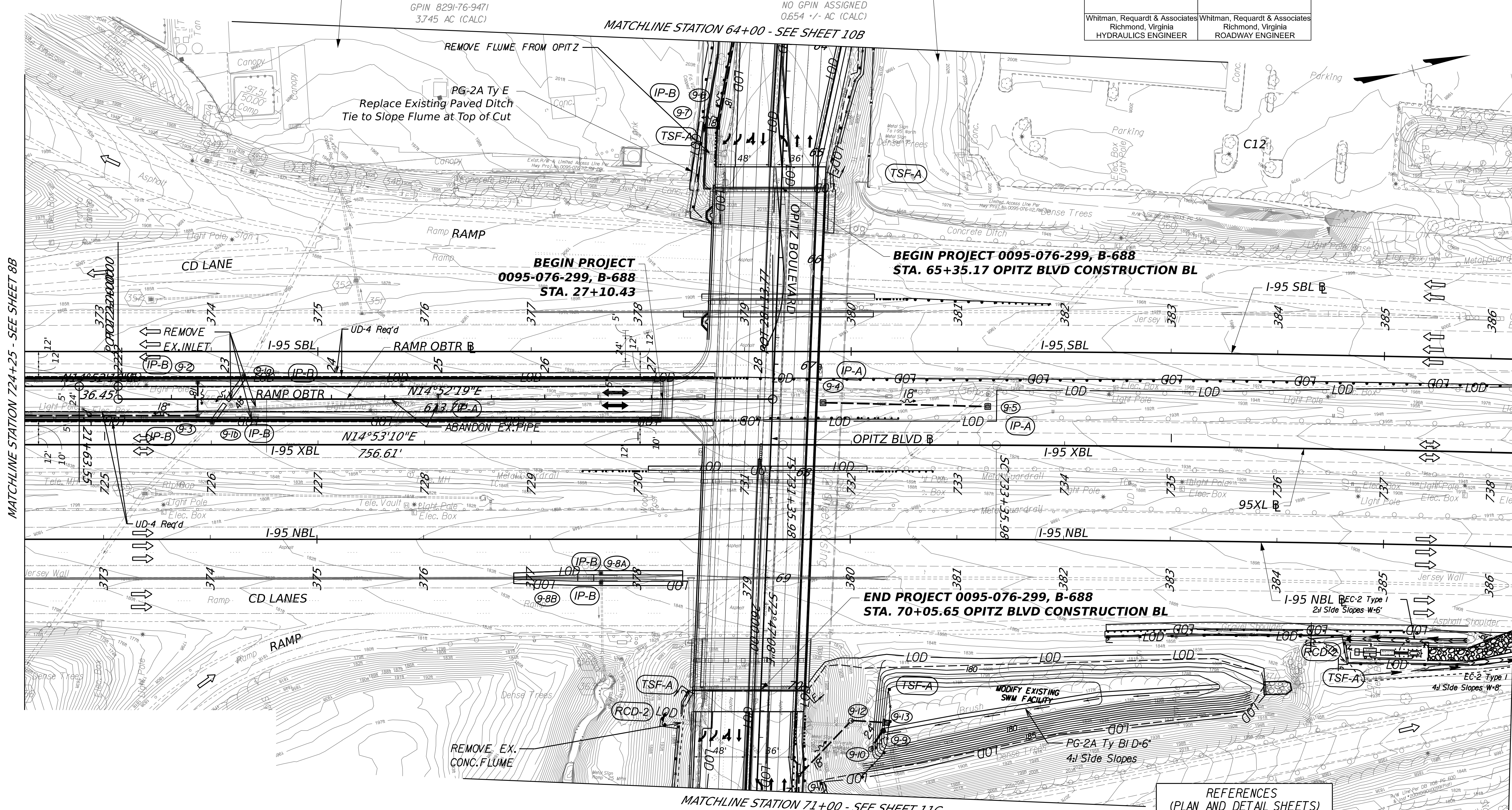
COMMONWEALTH OF VIRGINIA
 DEPARTMENT OF HIGHWAY
 DB 395 PG 225
 R/W FILE *819(PLAT)
 GPIN 8291-76-9471
 3.745 AC (CALC)

COMMONWEALTH OF VIRGINIA
 DB 1250 PG 506
 HWY PB 9 PG 314
 NO GPIN ASSIGNED
 0.654 +/- AC (CALC)

REVISED	STATE	ROUTE	STATE		SHEET NO.
			PROJECT		
	VA.	95	0095-076-299, C-501		9B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates Richmond, Virginia HYDRAULICS ENGINEER	Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER
--	---



MATCHLINE STATION 724+25 - SEE SHEET 8B

MATCHLINE STATION 71+00 - SEE SHEET 11C

LEGEND

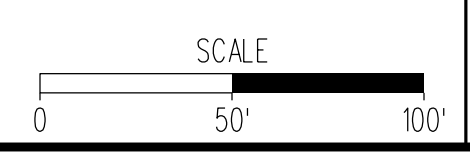
- Direction of Proposed Travel
- Direction of Existing Travel
- Denotes Construction Limits in Cuts
- Denotes Construction Limits in Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

OPITZ BLVD PLAN	9
OPITZ BLVD PROFILE	9A
DETENTION BASIN MOD. DETAILS	9C

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



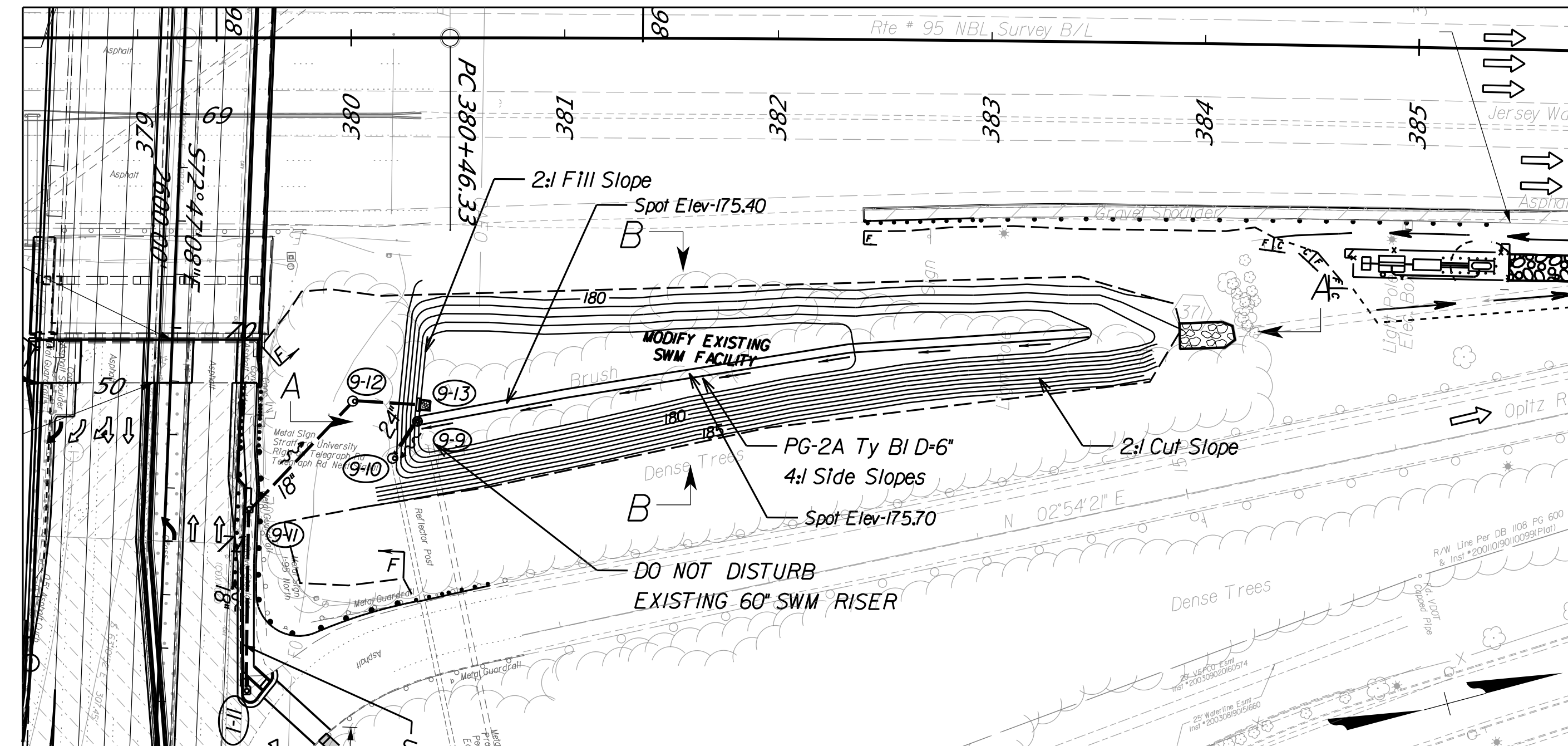
PROJECT MANAGER: *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140, 07/07/2021*

DETENTION BASIN MODIFICATION DETAILS

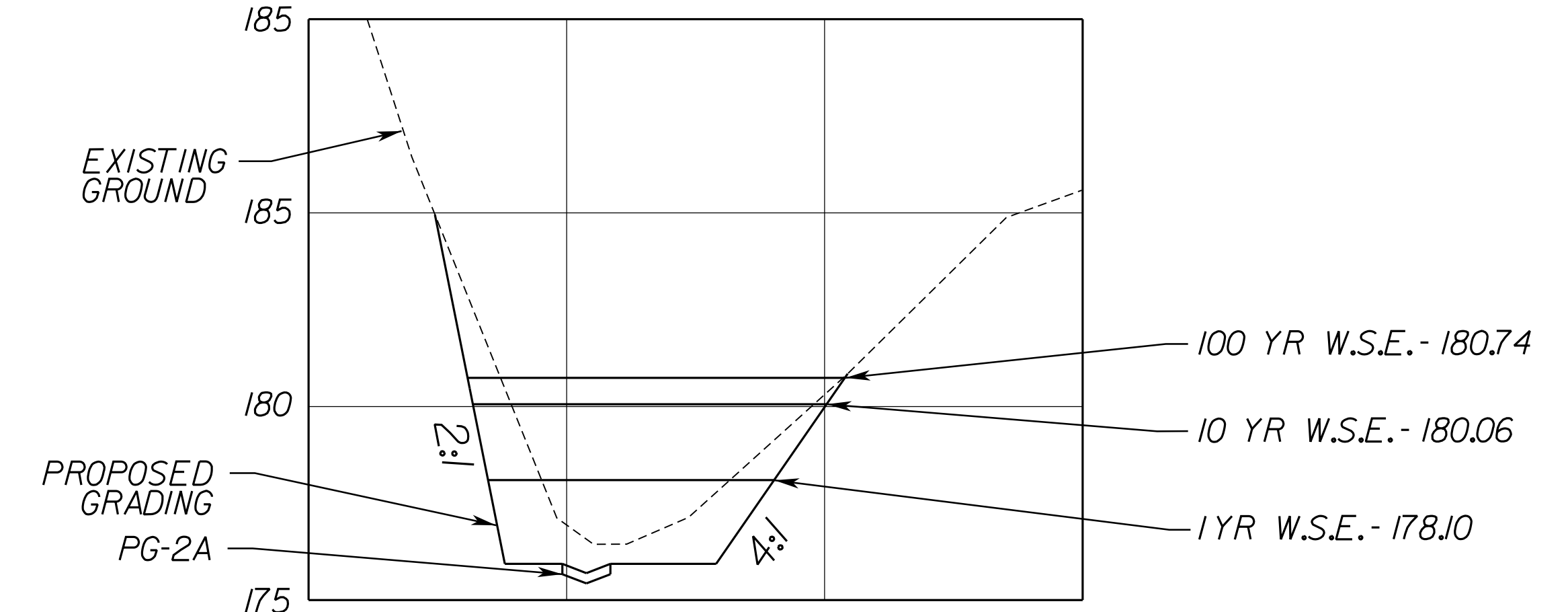
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	9C

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER



BASIN CROSS SECTION (SECTION B-B)
 (Not to Scale)

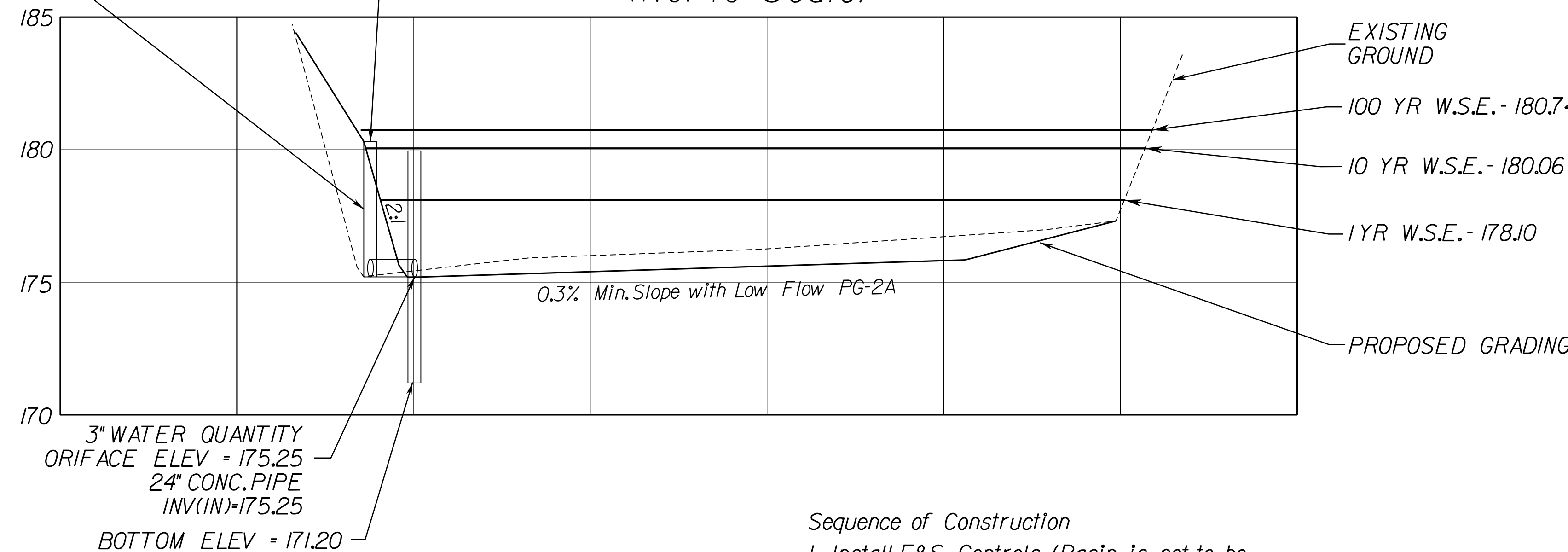


9-10 5 JLF Std. MH-1 or 2 Req.
 1 Std. MH-1 Frame & Cover Req.
 Inv = 175.20
 Modify Existing Structure with MH-1 top

9-9 SWM-1 (48" BASE)
 TOP ELEV = 179.95

BASIN PROFILE (SECTION A-A)
 (Not to Scale)

Elevation	Area (ft ²)	Volume Increment (ac-ft)	Volume Cummulative (ac-ft)
175.25	10	0	0
175.95	600	0	0
176	7,518.00	0.003	0.003
177	11,136.00	0.213	0.216
178	13,732.00	0.285	0.501
179	16,128.00	0.342	0.843
180	18,532.00	0.398	1.241
181	21,969.00	0.464	1.705



- 9-9 8.7' Std. SWM-1 Req. (48" Dia Base)
 Crest Elev = 179.95
 Bottom Elev = 171.25
 Std. Trash Rack Req'd
 3" Dia. Low Flow Orifice Req., Inv = 175.25
- 9-9 9-10 15' Concrete Pipe Req.
 Inv (In) = 175.25; Inv (Out) = 175.20
- 9-10 5 JLF Std. MH-1 or 2 Req.
 1 Std. MH-1 Frame & Cover Req.
 Inv = 175.20
 Modify Existing Structure with MH-1 top
- EX371 5 JLF Std. MH-1 or 2 Req.
 1 Std. MH-1 Frame & Cover Req.
 Inv = 175.20
 Modify Existing Structure with MH-1 top

Sequence of Construction

1. Install E&S Controls (Basin is not to be used as a temp. sediment basin.)
2. Take existing riser at proposed 9-10 offline. Install manhole for 9-10 and new riser 9-9.
3. Install E&S controls at SWM Risers
4. Excavate Basin, grade Opitz Blvd fill slope, install PG-2A.
5. Seed and stabilize disturbed areas.
6. Removed E&S controls.

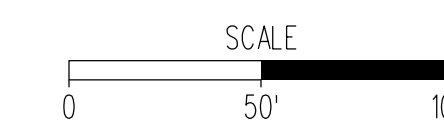
The Contractor shall provide "As-Built" drawings of all stormwater management facilities. The "As-Built" drawings shall show the actual finished ground contours, outlet structure dimensions and elevations, etc. as they exist at the completion of the project. These drawings shall be signed and sealed by the Licensed Professional Engineer or Land Surveyor registered in the State of Virginia. All costs shall be included under Construction Surveying.

REFERENCES
 (PLAN AND DETAIL SHEETS)

OPITZ BLVD PLAN	9
OPITZ BLVD PROFILE	9A
OBTR PROFILE	8A
E&S PLAN	9B

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	9C

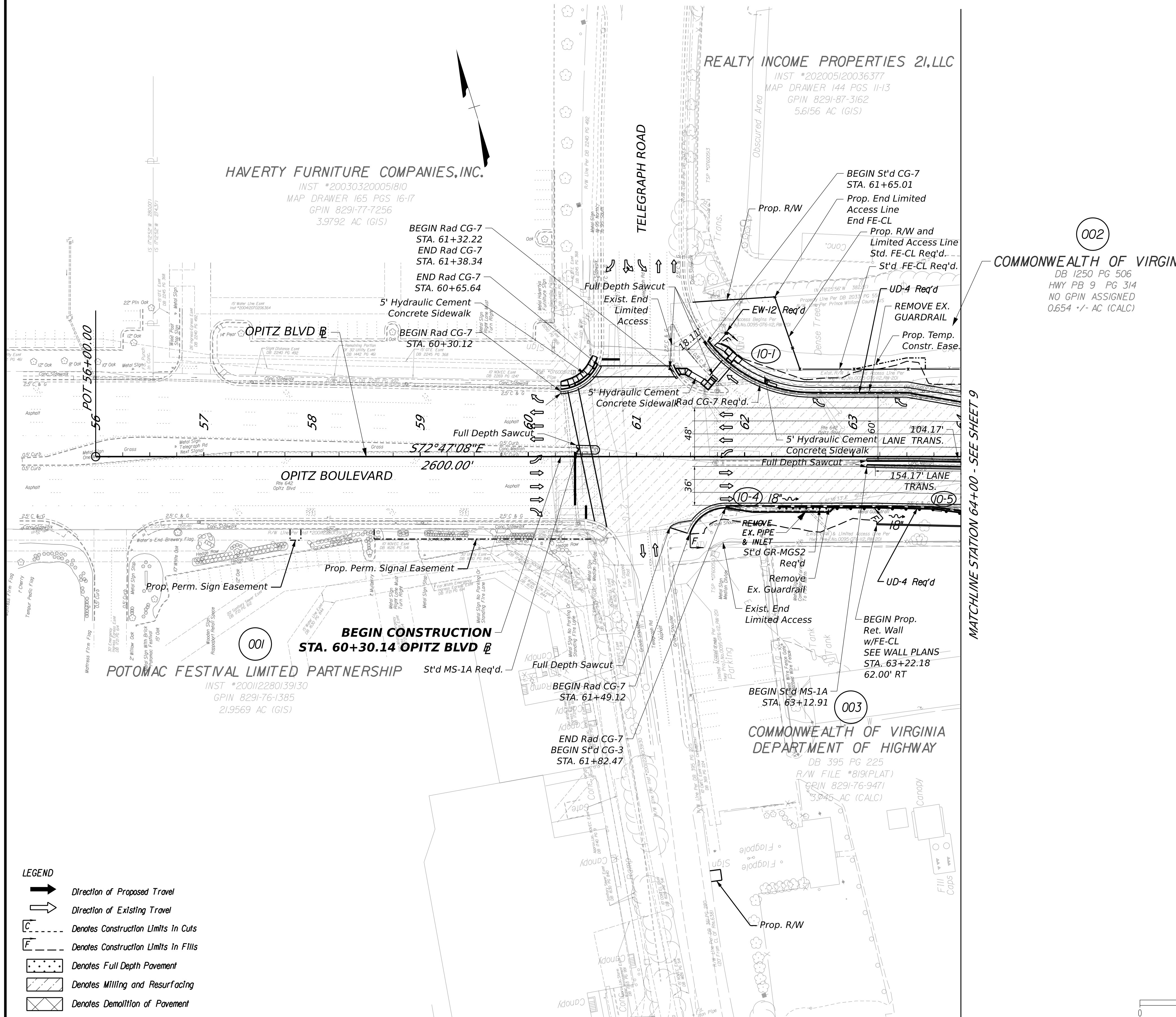
PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	10

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



002

003

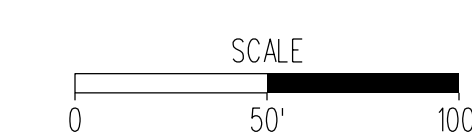
- Utility Owner's List**
- Water & Sewer:**
 Prince William County Service Authority
 4 County Complex Court
 Woodbridge, VA 22192
 Samantha (Sam) Kearney PE 703-335-7925
 skearney@pwcsa.org
 Luke Engbert Work: 703-393-4467
 Cell: 540-642-6288
 lengbert@pwcsa.org
- Street Lighting:**
 Richard "Ricky" Hagstrom
 Prince William County
 Street Lighting Program Coordinator
 703-792-6823
 rhagstrom@pwgov.org
- Power:**
 Dominion Energy
 7500 W Broad St
 Richmond, VA 23294
 Alec T. Hagerman
 Cell: 804-366-9344
 Alec.T.Hagerman@dominionenergy.com
- Northern Virginia Electric Cooperative**
 Manager, Field Services
 P.O. Box 2710
 Manassas, VA 20108
 Dale Diffenbaugh
 Office: 703-392-1720
 Cell: 703-926-7661
 Ddiffenbaugh@Novec.com
- Gas:**
 Washington Gas
 Mark Tajnai PE PMP
 Work: 703-750-5667
 Cell: 703-408-6534
 MTajnai@washgas.com
- Telecomm:**
 Comcast
 Mark Slebrch
 11101 University Blvd
 Manassas, VA 20110
 Cell: 540-553-1415
 Mark_Slebrch@comcast.com
- Cox Communications**
 Patricio (Jeff) Acierto
 7741 Southern Drive
 Springfield, VA 22150
 703-480-7812
 Patricio.Acierto@cox.com
- Verizon Virginia Inc.**
 Joe Zych
 6014 Windsor Drive
 Fredericksburg, VA 22407
 540-903-4188
 joezych@msn.com
- SummittIG LLC**
 Steve Ragland
 22375 Brodrick Dr., Suite 165
 Dulles, VA 20166
 Work: 804-317-4483
 Cell: 703-376-3695
 sragland@summittig.com
- LUMEN (Qwest)**
 Samantha Meyer
 Business Analyst - Relocations
 Tulsa, OK
 relocations@lumen.com

REFERENCES (PLAN AND DETAIL SHEETS)

OPITZ BLVD PROF.	10A
E&S PLAN	10B
RW PLAN	10RW
DRAINAGE DESC.	14(1)-14(2)
TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)
SIGNAL PLANS	18(1)-18(5)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	0095-076-299	SHEET NO.	10
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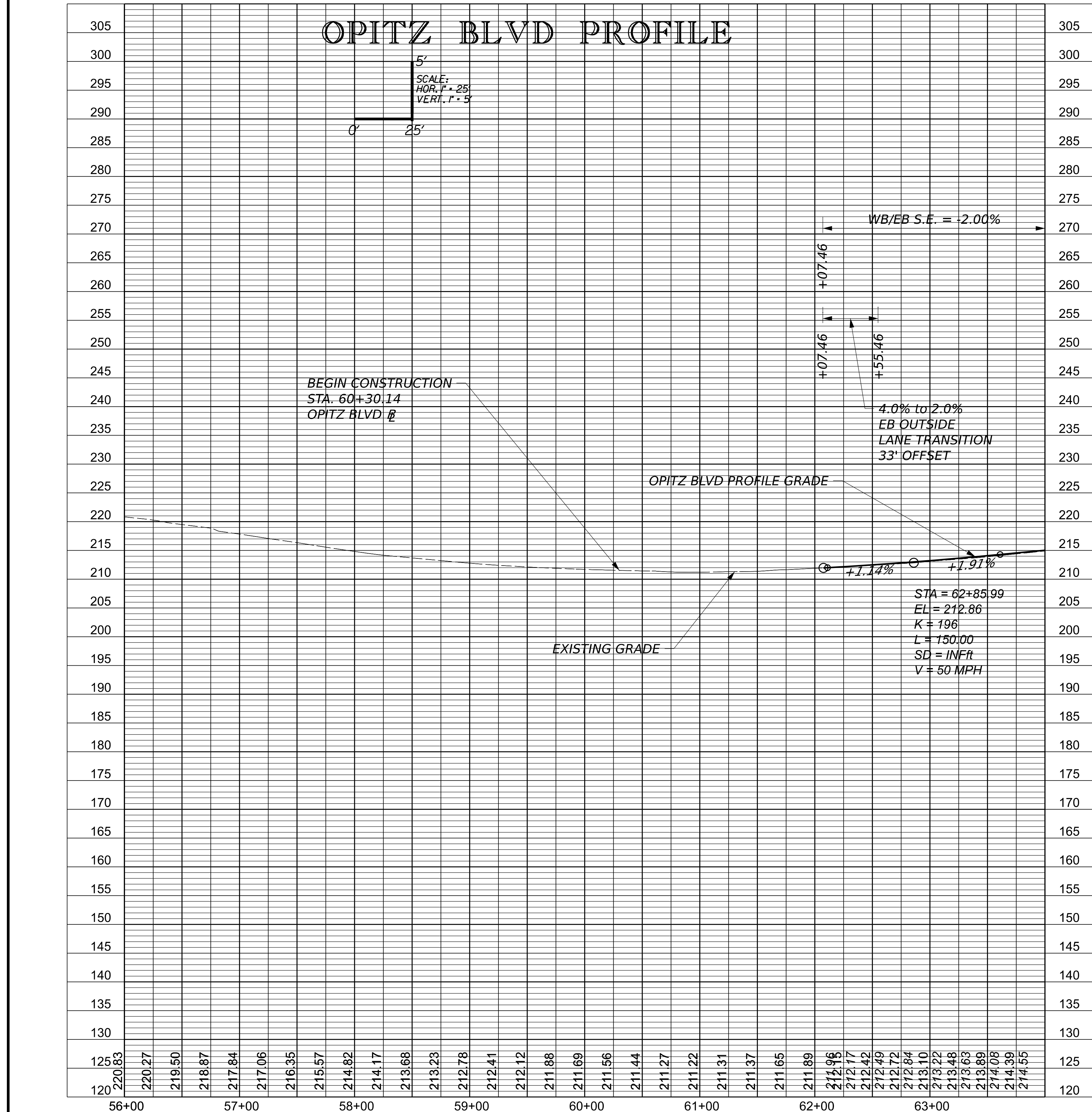
PROJECT MANAGER: *Rajpal Shah, P.E.* (203) 259-2362 (NOVA District)
 SURVEYED BY: DATE *H&B Surveying and Mapping, LLC* (804) 330-3781_03/09/2021
 DESIGN BY: *Whitman, Reardon & Associates, LLP* (804) 272-8700
 SUBSURFACE UTILITY BY: DATE *Accumar, Inc.* (804) 550-7790_07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	10A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140, 07/07/2021*

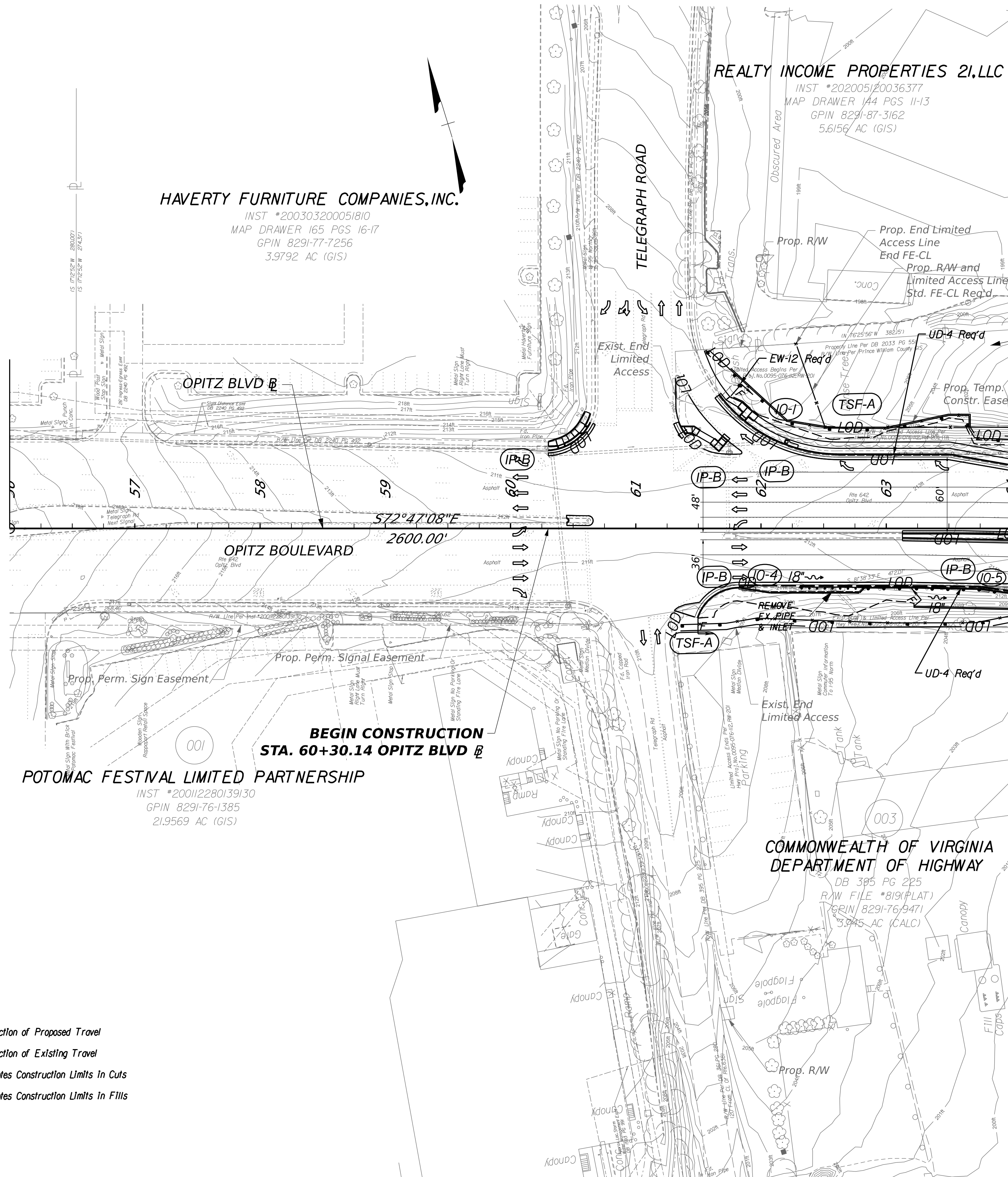
EROSION AND SEDIMENT CONTROL PLAN PHASE 1

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299,C-501	10B

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



COMMONWEALTH OF VIRGINIA
 DB 1250 PG 506
 HWY PB 9 PG 314
 NO GPIN ASSIGNED
 0.654 +/- AC (CALC)

- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

OPITZ BLVD PLAN	10
OPITZ BLVD PROFILE	10A


PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	10B

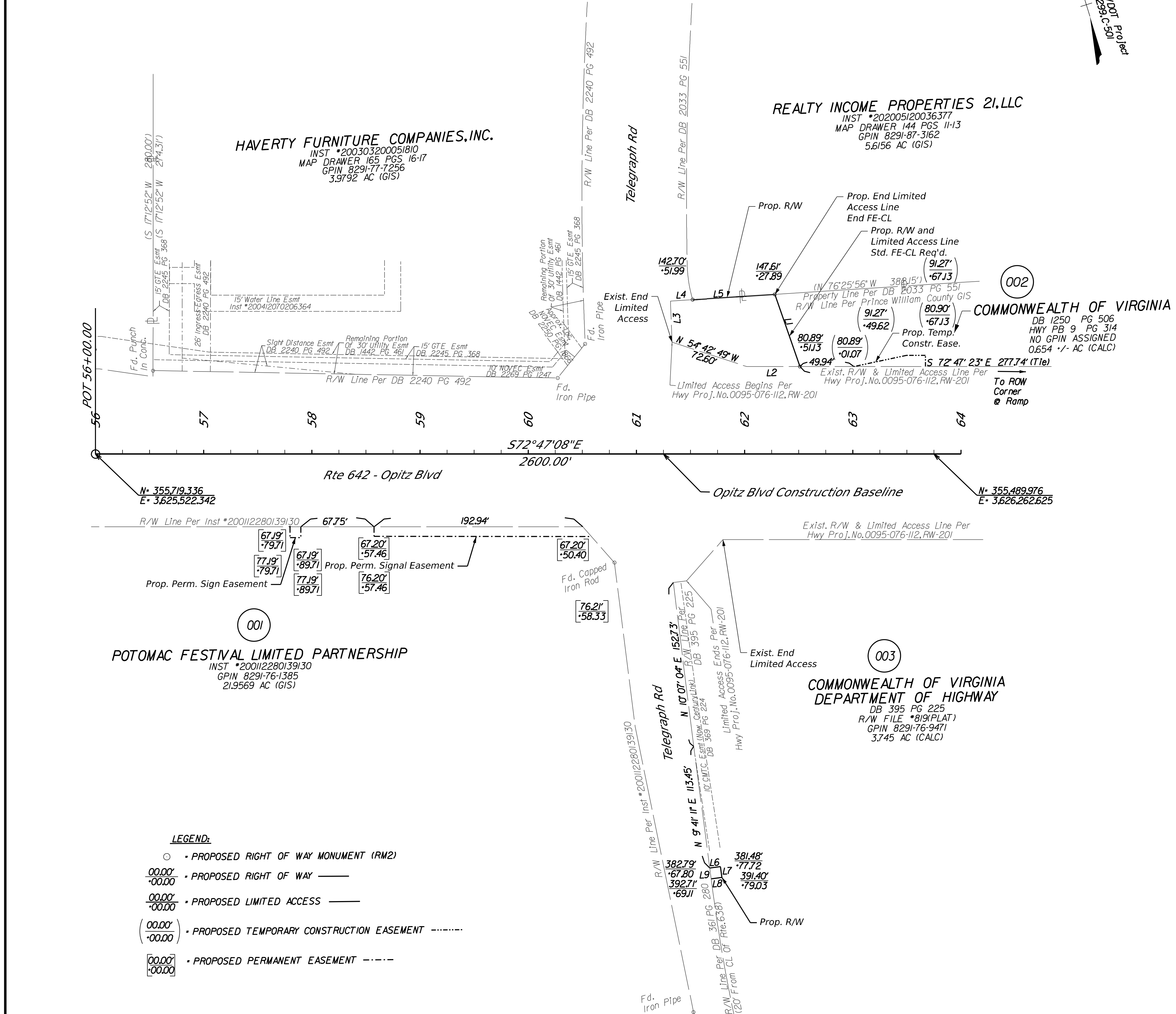
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Bequardt, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accurmark, Inc. (804) 550-7740, 07/07/2021

	REVISED	STATE	ROUTE	PROJECT	SHEET NO.
		VA.	95	0095-076-299, C-501	10RW

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Leslie R Byrnside
 2022.02.23 15:35:10-05'00"
 H&B Surveying and Mapping
 Richmond, Virginia
 LAND SURVEYOR

Based on VDOT Project
 0095-076-299, C-501



Line Table

Line	Bearing	Distance
L1	S 1° 59' 33" E	70.66'
L2	N 72° 47' 23" W	49.77'
L3	N 15° 02' 17" E	38.00'
L4	S 76° 29' 10" E	20.53'
L5	S 76° 29' 10" E	76.05'
L6	S 80° 18' 49" E	10.00'
L7	S 09° 41' 11" W	10.00'
L8	N 80° 18' 49" W	10.00'
L9	N 09° 41' 11" E	10.00'

Area Table

Parcel	Proposed Right-of-Way Take (Ac. or SF)	Proposed Temp. Const. Easement (Ac. or SF)	Proposed Permanent Sign Easement (Ac. or SF)	Proposed Permanent Traffic Easement (Ac. or SF)
001			100 SF	1,772 SF
002	6,070 SF	433 SF		
003	100 SF			

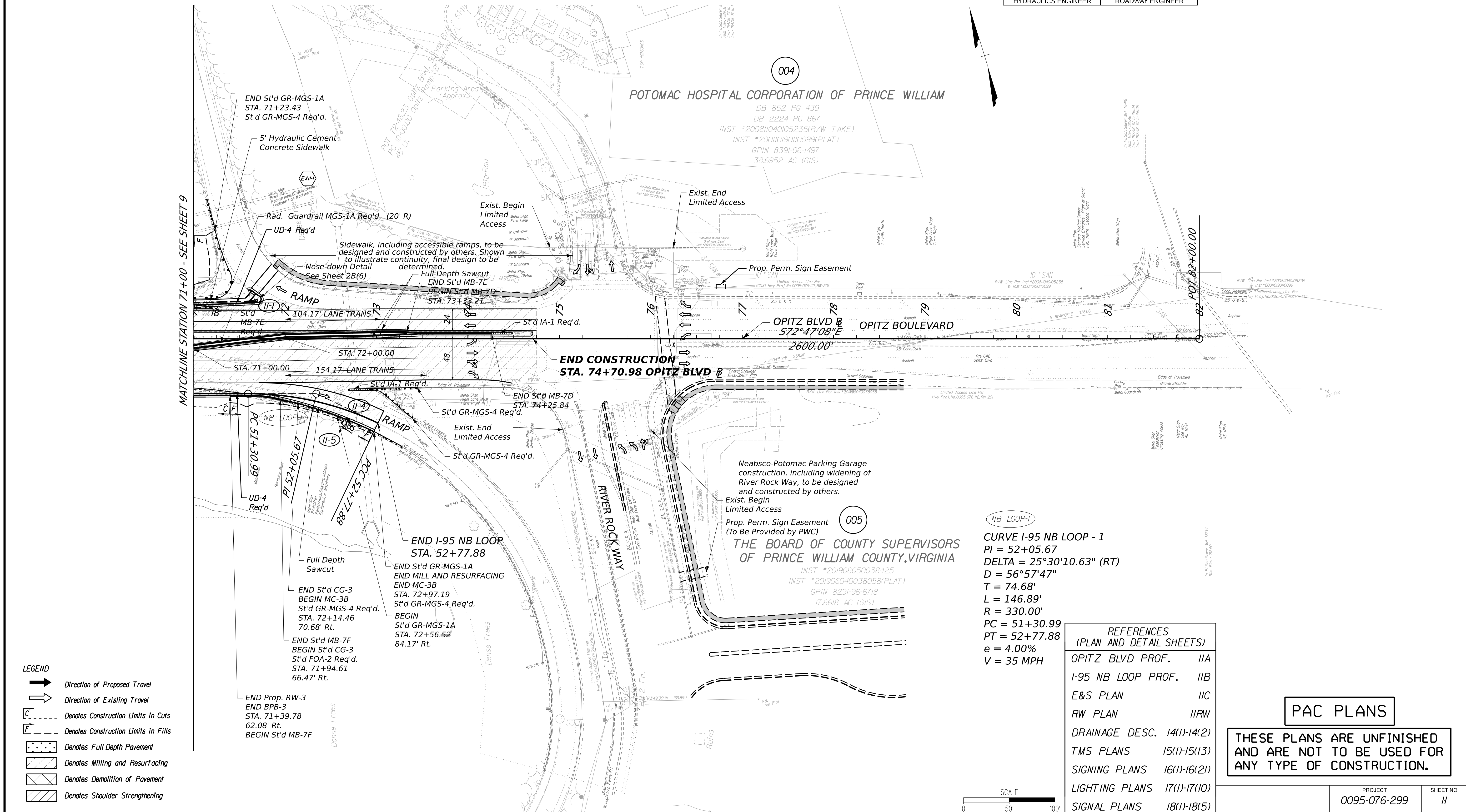
- Notes:
- This Right-of-Way Sheet is Based Upon a Field Run Perimeter Survey of the Existing and Proposed R/W Limits. All Other Adjoining/Departing Boundary Lines Shown are Compiled From Various Sources: Found Field Monumentation, Metes and Bounds Description and Recorded Plats. The Adjoining Lines Do Not Represent a Field Run Survey of the Adjoining Properties and are a Best Fit Based on Compiled Data. All Areas Shown for R/W Takes and Easements are Approximate Only. See Right-of-Way Sheet IC.
 - All of the Properties Physical Improvements are not Shown Hereon.
 - This Plan Sheet was Prepared Without the Benefit of a Title Report and May Not Show All Easements Which May Affect the Property Shown Hereon.
 - No Designation or Location of Subsurface Utilities were Performed During Preparation of This Plan Sheet.
 - This Survey Datum is Based on VDOT Project *0095-076-299, C-501, UPC *116663.
 - No Cemetery Sites were Observed / Visible on the Subject Properties.
 - I hereby Certify That This Plan Sheet is Correct to the Best of My Knowledge and Belief, and This Plan Sheet Complies With The Minimum Standards and Procedures as Established By The Virginia Department Of Transportation's Location and Design Division.
 - Coordinate Values Shown Hereon are VDOT Project Coordinates.
 - All Monumentation to be Set Within 6 Months of the Completion of Construction.

- LEGEND:
- - PROPOSED RIGHT OF WAY MONUMENT (RM2)
 - - - - - PROPOSED RIGHT OF WAY
 - - - - - PROPOSED LIMITED ACCESS
 - (- - - -) PROPOSED TEMPORARY CONSTRUCTION EASEMENT
 - - - - - PROPOSED PERMANENT EASEMENT

PROJECT MANAGER: *Rampal Shah, P.E.*, (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC*, (804) 330-3781, 03/09/2021
 DESIGN BY: *Whitman, Reardon & Associates, LLP*, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc.*, (804) 550-7140, 07/07/2021

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE		SHEET NO.
			PROJECT		
	VA.	95	0095-076-299, C-501		11
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Reardon & Associates Richmond, Virginia HYDRAULICS ENGINEER			Whitman, Reardon & Associates Richmond, Virginia ROADWAY ENGINEER		



PAC PLANS
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PROJECT	SHEET NO.
0095-076-299	11

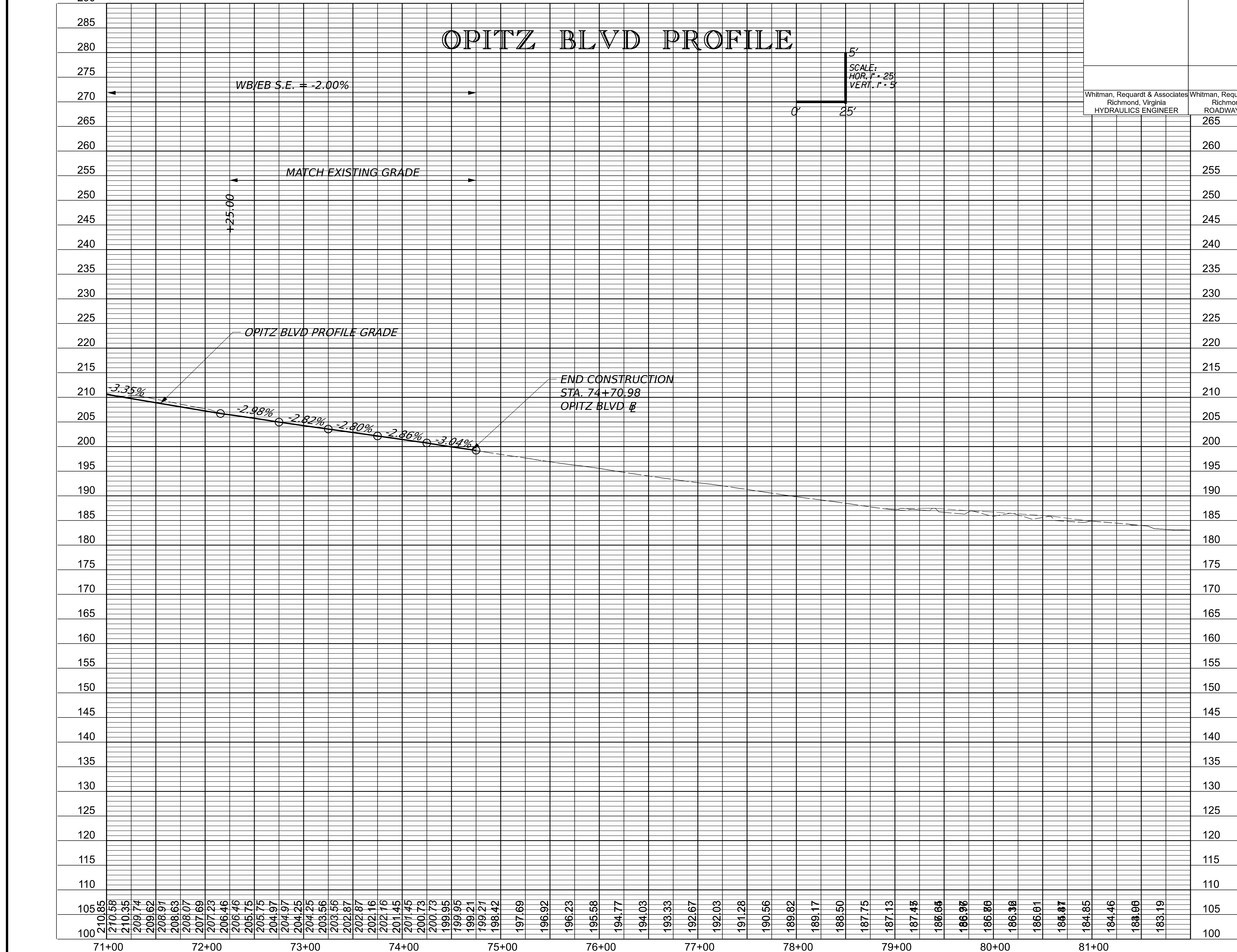
PROJECT MANAGER: *Rajpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY: DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITIES: DATE: *Acumbar, Inc. (804) 550-7790, 07/07/2021*

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	11A

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

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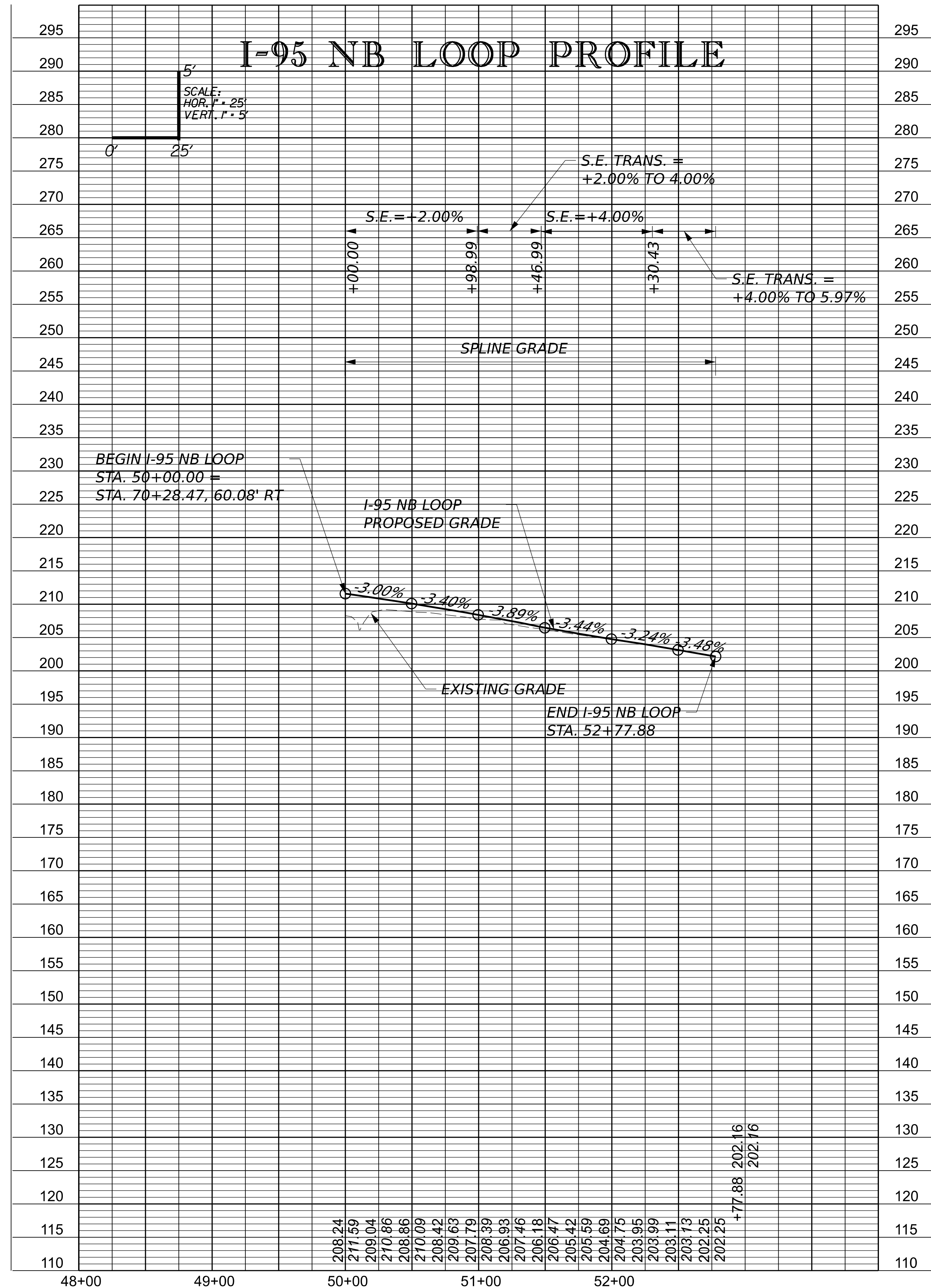
PROJECT MANAGER: Rmpal Shah, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumar, Inc. (804) 550-7790, 07/07/2021

REVISED	STATE			SHEET NO.
	STATE	ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	IIB

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	IIB

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781.03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140.07/07/2021*

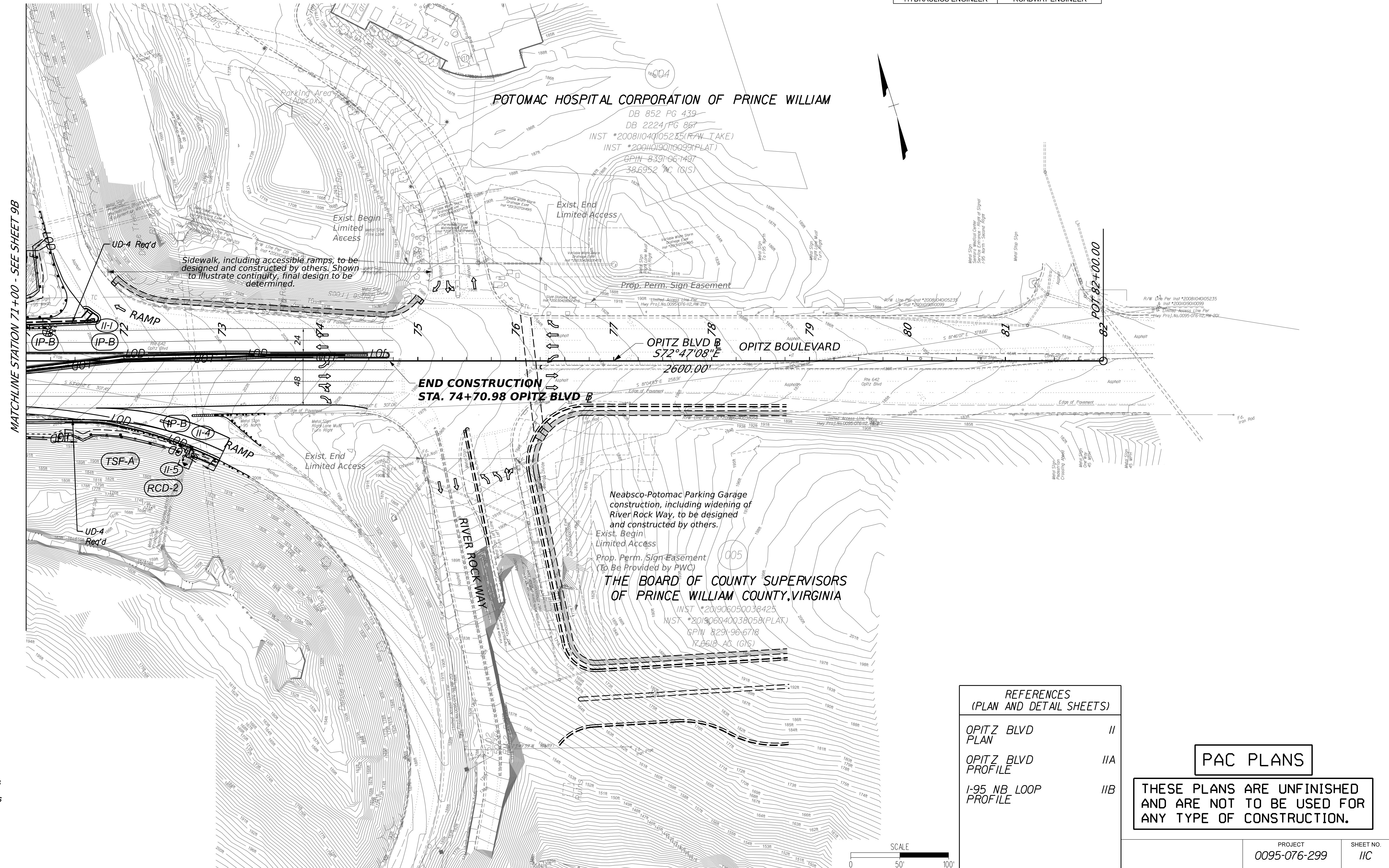
EROSION AND SEDIMENT CONTROL PLAN PHASE 1

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299-C-501	IIC

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



LEGEND

➔ Direction of Proposed Travel
 ➔ Direction of Existing Travel
 [---] Denotes Construction Limits In Cuts
 [---] Denotes Construction Limits In Fills

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

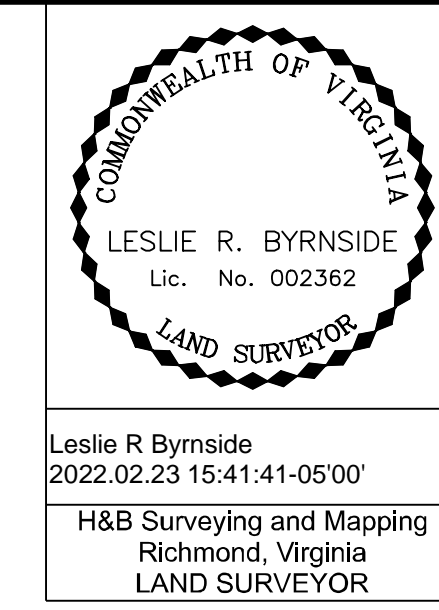
OPITZ BLVD PLAN	II
OPITZ BLVD PROFILE	IIA
I-95 NB LOOP PROFILE	IIIB

PAC PLANS

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PROJECT 0095-076-299	SHEET NO. IIC
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PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Bequardt, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021



REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	IIRW

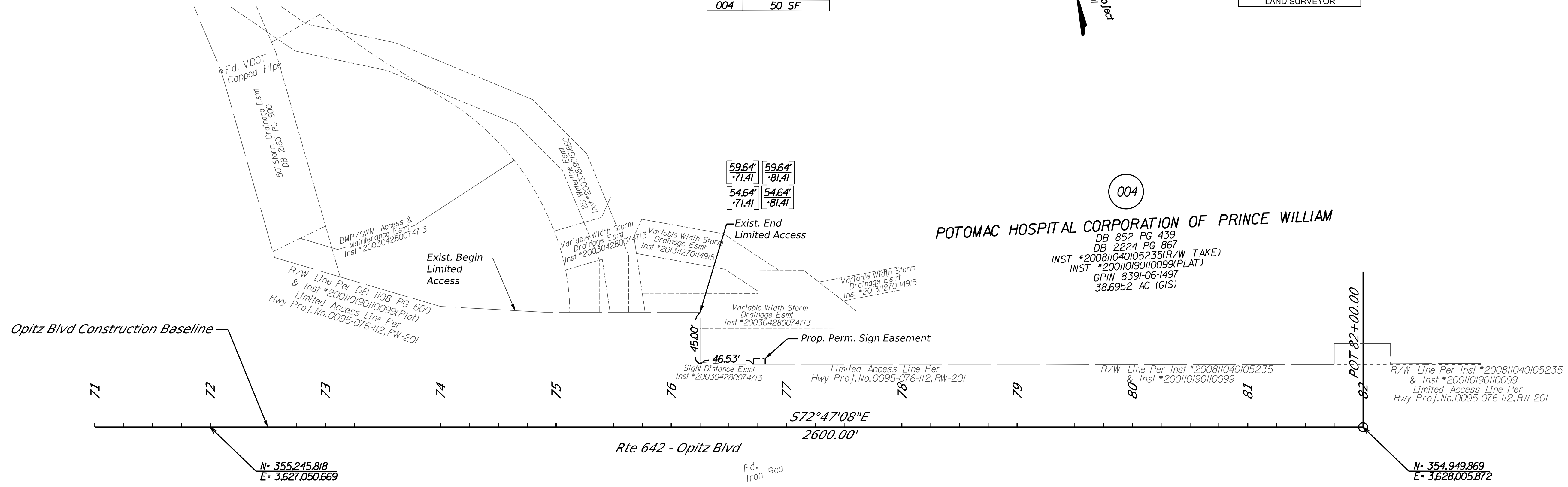
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Leslie R Byrnside
 2022.02.23 15:41:41-05'00"
 H&B Surveying and Mapping
 Richmond, Virginia
 LAND SURVEYOR

Area Table

Parcel	Proposed Permanent Sign Easement (Ac. or SF)
004	50 SF

Based on VDOT Project 0095-076-299, C-501



POTOMAC HOSPITAL CORPORATION OF PRINCE WILLIAM
 DB 852 PG 439
 DB 2224 PG 867
 INST *20081040105235(R/W TAKE)
 INST *200110190110099(PLAT)
 GPIN 8391-06-1497
 38.6952 AC (GIS)

THE BOARD OF COUNTY SUPERVISORS
 OF PRINCE WILLIAM COUNTY, VIRGINIA
 INST *201906050038425
 INST *201906040038058(PLAT)
 GPIN 8291-96-6718
 17.6618 AC (GIS)

Notes:

1. This Right-of-Way Sheet Is Based Upon a Field Run Perimeter Survey of the Existing and Proposed R/W Limits. All Other Adjoining/Departing Boundary Lines Shown are Compiled From Various Sources: Found Field Monumentation, Metes and Bounds Description and Recorded Plats. The Adjoining Lines Do Not Represent a Field Run Survey of the Adjoining Properties and are a Best Fit Based on Compiled Data. All Areas Shown for R/W Takes and Easements are Approximate Only. See Right-of-Way Sheet IC.
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6. No Cemetery Sites Were Observed / Visible on the Subject Properties.
7. I Herby Certify That This Plan Sheet Is Correct to the Best Of My Knowledge and Belief, and This Plan Sheet Complies With The Minimum Standards and Procedures as Established By The Virginia Department Of Transportation's Location and Design Division.
8. Coordinate Values Shown Hereon Are VDOT Project Coordinates.
9. All Monumentation to be Set Within 6 Months of the Completion of Construction.

LEGEND:

00.00' - PROPOSE PERMANENT SIGN EASEMENT - - - -



PROJECT	SHEET NO.
0095-076-299	IIRW

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140 07/07/2021*

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	12

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

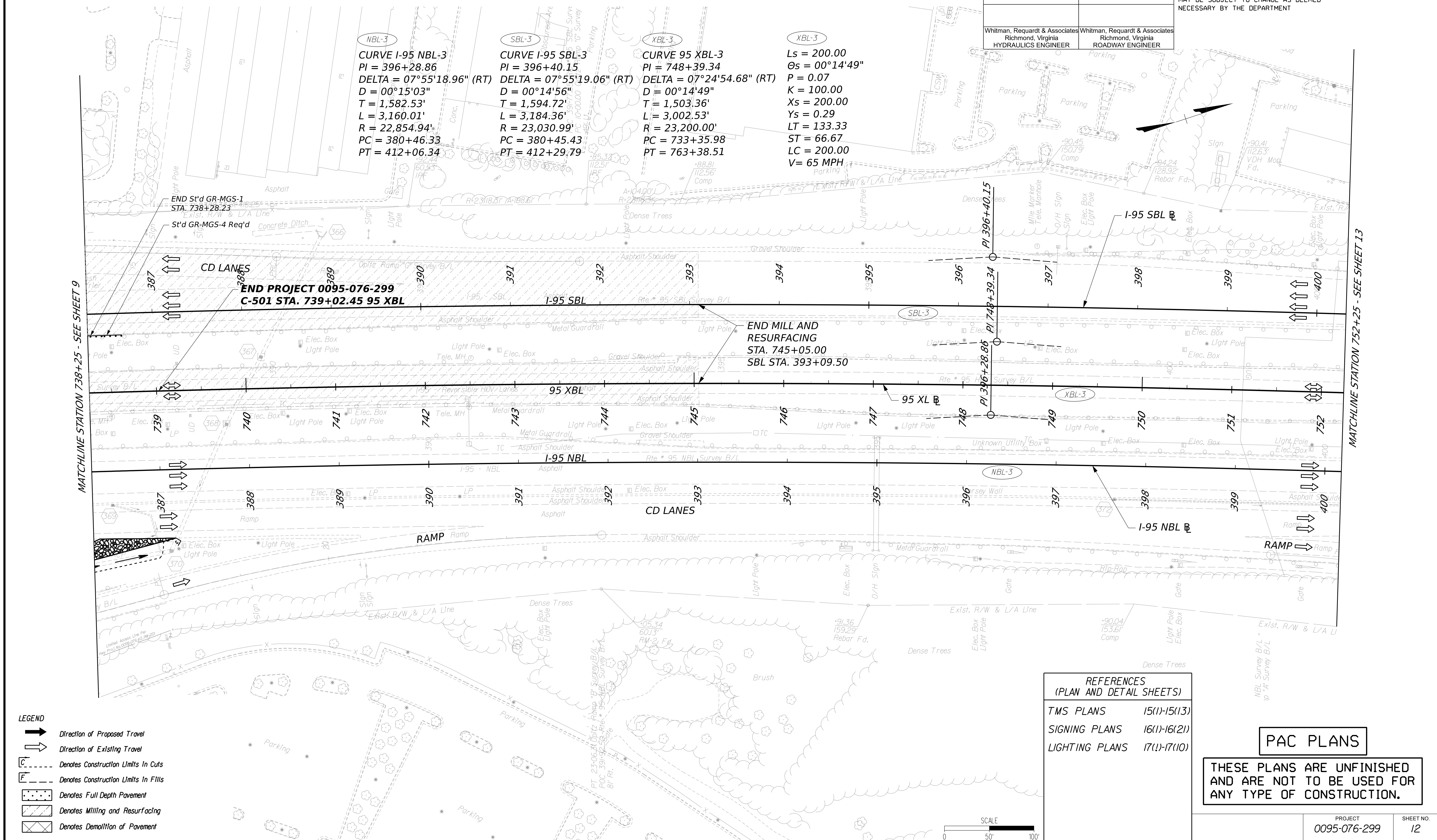
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

CURVE I-95 NBL-3
 PI = 396+28.86
 DELTA = 07°55'18.96" (RT)
 D = 00°15'03"
 T = 1,582.53'
 L = 3,160.01'
 R = 22,854.94'
 PC = 380+46.33
 PT = 412+06.34

CURVE SBL-3
 PI = 396+40.15
 DELTA = 07°55'19.06" (RT)
 D = 00°14'56"
 T = 1,594.72'
 L = 3,184.36'
 R = 23,030.99'
 PC = 380+45.43
 PT = 412+29.79

CURVE 95 XBL-3
 PI = 748+39.34
 DELTA = 07°24'54.68" (RT)
 D = 00°14'49"
 T = 1,503.36'
 L = 3,002.53'
 R = 23,200.00'
 PC = 733+35.98
 PT = 763+38.51

XBL-3
 Ls = 200.00
 Os = 00°14'49"
 P = 0.07
 K = 100.00
 Xs = 200.00
 Ys = 0.29
 LT = 133.33
 ST = 66.67
 LC = 200.00
 V = 65 MPH



LEGEND

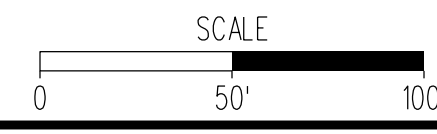
	Direction of Proposed Travel
	Direction of Existing Travel
	Denotes Construction Limits In Cuts
	Denotes Construction Limits In Fills
	Denotes Full Depth Pavement
	Denotes Milling and Resurfacing
	Denotes Demolition of Pavement

REFERENCES (PLAN AND DETAIL SHEETS)

TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

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PROJECT	0095-076-299	SHEET NO.	12
---------	--------------	-----------	----

PROJECT MANAGER: *Rampal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7140 07/07/2021*

See Sheet 10 For Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	13

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

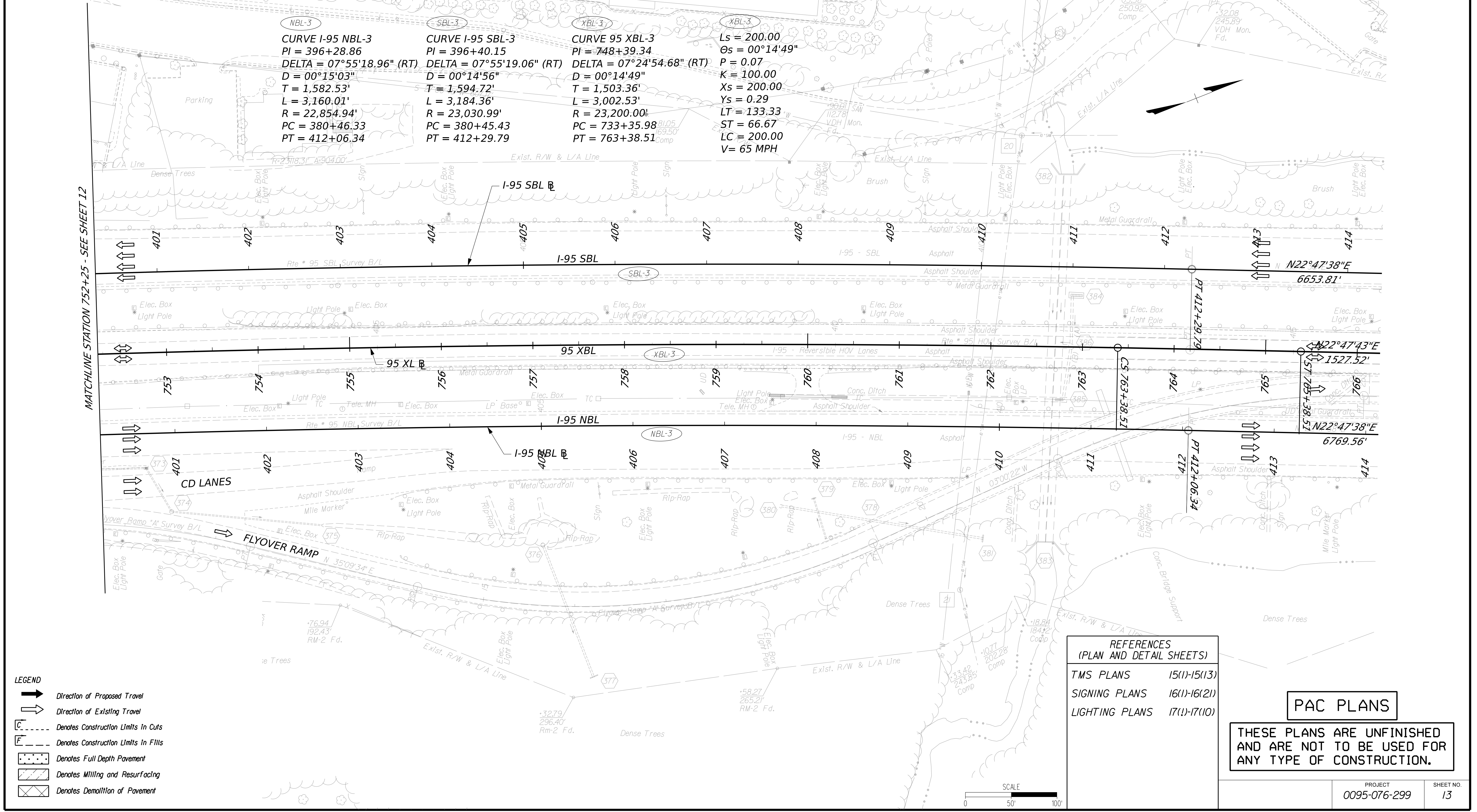
Whitman, Requardt & Associates Richmond, Virginia HYDRAULICS ENGINEER	Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER
---	--

CURVE I-95 NBL-3
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 L = 3,160.01'
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 DELTA = 07°55'19.06" (RT)
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 L = 3,184.36'
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 PC = 380+45.43
 PT = 412+29.79

CURVE 95 XBL-3
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 DELTA = 07°24'54.68" (RT)
 D = 00°14'49"
 T = 1,503.36'
 L = 3,002.53'
 R = 23,200.00'
 PC = 733+35.98
 PT = 763+38.51

Vertical Curve Data:
 Ls = 200.00
 Os = 00°14'49"
 P = 0.07
 K = 100.00
 Xs = 200.00
 Ys = 0.29
 LT = 133.33
 ST = 66.67
 LC = 200.00
 V = 65 MPH



MATCHLINE STATION 752+25 - SEE SHEET 12

- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement

REFERENCES (PLAN AND DETAIL SHEETS)

TMS PLANS	15(1)-15(13)
SIGNING PLANS	16(1)-16(21)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

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PROJECT MANAGER *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7740, 07/07/2021*

DRAINAGE DESCRIPTIONS

REVISED	STATE		STATE		SHEET NO.
	VA.	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501		14(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

SHEET 3

NO PROPOSED STRUCTURES

SHEET 4

4-1

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 4.4' INV.128.90
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

4-1 TO 4-2

147 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 128.90 INV.(OUT) 126.40
 SILT-TIGHT JOINT TYPE

4-2

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 3.3' INV.126.30
 CONNECT UD-4 TO STRUCTURE

4-2 TO 4-3

123 L.F.-18" STORM SEWER PIPE REQ'D (1' COVER)
 INV.(IN) 126.30 INV.(OUT) 124.79
 SILT-TIGHT JOINT TYPE
 LESS THAN MIN COVER

4-3

1 ST'D ES-10R 2 (18") REQ'D
 INV.(OUT) 124.79
 3 TONS STD.EC-I CLASS A TYPE A INSTALLATION

4-4

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 4.3' INV.106.95
 ST'D ST-1 REQ'D;

4-4 TO 4-5

148 L.F.-24" STORM SEWER PIPE REQ'D (4' COVER)
 INV.(IN) 106.95 INV.(OUT) 106.00
 SILT-TIGHT JOINT TYPE

4-5

1 ST'D ES-10R 2 (24") REQ'D
 INV.(OUT) 106.00
 20 TONS STD.EC-I CLASS A TYPE A INSTALLATION

SHEET 5

5-1a

1 ST'D DI-10K (TYPE III) (L=10') REQ'D
 H = 5.3' INV.161.80
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-1a TO 5-1b

11 L.F.-18" STORM SEWER PIPE REQ'D (4' COVER)
 INV.(IN) 161.80 INV.(OUT) 160.70
 SILT-TIGHT JOINT TYPE

5-1b

1 ST'D DI-10K (TYPE III) (L=14') REQ'D
 H = 4.3' INV.160.60
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-1b TO 5-2b

227 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 160.60 INV.(OUT) 156.90
 SILT-TIGHT JOINT TYPE

5-2a

1 ST'D DI-10K (TYPE III) (L=10') REQ'D
 H = 6.6' INV.157.70
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-2a TO 5-2b

8 L.F.-18" STORM SEWER PIPE REQ'D (5' COVER)
 INV.(IN) 157.70 INV.(OUT) 156.90
 SILT-TIGHT JOINT TYPE

5-2b

1 ST'D DI-10K (TYPE III) (L=14') REQ'D
 H = 4.8' INV.156.40
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-2b TO 5-2c

44 L.F.-24" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 156.40 INV.(OUT) 155.60
 SILT-TIGHT JOINT TYPE

5-2c

1 ST'D DI-10K (TYPE III) (L=4') REQ'D
 H = 4.9' INV.155.50
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-2c TO 5-3

128 L.F.-24" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 155.50 INV.(OUT) 153.00
 SILT-TIGHT JOINT TYPE

5-3

1 ST'D DI-10K (TYPE III) (L=10') REQ'D
 H = 4.9' INV.153.00
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-3 TO 5-4

313 L.F.-24" STORM SEWER PIPE REQ'D (5' COVER)
 INV.(IN) 153.00 INV.(OUT) 150.00
 SILT-TIGHT JOINT TYPE

5-4

1 ST'D DI-10K (TYPE II) (L=16') REQ'D
 H = 6.8' INV.148.00
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-4 TO 5-6

25 L.F.-24" STORM SEWER PIPE REQ'D (6' COVER)
 INV.(IN) 148.00 INV.(OUT) 147.60
 SILT-TIGHT JOINT TYPE

5-5

1 ST'D DI-10K (TYPE III) (L=8') REQ'D
 H = 4.6' INV.146.00
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-5 TO 5-6

7 L.F.-18" STORM SEWER PIPE REQ'D (6' COVER)
 INV.(IN) 146.00 INV.(OUT) 145.90
 SILT-TIGHT JOINT TYPE

5-6

1 ST'D DI-10K (TYPE III) (L=12') REQ'D
 H = 8.2' INV.145.40
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-6 TO 5-7

176 L.F.-24" STORM SEWER PIPE REQ'D (8' COVER)
 INV.(IN) 145.40 INV.(OUT) 143.00
 SILT-TIGHT JOINT TYPE

5-7

1 ST'D DI-10K (TYPE III) (L=12') REQ'D
 H = 9.9' INV.140.85
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT TWO EXISTING 24" PIPES TO STRUCTURE
 CONNECT UD-4 TO STRUCTURE

5-8

1 ST'D DI-10K (TYPE III) (L=16') REQ'D
 H = 4.5' INV.136.10
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-8 TO 5-9

4 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 136.10 INV.(OUT) 135.90
 SILT-TIGHT JOINT TYPE

5-9

3.7 FT. ST'D MH-10R MH-2 REQ'D
 ST'D MH-1 FRAME AND COVER REQ'D
 INV.135.80
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;

5-9 TO 5-11

92 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 135.80 INV.(OUT) 133.40
 SILT-TIGHT JOINT TYPE

5-10

1 ST'D DI-10K (TYPE III) (L=14') REQ'D
 H = 7.1' INV.135.25
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

5-10 TO 5-11

19 L.F.-18" STORM SEWER PIPE REQ'D (6' COVER)
 INV.(IN) 135.25 INV.(OUT) 133.40
 SILT-TIGHT JOINT TYPE

5-11

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 4.4' INV.133.30
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;

5-11 TO 4-1

153 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 133.30 INV.(OUT) 129.00
 SILT-TIGHT JOINT TYPE

SHEET 6

6-1a

1 ST'D DI-7 REQ'D GRATE A, TYPE I;
 H = 4.3' INV.163.30
 ST'D ST-1 REQ'D;

6-1a TO 6-1b

8 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 163.30 INV.(OUT) 163.20
 SILT-TIGHT JOINT TYPE

6-1b

1 ST'D DI-10K (TYPE III) (L=4') REQ'D
 H = 4.9' INV.163.10
 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE

6-1b TO 5-1b

250 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER)
 INV.(IN) 163.10 INV.(OUT) 160.70
 SILT-TIGHT JOINT TYPE

6-2

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 6.7' INV.163.13
 ST'D ST-1 REQ'D;
 CONNECT EXISTING 24" PIPE TO STRUCTURE

6-2 TO 6-3

8 L.F.-24" STORM SEWER PIPE REQ'D (6' COVER)
 INV.(IN) 163.13 INV.(OUT) 162.89
 SILT-TIGHT JOINT TYPE

6-3

8.3 FT. ST'D MH-10R MH-2 REQ'D
 ST'D MH-1 FRAME AND COVER REQ'D
 INV.162.79
 ST'D ST-1 REQ'D;
 CONNECT EXISTING 24" PIPE TO STRUCTURE
 CONNECT UD-4 TO STRUCTURE

6-4

1 ST'D DI-5 REQ'D
 Std.PG-2A Type E Cover
 H = 19.5' INV.155.98
 ST'D IS-1 REQ'D; ST'D SL-1 REQ'D; ST'D ST-1 REQ'D;

SHEET 7

NO PROPOSED STRUCTURES

SHEET 8

8-1

1 ST'D DI-10K (TYPE III) (L=4') REQ'D
 H = 5.1' INV.175.38
 ST'D ST-1 REQ'D;
 CONNECT UD-4 TO STRUCTURE
 CONNECT TWO EXISTING 18" PIPES TO STRUCTURE

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Rajpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

DRAINAGE DESCRIPTIONS

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	14(2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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8-2A	1 ST'D DI-10K (TYPE III) (L=8') REQ'D H = 5.5' INV.176.51 ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE	9-5	MODIFY EXISTING DROP INLET Add DI-5; Std.PG-2A Type E Cover ADJUST TO GRADE (RAISE 0.5'); MODIFY TO ACCEPT 18" PIPE PROPOSED TOP ELEV = INV 187.85		
8-2A TO 8-2B	1 L.F.-18" STORM SEWER PIPE REQ'D (4' COVER) INV.(IN) 176.51 INV.(OUT) 176.50 SILT-TIGHT JOINT TYPE	9-6	1 ST'D PRECAST T-DI-2BB (L=8') REQ'D ON 60" BASE H = 10.9' INV.204.05 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D; PIPE OFFSET FROM CENTER AT INLETS TO PROVIDE SEPARATION BETWEEN PIPE AND GUARDRAIL POSTS CONNECT UD-4 TO STRUCTURE	10-2	NOT USED
8-2B	1 ST'D DI-10K (TYPE III) (L=16') REQ'D H = 5.0' INV.176.00 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE CONNECT EXISTING PIPE TO STRUCTURE	9-6 TO 9-7	10 L.F.-18" STORM SEWER PIPE REQ'D (11' COVER) INV.(IN) 204.05 INV.(OUT) 204.00 SILT-TIGHT JOINT TYPE	10-3	NOT USED
8-3	1 ST'D DI-10K (TYPE III) (L=10') REQ'D H = 4.2' INV.178.20 ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE	9-7	1 ST'D 18" EW-1 (PRECAST) REQ'D INV.(OUT) 204.00	10-4	1 ST'D PRECAST T-DI-2B (L=12') REQ'D ON 60" BASE H = 4.0' INV.206.60 ST'D ST-1 REQ'D; PIPE OFFSET FROM CENTER AT INLETS TO PROVIDE SEPARATION BETWEEN PIPE AND GUARDRAIL POSTS CONNECT UD-4 TO STRUCTURE
8-3 TO 8-2B	29 L.F.-18" STORM SEWER PIPE REQ'D (4' COVER) INV.(IN) 178.20 INV.(OUT) 178.00 SILT-TIGHT JOINT TYPE	9-8A	1 ST'D DI-10K (TYPE III) (L=16') REQ'D H = 4.1' INV.179.24 ST'D ST-1 REQ'D;	10-4 TO 10-5	190 L.F.-18" STORM SEWER PIPE REQ'D (7' COVER) INV.(IN) 206.60 INV.(OUT) 205.60 SILT-TIGHT JOINT TYPE OFFSET CONNECTION AT INLETS
SHEET 9 9-1a	1 ST'D PRECAST T-DI-10K (TYPE III) (L=14') REQ'D ON 48" BASE H = 18.4' INV.169.20 ST'D IS-1 REQ'D; 1 ST'D SL-1 REQ'D; ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE CONNECT EXISTING 48" PIPE TO STRUCTURE	9-8A TO 9-8B	4 L.F.-15" STORM SEWER PIPE REQ'D (4' COVER) INV.(IN) 179.24 INV.(OUT) 179.20 SILT-TIGHT JOINT TYPE	10-5	1 ST'D PRECAST T-DI-2B (L=6') REQ'D ON 60" BASE H = 8.3' INV.205.50 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D; PIPE OFFSET FROM CENTER AT INLETS TO PROVIDE SEPARATION BETWEEN PIPE AND GUARDRAIL POSTS CONNECT UD-4 TO STRUCTURE
9-1a TO 9-1b	50 L.F.-48" STORM SEWER PIPE REQ'D (14' COVER) INV.(IN) 169.20 INV.(OUT) 168.25 SILT-TIGHT JOINT TYPE EXCAVATE 18 ³ / ₃₂ BELOW BOTTOM OF PIPE AND BACKFILL WITH 12 ³ / ₃₂ OF NO.57 STONE WRAPPED IN SEPARATION FABRIC COVER WRAPPED STONE WITH MINIMUM OF 6 ³ / ₃₂ CRUSHER RUN OR 6 ³ / ₃₂ OF BEDDING MATERIAL 293 CY MINOR STRUCTURE EXCAVATION DEWATERING BASIN REQ'D.	9-9	8.7' STD.SWM-1 REQ'D BOTTOM ELEV = 171.25' 3" DIA.LOW FLOW ORIFICE REQ'D, INV. = 175.25 ST'D.SWM-DR DEBRIS RACK REQ'D. ST'D.SWM-DR TRASH RACK REQ'D.	10-5 TO 9-6	102 L.F.-18" STORM SEWER PIPE REQ'D (9' COVER) INV.(IN) 205.50 INV.(OUT) 205.00 SILT-TIGHT JOINT TYPE OFFSET CONNECTION AT INLETS
9-1b	1 ST'D PRECAST T-DI-10K (TYPE III) (L=16') REQ'D ON 48" BASE H = 16.2' INV.168.15 ST'D IS-1 REQ'D; 1 ST'D SL-1 REQ'D; ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE CONNECT EXISTING 48" PIPE TO STRUCTURE	9-9 TO 9-10	15 L.F.-24" CONC.PIPE REQ'D (1' COVER) INV.(IN) 175.25 INV.(OUT) 175.20 WITH RUBBER GASKETS AND CONC.CRADLE SILT-TIGHT JOINT TYPE	SHEET II II-1	1 ST'D DI-3B (L=6') REQ'D H = 4.0' INV.204.20 ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE
9-2	1 ST'D DI-10K (TYPE III) (L=18') REQ'D H = 4.3' INV.192.20 ST'D ST-1 REQ'D;	9-10	5 J.FT.ST'D MH-1 OR MH-2 REQ'D ST'D MH-1 FRAME AND COVER REQ'D INV.175.20 CONNECT EXISTING 27" PIPE TO STRUCTURE	II-1 TO 9-11	82 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER) INV.(IN) 204.20 INV.(OUT) 203.87 SILT-TIGHT JOINT TYPE
9-2 TO 9-3	30 L.F.-18" STORM SEWER PIPE REQ'D (3' COVER) INV.(IN) 192.20 INV.(OUT) 192.00 SILT-TIGHT JOINT TYPE	9-11	1 ST'D DI-3BB (L=10') REQ'D H = 16.5' INV.194.00 ST'D IS-1 REQ'D; 1 ST'D SL-1 REQ'D; ST'D ST-1 REQ'D;	II-2	NOT USED
9-3	1 ST'D DI-10K (TYPE III) (L=16') REQ'D H = 4.7' INV.191.90 ST'D IS-1 REQ'D; ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE	9-11 TO 9-12	68 L.F.-18" STORM SEWER PIPE REQ'D (11' COVER) INV.(IN) 194.00 INV.(OUT) 189.50 SILT-TIGHT JOINT TYPE	II-3	NOT USED
9-3 TO 8-2B	326 L.F.-18" STORM SEWER PIPE REQ'D (4' COVER) INV.(IN) 191.90 INV.(OUT) 178.00 SILT-TIGHT JOINT TYPE	9-12	15.0 FT.ST'D MH-1 OR MH-2 REQ'D ST'D MH-1 FRAME AND COVER REQ'D INV.177.00 1 ST'D SL-1 REQ'D; ST'D ST-1 REQ'D;	II-4	1 ST'D DI-2BB (L=10') REQ'D H = 9.5' INV.199.05 ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE
9-4	1 ST'D DI-5 REQ'D Std.PG-2A Type E Cover H = 4.0' INV.184.30 ST'D ST-1 REQ'D; BACK-UP BERM REQ'D	9-12 TO 9-13	29 L.F.-18" STORM SEWER PIPE REQ'D (10' COVER) INV.(IN) 177.00 INV.(OUT) 176.00 SILT-TIGHT JOINT TYPE	II-4 TO II-5	5 L.F.-18" STORM SEWER PIPE REQ'D (8' COVER) INV.(IN) 199.05 INV.(OUT) 199.00 SILT-TIGHT JOINT TYPE
9-4 TO 9-5	151 L.F.-18" STORM SEWER PIPE REQ'D (4' COVER) INV.(IN) 184.30 INV.(OUT) 183.50 SILT-TIGHT JOINT TYPE	9-13	1 ST'D ES-1 OR 2 (18") REQ'D INV.(OUT) 176.00 3 TONS STD.EC-1 CLASS 1 TYPE A INSTALLATION	II-5	1 ST'D ES-1 OR 2 (18") REQ'D INV.(OUT) 199.00 OUTLET TO EXISTING FLUME
		EX371	44 TON EC-1 CL 1 REQ'D		
		SHEET 10 10-1	1 ST'D DI-3BB (L=10') REQ'D H = 8.2' INV.202.77 ST'D ST-1 REQ'D; CONNECT UD-4 TO STRUCTURE CONNECT EXISTING 24" PIPE TO STRUCTURE		

PAC PLANS

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LOCATION	ALLOWABLE TYPE OF STORM SEWER PIPE (UNLESS OTHERWISE SHOWN IN DRAINAGE DESCRIPTIONS) (SEE ROAD AND BRIDGE STANDARD PC-1 FOR HEIGHT OF COVER LIMITATIONS FOR EACH TYPE)						
	CONCRETE	ALUMINUM COATED TYPE 2 STEEL SPIRAL RIB	POLYMER COATED (10/10) CORRUGATED STEEL SPIRAL RIB	POLYMER COATED (10/10) CORRUGATED STEEL DOUBLE WALL (SMOOTH INTERIOR)	ALUMINUM SPIRAL RIB	POLYVINYLCHLORIDE (PVC) RIBBED PIPE (SMOOTH INTERIOR)	POLYETHYLENE (PE) CORRUGATED TYPE S
ENTIRE PROJECT	X						

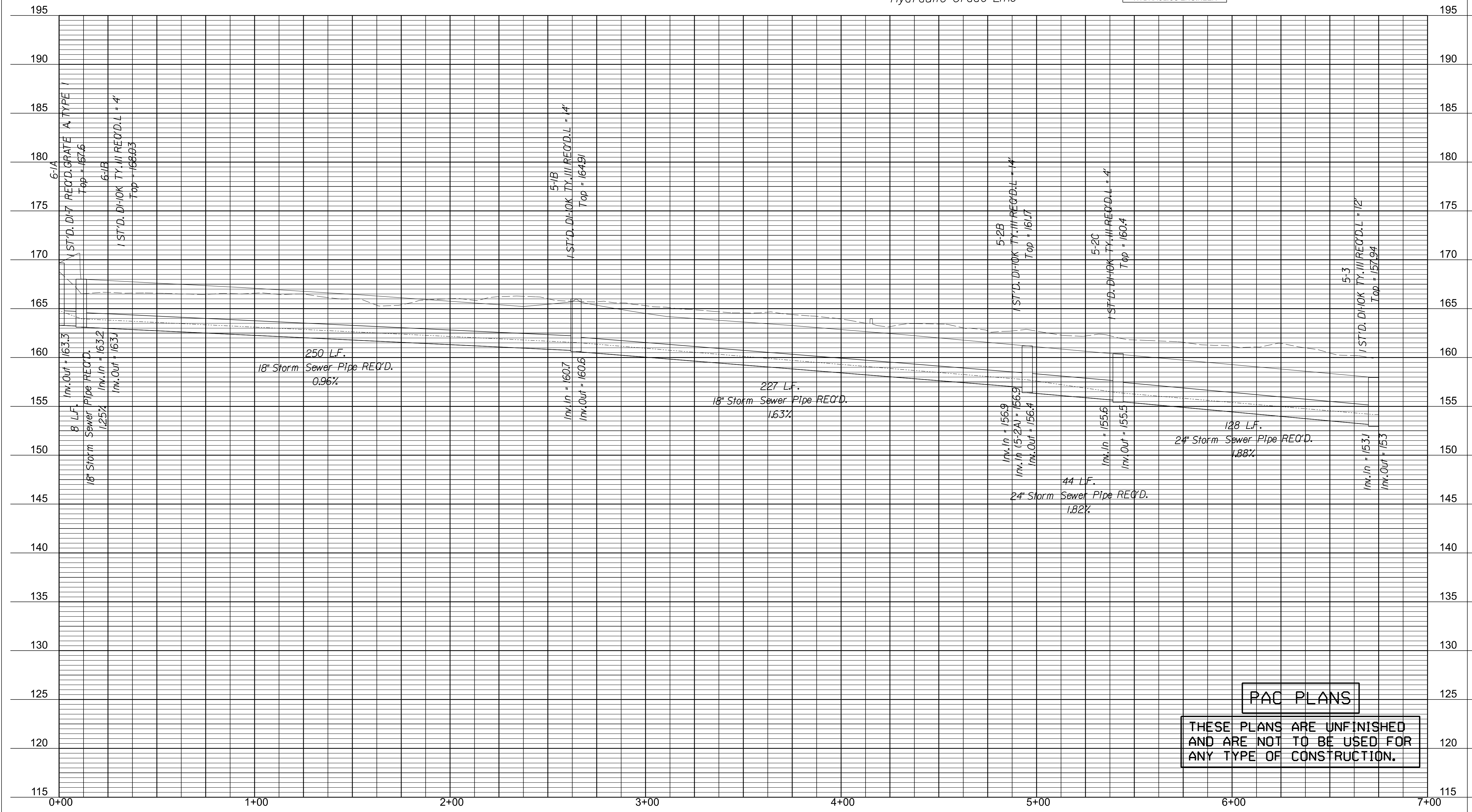
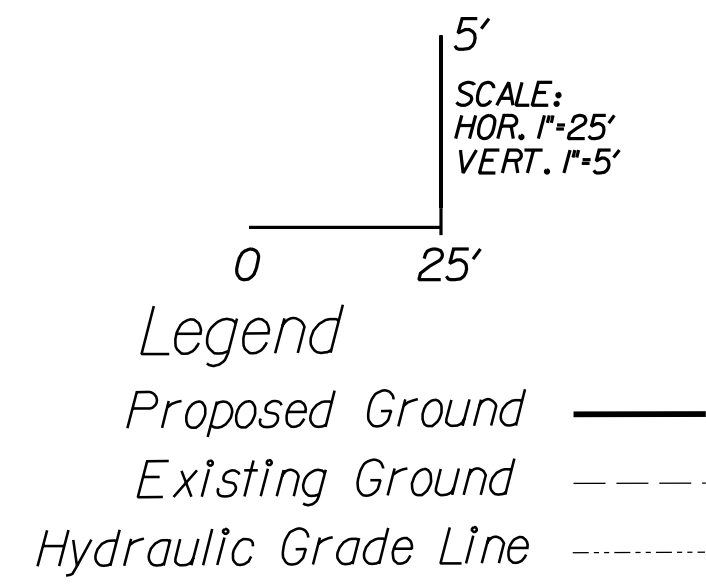
PROJECT MANAGER: Rimpal Shah, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Acumark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	14(3)

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Drainage Profiles 6-1A to 5-3



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PROJECT MANAGER: Btupal Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
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*Drainage Profiles
 5-3 TO 5-7*

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	14(4)

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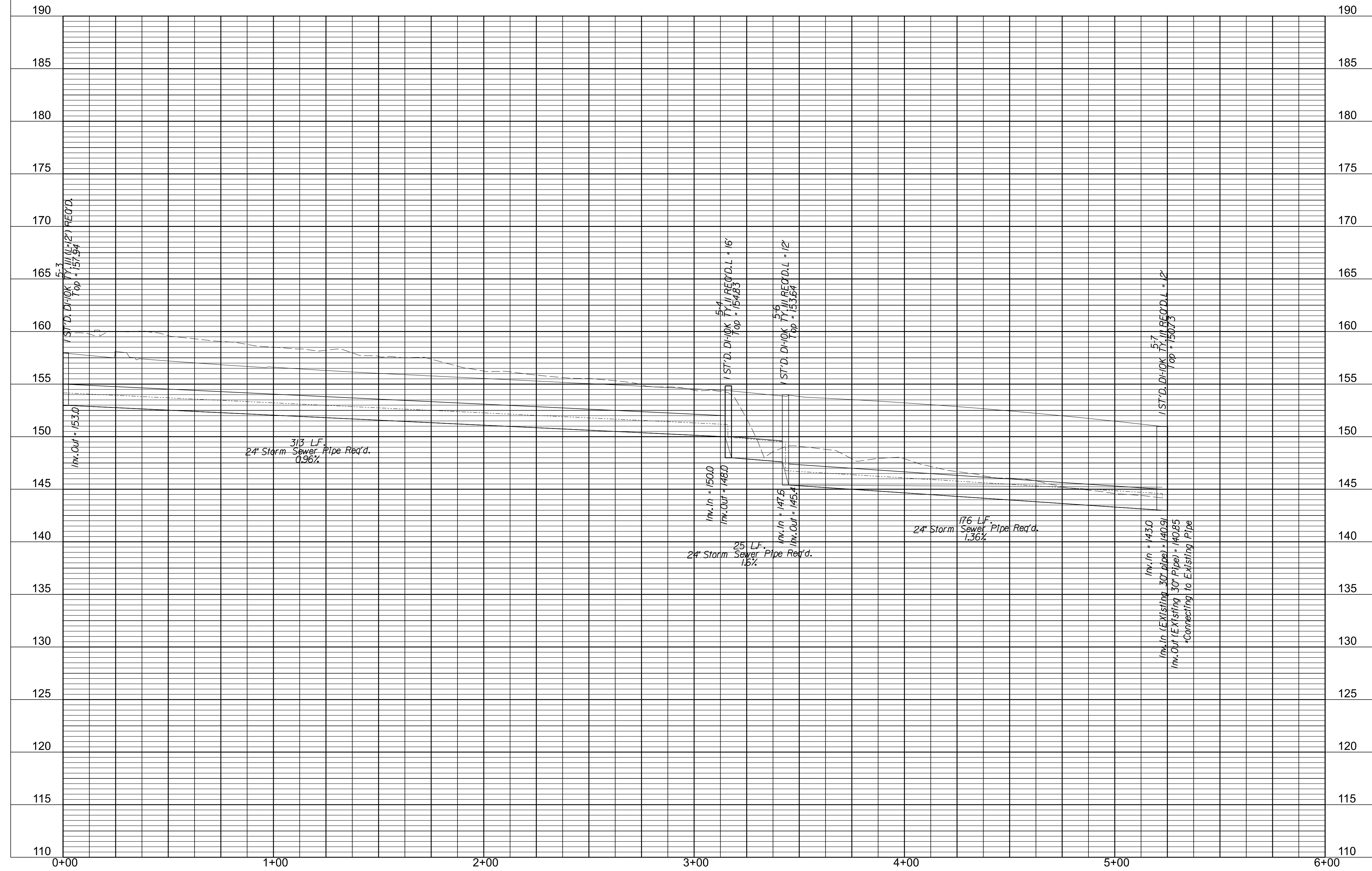
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 HYDRAULICS ENGINEER

5'
 SCALE:
 HOR. 1"=25'
 VERT. 1"=5'

0 25'

Legend

- Proposed Ground* ———
- Existing Ground* - - - - -
- Hydraulic Grade Line* - · - · - ·



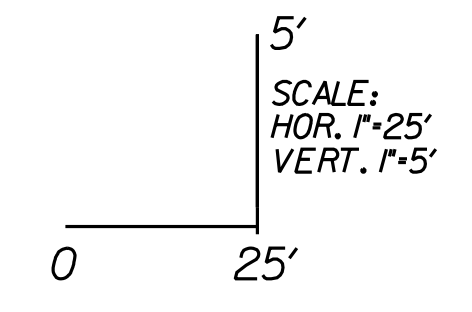
PROJECT MANAGER: Rtmpal Shah, P.E. (703) 259-2362 (NOVA District)
SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
DESIGN BY: Whitman, Reardon & Associates, L.P. (804) 272-8700
SUBSURFACE UTILITY BY: DATE Acasumar & Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	14(5)

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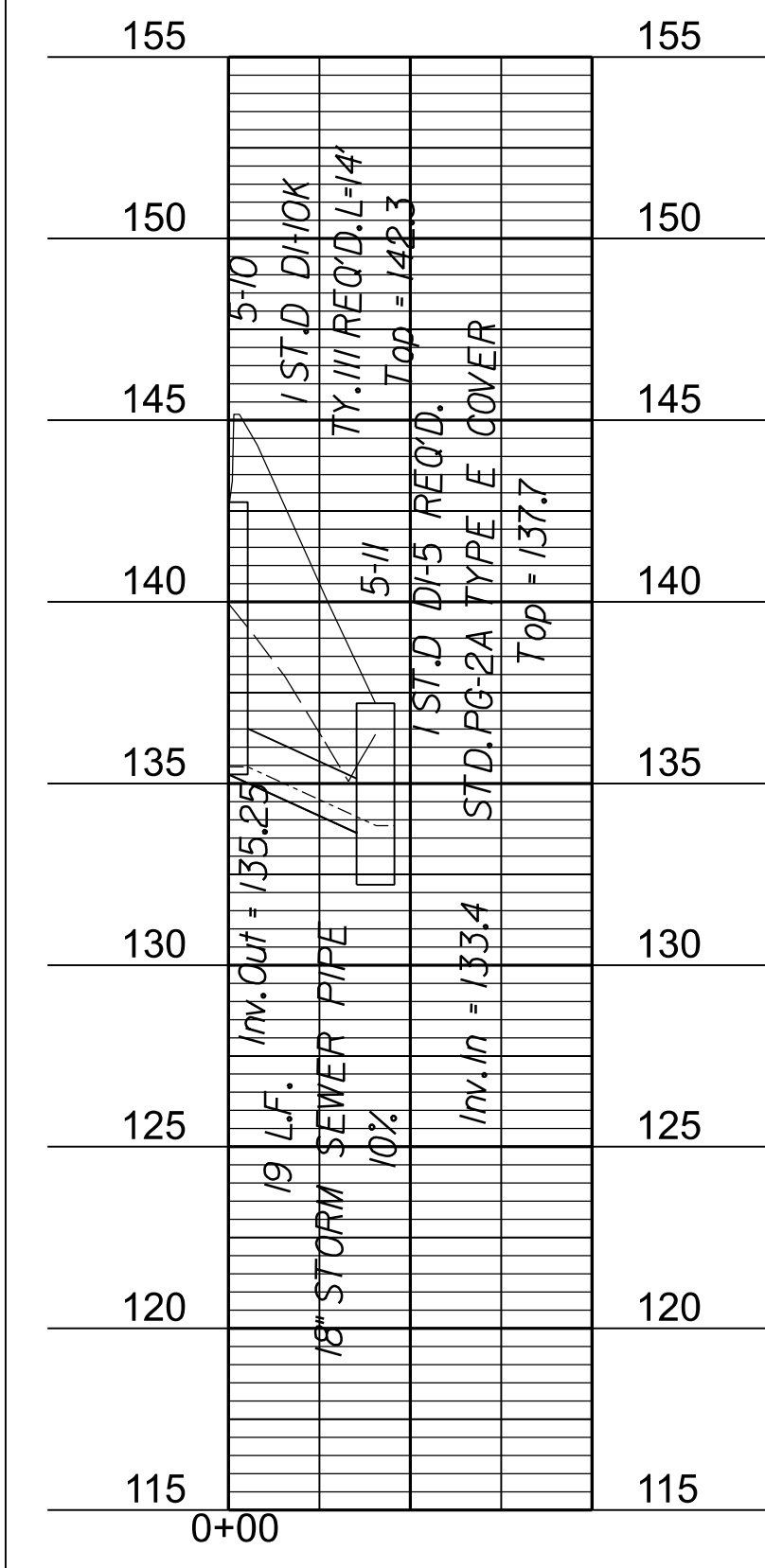
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HYDRAULICS ENGINEER

Drainage Profiles

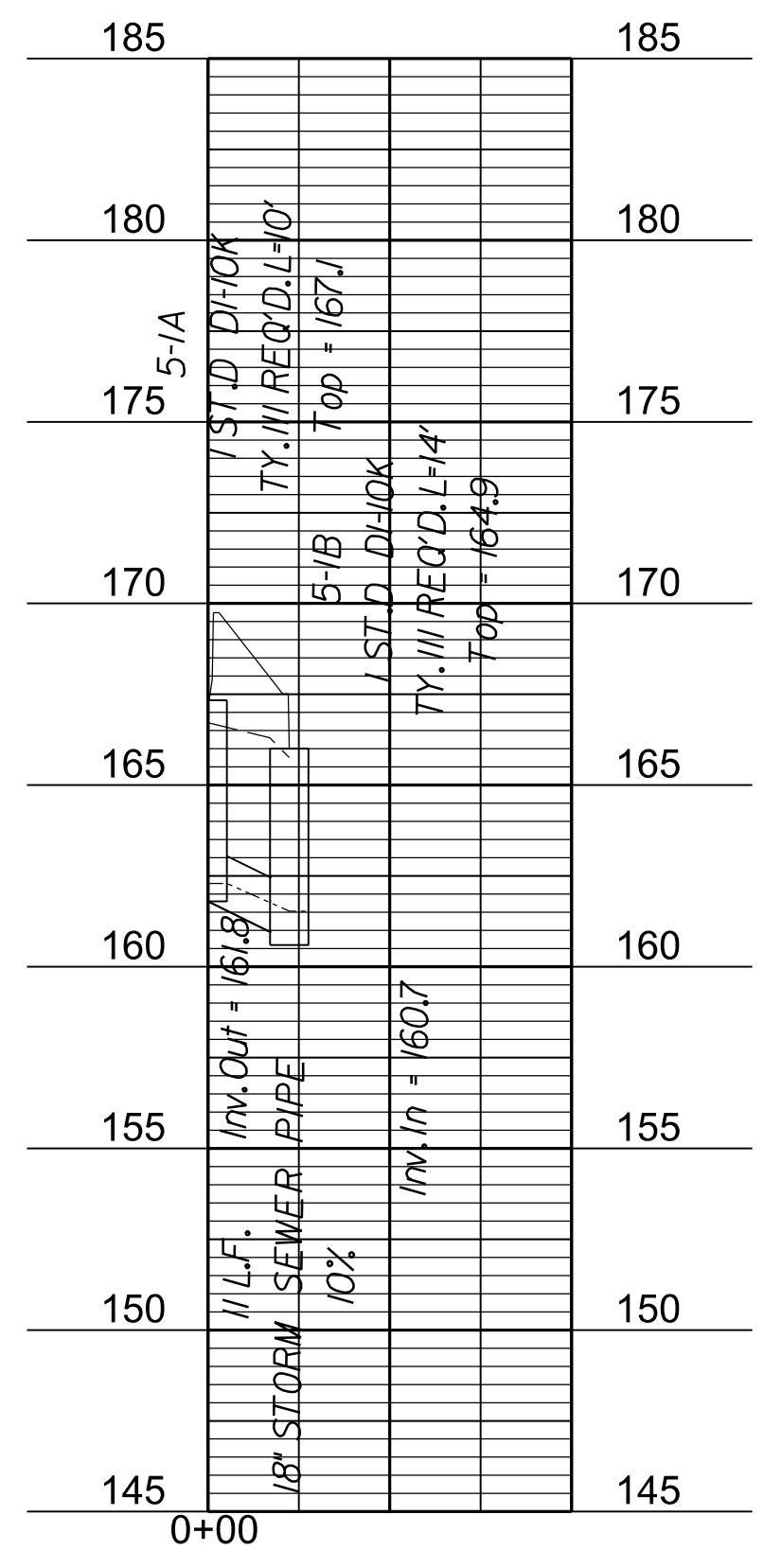


Legend
Proposed Ground ———
Existing Ground - - - - -
Hydraulic Grade Line - · - · - ·

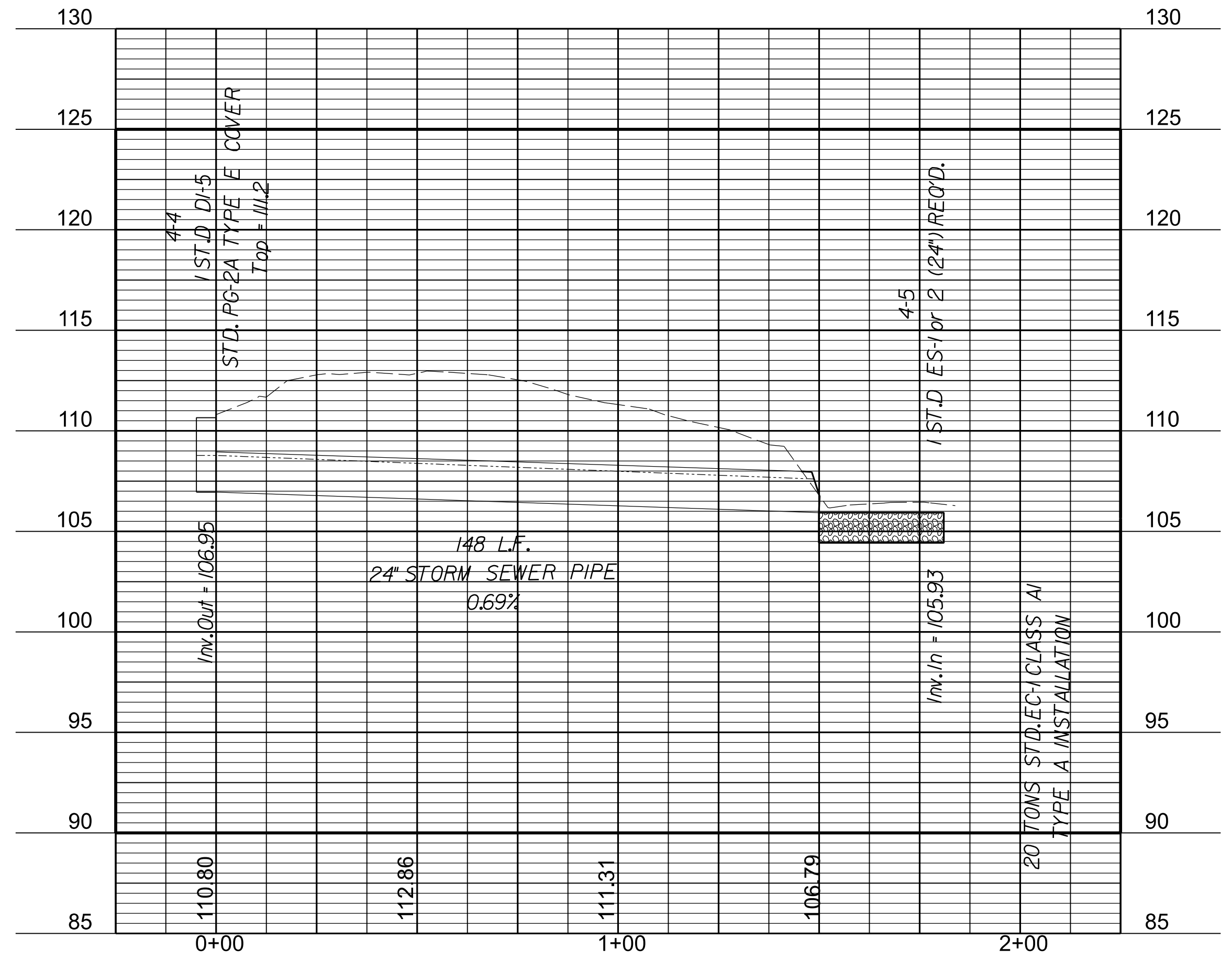
Profile 5-10 to 5-11



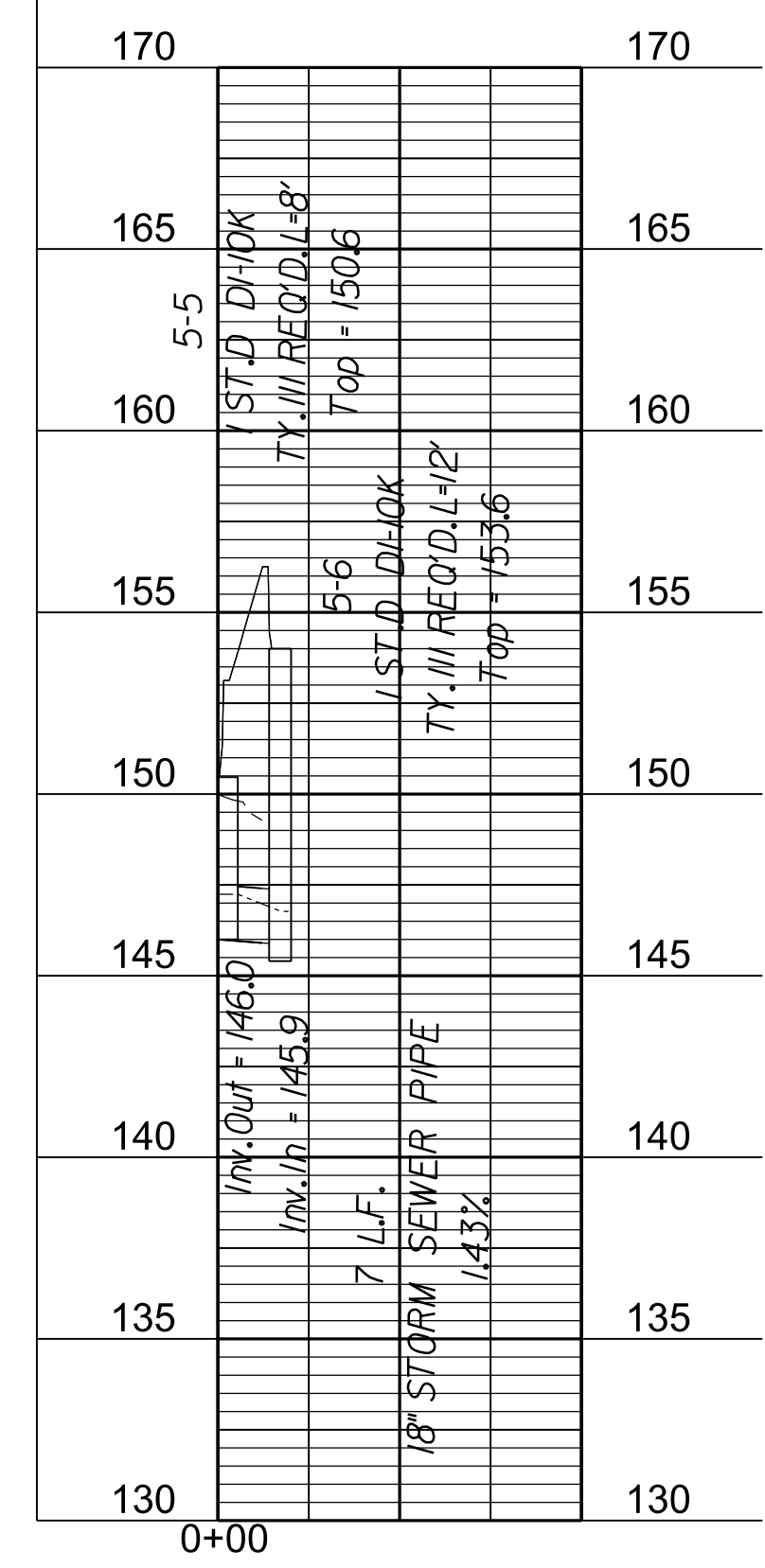
Profile 5-1A to 5-1B



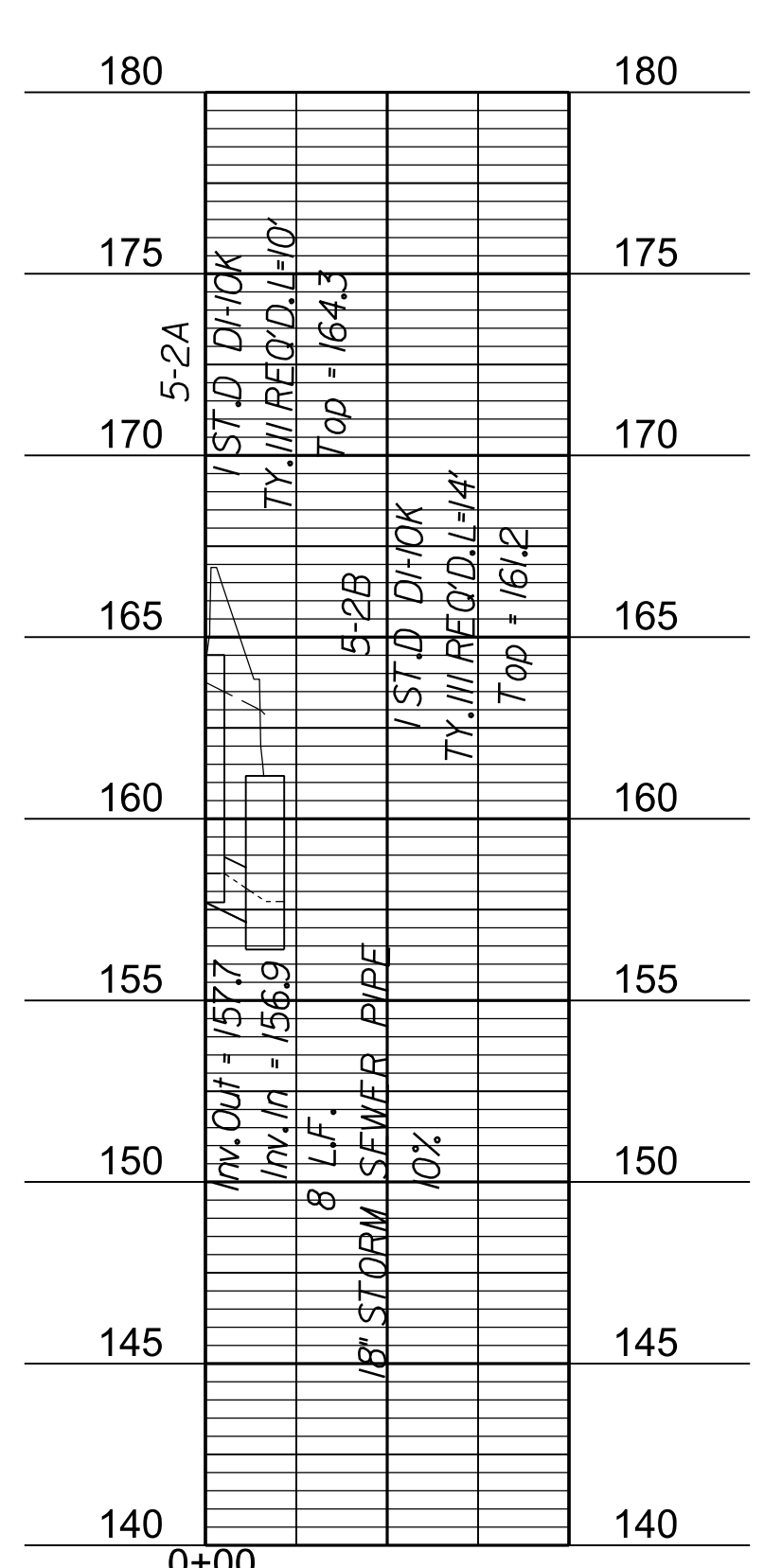
Profile 4-4 to 4-5



Profile 5-5 to 5-6



Profile 5-2A to 5-2B



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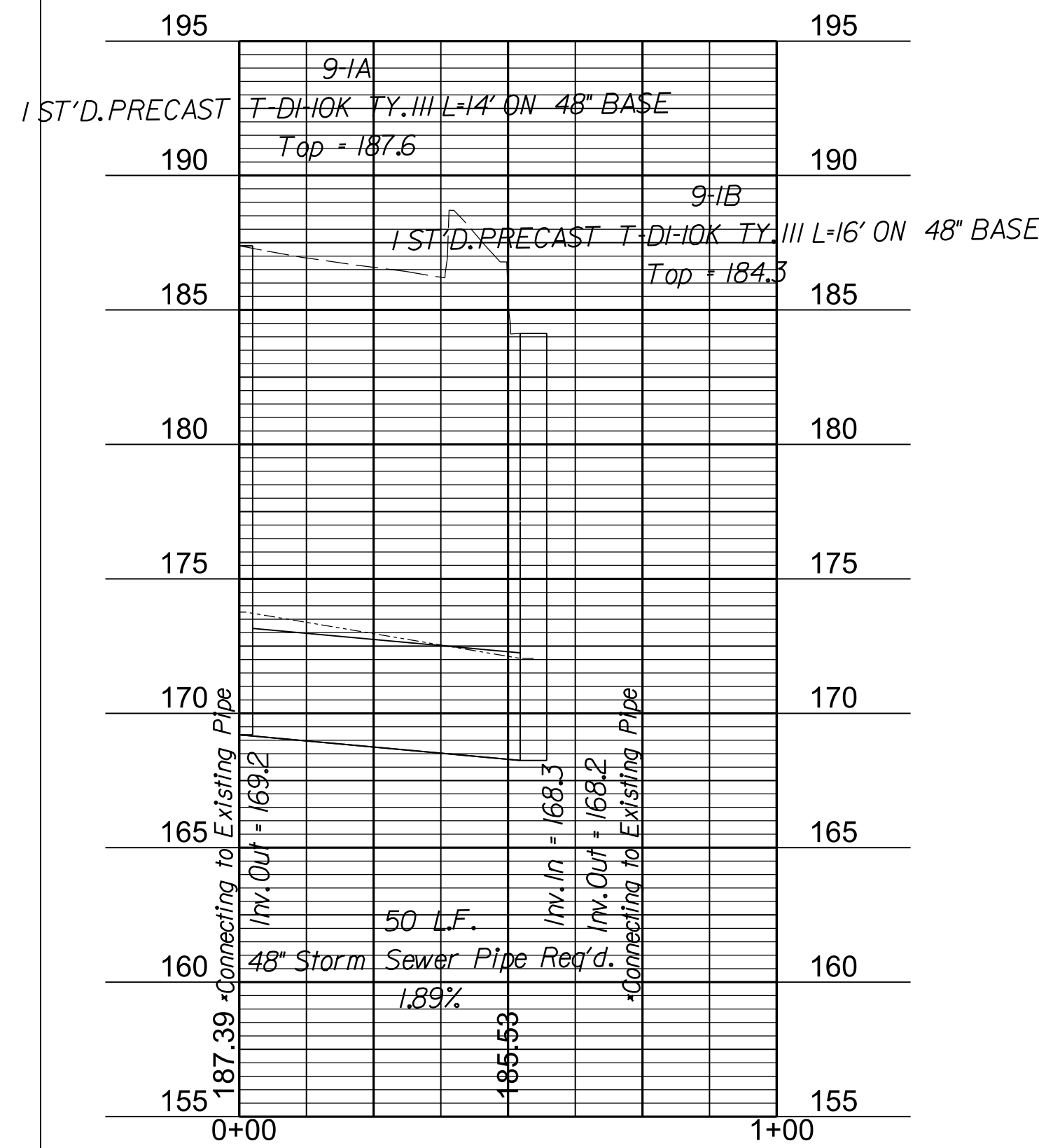
PROJECT MANAGER: Rmpal Shah, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Acumar & Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	1416

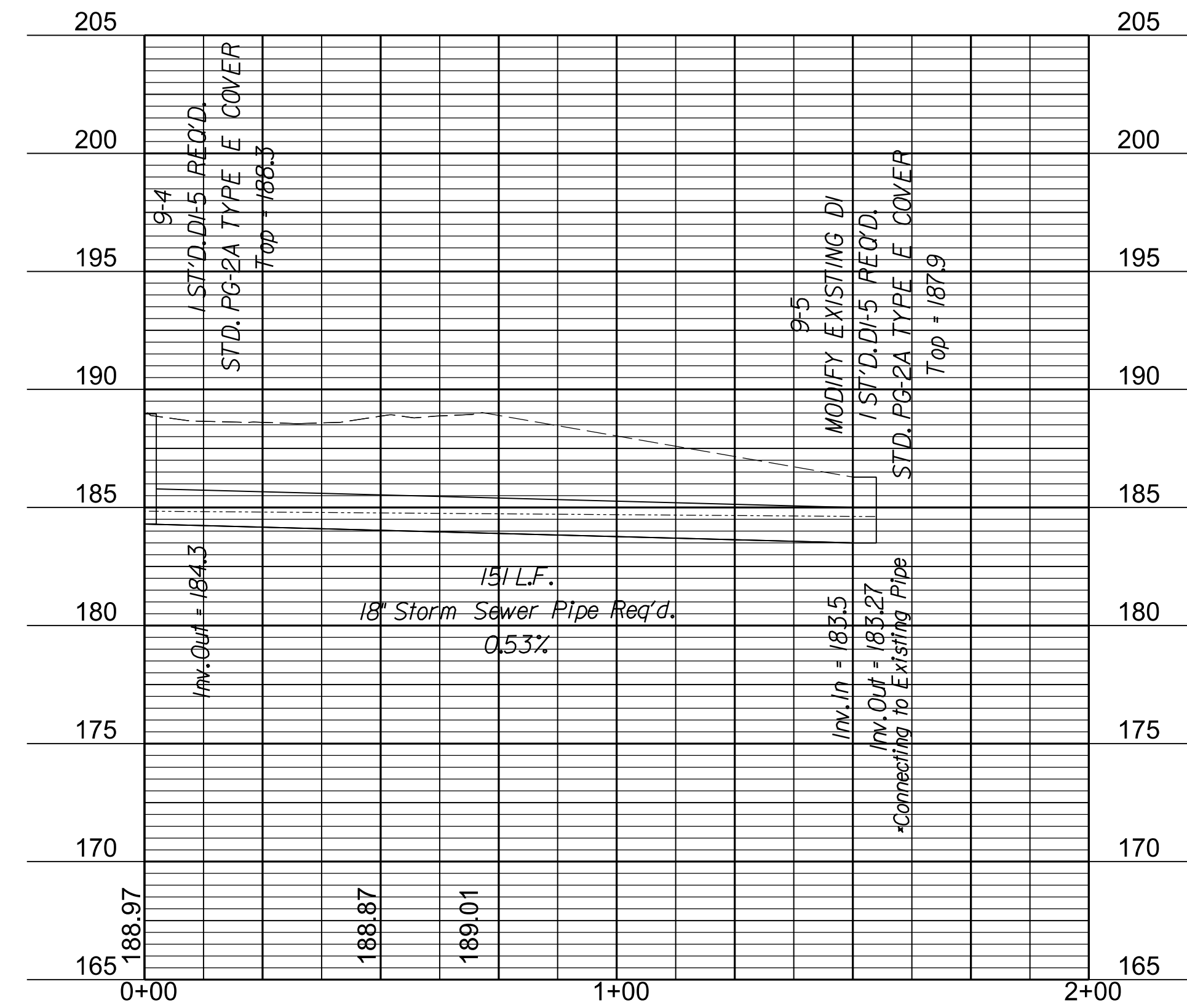
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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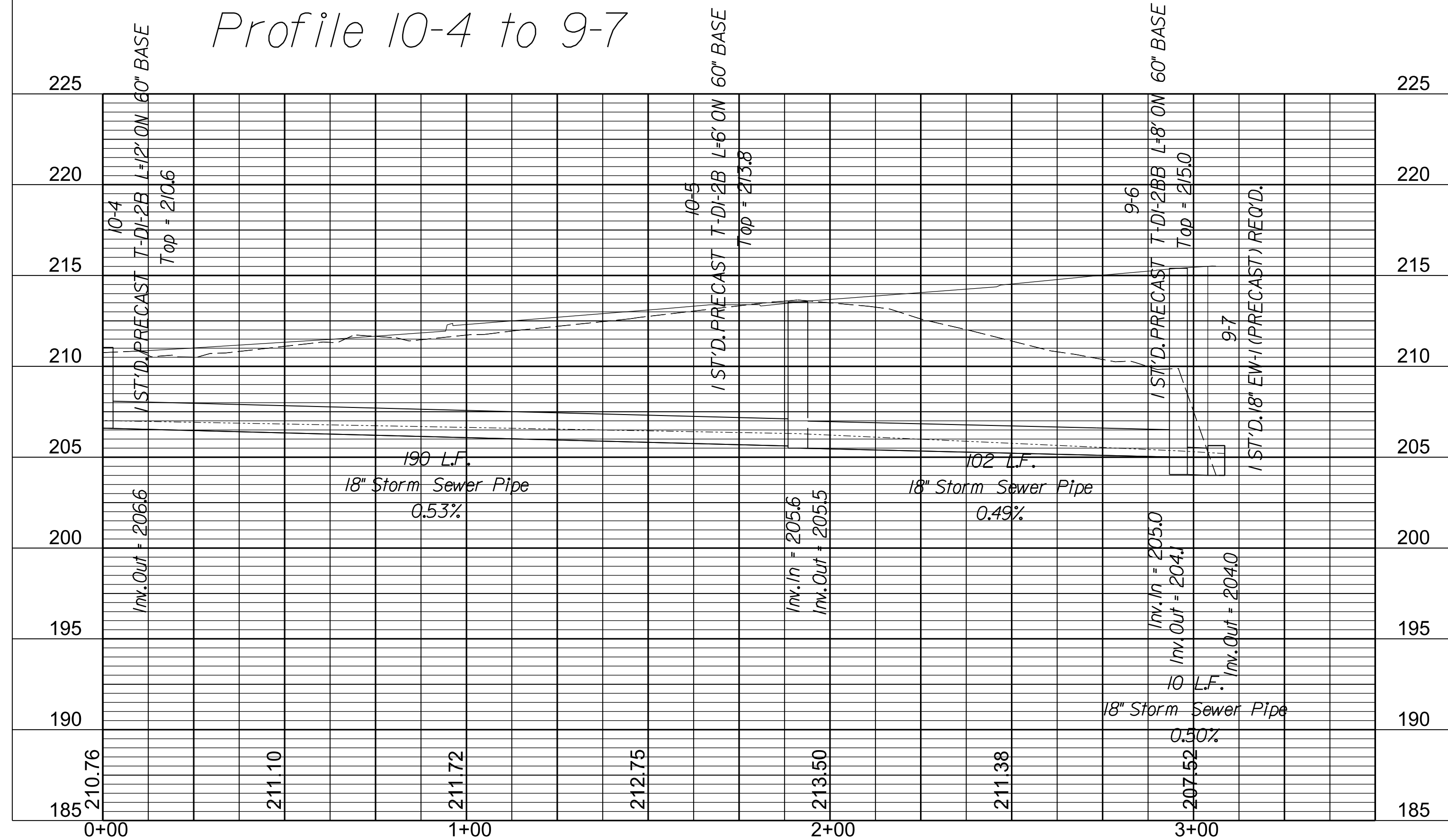
Profile 9-1A to 9-1B



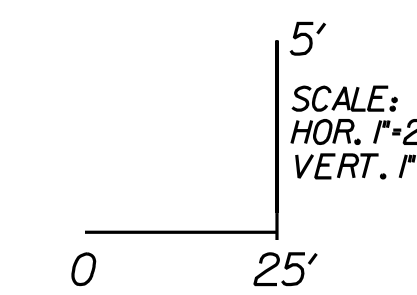
Profile 9-4 to 9-5



Profile 10-4 to 9-7



Legend
 Proposed Ground ———
 Existing Ground - - - - -
 Hydraulic Grade Line - · - · -



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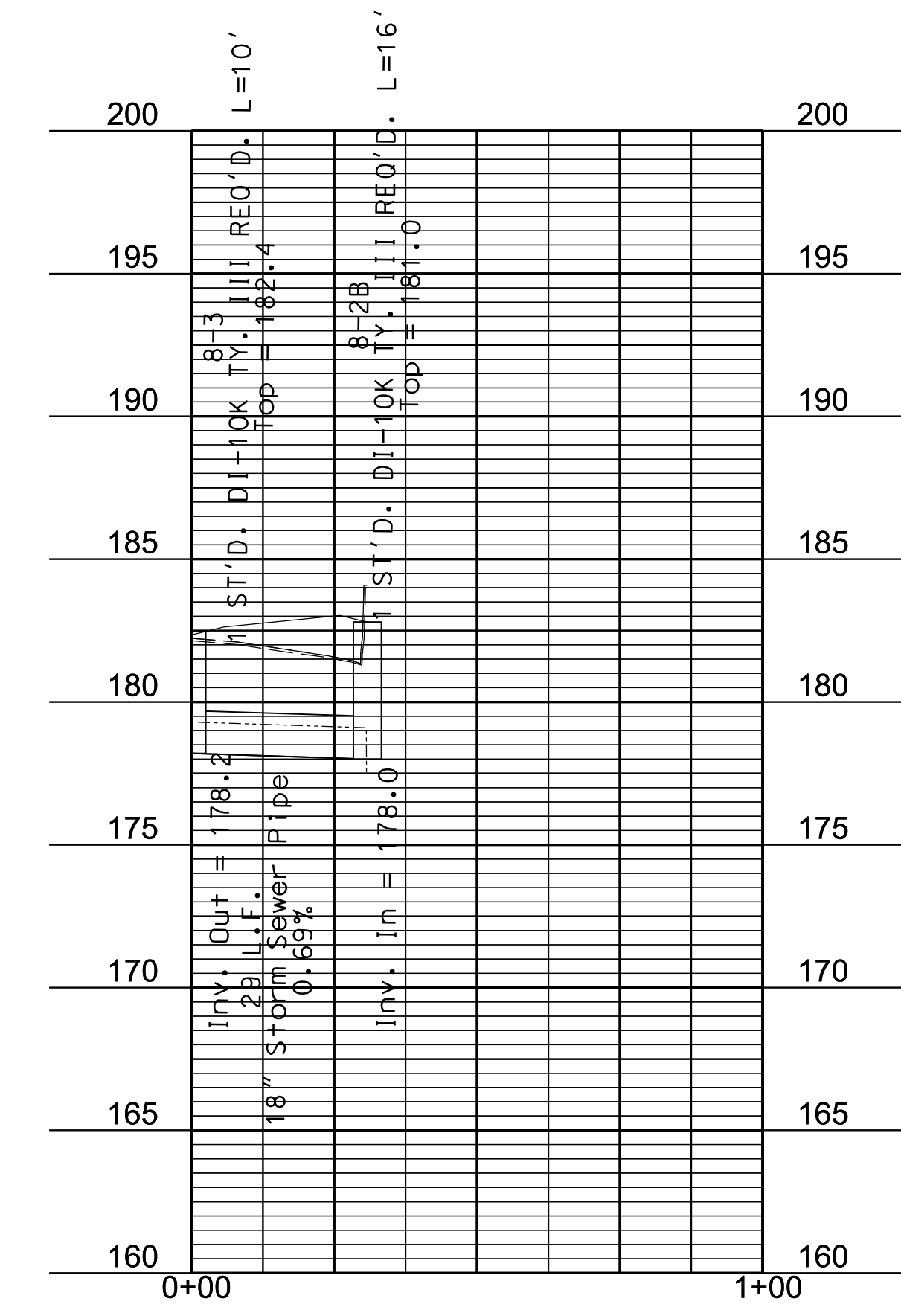
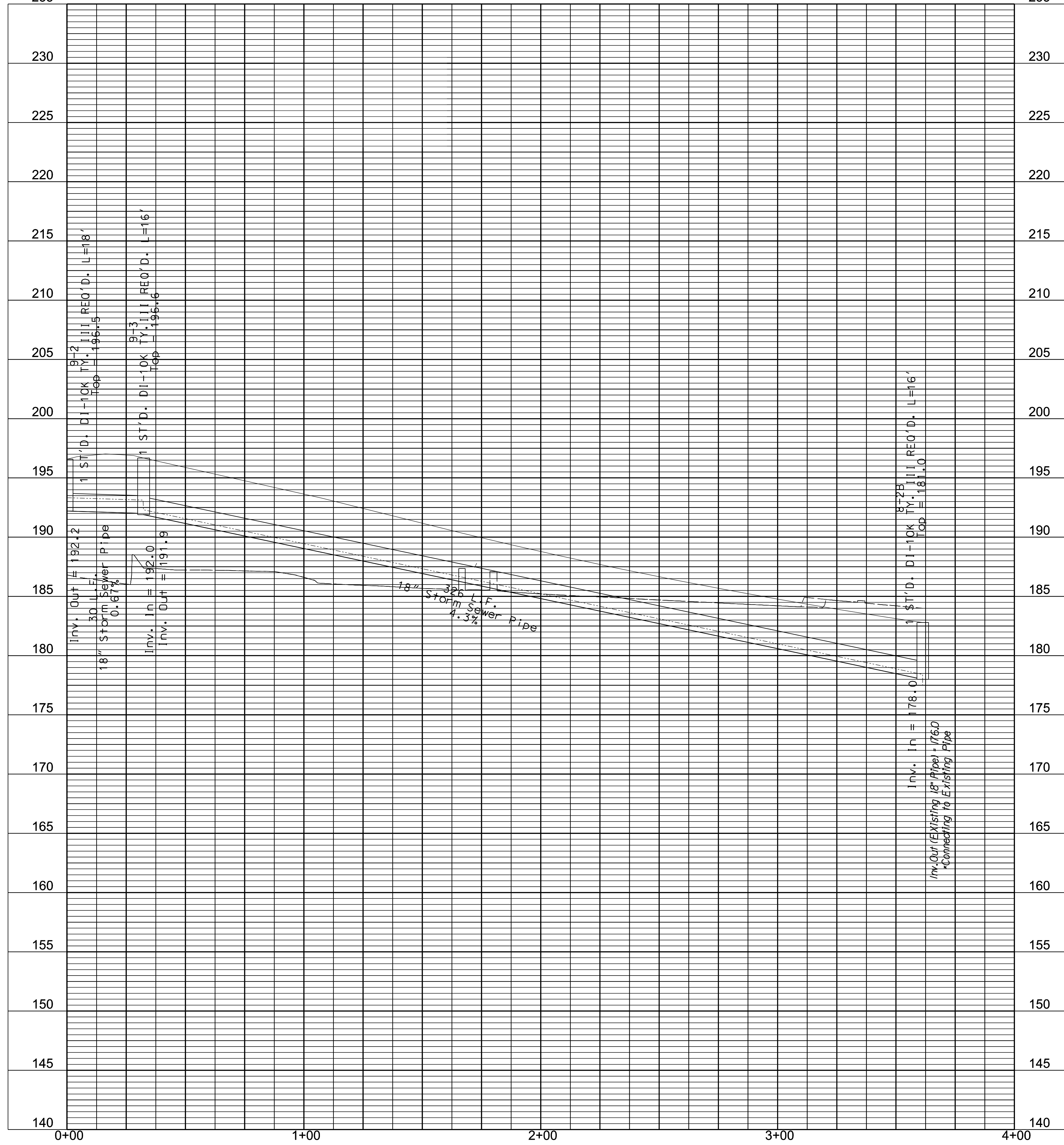
PROJECT MANAGER: Bimol Shah, P.E. (703) 259-2362 (NOVA District) ---
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
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 SUBSURFACE UTILITIES: DATE Acumark, Inc. (804) 550-7790, 07/07/2021

Profile 9-2 to 8-2B

REVISED	STATE			SHEET NO.
	STATE	ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	14(7)

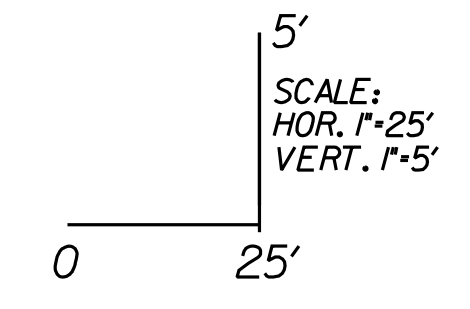
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Profile 8-3 to 8-2B

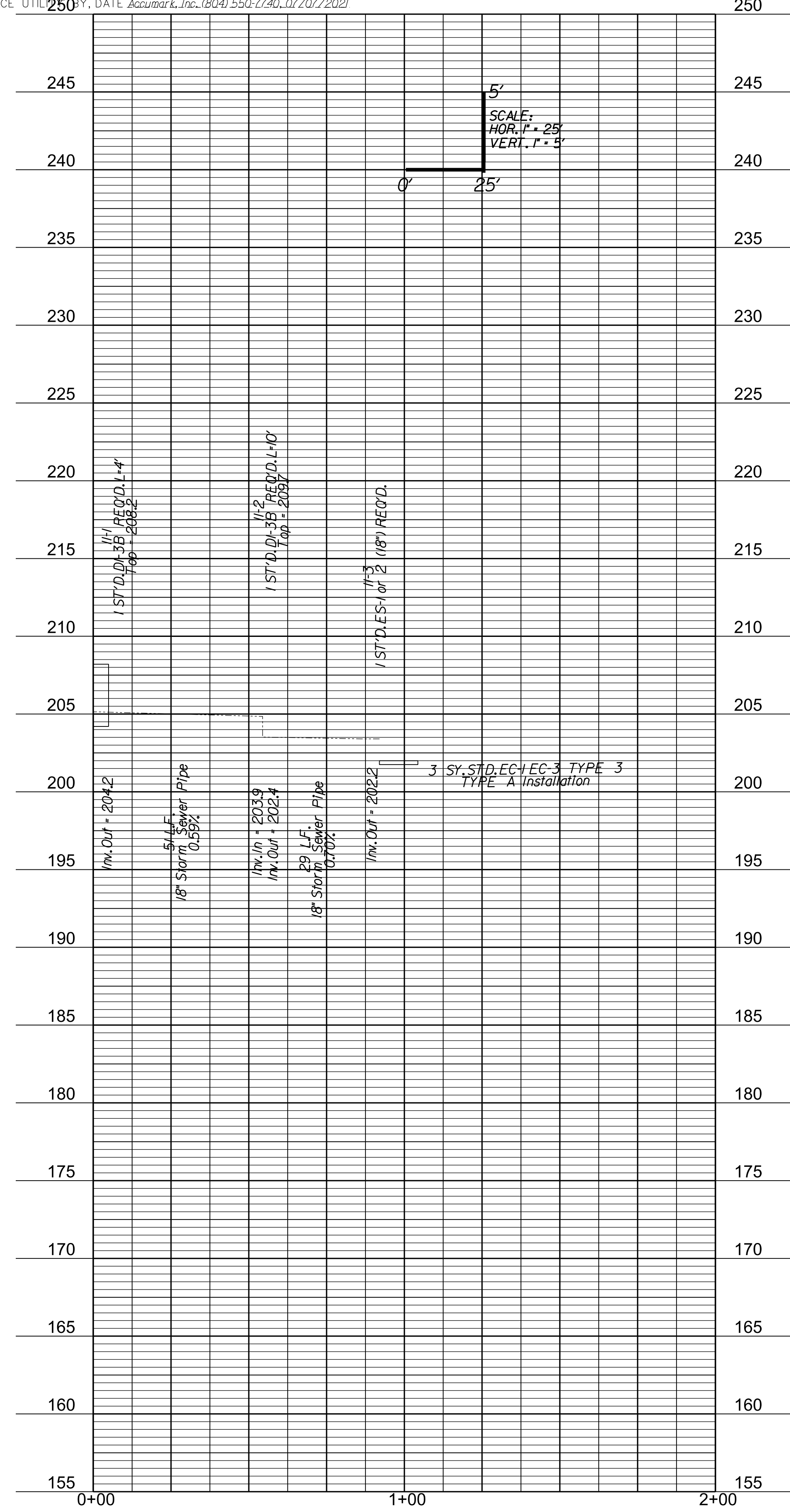
Legend
 Proposed Ground ———
 Existing Ground - - - - -
 Hydraulic Grade Line ·····



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PROJECT MANAGER: Rimpal Shah, P.E. (203) 259-2362 (NOVA District)
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Profile 11-1 to 11-3

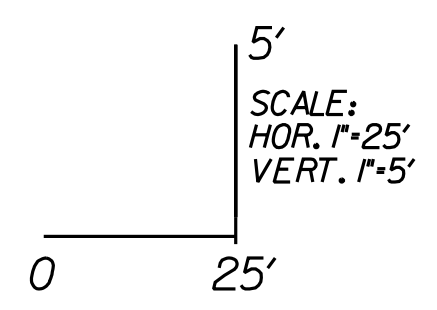


REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	14(8)

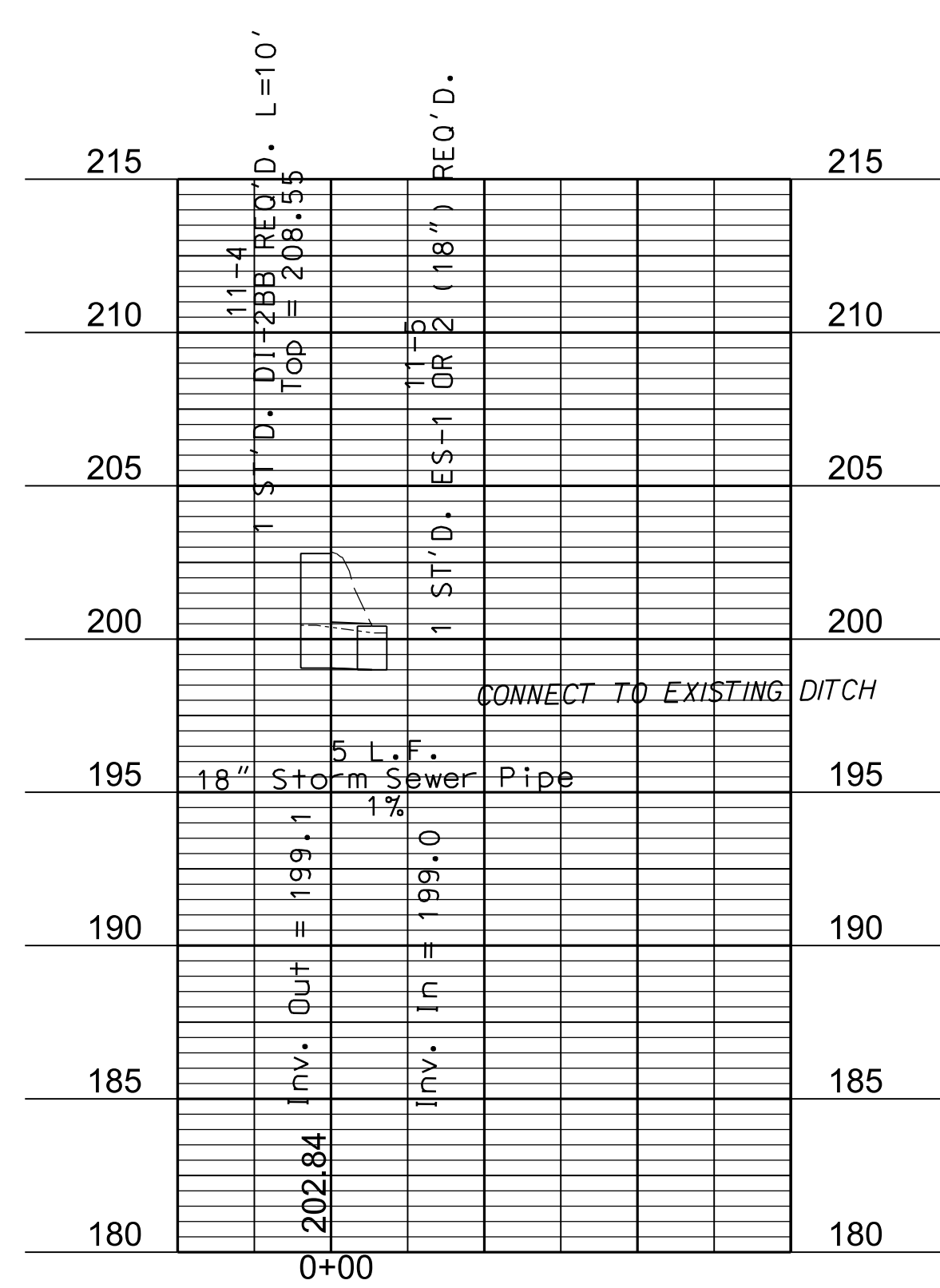
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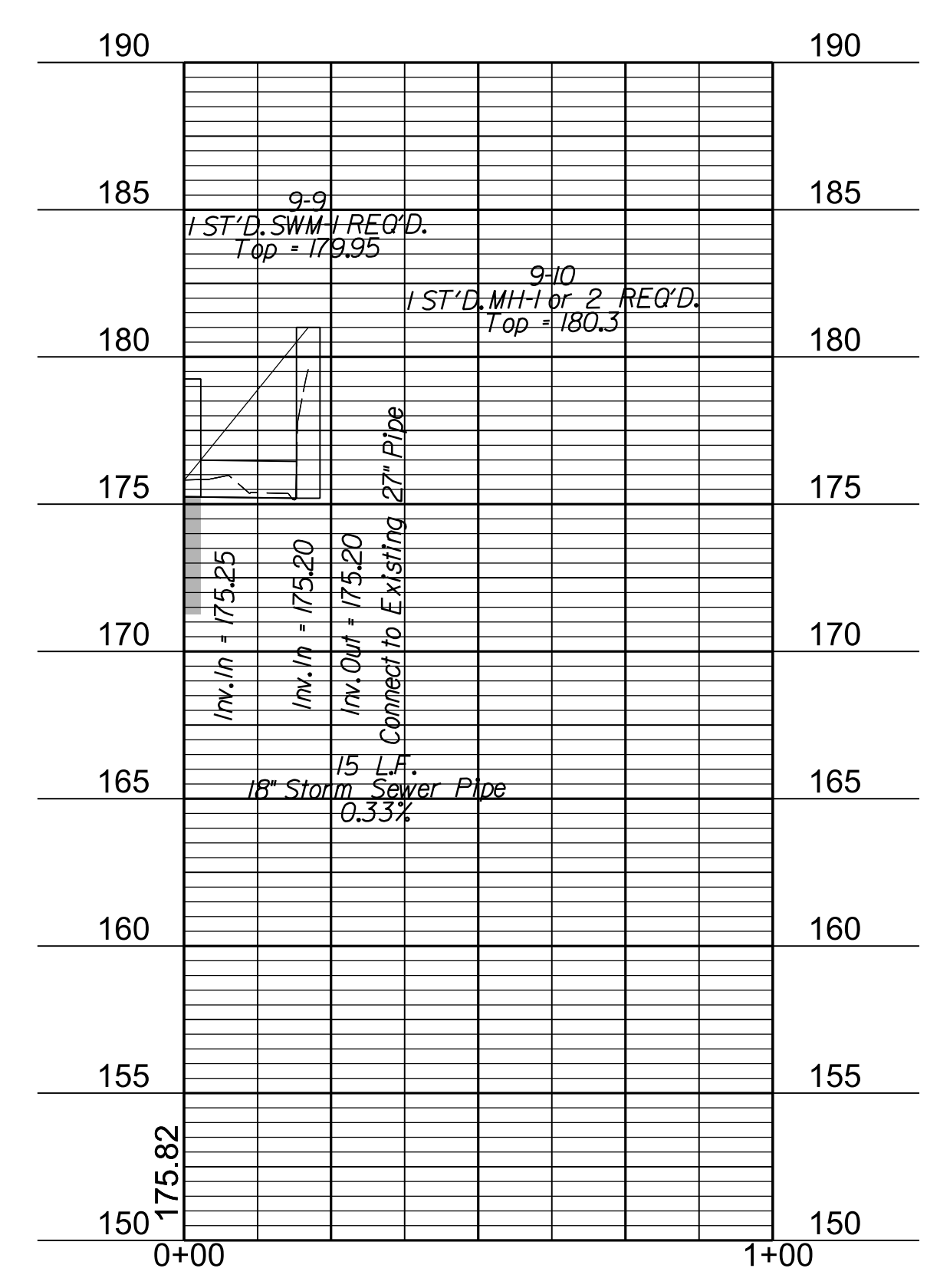
Legend
 Proposed Ground ———
 Existing Ground - - - - -
 Hydraulic Grade Line - · - · - ·



Profile 11-4 to 11-5



Profile 9-9 to 9-10



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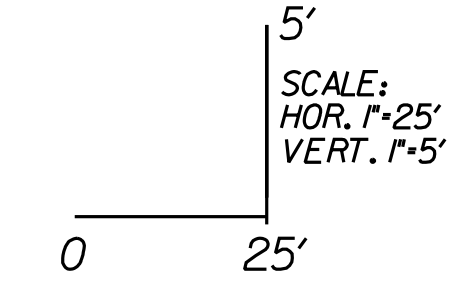
PROJECT MANAGER: Bimol Shah, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8000
 SUBSURFACE UTILITY BY: DATE Acumark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	14(9)

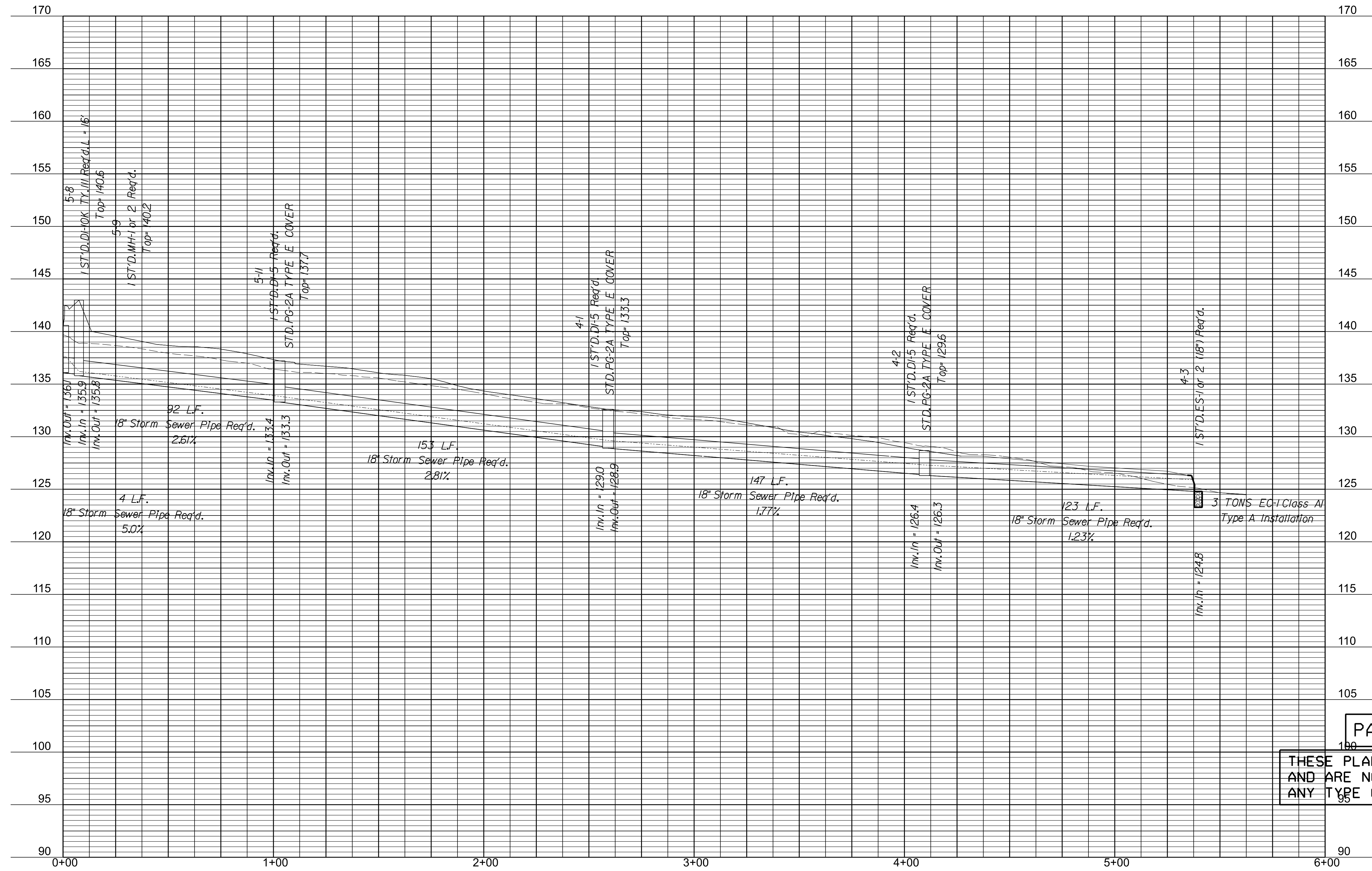
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Legend
 Proposed Ground ———
 Existing Ground - - - - -
 Hydraulic Grade Line - · - · -



Profile 5-8 to 4-3



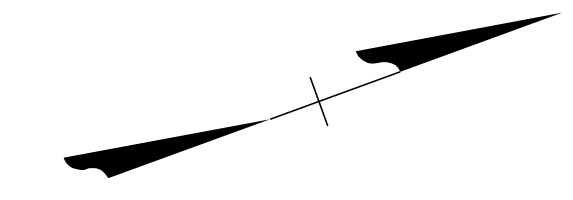
PAC PLANS
 THESE PLANS ARE UNFINISHED
 AND ARE NOT TO BE USED FOR
 ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

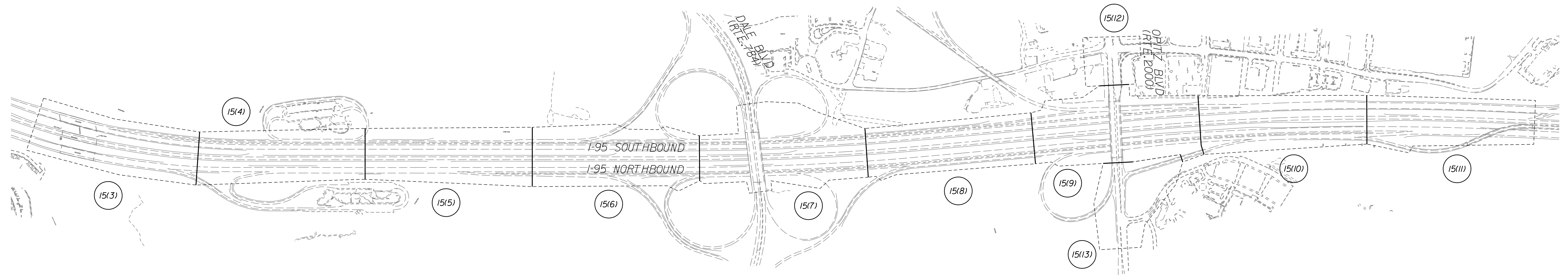
REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



TMS KEY PLAN



SHEET INDEX

- 15(1)
- 15(1A)
- 15(1B)
- 15(1C)
- 15(2B1) - 15(2B12)
- 15(2C1) - 15(2C2)
- 15(2D1) - 15(2D4)
- 15(2E1) - 15(2E11)
- 15(2F1) - 15(2F8)
- 15(2G1) - 15(2GX)
- 15(3) - 15(13)

- TMS SHEET INDEX, KEY PLAN, AND ABBREVIATIONS
- GENERAL NOTES
 - LEGEND
 - EQUIPMENT SCHEDULES
 - GATE DETAILS (SOME SHEETS NOT INCLUDED WITH THIS SUBMISSION)
 - GENERATOR SITE PLANS AND DETAILS
 - SERVICE PANEL DETAILS (SOME SHEETS NOT INCLUDED WITH THIS SUBMISSION)
 - POWER DISTRIBUTION DIAGRAMS AND PANEL SCHEDULES
 - FIBER CONNECTION DIAGRAMS
 - DEVICE CROSS SECTIONS (SHEETS NOT INCLUDED WITH THIS SUBMISSION)
 - PLAN SHEETS

ABBREVIATIONS

- CCTV - CLOSED-CIRCUIT TELEVISION
- COMM - COMMUNICATIONS
- DIST. - DISTRIBUTION
- EX. - EXISTING
- MM - MILEMARKER
- MVD - MICROWAVE VEHICLE DETECTOR
- NO. - NUMBER
- PR. - PROPOSED
- SP - SERVICE PANEL
- TMS - TRAFFIC MANAGEMENT SYSTEM
- XPL - EXPRESS LANES

PAC PLANS

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PROJECT	0095-076-299	SHEET NO.	15(1)
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PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

TMS GENERAL NOTES

GENERAL NOTES FOR TRAFFIC MANAGEMENT SYSTEM WORK:

- ALL VDOT AND 95 EXPRESS LANES FIBER OPTIC AND COMMUNICATIONS CABLES TO REMAIN IN PLACE AND OPERATIONAL UNLESS OTHERWISE NOTED ON THE PLANS.
- EXISTING VDOT AND 95 EXPRESS LANES TRAFFIC MANAGEMENT SYSTEMS EQUIPMENT IS SHOWN ON THE PLANS. LOCATIONS AND OPERATIONS HAVE NOT BEEN VERIFIED. THE CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND OPERATION PRIOR TO COMMENCING WORK THAT WILL IMPACT THE SYSTEM.
- THE CONTRACTOR SHALL NOTIFY THE VDOT AND 95 EXPRESS LANES ENGINEER OF EQUIPMENT THAT IS NOT OPERATIONAL PRIOR TO THE START OF WORK THAT WILL IMPACT THE SYSTEM. VDOT AND 95 EXPRESS LANES WILL RESTORE OPERATION OF THE EQUIPMENT PRIOR TO THE START OF WORK OR WILL OTHERWISE EXEMPT THE CONTRACTOR FROM ANY REQUIRED MAINTENANCE OF THE EQUIPMENT.
- EXISTING VDOT AND 95 EXPRESS LANES TRAFFIC MANAGEMENT SYSTEMS EQUIPMENT SHALL REMAIN IN SERVICE EXCEPT AS NOTED ON THE PLANS OR OTHERWISE APPROVED BY THE VDOT AND 95 EXPRESS LANES ENGINEER.
- TRAFFIC MANAGEMENT SYSTEMS EQUIPMENT THAT IS FOUND DURING THE COURSE OF CONSTRUCTION THAT IS NOT SHOWN ON THE PLANS SHALL BE GOVERNED BY THE SAME PROVISIONS OF THESE GENERAL NOTES.
- COMMUNICATION AND DEVICE CABLES MAY ONLY BE SPLICED IN EQUIPMENT CABINETS AND PEDESTALS, UNLESS OTHERWISE INDICATED IN THE PLANS.
- PULL WIRES UN CUT BETWEEN THE SERVICE PANEL AND THE EQUIPMENT CABINET. SPLICING IS ONLY PERMITTED WHEN THE LENGTH EXCEEDS THE AMOUNT ON A SUPPLIED REEL, WHEN THE CONDUCTOR SIZE IS LARGER THAN #4 AWG, OR WHERE SHOWN ON THE PLANS. ENGINEER APPROVED SPLICE KITS MUST BE USED FOR SUCH SPLICES UNLESS OTHERWISE NOTED IN THE PLANS.
- IN THE EVENT THAT VDOT AND 95 EXPRESS LANES COMMUNICATION CABLE IS DAMAGED DUE TO CONSTRUCTION ACTIVITY, NOTIFY VDOT AND 95 EXPRESS LANES IMMEDIATELY AND REPLACE ALL EXISTING CABLES IN KIND AT THE CONTRACTOR'S EXPENSE. REPAIRS SHALL BE COMPLETED AT LEAST TWO HOURS PRIOR TO THE NEXT TRAFFIC PEAK
- COORDINATE WITH VDOT AND 95 EXPRESS LANES FOR ACCESS TO TRAFFIC MANAGEMENT SYSTEM EQUIPMENT CABINETS. COORDINATE WITH VDOT AND 95 EXPRESS LANES FOR ANY WORK IMPACTING VDOT OR 95 EXPRESS LANES FACILITIES OR EQUIPMENT IN ACCORDANCE WITH THE CONTRACT SPECIAL PROVISIONS.
- EXISTING CONDUITS AND CABLES SHOWN ARE BASED ON AS BUILT PLAN INFORMATION AND MAY NOT BE COMPLETE. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO THE START OF WORK AND THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY DISCREPANCIES ARE FOUND THAT AFFECT THE ABILITY TO INSTALL PROPOSED EQUIPMENT AS SHOWN IN THE PLANS OR AS INDICATED IN THE PROJECT SPECIFICATIONS.
- THE CONTRACTOR SHALL PROVIDE ACCESS SWITCHES TO THE 95 EXPRESS ENGINEER FOR CONFIGURATION. UPON COMPLETION 95 EXPRESS WILL RETURN THE SWITCHES TO THE CONTRACTOR FOR INSTALLATION.
- ALL PROPOSED 95 EXPRESS LANES TRUNK AND DISTRIBUTION FIBER OPTIC CABLES SHALL BE ARMORED. ALL ARMORED FIBER OPTIC CABLES SHALL BE BONDED IN THE CABINET OR OTHER TERMINATION POINT. REFER TO THE PROJECT SPECIAL PROVISIONS FOR ADDITIONAL DETAILS.
- THE CONTRACTOR SHALL SUBMIT A NOTIFICATION OF IMPACT (NOI) FOR ALL IMPACTS TO EXISTING 95 EXPRESS OR VDOT TMS ASSETS CAUSED BY THE CONTRACTOR'S CONSTRUCTION ACTIVITIES. REFER TO THE PROJECT SPECIAL PROVISIONS FOR ADDITIONAL DETAILS OF THE NOI PROCEDURE.
- THE CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL A NETWORK CUTOVER PLAN FOR INTEGRATING NEW DEVICES INTO THE EXISTING SYSTEM AND FOR REMOVAL/MODIFICATION OF EXISTING DEVICES. REFER TO THE SPECIAL PROVISIONS FOR ADDITIONAL NETWORK CUTOVER PLAN REQUIREMENTS.
- THE CONTRACTOR SHALL PROVIDE GLOBAL POSITIONING SYSTEM (GPS) LOCATION DATA (COORDINATES) IN SPREADSHEET FORMAT OF ALL INSTALLED TMS FIELD DEVICES, INCLUDING BUT NOT LIMITED TO: JUNCTION BOXES (ELECTRICAL AND COMMUNICATION), SPLICE CABINETS, CCTV AND AID CAMERAS, DYNAMIC MESSAGE SIGN (DMS), MICROWAVE VEHICLE DETECTORS, GATES, POLE AND GROUND MOUNTED CABINETS, ROADWAY LIGHTING, AND ELECTRICAL SERVICE PANELS. A SPREADSHEET OF ALL INSTALLED OR MODIFIED TMS FIELD DEVICES, INCLUDING AT A MINIMUM THE DEVICE LOCATION, MODEL NUMBER, SERIAL NUMBER, AND TEST ACCEPTANCE DATE SHALL BE PROVIDED AS PART OF THE AS-BUILT DOCUMENTS. REFER TO THE SPECIAL PROVISIONS FOR ADDITIONAL AS-BUILT DOCUMENTATION REQUIREMENTS.
- ALL EXISTING ITS DEVICES DESIGNATED TO BE REMOVED ON THE PLANS SHALL BE SALVAGED AND RETURNED TO THE ORIGINAL OWNER (95 EXPRESS OR VDOT). THE ITS DEVICES SHALL INCLUDE, BUT NOT BE LIMITED TO, DYNAMIC MESSAGE SIGNS (DMS), ROADWAY GATES, CCTV CAMERAS, AID CAMERAS, VEHICLE DETECTORS, RADIO ANTENNAS, AND CONTROL CABINETS INCLUDING ALL INTERNAL EQUIPMENT AND CONTROLLERS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR THE SALVAGE AND DELIVERY OF ALL REMOVED EQUIPMENT TO A LOCATION SELECTED BY THE OWNER PRIOR TO PERFORMING ANY REMOVAL WORK. SHOULD THE OWNER DETERMINE THAT SALVAGING OF ANY EXISTING EQUIPMENT IS NOT REQUIRED, THE CONTRACTOR SHALL REMOVE AND DISPOSE OF THIS EQUIPMENT.
- THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL ITS STRUCTURES DESIGNATED TO BE REMOVED ON THE PLANS. THE CONTRACTOR SHALL REMOVE ALL FOUNDATIONS DESIGNATED TO BE REMOVED ON THE PLANS TO A DEPTH OF 2 FEET BELOW GRADE AND BACKFILL, SEED, AND MULCH.

CONDUIT INSTALLATION NOTES:

- CONDUIT SHALL BE DIRECTIONALLY BORED WHERE PLANS SHOW BORED CONDUIT.
- CONDUIT SHOWN AS TRENCHED MAY BE BORED ONLY WITH THE APPROVAL OF THE VDOT AND 95 EXPRESS LANES ENGINEER.
- INSTALL AN EQUIPMENT GROUNDING CONDUCTOR ("EGC") IN ALL NON-METALLIC POWER CONDUITS EXCEPT SPARES. THE "EGC" SIZE SHALL BE THE SAME AS THE LARGEST POWER CONDUCTOR IN THE CONDUIT, BUT NO SMALLER THAN #8.
- INSTALL INNERDUCT IN ALL 4 INCH COMMUNICATION CONDUITS THAT HAVE CABLES INSTALLED AS PART OF THE PROJECT.
- TRENCH EXCAVATION IN EARTH AREAS SHALL CONFORM TO STANDARD DRAWING ECI-UNLESS OTHERWISE NOTED. THE ECI-1 STANDARD SHALL BE CONSIDERED MODIFIED TO ALLOW GREATER THAN 24" OF COVER OVER THE CONDUITS. INSTALL COMMUNICATION CONDUIT AT MINIMUM OF 30 INCHES BELOW GRADE. THE REQUIRED DEPTH OF THE TRENCH IS MEASURED FROM THE LOW POINT OF THE SLOPE ABOVE.
- USE EXISTING CONDUIT STUB-OUTS WHERE AVAILABLE, ACCESSIBLE, AND NOT CLOGGED IN LIEU OF INSTALLING NEW CONDUIT INTO EXISTING MANHOLES, JUNCTION BOXES, AND FOUNDATIONS.
- WHEN INSTALLING NEW CABLE IN EXISTING DUCTS, DO NOT DISTURB THE EXISTING CABLES.
- USE FRE CONDUIT FOR EXPOSED HORIZONTAL RUNS ON BRIDGES, RIGID GALVANIZED STEEL (RGS) CONDUIT FOR OTHER EXPOSED RUNS, PVC CONDUIT FOR TRENCH RUNS, METALLIC CONDUIT FOR CONDUIT RUNS BETWEEN SERVICE PANEL AND CLOSEST JUNCTION BOX, AND HDPE CONDUIT FOR BORED RUNS.

CONDUIT INSTALLATION NOTES (CONTINUED):

- COORDINATE ALL WORK WITH OTHER CONTRACTORS TO AVOID CONFLICTS WITH OTHER WORK. CONDUITS SHALL AVOID BRIDGE PIERS, ABUTMENTS, GUARDRAIL POSTS, FOUNDATIONS, AND OTHER CIVIL WORKS.
- A 4 FOOT MINIMUM SEPARATION SHALL BE MAINTAINED BETWEEN THE FACE OF GUARDRAIL AND THE TRENCH.
- DIRECTIONAL BORING UNDER ROADWAY SHALL BE AT A MINIMUM DEPTH OF 5 FEET.
- ALL CONDUIT AND JUNCTION BOXES SHALL BE INSTALLED AS SHOWN ON THE PLANS. CONTACT THE VDOT AND 95 EXPRESS LANES ENGINEER IF FIELD CONDITIONS REQUIRE MODIFICATION.
- CONTRACTOR SHALL TAKE MEASURES TO ENSURE CONDUIT INSTALLED IN PROXIMITY TO SOUNDWALLS IS SUITABLY PROTECTED DURING SOUNDWALL CONSTRUCTION.
- ALL CONDUITS SHALL BE INSTALLED WITH A MINIMUM 2 FOOT CLEARANCE BETWEEN ALL THIRD PARTY WATER, GAS, SEWER, COMMUNICATIONS, POWER, DRAINAGE, OR OTHER UTILITY LINES UNLESS OTHERWISE APPROVED BY THE THIRD PARTY UTILITY OWNER AND THE ENGINEER.
- ALL EXISTING SPARE CONDUIT OR SPARE CONDUIT SPACE/CAPACITY SHALL REMAIN UNLESS OTHERWISE NOTED ON THE PLANS OR AUTHORIZED FOR USE BY 95 EXPRESS.

JUNCTION BOX NOTES:

- DE-WATER ALL EXISTING JUNCTION BOXES BEFORE PERFORMING ANY WORK INSIDE OF THEM.
- LIDS OF 95 EXPRESS LANES COMMUNICATION AND GATE COMMUNICATION JUNCTION BOXES SHALL BE LABELED "XPL COMM". LIDS OF 95 EXPRESS LANES POWER AND GATE POWER JUNCTION BOXES SHALL BE LABELED "XPL POWER". SEPARATE JUNCTION BOXES SHALL BE PROVIDED FOR GATE COMMUNICATIONS AND GATE POWER AS SHOWN ON THE PLANS. GATE COMMUNICATIONS AND POWER ARE NOT PERMITTED TO SHARE COMMON JUNCTION BOXES.
- LIDS OF VDOT COMMUNICATION BOXES SHALL SAY "VDOT COMM". LIDS OF VDOT POWER BOXES SHALL SAY "VDOT ELEC".
- CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL EXISTING MANHOLES AND JUNCTION BOXES BEFORE COMMENCING ANY WORK WITH THEM. IN CASE THE JUNCTION BOXES COULD NOT BE VERIFIED OR ARE NOT IN PLACE AS SHOWN IN PLANS, CONTACT ROGER ANDERSON (VDOT NRO ITS MAINTENANCE, OFFICE: 703-334-0877, MOBILE: 571-259-9682, ROGER.ANDERSON@VDOT.VIRGINIA.GOV) AND THE 95 EXPRESS LANES ENGINEER FOR FURTHER ACTION.
- IN CASE OF SPACE CONSTRAINTS WHEN ADDING NEW CONDUITS TO EXISTING JUNCTION BOXES, CONTACT ROGER ANDERSON (VDOT NRO ITS MAINTENANCE, OFFICE: 703-334-0877, MOBILE: 571-259-9682, ROGER.ANDERSON@VDOT.VIRGINIA.GOV) AND THE 95 EXPRESS LANES ENGINEER TO DETERMINE DIFFERENT SIZE AND NUMBER OF CONDUITS TO MAKE THE CONNECTION. REVISIONS REQUIRE REVIEW AND APPROVAL FROM VDOT AND 95 EXPRESS LANES TO CONFIRM CONDUIT FILL IS LESS THAN 40%. IF STANDARD CLEARANCES BETWEEN CONDUIT ENTRANCES AND/OR CONDUIT FILL CAPACITY CANNOT BE MET WITH THE ADDITION OF NEW CONDUITS AND CABLES, THE CONTRACTOR SHALL REPLACE THE EXISTING JUNCTION BOX.
- JUNCTION BOXES MAY BE STAGGERED TO ALLOW TIE-INS. JUNCTION BOXES SHALL NOT BE INSTALLED IN LOW-LYING LOCATIONS WITH POOR DRAINAGE TO PREVENT WATER INTRUSION INTO JUNCTION BOXES.
- FOR ALL COMMUNICATION JUNCTION BOXES LOCATED ON SLOPES 2:1 OR STEEPER, A MINIMUM 3'x6' FLAT AREA (4" THICK CONCRETE PAD) IMMEDIATELY ADJACENT TO THE DOWNSLOPE SIDE OF THE JUNCTION BOX SHALL BE PROVIDED TO ACCOMMODATE MAINTENANCE PERSONNEL WORKSPACE AND PLACEMENT OF THE JUNCTION BOX LID WHEN REMOVED. THE 3'x6'x4" CONCRETE PAD SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONCRETE TECHNICIAN PADS SHOWN ON THE CABINET FOUNDATION STANDARDS (CF-1 THROUGH CF-4) OF THE ROAD AND BRIDGE STANDARDS AND THE ELECTRIC SERVICE WORK PAD AND CONCRETE TECHNICIAN WORK PAD REQUIREMENTS OF SECTION 700 AND SECTION 801 OF THE ROAD AND BRIDGE SPECIFICATIONS.

UTILITY NOTES:

- THE EXISTING UNDERGROUND UTILITIES AND STORM SEWERS ARE NOT SHOWN IN THEIR EXACT LOCATION AND MAY NOT BE COMPLETE. ALL UTILITIES SHALL BE MARKED PRIOR TO INITIATION OF CONSTRUCTION. ARRANGE FOR MISS UTILITY TO MARK UNDERGROUND UTILITIES. IN ADDITION, CONTACT THE ENGINEER TO ARRANGE FOR VDOT TO MARK VDOT'S CABLES AND CONDUITS, PROVIDING TWO WORKING DAYS' NOTICE.
- VERIFY THE DEPTH OF ALL EXISTING UNDERGROUND UTILITIES AT LOCATIONS WHERE PROPOSED CONDUIT BORE OR TRENCH IS CROSSING TO AVOID ANY DISRUPTION TO THE EXISTING UNDERGROUND UTILITIES.
- AVOID IMPACTING ANY EXISTING UNDER-DRAIN SYSTEMS AT LOCATIONS WHERE PROPOSED CONDUIT BORE OR TRENCH IS CROSSING.

POWER DISTRIBUTION NOTES:

- CABLES IDENTIFIED TO BE ABANDONED SHALL BE DISCONNECTED FROM THE CABINET, SERVICE PANEL, OR MID-POINT JUNCTION BOX AS SHOWN ON THE PLANS. EACH END OF ABANDONED CABLES SHALL BE LABELED "ABANDONED" PER THE REQUIREMENTS STATED IN THE SPECIAL PROVISIONS. ABANDONED CABLES SHALL BE PULLED FROM THE SERVICE PANEL OR CABINET TO THE NEAREST JUNCTION BOX AND COILED SO THAT THE CABLE LABEL IS VISIBLE.
- WHERE PROPOSED CONDUCTORS ARE INSTALLED IN EXISTING CONDUIT, THE CONTRACTOR SHALL INSTALL/MODIFY EXISTING EQUIPMENT GROUNDING CONDUCTOR (EGC) TO BE THE SAME AS THE LARGEST POWER CONDUCTOR IN THE CONDUIT.
- INSTALLATION OF ELECTRICAL SERVICES SHALL BE COORDINATED WITH DOMINION ENERGY OF VIRGINIA (DE) OR NORTHERN VIRGINIA ELECTRIC COOPERATIVE (NOVEC), AS APPLICABLE.
- NEW SERVICE PANEL IDS HAVE BEEN PROVIDED FOR REFERENCE ONLY. NEW SERVICE PANEL IDS SHALL BE COORDINATED WITH 95 EXPRESS LANES.
- THE CONTRACTOR SHALL PROVIDE TERMINAL ADAPTERS TO TERMINATE CONDUCTORS GREATER THAN #2 AWG ON CIRCUIT BREAKERS OR OTHER ELECTRICAL EQUIPMENT AS REQUIRED.

EROSION AND SEDIMENT CONTROL NOTES:

- CONTRACTOR SHALL EXECUTE ALL EARTH WORK DURING DRY CONDITIONS.
- THE CONTRACTOR SHALL STABILIZE ALL SURFACES DISTURBED BY EARTHWORK AT THE END OF EACH WORK SHIFT. IF THE CONTRACTOR'S MEANS AND METHODS DO NOT ALLOW FOR SAME WORK SHIFT STABILIZATION, THE CONTRACTOR SHALL PLACE APPROPRIATE E&S CONTROL MEASURES, SUCH AS SILT FENCE, AROUND THE DISTURBED AREA AS DIRECTED BY THE ENGINEER.

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	

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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	15(1A)

PROJECT MANAGER *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accurmark, Inc. (804) 550-7740 07/07/2021*

TMS LEGEND

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	15(1B)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER				

EXISTING	PROPOSED	DESCRIPTION
		COMMUNICATION/CONTROL CONDUIT/DUCT BANK
		EQUIPMENT POWER CONDUIT/DUCT BANK
		COMMUNICATION AND POWER CONDUIT/DUCT BANK
		TRENCHED CONDUIT CROSS SECTION
		BORED CONDUIT CROSS SECTION
		STRUCTURE MOUNTED CONDUIT CROSS SECTION
		GENERATOR
		JUNCTION BOX EMBEDDED IN OR ATTACHED TO STRUCTURE
		SERVICE PANEL
	N/A	SPLICE PEDESTAL
		DETECTOR POLE
		50' POLE AND FOUNDATION
		40' POLE AND FOUNDATION
	N/A	EXISTING POLE
	N/A	TOLL GANTRY
		HORIZONTAL SWING GATE
N/A		VERTICAL SWING GATE
		EXPRESS LANES MICROWAVE VEHICLE DETECTOR
		EXPRESS LANES CCTV CAMERA
		EXPRESS LANES AID CAMERA
		EXPRESS LANES DYNAMIC MESSAGE SIGN
		EXPRESS LANES ELECTRICAL JUNCTION BOX JB-RI AND JB-R2
		ELECTRICAL JUNCTION BOX FOR GATES
		EXPRESS LANES COMMUNICATION/CONTROL CIRCULAR JUNCTION BOX
N/A		EXPRESS LANES LIGHTING JUNCTION BOX (JB-R2)
		EXPRESS LANES POLE OR STRUCTURE MOUNTED CABINET
		EXPRESS LANES GROUND-MOUNTED EQUIPMENT CABINET ONE CABINET ON SINGLE FOUNDATION
		EXPRESS LANES GROUND-MOUNTED EQUIPMENT CABINET TWO CABINETS ON SINGLE FOUNDATION

EXISTING	PROPOSED	DESCRIPTION
		VDOT CCTV CAMERA
		VDOT MICROWAVE VEHICLE DETECTOR
	N/A	VDOT RADIO ANTENNA
		VDOT POLE MOUNTED CABINET
		VDOT ELECTRICAL JUNCTION BOX, JB-RI, OR JB-R2
	N/A	VDOT MANHOLE
	N/A	VDOT COMMUNICATION/CONTROL CIRCULAR JUNCTION BOX
		VDOT GROUND-MOUNTED EQUIPMENT CABINET ONE CABINET ON SINGLE FOUNDATION
	N/A	VDOT GROUND-MOUNTED EQUIPMENT CABINET TWO CABINETS ON SINGLE FOUNDATION
	N/A	VDOT GROUND-MOUNTED EQUIPMENT CABINET THREE CABINETS ON SINGLE FOUNDATION

ACTION ITEM LEGEND

- EXISTING TMS EQUIPMENT TO BE REMOVED.
- EXISTING TMS CABLES TO BE REMOVED FROM CONDUIT AND CONDUIT TO BE ABANDONED.

PAC PLANS

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PROJECT MANAGER: Bimbal Stubb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7140 07/07/2021

TMS EQUIPMENT SCHEDULES

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	151(C)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PROPOSED XPL CABINET SCHEDULE								EQUIPMENT QUANTITY					
ITEM NO.	STA.	OFFSET (FT)	SHEET NO.	OWNER	CABINET TYPE	CABINET ID	DISPOSITION	CCTV	MVD	DMS	GATES	AID	TELEMETRY
1	657+50	31.7	LT	15(04)	XPL	POLE MOUNT	C095HL1560A	PROPOSED				1	
2	664+74	43.0	LT	15(04)	XPL	POLE MOUNT	C095HL1561A	PROPOSED				1	
3	668+05	43.0	LT	15(04)	XPL	GROUND MOUNT	C095HL1561D	PROPOSED		1			
4	668+37	44.1	LT	15(05)	XPL	GROUND MOUNT	C095HL1561G	PROPOSED			9		
5	671+50	51.3	LT	15(05)	XPL	POLE MOUNT	C095HL1562A	PROPOSED				1	
6	677+10	34.9	RT	15(05)	XPL	GROUND MOUNT	C095HR1563D	PROPOSED		1			
7	686+14	42.9	LT	15(06)	XPL	GROUND MOUNT	C095HL1565G	PROPOSED			11	1	
8	686+45	191.8	LT	15(06)	XPL	RACK MOUNT	H118A GENERATOR COMM.	PROPOSED					1
9	694+20	52.7	LT	15(06)	XPL	GROUND MOUNT	C095HL1566D	PROPOSED		1		1	
10	697+32	40.1	LT	15(07)	XPL	POLE MOUNT	C095HL1566A	PROPOSED				1	
11	724+25	130.0	LT	15(08)	XPL	GROUND MOUNT	C095HL1572D	PROPOSED		1		1	
12	62+25	71.0	RT	15(12)	XPL	GROUND MOUNT	C2000XR0001D	PROPOSED	1	1			
13	63+50	58.5	RT	15(12)	XPL	GROUND MOUNT	C2000XR0001G	PROPOSED	1		7	1	
14	71+22	52.3	LT	15(13)	XPL	GROUND MOUNT	C2000XL0001D	PROPOSED		1			
15	73+65	60.4	RT	15(13)	XPL	GROUND MOUNT	C2000XR0001C	PROPOSED	1				
16	726+81	42.2	RT	15(09)	XPL	POLE MOUNT	C095HR1572C	PROPOSED	1	1			
17	728+74	185.9	RT	15(09)	XPL	GROUND MOUNT	C095NR1573D	PROPOSED		1			
18	732+03	39.3	RT	15(09)	XPL	GROUND MOUNT	C095HL1574A	PROPOSED				1	
19	736+90	189.7	RT	15(09)	XPL	RACK MOUNT	H117A GENERATOR COMM.	PROPOSED					1
TOTAL								4	1	7	27	9	2

EXISTING XPL CABINET SCHEDULE								EQUIPMENT QUANTITY					
ITEM NO.	STA.	OFFSET (FT)	SHEET NO.	OWNER	CABINET TYPE	CABINET ID	DISPOSITION	CCTV	MVD	DMS	GATES	AID	TELEMETRY
1	642+62	33.7	RT	15(03)	XPL	POLE MOUNT	C095HR1556C	EX. TO REMAIN	1				
2	653+59	42.6	RT	15(03)	XPL	POLE MOUNT	C095HR1559M	EX. TO REMAIN		1			
3	668+91	35.0	RT	15(05)	XPL	GROUND MOUNT	C095HR1562 (C)	EX. TO REMAIN	1	1	-1		
0	669+31	175.1	LT	15(05)	XPL	RACK MOUNT	H119 GENERATOR COMM.	EX. TO REMAIN					1
5	685+98	33.1	RT	15(06)	XPL	POLE MOUNT	C095HR1565C	EX. TO REMAIN	1	1			
6	702+44	397.0	LT	15(07)	XPL	RACK MOUNT	H118 GENERATOR COMM.	EX. TO REMAIN					1
7	702+48	37.9	RT	15(07)	XPL	POLE MOUNT	C095HR1568A	EX. TO REMAIN		1		1	
8	706+98	31.6	LT	15(07)	XPL	POLE MOUNT	C095HL1569C	EX. TO REMAIN	1			1	
9	712+27	42.6	LT	15(08)	XPL	GROUND MOUNT	C095HL1570G (A)	EX. TO REMAIN		1	-8	1	
10	724+53	26.2	LT	15(09)	XPL	POLE MOUNT	C095HL1572A	EX. TO BE REMOVED				-1	
11	729+02	31.0	LT	15(09)	XPL	GROUND MOUNT	C095HL1573G	EX. TO BE REMOVED	-1	-1		-7	-1
12	730+10	183.4	RT	15(09)	XPL	GROUND MOUNT	C095XR1573D	EX. TO BE REMOVED			-1		
13	735+08	334.3	RT	15(09)	XPL	GROUND MOUNT	C095XR1574D	EX. TO REMAIN			1		
14	736+70	50.3	LT	15(09)	XPL	GROUND MOUNT	C095SL1575D	EX. TO BE REMOVED			-1		
15	739+51	54.0	LT	15(10)	XPL	POLE MOUNT	C095SL1575A (M)	EX. TO REMAIN		1			-1
16	746+67	184.8	RT	15(10)	XPL	GROUND MOUNT	C095XR1576D	EX. TO REMAIN			1	4	
17	751+44	36.9	LT	15(10)	XPL	POLE MOUNT	C095HR1577C	EX. TO REMAIN	1	1			
18	751+77	159.7	LT	15(10)	XPL	RACK MOUNT	H117 GENERATOR COMM.	EX. TO REMAIN					1
19	755+67	223.9	RT	15(11)	XPL	POLE MOUNT	C095XR1578A	EX. TO REMAIN				1	
20	757+41	59.3	LT	15(11)	XPL	GROUND MOUNT	C095SL1578D	EX. TO BE REMOVED			-1		
21	760+73	37.1	LT	15(11)	XPL	GROUND MOUNT	C095SL1579D	EX. TO REMAIN			1		
22	770+02	31.1	LT	NOT SHOWN	XPL	POLE MOUNT	C095HR1581A	EX. TO REMAIN		1		2	

PROPOSED VDOT CABINET SCHEDULE								EQUIPMENT QUANTITY		NOTES
ITEM NO.	STA.	OFFSET (FT)	SHEET NO.	OWNER	CABINET TYPE	CABINET ID	DISPOSITION	CCTV	MVD	
1	726+43	52.9	RT	15(09)	VDOT	GROUND MOUNT	NRO-CAB-195-N-01572	PROPOSED	1	
2	727+13	133.6	LT	15(09)	VDOT	POLE MOUNT	NRO-CAB-195-S-01572	PROPOSED		2
TOTAL								1	2	

EXISTING VDOT CABINET SCHEDULE								EQUIPMENT QUANTITY		NOTES	
ITEM NO.	STA.	OFFSET (FT)	SHEET NO.	OWNER	CABINET TYPE	CABINET ID	DISPOSITION	CCTV	MVD		
1	654+10	186.0	LT	15(03)	VDOT	GROUND MOUNT	B132	EX. TO REMAIN		1	
2	656+44	32.0	RT	15(04)	VDOT	GROUND MOUNT	B139	EX. TO REMAIN			OLD DMS CABINET. CURRENTLY SERVES AS FIBER SPLICE THROUGH.
3	677+52	172.8	LT	15(05)	VDOT	GROUND MOUNT	B130	EX. TO REMAIN	1	1	
4	701+82	56.0	RT	15(07)	VDOT	GROUND MOUNT	B135	EX. TO REMAIN			OLD DETECTOR CABINET. CURRENTLY SERVES AS FIBER SPLICE THROUGH.
5	725+05	183.9	LT	15(09)	VDOT	GROUND MOUNT	B122	EX. TO REMAIN	1		
6	703+02	42.8	LT	15(09)	VDOT	POLE MOUNT	B131M	EX. TO BE REMOVED		-1	SURGE PROTECTION CABINET.
7	730+52	55.0	RT	15(09)	VDOT	GROUND MOUNT	B131	EX. TO BE REMOVED			OLD DMS AND DETECTOR CABINET. CURRENTLY SERVES AS FIBER SPLICE THROUGH.
8	738+50	45.0	RT	15(10)	VDOT	GROUND MOUNT	B127	EX. TO REMAIN			OLD DETECTOR CABINET. CURRENTLY SERVES AS FIBER SPLICE THROUGH.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

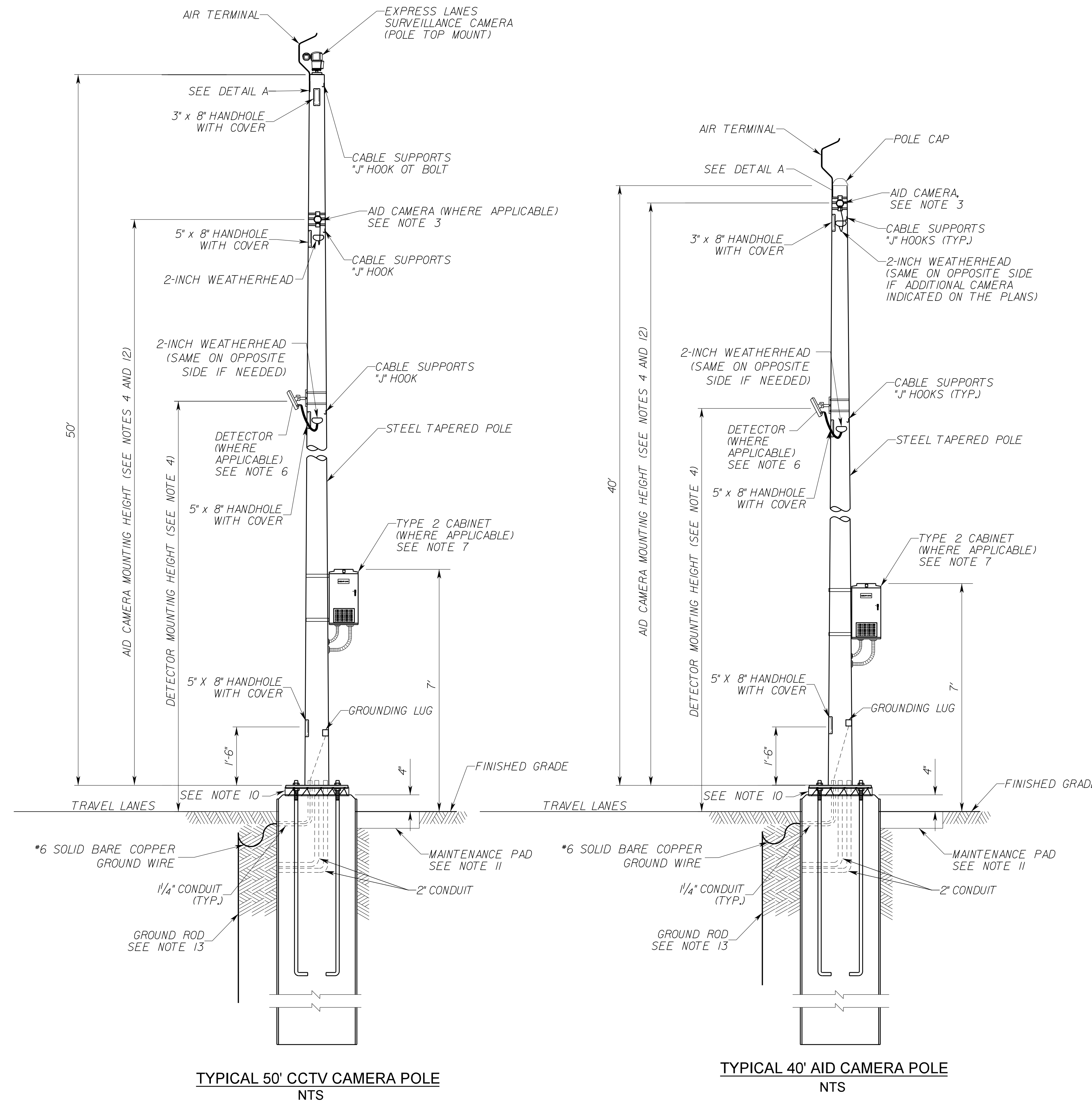
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

CCTV AND AID CAMERA POLE DETAILS

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2A)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



NOTES:

- ALL CONDUITS AND ANCHOR BOLTS SHALL BE RIGIDLY INSTALLED BEFORE THE CONCRETE IS PLACED. THE TOP OF THE CONDUITS SHALL BE FLUSH WITH THE TOP OF THE ANCHOR BOLTS AND THE CONDUITS SHALL BE CENTERED IN THE CENTER OF THE FOUNDATION.
- STAINLESS STEEL BOLTS SHALL CONFORM TO ASTM A193, GRADE B5, B6, B7, OR B16. NUTS SHALL BE COMPATIBLE AND CONFORM TO ASTM A194, SELF-LOCKING.
- SEE CCTV AND AID CAMERA MOUNTING DETAILS ON SHEET 15(2A2) FOR EQUIPMENT INSTALLATION DETAILS.
- SEE ITS EQUIPMENT CROSS SECTION DRAWINGS FOR EQUIPMENT MOUNTING HEIGHTS.
- PROVIDE A SOLID COPPER AIR TERMINAL, 0.75 INCHES IN DIAMETER. THE LENGTH OF THE AIR TERMINAL SHALL BE SUCH THAT IT PROJECTS 5 FEET ABOVE THE TOP OF THE CAMERA. AIR TERMINAL SHALL BE ATTACHED WITH TWO BOLTS.
- SEE DETECTOR MOUNTING DETAILS ON SHEET 15(2A3).
- CABINETS ARE NOT REQUIRED AT ALL LOCATIONS. TYPE 2 CABINET SHALL BE INSTALLED AS SHOWN ON SHEET 15(2A5).
- AT THE POINTS WHERE THE ROD BOLTS TO THE POLE, USE A CONDUCTIVE JOINT COMPOUND TO MINIMIZE GALVANIC CORROSION OF THE DISSIMILAR METALS.
- POLE AND FOUNDATION SHALL BE DESIGNED BY THE CONTRACTOR TO CONFORM TO THE REQUIREMENTS OF THESE DETAILS AND SPECIAL PROVISIONS.
- FURNISH AND INSTALL SCREEN IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS, 2016 VS-11302.60 TO PREVENT RODENT ENTRY AT THE BASE OF ALL TTMS POLES.
- IF CABINET IS FACING 2:1 OR STEEPER DOWNSLOPE, INSTALL 3' x 3' x 4" CONCRETE PAD ADJACENT TO EACH CABINET DOOR FOR MAINTENANCE PERSONNEL TO STAND WHEN ACCESSING ITS CABINETS.
- AID CAMERA MOUNTING HEIGHT MEASURED FROM BOTTOM OF POLE.
- GROUND ROD SHALL BE BURIED AT LEAST 6" BELOW FINISHED GRADE.
- POLE SHALL BE PROTECTED AS SHOWN ON THE PLANS.
- EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG. LOCATIONS OF EMPTY CONDUITS SHALL HAVE AN ADDITIONAL 2" LONG MARK MADE PERPENDICULAR TO AND CENTERED ON THIS MARKING.

PAC PLANS

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N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2A)
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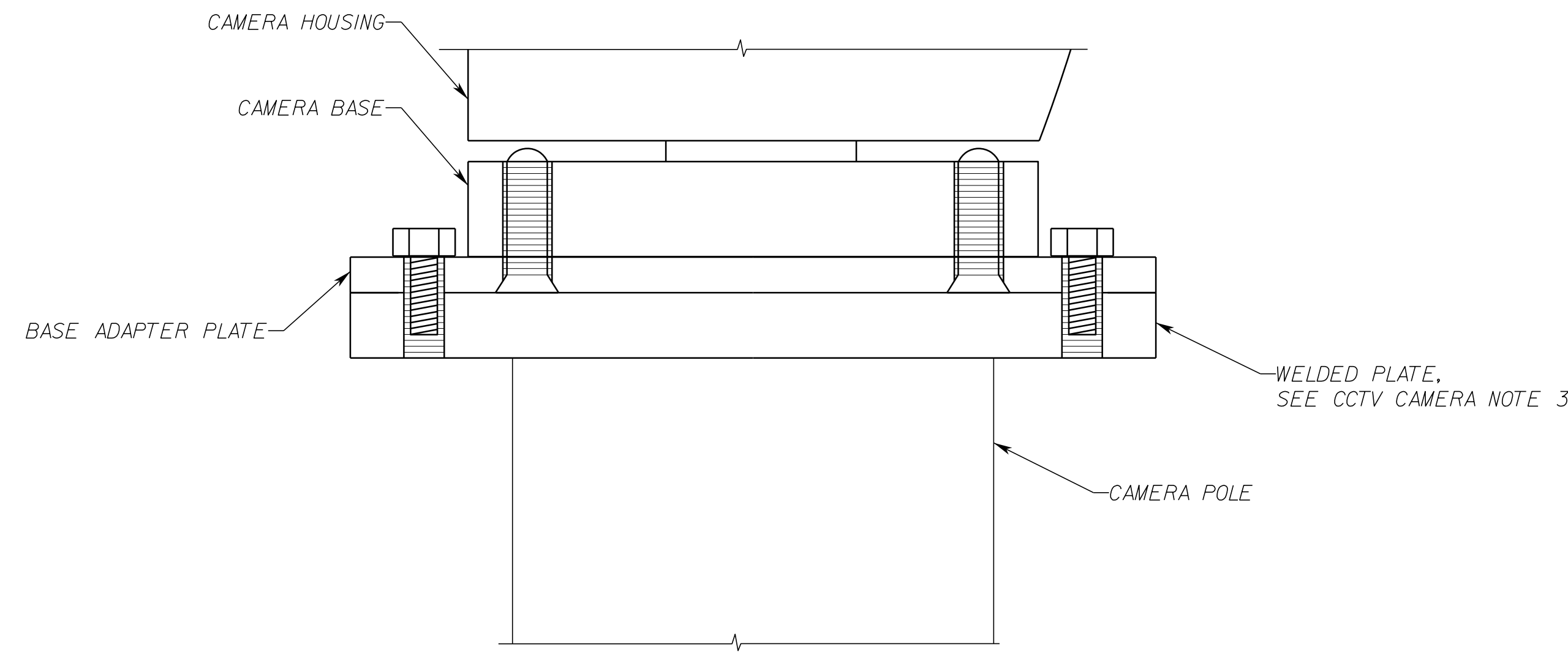
PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		STATE		SHEET NO.
	STATE	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501		15(2A2)

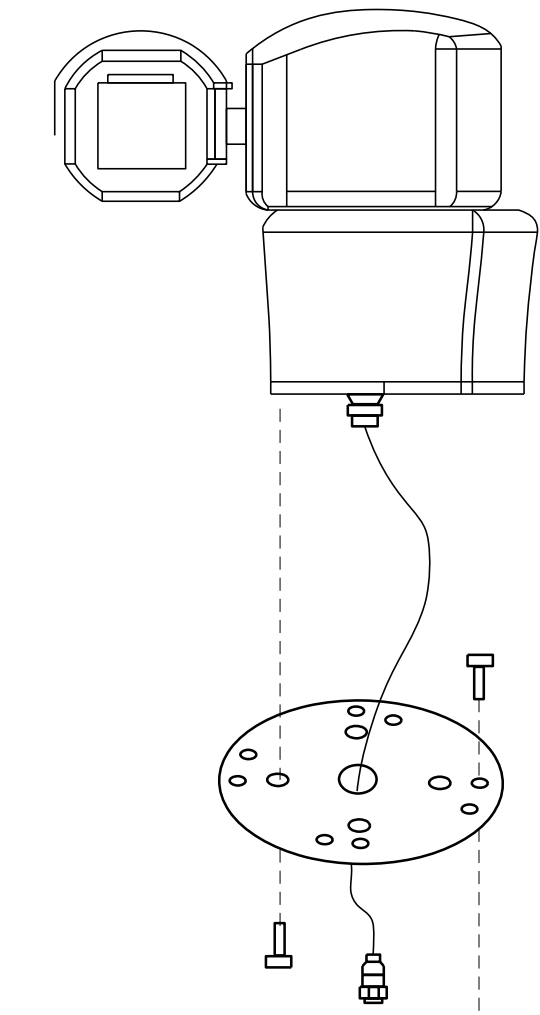
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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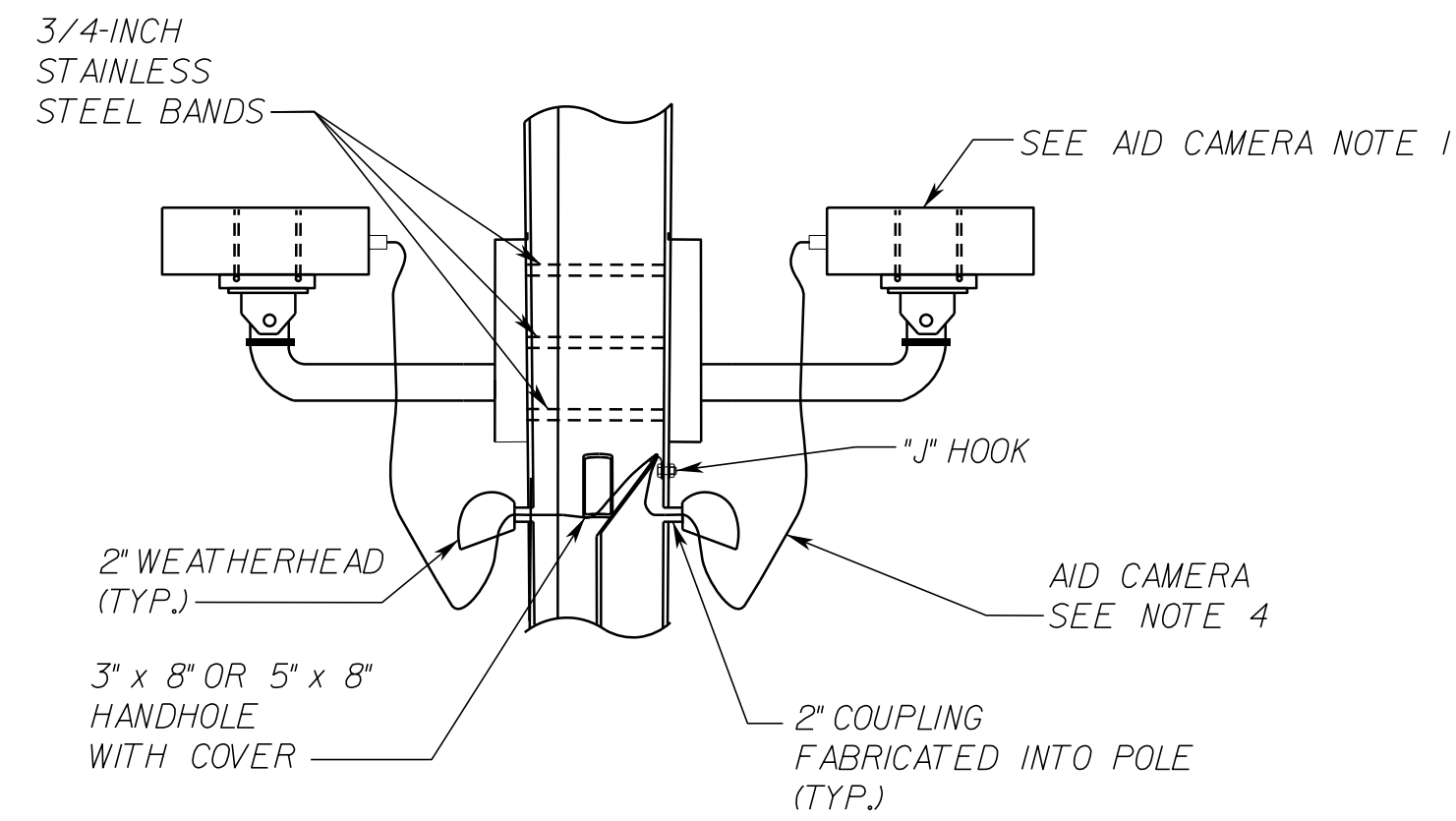
CCTV AND AID CAMERA MOUNTING DETAILS



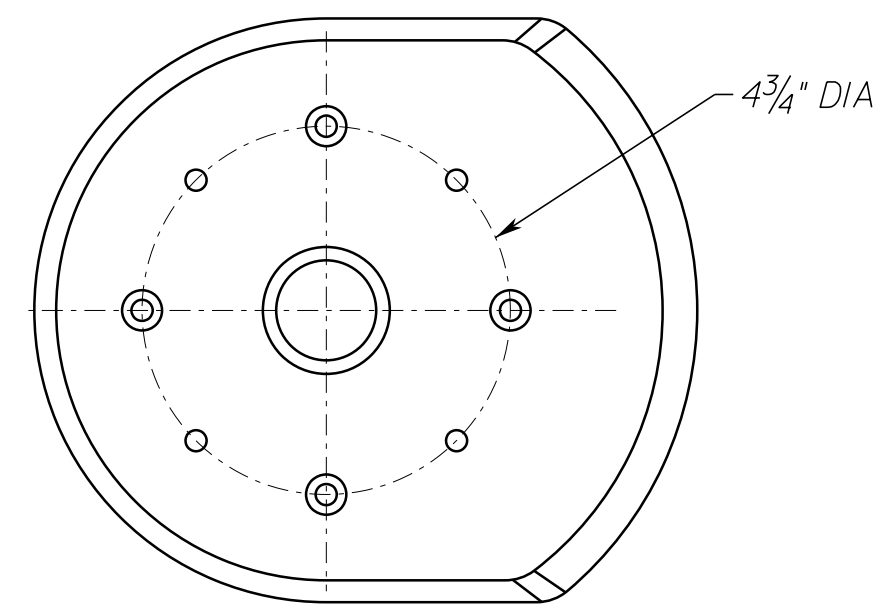
CCTV CAMERA INSTALLATION ON CAMERA POLE
 NTS



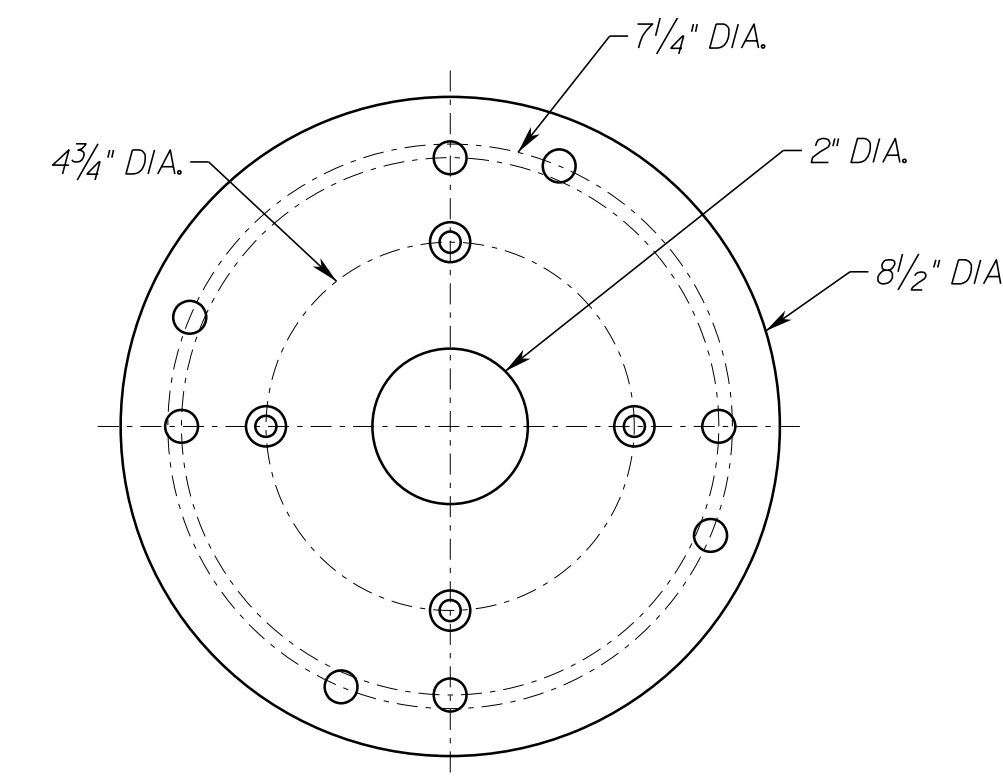
CCTV CAMERA INSTALLATION ON BASE ADAPTER PLATE
 NTS



AID CAMERA MOUNTING DETAIL
 NTS



CCTV CAMERA BASE DETAIL
 NTS



CCTV CAMERA BASE ADAPTER PLATE DETAIL
 NTS

AID CAMERA NOTES:

1. AID CAMERAS SHALL BE COHU 3430HD SERIES FIXED BARREL.
2. AID CAMERAS SHALL BE INSTALLED PER VERTICAL POLE MOUNT INSTALLATION RECOMMENDED BY THE MANUFACTURER.
3. AID CAMERA SHALL BE MOUNTED ABOVE WEATHERHEAD.
4. DRIP LOOP SHALL BE MAINTAINED AT ALL TIMES.

CCTV CAMERA NOTES:

1. CCTV CAMERAS SHALL BE COHU HD COSTAR 4260HD RISE 4260 SERIES POSITIONER.
2. FOUR-HOLE PATTERN BASE ADAPTER PLATE SHALL BE USED TO INSTALL CCTV AT THE TOP OF CAMERA POLE. CAMERA SHALL BE DIRECTLY ATTACHED TO BASE ADAPTER PLATE WITH MANUFACTURER SUGGESTED HARDWARE AND INSTALLATION RECOMMENDATIONS.
3. CONTRACTOR TO COORDINATE CCTV BASE ADAPTER PLATE SIZING AND INSTALLATION WITH CCTV MANUFACTURER.

PAC PLANS

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PROJECT	SHEET NO.
N.T.S.	15(2A2)
0095-076-299	

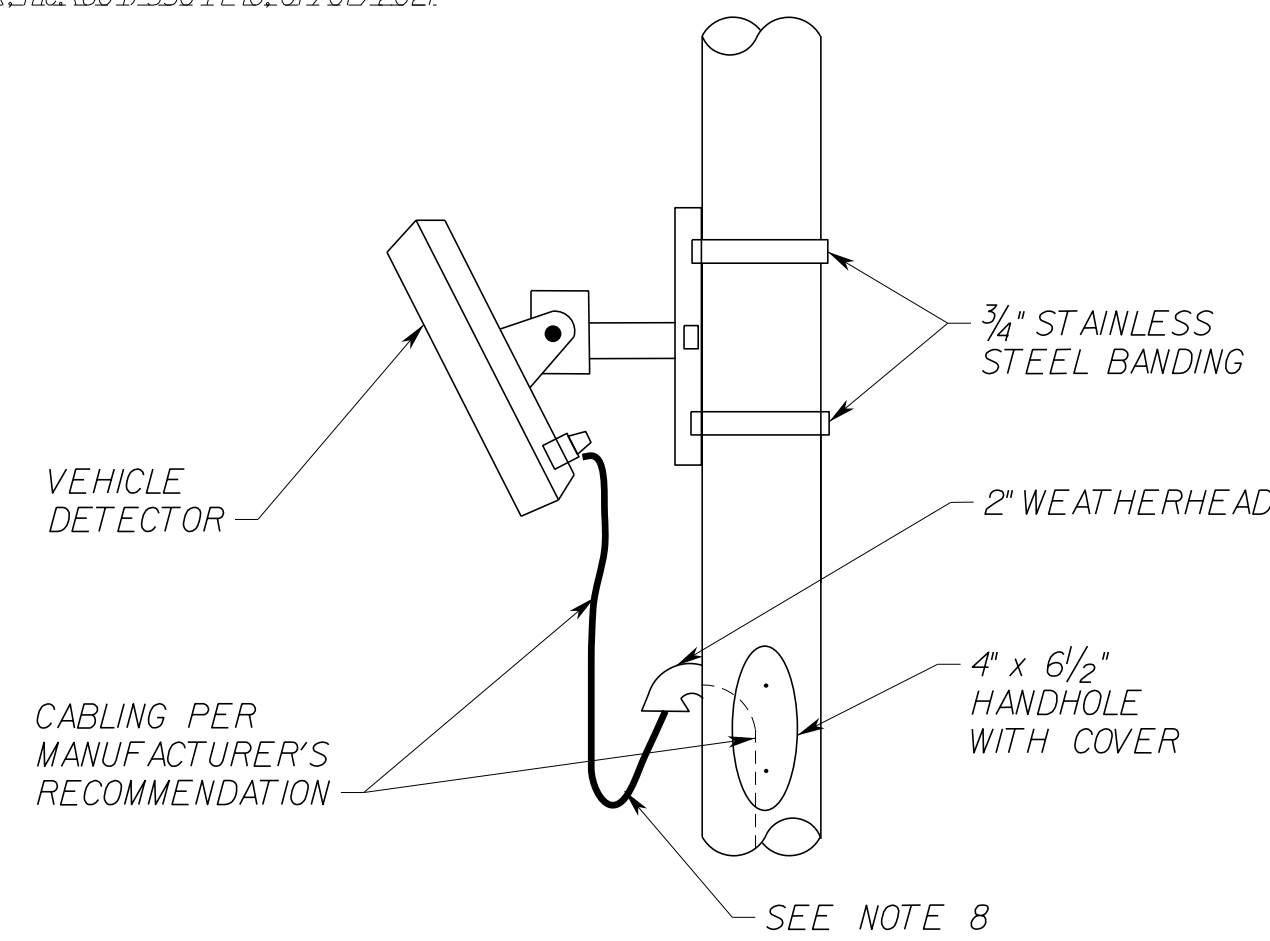
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

VEHICLE DETECTOR AND DMS MESSAGE VERIFICATION CAMERA POLE DETAILS

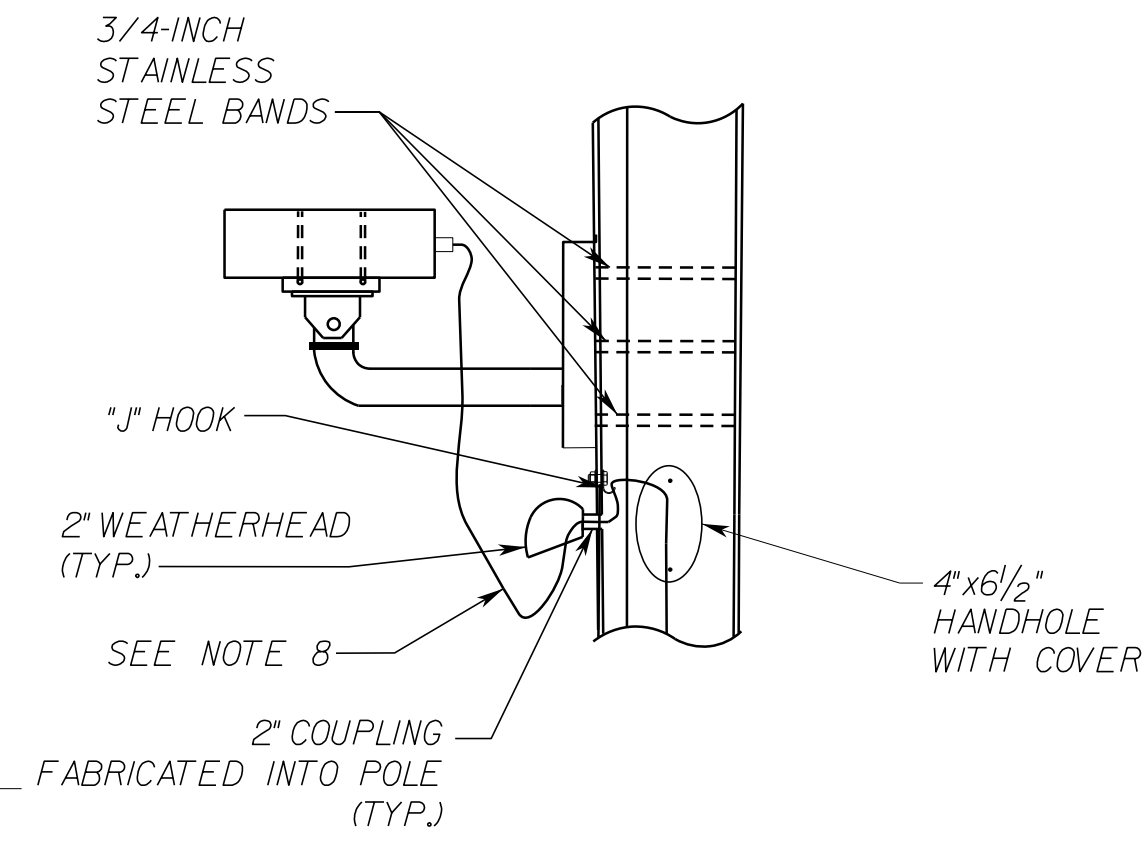
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2A3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

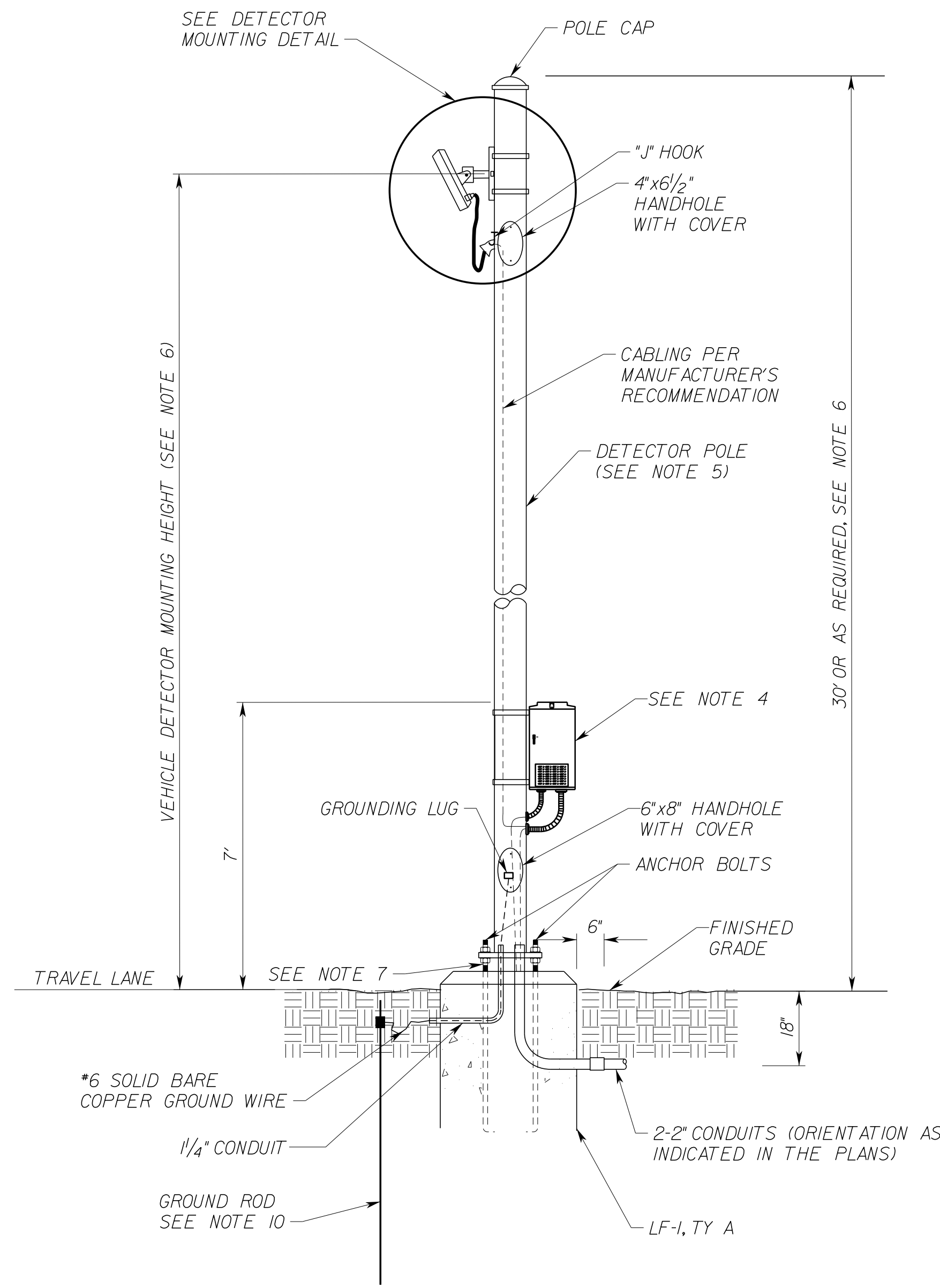
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



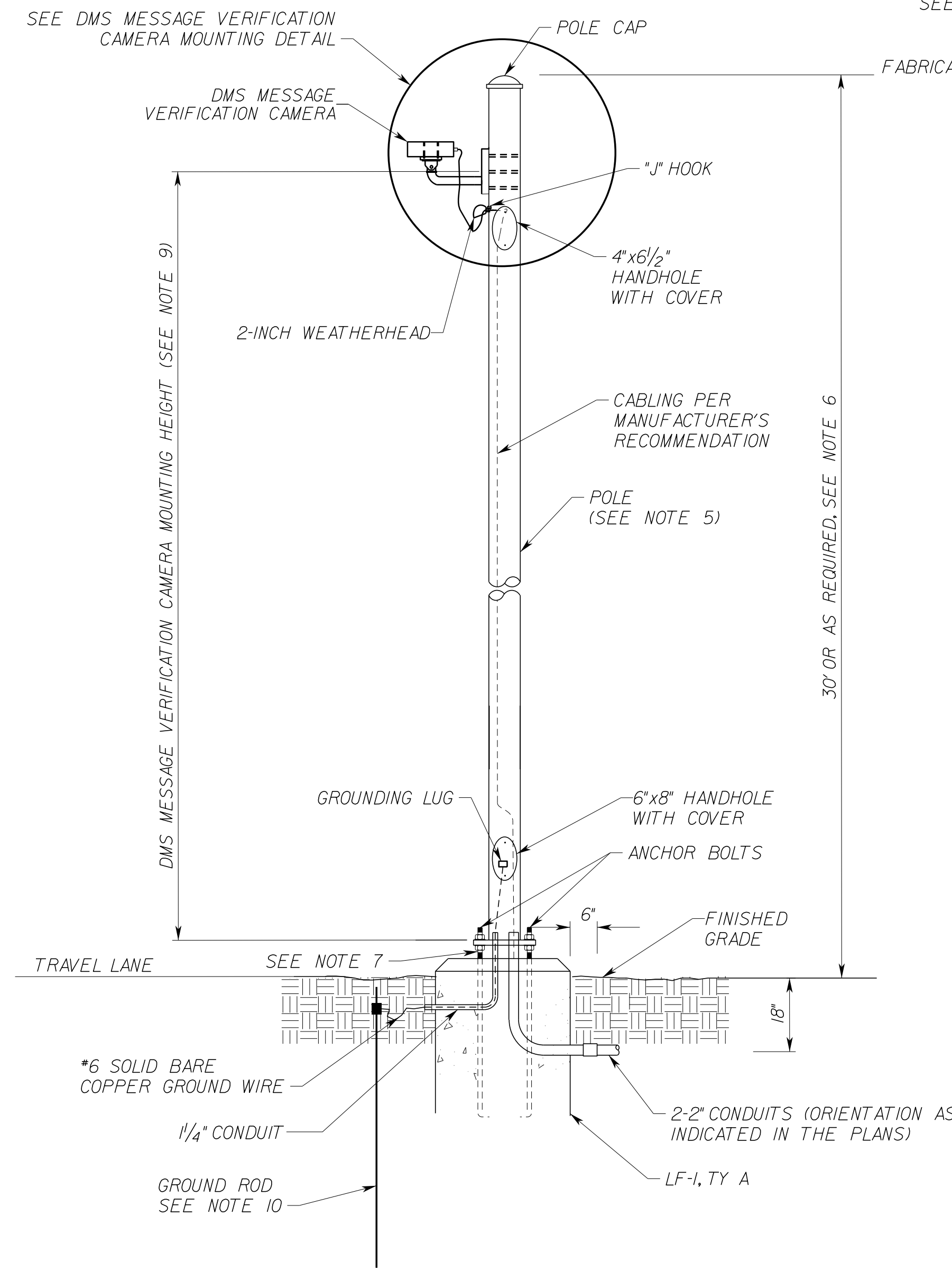
DETECTOR MOUNTING DETAIL
 NTS



DMS MESSAGE VERIFICATION CAMERA MOUNTING DETAIL
 NTS



VEHICLE DETECTOR ON DEDICATED GROUND MOUNTED POLE
 NTS



DMS MESSAGE VERIFICATION CAMERA ON DEDICATED GROUND MOUNTED POLE
 NTS

NOTES:

- POLE SHALL BE PROTECTED AS SHOWN ON THE PLANS.
- EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS, THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG, LOCATIONS OF EMPTY CONDUITS SHALL HAVE AN ADDITIONAL 2" LONG MARK MADE PERPENDICULAR TO AND CENTERED ON THIS MARKING.
- ALL CONNECTORS, BANDING AND MISCELLANEOUS EQUIPMENT SHALL BE STAINLESS STEEL.
- SEE PLANS FOR CABINET TYPE, CABINETS ARE NOT REQUIRED AT ALL LOCATIONS. FOR TYPE 2 CABINET, INSTALL 3" COMMUNICATION AND 2" POWER FLEXIBLE METAL CONDUITS. FOR TYPE 1 CABINET, INSTALL 2" FLEXIBLE METAL CONDUIT. SEE ITS CROSS SECTIONS FOR EQUIPMENT MOUNTING HEIGHTS, AND CABINET ORIENTATION.
- POLE SHALL MEET THE REQUIREMENTS OF VDOT STANDARD LP-2 WITH FOLLOWING EXCEPTIONS:
 - 2" CONDUIT COUPLING THROUGH WALL, WELDED TO POLE WALL ALL THE WAY AROUND. PROVIDE REMOVABLE PLUG IF NOT USED.
 - WEATHERHEAD 5' FROM TOP
 - HANDHOLE 5' FROM TOP
 - POLE CAP
- SEE ITS CROSS SECTIONS FOR POLE HEIGHTS AND DETECTOR MOUNTING HEIGHTS.
- FURNISH AND INSTALL SCREEN IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS 2016 VS-11302.60 TO PREVENT RODENT ENTRY AT THE BASE OF ALL TTMS POLES.
- DRIP LOOP SHALL BE MAINTAINED AT ALL TIMES.
- DMS MESSAGE VERIFICATION CAMERA MOUNTING HEIGHT MEASURED FROM BOTTOM OF POLE.
- GROUND ROD SHALL BE BURIED AT LEAST 6" BELOW FINISHED GRADE.

PAC PLANS

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N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2A3)
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PROJECT MANAGER: Bimbal Stubb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

GROUND MOUNTED CABINET FOUNDATION DETAILS

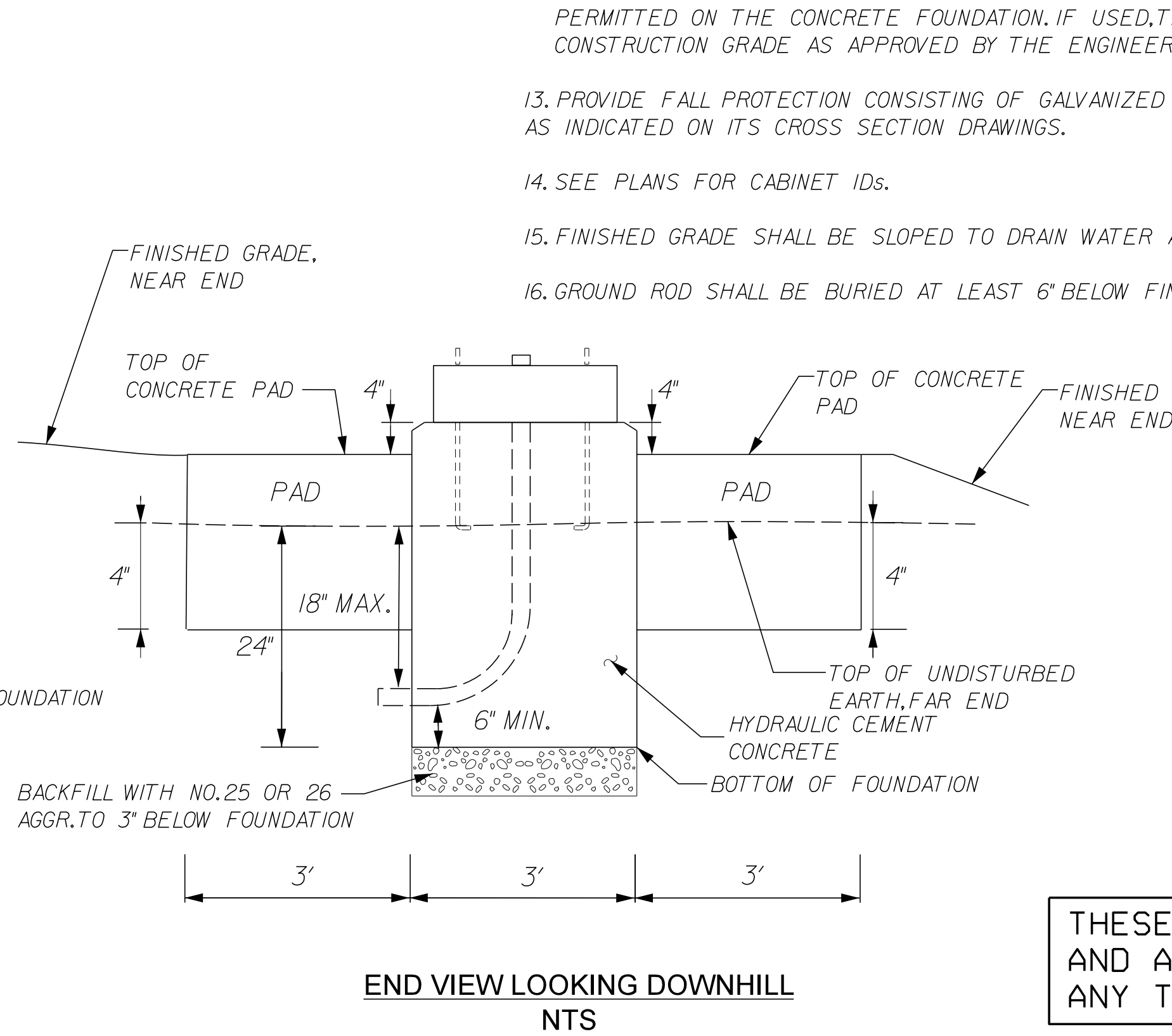
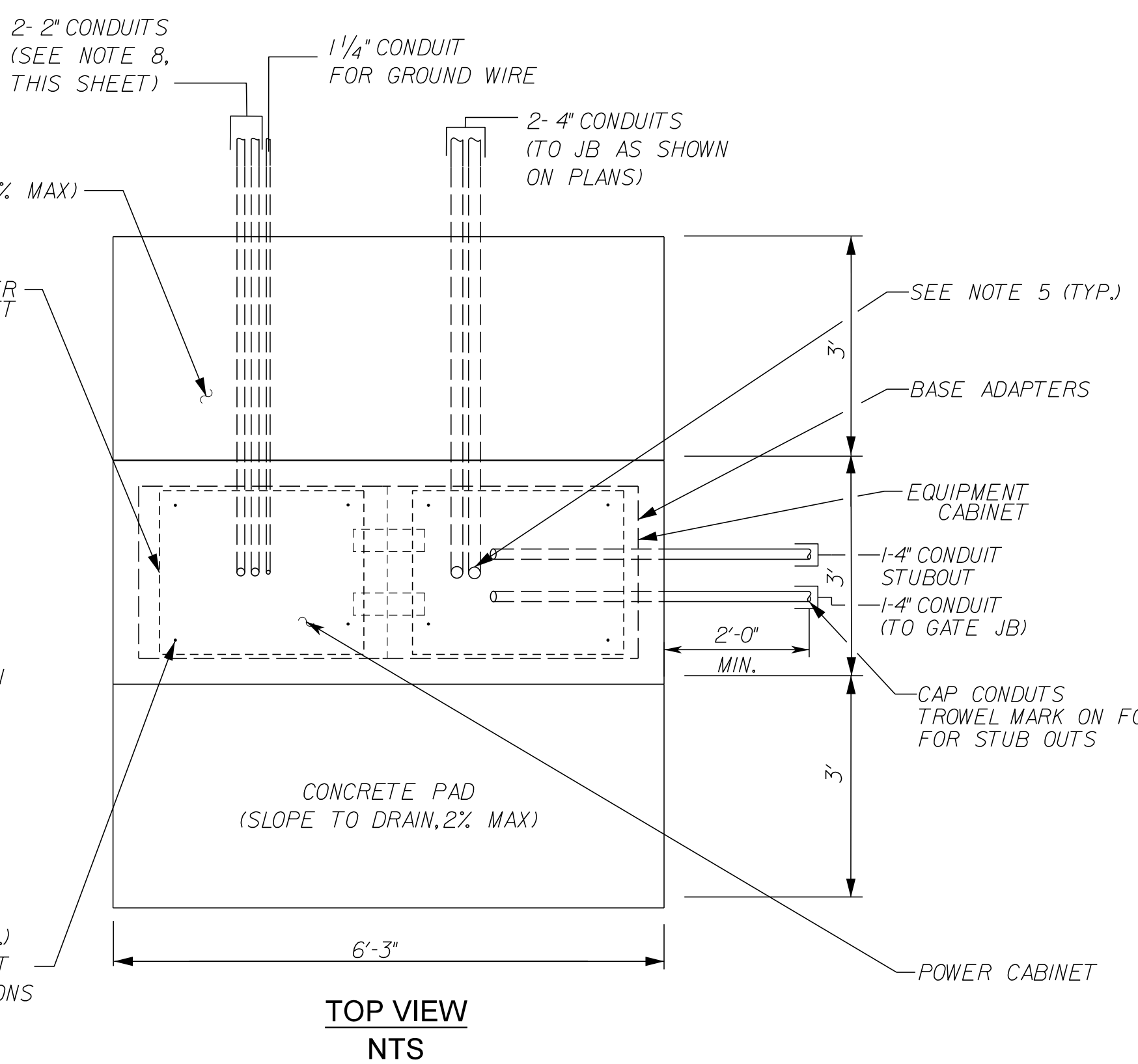
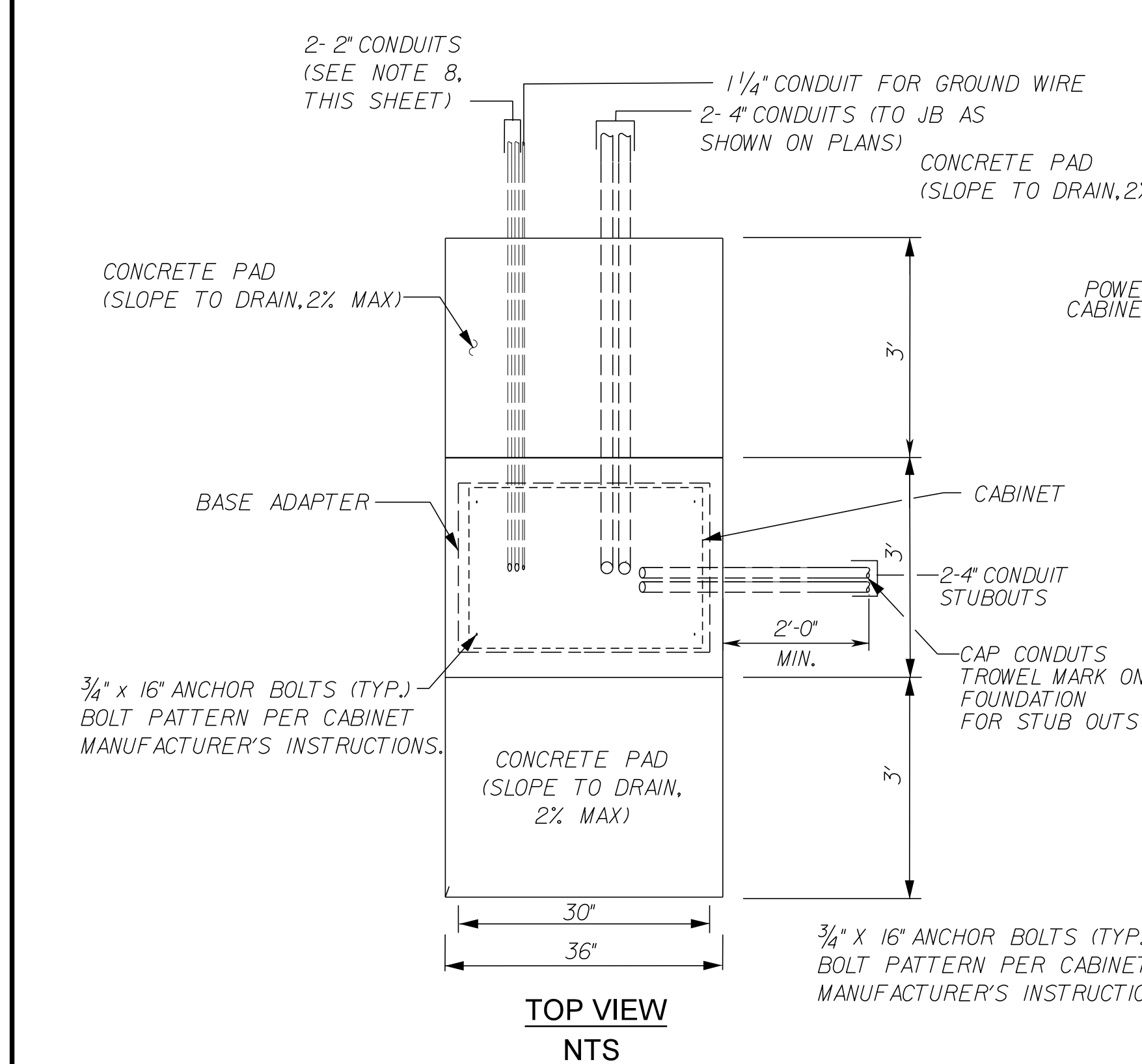
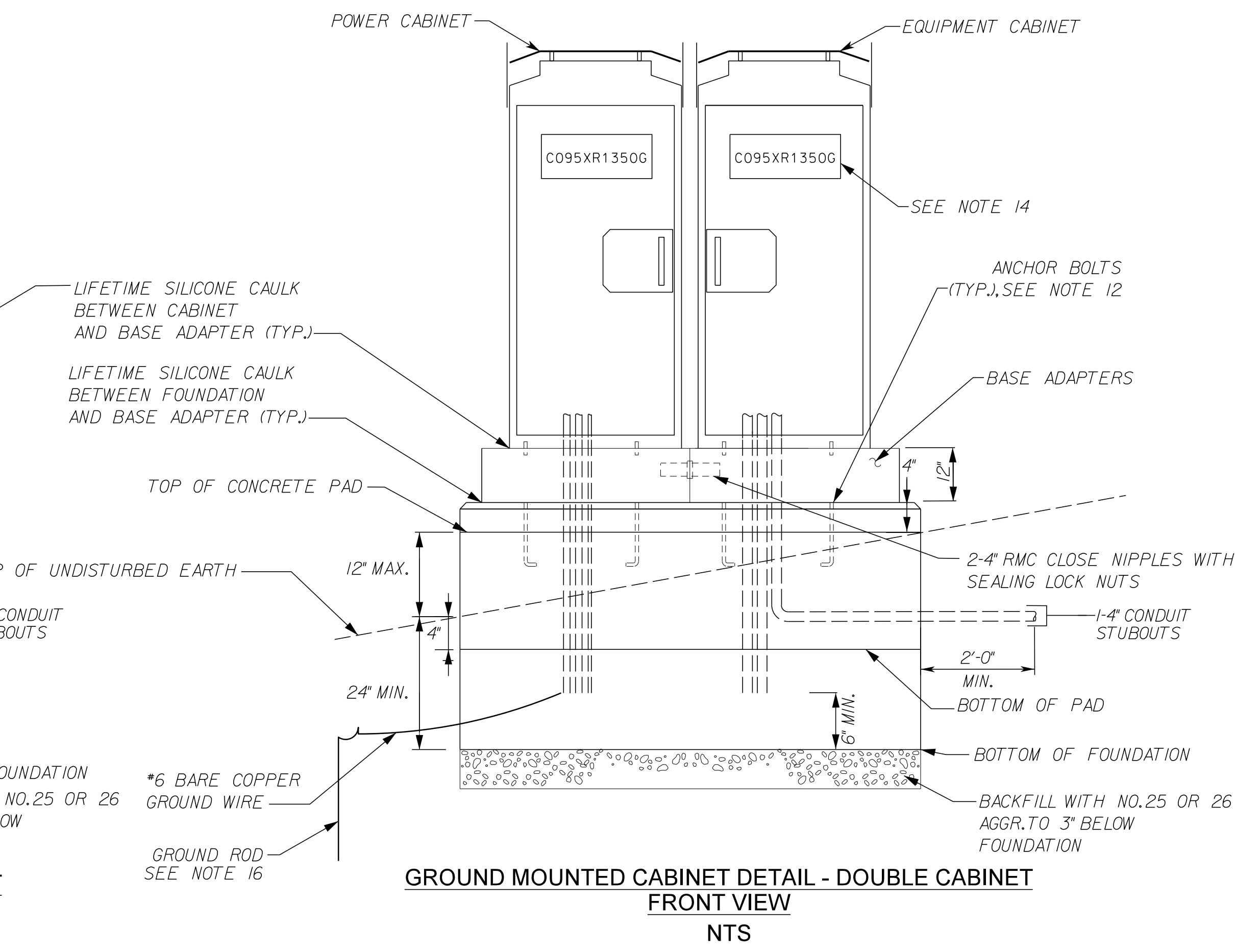
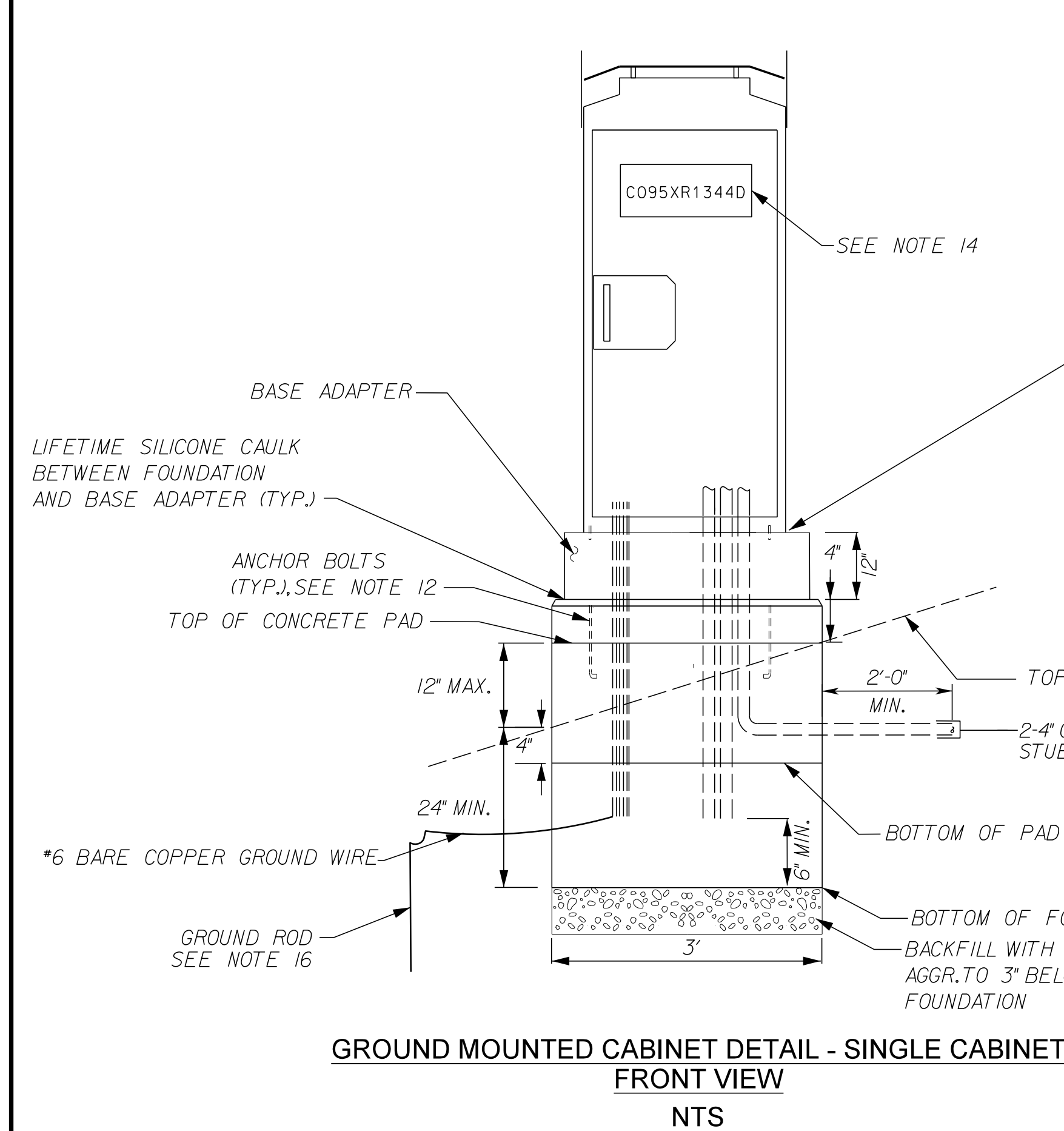
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2A4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

FOUNDATION NOTES:

- ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED 3/4 INCHES.
- ANCHOR BOLTS AND BOLT TEMPLATE SHALL BE FURNISHED WITH THE CABINET.
- THE CABINETS AND BASE ADAPTERS SHALL BE SEALED WITH A SILICONE CAULK WHERE THEY MATE WITH EACH OTHER OR CONCRETE.
- BELL ENDS SHALL BE INSTALLED ON THE END OF PVC CONDUITS. GROUNDING BUSHINGS SHALL BE INSTALLED ON THE END OF METAL CONDUITS.
- TYPICAL FOR ALL CONDUIT ENTRIES INTO CABINETS: A) CAP SPARE CONDUITS. B) FURNISH AND INSTALL COPPER WOOL AND DUCT SEAL AROUND CABLES TO PREVENT MOISTURE AND RODENT ENTRY AT ALL CONDUITS ENTERING THE CABINET.
- TWO 1/2 INCH DIAMETER WEEPHOLES SHALL BE PROVIDED IN THE FOUNDATION AND LOCATED 2 INCHES INSIDE OF THE BACK OR SIDE EDGES OF THE BASE ADAPTER. WEEPHOLES SHALL BE SLOPED TO ALLOW THE OUTLET TO EXIT 3 INCHES BELOW THE TOP OF FOUNDATION. TWO INCHES OF THE OUTLET SHALL BE FIBER FILLED.
- SEE ITS CROSS SECTIONS FOR CABINET ORIENTATION AND LOCATION.
- TWO 2" CONDUITS UNLESS MORE ARE SHOWN ON THE PLANS.
- NO CONCRETE PAD IS REQUIRED IF CABINET IS INSTALLED ON A CAPPED MEDIAN.
- CONTRACTOR SHALL STUB OUT CONDUITS A MINIMUM OF 24 INCHES FROM THE EDGE OF THE FOUNDATION OR PAD. DIRECTION OF STUB OUTS SHALL BE DETERMINED IN THE FIELD. STUB OUTS SHALL BE IN DIRECTION THAT ALLOWS FOR FUTURE ACCESS BASED ON CURRENT SITE CONDITIONS. PROVIDE 2 1/2" TROWEL MARKS IN FOUNDATION/PAD INDICATING DIRECTION OF STUB OUTS.
- DOUBLE CABINETS SHALL ONLY BE PROVIDED FOR THE GATE CONTROLLER CABINET. ALL OTHER GROUND-MOUNTED CABINETS SHALL BE A SINGLE CABINET.
- ANCHOR BOLTS TO BE CAST IN PLACE PER MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR MAY USE AN EPOXY ANCHOR BOLT SYSTEM WHERE FIELD DRILL IS PERMITTED ON THE CONCRETE FOUNDATION. IF USED, THE EPOXY SHALL MEET THE CONSTRUCTION GRADE AS APPROVED BY THE ENGINEER.
- PROVIDE FALL PROTECTION CONSISTING OF GALVANIZED METAL HAND RAILS AND STAIRS AS INDICATED ON ITS CROSS SECTION DRAWINGS.
- SEE PLANS FOR CABINET IDS.
- FINISHED GRADE SHALL BE SLOPED TO DRAIN WATER AWAY FROM PAD.
- GROUND ROD SHALL BE BURIED AT LEAST 6" BELOW FINISHED GRADE.



PAC PLANS

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N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2A4)
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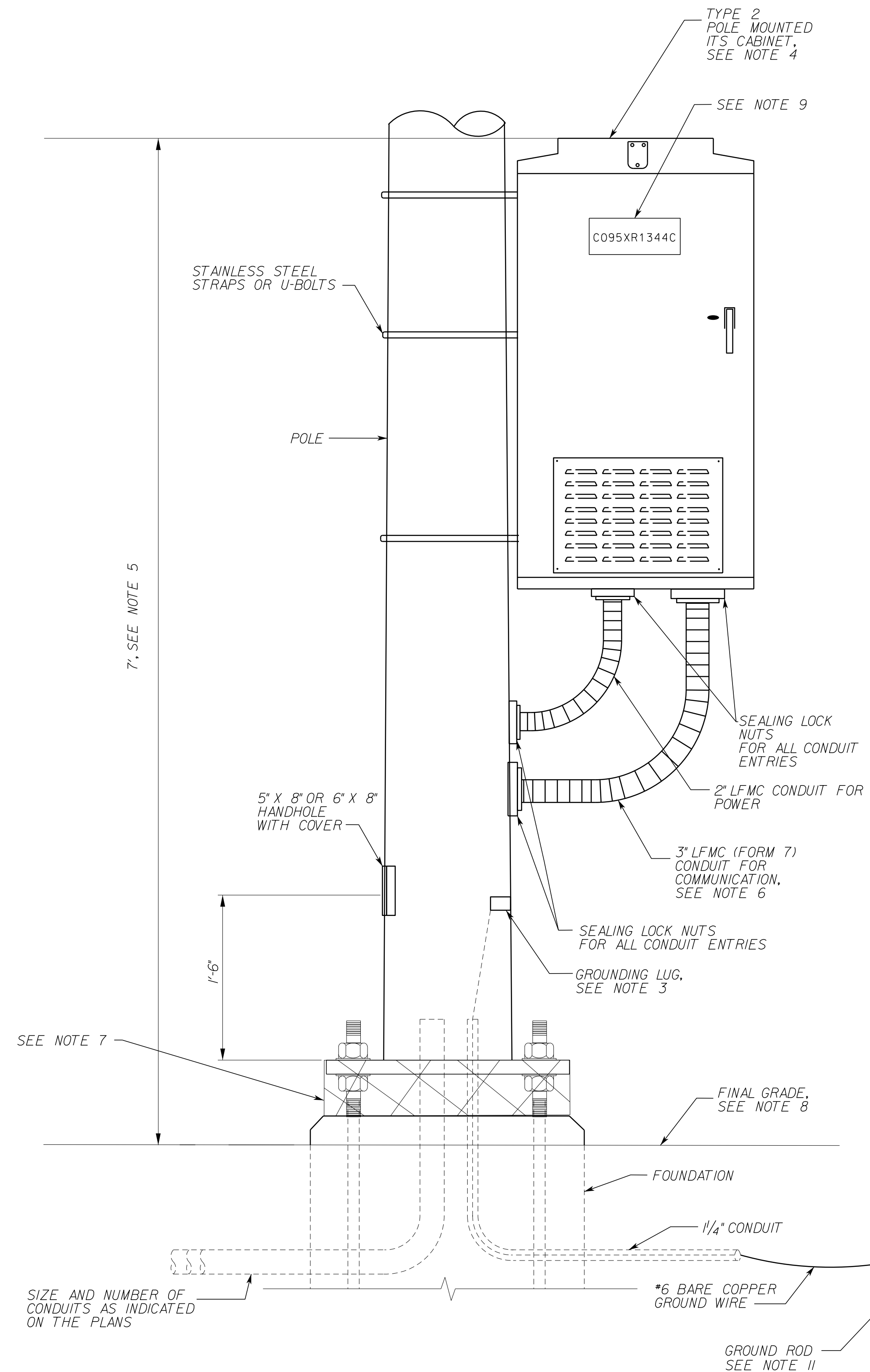
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

POLE MOUNTED CABINET DETAIL

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(2A5)

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 Baltimore, Maryland
 TRAFFIC ENGINEER



POLE MOUNTED CABINET FRONT VIEW
 NTS

NOTES:

1. ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED $\frac{3}{4}$ INCHES.
2. A BELL END SHALL BE INSTALLED ON THE END OF PVC CONDUIT.
3. BONDING WIRE SHALL RUN FROM GROUNDING LUG IN THE POLE TO GROUND BUS IN A CABINET.
4. SEE ITS CROSS SECTIONS FOR CABINET ORIENTATION.
5. CABINET HEIGHT SHALL NOT BE MORE THAN 84" ABOVE THE FINISHED GRADE OF THE MAINTENANCE WORKSPACE.
6. MAINTAIN BENDING RADIUS AS REQUIRED FOR FIBER OPTIC CABLES.
7. FURNISH AND INSTALL SCREEN IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS 2016 VS-1 1302.60 TO PREVENT RODENT ENTRY AT THE BASE OF ALL TTMS POLES.
8. A MINIMUM 3' x 3' FLAT WORK AREA SHALL BE PROVIDED IMMEDIATELY ADJACENT TO CABINET DOOR FOR MAINTENANCE PERSONNEL TO STAND WHEN ACCESSING ALL CABINETS. IF CABINET IS FACING 2:1 OR STEEPER DOWNSLOPE, INSTALL 3' x 3' x 4" CONCRETE PAD ADJACENT TO EACH CABINET DOOR FOR MAINTENANCE PERSONNEL TO STAND WHEN ACCESSING ITS CABINETS.
9. SEE PLANS FOR CABINET ID'S.
10. TYPICAL FOR ALL CONDUIT ENTRIES INTO CABINETS: A) CAP SPARE CONDUIT. B) FURNISH AND INSTALL COPPER WOOL AND DUCT SEAL AROUND CABLES TO PREVENT MOISTURE AND RODENT ENTRY AT ALL CONDUIT ENTERING THE CABINET.
11. GROUND ROD SHALL BE BURIED AT LEAST 6' BELOW FINISHED GRADE.

PAC PLANS

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PROJECT	SHEET NO.
N.T.S.	15(2A5)
0095-076-299	

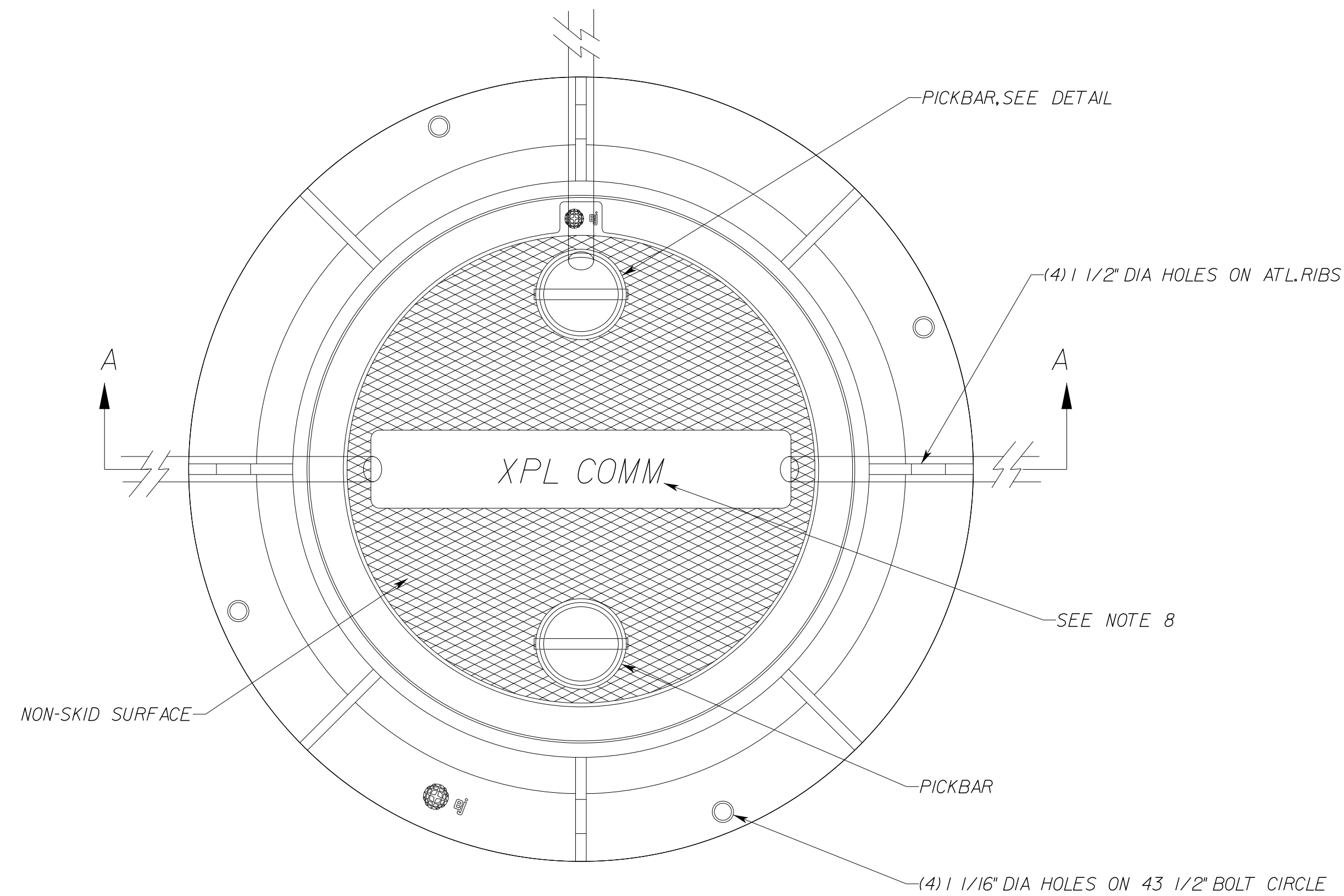
PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

CIRCULAR JUNCTION BOX DETAIL

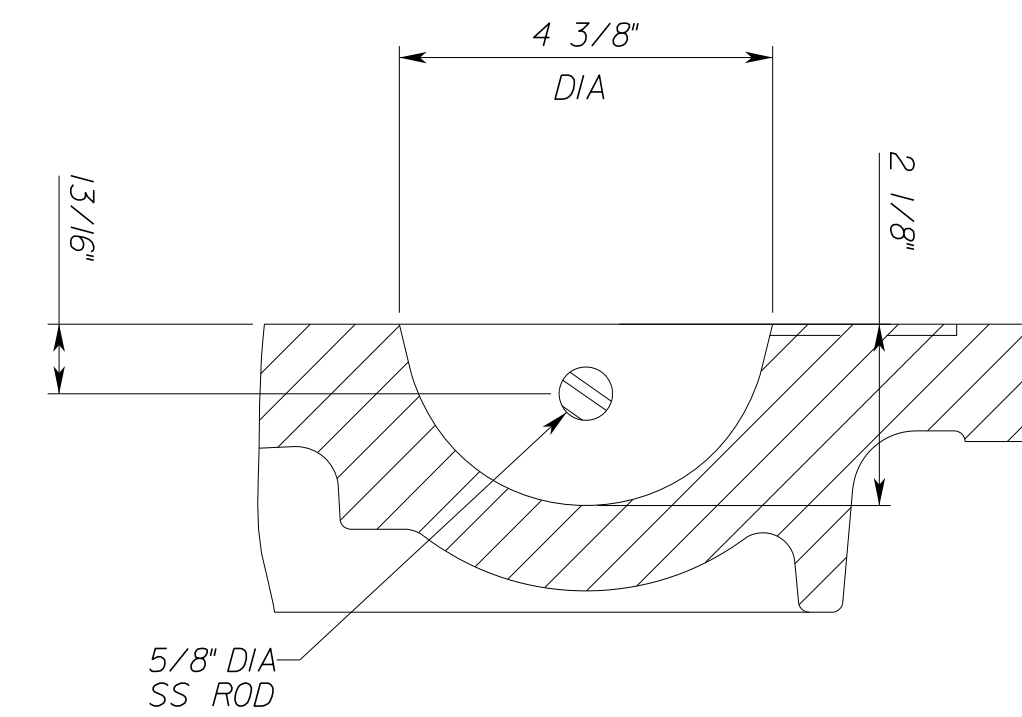
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2A6)

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 TRAFFIC ENGINEER



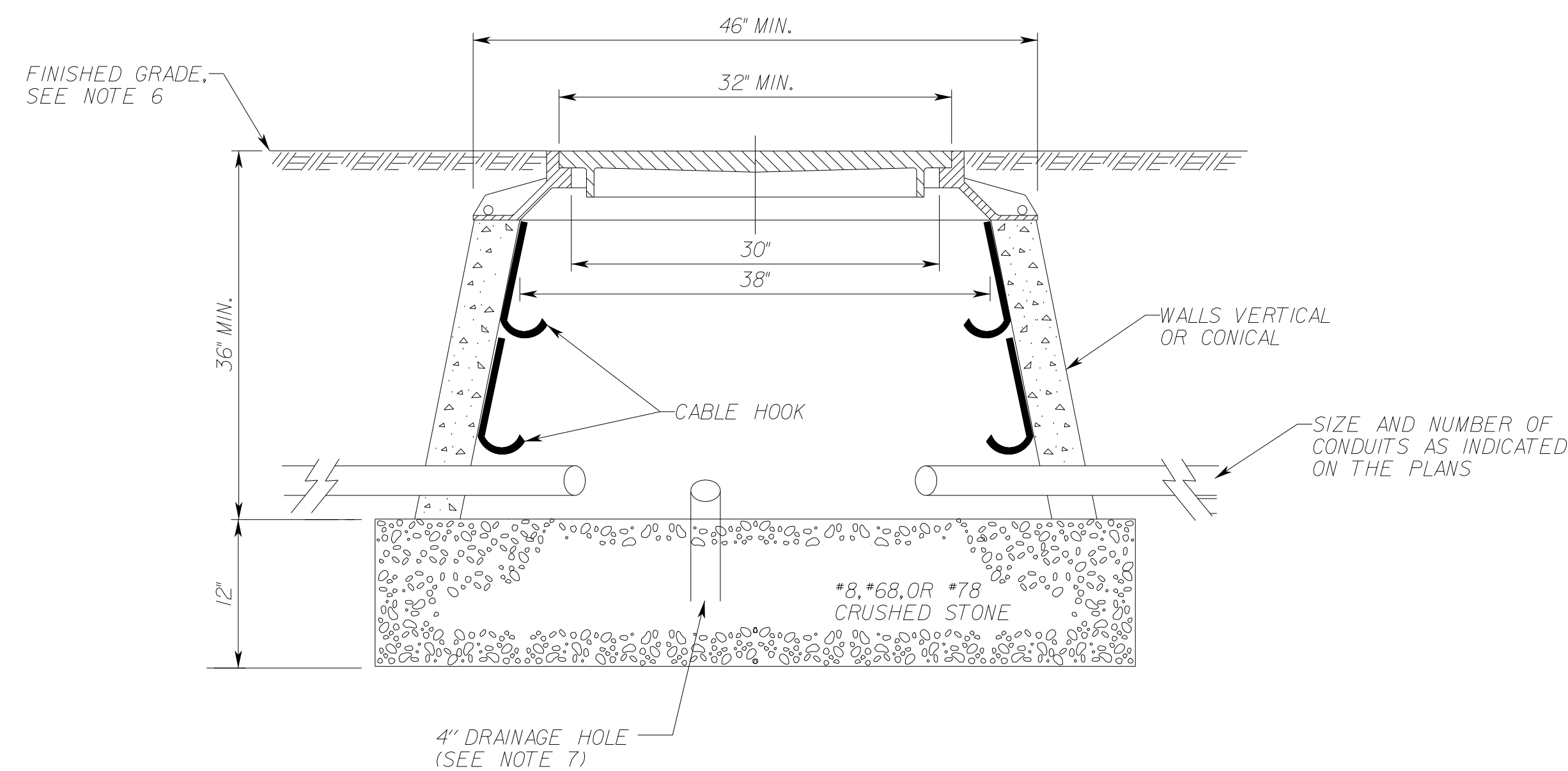
CIRCULAR JUNCTION BOX DETAIL - PLAN VIEW
 NTS



PICKBAR DETAIL
 NTS

CIRCULAR JUNCTION BOX NOTES:

1. BOX SHALL BE PRECAST MADE OF 4000 PSI CONCRETE WITH STEEL REINFORCING. THE BOX MUST HAVE AN AASHTO H-20 RATING.
2. LID SHALL BE DESIGNED TO FACILITATE REMOVAL USING A PICKBAR.
3. PROVIDE FOUR PAIRS OF CABLE HOOKS, EQUALLY SPACED. EACH HOOK SHALL HAVE A 3" THROAT OPENING, BE AT LEAST 3" WIDE, HAVE ROUNDED EDGES, HAVE CAPACITY FOR 10-5/8" DIAMETER CABLES (WITHOUT CABLE TIES), SUPPORT AT LEAST 220 LBS, BE MADE OF NON-CORROSIVE MATERIAL, AND BE BOLTED OR OTHERWISE PERMANENTLY ATTACHED TO THE WALL OF THE BOX.
4. DEEPEN TRENCH IN VICINITY OF BOX, SO THAT ALL CONDUITS ARE 30" BELOW GRADE AT BOX. ADJUST TRENCH DEPTH UNIFORMLY OVER A DISTANCE OF AT LEAST 20 FEET.
5. GRADE AREA AROUND BOX SUCH THAT RUNOFF IS DIRECTED AWAY FROM THE BOX.
6. FOR COMMUNICATION JUNCTION BOXES LOCATED ON SLOPES 2:1 OR STEEPER, AND LOCATED MORE THAN 2 FEET IN ELEVATION ABOVE THE TOE OF SLOPE, 3' x 6' x 4" THICK MAINTENANCE PAD SHALL BE PROVIDED ON THE DOWNSIDE SLOPE IMMEDIATELY ADJACENT TO THE JUNCTION BOX. SEE ITS CROSS SECTIONS FOR MAINTENANCE PAD LOCATIONS.
7. PROVIDE POSITIVE DRAINAGE INTO GRAVEL SUBBASE.
8. LIDS OF 95 EXPRESS LANES COMMUNICATION BOXES SHALL SAY "XPL COMM". LIDS OF VDOT COMMUNICATION BOXES SHALL SAY "VDOT COMM".



SECTION A-A
 NTS

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
N.T.S.	15(2A6)

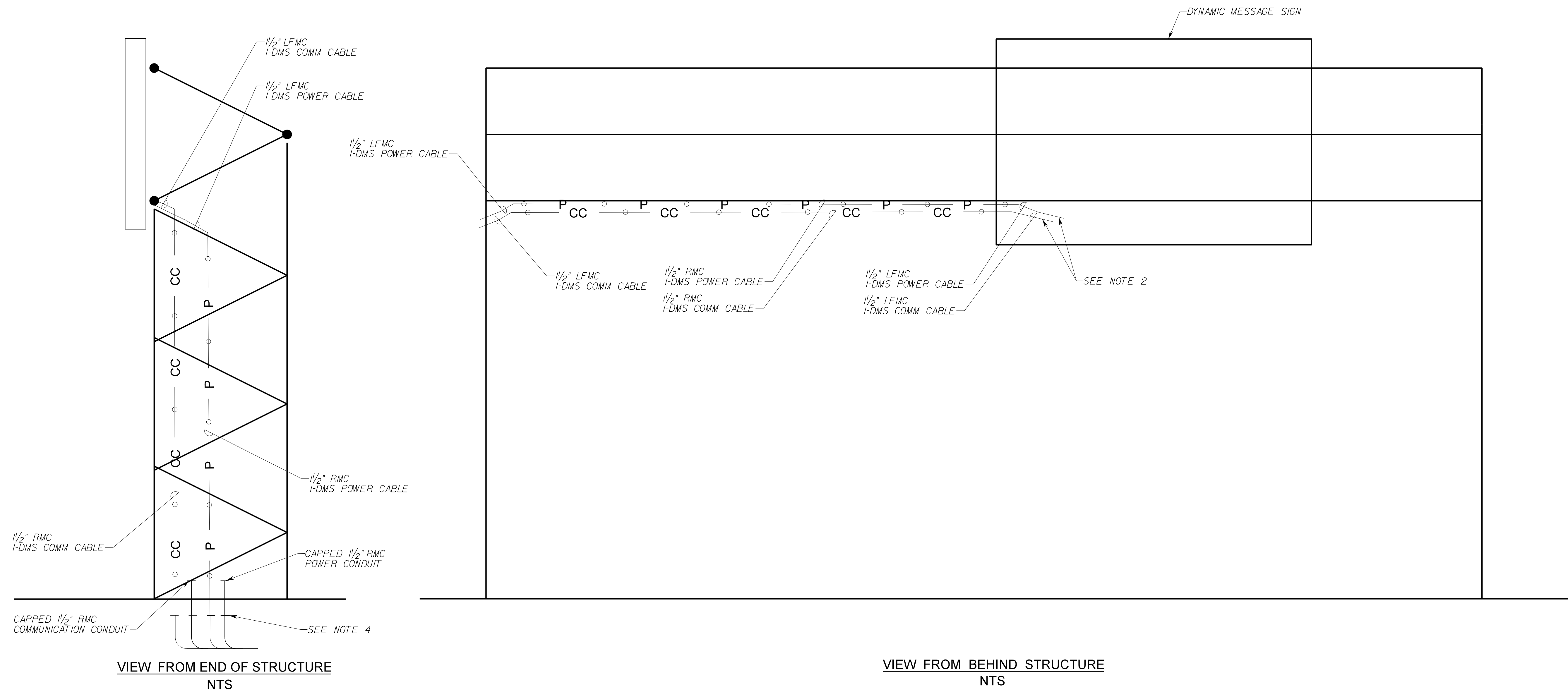
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

TYPICAL CONDUIT ROUTING
 ON DMS SIGN STRUCTURE

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2A7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



NOTES:

1. CONDUIT CONNECTION DETAILS SHALL BE COORDINATED WITH SIGN STRUCTURE DESIGN/FABRICATION.
2. CONDUITS SHALL BE CONNECTED PER MANUFACTURER'S RECOMMENDATION.
3. PROVIDE CONDUIT COUPLINGS AS REQUIRED.
4. RIGID METAL CONDUITS SHALL CONTINUE 6" BELOW THE FINISHED GRADE. RIGID METAL CONDUITS SHALL BE COUPLED TO PVC OR RIGID METAL CONDUITS AT CONTRACTOR'S DISCRETION TO CONTINUE TO A JUNCTION BOX. RIGID METAL CONDUIT SHALL BE CONTINUOUS ALONG THE UPRIGHT.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2A7)
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PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District) -----
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700 -----
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(2B1)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER					

GATE SCHEDULES

GATE NUMBER	TYPE	GATE POSITION AS SEEN BY APPROACHING TRAFFIC	STATION	OFFSET	DIMENSION 'A' (FEET)	NORTHING	EASTING	VERTICAL CLEARANCE (FEET)	TOP OF FOUNDATION ELEVATION	TYPICAL DETAIL	NOTES
G-01	VERTICAL - STRAIGHT ARM	1	10+20	7.7', LT.	13.8	348660	3624418	4.0	118.1	15(2B2)	
G-02	VERTICAL - STRAIGHT ARM	2	12+05	11.8', LT.	18.3	348835	3624478	4.0	123.4	15(2B2)	
G-03	VERTICAL - STRAIGHT ARM	3	13+80	18.8', LT.	25.3	349002	3624531	4.0	128.3	15(2B2)	
G-04	VERTICAL - STRAIGHT ARM	4	15+55	20.0', LT.	26.5	349167	3624590	4.0	133.2	15(2B2)	
G-05	VERTICAL - STRAIGHT ARM	5	17+40	20.0', LT.	26.5	349341	3624653	4.0	138.0	15(2B2)	
G-06	VERTICAL - STRAIGHT ARM	6	19+25	18.3', LT.	26.5	349515	3624716	4.0	143.0	15(2B2)	
G-07	VERTICAL - STRAIGHT ARM	7	20+80	16.0', LT.	25.0	349662	3624766	4.0	147.6	15(2B3)	
G-08	VERTICAL - STRAIGHT ARM	8	22+30	14.7', LT.	25.5	349805	3624811	4.0	151.3	15(2B3)	
G-09	VERTICAL - STRAIGHT ARM	9	23+55	12.1', LT.	32.4	349923	3624851	4.0	154.0	15(2B3)	

GATE NUMBER	TYPE	GATE POSITION AS SEEN BY APPROACHING TRAFFIC	STATION	OFFSET	DIMENSION 'A' (FEET)	NORTHING	EASTING	VERTICAL CLEARANCE (FEET)	TOP OF FOUNDATION ELEVATION	TYPICAL DETAIL	NOTES
G-10	VERTICAL - OFFSET ARM	11	27+15	8.7', RT.	32.8	350250	3625002	4.2	160.2	15(2B2)	
G-11	VERTICAL - OFFSET ARM	10	28+40	9.4', RT.	24.1	350368	3625044	4.3	162.4	15(2B2)	
G-12	VERTICAL - OFFSET ARM	9	29+90	10.3', RT.	26.1	350510	3625095	4.2	165.1	15(2B2)	
G-13	VERTICAL - OFFSET ARM	8	31+65	11.9', RT.	26.1	350675	3625153	4.2	167.7	15(2B2)	
G-14	VERTICAL - OFFSET ARM	7	33+40	14.1', RT.	26.1	350841	3625208	4.2	170.0	15(2B2)	
G-15	VERTICAL - STRAIGHT ARM	6	35+15	17.3', RT.	28.2	351007	3625263	4.0	170.0	15(2B2)	
G-16	VERTICAL - STRAIGHT ARM	5	37+15	21.9', RT.	27.7	351197	3625332	4.0	172.1	15(2B2)	
G-17	VERTICAL - STRAIGHT ARM	4	39+15	22.0', RT.	28.5	351383	3625400	4.0	174.0	15(2B2)	
G-18	VERTICAL - STRAIGHT ARM	3	41+15	21.1', RT.	27.7	351571	3625468	4.0	176.0	15(2B2)	
G-19	VERTICAL - STRAIGHT ARM	2	43+15	12.7', RT.	19.7	351762	3625528	4.0	178.0	15(2B2)	
G-20	VERTICAL - STRAIGHT ARM	1	343+50	33.2', RT.	15.3	351951	3625593	4.0	180.1	15(2B2)	

GATE NUMBER	TYPE	GATE POSITION AS SEEN BY APPROACHING TRAFFIC	STATION	OFFSET	DIMENSION 'A' (FEET)	NORTHING	EASTING	VERTICAL CLEARANCE (FEET)	TOP OF FOUNDATION ELEVATION	TYPICAL DETAIL	NOTES
G-21	HORIZONTAL	1	64+62	65.8', RT.	14.9	355401	3626326	4.0	215.9	15(2B4)	ON-GRADE
G-22	HORIZONTAL	2	65+64	65.1', RT.	14.1	355372	3626424	4.0	33.5"	15(2B5)	BRIDGE PARAPET MOUNT
G-23	HORIZONTAL	3	66+59	65.1', RT.	14.1	355344	3626515	4.0	33.5"	15(2B5)	BRIDGE PARAPET MOUNT
G-24	HORIZONTAL	4	68+21	8.6', RT.	12.5	355350	3626686	4.0	34.5"	15(2B6)	MEDIAN BARRIER MOUNT
G-25	HORIZONTAL	3	69+21	8.6', RT.	12.5	355320	3626781	4.0	34.5"	15(2B6)	MEDIAN BARRIER MOUNT
G-26	HORIZONTAL	2	70+21	8.6', RT.	12.5	355291	3626877	4.0	34.5"	15(2B6)	MEDIAN BARRIER MOUNT
G-27	HORIZONTAL	1	71+16	6.5', RT.	10.6	355264	3626968	4.0	34.5"	15(2B6)	MEDIAN BARRIER MOUNT

NOTES:

1. STATION AND OFFSET INFORMATION IS PROVIDED TO THE CENTERLINES OF THE GATE HOUSING.

PAC PLANS

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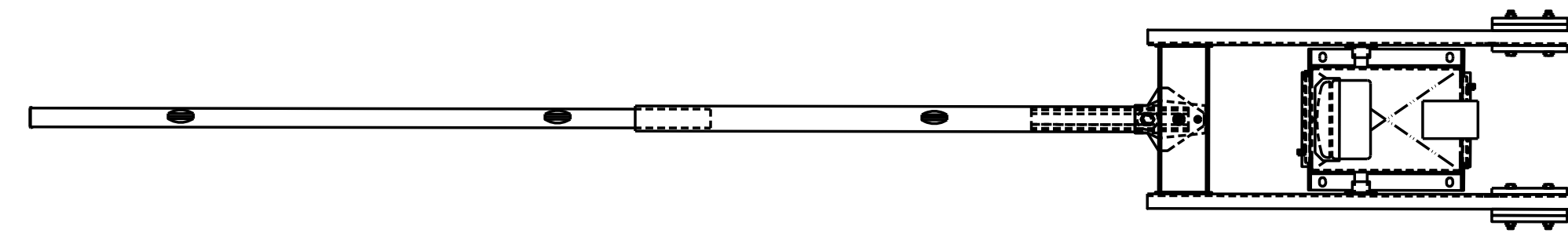
PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

VERTICAL SWING GATE DETAIL

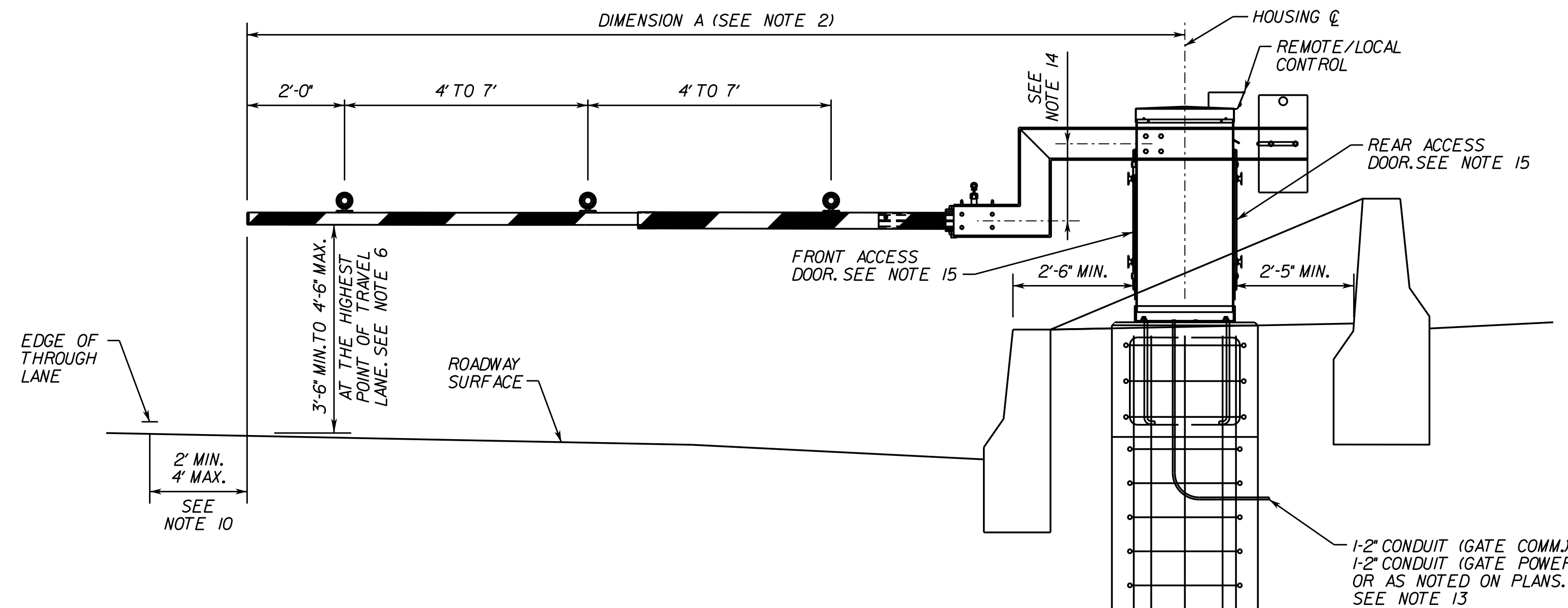
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(2B2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

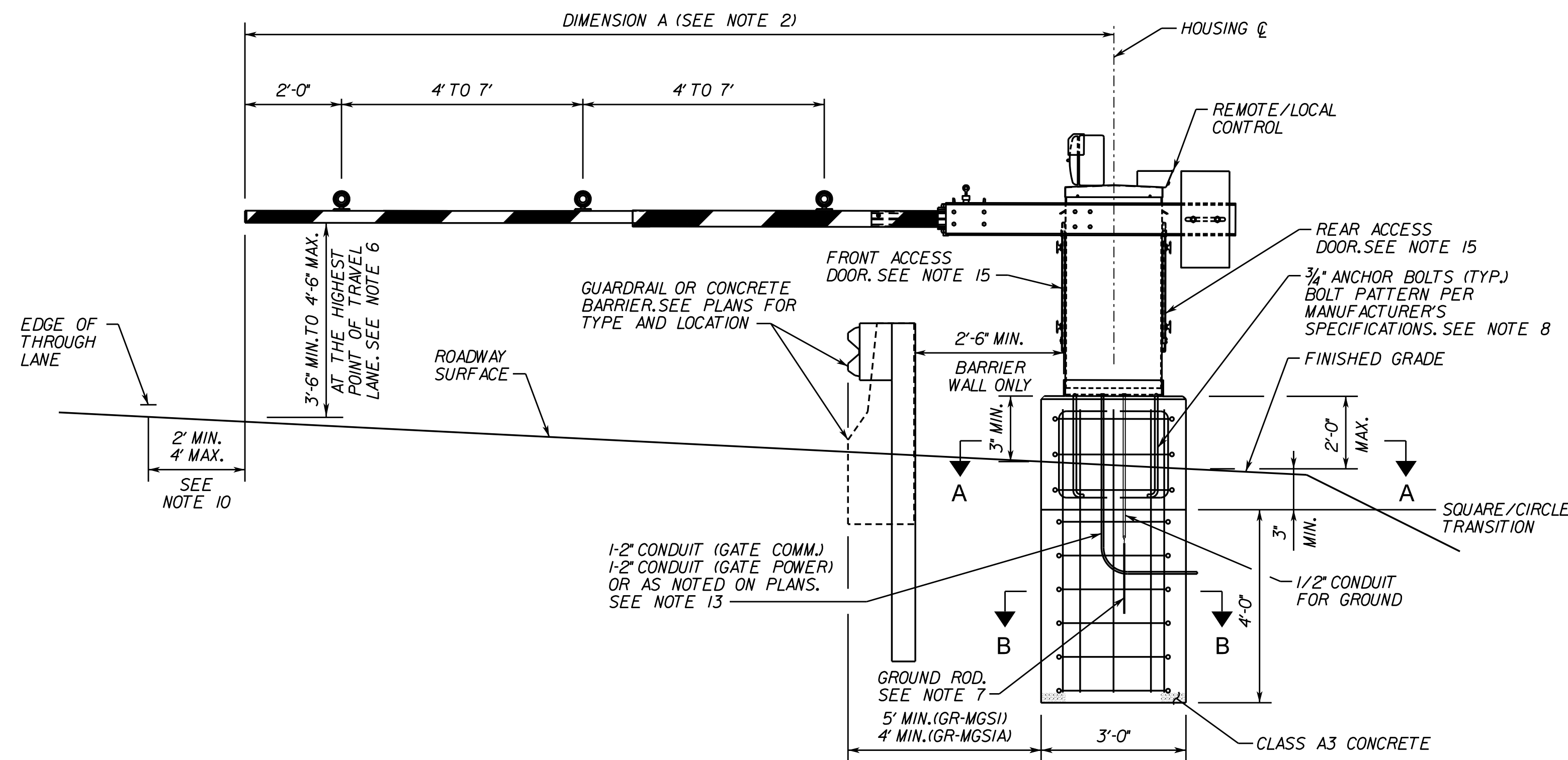
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PLAN VIEW



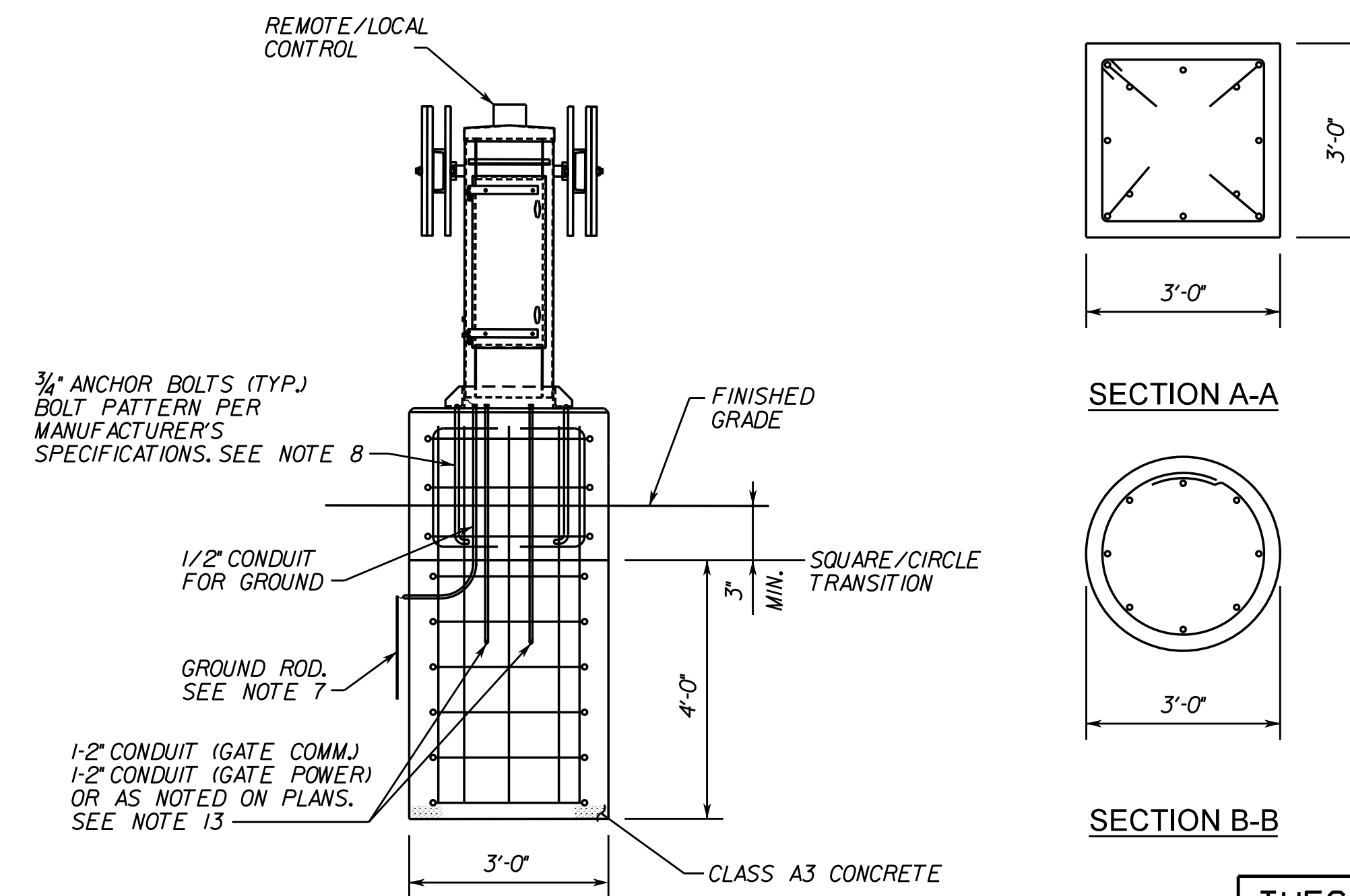
SECTION VIEW - OFFSET ARM



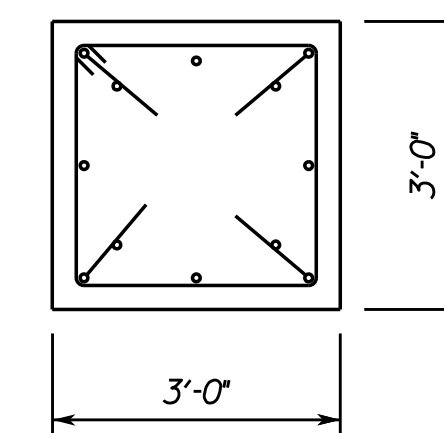
SECTION VIEW - STRAIGHT ARM IN EARTH

NOTES:

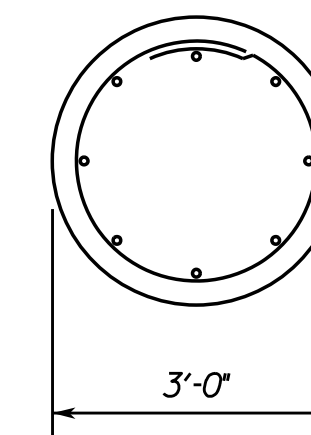
- FOUNDATION SHALL EXTEND 4'-3" MIN. BELOW GRADE, INCLUDING WHEN INSTALLED ON SLOPES. ADJUST THE ELEVATION OF THE FOUNDATIONS FOR GATES IN EARTH SO THAT THE GATE ARM CLEARS ANY GUARDRAIL OR BARRIER, AND IS 4' (-/- 0.5') ABOVE THE HIGHEST POINT OF THE TRAVEL LANE, AND IS WITHIN THE TOLERANCES SHOWN ON THE PLAN. THE FOUNDATIONS FOR GATES WITHIN CAPPED AREAS BETWEEN BARRIERS SHALL BE INSTALLED AS SHOWN ON THE PLAN.
- SEE GATE SCHEDULES ON SHEET 15(2B1) FOR GATE ARM LENGTHS. FINAL GATE ARM LENGTH TO BE FIELD VERIFIED BY CONTRACTOR.
- GATE ARMS 0' TO 4' LONG SHALL HAVE ONE (1) WARNING LIGHT. GATE ARMS 4' TO 8' LONG SHALL HAVE TWO (2) WARNING LIGHTS. GATE ARMS MORE THAN 8' LONG SHALL HAVE THREE (3) WARNING LIGHTS. GATE ARM SHALL NOT HAVE MORE THAN THREE WARNING LIGHTS.
- GATES SHALL BE B&B ROADWAY VW-4 (STANDARD AND OFFSET ARM).
- CONTRACTOR SHALL VERIFY ALL GATE DIMENSIONS WITH THE MANUFACTURER/INSTALLER AND ALL FIELD DIMENSIONS PRIOR TO SHOP DRAWING SUBMITTALS AND INSTALLATION.
- SEE GATE SCHEDULES FOR ELEVATION DATA. FINAL ELEVATION AND GATE ARM HEIGHT TO BE FIELD VERIFIED BY CONTRACTOR.
- GROUND ROD SHALL BE BURIED AT LEAST 6' BELOW FINISHED GRADE.
- ANCHOR BOLTS TO BE CAST IN PLACE PER MANUFACTURER'S SPECIFICATIONS. THE CONTRACTOR MAY USE AN EPOXY ANCHOR BOLT SYSTEM WHERE FIELD DRILLING IS PERMITTED ON THE CONCRETE FOUNDATION. IF USED, THE EPOXY SHALL MEET THE CONSTRUCTION GRADE AS APPROVED BY THE ENGINEER.
- ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED 3/4".
- GATE ARMS FOR GATES LOCATED BETWEEN THE THEORETICAL GORE AND PHYSICAL GORE MAY EXTEND THE FULL WIDTH OF THE RAMP LANE, PROVIDED THE END OF THE ARM IS OFFSET AT LEAST 2' FROM THE EDGE OF THE THROUGH LANE.
- GATE KICKSTANDS SHALL BE PROVIDED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- OFFSET GATE ARMS SHALL ONLY BE USED WHERE SHOWN ON THE PLANS. REFER TO GATE SCHEDULE ON SHEET 15(2B1).
- CONDUIT DESIGNATED FOR POWER SHALL CONTAIN (1) #6 AWG. GROUND WIRE TO BE GROUNDED IN THE ASSOCIATED JUNCTION BOX.
- 19" FROM CENTER OF UPPER TO CENTER OF LOWER ARMS IS USED FOR THE BASIS OF DESIGN FOR THE GATE CROSS SECTIONS SHOWN ON DWGS. 15(2B1) AND 15(2B2). THE CONTRACTOR SHALL VERIFY THE ARM OFFSET FOR THE SHOP DRAWING SUBMITTAL.
- THE FRONT AND REAR ACCESS DOORS ON THE GATE HOUSING SHALL BE ABLE TO OPEN AND SHALL BE REMOVABLE.



END VIEW - STRAIGHT ARM IN EARTH



SECTION A-A



SECTION B-B

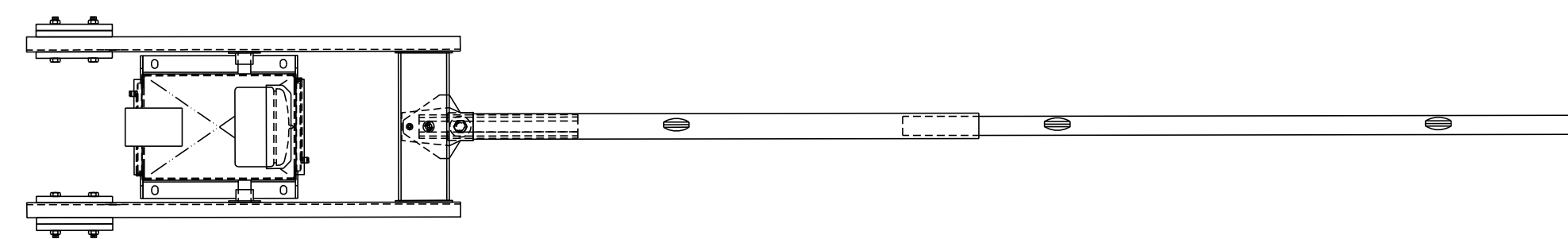
PAC PLANS

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PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

VERTICAL SWING GATE DETAIL

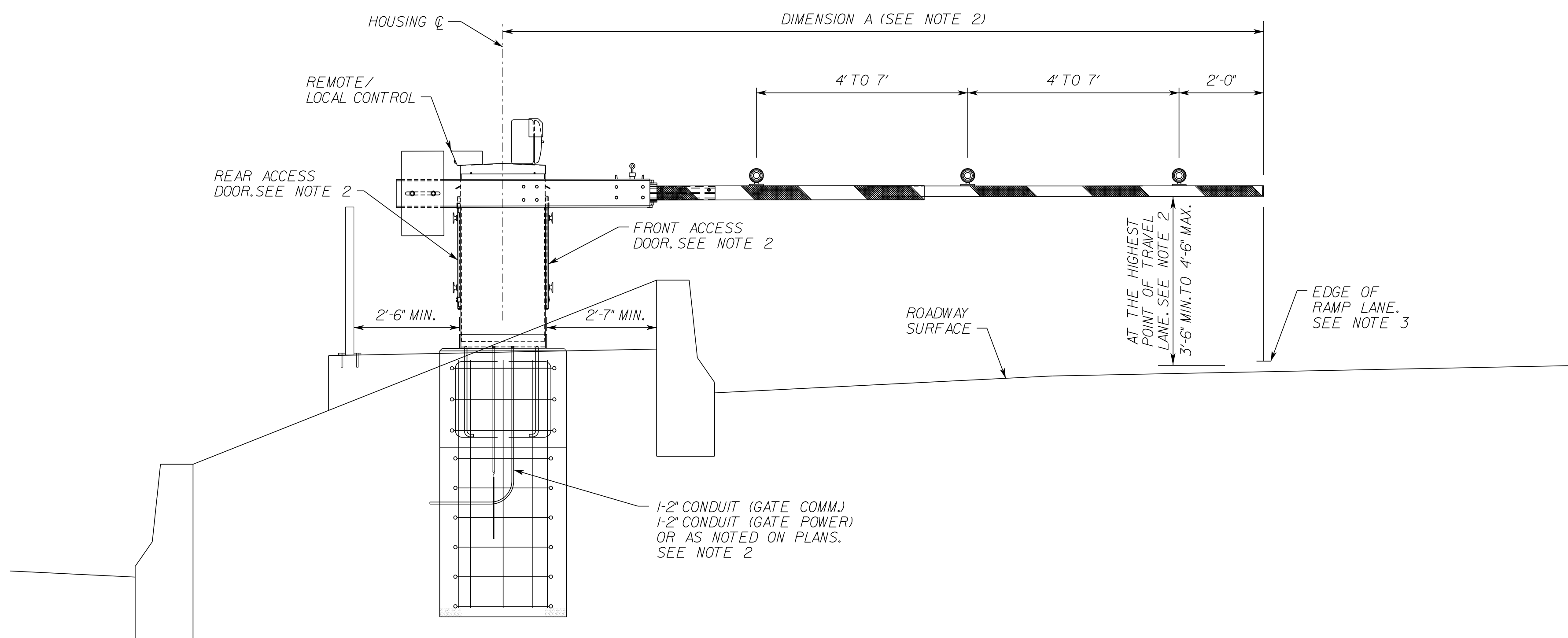
REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(2B3)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				



PLAN VIEW

NOTES:

- REFER TO SHEETS 15(2B7) AND 15(2B8) FOR DETAILS OF MAINTENANCE AREAS FOR GATES LOCATED WITHIN CAPPED AREAS BETWEEN BARRIERS.
- REFER TO SHEET 15(2B2) FOR NOTES APPLICABLE TO THE TYPICAL DETAILS.
- GATE ARMS FOR GATES G-07 AND G-08 SHALL EXTEND THE FULL WIDTH OF THE RAMP LANE. THE GATE ARM FOR GATE G-09 SHALL EXTEND TO THE CENTER OF THE IMPACT ATTENUATOR.



SECTION VIEW - STRAIGHT ARM IN CAPPED AREAS BETWEEN BARRIERS

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2B3)
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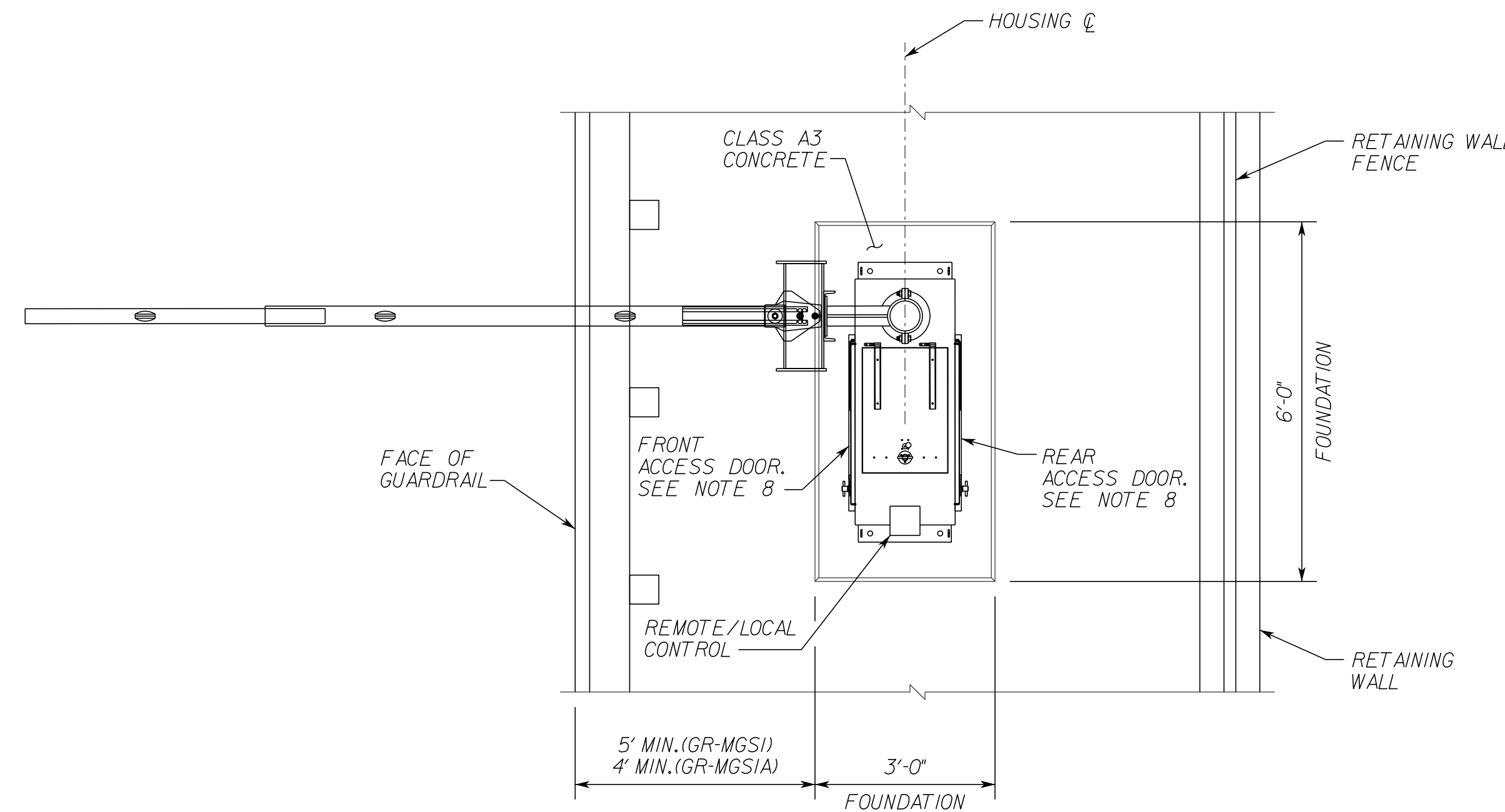
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

HORIZONTAL SWING GATE DETAIL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

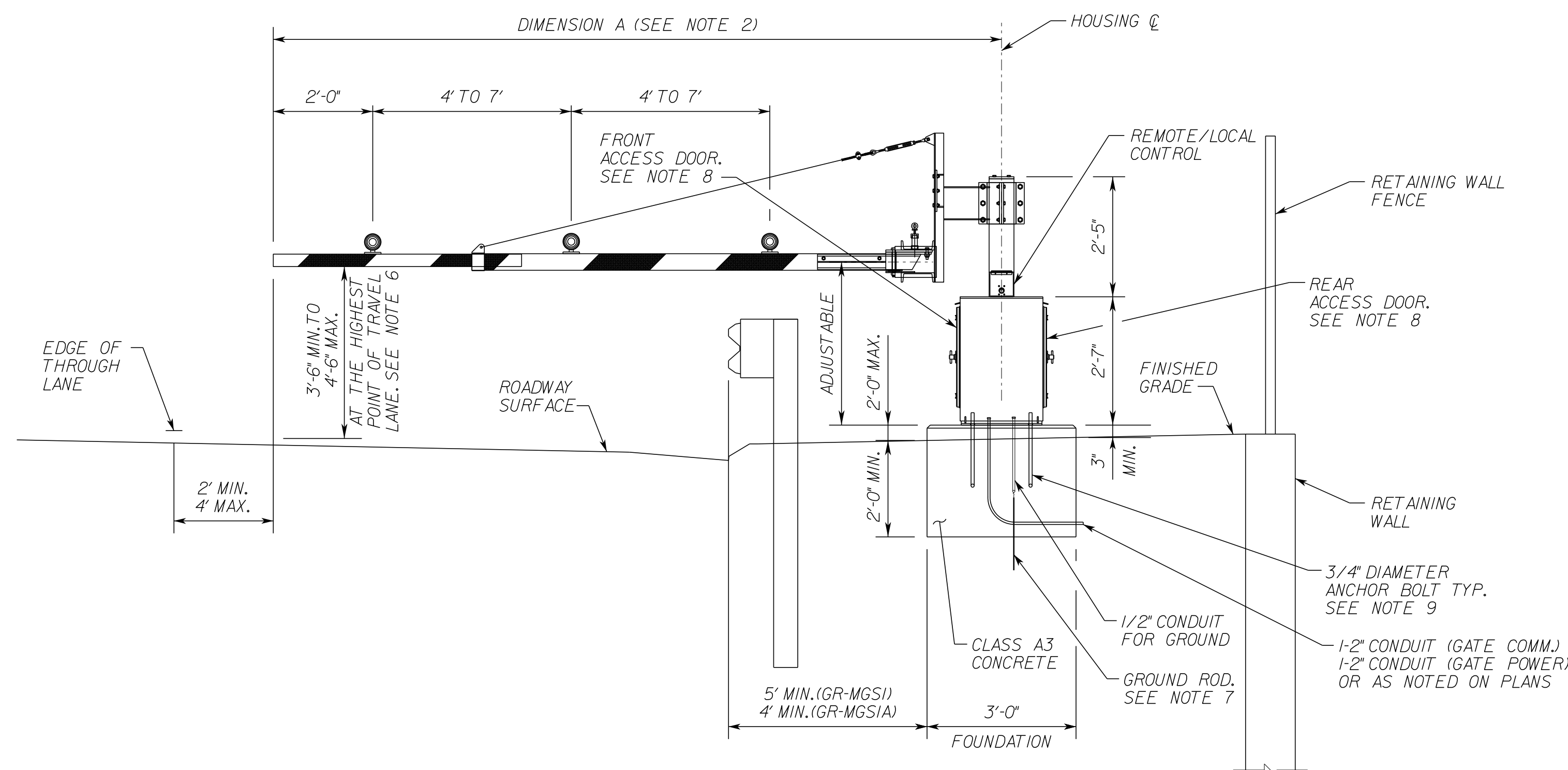
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 TRAFFIC ENGINEER



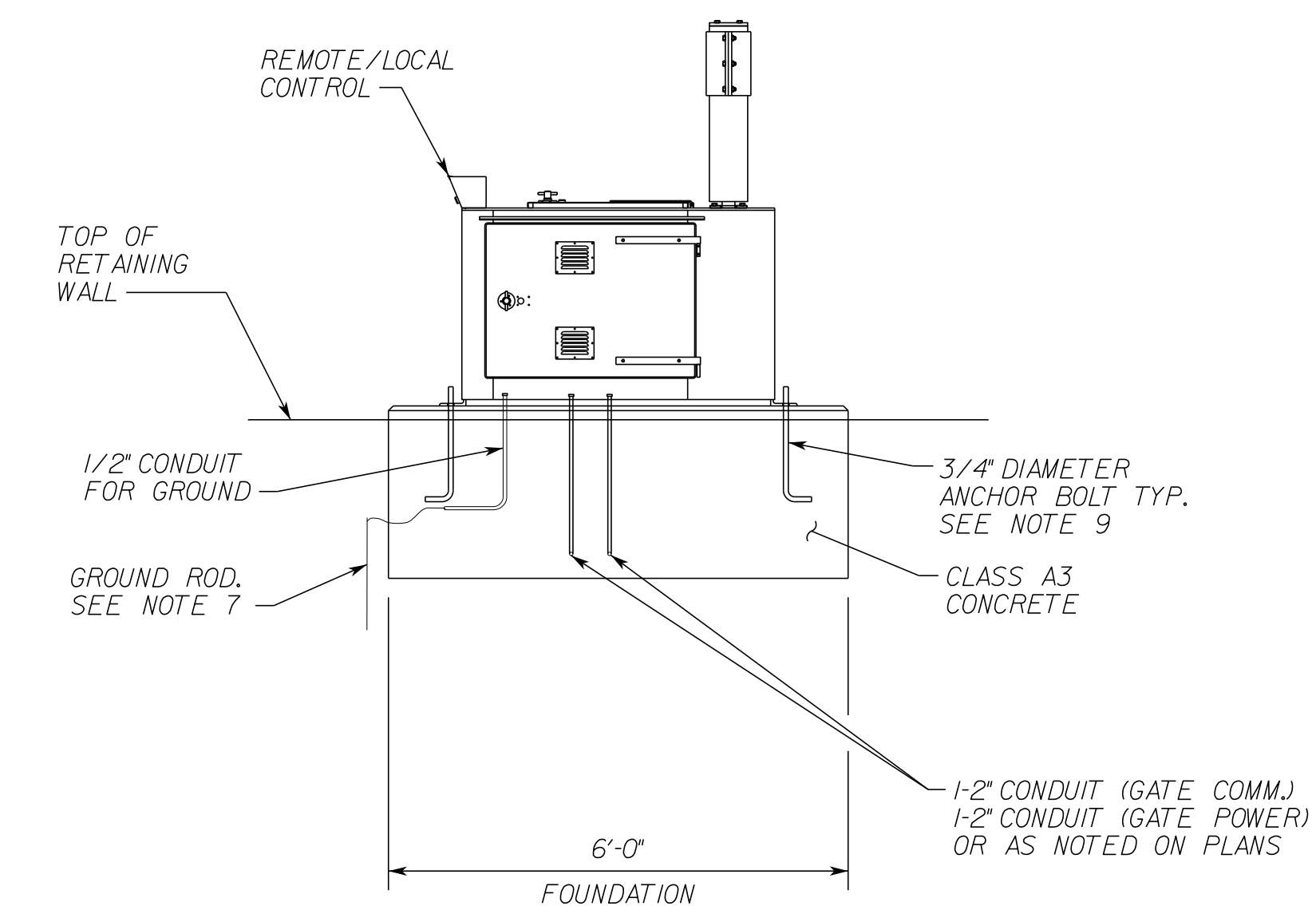
PLAN VIEW

NOTES:

- FOUNDATION SHALL EXTEND 2'-0" MIN. BELOW GRADE, INCLUDING WHEN INSTALLED ON SLOPES. ADJUST THE ELEVATION OF THE FOUNDATION FOR GATE IN EARTH SO THAT THE GATE ARM CLEARS ANY GUARDRAIL OR BARRIER, AND IS 4' (+/- 0.5') ABOVE THE HIGHEST POINT OF THE TRAVEL LANE.
- SEE GATE SCHEDULES ON SHEET 15(2B1) FOR GATE ARM LENGTHS. FINAL GATE ARM LENGTH TO BE FIELD VERIFIED BY THE CONTRACTOR.
- GATE ARMS 0' TO 4' LONG SHALL HAVE ONE (1) WARNING LIGHT. GATE ARMS 4' TO 8' LONG SHALL HAVE TWO (2) WARNING LIGHTS. GATE ARMS MORE THAN 8' LONG SHALL HAVE THREE (3) WARNING LIGHTS. GATE ARM SHALL NOT HAVE MORE THAN THREE WARNING LIGHTS.
- GATES SHALL BE B&B ROADWAY HW-4.
- CONTRACTOR SHALL VERIFY ALL GATE DIMENSIONS WITH THE MANUFACTURER/INSTALLER AND ALL FIELD DIMENSIONS PRIOR TO SHOP DRAWING SUBMITTALS AND INSTALLATION.
- SEE GATE SCHEDULES FOR ELEVATION DATA. FINAL ELEVATION AND GATE ARM HEIGHT TO BE FIELD VERIFIED BY CONTRACTOR.
- GROUND ROD SHALL BE BURIED AT LEAST 6' BELOW FINISHED GRADE.
- THE FRONT AND REAR ACCESS DOORS ON THE GATE HOUSING SHALL BE ABLE TO OPEN AND SHALL BE REMOVABLE.
- ANCHOR BOLTS TO BE CAST IN PLACE PER MANUFACTURER'S SPECIFICATIONS. THE CONTRACTOR MAY USE AN EPOXY ANCHOR BOLT SYSTEM WHERE FIELD DRILL IS PERMITTED ON THE CONCRETE FOUNDATION. IF USED, THE EPOXY SHALL MEET THE CONSTRUCTION GRADE AS APPROVED BY THE ENGINEER.
- ALL EXPOSED CONCRETE SURFACE EDGES SHALL BE CHAMFERED 3/4".
- GATE KICKSTANDS SHALL BE PROVIDED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.



SECTION VIEW



END VIEW

PAC PLANS

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N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2B4)
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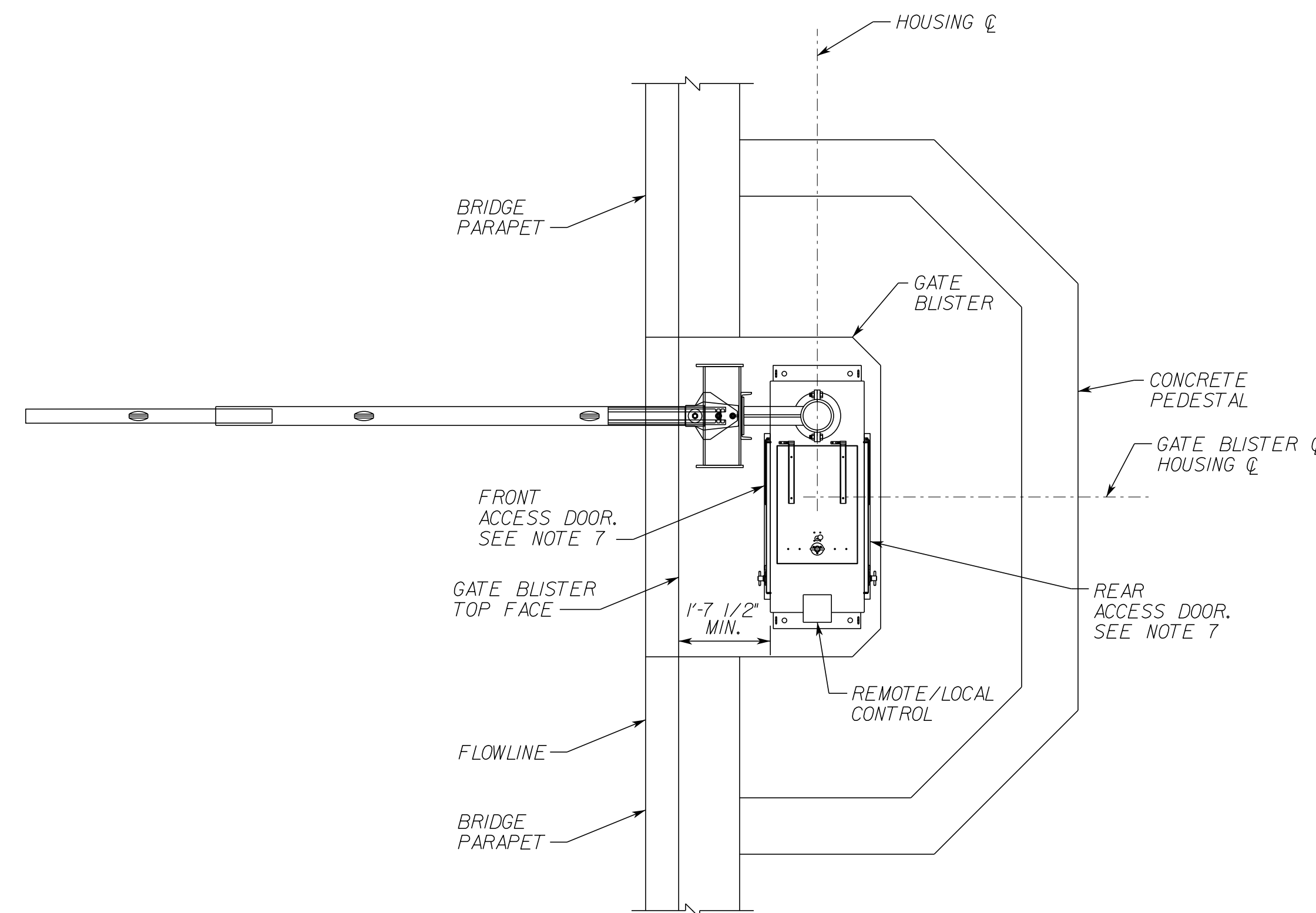
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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 Baltimore, Maryland
 TRAFFIC ENGINEER

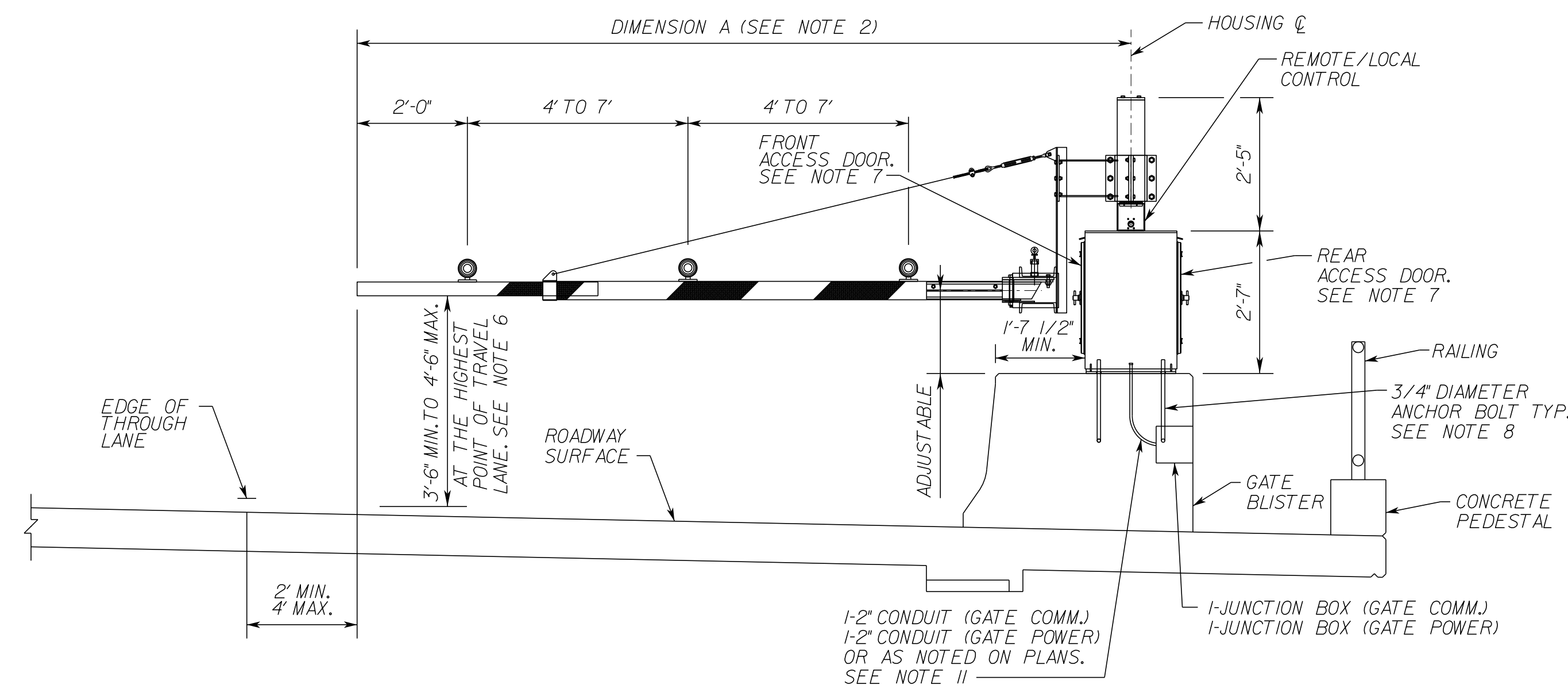
HORIZONTAL SWING GATE DETAIL - BRIDGE PARAPET MOUNTED



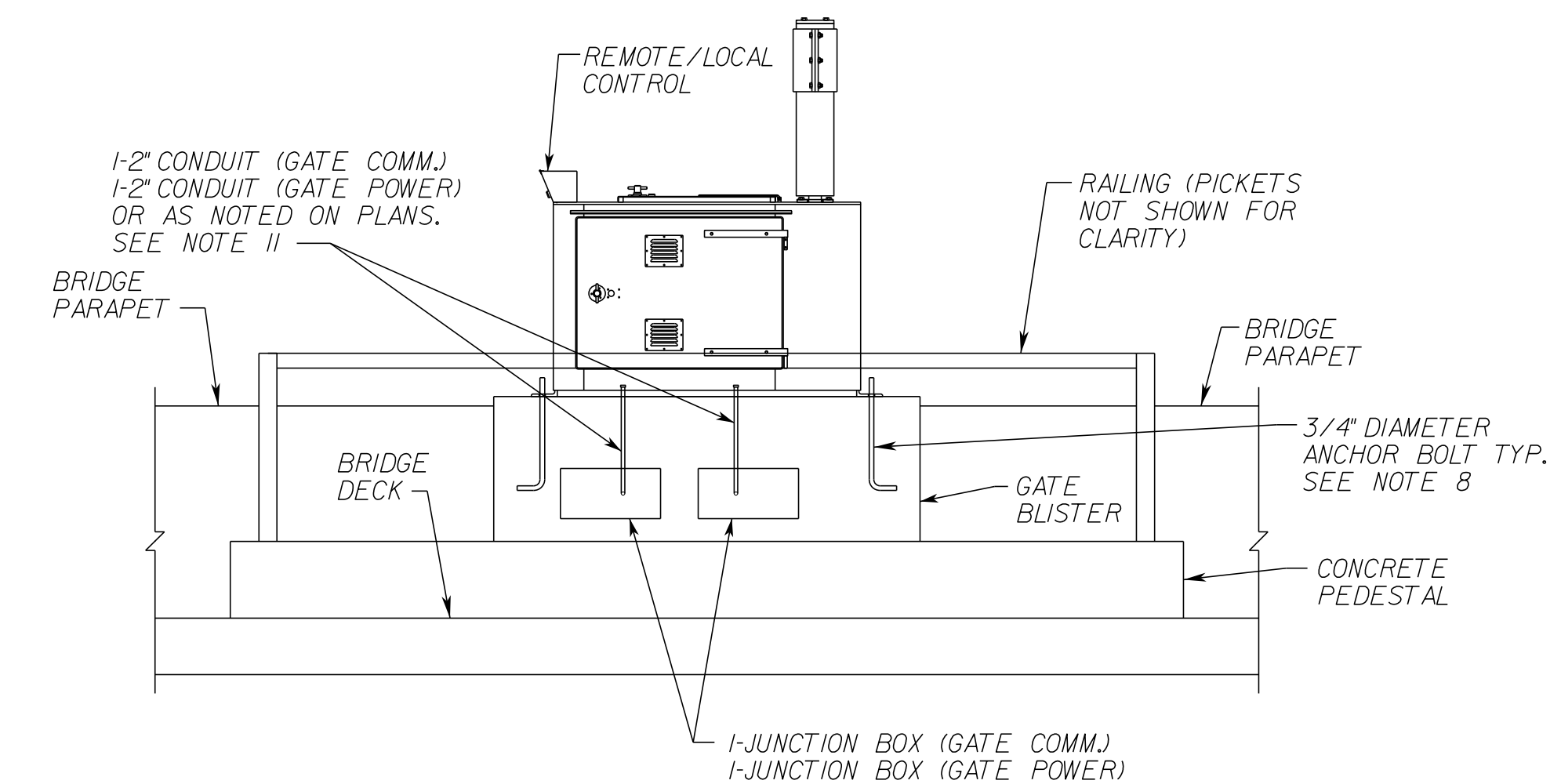
PLAN VIEW

NOTES:

- ADJUST ELEVATION OF THE GATE ARM SO THAT THE GATE ARM HEIGHT ABOVE GRADE CLEARS ANY GUARDRAIL, BARRIER, OR PLATE AND IS 4' (-/-0.5') ABOVE THE HIGHEST POINT OF THE TRAVEL LANE.
- SEE GATE SCHEDULES ON SHEET 15(2B1) FOR GATE ARM LENGTHS. FINAL GATE ARM LENGTH TO BE FIELD VERIFIED BY THE CONTRACTOR.
- GATE ARMS 0' TO 4' LONG SHALL HAVE ONE (1) WARNING LIGHT. GATE ARMS 4' TO 8' LONG SHALL HAVE TWO (2) WARNING LIGHTS. GATE ARMS MORE THAN 8' LONG SHALL HAVE THREE (3) WARNING LIGHTS. GATE ARM SHALL NOT HAVE MORE THAN THREE WARNING LIGHTS.
- GATE SHALL BE B&B ROADWAY HW-4.
- CONTRACTOR SHALL VERIFY ALL GATE DIMENSIONS WITH THE MANUFACTURER/INSTALLER AND ALL FIELD DIMENSIONS PRIOR TO SHOP DRAWING SUBMITTALS AND INSTALLATION.
- SEE GATE SCHEDULES FOR ELEVATION DATA. FINAL ELEVATION AND GATE ARM HEIGHT TO BE FIELD VERIFIED BY CONTRACTOR.
- THE FRONT AND REAR ACCESS DOORS ON THE GATE HOUSING SHALL BE ABLE TO OPEN AND SHALL BE REMOVABLE.
- ANCHOR BOLTS TO BE CAST IN PLACE PER MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR MAY USE AN EPOXY ANCHOR BOLT SYSTEM WHERE FIELD DRILL IS PERMITTED ON THE CONCRETE FOUNDATION. IF USED, THE EPOXY SHALL MEET THE CONSTRUCTION GRADE AS APPROVED BY THE ENGINEER.
- REFER TO THE OPITZ BRIDGE PLANS FOR DETAILS OF THE GATE BRIDGE PARAPET MOUNT.
- GATE KICKSTANDS SHALL BE PROVIDED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- CONDUIT DESIGNATED FOR POWER SHALL CONTAIN (1) #6 AWG. GROUNDING WIRE THAT IS CONNECTED TO A GROUND WIRE IN A JUNCTION BOX LOCATED IN THE GROUND OFF THE BRIDGE. REFER TO SHEET 15(9B) FOR WIRING DETAILS.



SECTION VIEW



END VIEW

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
N.T.S.	15(2B5)

PROJECT
0095-076-299

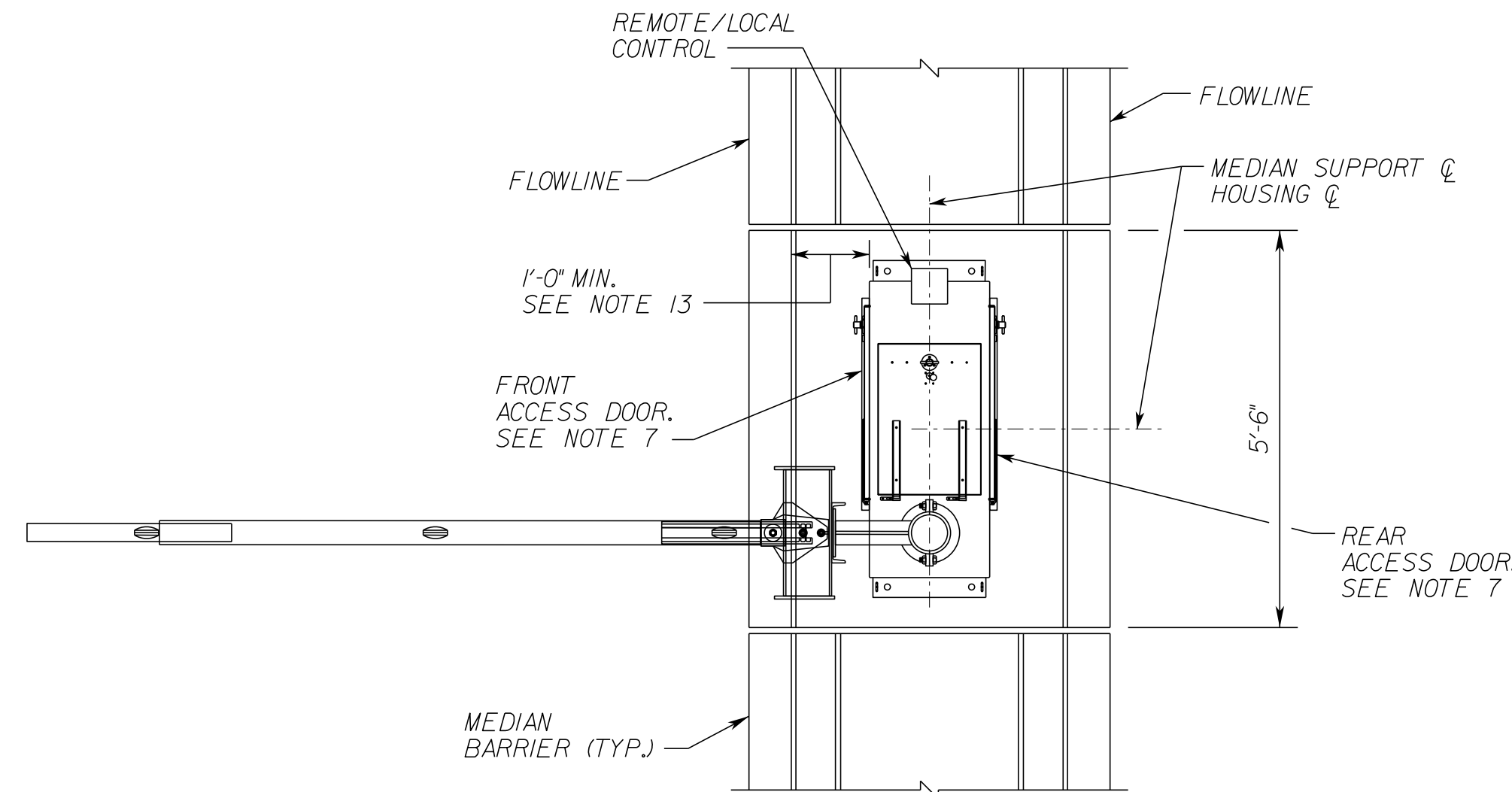
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

HORIZONTAL SWING GATE DETAIL - MEDIAN BARRIER MOUNTED

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

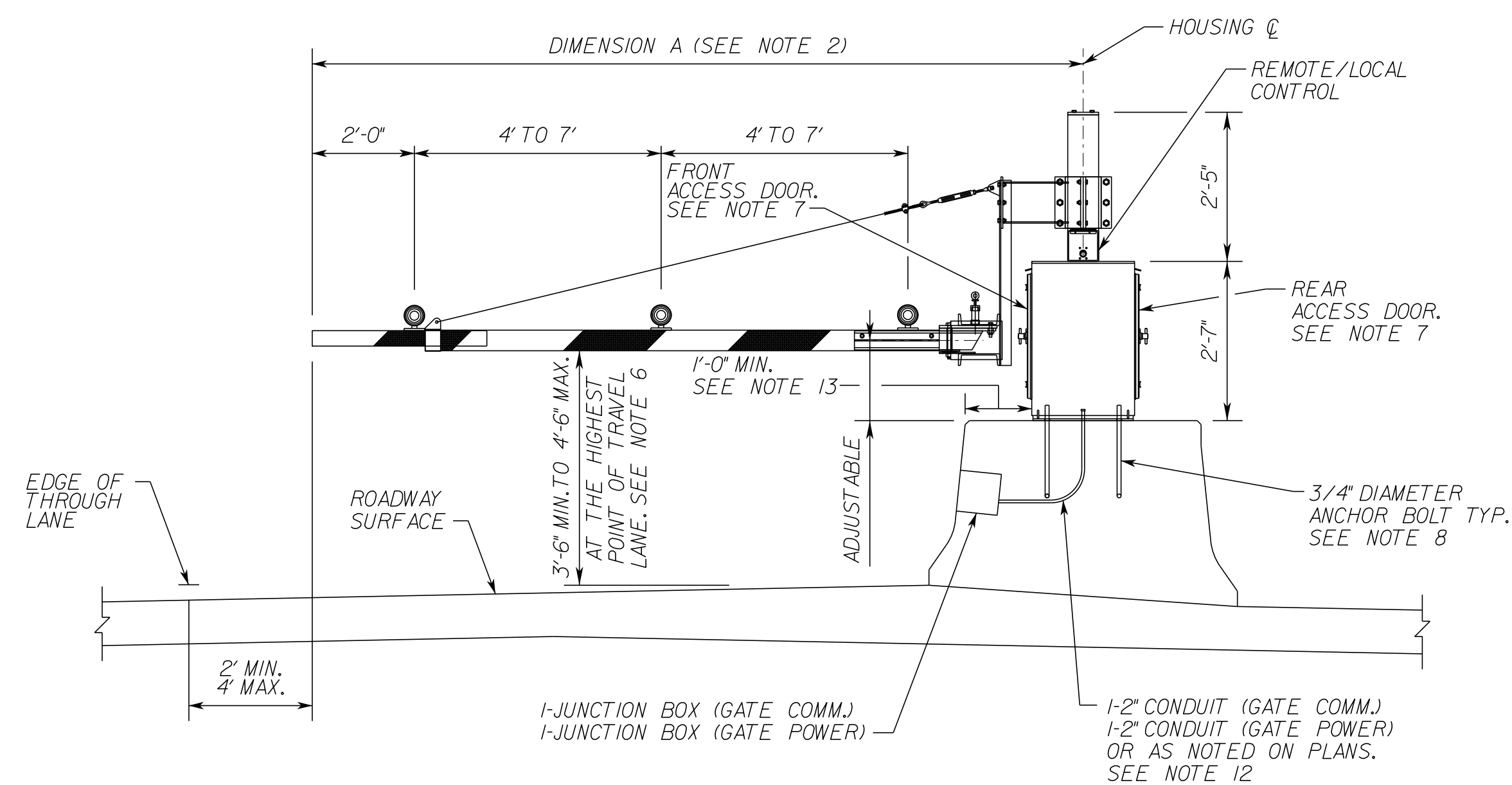
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



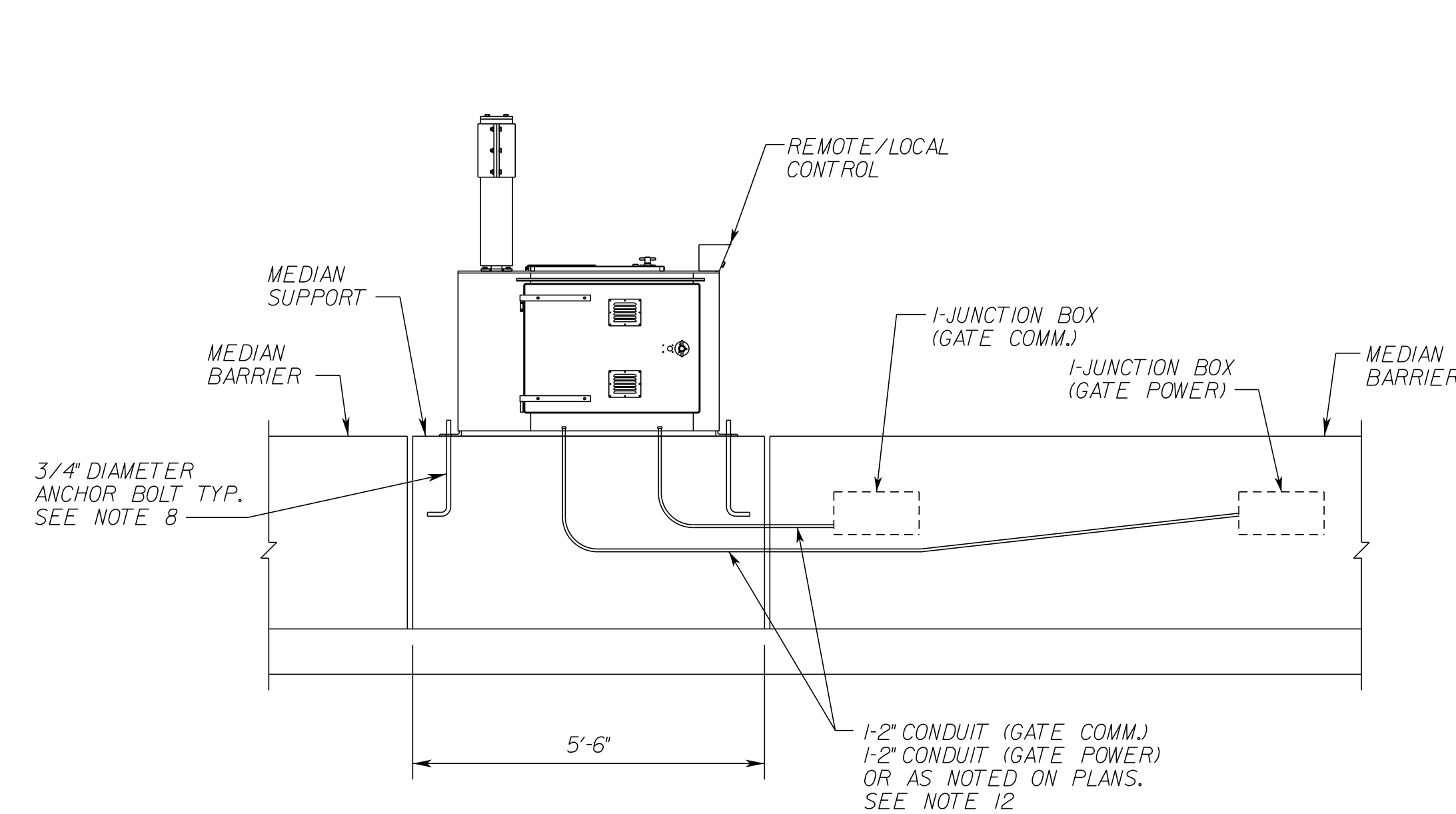
PLAN VIEW

NOTES:

- ADJUST ELEVATION OF THE GATE ARM SO THAT THE GATE ARM HEIGHT ABOVE GRADE CLEARS ANY GUARDRAIL, BARRIER, OR PLATE AND IS 4' (+/- 0.5') ABOVE THE HIGHEST POINT OF THE TRAVEL LANE.
- SEE GATE SCHEDULES ON SHEET 15(2B1) FOR GATE ARM LENGTHS. FINAL GATE ARM LENGTH TO BE FIELD VERIFIED BY THE CONTRACTOR.
- GATE ARMS 0' TO 4' LONG SHALL HAVE ONE (1) WARNING LIGHT. GATE ARMS 4' TO 8' LONG SHALL HAVE TWO (2) WARNING LIGHTS. GATE ARMS MORE THAN 8' LONG SHALL HAVE THREE (3) WARNING LIGHTS. GATE ARM SHALL NOT HAVE MORE THAN THREE WARNING LIGHTS.
- GATE SHALL BE B&B ROADWAY HW-4.
- CONTRACTOR SHALL VERIFY ALL GATE DIMENSIONS WITH THE MANUFACTURER/INSTALLER AND ALL FIELD DIMENSIONS PRIOR TO SHOP DRAWING SUBMITTALS AND INSTALLATION.
- SEE GATE SCHEDULES FOR ELEVATION DATA. FINAL ELEVATION AND GATE ARM HEIGHT TO BE FIELD VERIFIED BY CONTRACTOR.
- THE FRONT AND REAR ACCESS DOORS ON THE GATE HOUSING SHALL BE ABLE TO OPEN AND SHALL BE REMOVABLE.
- ANCHOR BOLTS TO BE CAST IN PLACE PER MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR MAY USE AN EPOXY ANCHOR BOLT SYSTEM WHERE FIELD DRILL IS PERMITTED ON THE CONCRETE FOUNDATION. IF USED, THE EPOXY SHALL MEET THE CONSTRUCTION GRADE AS APPROVED BY THE ENGINEER.
- REFER TO THE OPITZ BRIDGE PLANS FOR DETAILS OF THE GATE MEDIAN BARRIER MOUNT.
- BRIDGE MEDIAN VIEW SHOWN. SAME REQUIREMENTS APPLY FOR MEDIAN BARRIER MOUNTED GATES ON THE ROADWAY APPROACH TO THE BRIDGE.
- GATE KICKSTANDS SHALL BE PROVIDED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- CONDUIT DESIGNATED FOR POWER SHALL CONTAIN (1) #6 AWG. GROUNDING WIRE THAT IS CONNECTED TO A GROUND WIRE IN A JUNCTION BOX LOCATED IN THE GROUND OFF THE BRIDGE. REFER TO SHEET 15(9B) FOR WIRING DETAILS.
- CENTER GATE HOUSING ON TOP LOCAL PORTION OF THE MEDIAN SUPPORT.



SECTION VIEW



END VIEW

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2B6)
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PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

MAINTENANCE AREA FOR GATE BETWEEN BARRIER - TYPE A (GATE ARM ON LOW SIDE)

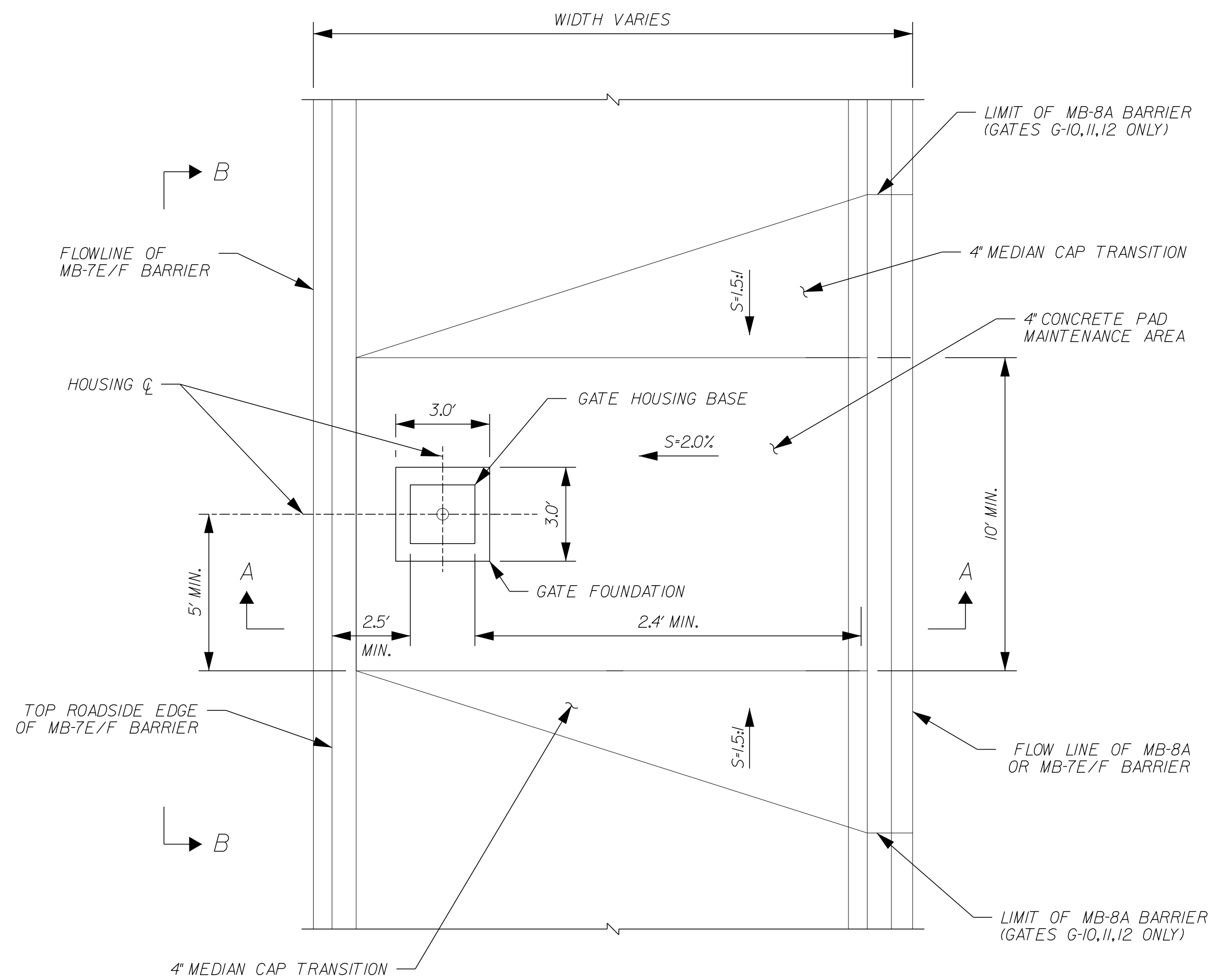
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

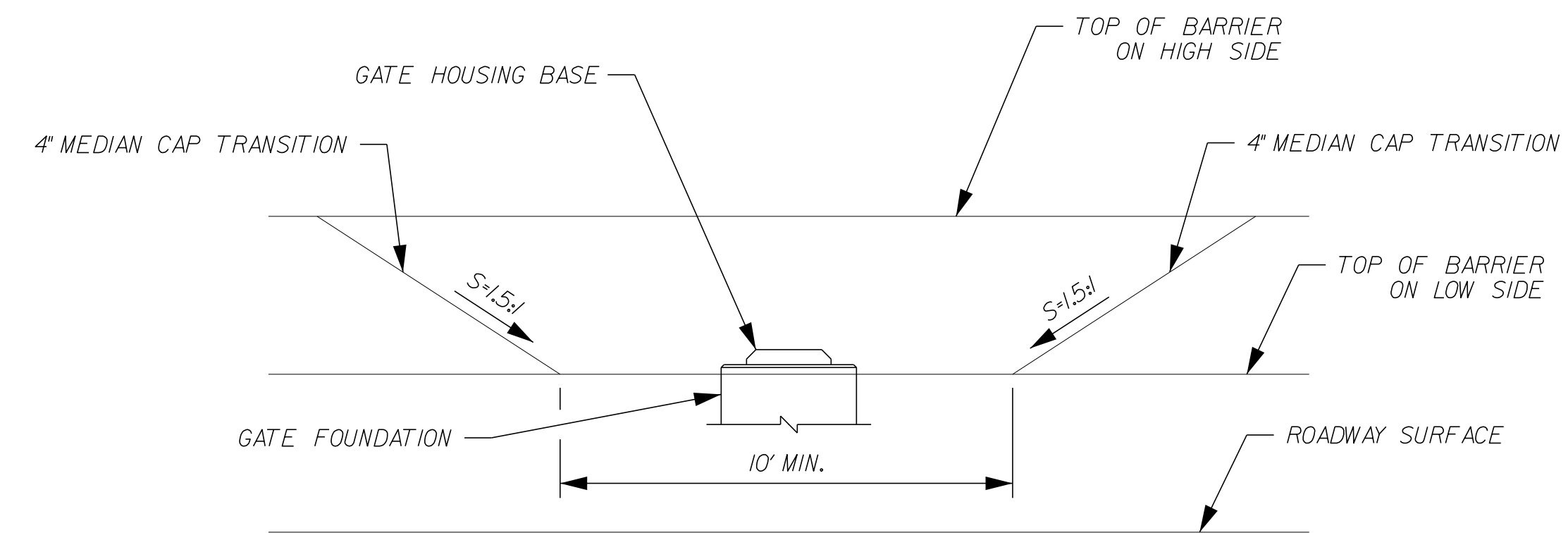
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

NOTES:

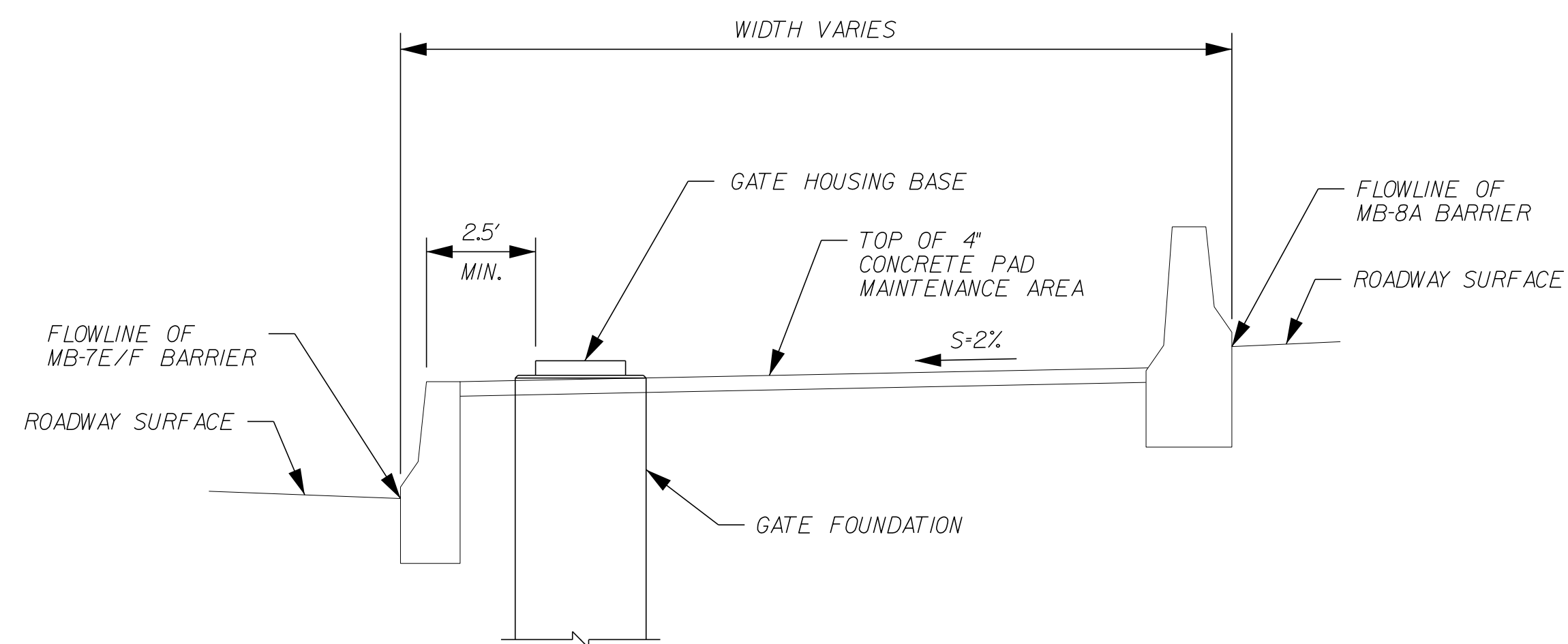
- THE CONTRACTOR SHALL STAKEOUT AND SUBMIT MAINTENANCE AREA SITE LAYOUT PLANS FOR APPROVAL PRIOR TO INSTALLATION.



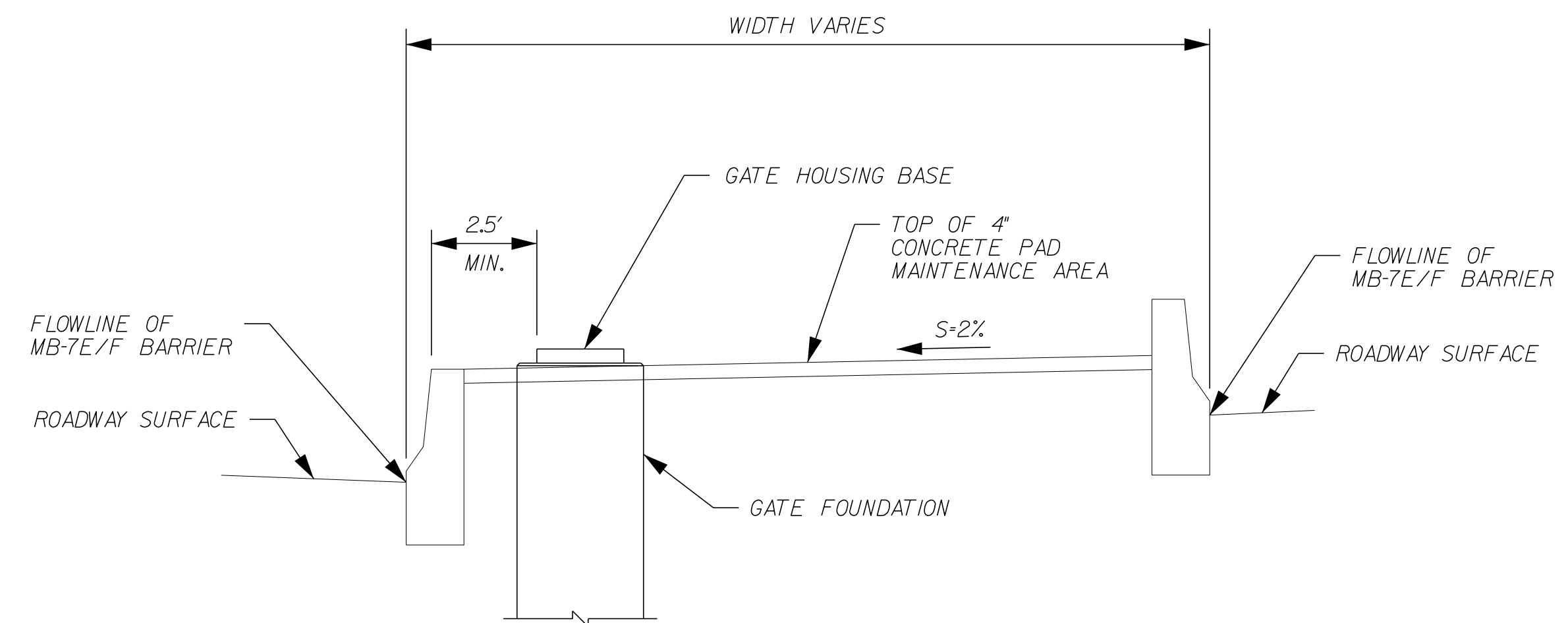
PLAN



SECTION B-B



SECTION A-A AT MB-8A



SECTION A-A AT MB-7E/F

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

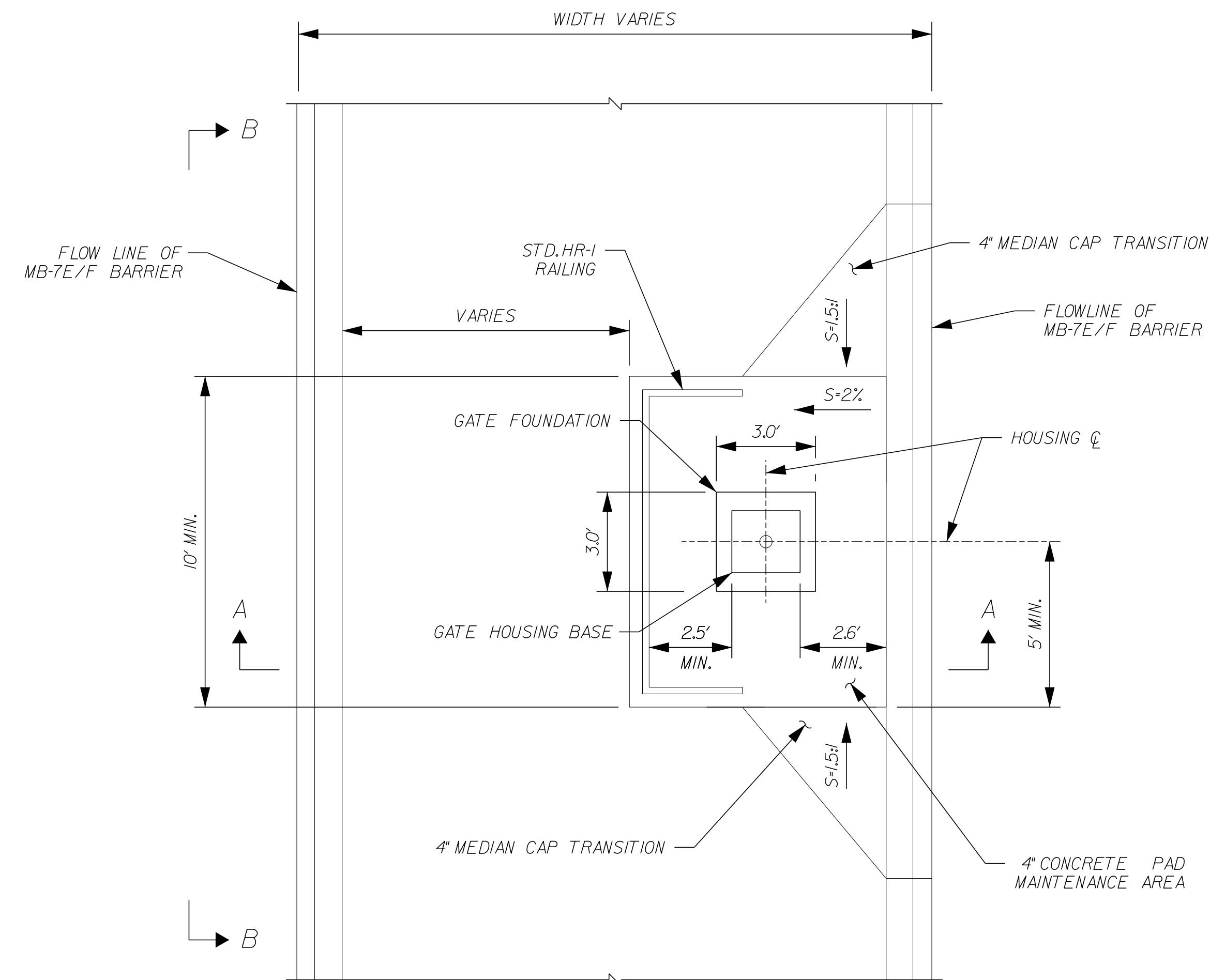
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

MAINTENANCE AREA FOR GATE BETWEEN BARRIER - TYPE B (GATE ARM ON HIGH SIDE)

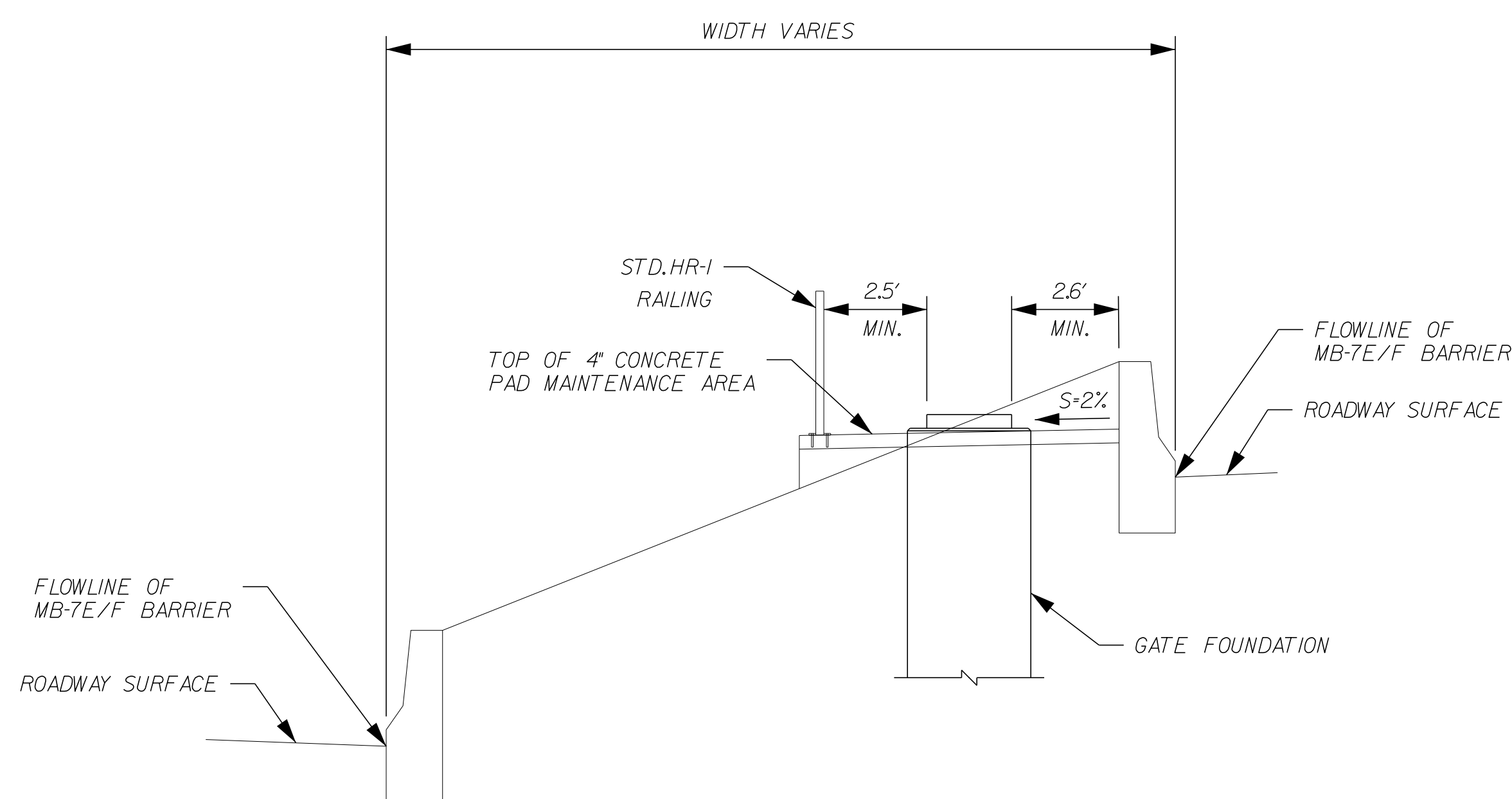
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B8)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

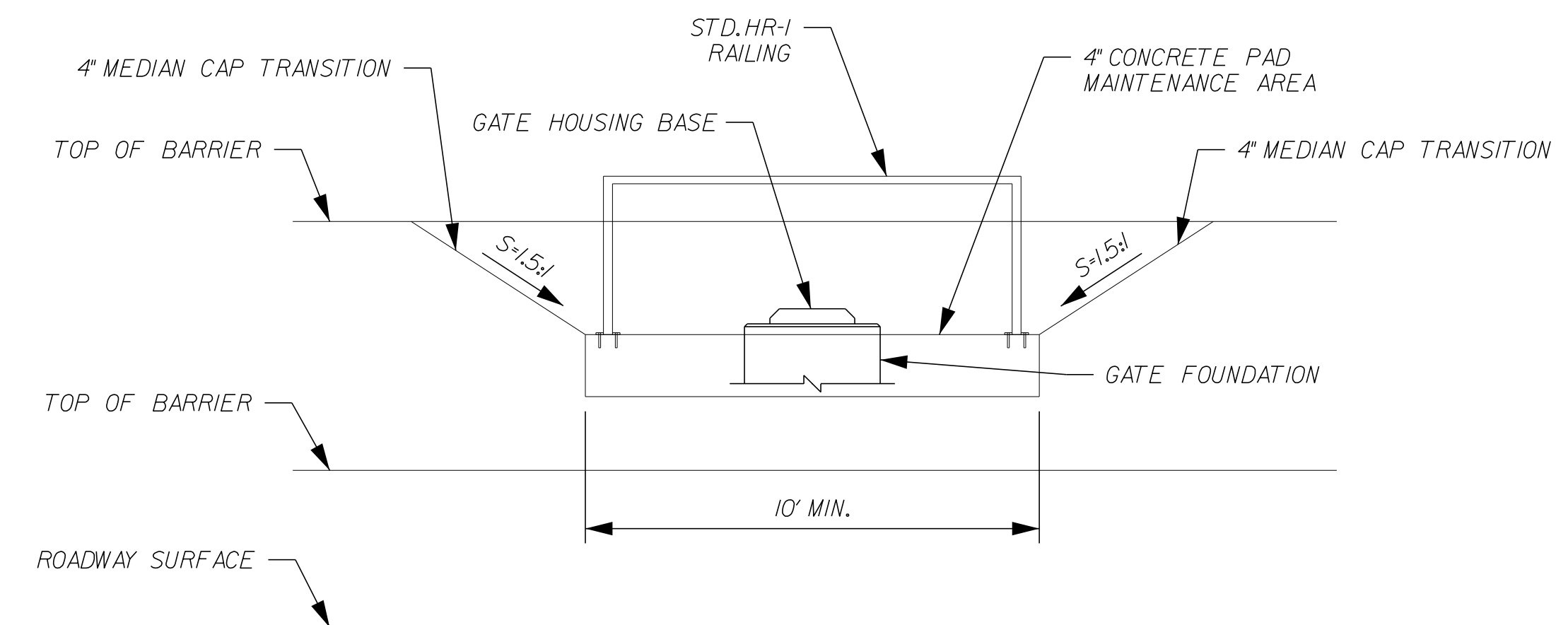
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. THE CONTRACTOR SHALL STAKEOUT AND SUBMIT MAINTENANCE AREA SITE LAYOUT PLANS FOR APPROVAL PRIOR TO INSTALLATION.

PAC PLANS

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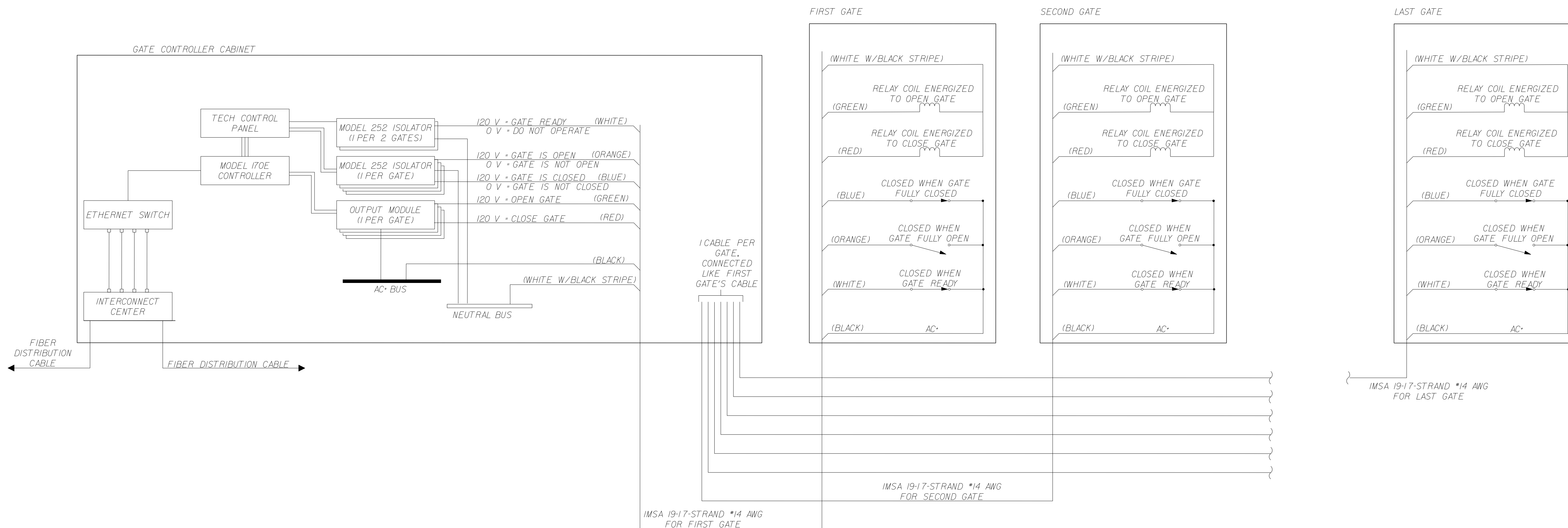
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 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

GATE CONTROL WIRING DIAGRAM

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2B9)
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PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

GATE POWER WIRING DIAGRAM

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B10)

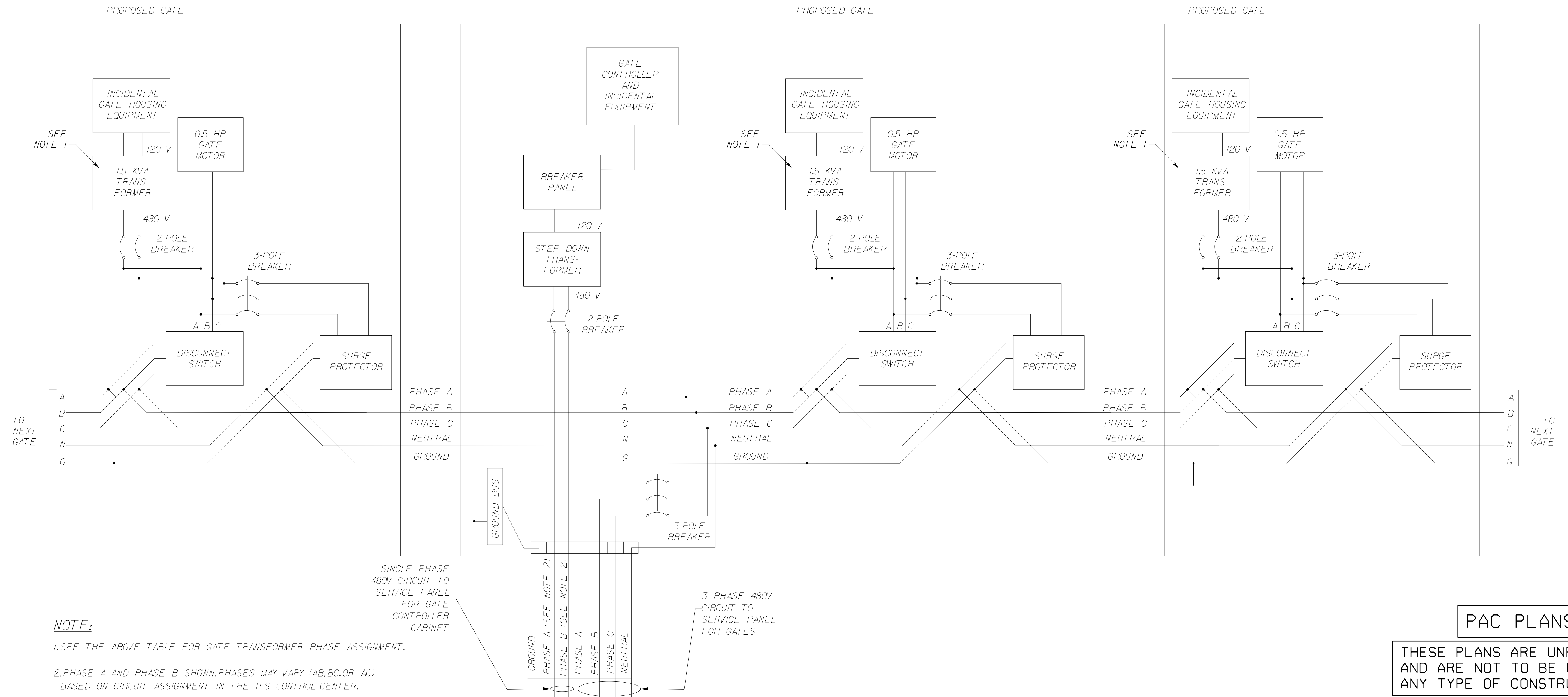
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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 TRAFFIC ENGINEER

GATE TRANSFORMER PHASE ASSIGNMENT				
GATE GROUP	GATE POSITION (LOOKING NORTH)	480V, 3Ø		
		A	B	C
SLIP RAMP C095HU561G	FIRST	X	X	
	SECOND		X	X
	THIRD	X		X
	FOURTH	X	X	
	FIFTH		X	X
	SIXTH	X		X
	SEVENTH	X	X	
	EIGHTH		X	X
	NINTH	X		X

GATE TRANSFORMER PHASE ASSIGNMENT				
GATE GROUP	GATE POSITION (LOOKING NORTH)	480V, 3Ø		
		A	B	C
SLIP RAMP C095HU565G	FIRST	X	X	
	SECOND		X	X
	THIRD	X		X
	FOURTH	X	X	
	FIFTH		X	X
	SIXTH	X		X
	SEVENTH	X	X	
	EIGHTH		X	X
	NINTH	X		X
	TENTH	X	X	
	ELEVENTH		X	X

GATE TRANSFORMER PHASE ASSIGNMENT				
GATE GROUP	GATE POSITION (LOOKING EAST)	480V, 3Ø		
		A	B	C
OPITZ BLVD C2000XR0001G	FIRST	X	X	
	SECOND		X	X
	THIRD	X		X
	FOURTH	X	X	
	FIFTH		X	X
	SIXTH	X		X
	SEVENTH	X	X	



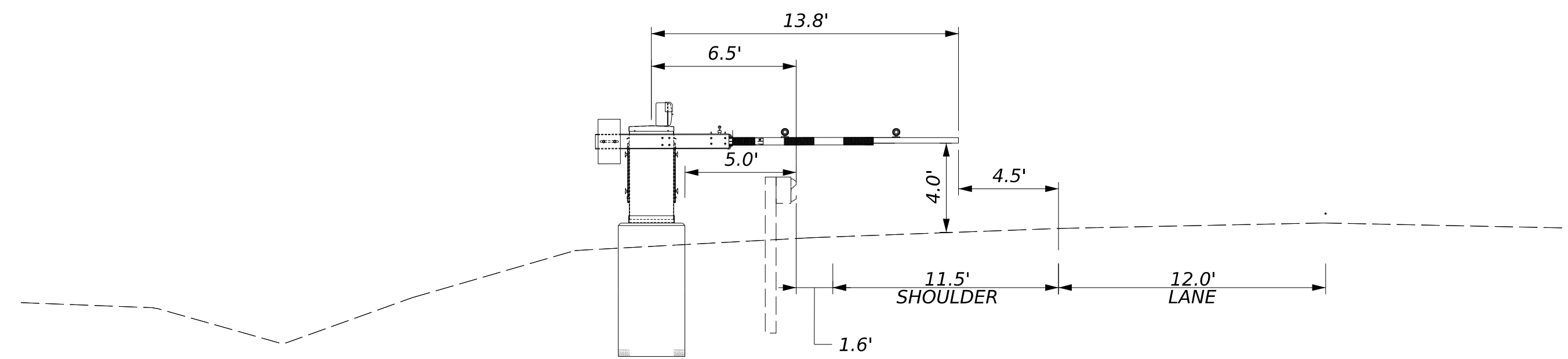
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt, & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(2B11)

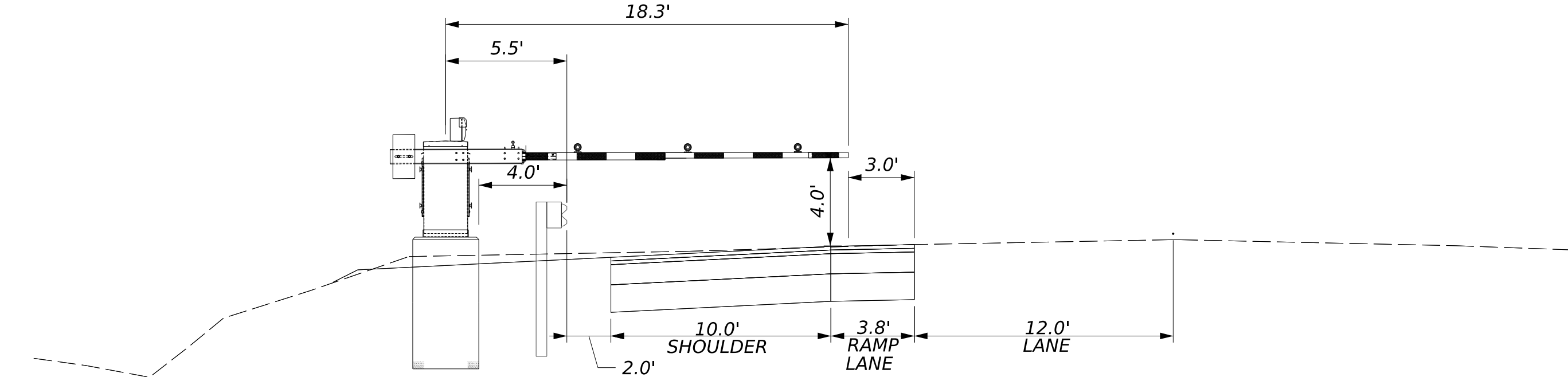
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 Baltimore, Maryland
 TRAFFIC ENGINEER

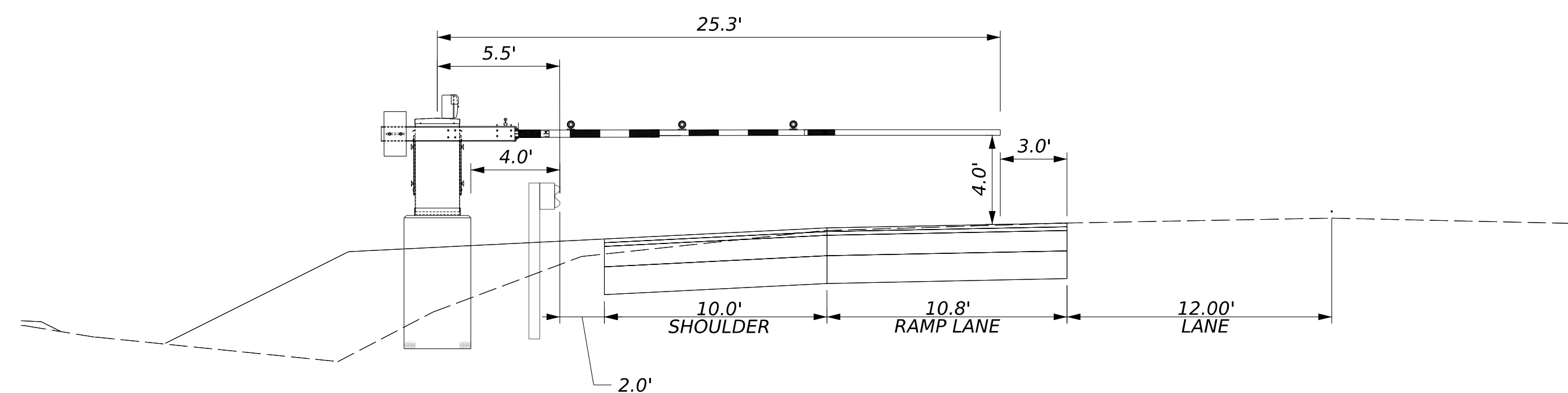
GATE G-01
 STA. 10+20, RAMP DBSR CONST.



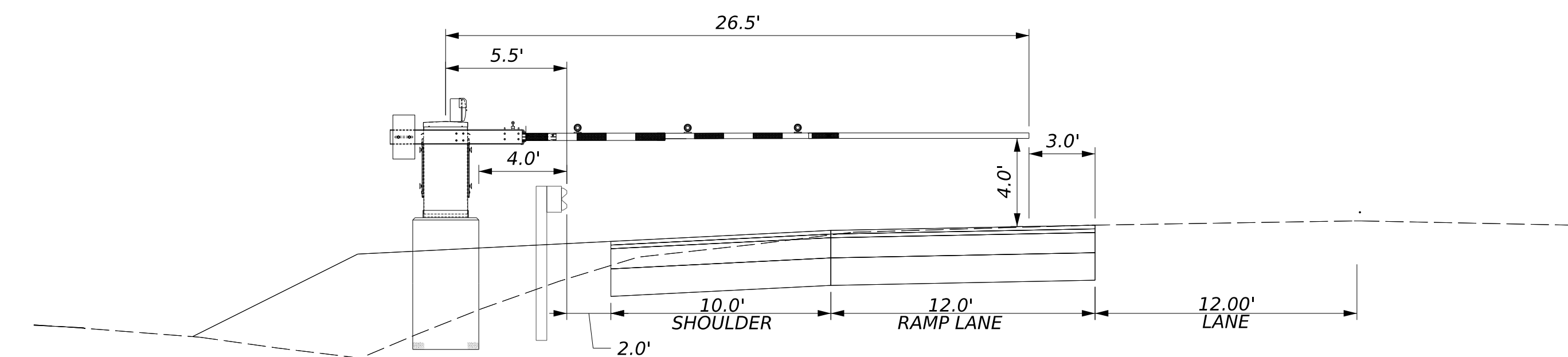
GATE G-02
 STA. 12+05, RAMP DBSR CONST.



GATE G-03
 STA. 13+80, RAMP DBSR CONST.



GATE G-04
 STA. 15+55, RAMP DBSR CONST.



NOTES:

- REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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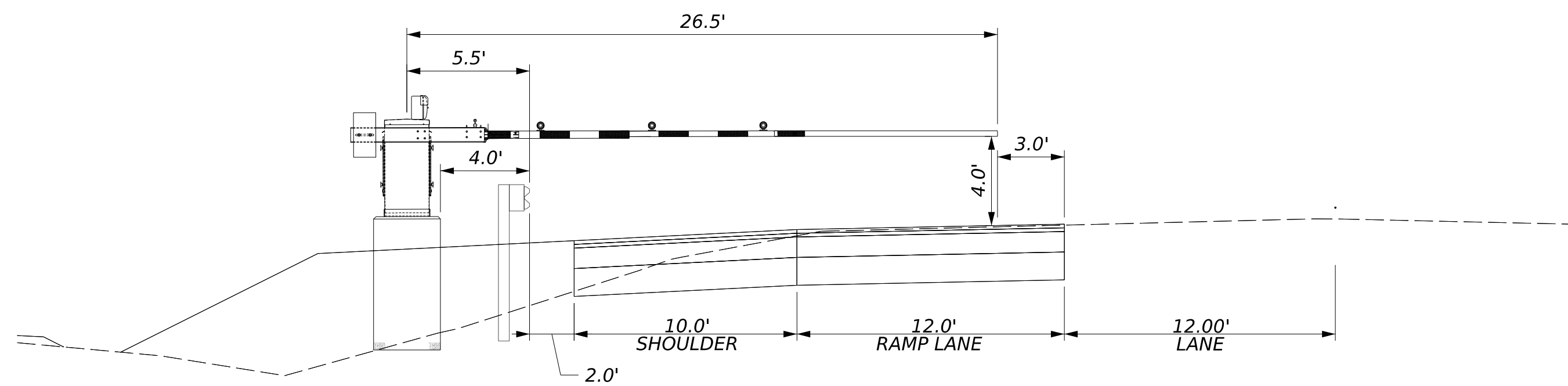
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		STATE		SHEET NO.
	ROUTE	PROJECT	ROUTE	PROJECT	
	VA.	95	0095-076-299	C-501	15(2B)2

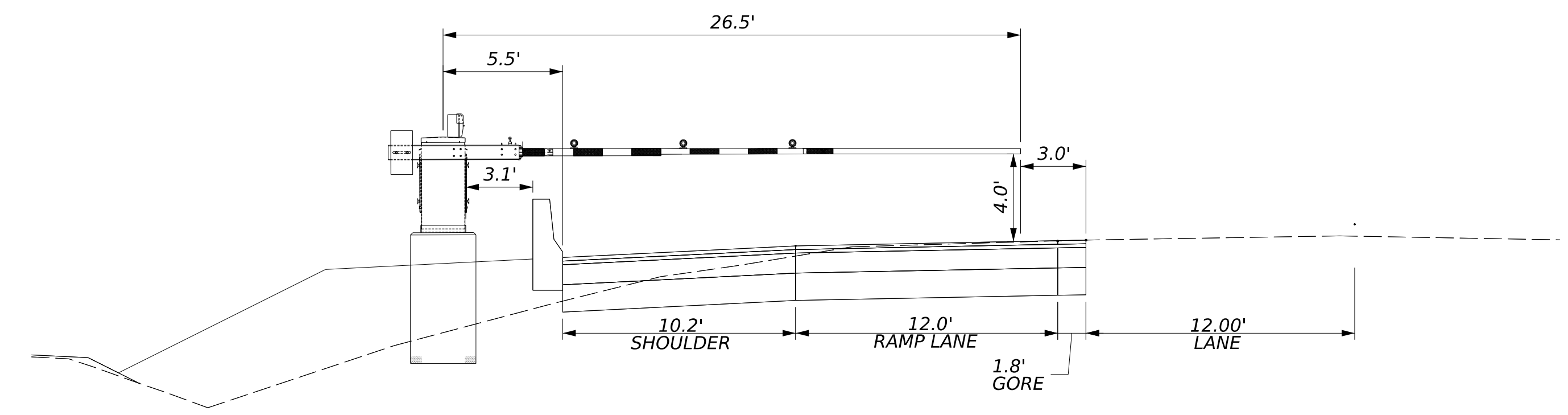
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

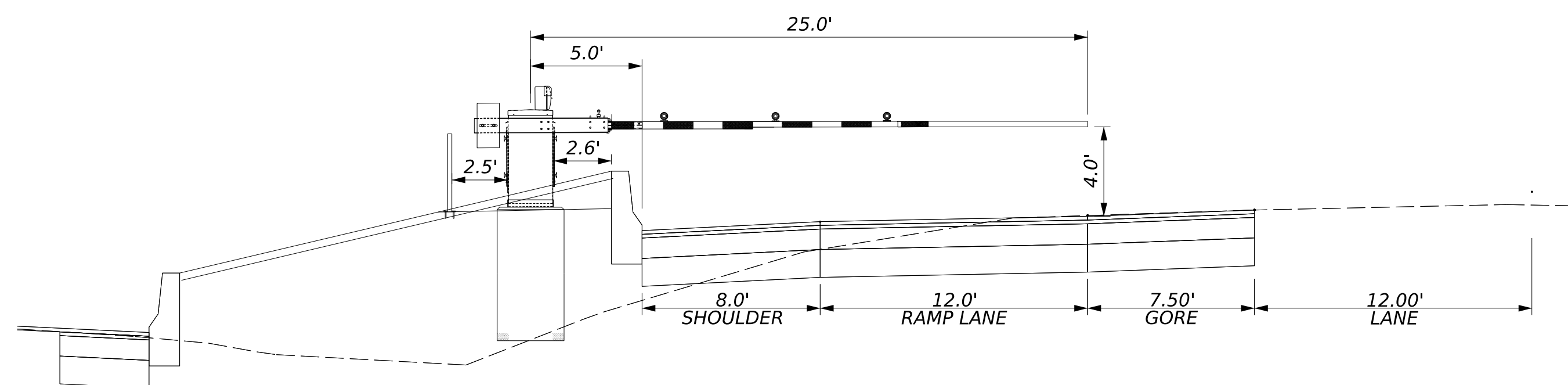
GATE G-05
 STA. 17+40, RAMP DBSR CONST.



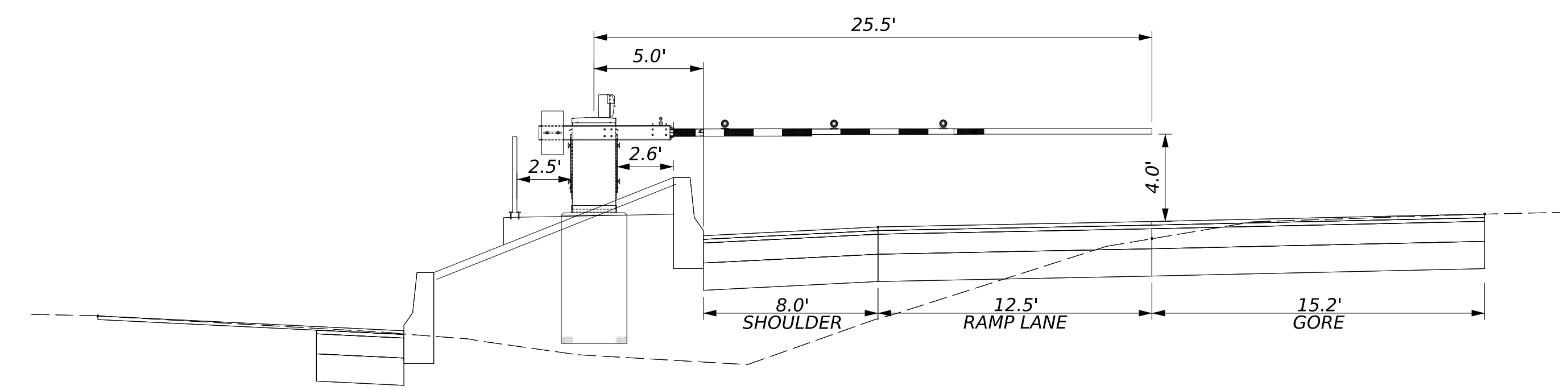
GATE G-06
 STA. 19+25, RAMP DBSR CONST.



GATE G-07
 STA. 20+80, RAMP DBSR CONST.



GATE G-08
 STA. 22+30, RAMP DBSR CONST.



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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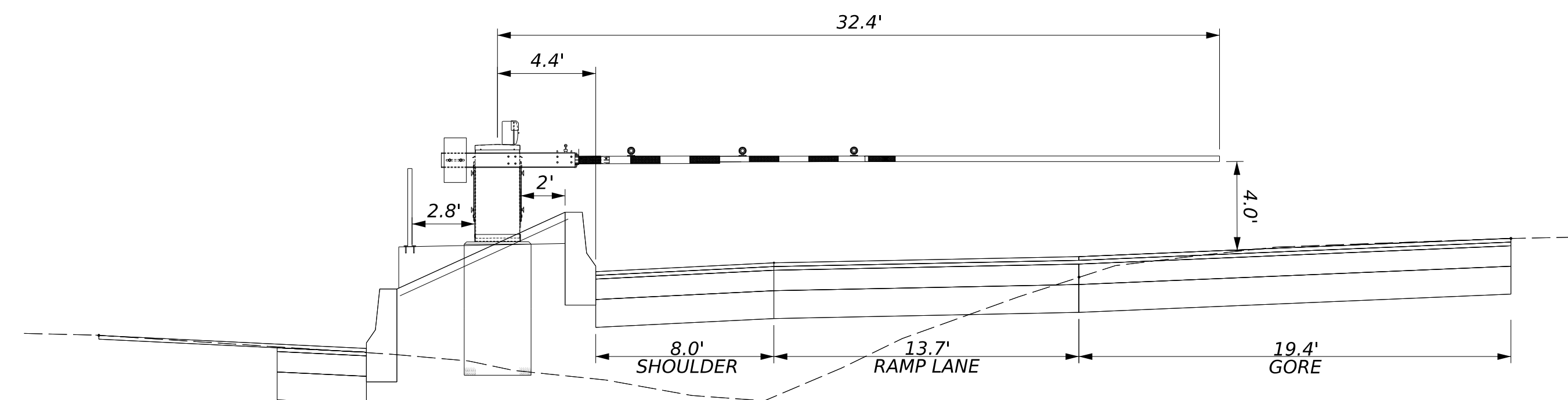
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2B)3

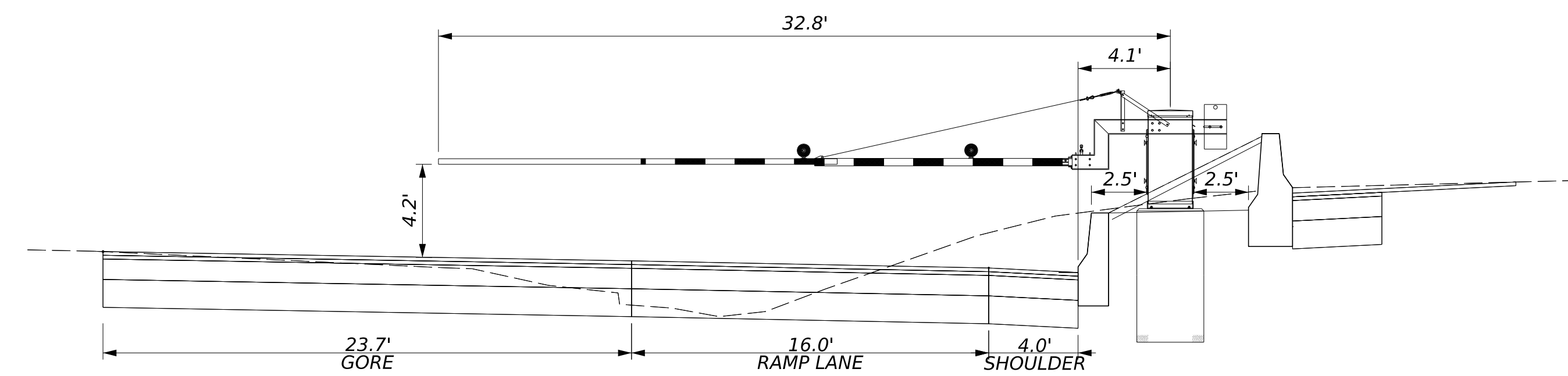
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

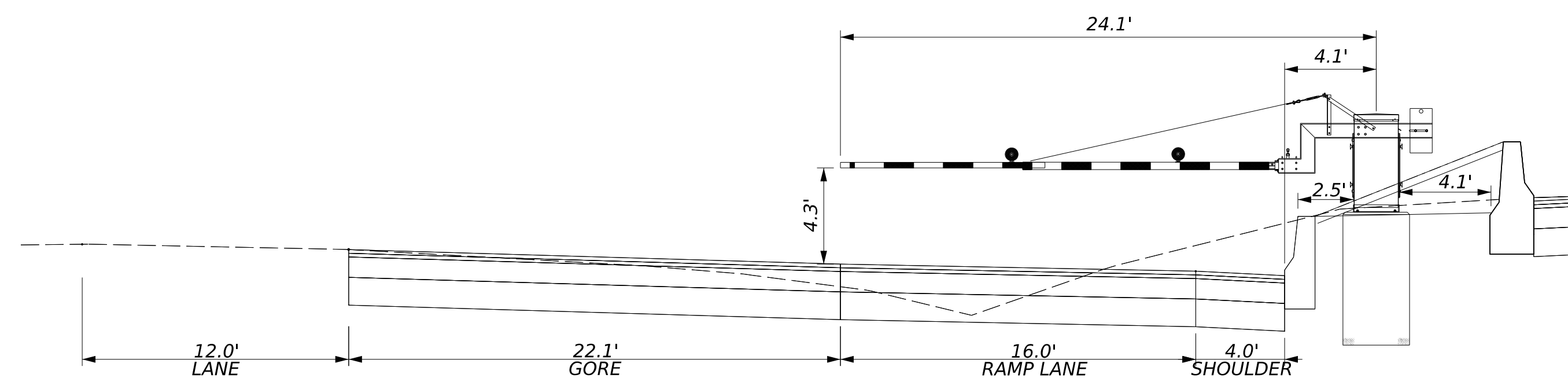
GATE G-09
 STA. 23+55, RAMP DBSR CONST.



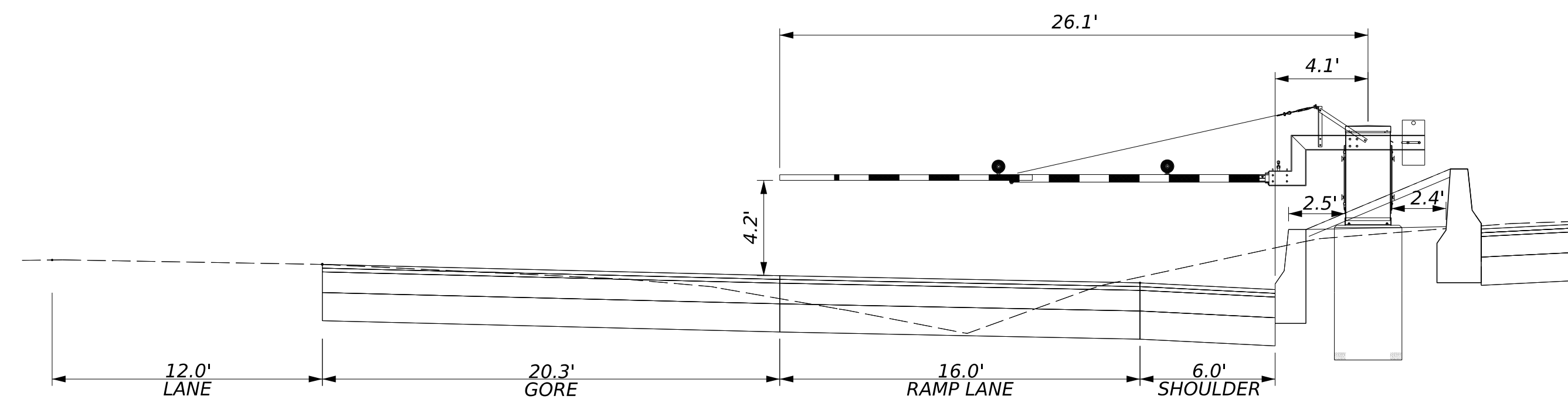
GATE G-10
 STA. 27+15, RAMP DBSR CONST.



GATE G-11
 STA. 28+40, RAMP DBSR CONST.



GATE G-12
 STA. 29+90, RAMP DBSR CONST.



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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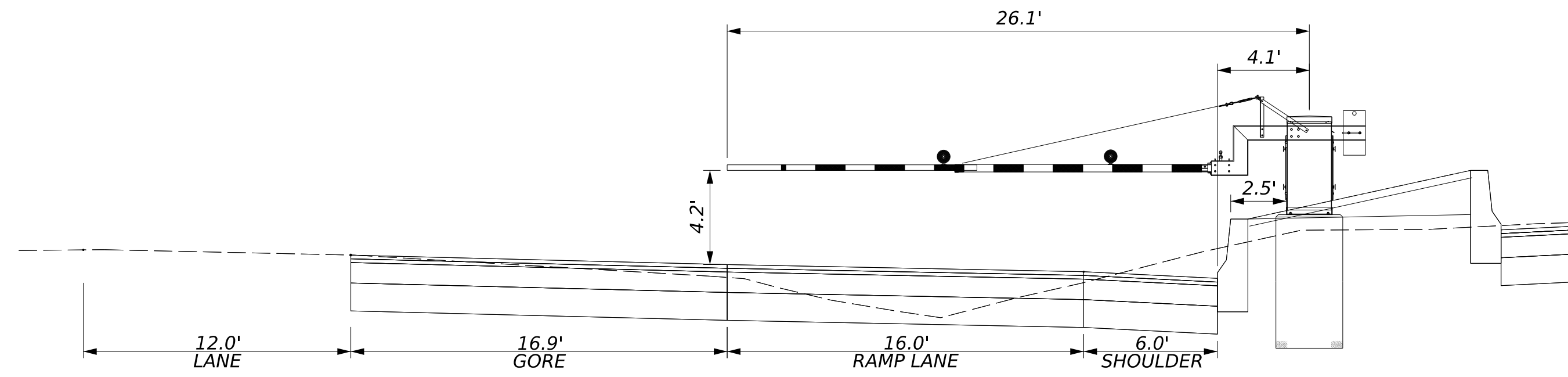
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740 07/07/2021

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(2B14)

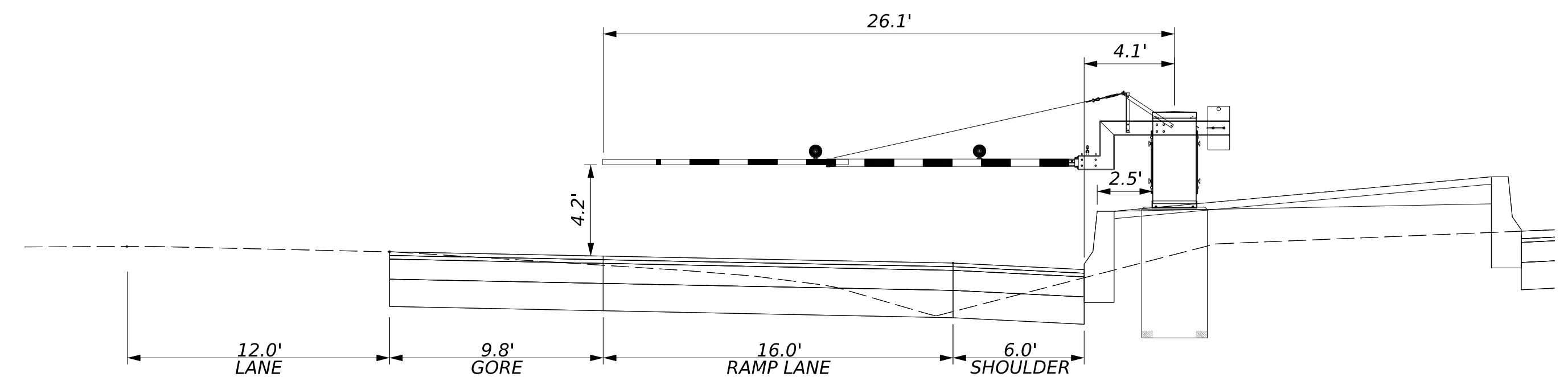
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

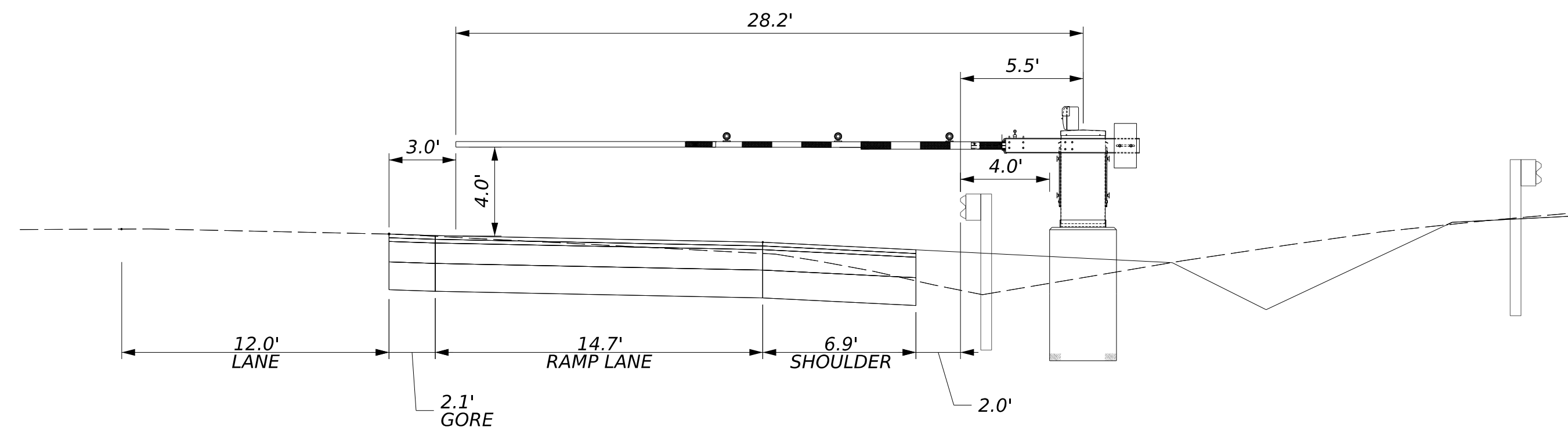
GATE G-13
 STA. 31+65, RAMP DBSR CONST. @



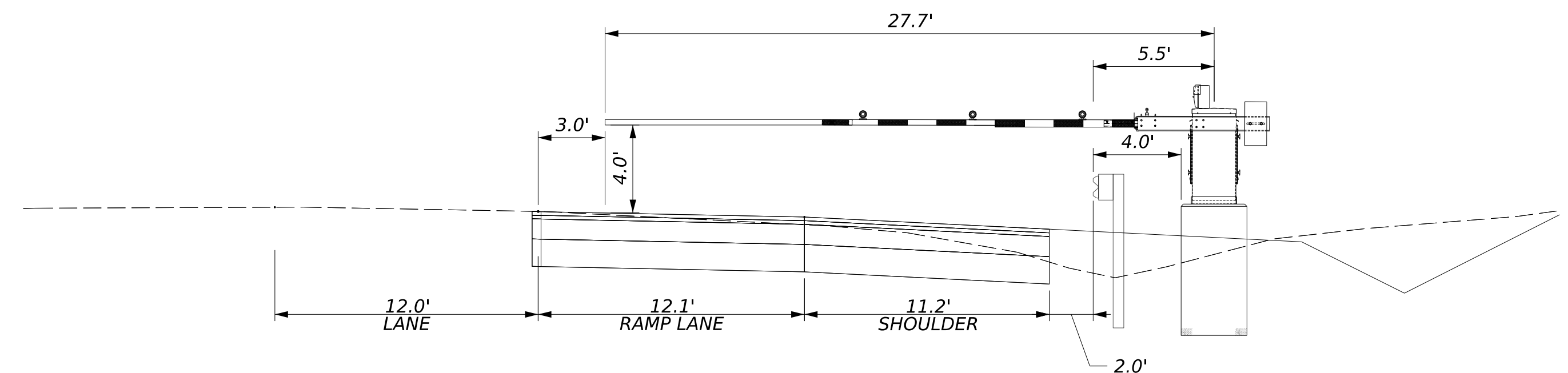
GATE G-14
 STA. 33+40, RAMP DBSR CONST. @



GATE G-15
 STA. 35+15, RAMP DBSR CONST. @



GATE G-16
 STA. 37+15, RAMP DBSR CONST. @



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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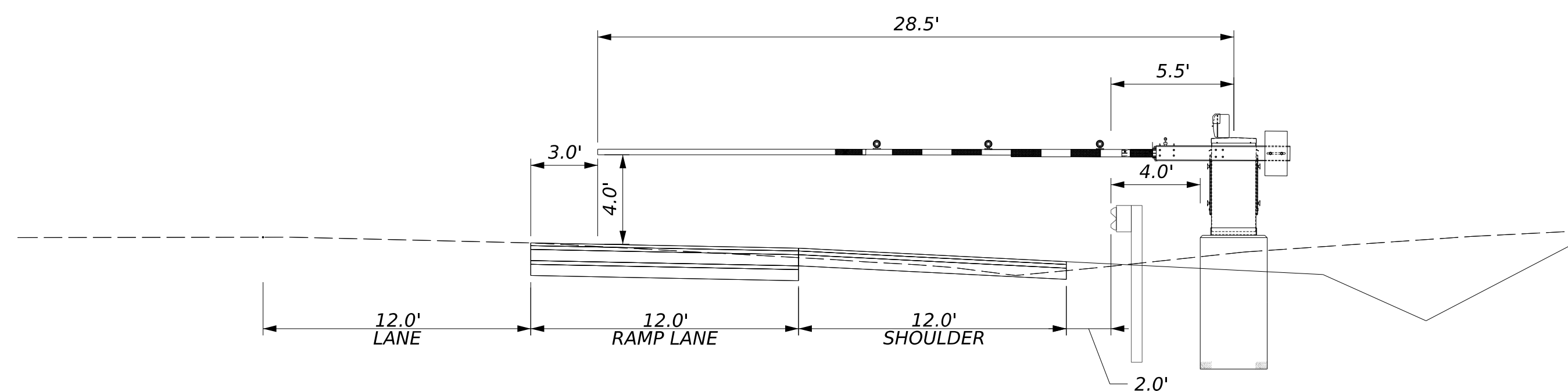
PROJECT MANAGER: Bimal Shrivastava, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(2B15)

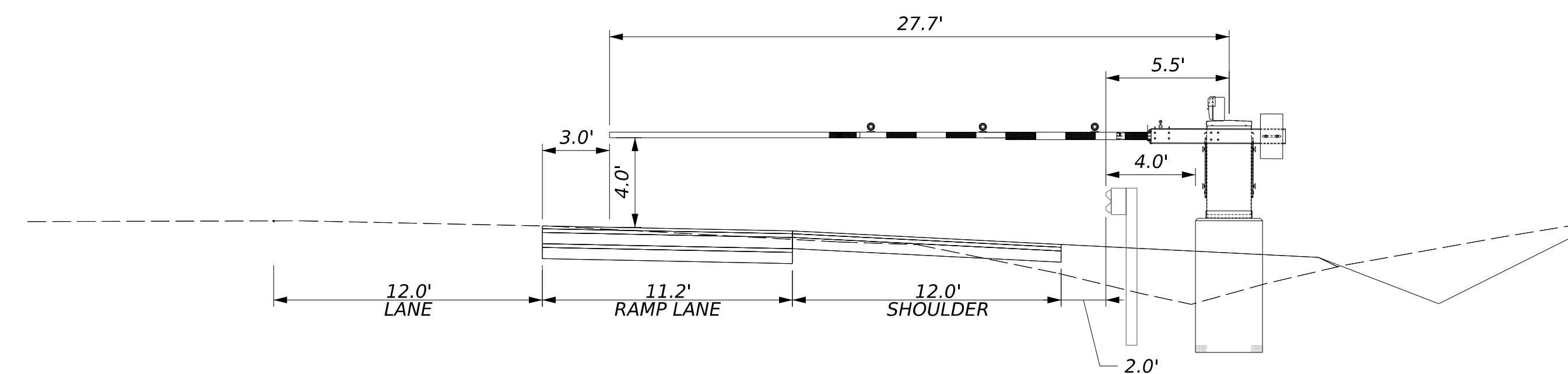
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

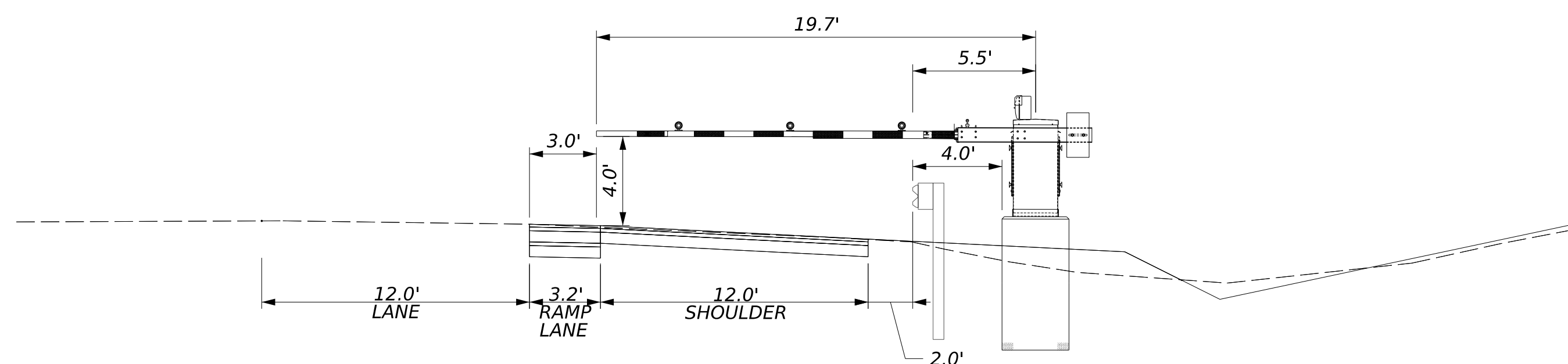
GATE G-17
 STA. 39+15, RAMP DBSR CONST.



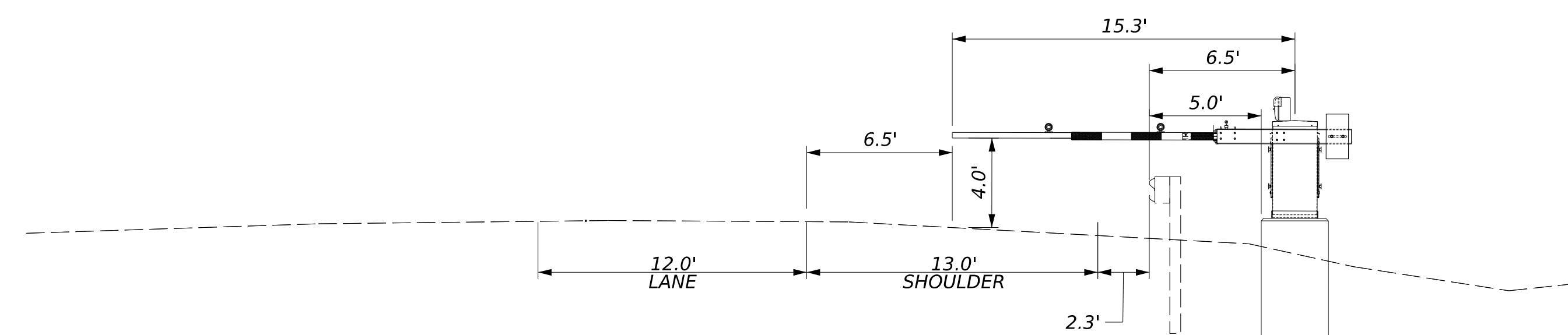
GATE G-18
 STA. 41+15, RAMP DBSR CONST.



GATE G-19
 STA. 43+15, RAMP DBSR CONST.



GATE G-20
 STA. 343+50, I-95 CONST.



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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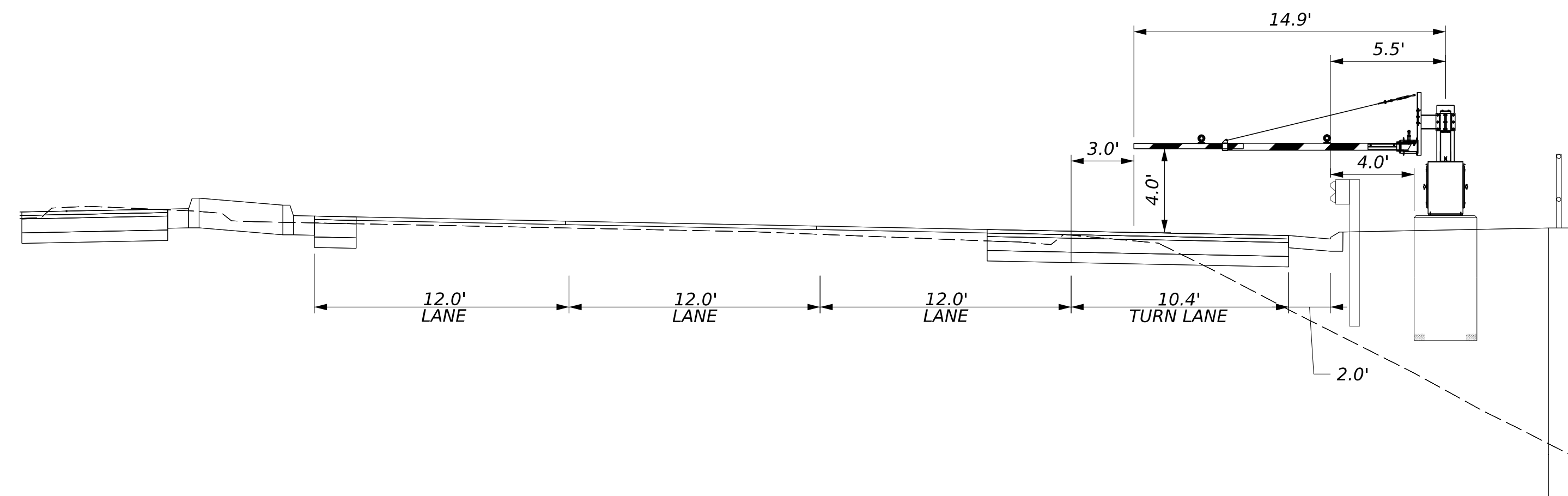
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(2B16)

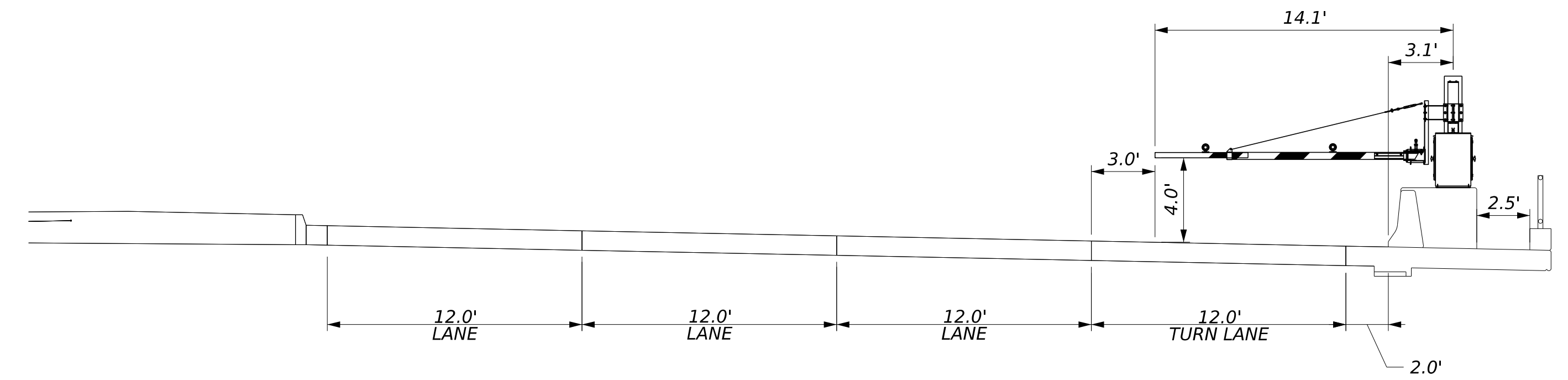
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

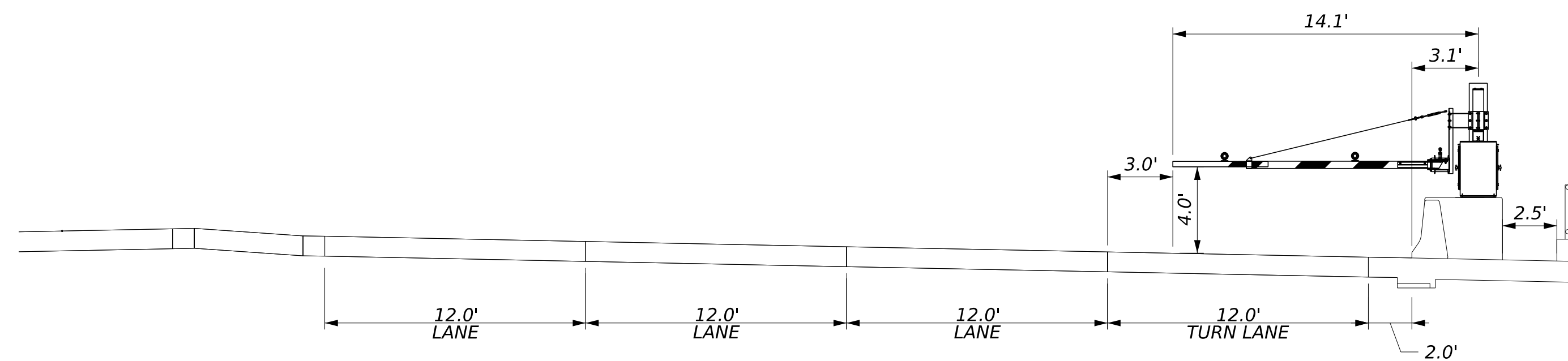
GATE G-21
 STA. 64+62.0 PITZ BLVD CONST. @



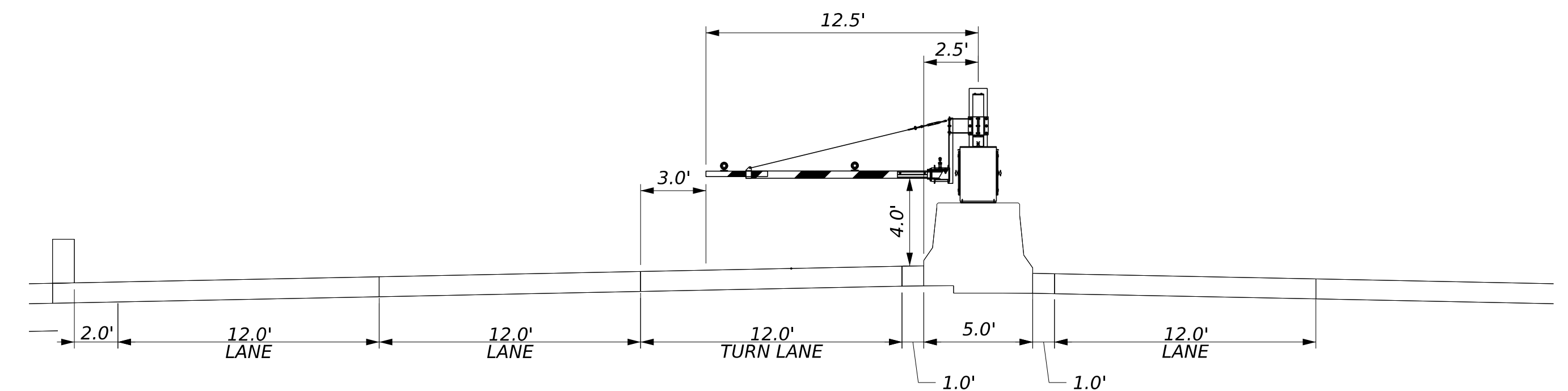
GATE G-22
 STA. 65+64.0 PITZ BLVD CONST. @



GATE G-23
 STA. 66+59.0 PITZ BLVD CONST. @



GATE G-24
 STA. 68+21.0 PITZ BLVD CONST. @



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

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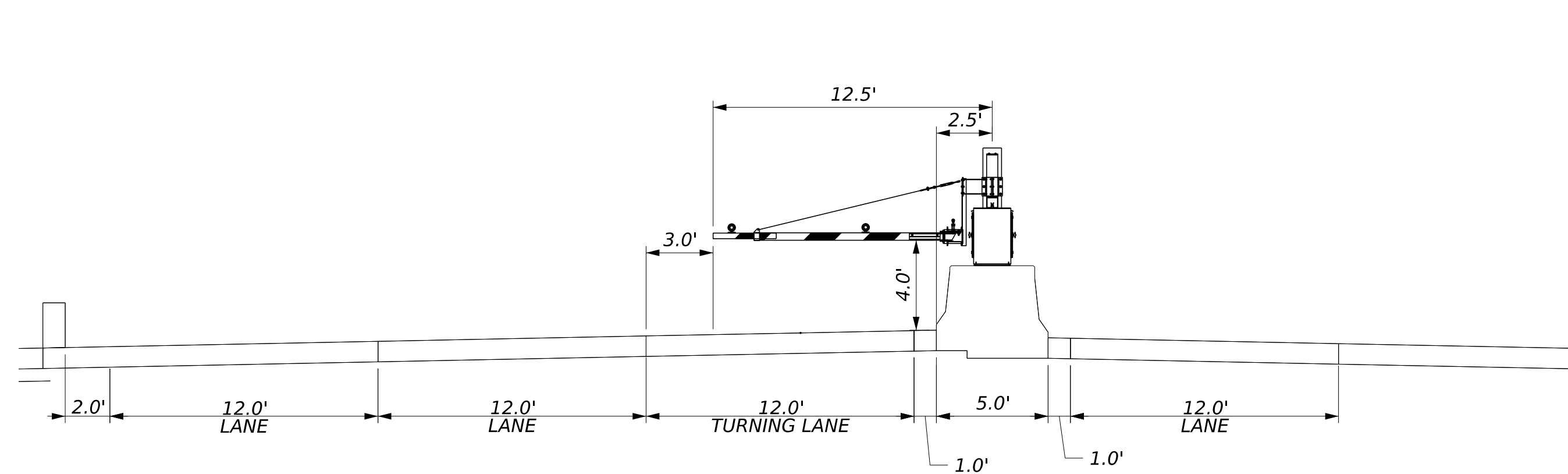
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	15(2B17)

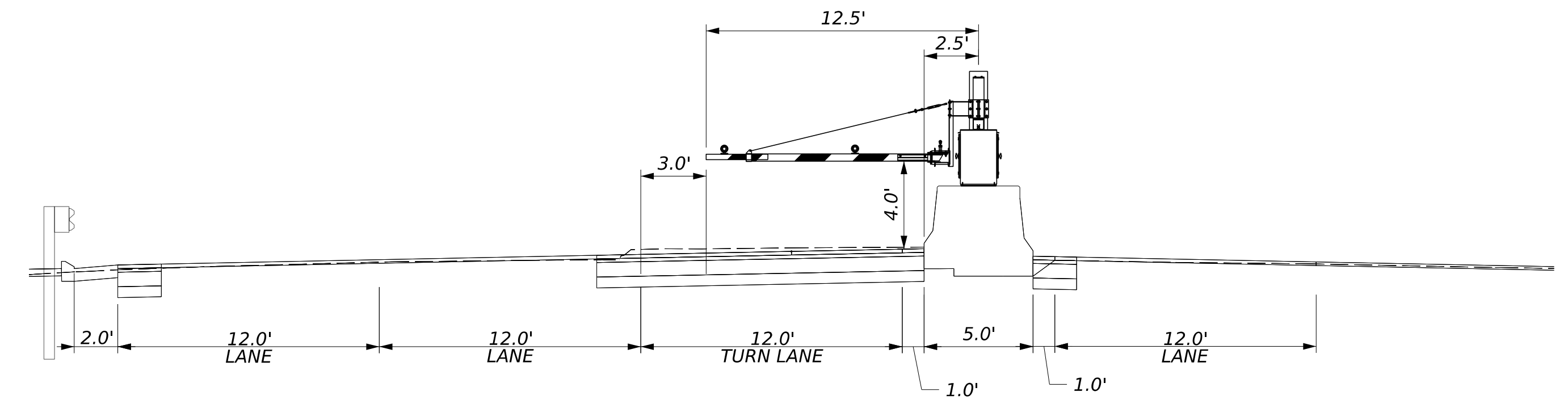
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

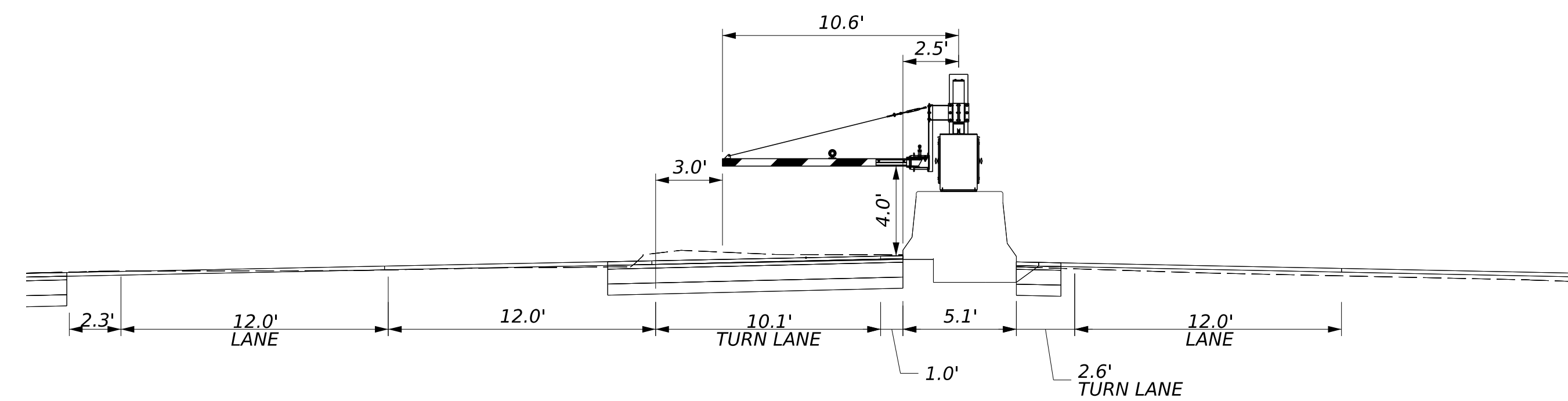
GATE G-25
 STA. 69+21, OPITZ BLVD CONST. @



GATE G-26
 STA. 70+21, OPITZ BLVD CONST. @



GATE G-27
 STA. 71+16, OPITZ BLVD CONST. @



NOTES:

1. REFER TO SHEETS 15(2B2)-15(2B6) FOR ADDITIONAL GATE INSTALLATION DETAILS. DIMENSIONS FOR VERTICAL AND LATERAL CLEARANCE OF GATE ARM ARE BASIS OF DESIGN. ALL CLEARANCES SHALL BE WITHIN THE TOLERANCES SPECIFIED ON SHEETS 15(2B2)-15(2B6) AND SHALL BE VERIFIED BY THE CONTRACTOR.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

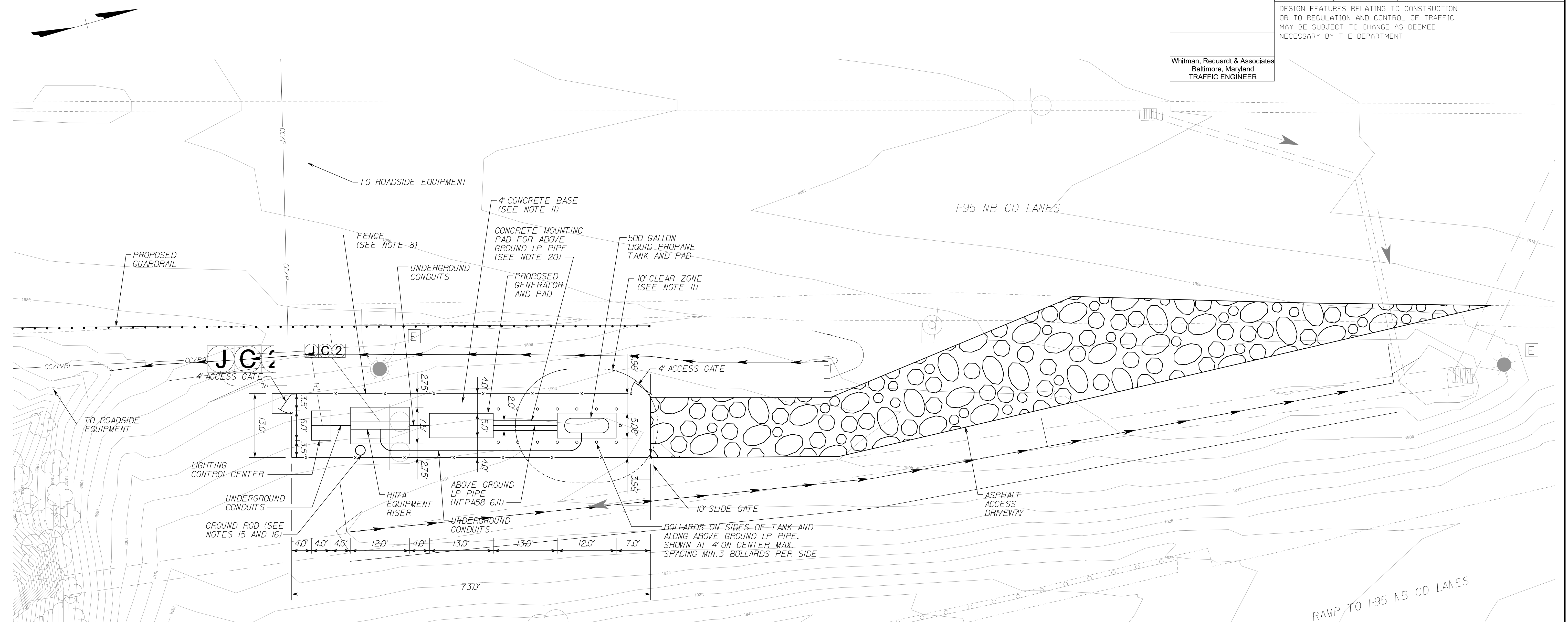
PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

GENERATOR H117A SITE PLAN

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2C1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



NOTES:

- ALL WORK SHALL COMPLY WITH SHEET NOTES AND TTMS SPECIAL PROVISIONS SECTION 819.
- SEE ITS PANEL BOARD SCHEDULES FOR GENERATOR CAPACITY.
- SEE SERVICE PANEL DETAILS ON SHEET 15(2D2) FOR EQUIPMENT AND CONDUIT ARRANGEMENT.
- CONTAINER SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH NFPA58, 2020 EDITION.
- REFUELING, EMERGENCY, AND MAINTENANCE ACCESS SHALL BE FROM ACCESS PATH FROM I-95 NORTHBOUND CD LANES.
- FOR PROPANE TANK AND PAD DETAILS REFER TO PROPANE TANK DETAIL, SHEET 15(2C3).
- PROPANE TANK SHALL BE GROUNDED PER MANUFACTURERS RECOMMENDATION.
- ENCLOSURE FENCE SHALL BE A MINIMUM OF 6' HIGH INDUSTRIAL-TYPE FENCE, CHAIN LINK FENCE, OR EQUIVALENT PROTECTION WITH INCORPORATED PRIVACY SCREENING MATERIAL. VINYL SLATS SHALL BE INSTALLED FOR PRIVACY FENCE SCREENING AT GENERATOR SITES.
- ALL EGRESS GATES SHALL BE SECURED BY LOCKS WITH KEYS, APPROVED BY THE CONCESSIONAIRE. CONCESSIONAIRE SHALL MAKE KEYS AVAILABLE TO COMPANY PROVIDING CONTRACTED MAINTENANCE AND APPROPRIATE AGENCIES AND DEPARTMENTS PROVIDING FOR PUBLIC SAFETY.
- VISIBLE HAZARD IDENTIFICATION SIGNS SHALL BE PLACED IN ACCORDANCE WITH NFPA 704 AND VA STATEWIDE FIRE PREVENTION CODE.
- OPEN AREA WITHIN THE FENCE SHALL BE COVERED WITH 4" CONCRETE BASE AND 10' CLEAR ZONE AROUND THE CONTAINER SYSTEM (DISTANCE SHALL BE MEASURED FROM THE EDGE OF THE TANK) SHALL BE COVERED WITH GRAVEL AGGREGATE BASE MATERIAL (TYPE 1, SIZE 21, 6 INCH DEPTH). GATE ACCESS SHALL BE COVERED WITH 4" CONCRETE BASE.

- ELECTRICAL EQUIPMENT AND WIRING INSTALLED SHALL BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.
- THE 95 EXPRESS LANES ENGINEER SHALL BE CONTACTED PRIOR TO FILLING PROPANE TANK TO ARRANGE SITE INSPECTION. CONTAINER SHALL BE FILLED ONLY AFTER DETERMINATION THAT IT COMPLIES WITH THE DESIGN, FABRICATION, INSPECTION, AND MARKING CODES.
- CONTAINER SITE SHALL MEET REQUIREMENTS FOR "LOW EMISSION TRANSFER SITE" (NFPA 6.7.3.4 AND 6.30.5)
- INTERCONNECT GENERATOR, SERVICE PANEL AND FENCE GROUND ROD ELECTRODES WITH #2 BARE TINNED SOLID CONDUCTOR. OTHER METALLIC STRUCTURES WITH PATHS TO GROUND SHALL BE CONNECTED TO THE GROUNDING CONDUCTOR IF THEY ARE LOCATED WITHIN 10' OF THE GROUNDING ELECTRODE SYSTEM.
- INSTALLATION AND TESTING OF THE GROUND RODS SHALL BE IN ACCORDANCE WITH VDOT 2020 ROAD AND BRIDGE SPECIFICATIONS SECTION 700.
- CONTRACTOR SHALL VERIFY EXISTING UTILITIES PRIOR TO THE INSTALLATION OF ANY EQUIPMENT. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCOVERED CONFLICTS.
- MAINTAIN A MINIMUM OF 3' CLEARANCE AROUND ALL SIDES OF EACH EQUIPMENT AND 3.5' IN FRONT OF ALL ELECTRICAL EQUIPMENT.
- SEE SHEET 15(9) FOR GENERATOR SITE LOCATION.
- INSTALL CONCRETE FOUNDATIONS FOR THE GENERATOR AND LIQUID PROPANE TANK PRIOR TO INSTALLING THE CONCRETE MOUNTING PAD FOR THE ABOVE GROUND LP PIPE. INSTALL 1/2" EXPANDED RUBBER JOINT SEALER BETWEEN THE MOUNTING PAD AND FOUNDATIONS. CENTER THE ABOVE GROUND LP PIPE ON THE MOUNTING PAD.

CROSS REFERENCES:

- 2B(10) GENERATOR SITE GRADING PLANS
- 15(2C3) PROPANE TANK DETAIL
- 15(2C4) GENERATOR CONNECTION DIAGRAM
- 15(2D2) DISTRIBUTION DETAIL H117A SERVICE PANEL

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	15(2C1)

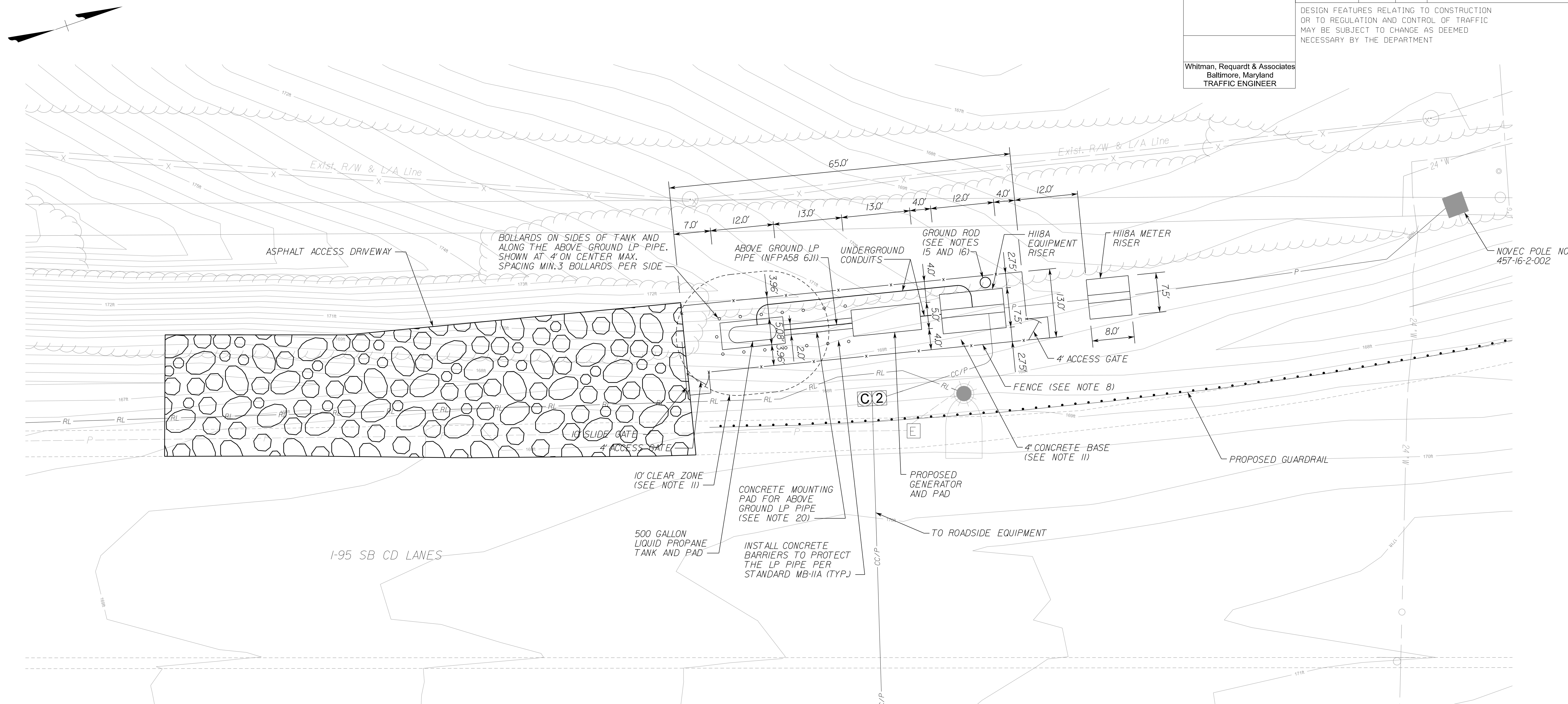
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140 07/07/2021

GENERATOR H118A SITE PLAN

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2C2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



NOTES:

- ALL WORK SHALL COMPLY WITH SHEET NOTES AND TTMS SPECIAL PROVISIONS SECTION 819.
- SEE ITS PANEL BOARD SCHEDULES FOR GENERATOR CAPACITY.
- SEE SERVICE PANEL DETAILS ON SHEET 15(2D1) FOR EQUIPMENT AND CONDUIT ARRANGEMENT.
- CONTAINER SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH NFPA58, 2020 EDITION.
- REFUELING, EMERGENCY, AND MAINTENANCE ACCESS SHALL BE FROM ACCESS PATH FROM I-95 SOUTHBOUND CD LANES.
- FOR PROPANE TANK AND PAD DETAILS REFER TO PROPANE TANK DETAIL, SHEET 15(2C3).
- PROPANE TANK SHALL BE GROUNDED PER MANUFACTURERS RECOMMENDATION.
- ENCLOSURE FENCE SHALL BE A MINIMUM OF 6' HIGH INDUSTRIAL-TYPE FENCE, CHAIN LINK FENCE, OR EQUIVALENT PROTECTION WITH INCORPORATED PRIVACY SCREENING MATERIAL. VINYL SLATS SHALL BE INSTALLED FOR PRIVACY FENCE SCREENING AT GENERATOR SITES.
- ALL EGRESS GATES SHALL BE SECURED BY LOCKS WITH KEYS, APPROVED BY THE CONCESSIONAIRE. CONCESSIONAIRE SHALL MAKE KEYS AVAILABLE TO COMPANY PROVIDING CONTRACTED MAINTENANCE AND APPROPRIATE AGENCIES AND DEPARTMENTS PROVIDING FOR PUBLIC SAFETY.
- VISIBLE HAZARD IDENTIFICATION SIGNS SHALL BE PLACED IN ACCORDANCE WITH NFPA 704 AND VA STATEWIDE FIRE PREVENTION CODE.
- OPEN AREA WITHIN THE FENCE SHALL BE COVERED WITH 4" CONCRETE BASE AND 10' CLEAR ZONE AROUND THE CONTAINER SYSTEM (DISTANCE SHALL BE MEASURED FROM THE EDGE OF THE TANK) SHALL BE COVERED WITH GRAVEL AGGREGATE BASE MATERIAL (TYPE 1, SIZE 21, 6 INCH DEPTH). GATE ACCESS SHALL BE COVERED WITH 4" CONCRETE BASE.

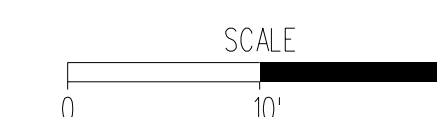
- ELECTRICAL EQUIPMENT AND WIRING INSTALLED SHALL BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.
- THE 95 EXPRESS LANES ENGINEER SHALL BE CONTACTED PRIOR TO FILLING PROPANE TANK TO ARRANGE SITE INSPECTION. CONTAINER SHALL BE FILLED ONLY AFTER DETERMINATION THAT IT COMPLIES WITH THE DESIGN, FABRICATION, INSPECTION, AND MARKING CODES.
- CONTAINER SITE SHALL MEET REQUIREMENTS FOR "LOW EMISSION TRANSFER SITE" (NFPA 67.3.4 AND 6.30.5)
- INTERCONNECT GENERATOR, SERVICE PANEL AND FENCE GROUND ROD ELECTRODES WITH #2 BARE TINNED SOLID CONDUCTOR. OTHER METALLIC STRUCTURES WITH PATHS TO GROUND SHALL BE CONNECTED TO THE GROUNDING CONDUCTOR IF THEY ARE LOCATED WITHIN 10' OF THE GROUNDING ELECTRODE SYSTEM.
- INSTALLATION AND TESTING OF THE GROUND RODS SHALL BE IN ACCORDANCE WITH VDOT 2020 ROAD AND BRIDGE SPECIFICATIONS SECTION 700.
- CONTRACTOR SHALL VERIFY EXISTING UTILITIES PRIOR TO THE INSTALLATION OF ANY EQUIPMENT. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCOVERED CONDUITS.
- MAINTAIN A MINIMUM OF 3' CLEARANCE AROUND ALL SIDES OF EACH EQUIPMENT AND 3.5' IN FRONT OF ALL ELECTRICAL EQUIPMENT.
- SEE SHEET 15(16) FOR GENERATOR SITE LOCATION.
- INSTALL CONCRETE FOUNDATIONS FOR THE GENERATOR AND LIQUID PROPANE TANK PRIOR TO INSTALLING THE CONCRETE MOUNTING PAD FOR THE ABOVE GROUND LP PIPE. INSTALL 1/2" EXPANDED RUBBER JOINT SEALER BETWEEN THE MOUNTING PAD AND FOUNDATIONS. CENTER THE ABOVE GROUND LP PIPE ON THE MOUNTING PAD.

CROSS REFERENCES:

- 2B(9) GENERATOR SITE GRADING PLANS
- 15(2C3) PROPANE TANK DETAIL
- 15(2C4) GENERATOR CONNECTION DIAGRAM
- 15(2D1) DISTRIBUTION DETAIL H118A SERVICE PANEL

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	15(2C2)

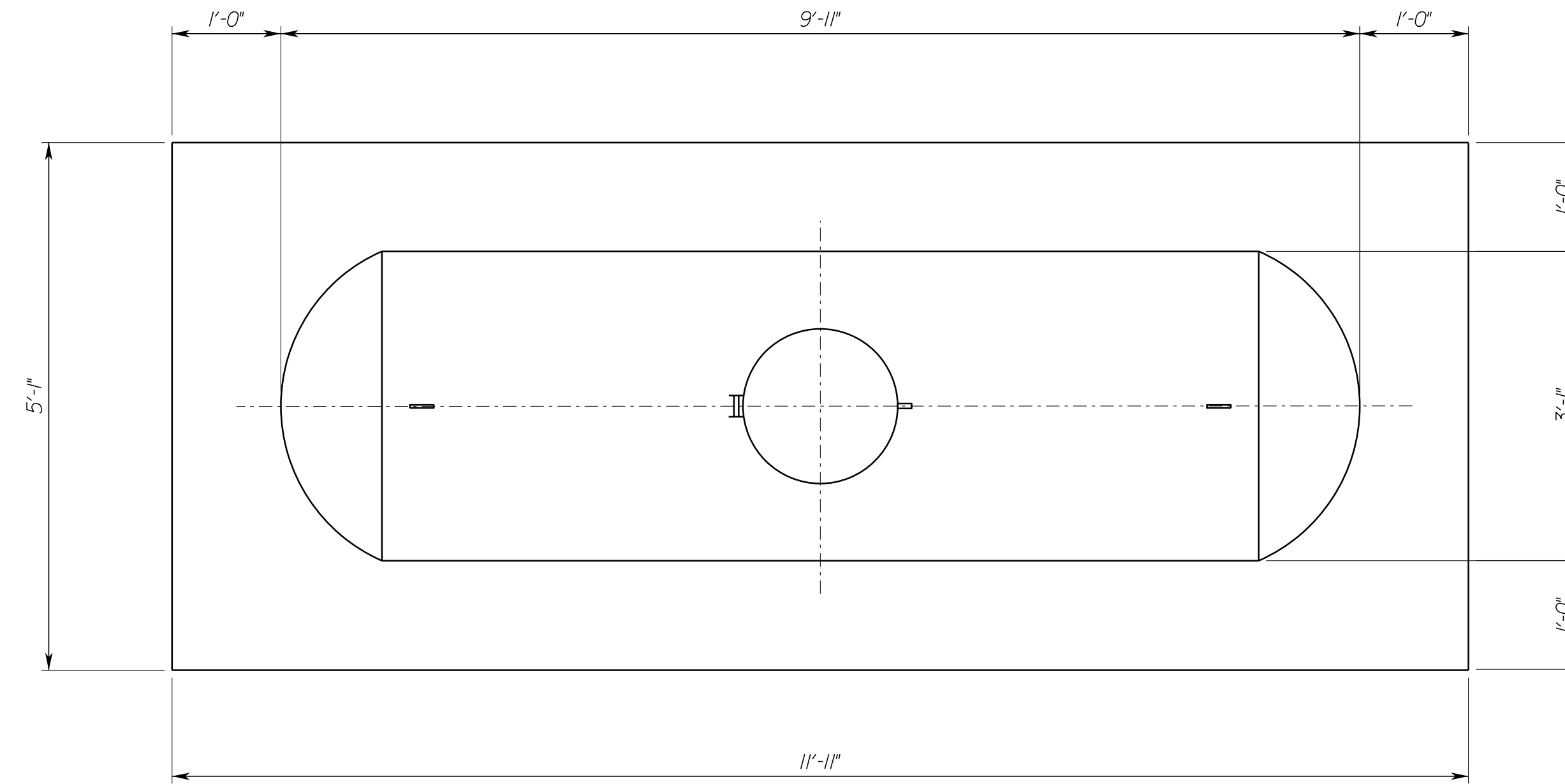
PROJECT MANAGER *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7740, 07/07/2021*

PROPANE TANK DETAIL

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(2C3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



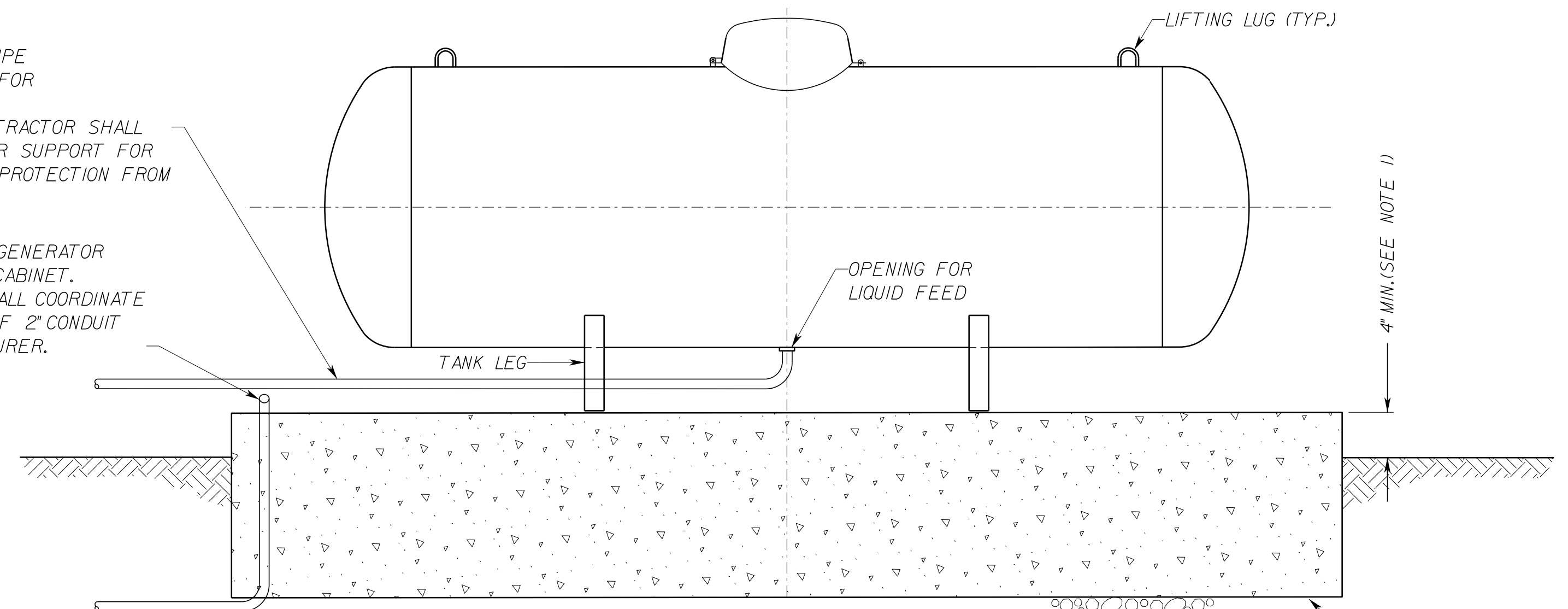
PLAN VIEW
NTS

NOTES:

1. CONSTRUCT TANK SLAB SO TANK BOTTOM IS HIGHER THAN GENERATOR FUEL INTAKE.
2. TANK SHALL BE ASME AMERICAN WELDING AND TANK, LLC OR APPROVED EQUAL CONTAINER, IT SHALL BE IN COMPLIANCE WITH NFPA58 6.6.3, 5.2.4, AND 5.2.5 AND SPECIAL PROVISIONS SECTION 819.
3. CONTAINER SHALL BE MARKED WITH HAZARD IDENTIFICATION SIGNS AS PROVIDED IN THE REGULATIONS, RULES, OR CODE UNDER WHICH THEY ARE FABRICATED AND IN ACCORDANCE WITH NFPA58 5.2.8 AND NFPA704.
4. TANK SHALL BE INSTALLED LEVEL, WITH ALL LEGS IN SAME PLANE TO ASSURE EVEN DISTRIBUTION OF LOADS AND OPTIMIZE ACCURACY OF GAUGE DEVICE.
5. CONCRETE PAD AND SUBBASE SHALL BE DESIGNED BY CONTRACTOR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
6. TANK, APPURTENANCES AND INSTALLATION SHALL COMPLY WITH NFPA58.
7. TANK SHALL BE PAINTED IN ACCORDANCE WITH NFPA58 6.6.1.4.
8. THREADS OF ALL FITTINGS TO BE COATED WITH COMPOUND SUITABLE FOR USE WITH LP GAS.
9. THE DOME HASP AND HINGE SHALL BE GALVANIZED OR GALVALUME TO ELIMINATE THE RUST AT CONNECTIONS AND SHALL NOT BE WELDED TO THE TANK.
10. DEVICE MEASURING THE AMOUNT OF LIQUID PROPANE AND TRANSMITTER SHALL BE PLACED UNDER THE DOME.
11. PROPANE TANK SHALL HAVE DATA PLATE IN ACCORDANCE WITH NFPA58 5.2.8.3.
12. LIQUID PROPANE VAPORIZER, REGULATOR AND CONTAINMENT SEPARATOR SHALL BE INSTALLED BETWEEN THE GENERATOR AND PROPANE TANK WITH THE CAPACITY SIZED APPROPRIATELY FOR THE RESPECTIVE GENERATOR SIZE. CONTRACTOR TO PROVIDE REQUIRED EQUIPMENT LAYOUT AND DESIGN FOR APPROVAL.

ABOVEGROUND PIPE TO GENERATOR FOR PROPANE PER NFPA58 6.9. CONTRACTOR SHALL PROVIDE PROPER SUPPORT FOR THE PIPE AND PROTECTION FROM CORROSION.

2" CONDUIT TO GENERATOR COMMUNICATION CABINET. CONTRACTOR SHALL COORDINATE THE LOCATION OF 2" CONDUIT WITH MANUFACTURER.



SIDE VIEW
NTS

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2C3)
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PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

GENERATOR CONNECTION DIAGRAM

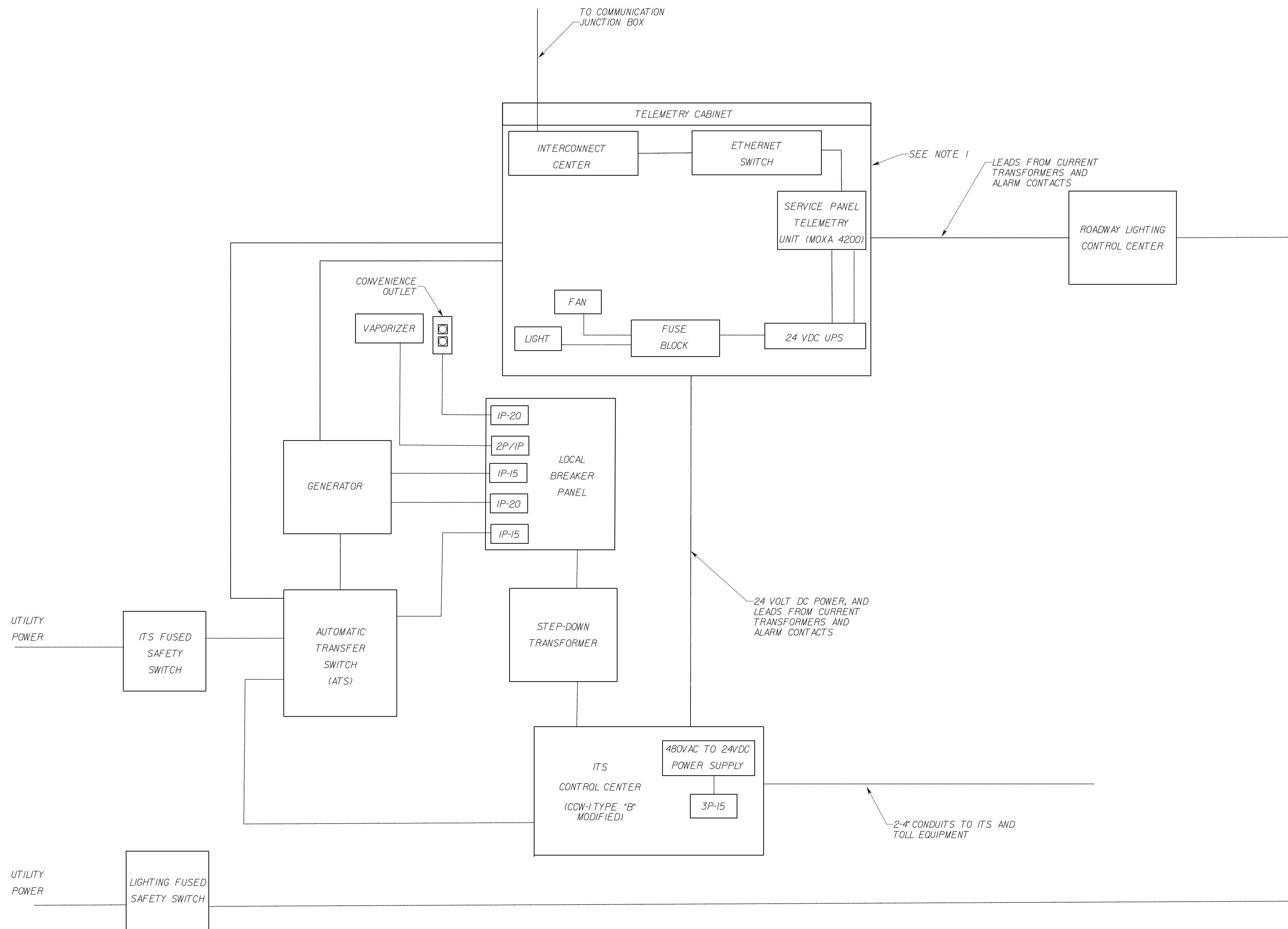
REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	15(2C4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

NOTES:

- SEE SPECIAL PROVISION GENERATOR ASSEMBLIES FOR TELEMTRY STATION SECTION.
- DEVICES VARY BY SITE. SEE SERVICE PANEL DETAILS FOR DEVICES.
- BREAKER SIZE AND CAPACITY VARIES DEPENDING ON THE SELECTED VAPORIZER MODEL.



GENERATOR BREAKERS

IP-20	CONVENIENCE OUTLET
IP-15	120V BATTERY CHARGER
IP-20	120V COOLANT HEATER
IP-15	TRANSFER SWITCH CONTROLLER
2P/IP	VAPORIZER (SEE NOTE 3)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	SHEET NO.
N.T.S.	15(2C4)
0095-076-299	

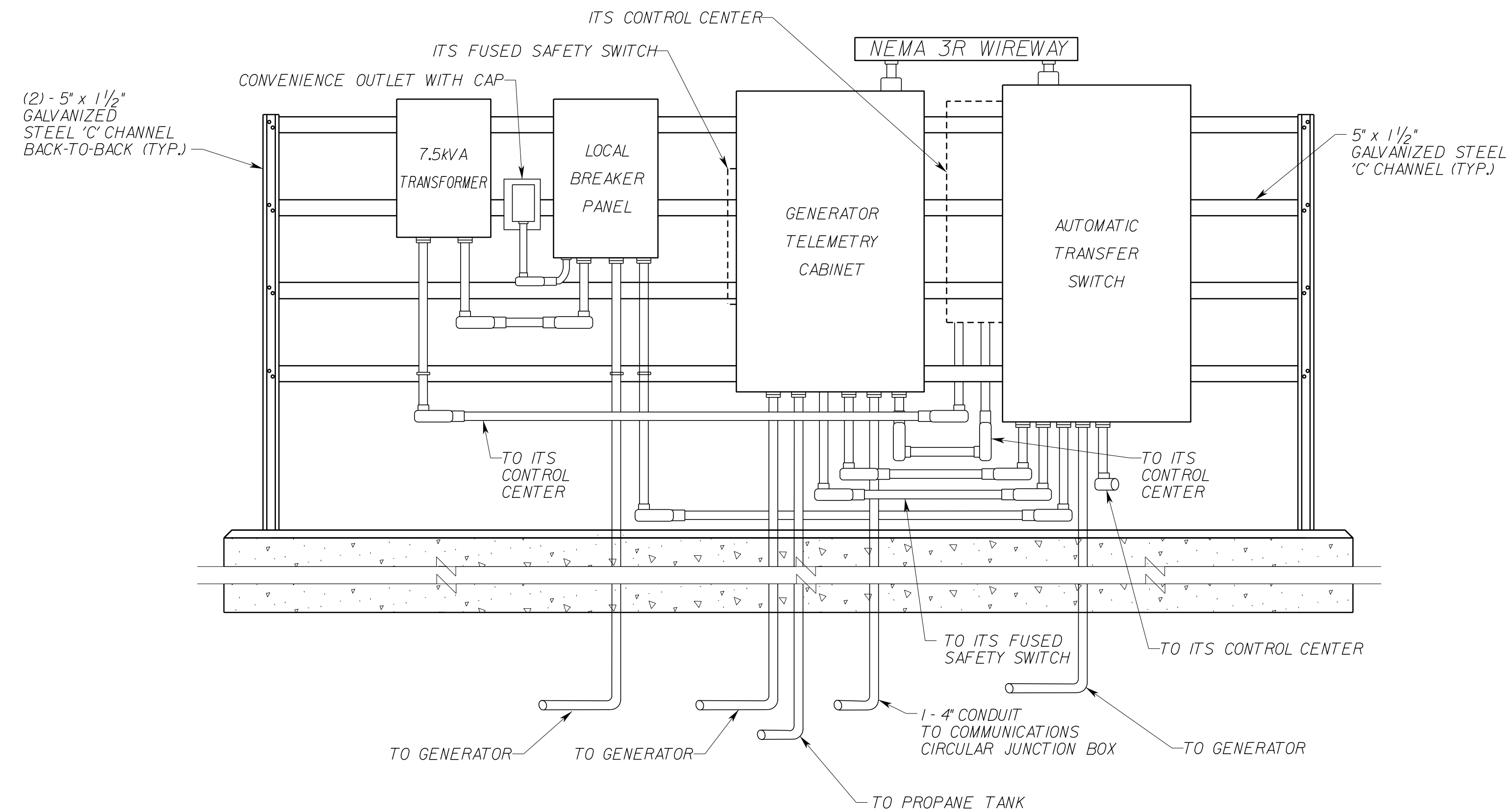
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

H118A POWER EQUIPMENT AND SERVICE RISER DETAILS

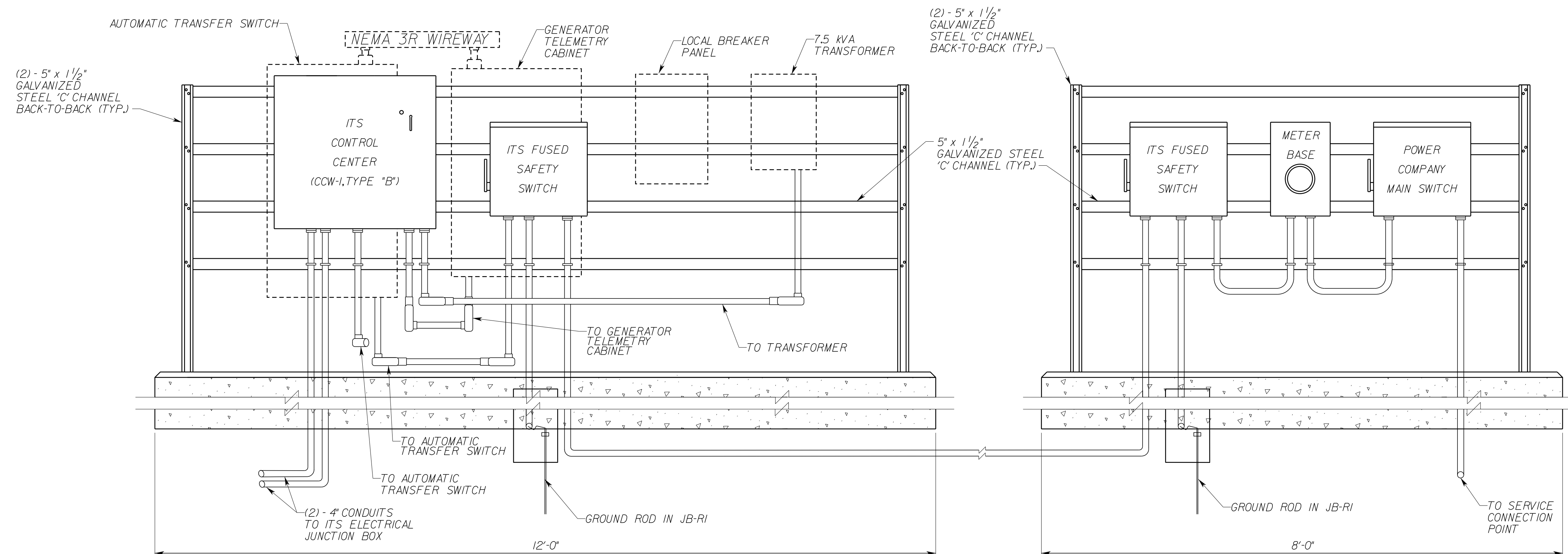
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2D1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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 Baltimore, Maryland
 TRAFFIC ENGINEER



H118A EQUIPMENT RISER - BACK FACE
 NTS



H118A EQUIPMENT RISER - FRONT FACE
 NTS

H118A METER RISER - FRONT FACE
 NTS

NOTES:

- ALL EXPOSED CONDUITS SHALL BE GALVANIZED RIGID STEEL.
- ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED $\frac{3}{4}$ \times $\frac{1}{2}$ INCHES.
- GROUNDING BUSHINGS SHALL BE INSTALLED ON EACH END OF METAL CONDUITS.
- BELL ENDS SHALL BE INSTALLED ON THE ENDS OF PVC CONDUITS.
- LOCAL POWER COMPANY WILL INSTALL SERVICE CABLE FROM ITS POWER SOURCE TO THE POWER COMPANY MAIN SWITCH AND METER BASE.
- ALL ENCLOSURES, CABINETS AND WIREWAYS SHALL BE ATTACHED TO THE CHANNELING WITH $\frac{3}{8}$ " GALVANIZED BOLTS, LOCK WASHERS AND NUTS. FOUR CROSS CHANNELS SHALL BE UTILIZED.
- EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE $\frac{1}{4}$ " DEEP AND 4" TO 6" LONG.
- THIS DETAIL IS APPLICABLE FOR 277V/480V ELECTRICAL SERVICE ONLY.
- THE CONTRACTOR SHALL COORDINATE WITH THE LOCAL POWER COMPANY TO LEAVE A SUFFICIENT AMOUNT OF CONDUCTOR CABLE TO PERMIT THE LOCAL POWER COMPANY TO MAKE ITS CONNECTION TO THE METER.
- ALL ENCLOSURES SHALL MEET NEMA 3R SPECIFICATIONS AND REQUIREMENTS.
- INSTALL GROUND RODS AND JUNCTION BOXES IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS 2020 SECTION 700. TESTING OF GROUND RODS SHALL BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS SECTION 700.
- CONTRACTOR SHALL PROVIDE FINAL DESIGN OF THE RISERS BASED ON FIELD CONDITIONS TO THE ENGINEER FOR APPROVAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING DIMENSIONS OF ALL EQUIPMENT TO BE PROVIDED SO THAT FINAL DIMENSIONS OF STRUCTURES THAT EQUIPMENT IS MOUNTED ON CAN BE CONFIRMED AND TO CONFIRM THERE ARE NO CONFLICTS.
- SEE SHEET 15(2D3) FOR POWER EQUIPMENT AND SERVICE RISER FOUNDATION DETAILS.
- THE CONTRACTOR SHALL COORDINATE WITH NOVEC (JOSEPH BERRY, ELECTRIC UTILITY DESIGNER, 709-754-5756, JBERRY@NOVEC.COM) FOR THE INSTALLATION OF THE ELECTRIC SERVICE CONNECTION EQUIPMENT. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH NOVEC'S ELECTRICIAN'S GUIDE.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2D1)
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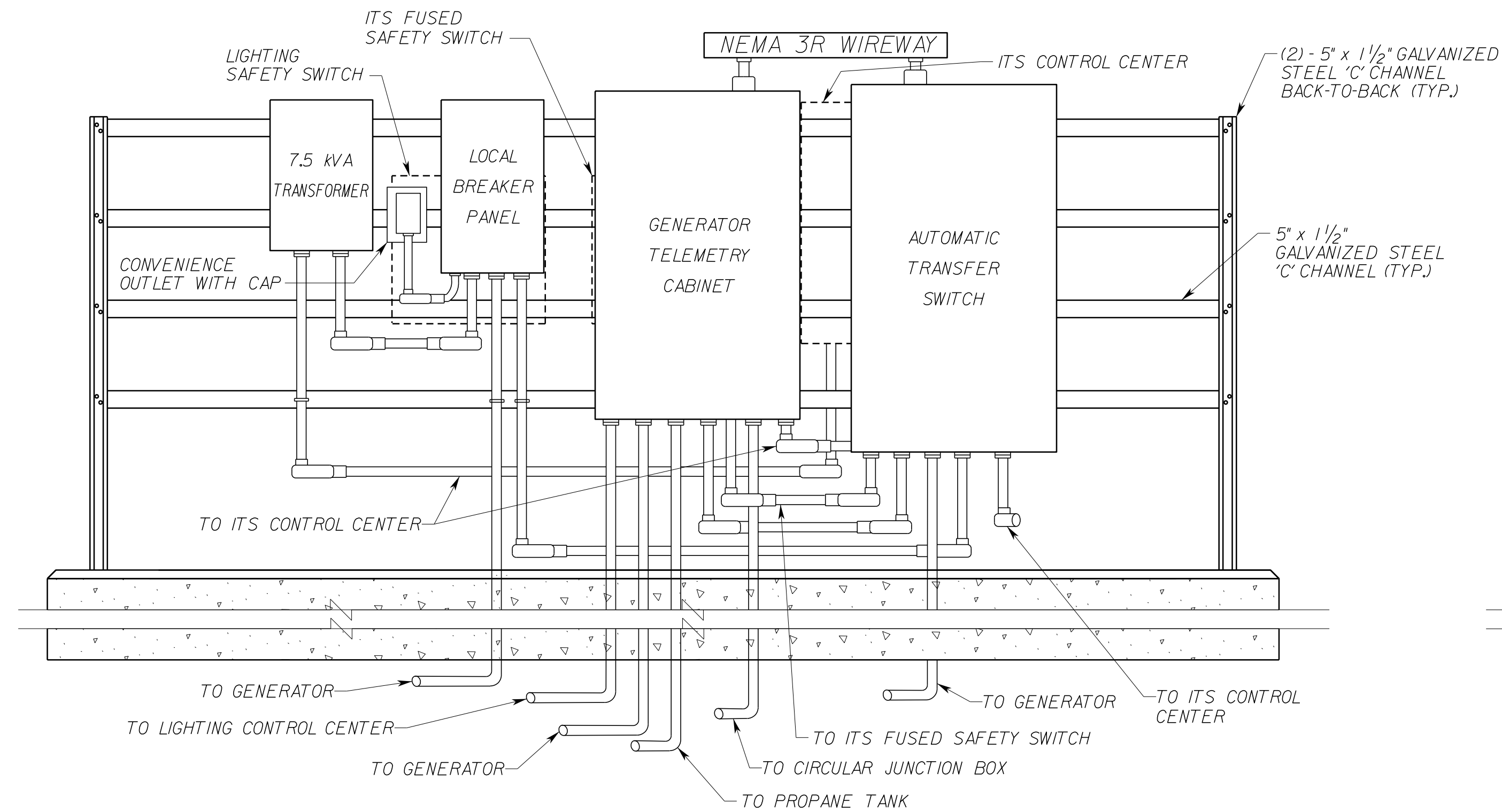
PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accurmark, Inc. (804) 550-7140, 07/07/2021

H117A POWER EQUIPMENT AND SERVICE RISER DETAILS

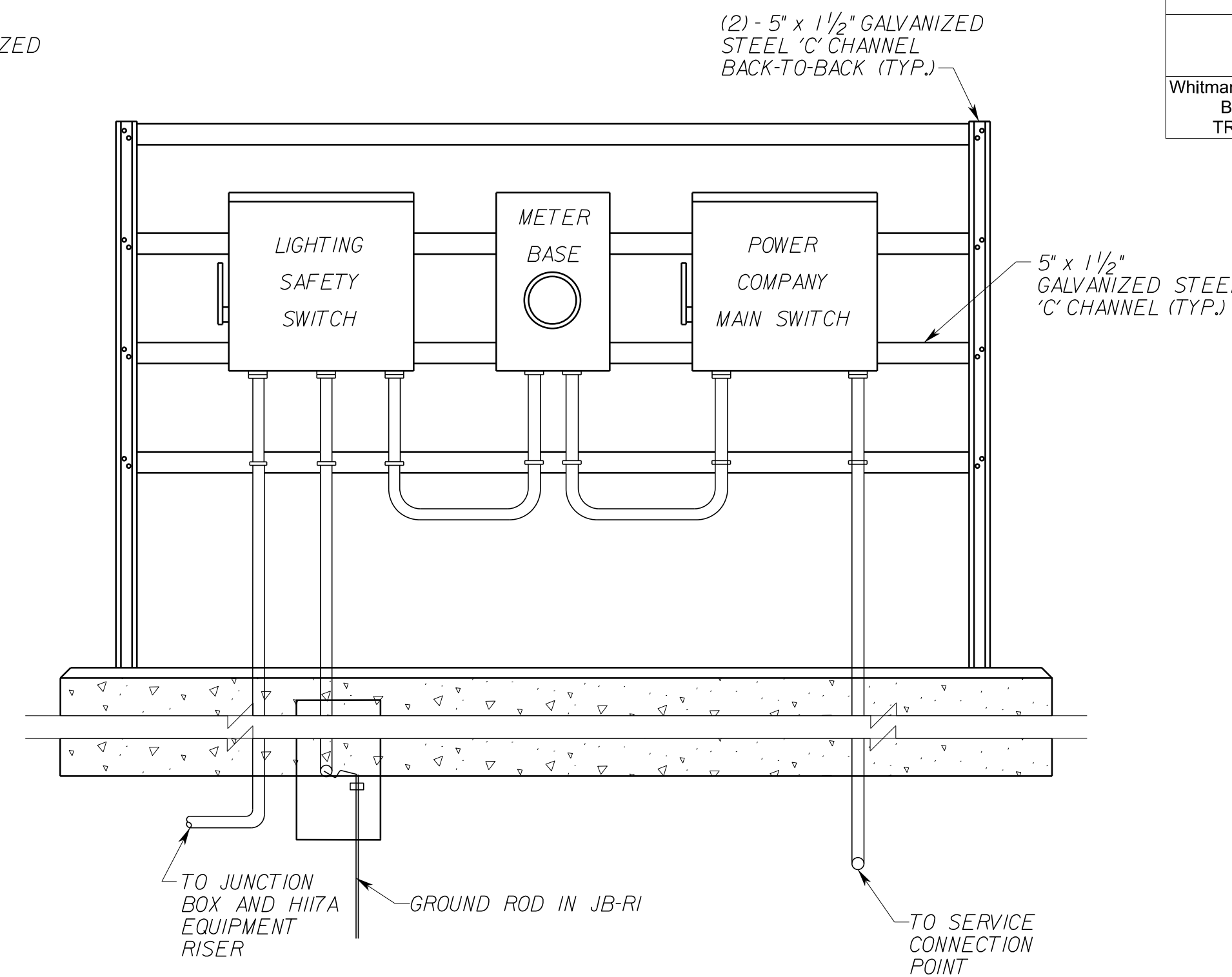
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2D2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

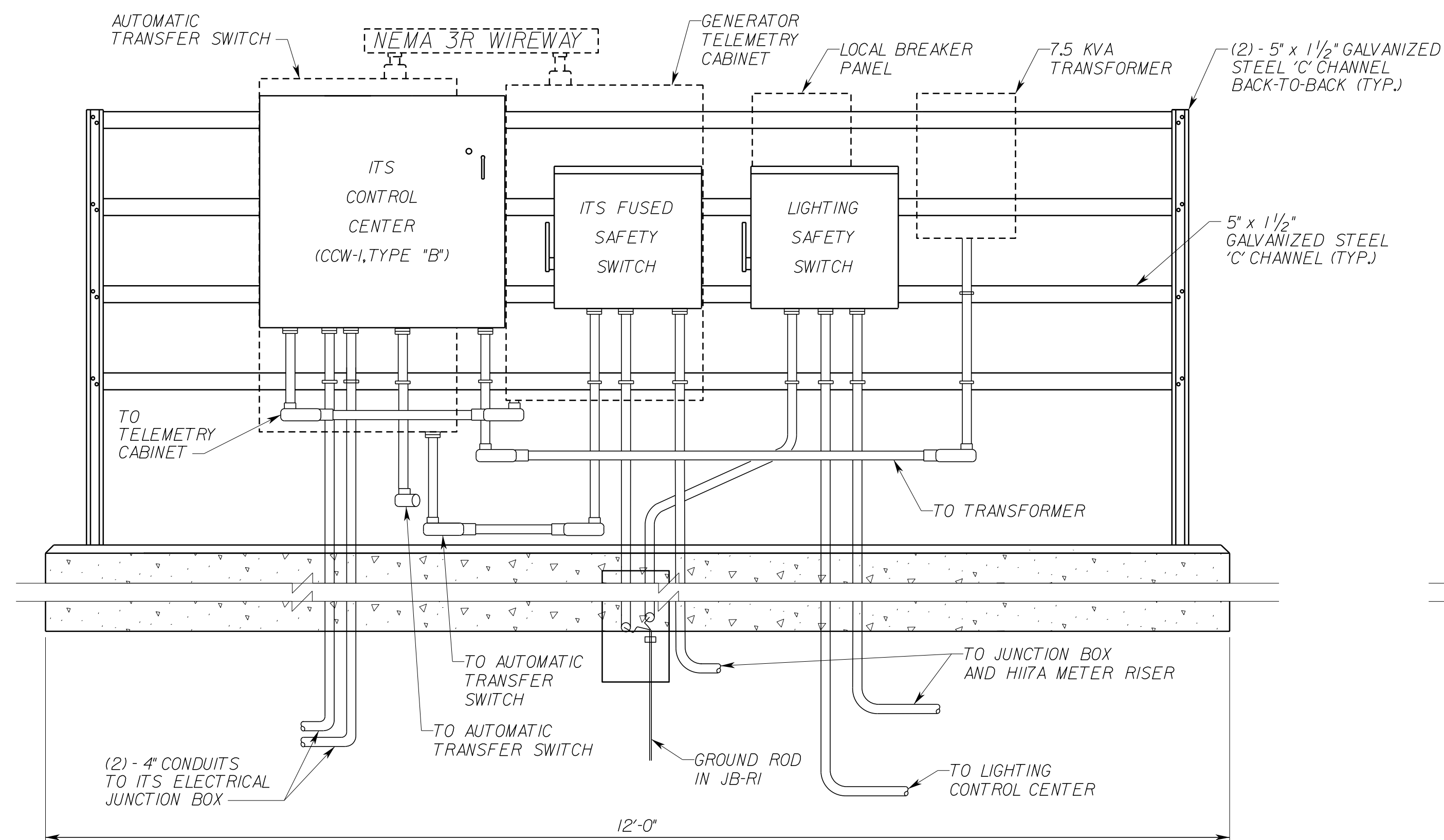
Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



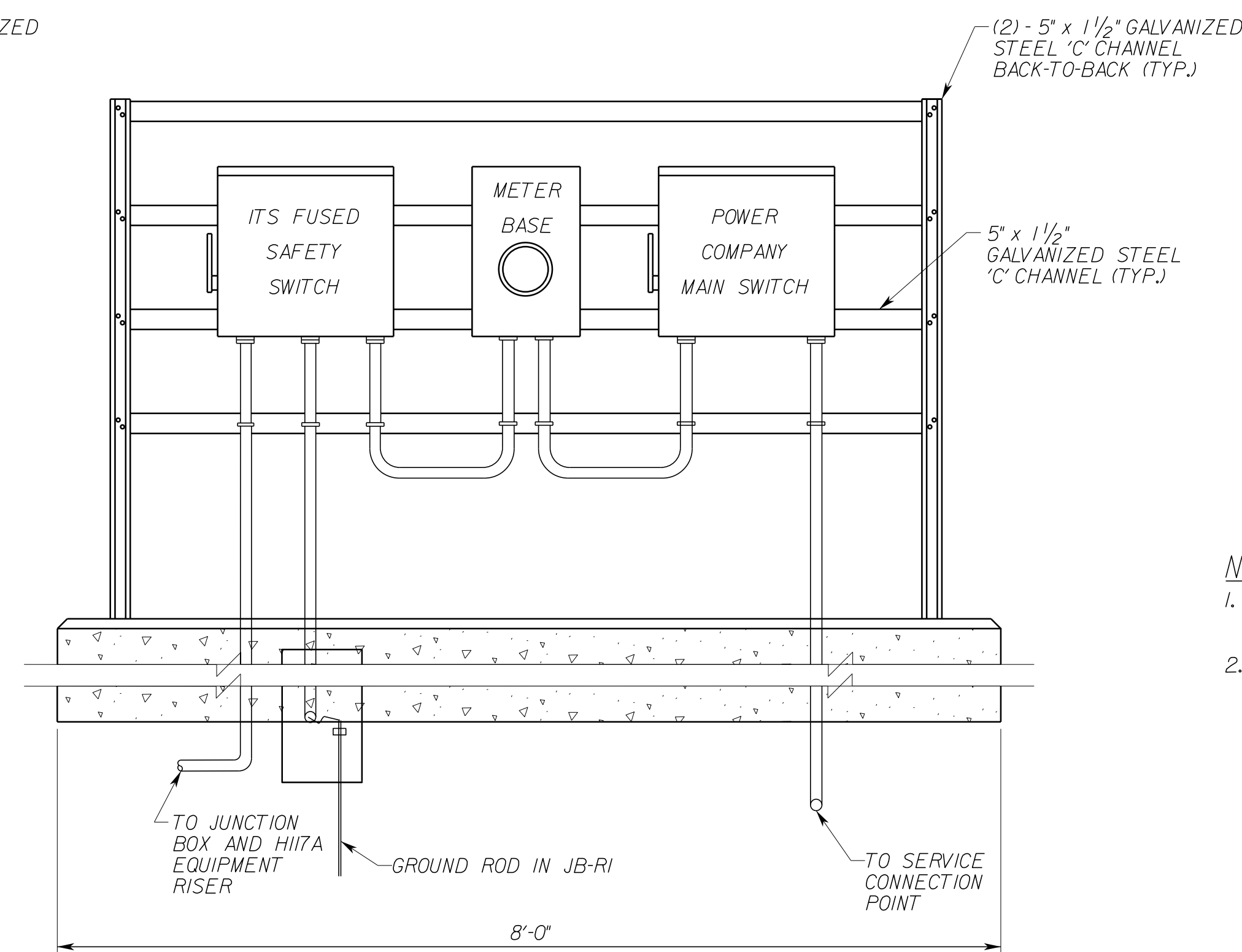
H117A EQUIPMENT RISER - BACK FACE
 NTS



H117A METER RISER - BACK FACE
 NTS



H117A EQUIPMENT RISER - FRONT FACE
 NTS



H117A METER RISER - FRONT FACE
 NTS

- NOTES:**
- SEE SHEET 15(2D1) FOR NOTES APPLICABLE TO THESE DETAILS.
 - SEE SHEET 15(2D3) FOR LIGHTING CONTROL CENTER AND POWER EQUIPMENT AND SERVICE RISER FOUNDATION DETAILS.

PAC PLANS

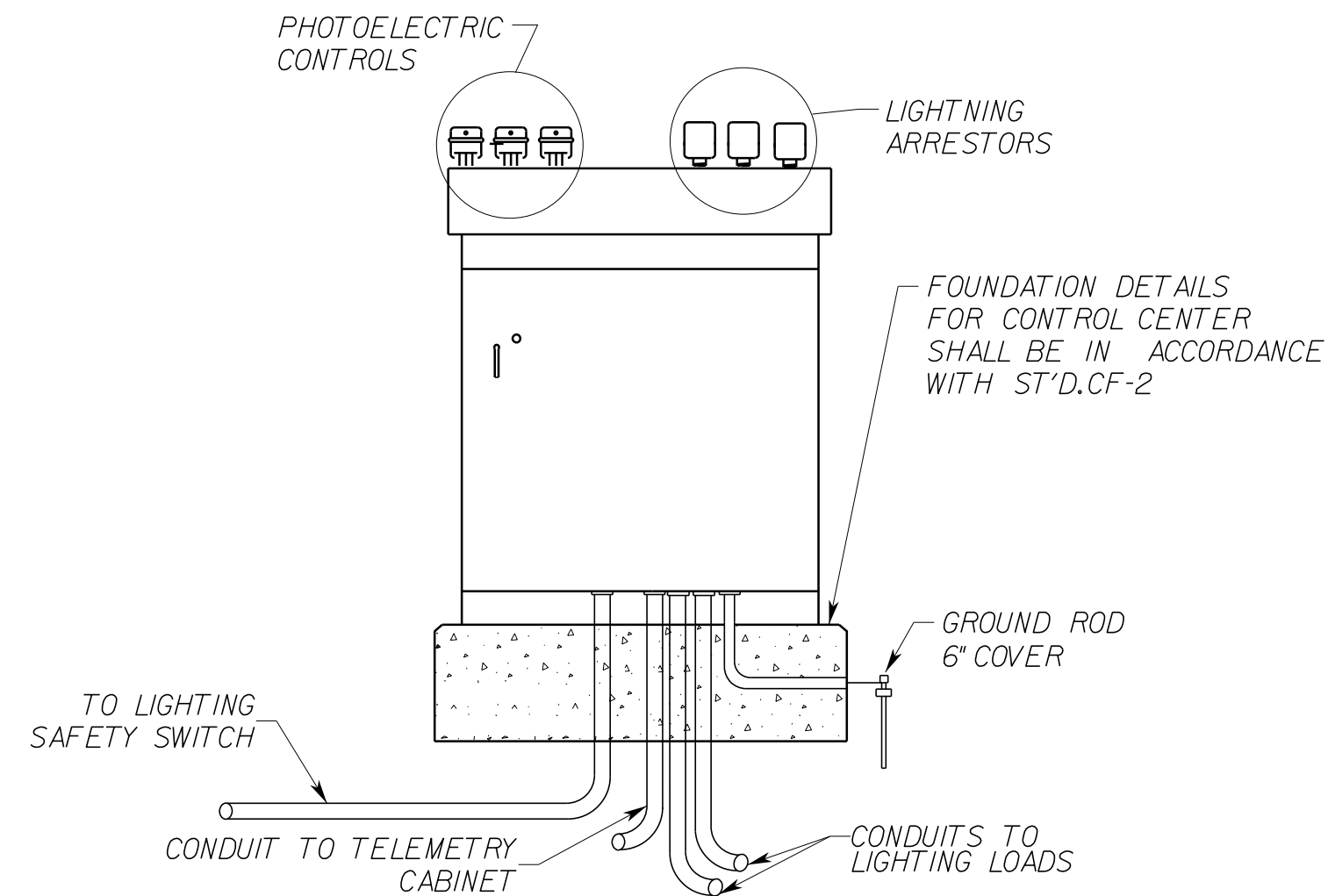
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2D2)
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PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

ROADWAY LIGHTING CONTROL CENTER AND POWER EQUIPMENT AND SERVICE RISER FOUNDATION DETAILS

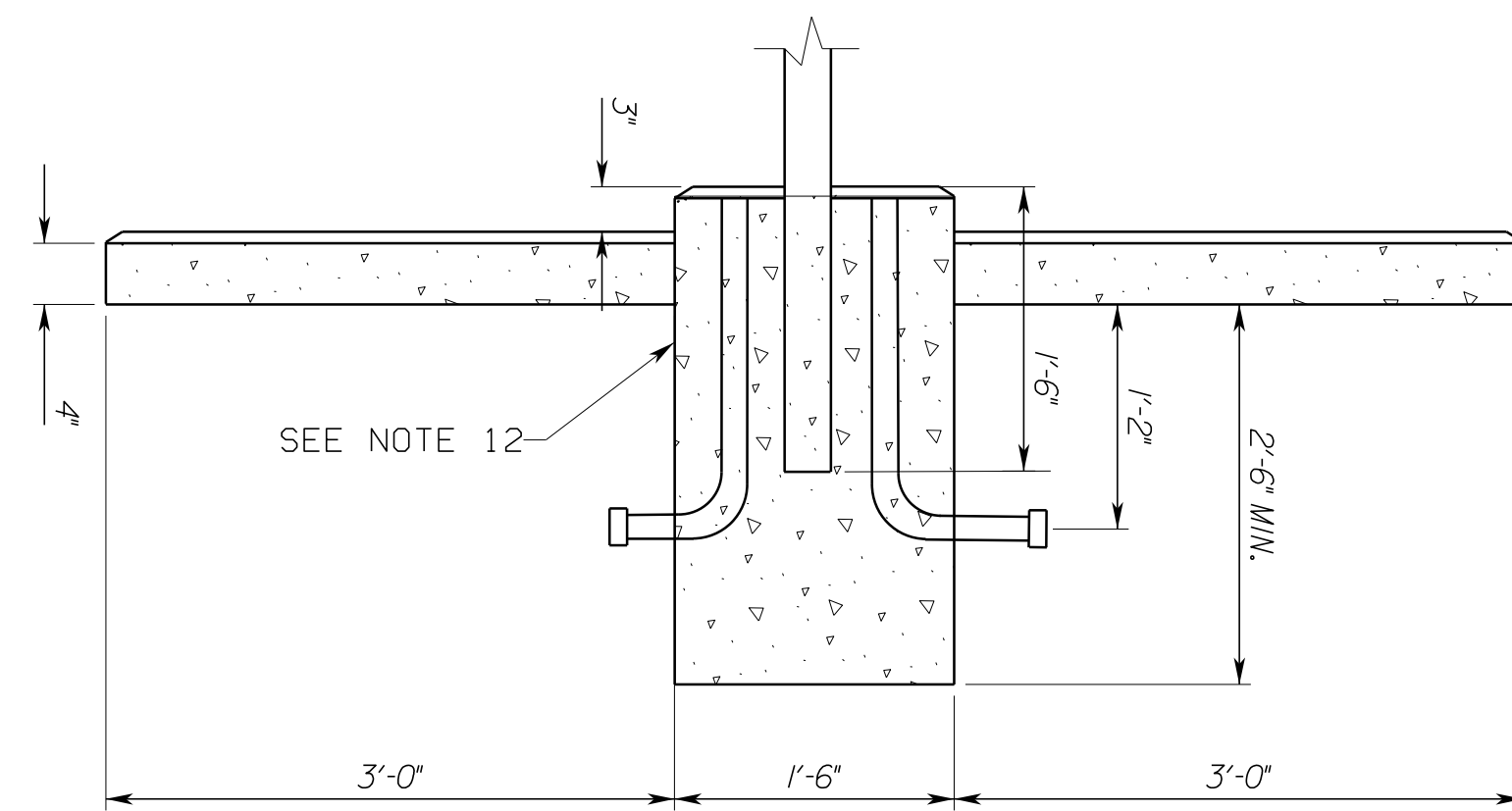
REVISED	STATE		STATE		SHEET NO.
	STATE	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501		15(2D3)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER					



**ROADWAY LIGHTING
 CONTROL CENTER
 CCW-1 TYPE "H" MODIFIED**
 NTS

NOTES:

1. ALL EXPOSED CONDUITS SHALL BE GALVANIZED RIGID STEEL.
2. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED $\frac{3}{4}$ " \times $\frac{1}{2}$ INCHES.
3. GROUNDING BUSHINGS SHALL BE INSTALLED ON EACH END OF METAL CONDUITS.
4. BELL ENDS SHALL BE INSTALLED ON THE ENDS OF PVC CONDUITS.
5. LOCAL POWER COMPANY WILL INSTALL SERVICE CABLE FROM ITS POWER SOURCE TO THE CURRENT TRANSFORMER CABINET AND METER BASE.
6. EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE $\frac{1}{4}$ " DEEP AND 4" TO 6" LONG.
7. THIS DETAIL IS APPLICABLE FOR 277/480V ELECTRICAL SERVICE ONLY.
8. THE CONTRACTOR SHALL COORDINATE WITH THE LOCAL POWER COMPANY TO LEAVE A SUFFICIENT AMOUNT OF CONDUCTOR CABLE COILED INSIDE THE CURRENT TRANSFORMER CABINET TO PERMIT THE LOCAL POWER COMPANY TO MAKE ITS CONNECTION.
9. ALL ENCLOSURES SHALL MEET NEMA 3R SPECIFICATIONS AND REQUIREMENTS.
10. LIGHTNING ARRESTORS SHALL BE 277 VOLTS, DELTA LIGHTNING ARRESTOR MODEL LA 601 OR APPROVED EQUAL.
11. INSTALL GROUND RODS AND JUNCTION BOXES IN ACCORDANCE WITH 2020 VDOT ROAD AND BRIDGE SPECIFICATIONS SECTION 700. TESTING OF GROUND RODS SHALL BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATIONS SECTION 700.
12. CONTRACTOR SHALL PROVIDE FINAL DESIGN OF THE RISERS BASED ON FIELD CONDITIONS TO THE ENGINEER FOR APPROVAL.



EQUIPMENT AND METER RISER FOUNDATION DETAIL - SIDE VIEW
 NTS

PAC PLANS

THESE PLANS ARE UNFINISHED
 AND ARE NOT TO BE USED FOR
 ANY TYPE OF CONSTRUCTION.

N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2D3)
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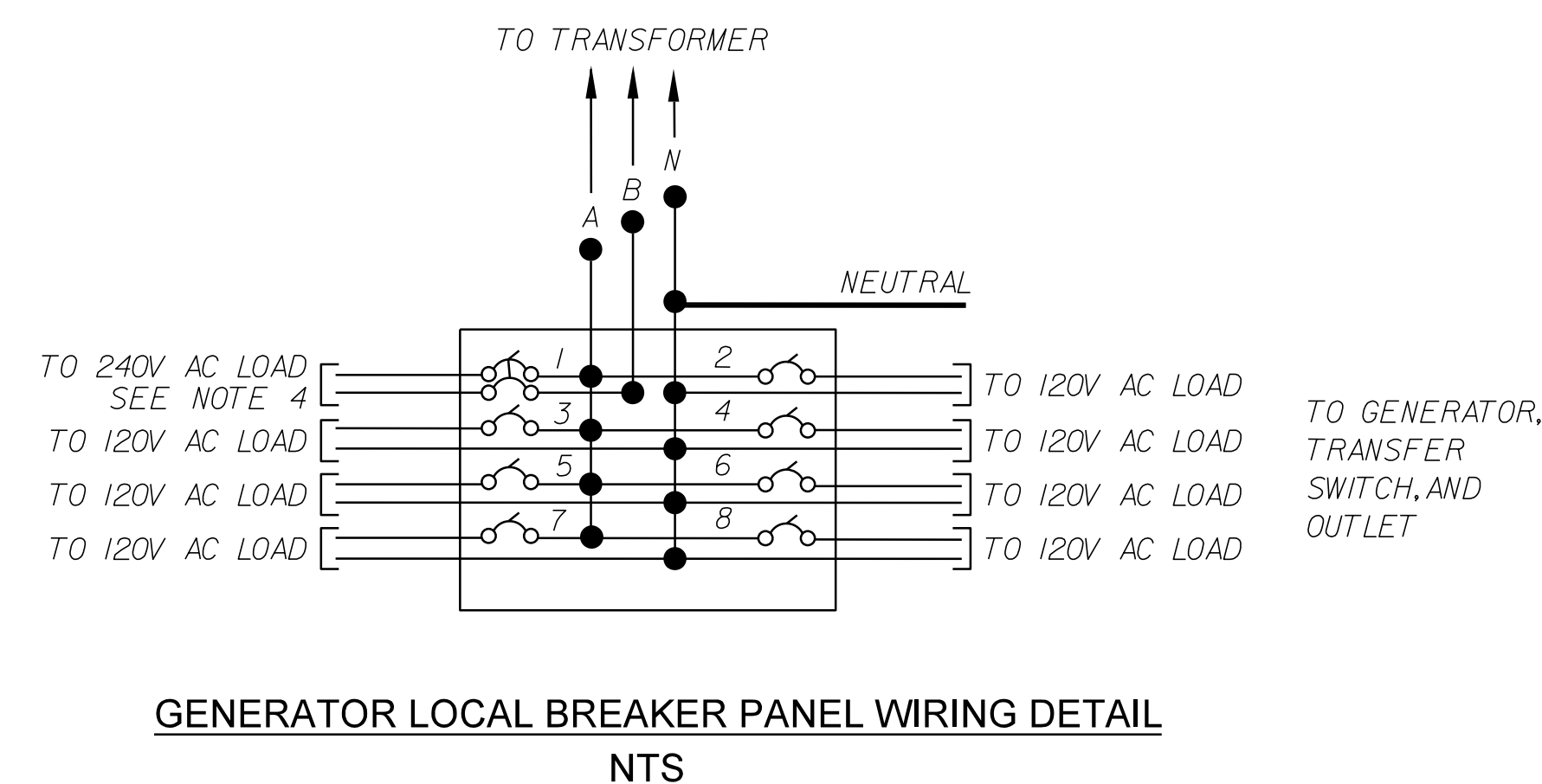
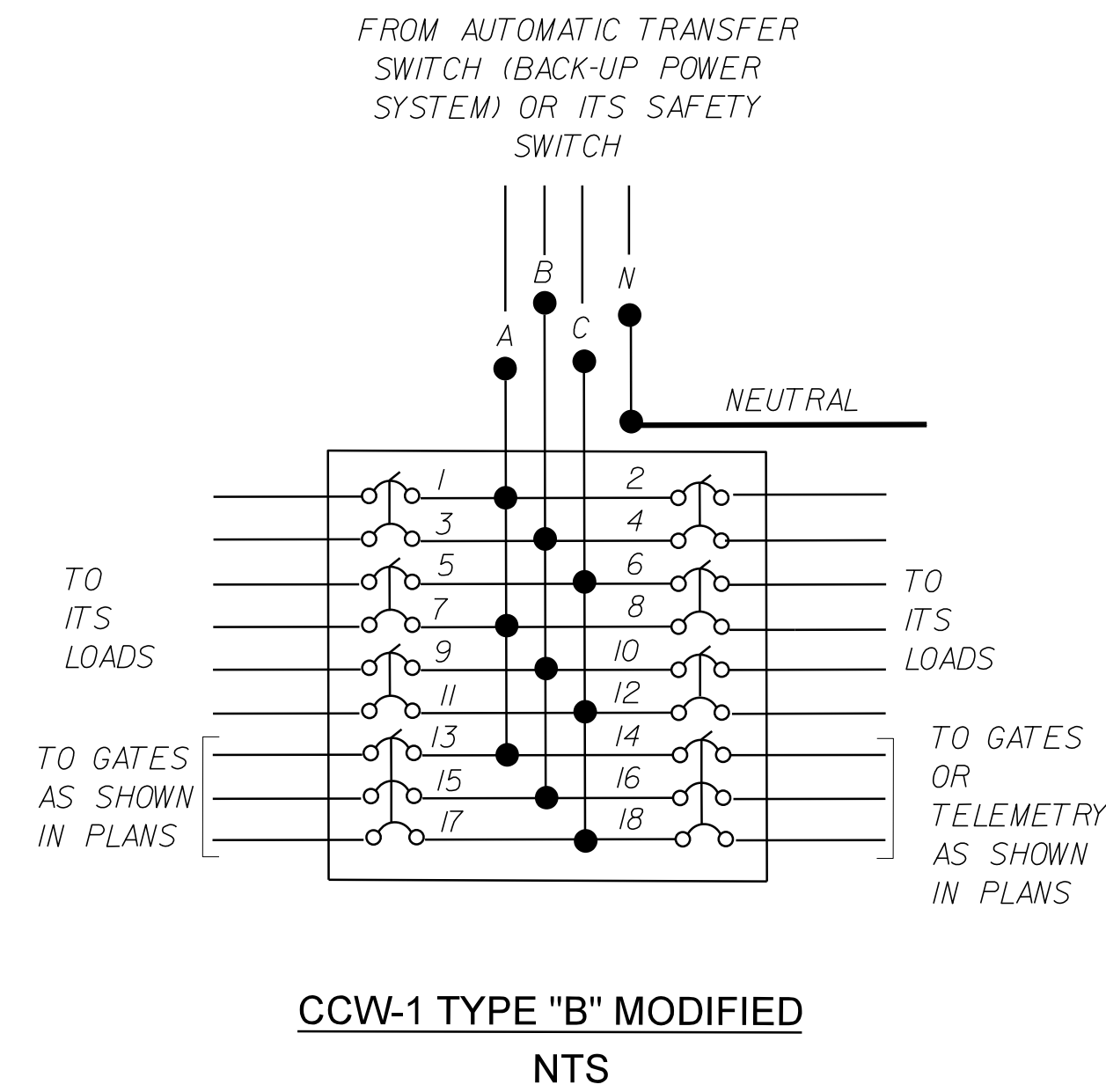
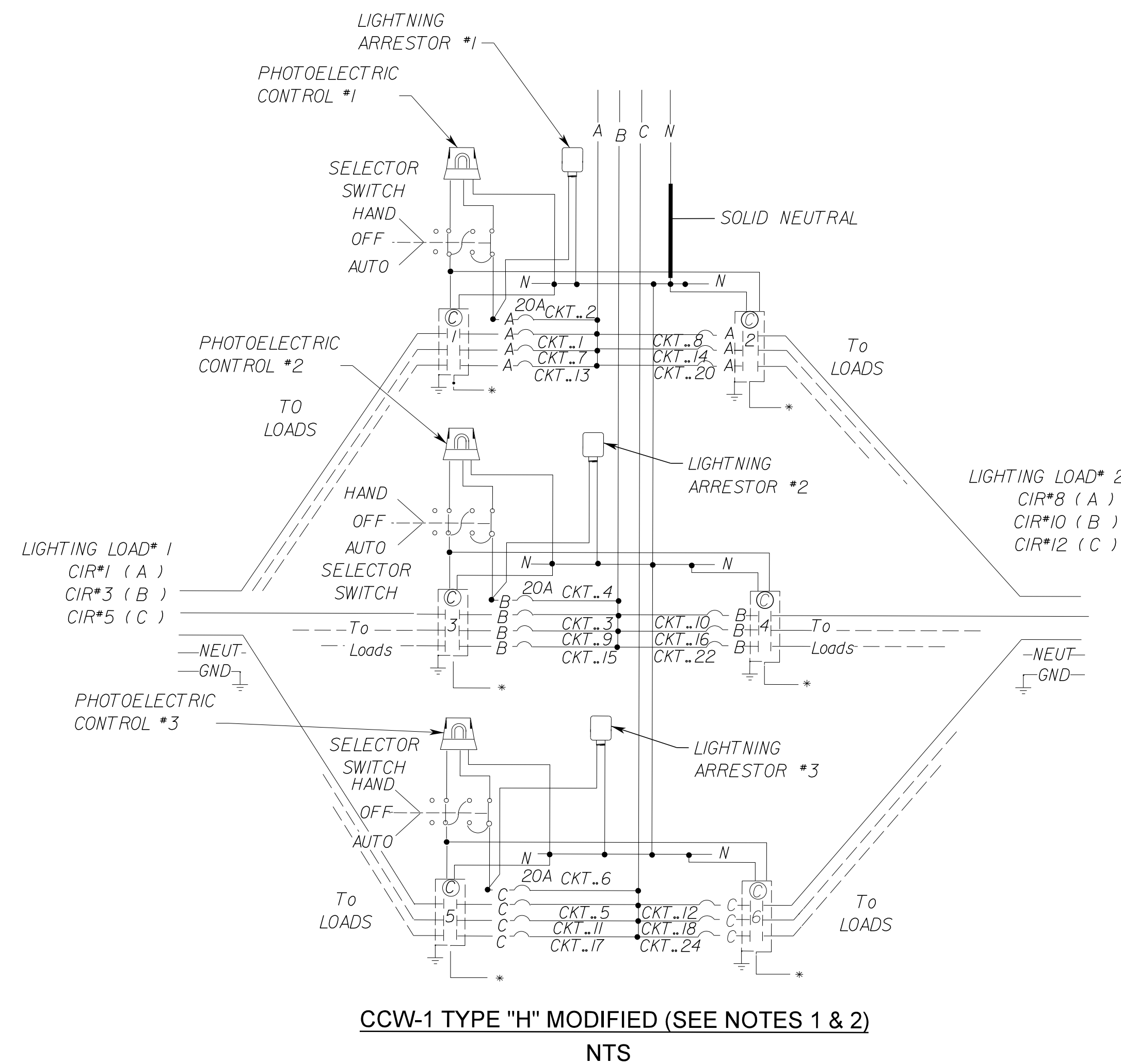
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

CONTROL CENTER AND BREAKER PANEL WIRING DETAILS

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2D4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



AMP RATING	CONDUIT SIZE	CONDUCTOR SIZE
30 AMP	1"	#8
60 AMP	1 1/4"	#6
100 AMP	1 1/2"	#2
200 AMP	2"	#000
300 AMP	2 1/2"	250 MCM
400 AMP	3 1/2"	500 MCM

NOTES:

- CONTACTORS SHALL HAVE 3 POLES FOR THREE PHASE SERVICES. NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING UTILIZED.
- IN THE CCW-1, TYPE H MODIFIED, ALL CIRCUIT BREAKERS SHALL BE SINGLE POLE. VOLTAGE AND CURRENT RATING OF CONTACTORS AND BREAKERS SHALL BE AS INDICATED ON THE PLANS.
- NUMBER OF CIRCUITS SHOWN ARE TYPICAL. EXACT NUMBER REQUIRED SHALL BE AS INDICATED IN THE PLANS.
- VAPORIZER CONNECTION IS ONLY APPLICABLE TO SERVICE PANEL SITES WITH GENERATORS. VAPORIZER WIRING MAY VARY DEPENDING ON THE SELECTED VAPORIZER MODEL.
- IF NEEDED, CONTRACTOR SHALL INSTALL A SPLICE JUNCTION BOX OR WIRING TROUGH IN ORDER TO REDUCE CONDUCTOR SIZES FOR TERMINATION ON DISCONNECT SWITCHES OR CIRCUIT BREAKERS.
- ALL SERVICE PANELS SHALL BE CAPABLE OF MONITORING AND REPORTING ALARMS FOR THE MAIN POWER AND EACH BRANCH CIRCUIT. THE CURRENT FLOW, AND ANY TRIPPED BREAKERS, PROVIDE TELEMETRY EQUIPMENT AT EACH EXPRESS LANES CONTROL CENTER TO REPORT THE CURRENT AND BREAKER STATUS OF EACH CIRCUIT AND MAIN POWER. THE TELEMETRY EQUIPMENT SHALL BE CAPABLE OF PROVIDING STATUS INFORMATION FOR TROUBLESHOOTING POWER RELATED OUTAGES AND HELP TO DETERMINE IF THE TROUBLE IS A LOSS OF POWER FROM THE UTILITY PROVIDER, A TRIPPED CIRCUIT BREAKER, OR SEVERED DISTRIBUTION LINE BETWEEN THE CONTROL CENTER AND THE FIELD DEVICE.

PAC PLANS

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N.T.S.	PROJECT 0095-076-299	SHEET NO. 15(2D4)
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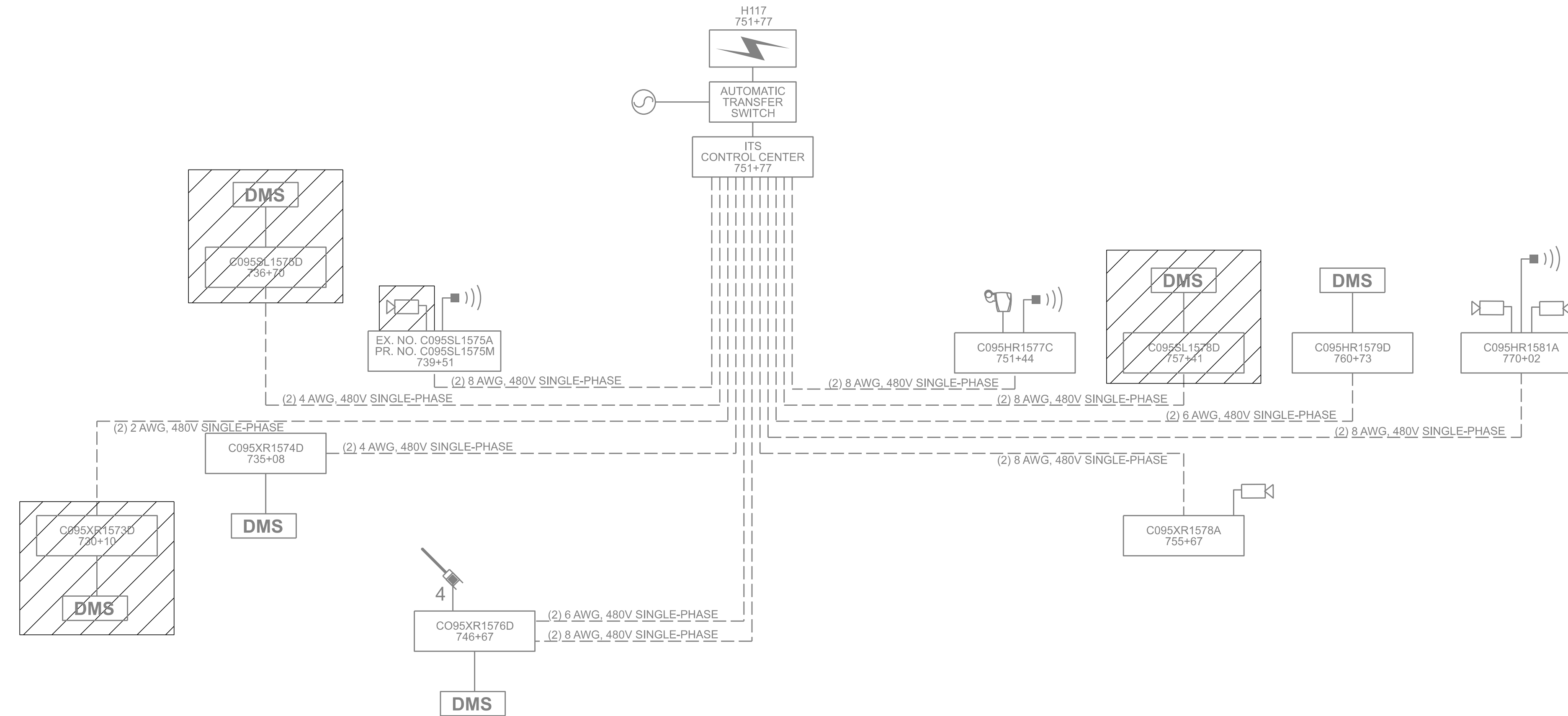
PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

POWER DISTRIBUTION DIAGRAM - H117



NOTES:
 1. CIRCUIT INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED ON THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		UTILITY ELECTRIC SERVICE			GENERATOR
		POWER CABLE			N/A
		GATE			TTMS CABINET / TTMS CONTROL CENTER
		MICROWAVE VEHICLE DETECTOR			EXISTING EQUIPMENT TO BE REMOVED
		PTZ CCTV CAMERA			FIXED CCTV CAMERA
		AID CAMERA			
		DYNAMIC MESSAGE SIGN			

PAC PLANS

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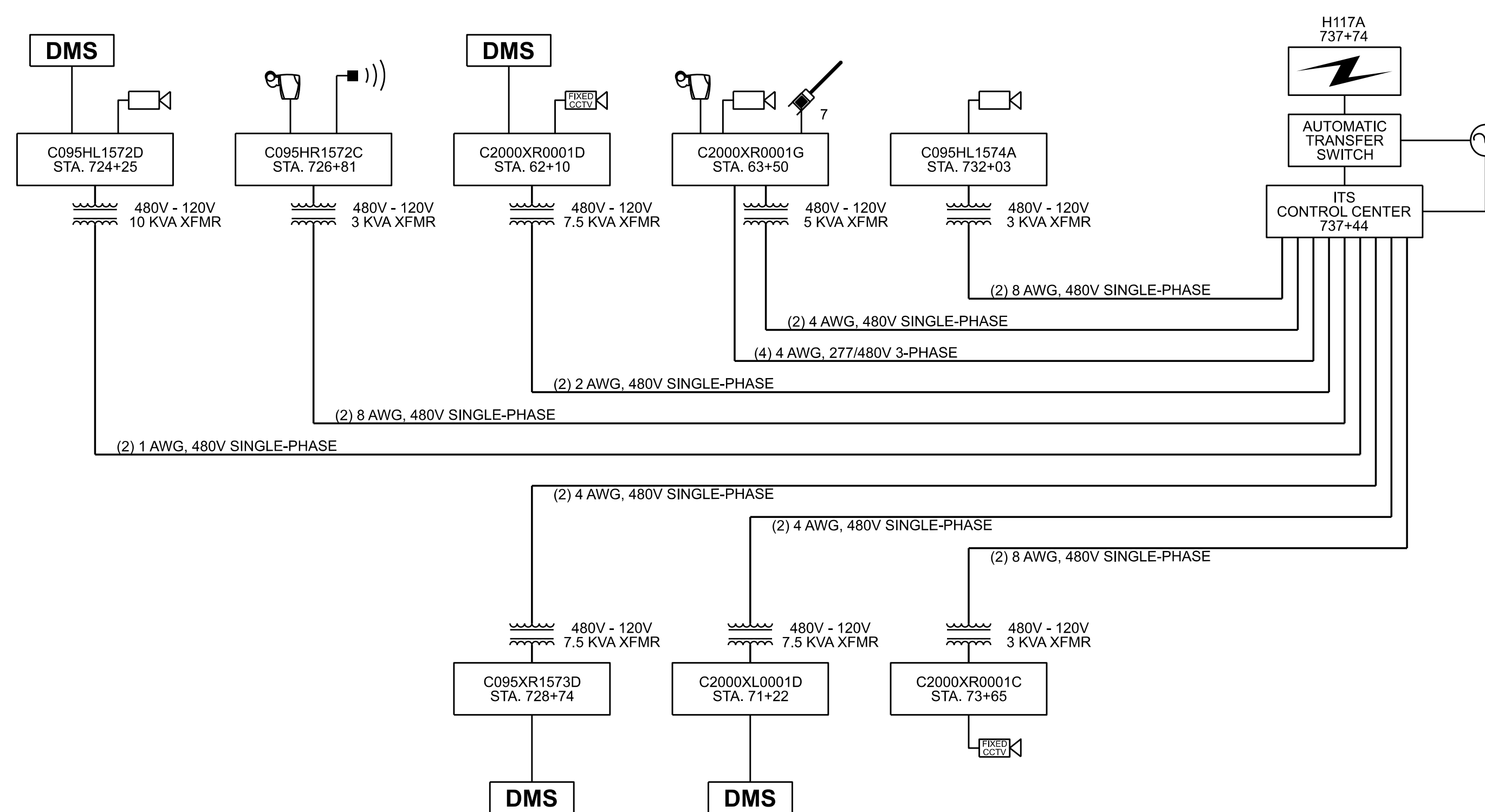
PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E2)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

POWER DISTRIBUTION DIAGRAM - H117A



LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		UTILITY ELECTRIC SERVICE			GENERATOR
		POWER CABLE		N/A	TOLL TAG READER & ENFORCEMENT
		GATE			TTMS CABINET / TTMS CONTROL CENTER
		MICROWAVE VEHICLE DETECTOR	N/A		EXISTING EQUIPMENT TO BE REMOVED
		PTZ CCTV CAMERA	N/A		FIXED CCTV CAMERA
		AID CAMERA			
		DYNAMIC MESSAGE SIGN			

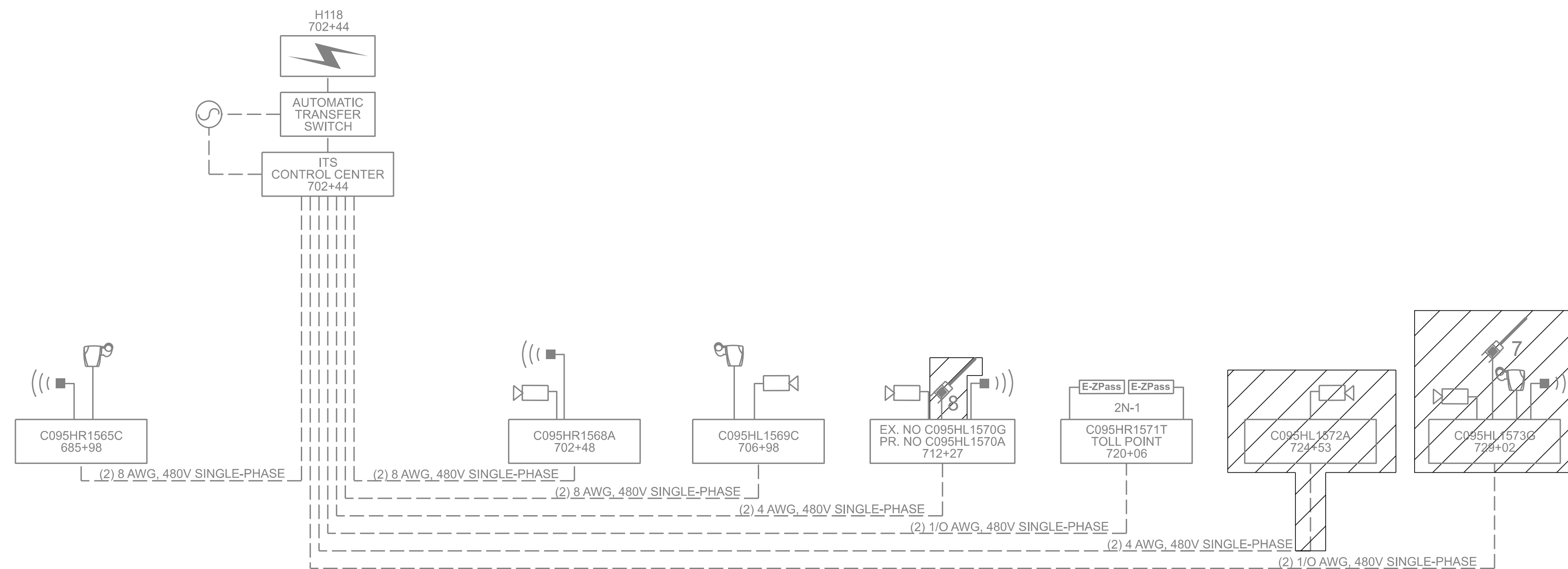
PAC PLANS

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PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E3)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				

POWER DISTRIBUTION DIAGRAM - HI18



LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		UTILITY ELECTRIC SERVICE			GENERATOR
		POWER CABLE			TOLL TAG READER & ENFORCEMENT
		GATE			TTMS CABINET / TTMS CONTROL CENTER
		MICROWAVE VEHICLE DETECTOR			EXISTING EQUIPMENT TO BE REMOVED
		PTZ CCTV CAMERA			FIXED CCTV CAMERA
		DYNAMIC MESSAGE SIGN			

NOTES:

1. CIRCUIT INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED ON OF THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT
0095-076-299

SHEET NO.
15(2E3)

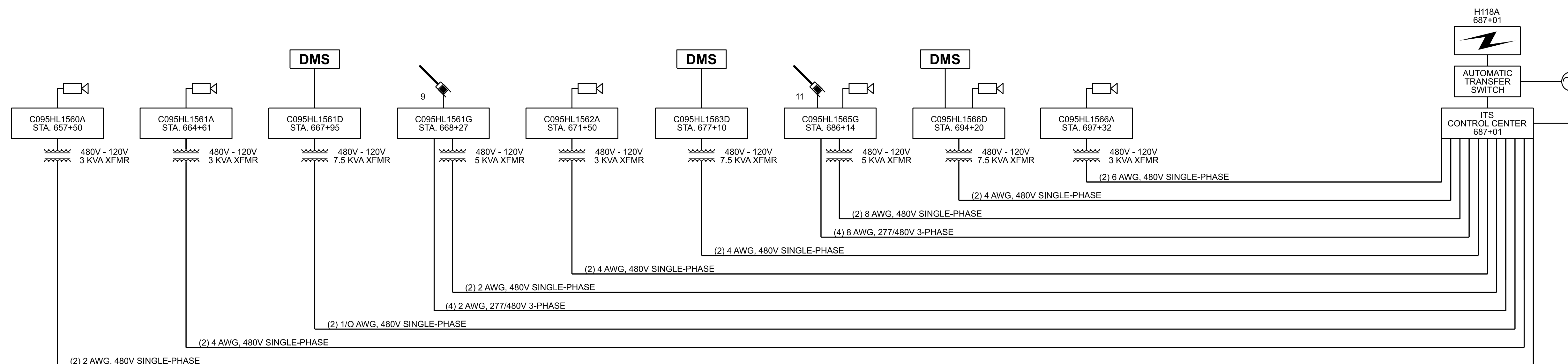
PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

POWER DISTRIBUTION DIAGRAM - H118A



LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		UTILITY ELECTRIC SERVICE			GENERATOR
		POWER CABLE			TOLL TAG READER & ENFORCEMENT
		GATE			TTMS CABINET / TTMS CONTROL CENTER
		MICROWAVE VEHICLE DETECTOR			EXISTING EQUIPMENT TO BE REMOVED
		PTZ CCTV CAMERA			FIXED CCTV CAMERA
		AID CAMERA			
		DYNAMIC MESSAGE SIGN			

PAC PLANS

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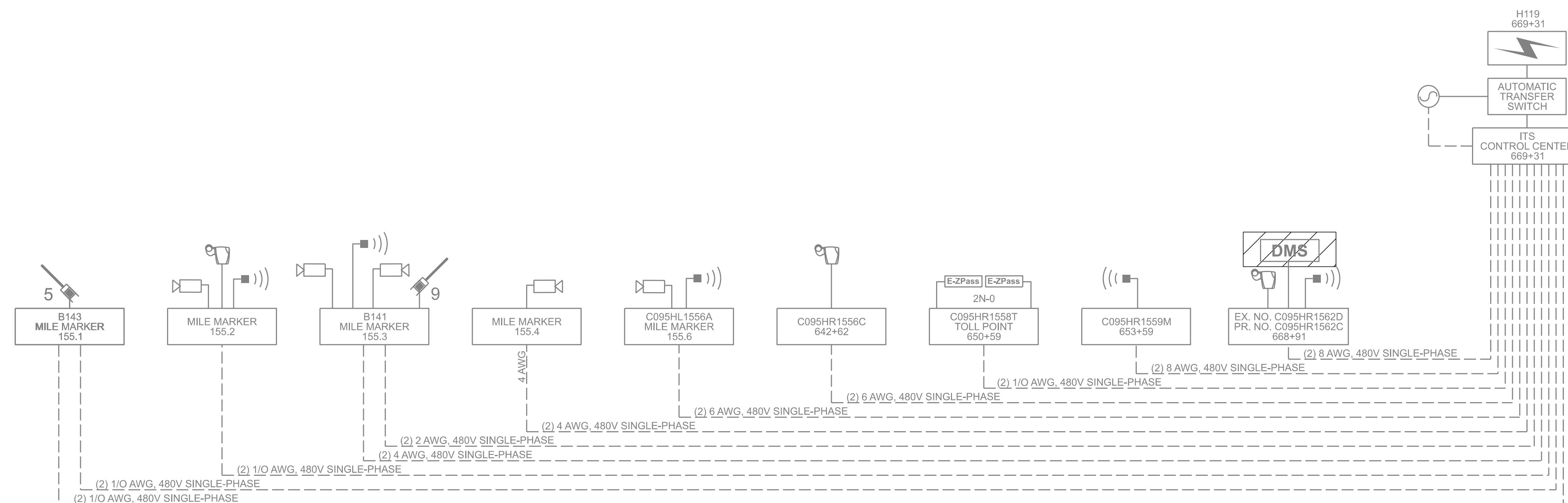
PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

POWER DISTRIBUTION DIAGRAM - H119



NOTES:
 1. CIRCUIT INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED ON OF THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

LEGEND					
EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		UTILITY ELECTRIC SERVICE			GENERATOR
		POWER CABLE			TOLL TAG READER & ENFORCEMENT
		GATE			TTMS CABINET / TTMS CONTROL CENTER
		MICROWAVE VEHICLE DETECTOR			EXISTING EQUIPMENT TO BE REMOVED
		PTZ CCTV CAMERA			FIXED CCTV CAMERA
		AID CAMERA			
		DYNAMIC MESSAGE SIGN			

PAC PLANS

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PROJECT MANAGER: *Bimal Shabb, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E6)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER				

PANEL SCHEDULE - H117

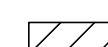
STANDARD	TYPE	VOLTAGE	SAFETY SWITCH		BACK UP POWER SYSTEM	
			VOLTAGE	AMPERAGE	VOLTAGE	KILOWATTS
SE - 9	C	277/480	600	200	277/480	35

BRANCH CIRCUITS

CABINET	DEVICES	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	BREAKER SIZE	CIRCUIT NO.				BREAKER SIZE	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	DEVICES	CABINET
				1	2	3	4				
C095XRI573D 730-10	1 - DMS	7.5	2P-20	1	1	2	2	2P-15	5	1 - DMS	C095XRI574D 735-08
				1	3	4	2				
C095SLI575D 736-70	1 - DMS	7.5	2P-20	3	5	6	4	2P-15	3	1 - AID 1 - MVD	EX. NO. C095SLI575A PR. NO. C095SLI575M 739-51
				3	7	8	4				
C095XRI576D 746-67	1 - GATE CONTROL 1 - DMS	10	2P-30	5	9	10	6	2P-15	5	4 - GATES	C095XRI576D 746-67
				5	11	12	6				
751-77	GENERATOR BREAKER PANEL	3	2P-15	7	13	14	8	2P-15	3	1 - CCTV 1 - MVD	C095HRI577C 751-44
				7	15	16	8				
C095XRI578A 755-67	1 - AID	3	2P-15	9	17	18	10	2P-20	7.5	1 - DMS	C095SLI578D 757-41
				9	19	20	10				
C095HRI579D 760-73	1 - DMS	7.5	2P-20	11	21	22	12	2P-15	3	2 - AID 1 - MVD	C095HRI581A 770-02
				11	23	24	12				
			SPACE	N/A	25	26	14	3P-15	1	GENERATOR COMMUNICATION CABINET	751-77
			SPACE	N/A	27	28	14				
			SPACE	N/A	29	30	14				

PAC PLANS

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LEGEND
 EQUIPMENT TO BE REMOVED FROM EXISTING CIRCUITS, EXISTING CIRCUITS SHALL BECOME SPARES OR RE-PURPOSED AS SHOWN.

NOTES:
 1. PANEL SCHEDULE INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED OF OF THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

PROJECT MANAGER *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Reardon, & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(2E7)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER					

PANEL SCHEDULE - H117A

STANDARD	TYPE	VOLTAGE	SAFETY SWITCH		BACK UP POWER SYSTEM	
			VOLTAGE	AMPERAGE	VOLTAGE	KILOWATTS
SE - 9	C	277/480	600	200	277/480	50

BRANCH CIRCUITS

CABINET	DEVICES	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	BREAKER SIZE	CIRCUIT NO.				BREAKER SIZE	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	DEVICES	CABINET
				1	2	3	4				
C095HR1573D 728-74	1 - DMS	7.5	2P-20	1	1	2	2	2P-20	7.5	1 - DMS 1 - FIXED CCTV	C2000XR0001D 62-10
				1	3	4	2				
C2000XR0001G 63-50	1 - PTZ CCTV 1 - AID 1 - GATE CONTROL	5	2P-30	3	5	6	4	3P-15	13125	7 - GATES	C2000XR0001G 63-50
				3	7	8	4				
C2000XL0001D 71-22	1 - DMS	7.5	2P-20	5	9	10	4	2P-15	3	1 - FIXED CCTV	C2000XR0001C 73-65
				5	11	12	6				
C095HL1574A 732-03	1 - AID	3	2P-15	7	13	14	6	3P-15	1	GENERATOR COMMUNICATION CABINET	737-74
				7	15	16	8				
737-74	GENERATOR BREAKER PANEL	3	2P-15	9	17	18	8	SPACE			
				9	19	20	8				
C095HR1572C 726-81	1 - CCTV 1 - MVD	3	2P-15	N/A	21	22	N/A	SPACE			
				N/A	23	24	N/A				
C095HL1572D 724-25	1 - DMS 1 - AID	10	2P-30	N/A	25	26	N/A	SPACE			
				N/A	27	28	N/A				
			SPACE	N/A	29	30	N/A	SPACE			
			SPACE	N/A	31	32	N/A	SPACE			
			SPACE	N/A	33	34	N/A	SPACE			
			SPACE	N/A	35	36	N/A	SPACE			

PAC PLANS

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PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
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 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E8)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER				

PANEL SCHEDULE - H118

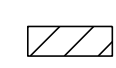
STANDARD	TYPE	VOLTAGE	SAFETY SWITCH		BACK UP POWER SYSTEM	
			VOLTAGE	AMPERAGE	VOLTAGE	KILOWATTS
SE - 9	C	277/480	600	200	277/480	50

BRANCH CIRCUITS

CABINET	DEVICES	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	BREAKER SIZE	CIRCUIT NO.		BREAKER SIZE	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	DEVICES	CABINET
				1	2				
C095HRI565C 685-98	1 - CCTV 1 - MVD	3	2P-15	1	2	2P-15	3	GENERATOR BREAKER PANEL	702-44
				3	4				
C095HRI568A 702-48	1 - AID 1 - MVD	3	2P-15	3	4	2P-30	10	8 - GATES 1 - MVD 1 - AID	EX. NO. C095HLI570G PR. NO. C095HLI570A 712-27
				3	4				
C095HLI569C 706-98	1 - CCTV 1 - AID	3	2P-15	5	6	2P-15	3	1 - AID	C095HLI572A 724-53
				5	6				
720-06	TOLL POINT 2N - 1	15	2P-40	7	8	3P-15	1	GENERATOR COMMUNICATION CABINET	DALE BLVD. 702-44
				7	8				
C095HLI573G 729-02	7 - GATES 1 - CCTV 1 - AID 1 - MVD	10	2P-30	9	8	SPACE			
				9	N/A				
			SPACE	N/A	21	N/A	SPACE		
			SPACE	N/A	23	N/A	SPACE		
			SPACE	N/A	25	N/A	SPACE		
			SPACE	N/A	27	N/A	SPACE		
			SPACE	N/A	29	N/A	SPACE		

PAC PLANS

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LEGEND
 EQUIPMENT TO BE REMOVED FROM EXISTING CIRCUITS, EXISTING CIRCUITS SHALL BECOME SPARES OR RE-PURPOSED AS SHOWN.

NOTES:
 1. PANEL SCHEDULE INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED OF OF THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

PROJECT MANAGER *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Reardon, & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2E9)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER				

PANEL SCHEDULE - H118A

STANDARD	TYPE	VOLTAGE	SAFETY SWITCH		BACK UP POWER SYSTEM	
			VOLTAGE	AMPERAGE	VOLTAGE	KILOWATTS
SE - 9	C	277/480	600	200	277/480	60

BRANCH CIRCUITS

CABINET	DEVICES	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	BREAKER SIZE	CIRCUIT NO.				BREAKER SIZE	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	DEVICES	CABINET
				1	2	3	4				
C095HLI560A 657-50	I - AID	3	2P-15	1	1	2	2	2P-20	7.5	I-DMS	C095HLI561D 667-95
				1	3	4	2				
C095HLI561G 668-27	9 - GATES	16.875	3P-20	3	5	6	4	2P-15	3	I-AID	C095HLI561A 664-61
				3	7	8	4				
				3	8	10	6	2P-15	5	I - GATE CONTROL	C095HLI561G 668-27
C095HLI562A 671-50	I - AID	3	2P-15	5	11	12	6	2P-20	7.5	I - DMS I - AID	C095HLI566D 694-20
				5	13	14	8				
C095HLI563D 677-10	I - DMS	7.5	2P-20	7	15	16	8	2P-15	5	I - GATE CONTROL I-AID	C095HLI565G 686-14
				7	17	18	10				
C095HLI565G 686-14	II - GATES	20.625	3P-20	9	19	20	10	2P-15	3	I - AID	C095HLI566A 697-32
				9	21	22	12				
				9	23	24	12				
686-33	GENERATOR BREAKER PANEL	3	2P-15	11	25	26	14	3P-15	1	GENERATOR COMMUNICATION CABINET	C095SLI564T 686-33
				11	27	28	14				
			SPACE	N/A	29	30	14				
			SPACE	N/A	31	32	N/A	SPACE			
			SPACE	N/A	33	34	N/A	SPACE			
			SPACE	N/A	35	36	N/A	SPACE			

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Reardon, & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(2E10)

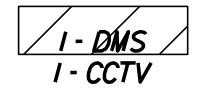
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PANEL SCHEDULE - H119

STANDARD	TYPE	VOLTAGE	SAFETY SWITCH		BACK UP POWER SYSTEM	
			VOLTAGE	AMPERAGE	VOLTAGE	KILOWATTS
SE - 9	C	277/480	600	200	277/480	50

BRANCH CIRCUITS

CABINET	DEVICES	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	BREAKER SIZE	CIRCUIT NO.				BREAKER SIZE	TRANSFORMER SIZE (KVA) / CONNECTED LOAD	DEVICES	CABINET
				1	2	3	4				
B143 MILE MARKER 155.1	1 - GATE CONTROL	5	2P-15	1	1	2	2	2P-15	5	5 - GATES	MILE MARKER 155.1
				1	3	4	2				
MILE MARKER 155.2	1 - CCTV 1 - AID 1 - MVD	3	2P-15	3	5	6	4	2P-15	5	1 - GATE CONTROL 2 - AID 1 - MVD	B141 MILE MARKER 155.3
				3	7	8	4				
MILE MARKER 155.3	9 - GATES	7.5	2P-20	5	9	10	6	2P-15	3	1 - AID	MILE MARKER 155.4
				5	11	12	6				
C095H1556A MILE MARKER 155.6	1 - AID 1 - MVD	3	2P-15	7	13	14	8	2P-15	3	1 - CCTV	C095H1556C 642-62
				7	15	16	8				
C095H1559M 653-59	1 - MVD	3	2P-15	9	17	18	10	2P-20	7.5	 1 - DMS 1 - CCTV 1 - MVD	EX. NO. C095H1562D PR. NO. C095H1562C 668-91
				9	19	20	10				
669-31	GENERATOR BREAKER PANEL	3	2P-15	11	21	22	12	2P-40	15	TOLL POINT 2N - 0	650-59
				11	23	24	12				
			SPACE	N/A	25	26	14				
			SPACE	N/A	27	28	14	3P-15	1	GENERATOR COMMUNICATION CABINET	669-31
			SPACE	N/A	29	30	14				
			SPACE	N/A	31	32	N/A	SPACE			
			SPACE	N/A	33	34	N/A	SPACE			
			SPACE	N/A	35	36	N/A	SPACE			

PAC PLANS

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LEGEND

 EQUIPMENT TO BE REMOVED FROM EXISTING CIRCUITS, EXISTING CIRCUITS SHALL BECOME SPARES OR RE-PURPOSED AS SHOWN.

NOTES:

1. PANEL SCHEDULE INFORMATION SHOWN FOR EXISTING CIRCUITS IS BASED OF OF THE 95 EXPRESS LANES SEGMENT 2N AS-BUILT PLANS.

PROJECT
0095-076-299

SHEET NO.
15(2E10)

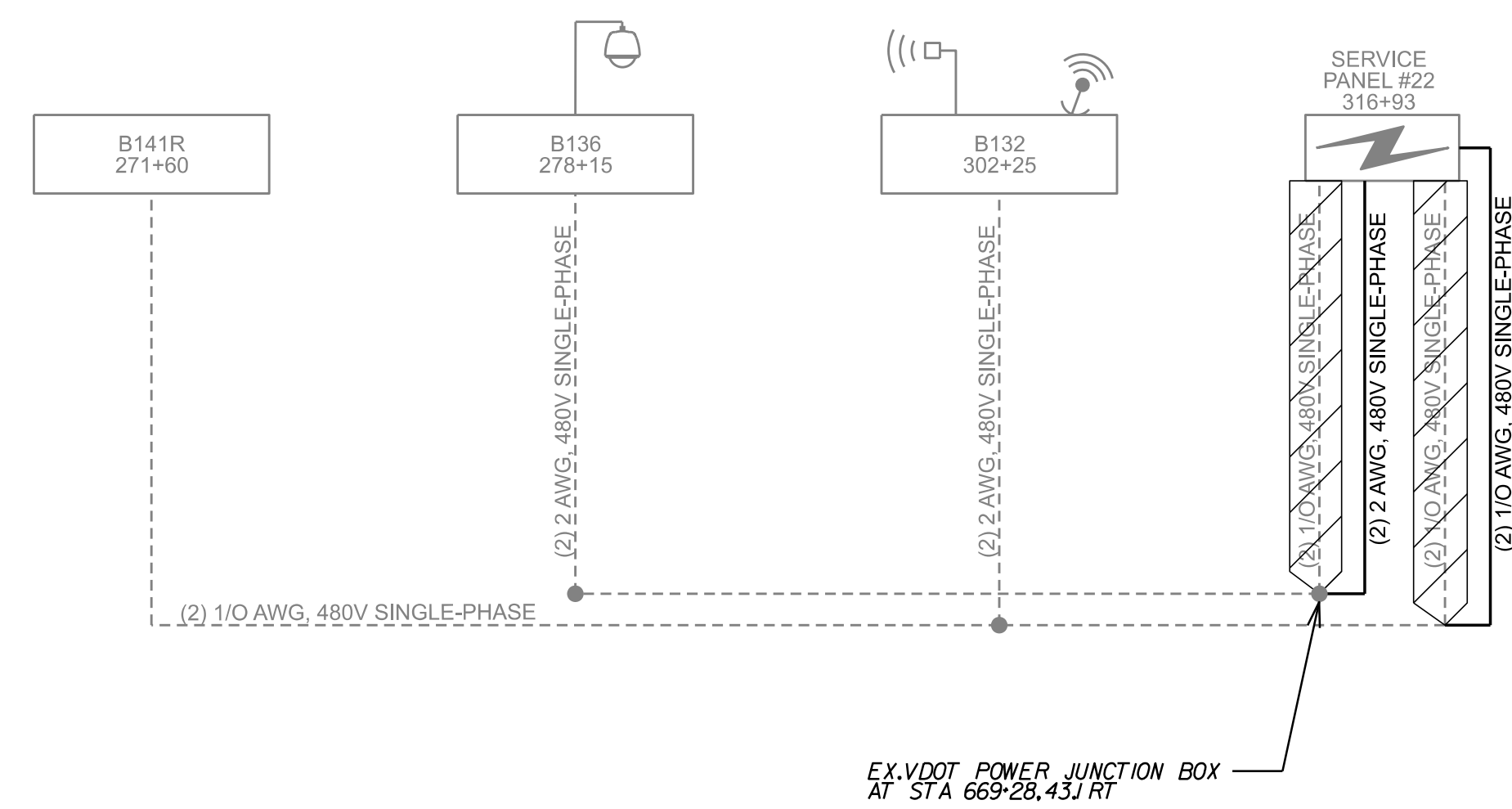
PROJECT MANAGER: *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(2E11)

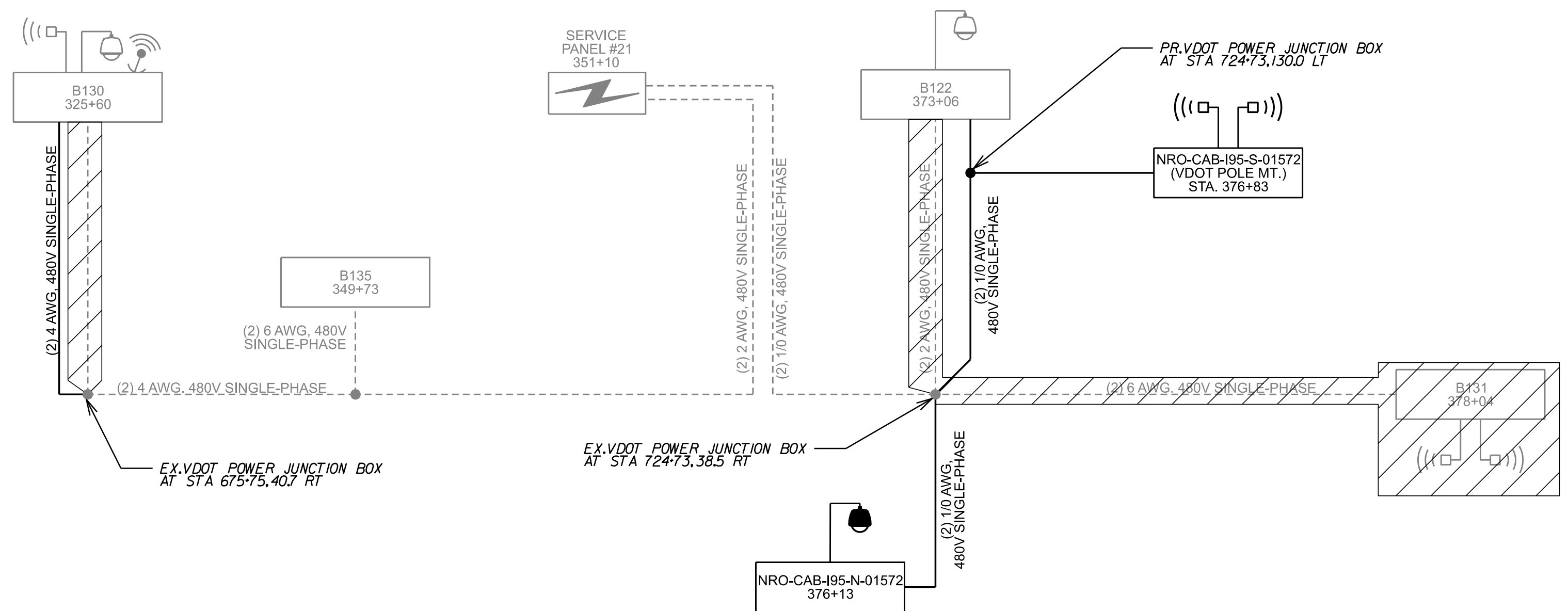
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

POWER DISTRIBUTION DIAGRAM - VDOT SP-22



POWER DISTRIBUTION DIAGRAM - VDOT SP-21



LEGEND

EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
		SERVICE PANEL			RADIO EQUIPMENT
		VDOT POWER CABLE			ITS EQUIPMENT
		VDOT MICROWAVE VEHICLE DETECTOR			EXISTING EQUIPMENT TO BE REMOVED
		VDOT CCTV CAMERA			

NOTES:
 1. CONNECTIONS AND CABLE SIZES AS SHOWN ARE FROM THE AS BUILTS.

PAC PLANS

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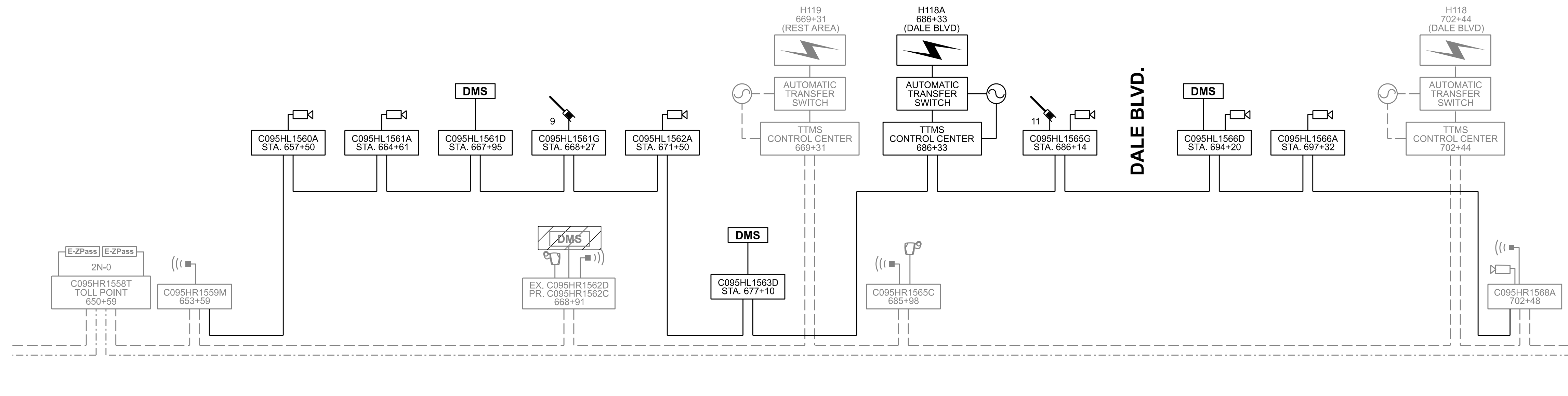
PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
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 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F1)

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Whitman, Requardt & Associates
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COMMUNICATIONS ARCHITECTURE - XPL



LEGEND					
EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
---	—	EXPRESS LANES DISTRIBUTION CABLE	DMS	DMS	DYNAMIC MESSAGE SIGN
---	N/A	EXPRESS LANES TRUNK CABLE	E-ZPass	N/A	TOLL TAG READER AND ENFORCEMENT
⚡	⚡	GATE	CXXXXXXXXX XXXXXX	CXXXXXXXXX XXXXXX	ITS CABINET
📹	📹	EXPRESS LANES VIDEO CAMERA	⚡	⚡	UTILITY ELECTRIC SERVICE
📹	📹	AID CAMERA	⚡	⚡	GENERATOR
N/A	FIXED CCTV	FIXED CCTV CAMERA	⚡	⚡	EXISTING EQUIPMENT TO BE REMOVED
■))	■))	MICROWAVE VEHICLE DETECTOR	N/A	⚡	

NOTES:
 1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.

PAC PLANS

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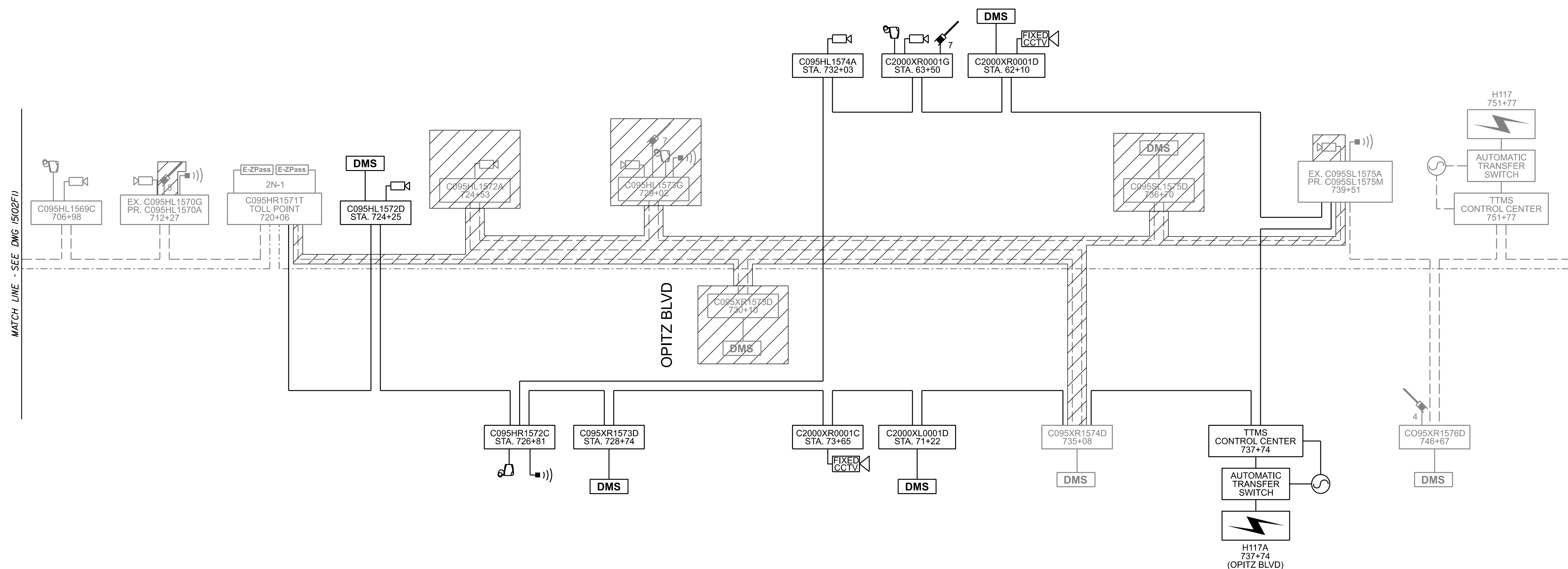
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
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 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7740 (07/07/2021)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F2)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

COMMUNICATIONS ARCHITECTURE - XPL



NOTES:
 1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.

EXISTING		PROPOSED		DESCRIPTION
---	---	---	---	EXPRESS LANES DISTRIBUTION CABLE
---	N/A	---	N/A	EXPRESS LANES TRUNK CABLE
⌂	⌂	⌂	⌂	GATE
📹	📹	📹	📹	EXPRESS LANES VIDEO CAMERA
📹	📹	📹	📹	AID CAMERA
N/A	FIXED CCTV	N/A	FIXED CCTV	FIXED CCTV CAMERA
⦿	⦿	⦿	⦿	GENERATOR
⦿	⦿	⦿	⦿	MICROWAVE VEHICLE DETECTOR
DMS	DMS	DMS	DMS	DYNAMIC MESSAGE SIGN
E-ZPass	E-ZPass	E-ZPass	E-ZPass	TOLL TAG READER AND ENFORCEMENT
CXXXXXXXXXX XXX+XX	CXXXXXXXXXX XXX+XX	CXXXXXXXXXX XXX+XX	CXXXXXXXXXX XXX+XX	ITS CABINET
⚡	⚡	⚡	⚡	UTILITY ELECTRIC SERVICE
⦿	⦿	⦿	⦿	GENERATOR
N/A	⦿	N/A	⦿	EXISTING EQUIPMENT TO BE REMOVED

PAC PLANS

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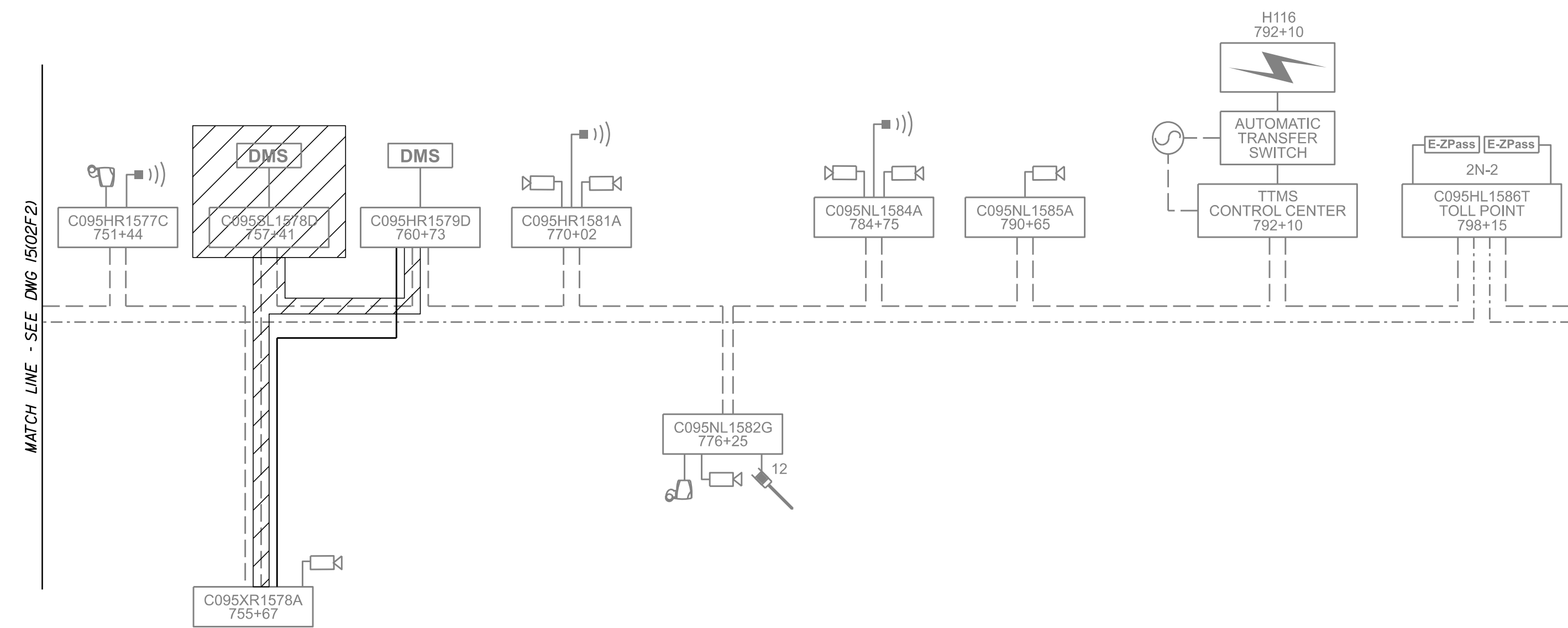
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 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F3)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

COMMUNICATIONS ARCHITECTURE - XPL



NOTES:
 1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.

EXISTING		PROPOSED		DESCRIPTION
---	---	---	---	EXPRESS LANES DISTRIBUTION CABLE
---	N/A	---	N/A	EXPRESS LANES TRUNK CABLE
				GATE
				EXPRESS LANES VIDEO CAMERA
				AID CAMERA
N/A		N/A		FIXED CCTV CAMERA
				MICROWAVE VEHICLE DETECTOR
				DYNAMIC MESSAGE SIGN
				EXPRESS TAG READER AND ENFORCEMENT
				ITS CABINET
				UTILITY ELECTRIC SERVICE
				GENERATOR
				EXISTING EQUIPMENT TO BE REMOVED

PAC PLANS

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PROJECT MANAGER: Bimal Saha, P.E. (703) 259-2362 (NOVA District)
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 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

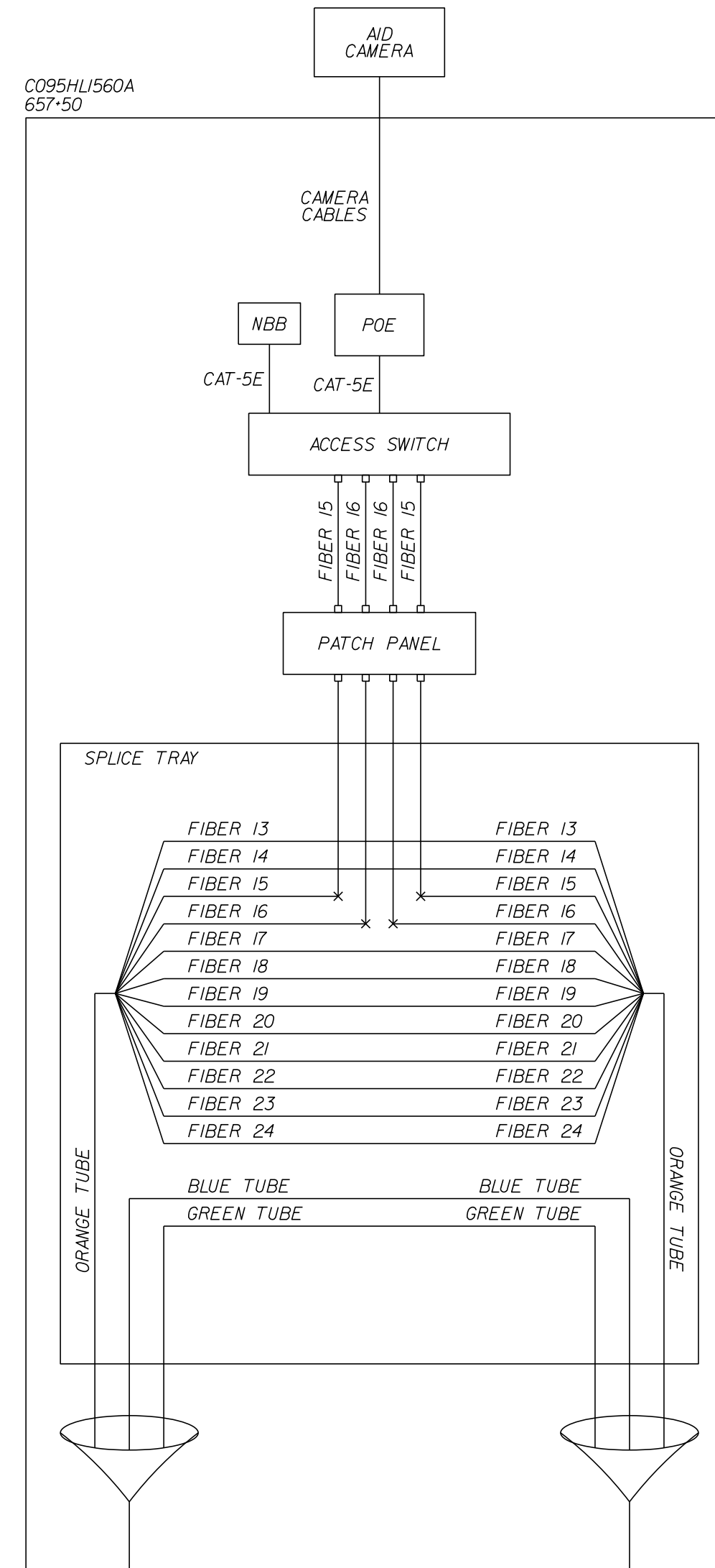
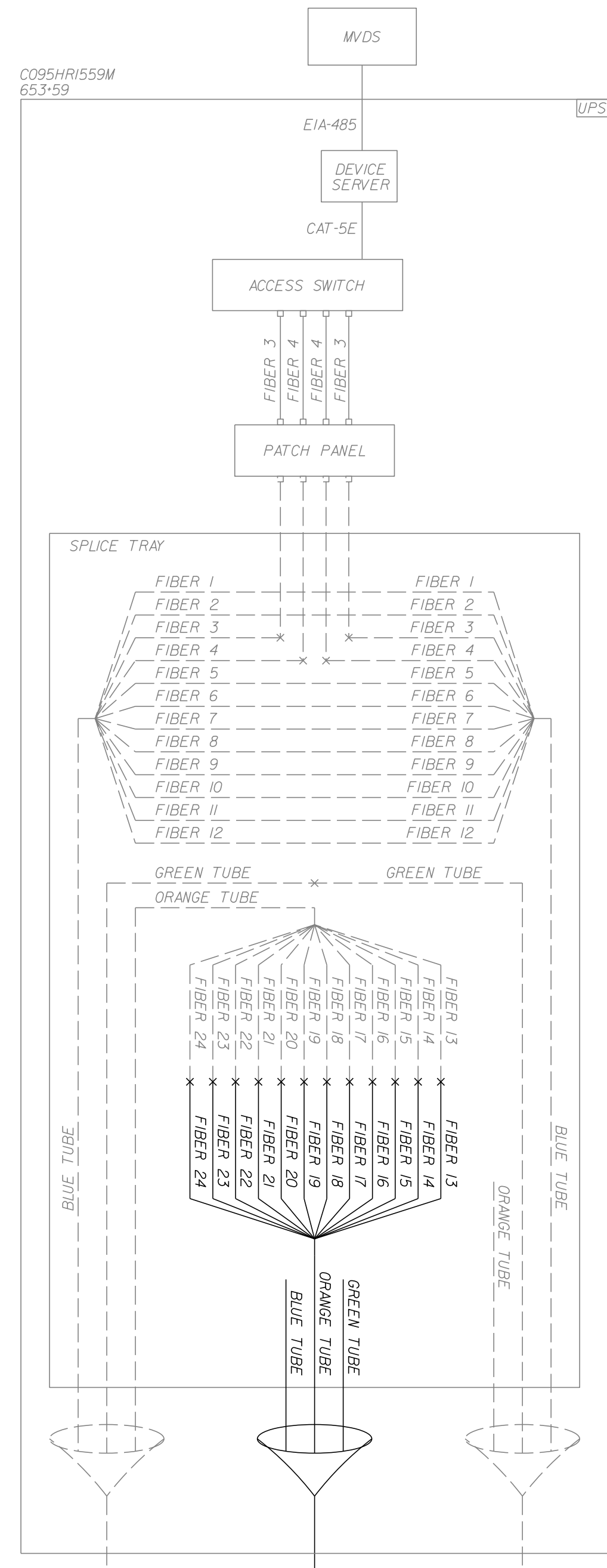
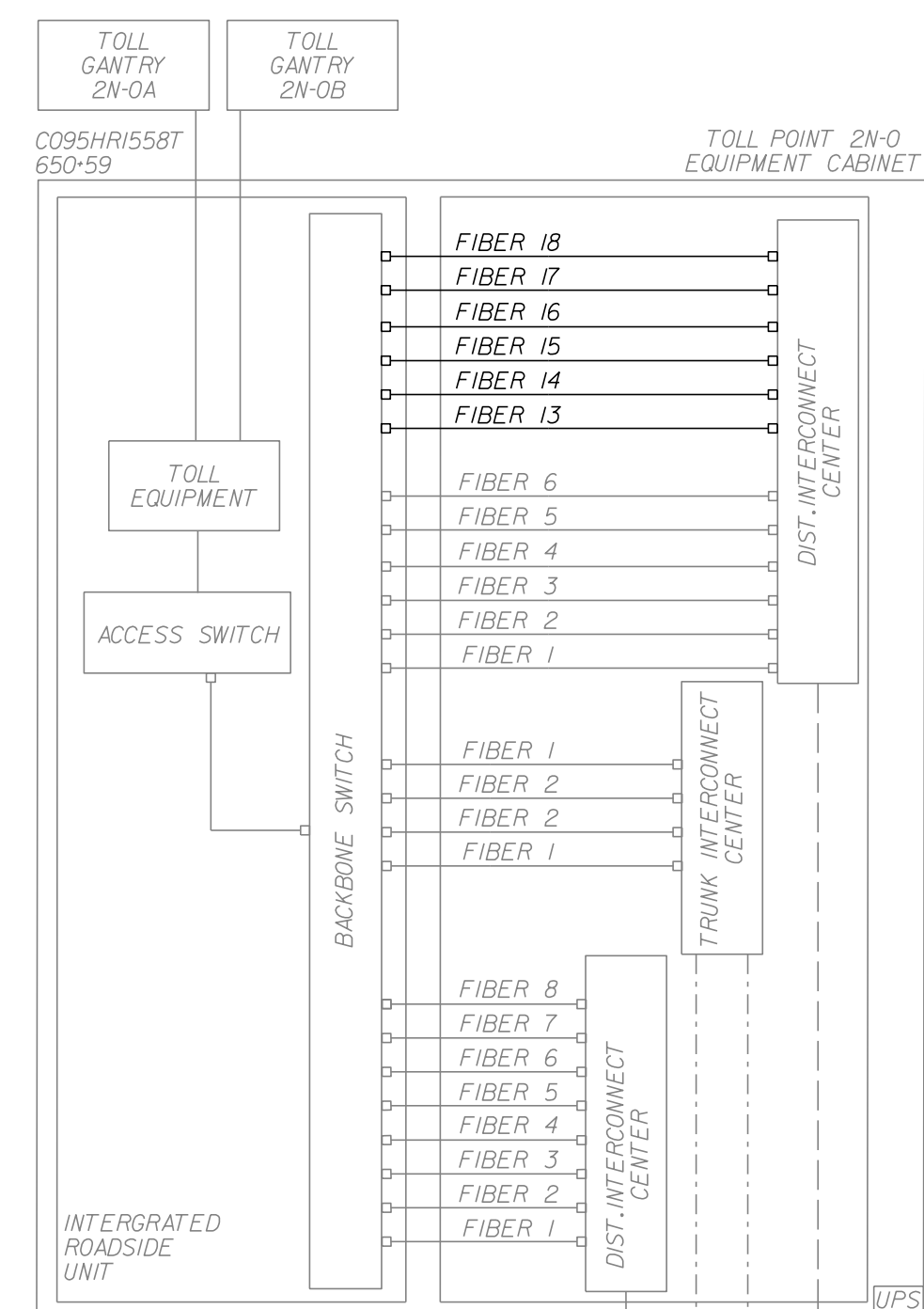
NOTES:

- FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.
- THE CONTRACTOR SHALL VERIFY ALL ACTIVE FIBERS AND COORDINATE ANY PROPOSED MODIFICATIONS TO THE EXISTING FIBER (ANY WORK THAT DIRECTLY OR INDIRECTLY IMPACTS THE EXISTING FIBER) WITH THE 95 EXPRESS ENGINEER.
- ALL FIBERS NOT SHOWN TERMINATED SHALL BE PASSED THROUGH UN CUT OR SHALL BE SPLICED THROUGH.

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

PAC PLANS

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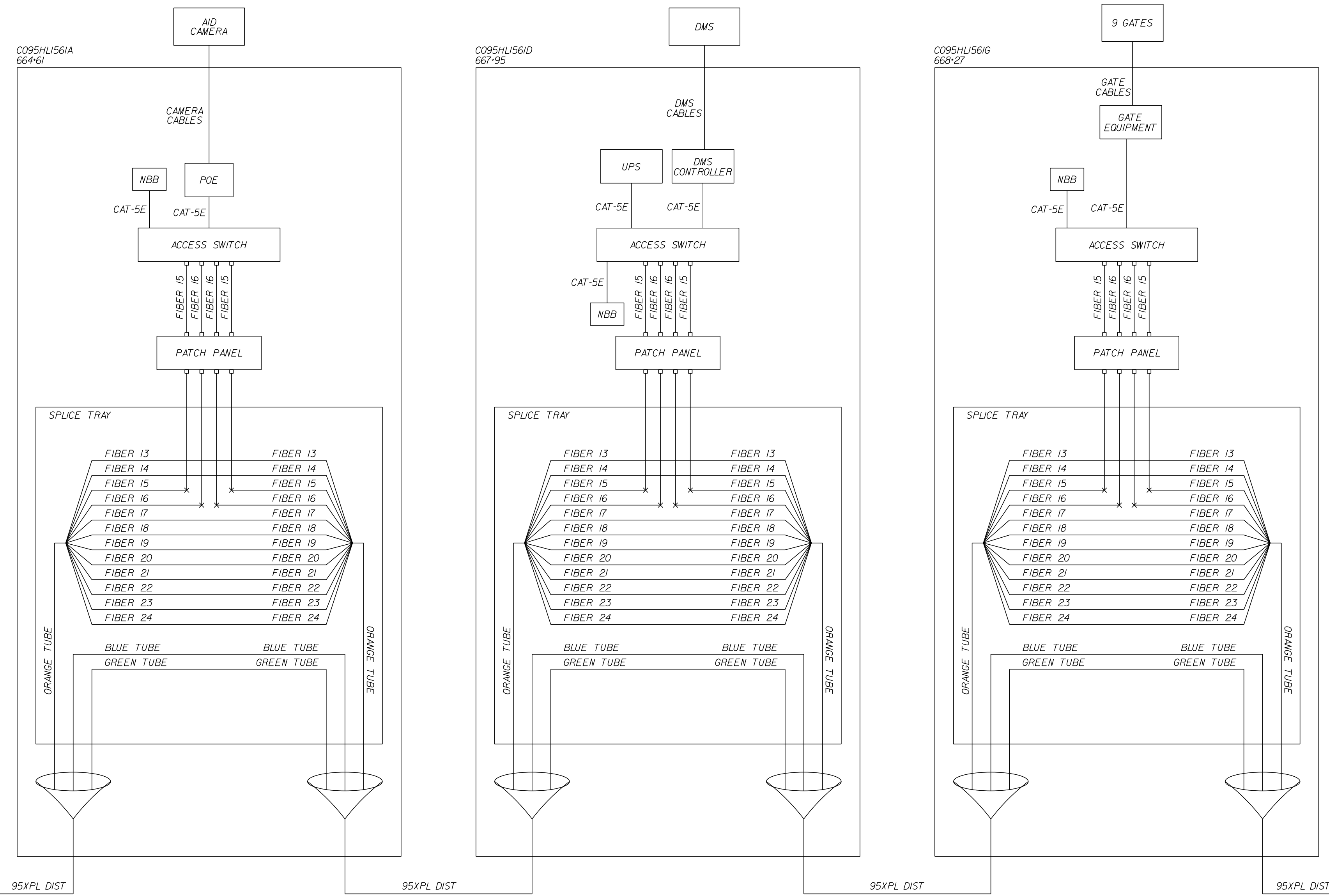
PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
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 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

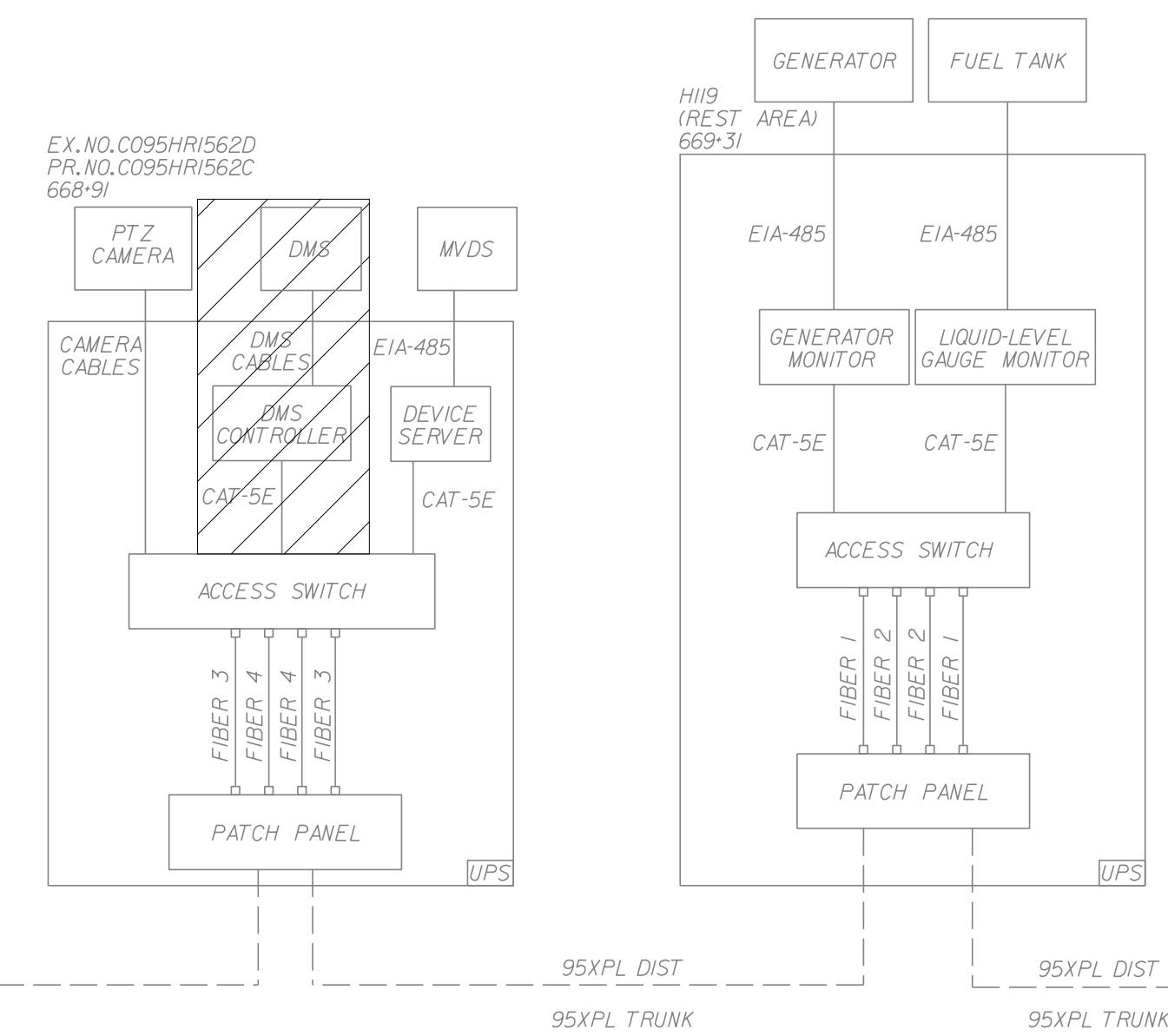
Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



- NOTES:
1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.
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MATCH LINE - SEE DWG 15(02F-4)

MATCH LINE - SEE DWG 15(02F-6)



LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□-□	□-□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

PAC PLANS

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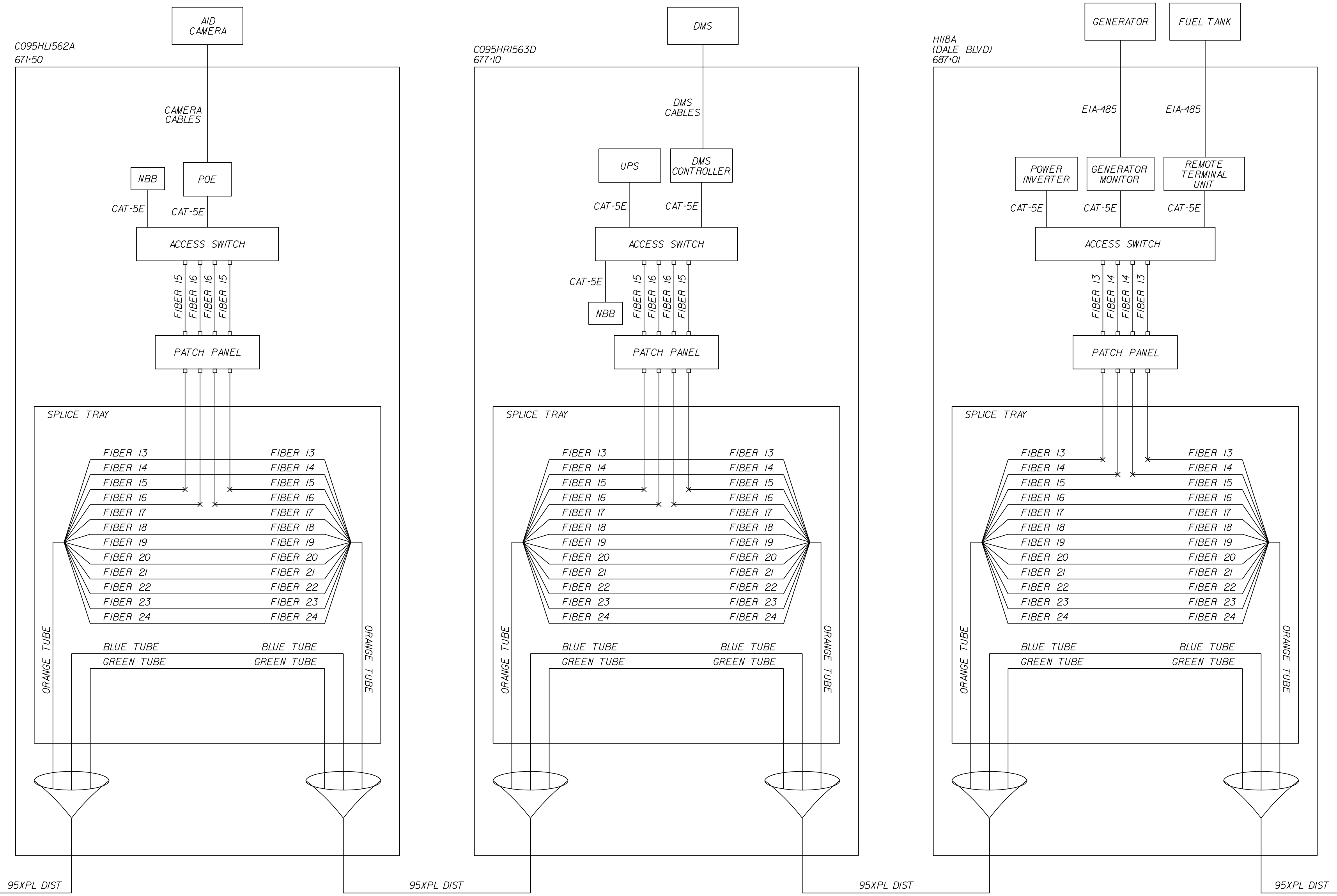
PROJECT MANAGER: Bimbal Shabb, P.E., (703) 259-2362 (NOVA District)
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FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F6)

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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



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LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□-□	□-□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

PAC PLANS

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MATCH LINE - SEE DWG 15(02F5)

MATCH LINE - SEE DWG 15(02F7)

95XPL TRUNK

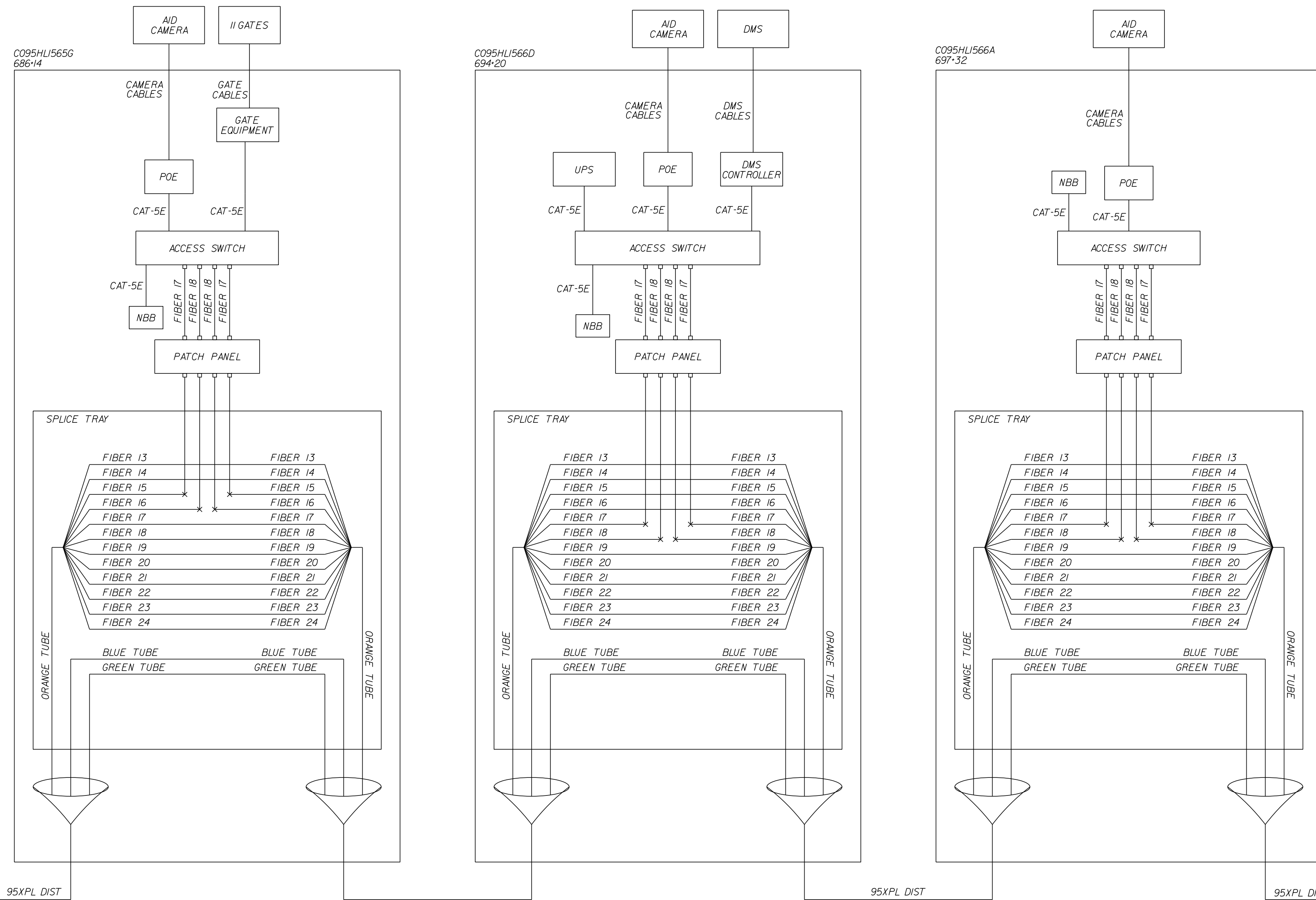
PROJECT MANAGER: Bimal Shaha, P.E., (703) 259-2362 (NOVA District)
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 SUBSURFACE UTILITY BY: DATE: Accumark, Inc. (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

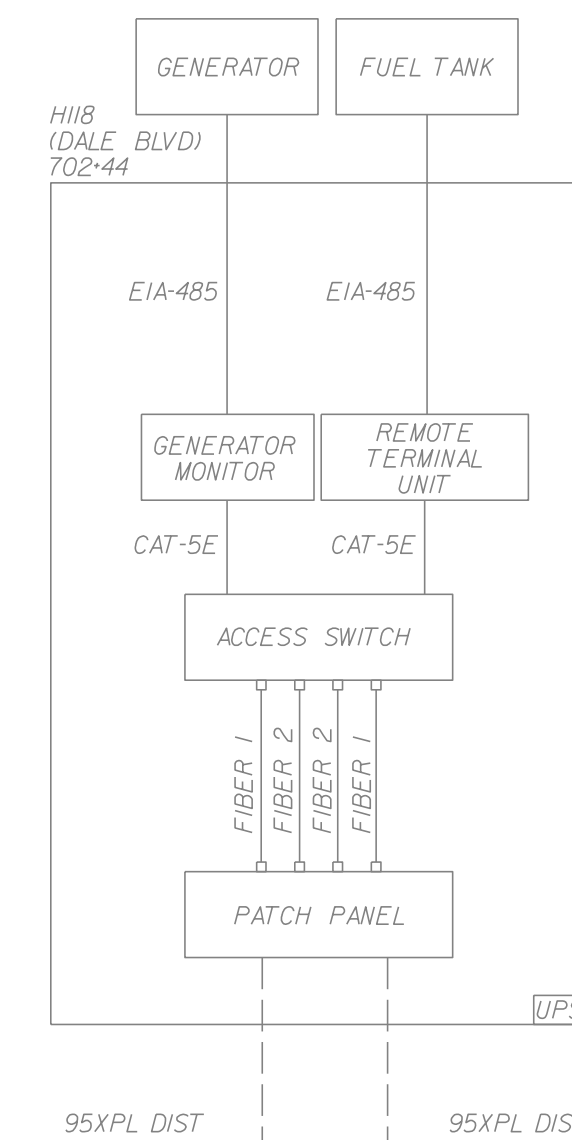
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F7)

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LEGEND

EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□	□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

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MATCH LINE - SEE DWG 15(02F6)

MATCH LINE - SEE DWG 15(02F8)

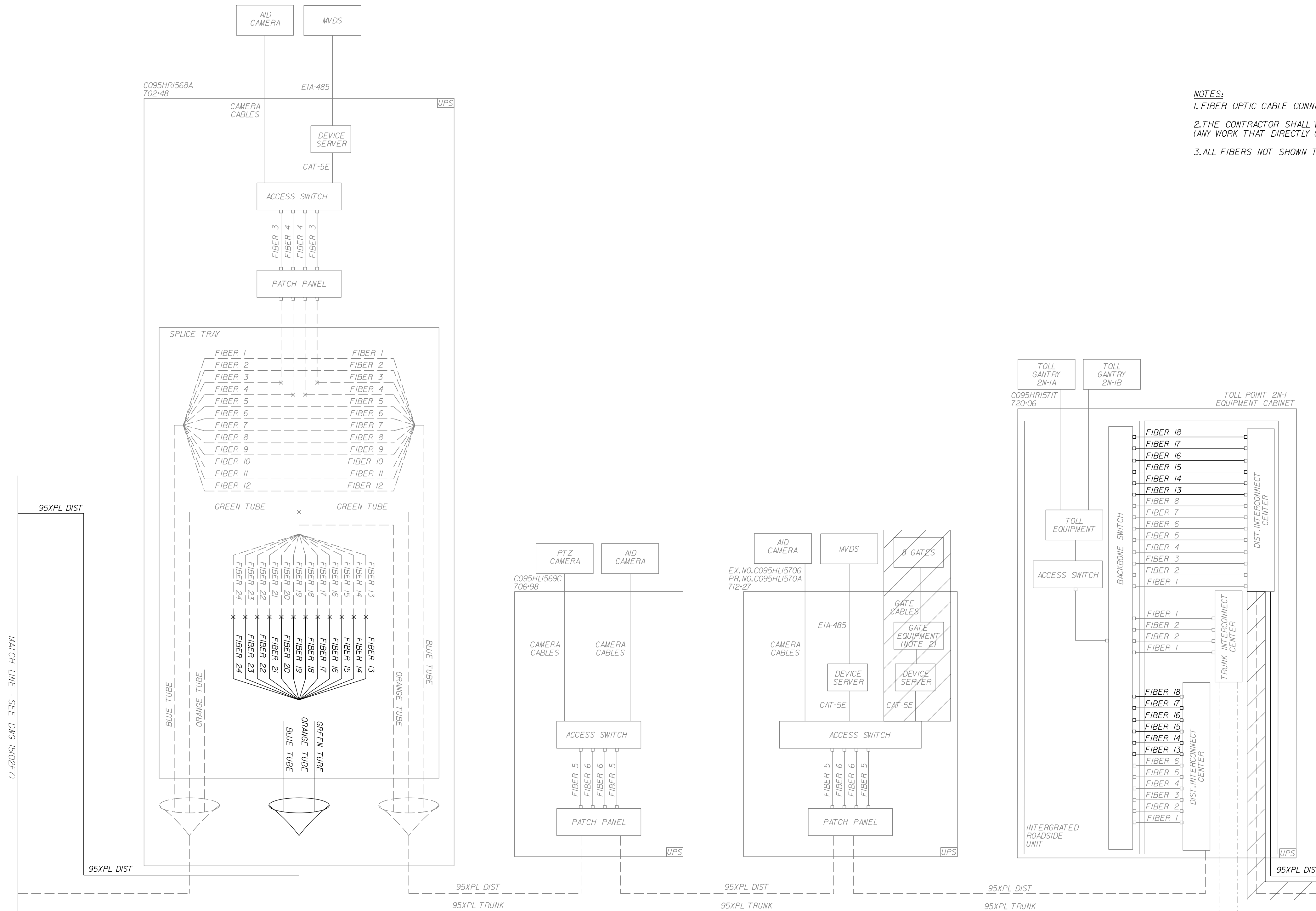
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FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F8)

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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



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LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□	□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

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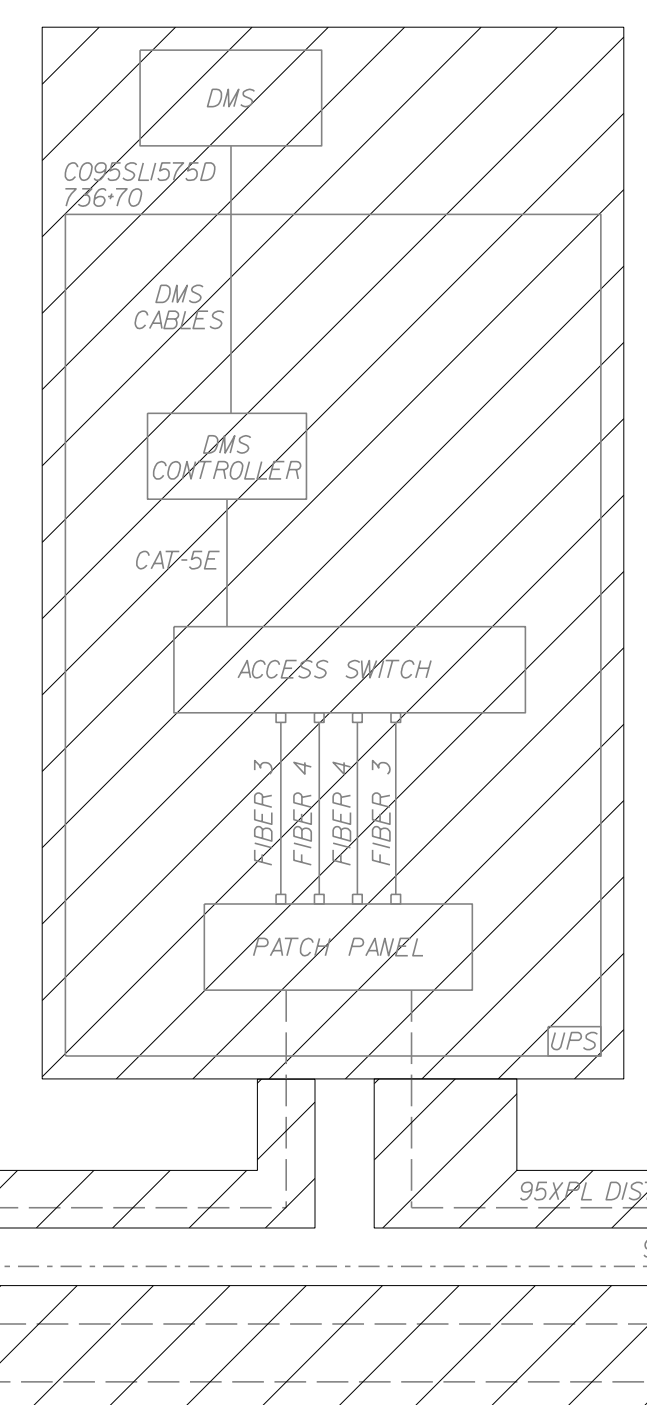
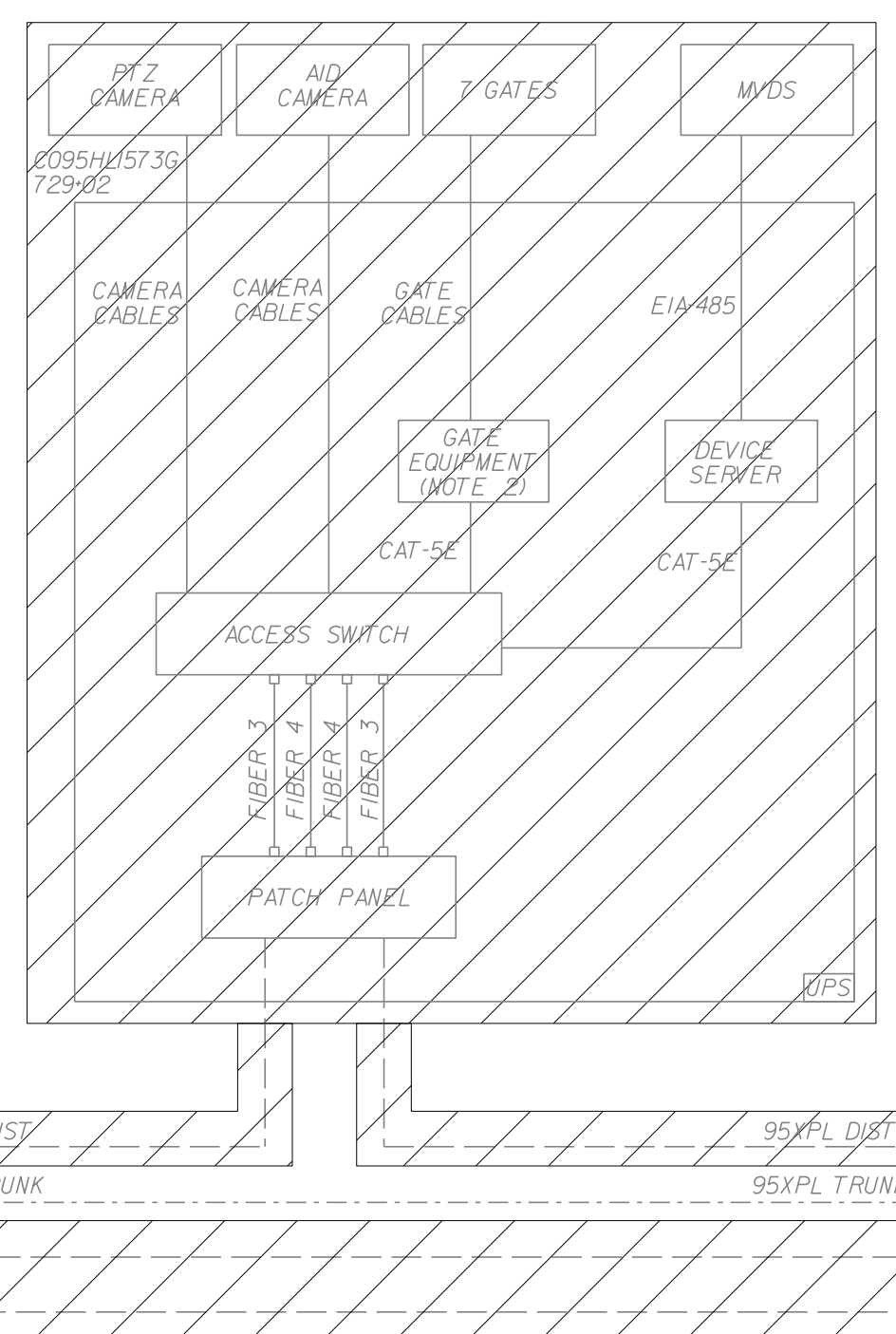
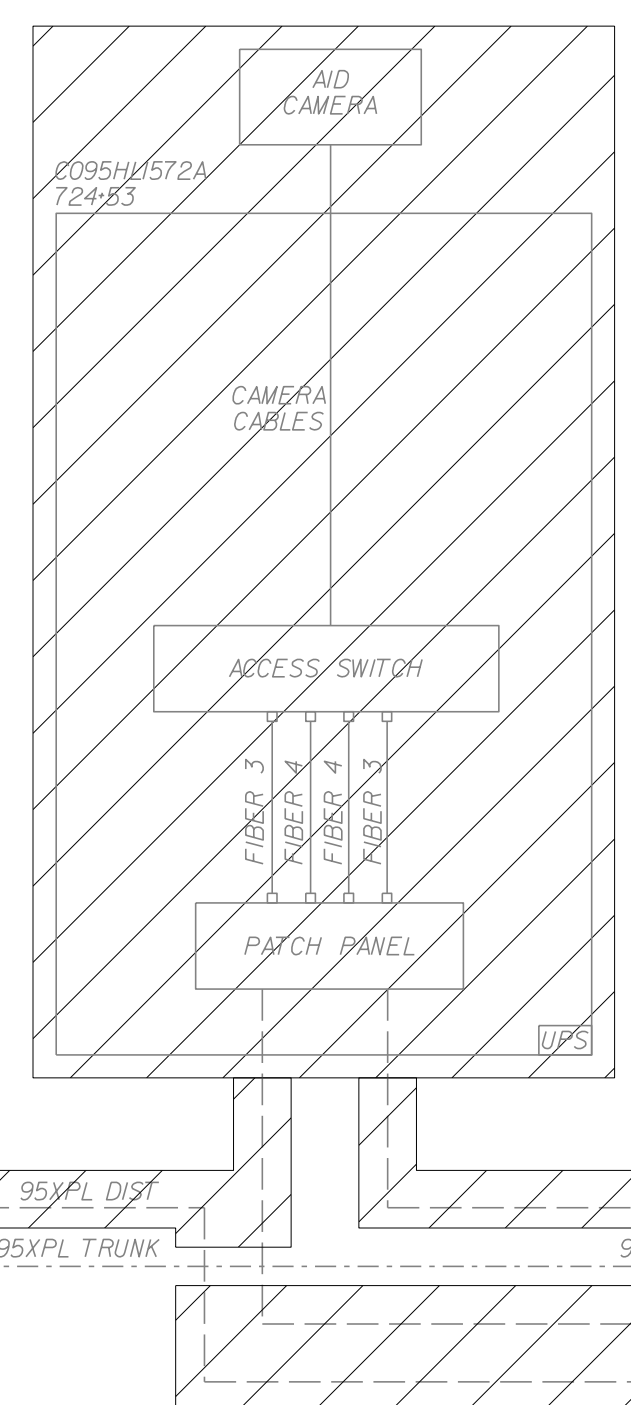
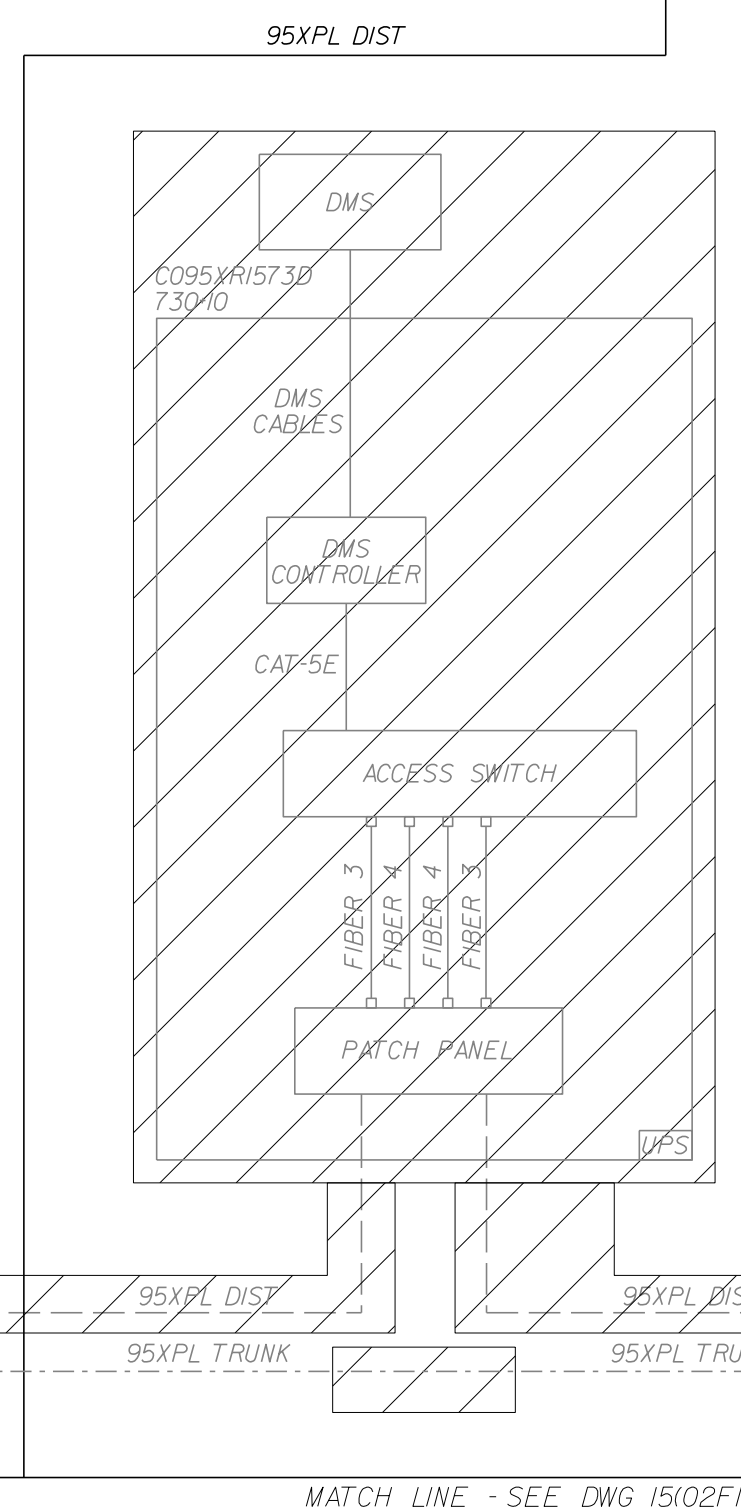
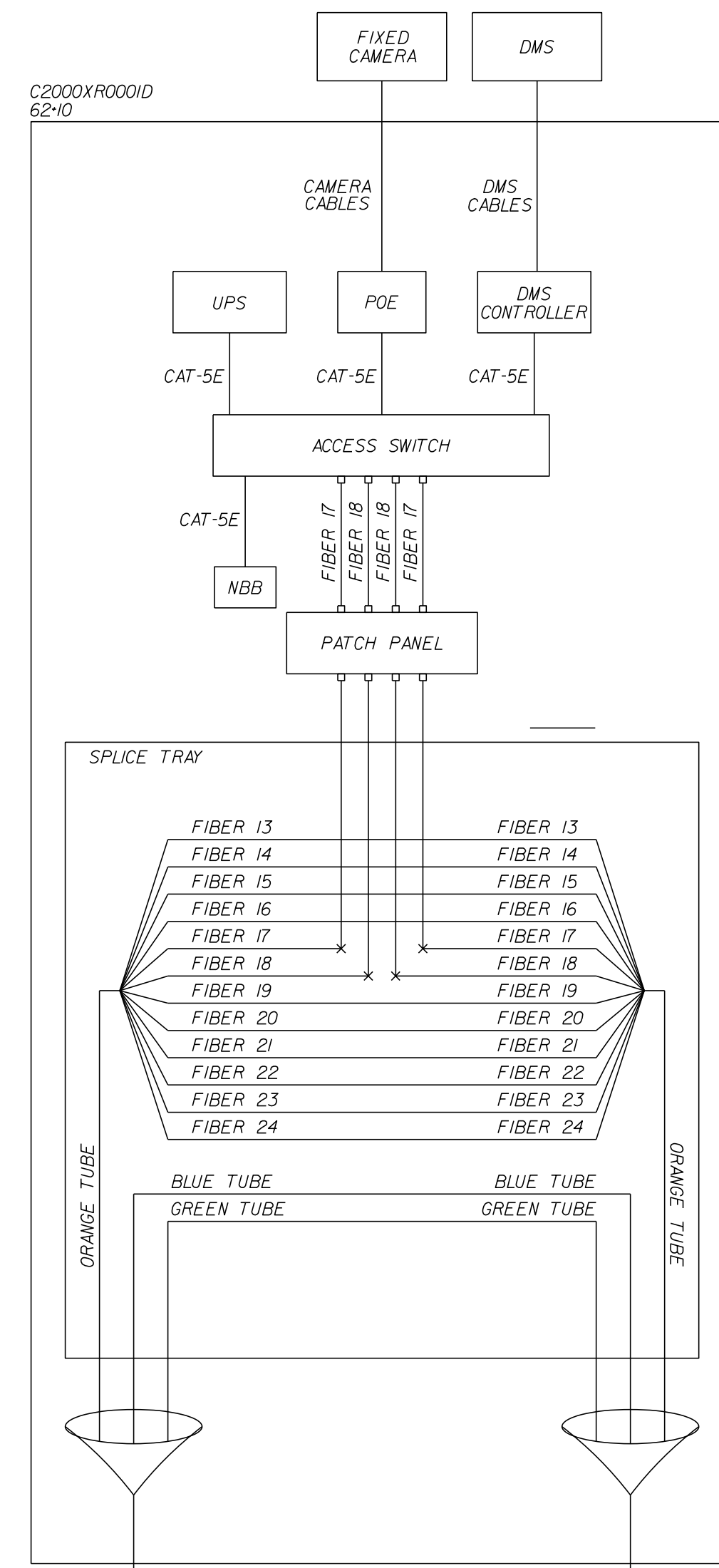
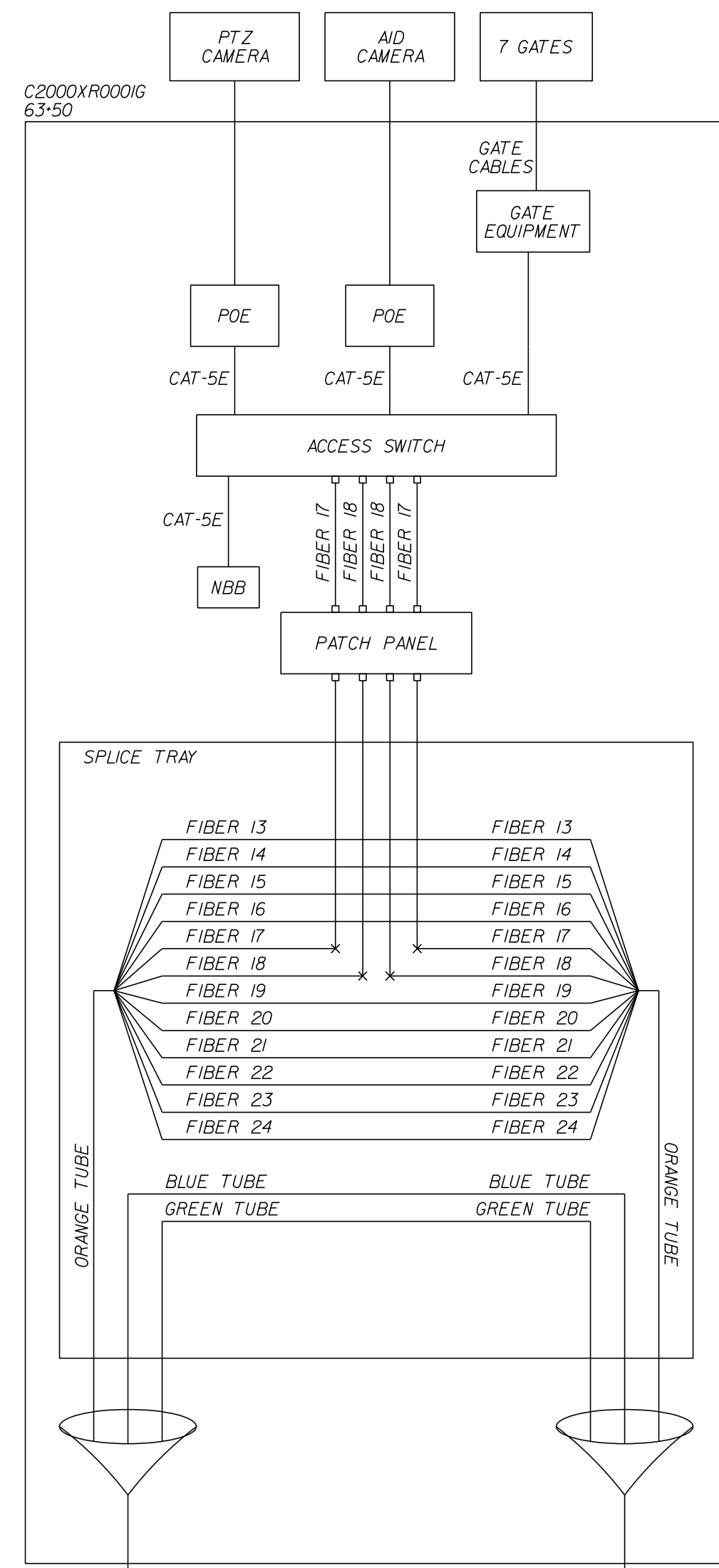
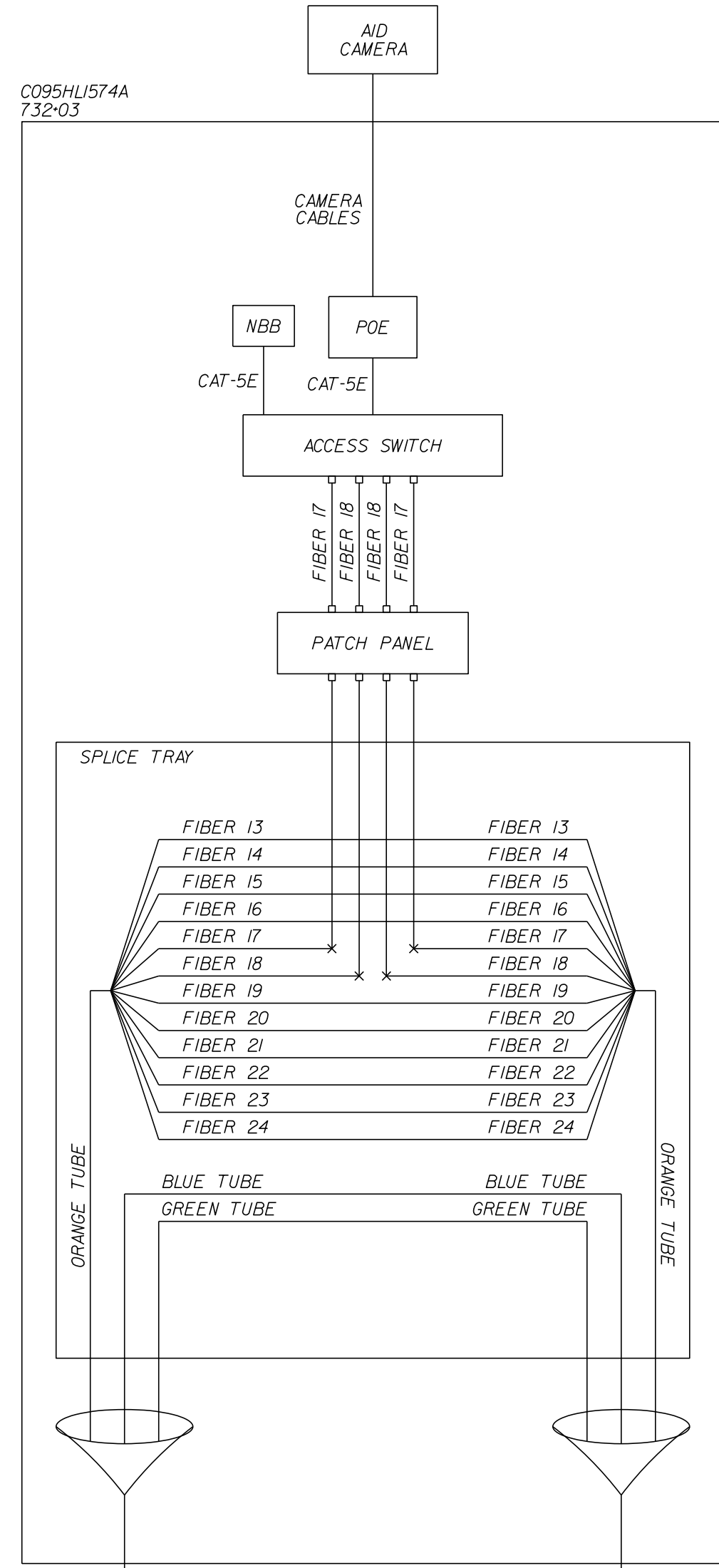
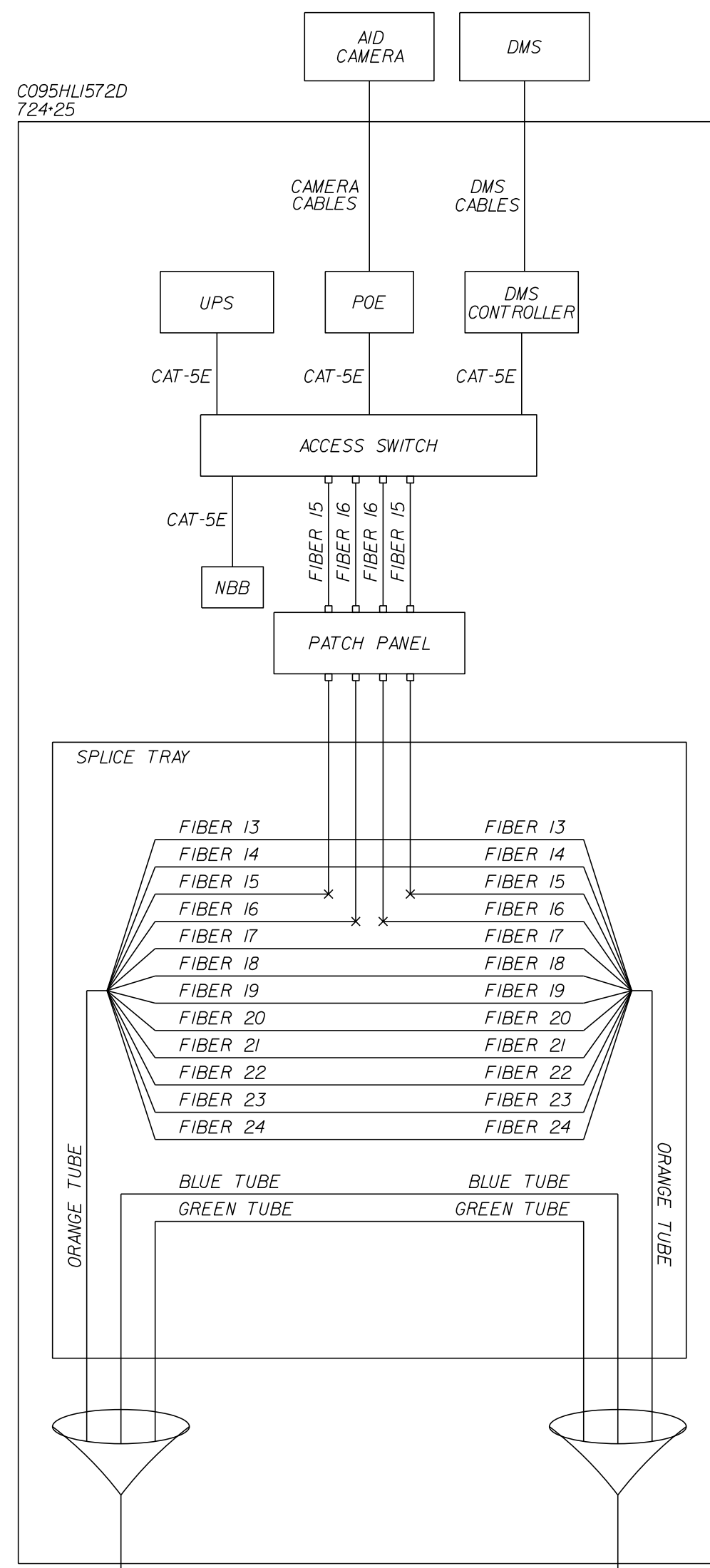
FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

- NOTES:
- FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.
 - THE CONTRACTOR SHALL VERIFY ALL ACTIVE FIBERS AND COORDINATE ANY PROPOSED MODIFICATIONS TO THE EXISTING FIBER (ANY WORK THAT DIRECTLY OR INDIRECTLY IMPACTS THE EXISTING FIBER) WITH THE 95 EXPRESS ENGINEER.
 - ALL FIBERS NOT SHOWN TERMINATED SHALL BE PASSED THROUGH UN-CUT OR SHALL BE SPliced THROUGH.



LEGEND

EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

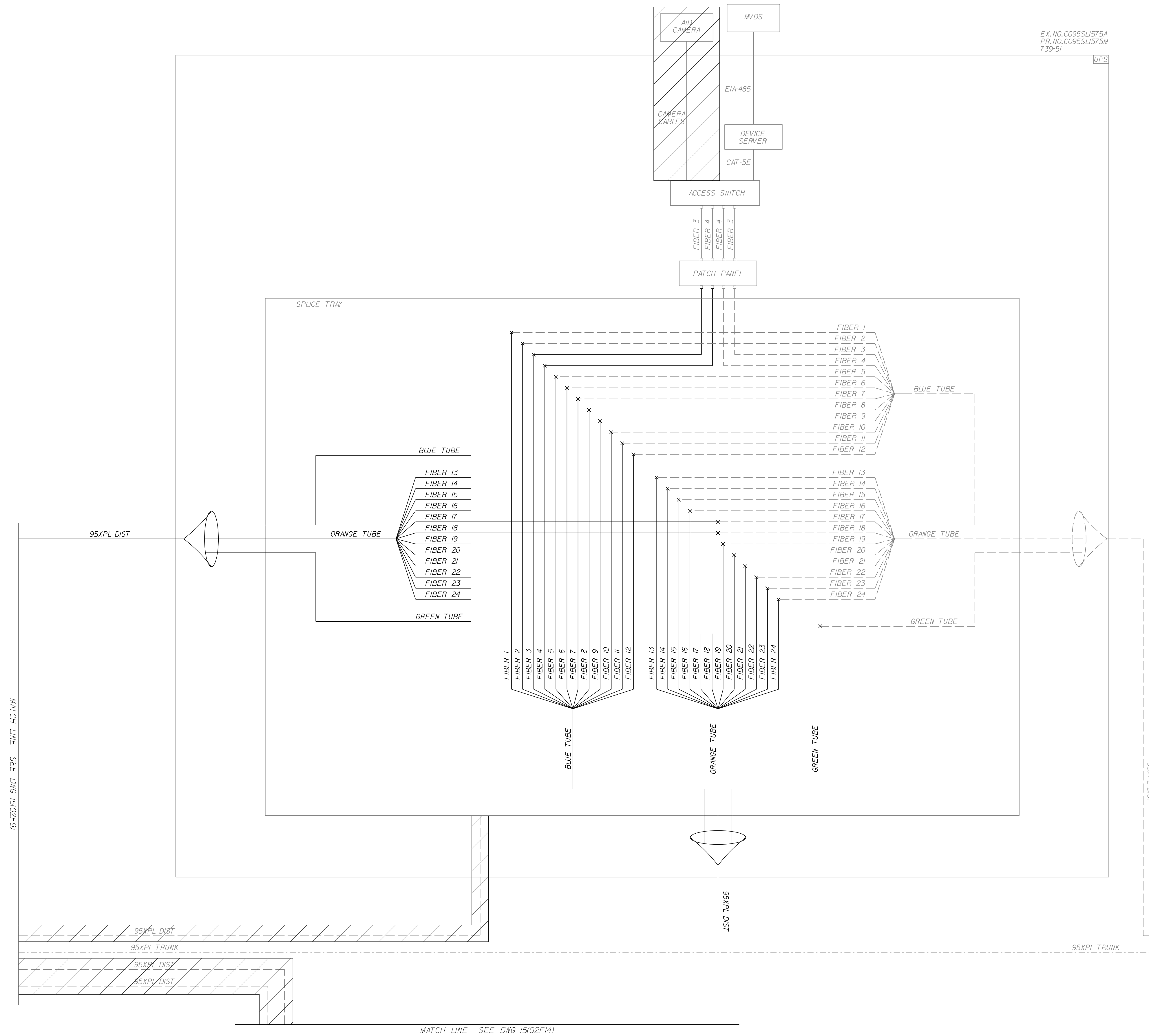
FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

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LEGEND

EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	0095-076-299	SHEET NO.	15(2F10)
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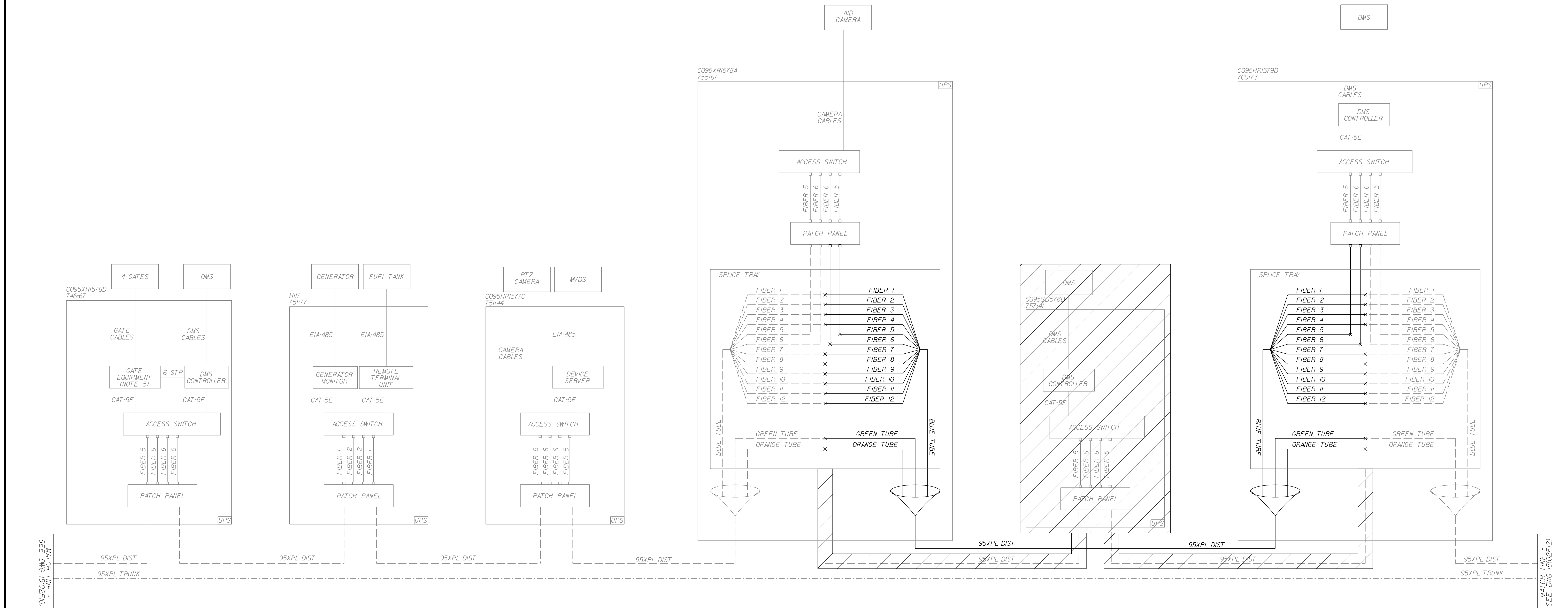
PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt, & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc., (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F11)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



LEGEND

EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

NOTES:
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PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	15(2F11)

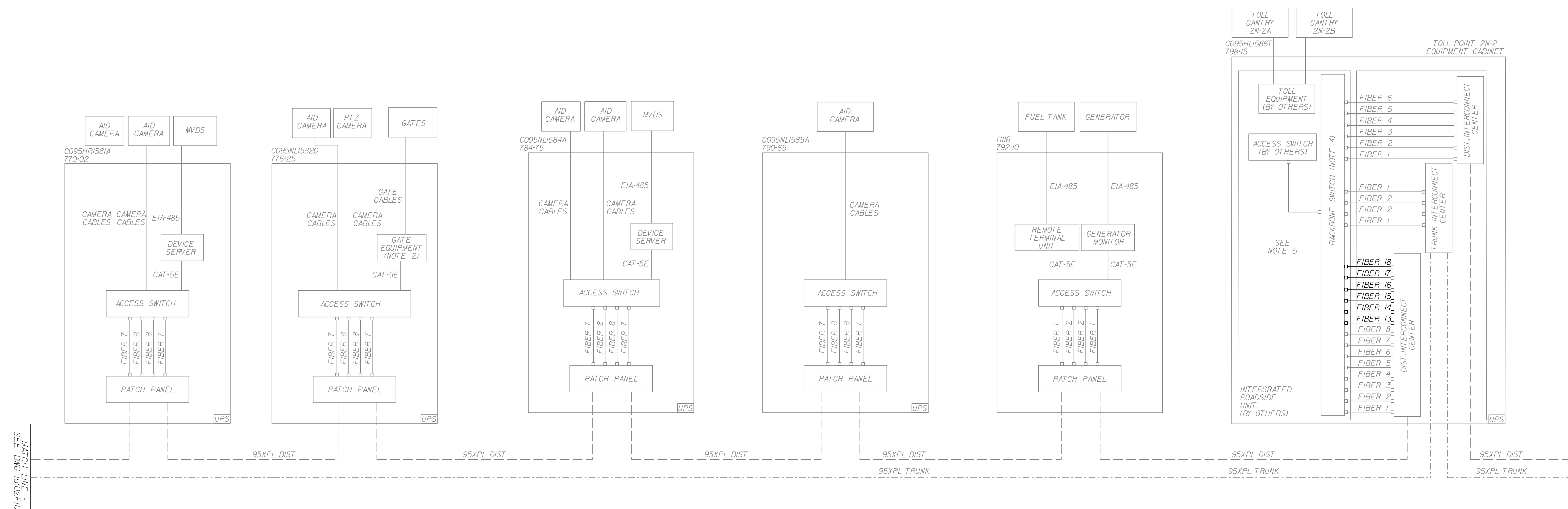
PROJECT MANAGER: Bimal Shabb, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F12)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



LEGEND

EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

NOTES:
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 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc., (804) 550-7740, 07/07/2021

FIBER CONNECTION DIAGRAM - XPL

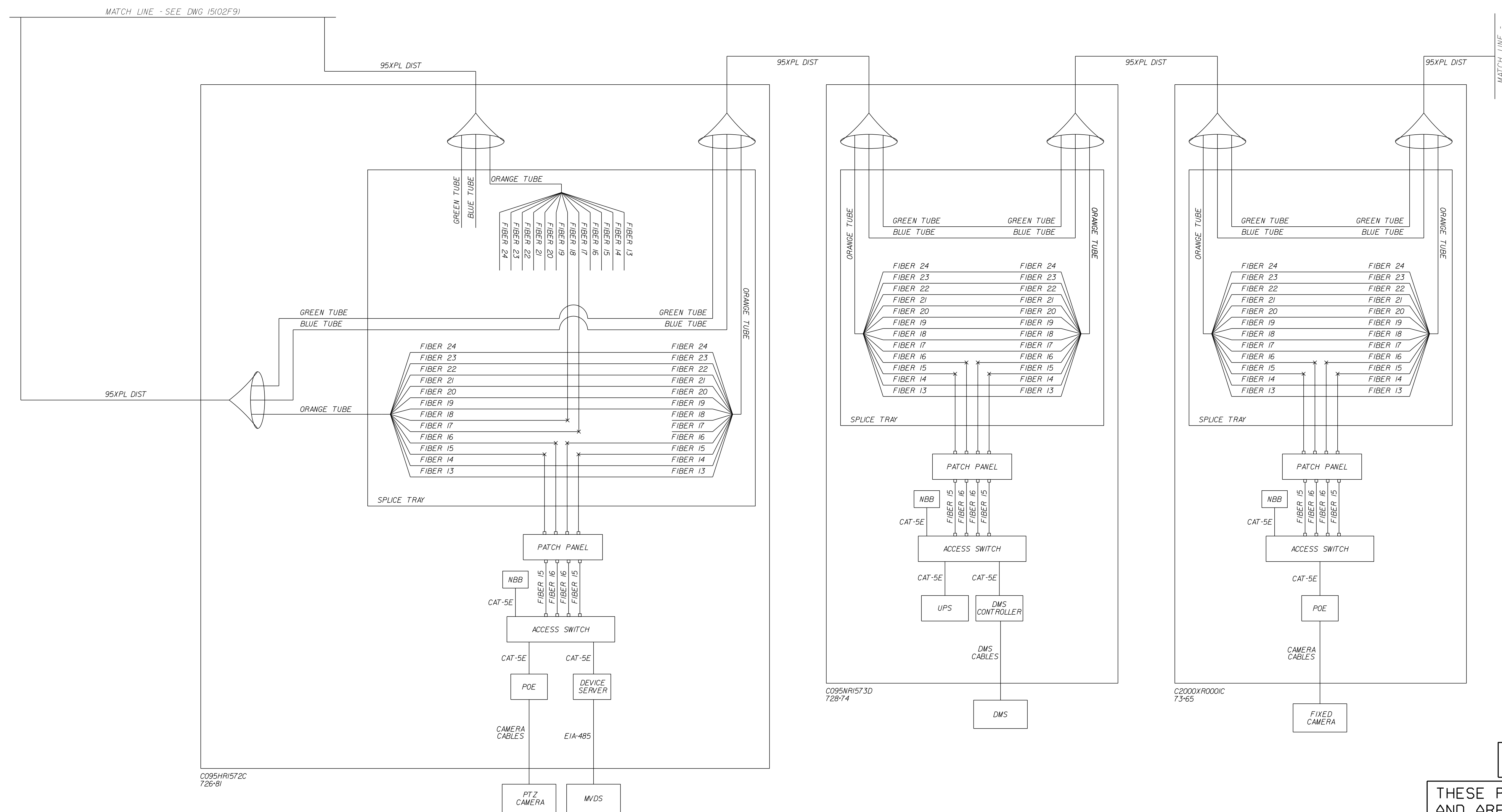
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F13)

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

NOTES:
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PROJECT MANAGER: *Bimal Shaha, P.E., (703) 259-2362 (NOVA District)*
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 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

FIBER CONNECTION DIAGRAM - XPL

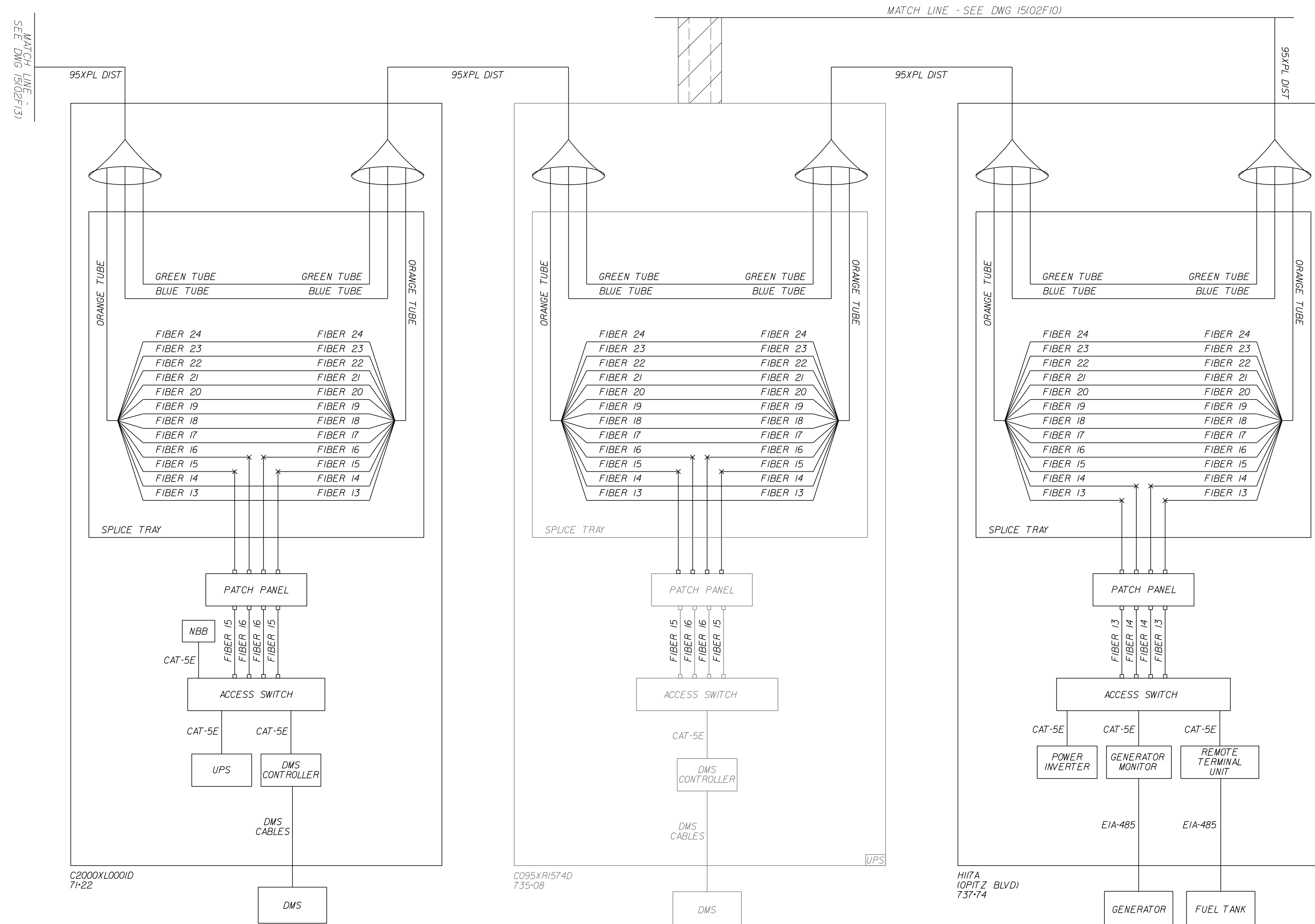
REVISED	STATE		STATE		SHEET NO.
	STATE	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501		15(2F14)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

LEGEND		
EXISTING	PROPOSED	DESCRIPTION
---	---	TRUNK
---	---	DISTRIBUTION
□—□	□—□	SINGLE MODE FIBER JUMPER
N/A	▨	EXISTING EQUIPMENT TO BE REMOVED
UPS	N/A	CABINETS WITH UNINTERRUPTIBLE POWER SUPPLY

NOTES:
 1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT PLANS.
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PAC PLANS

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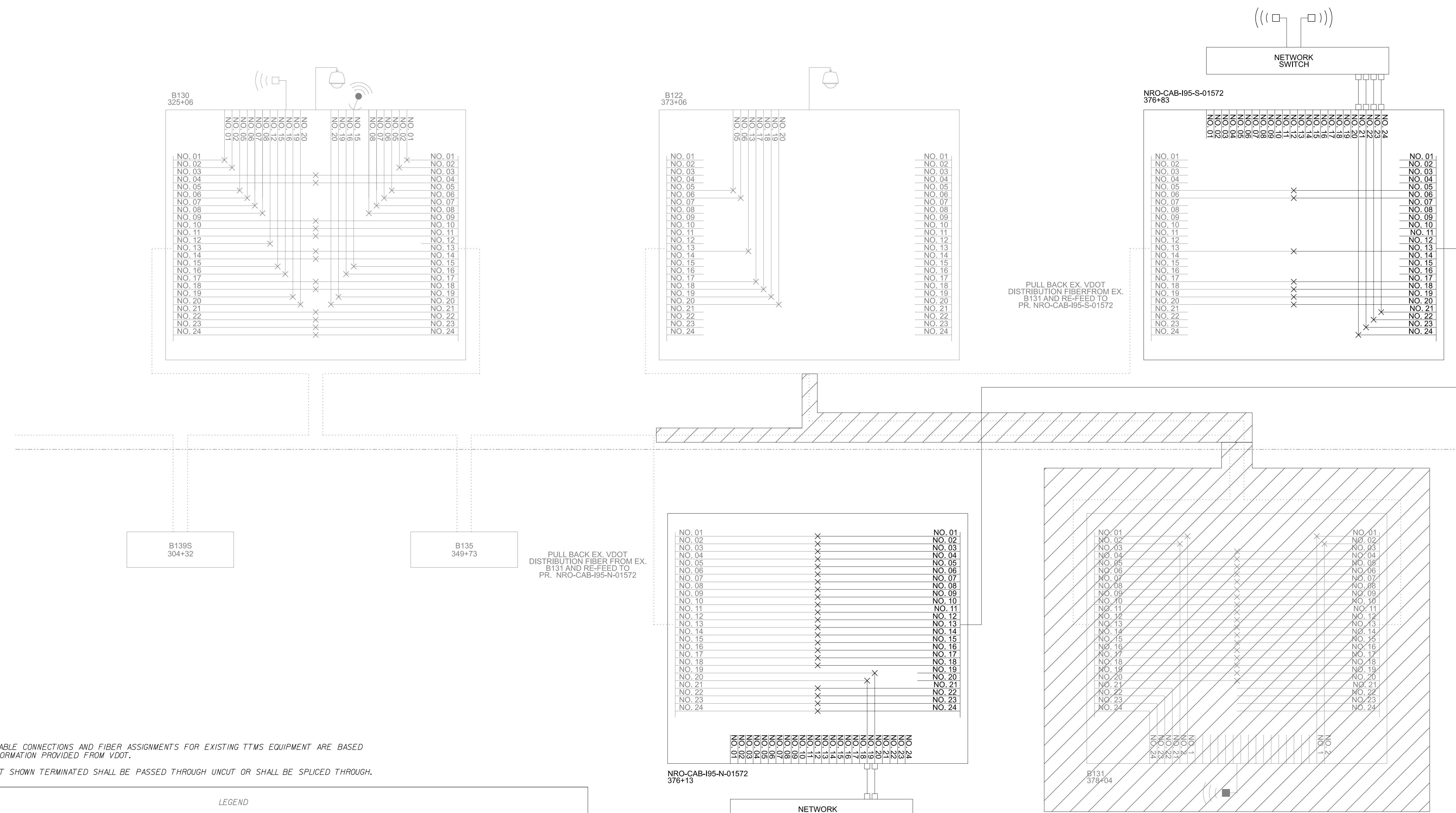
PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc., (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(2F15)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

COMMUNICATIONS ARCHITECTURE - VDOT



NOTES:
 1. FIBER OPTIC CABLE CONNECTIONS AND FIBER ASSIGNMENTS FOR EXISTING TTMS EQUIPMENT ARE BASED ON AS BUILT INFORMATION PROVIDED FROM VDOT.
 2. ALL FIBERS NOT SHOWN TERMINATED SHALL BE PASSED THROUGH UNCUT OR SHALL BE SPLICED THROUGH.

LEGEND					
EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION
-----	—	VDOT DISTRIBUTION CABLE	□—□	□—□	SINGLE MODE FIBER JUMPER
----	N/A	VDOT TRUNK CABLE	BXXX XXX+XX	CAB-XX XXX+XX	ITS CABINET
□	□	VDOT MICROWAVE VEHICLE DETECTOR	N/A		EXISTING EQUIPMENT TO BE REMOVED
📷	📷	VDOT CCTV CAMERA	*	*	FIBER SPLICE
📻	N/A	RADIO EQUIPMENT			

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT	0095-076-299	SHEET NO.	15(2F15)
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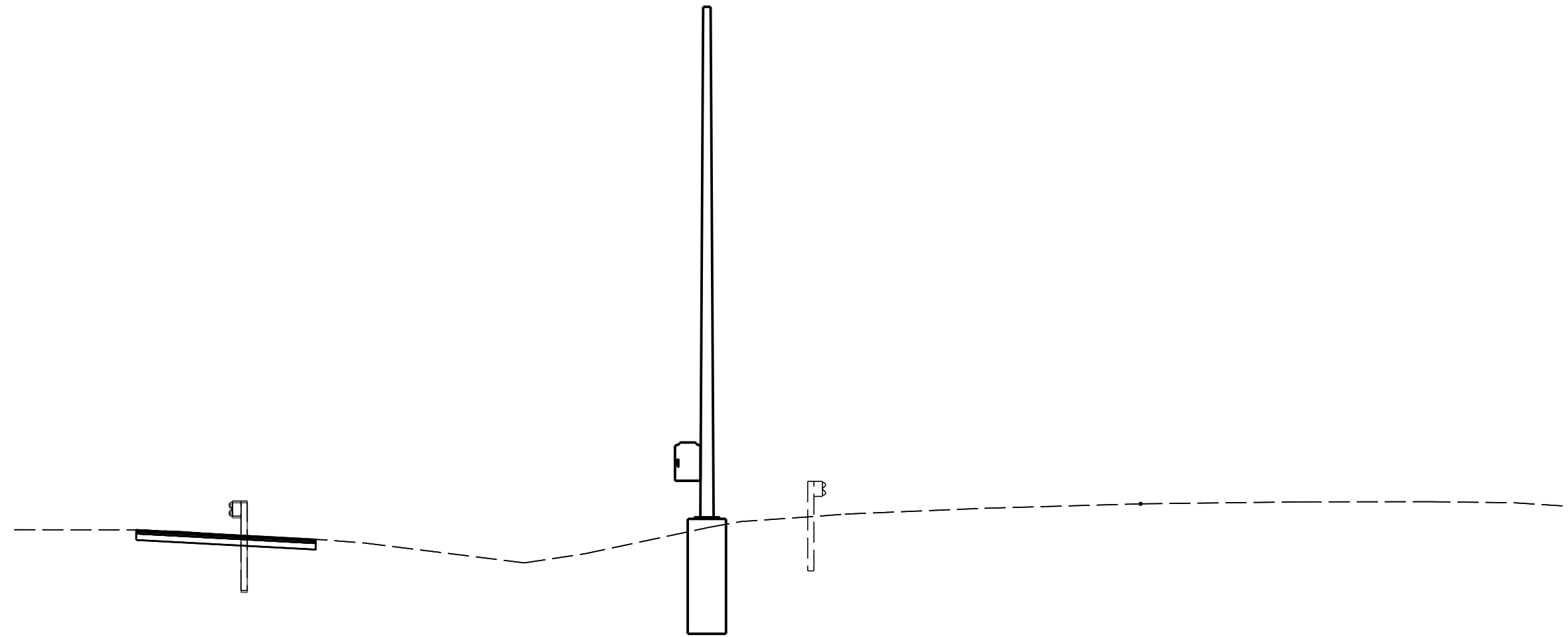
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(2G1)

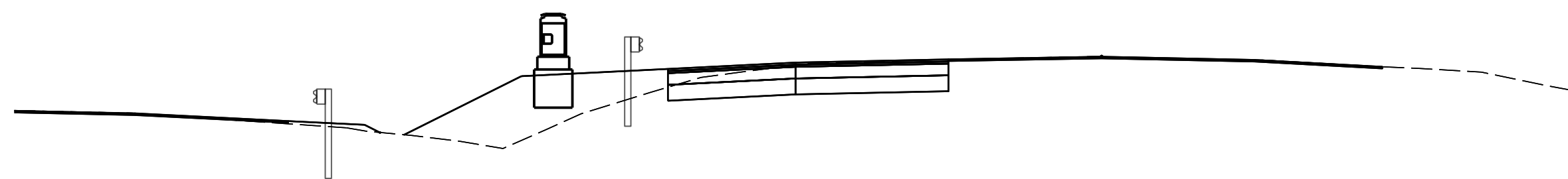
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

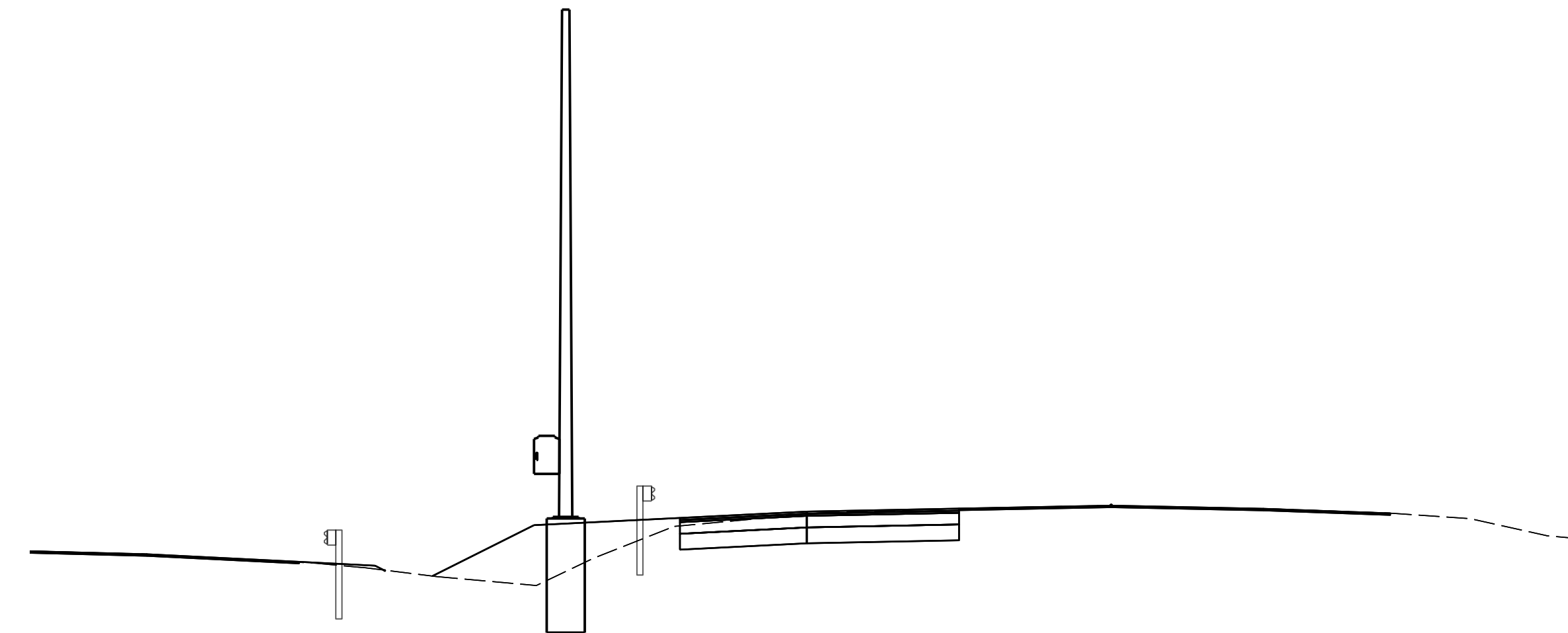
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 STA. 657+50, XBL CONST. @



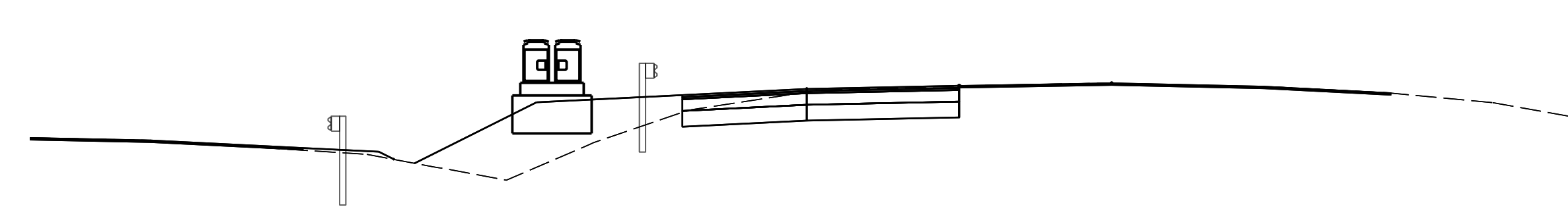
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 STA. 667+95, XBL CONST. @



AID POLE
 STA. 664+61, XBL CONST. @



C095HL156G
 STA. 668+27, XBL CONST. @



PAC PLANS

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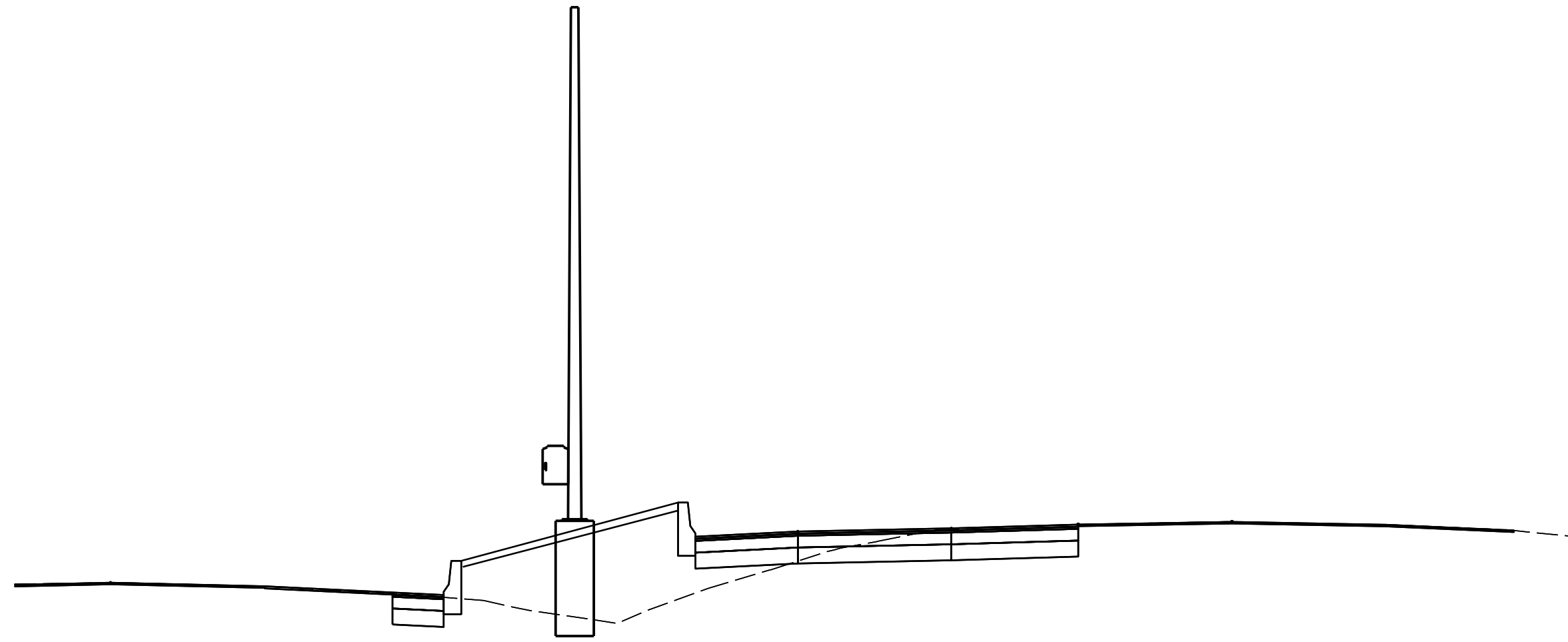
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 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(262)

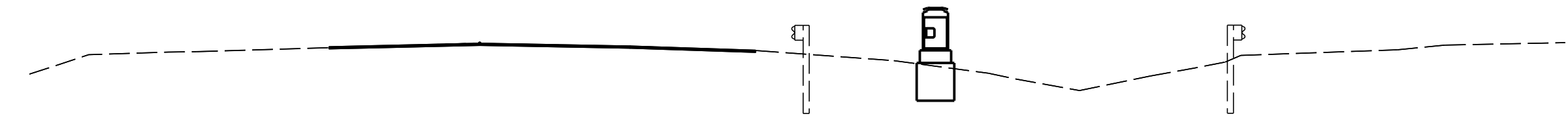
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

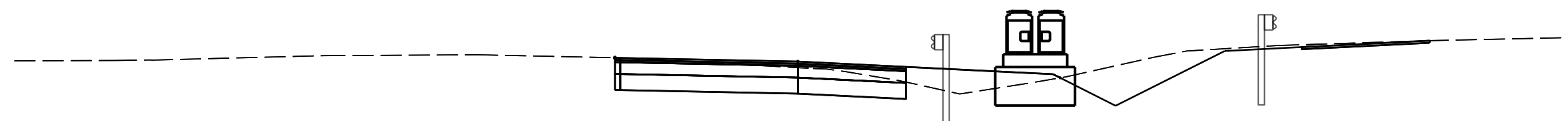
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 STA. 671+50, XBL CONST. B



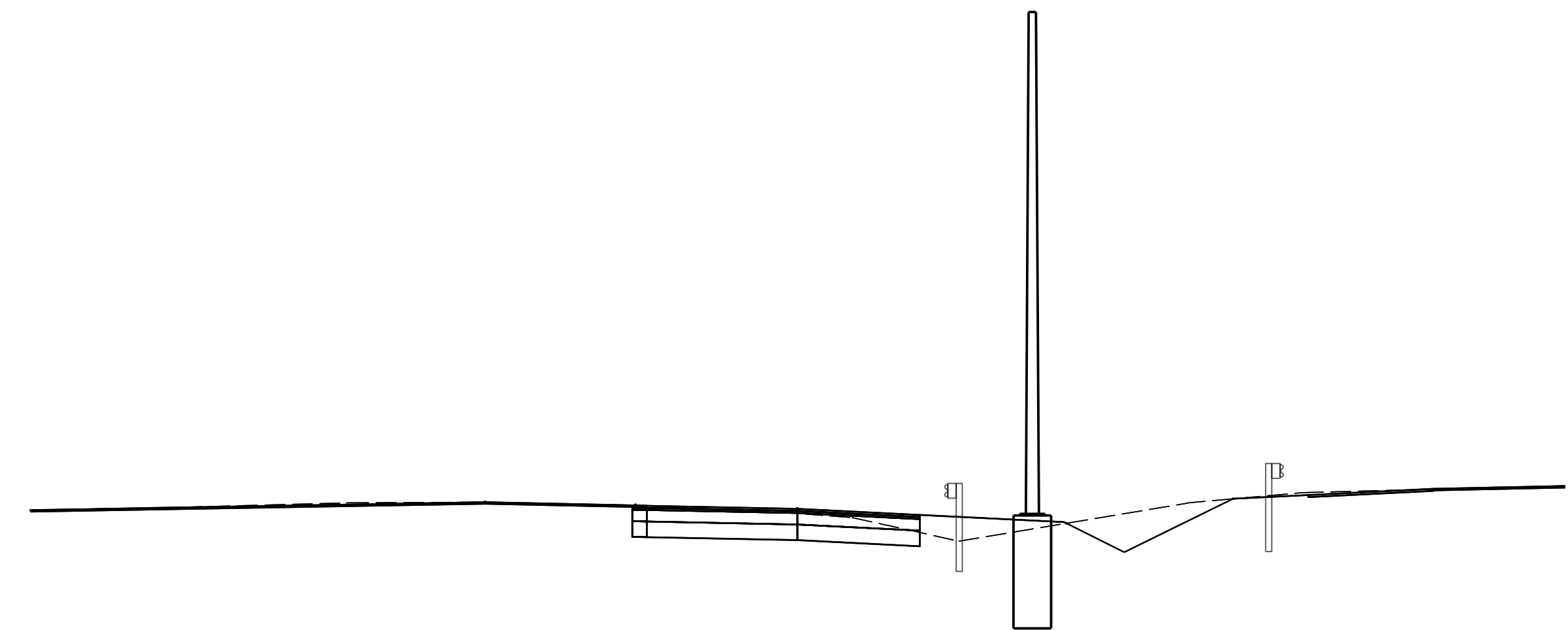
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C095HLI565G
 STA. 686+14, XBL CONST. B



AID POLE
 STA. 686+75, XBL CONST. B



PAC PLANS

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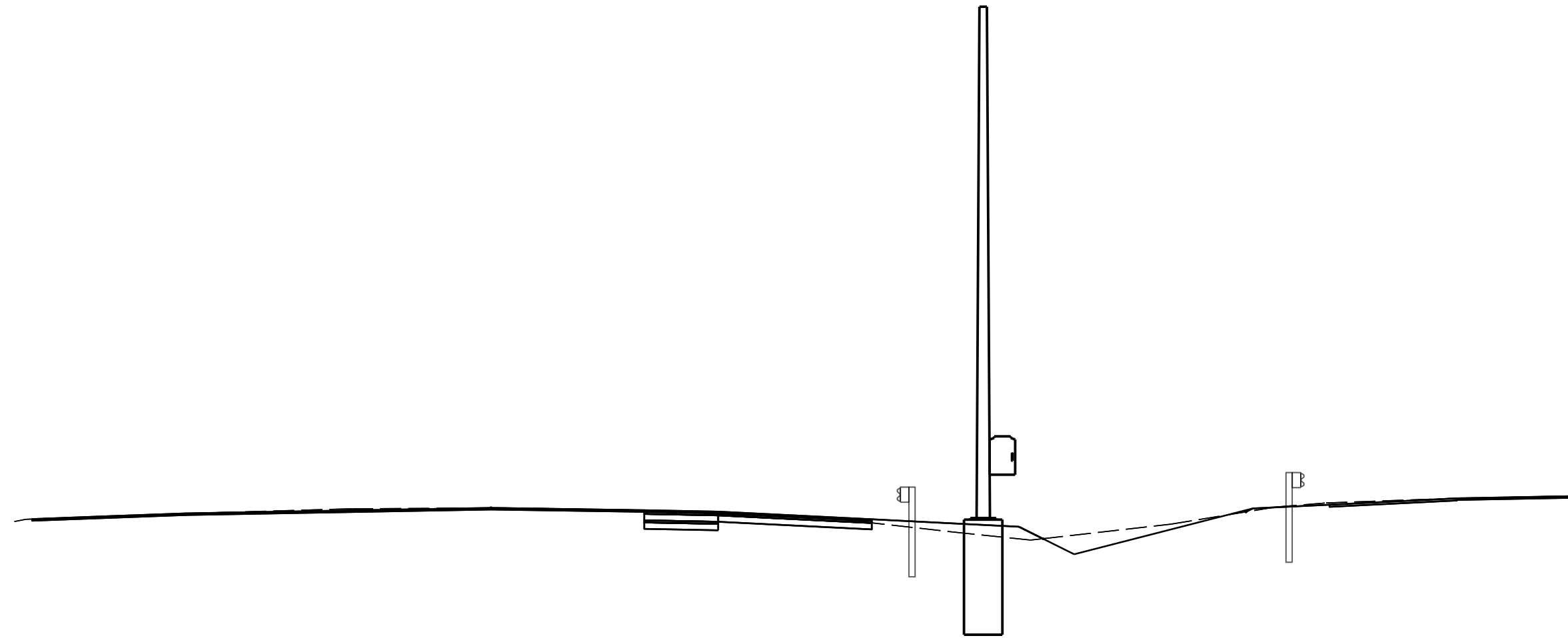
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740 07/07/2021

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(263)

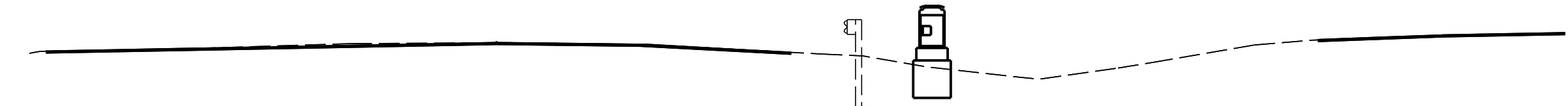
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

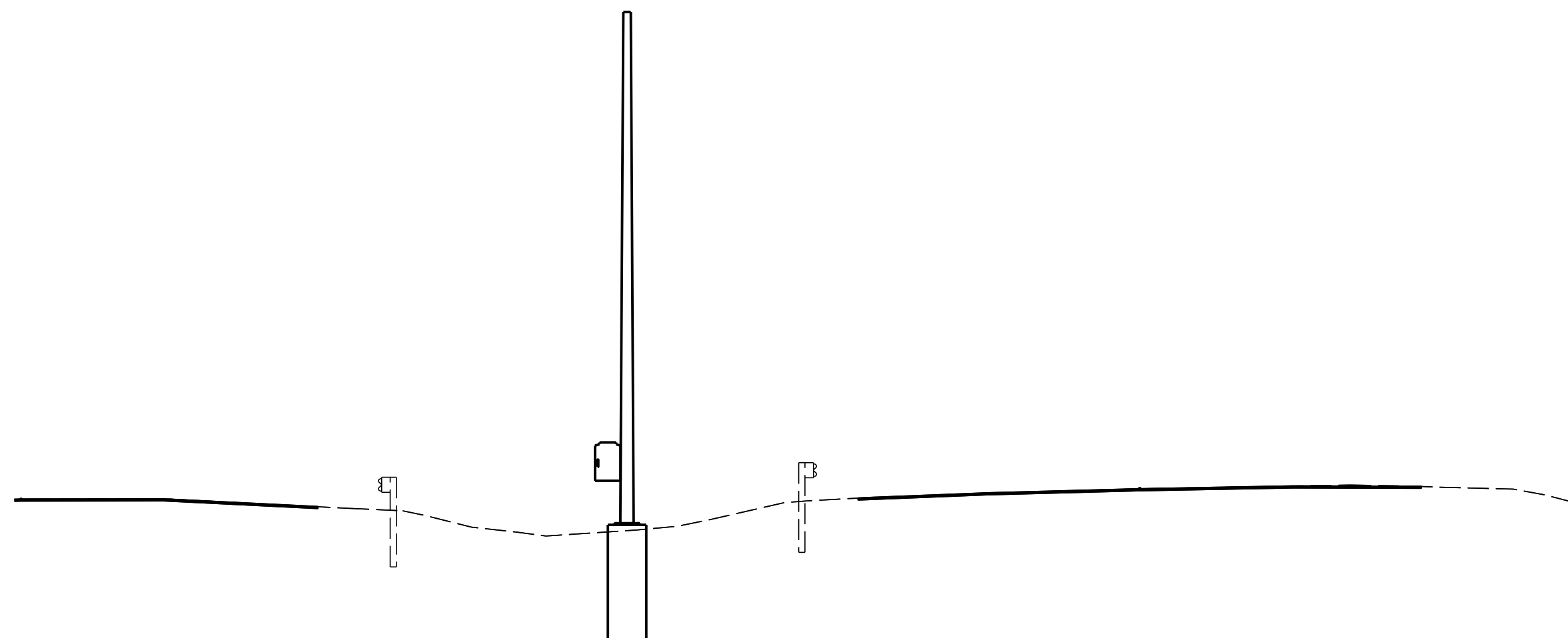
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 STA. 6692+75, XBL CONST. @



C095HL1566D
 STA. 694+20, XBL CONST. @



AID POLE
 STA. 697+32, XBL CONST. @



C095HL1572D
 STA. 724+25, XBL CONST. @



PAC PLANS

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PROJECT MANAGER *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *AccuMark, Inc. (804) 550-7740 07/07/2021*

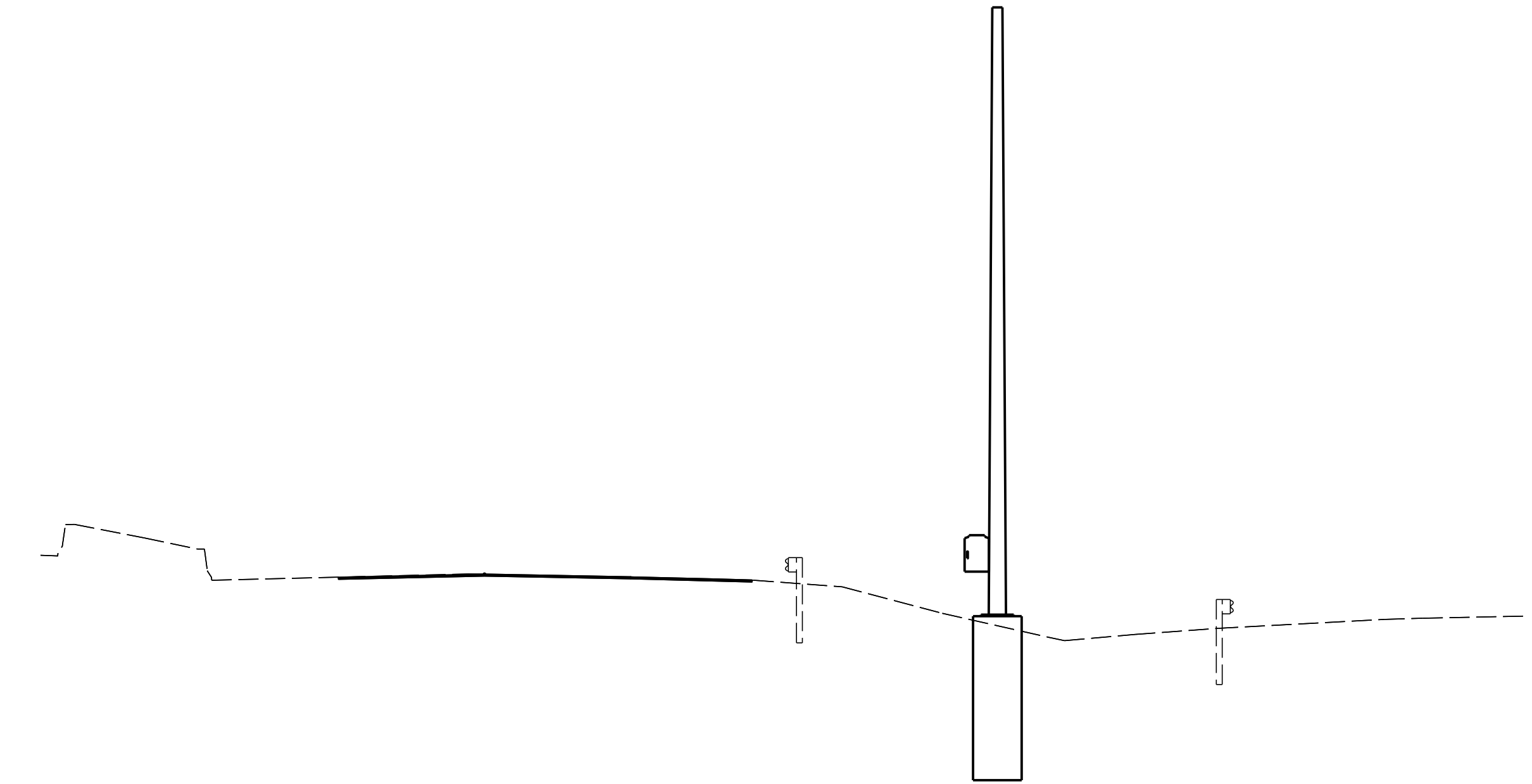
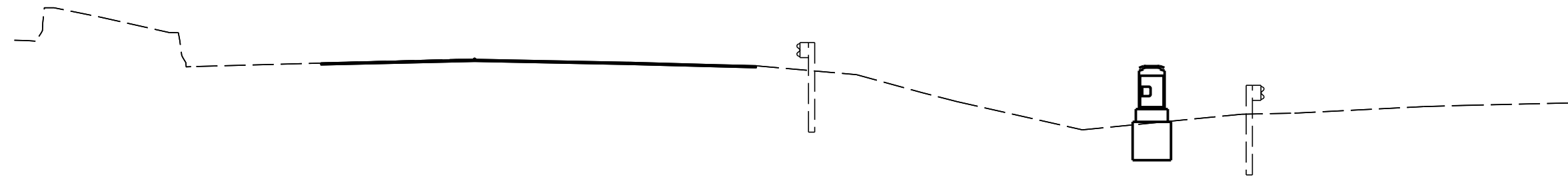
REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(264)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

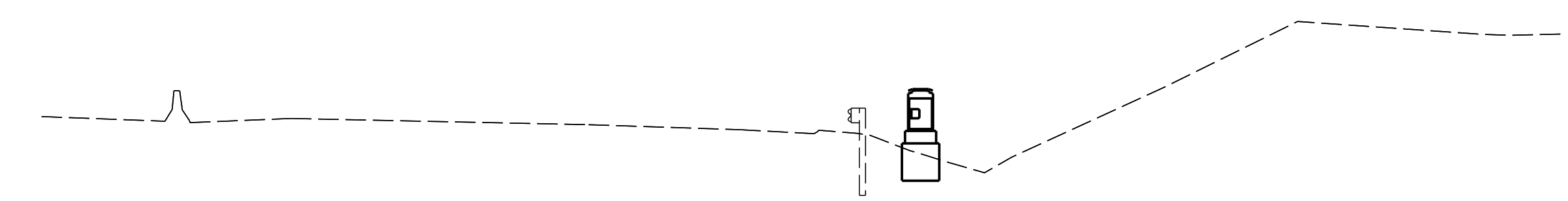
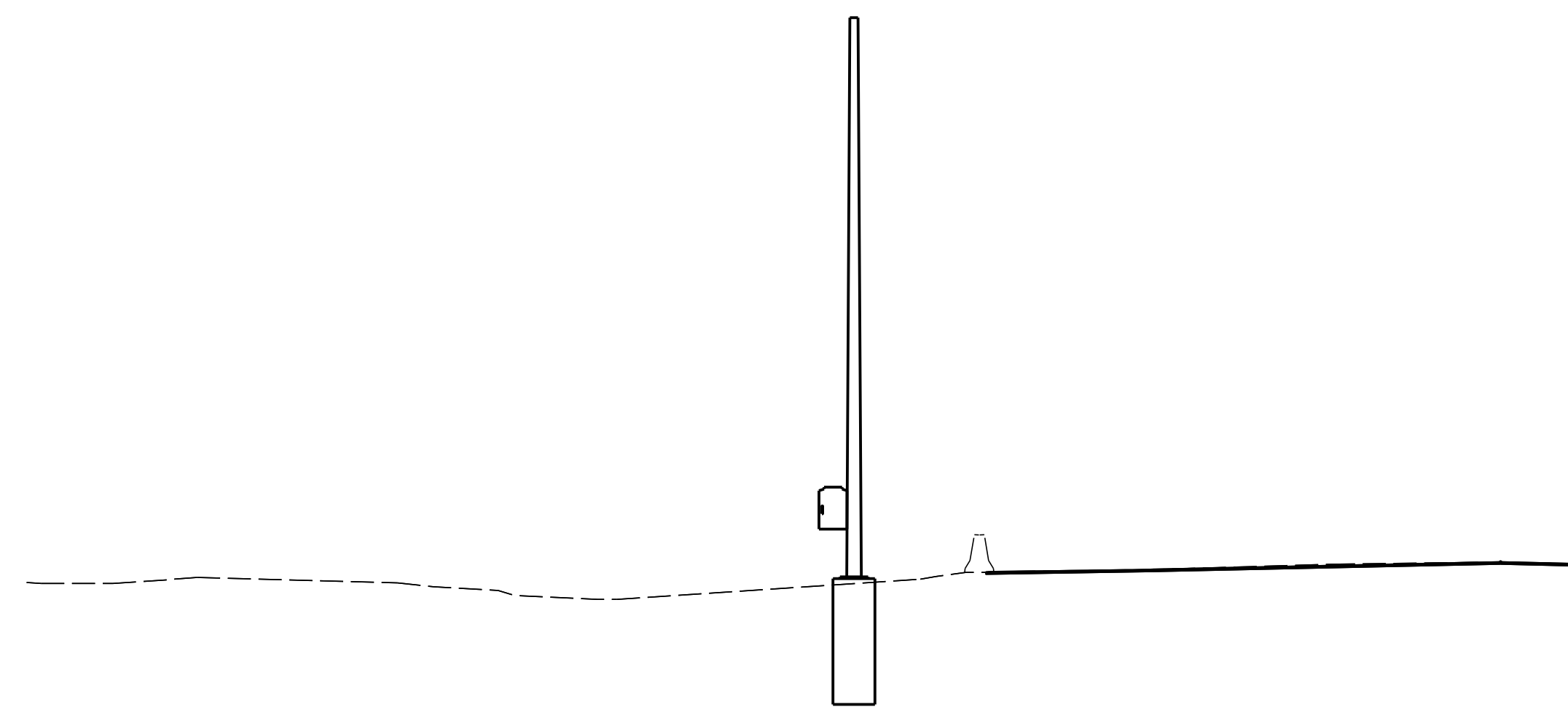
NRO-CAB-195-N-01572
 STA. 726+43, XBL CONST. @

CCTV POLE
 STA. 726+81, XBL CONST. @



NRO-CAB-195-S-01572 AND MVD POLE
 STA. 727+13, XBL CONST. @

C095NR1573D
 STA. 728+74, XBL CONST. @



PAC PLANS

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PROJECT MANAGER Bimal Shab, P.E. (703) 259-2362 (NOVA District)
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 DESIGN BY Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE AccuMark, Inc. (804) 550-7740 07/07/2021

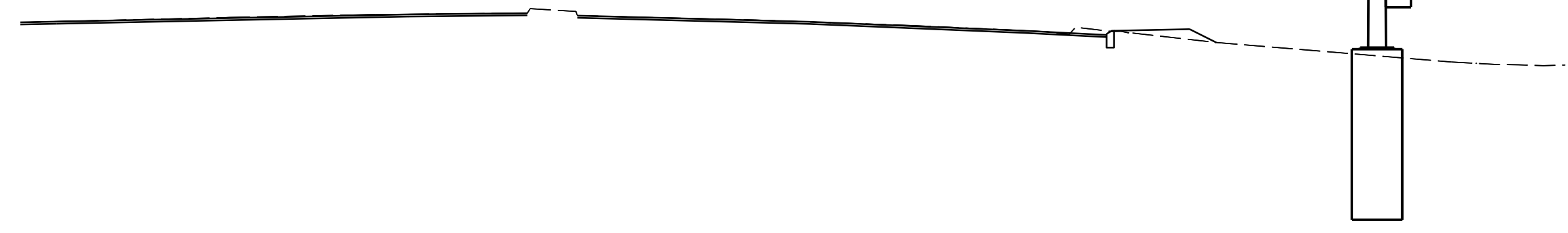
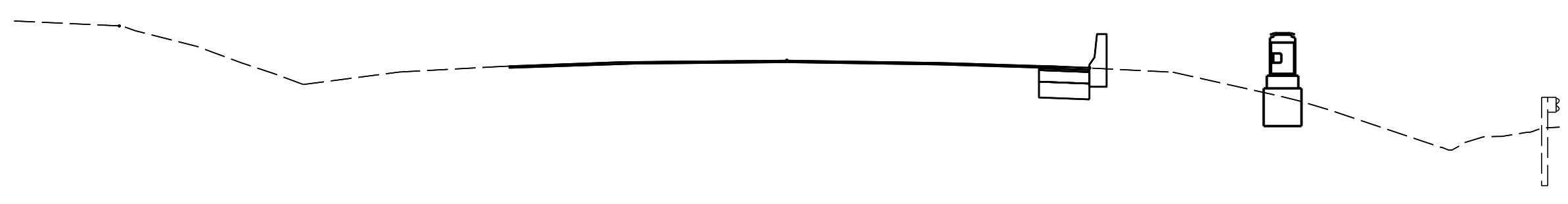
REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	15(265)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

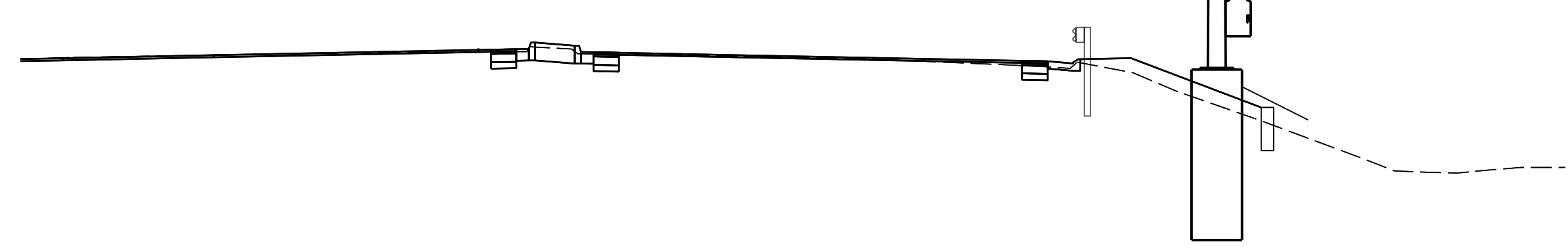
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 STA. 732+03, XBL CONST. @

CCTV POLE
 STA. 62+10, OPITZ XS CONST. @



C2000XR000ID
 STA. 62+10, OPITZ XS CONST. @

AID AND CCTV POLE
 STA. 63+25, OPITZ XS CONST. @



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	15(265)

PROJECT MANAGER Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE AccuMark, Inc. (804) 550-7740 07/07/2021

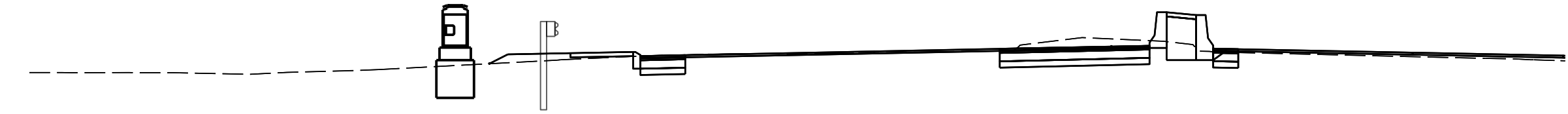
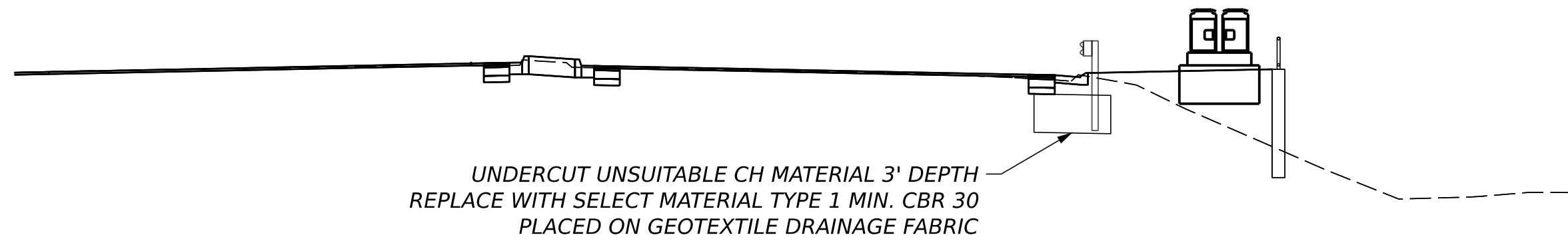
REVISED	STATE			SHEET NO.
	STATE	ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	15(266)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

C2000XR000IG
 STA. 63+50.0PITZ XS CONST. @

C2000XL000ID
 STA. 71+22.0PITZ XS CONST. @



C2000XR000IC
 STA. 73+65.0PITZ XS CONST. @



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	15(266)

PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

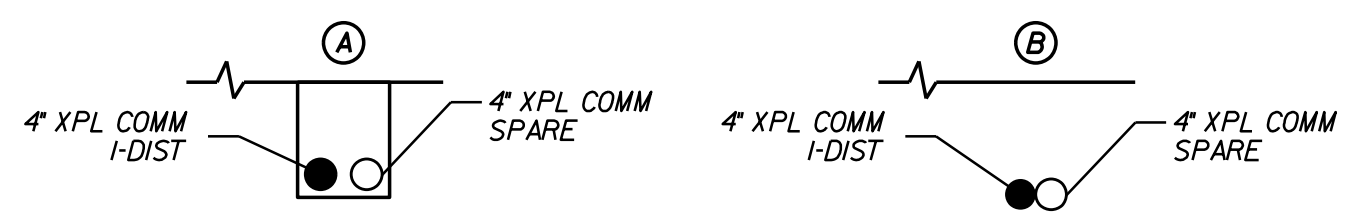
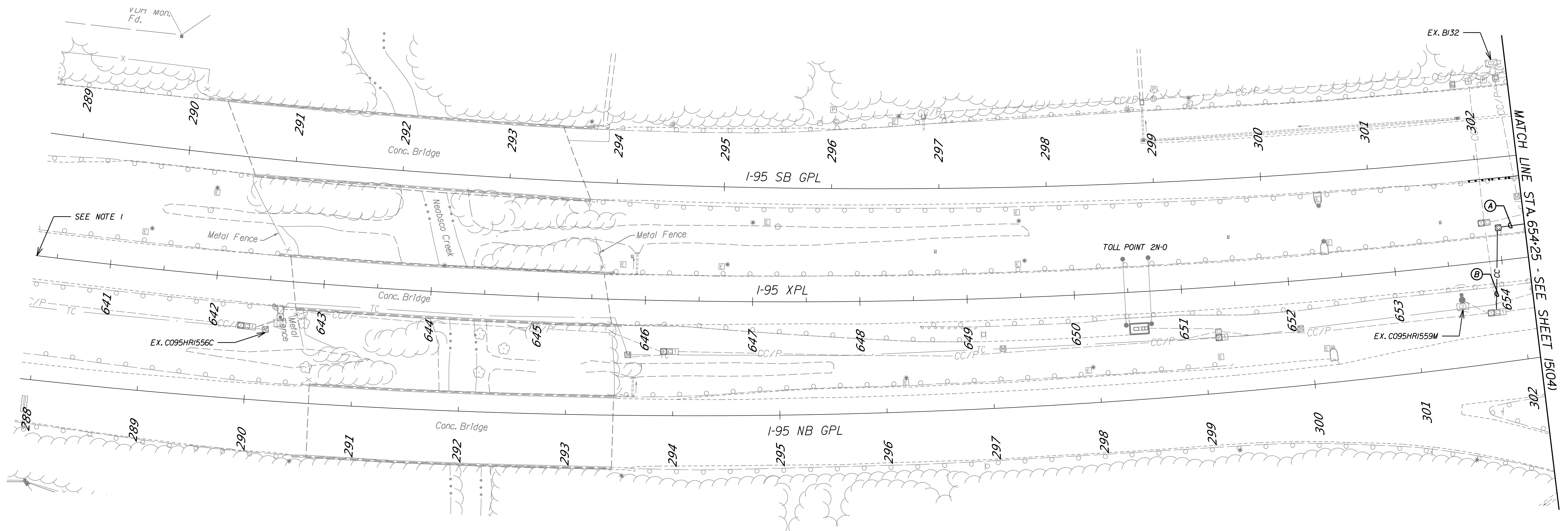
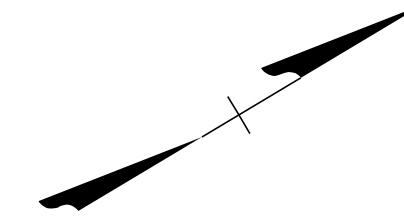
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(3)

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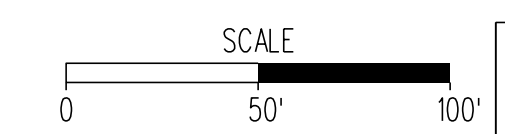
NOTES:

1. CABINETS CONNECTED TO HI19 AT THE FOLLOWING LOCATIONS ARE NOT SHOWN ON THE PLANS SINCE THEY ARE LOCATED OUTSIDE THE LIMITS OF CONSTRUCTION: MILEMARKER 155.1, MILEMARKER 155.2, MILEMARKER 155.3, MILEMARKER 155.5, AND MILEMARKER 155.6



PAC PLANS

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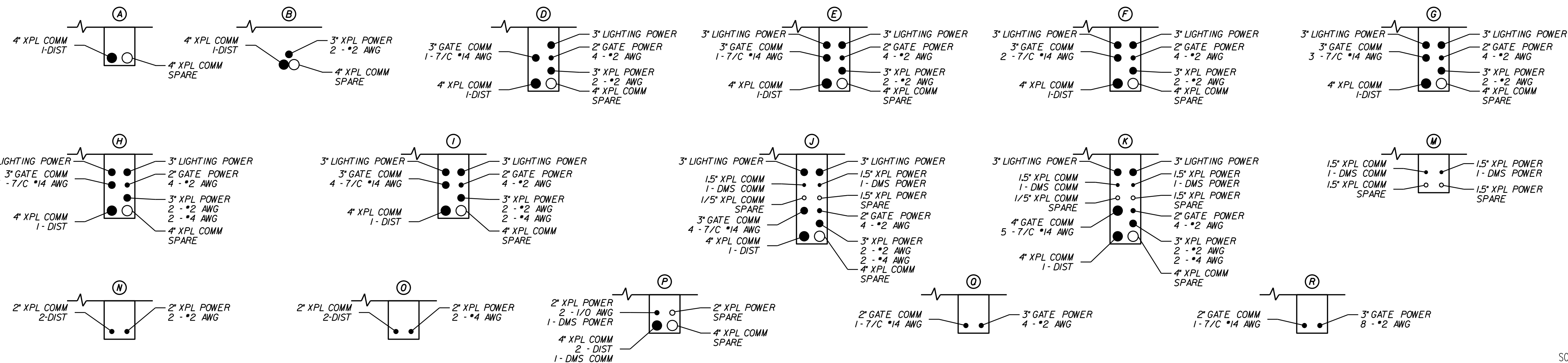
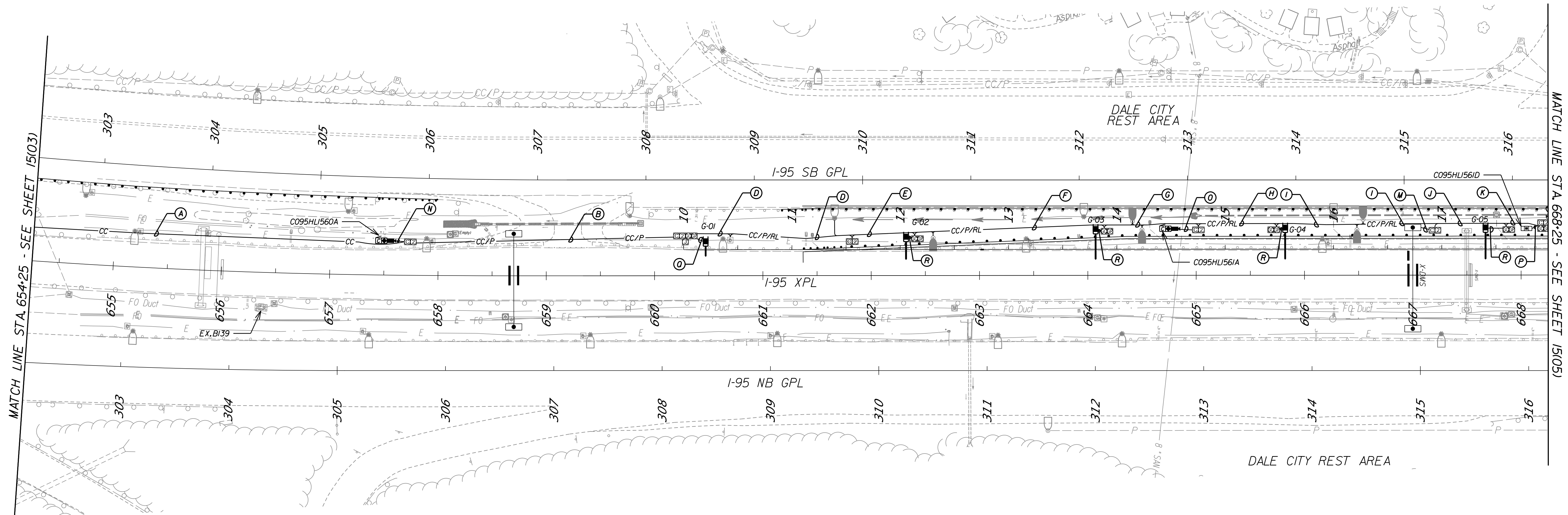
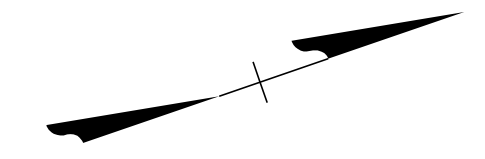
PROJECT	SHEET NO.
0095-076-299	15(3)

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3781.03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140.07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(4)

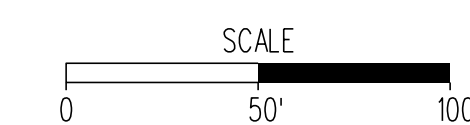
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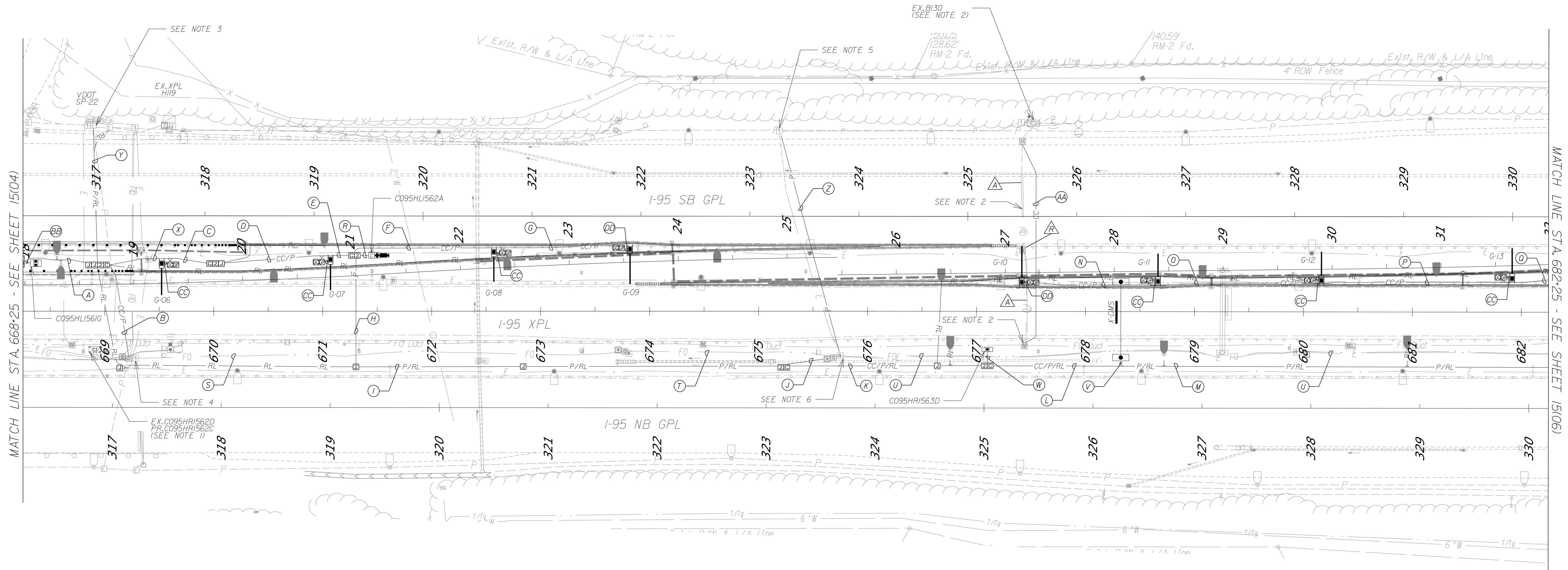
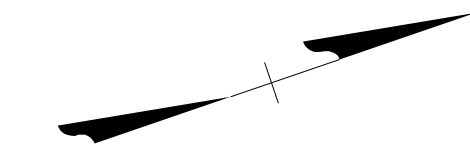
PROJECT	SHEET NO.
0095-076-299	15(4)

PROJECT MANAGER: Bimbal, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
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 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7140 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(5)

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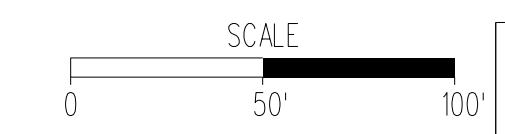


NOTES:

- EXISTING CABINET TO REMAIN FOR MVD AND CCTV CONTROL. REMOVE AND SALVAGE EXISTING DMS CONTROLS FROM CABINET AND RETURN TO 95 EXPRESS.
- DISCONNECT EX-FIBER OPTIC CABLES IN EXISTING CABINET AND PULL BACK TO EX-VDOT MANHOLE LOCATED AT STA. 677+45. RE-FEED EXISTING CABLES THROUGH PROPOSED AND EXISTING CONDUITS AND RECONNECT IN EXISTING CABINET.
- TERMINATE THE PROPOSED CONDUITS FOR VDOT POWER INTO THE EXISTING JUNCTION BOX FOR VDOT POWER. REMOVE THE EXISTING CABLES BETWEEN THE EXISTING JUNCTION BOX AND THE EXISTING SERVICE PANEL. FEED PROPOSED CABLES THROUGH THE EXISTING CONDUIT AND CONNECT TO THE EXISTING CIRCUIT BREAKERS FOR EXISTING CIRCUITS FOR EX.136 AND EX.B132/B141R IN THE EXISTING VDOT SERVICE PANEL SP-22.
- TERMINATE THE PROPOSED CONDUIT FOR VDOT POWER INTO THE EXISTING JUNCTION BOX FOR VDOT POWER. SPLICE THE EXISTING CONDUCTORS IN THE CONDUIT THAT RUNS SOUTH TOWARDS EX.B132 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.
- SPLICE THE EXISTING CONDUCTORS IN THE CONDUIT THAT RUNS NORTH TOWARDS EX.B130 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.
- SPLICE THE EXISTING CONDUCTORS IN THE CONDUIT THAT RUNS NORTH TOWARDS SP-21 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.

PAC PLANS

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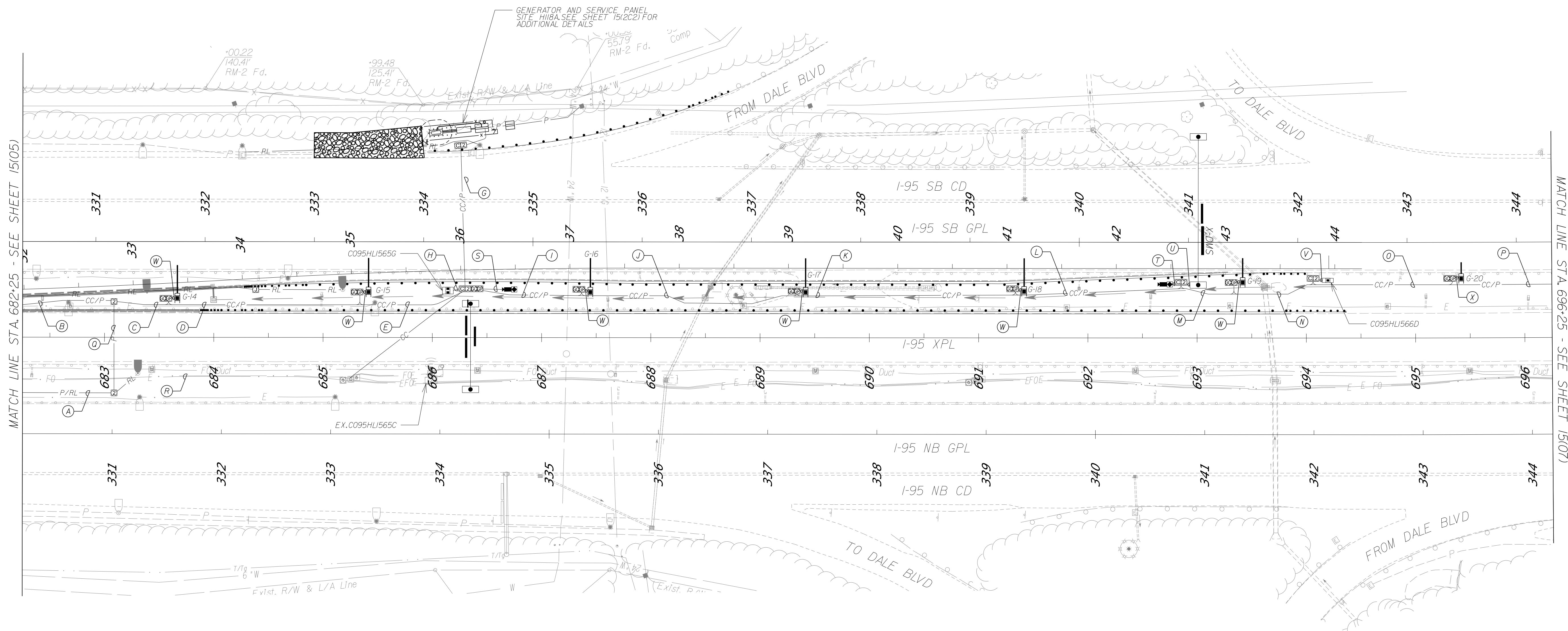
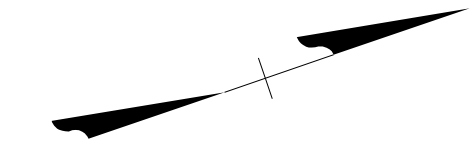
PROJECT	SHEET NO.
0095-076-299	15(5)

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
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 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	1516

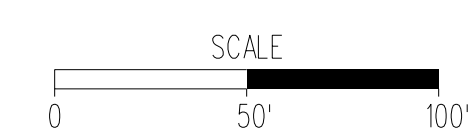
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

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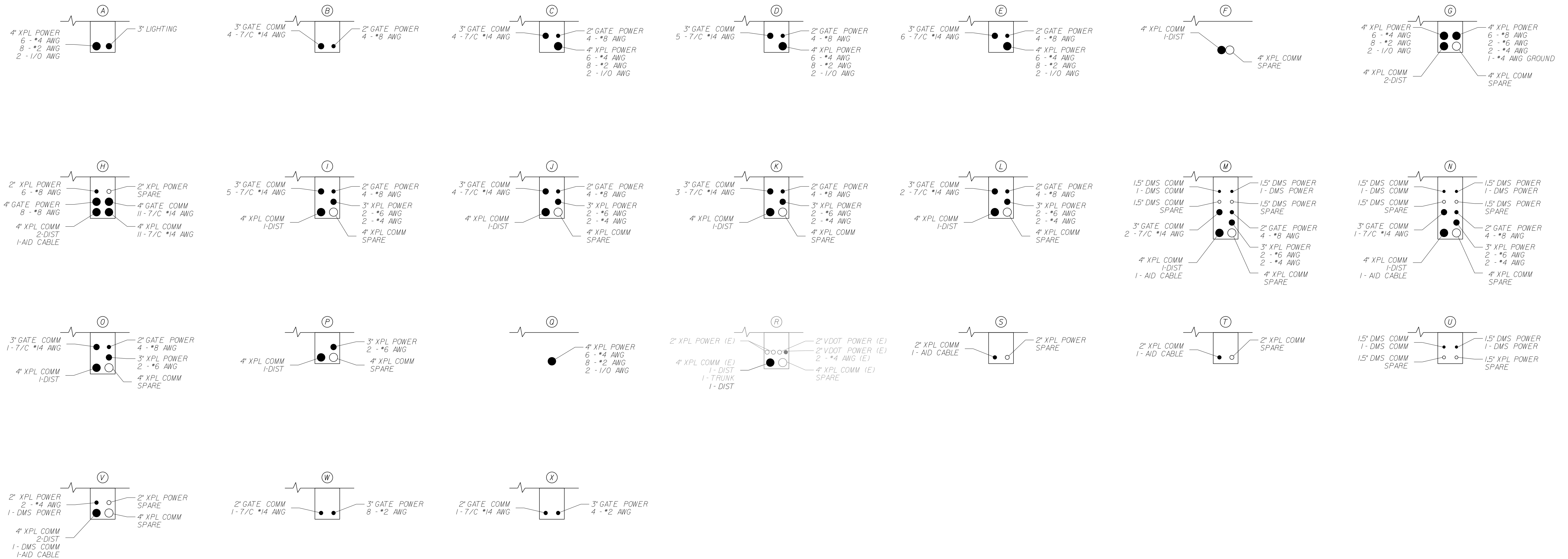
PROJECT	SHEET NO.
0095-076-299	1516

PROJECT MANAGER: *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	15(6A)

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PAC PLANS

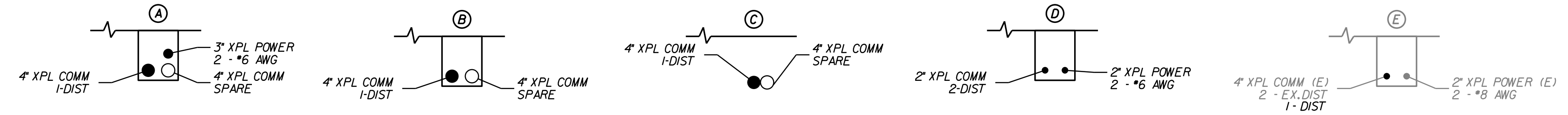
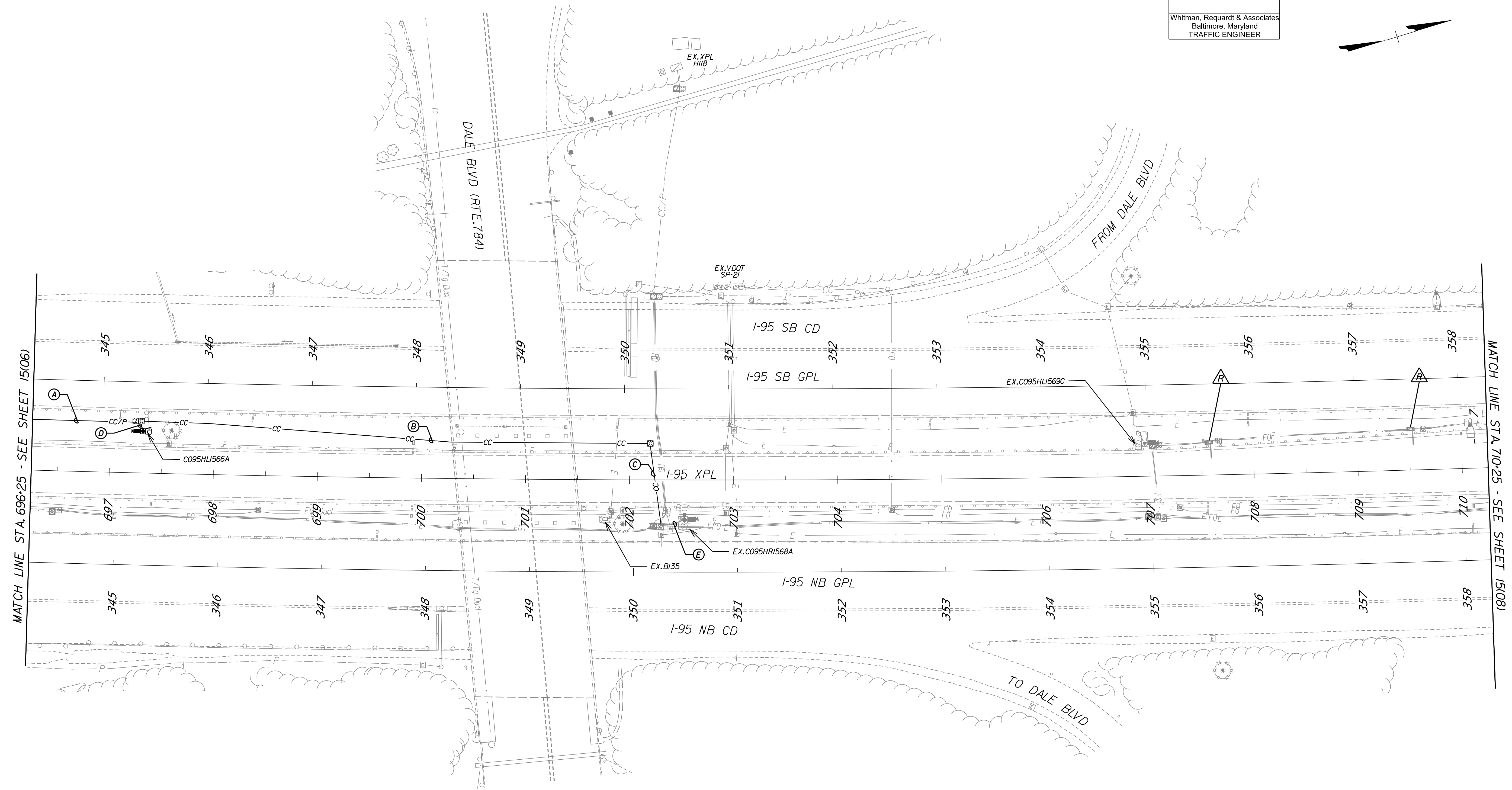
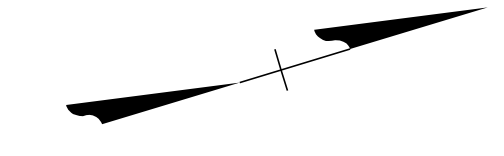
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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(7)

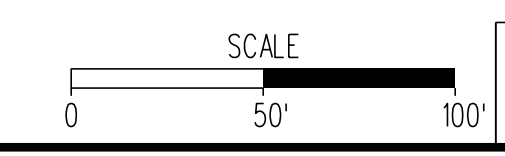
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 TRAFFIC ENGINEER



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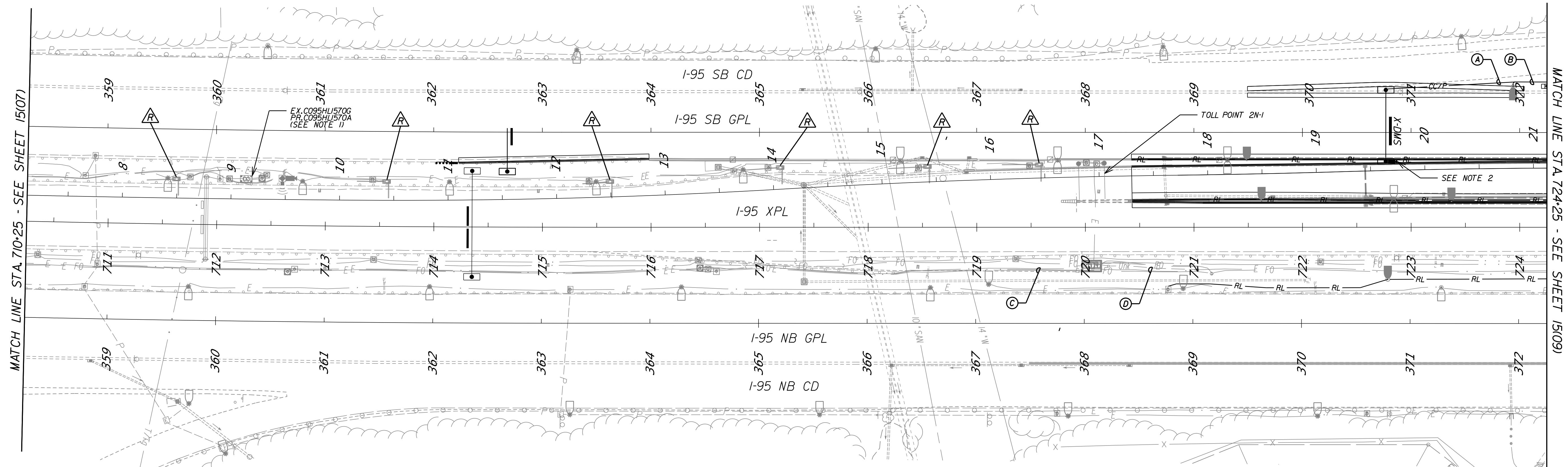
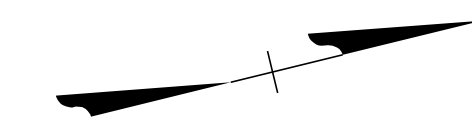
PROJECT	SHEET NO.
0095-076-299	15(7)

PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1518

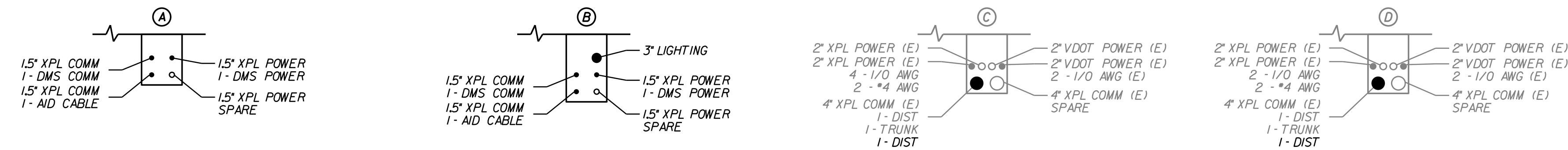
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MATCH LINE STA 710+25 - SEE SHEET 15107

MATCH LINE STA 724+25 - SEE SHEET 15109

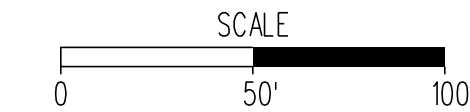


NOTES:

- EXISTING CABINET TO REMAIN FOR AID AND MVD CONTROL. REMOVE AND SALVAGE EXISTING GATE CONTROL EQUIPMENT FROM CABINET AND RETURN TO TRANSURBAN.
- INSTALL AID CAMERA ON PROPOSED SIGN STRUCTURE FOLLOWING MOUNTING DETAILS ON SHEET 1512A2. UTILIZE THE DMS COMMUNICATIONS CONDUIT FOR THE AID CABLE BY CONTINUING THE DMS COMMUNICATIONS CONDUIT FROM THE DMS TO THE AID CAMERA LOCATION. TERMINATE THE CONDUIT AT THE AID WITH A WEATHERHEAD.

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	1518

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3281 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(9)

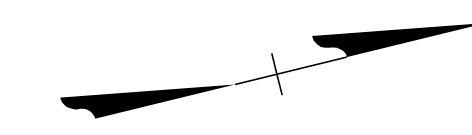
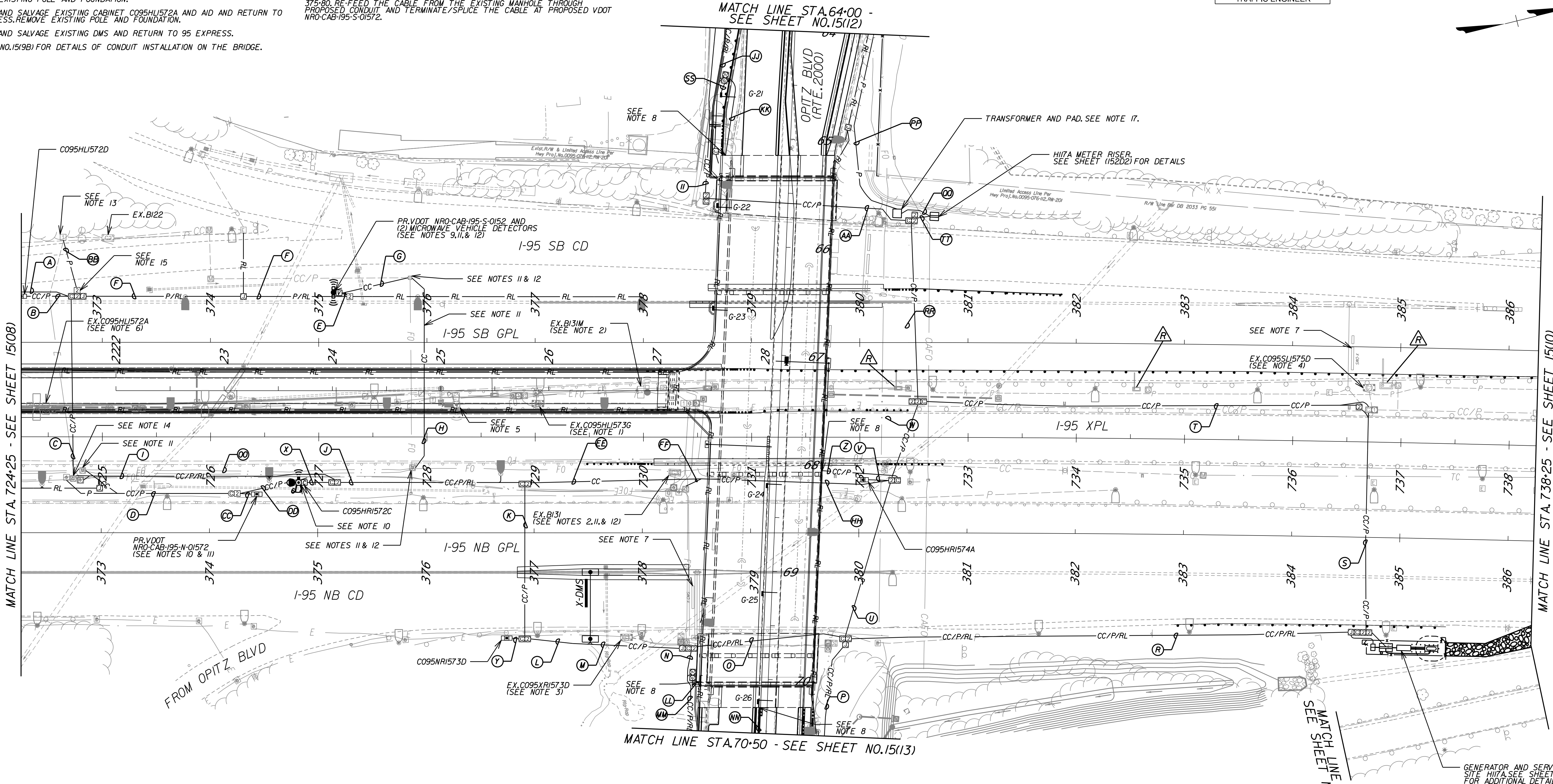
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 Baltimore, Maryland
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- NOTES:
- REMOVE AND SALVAGE EXISTING CABINET C095HJ1573G AND RETURN TO 95 EXPRESS. REMOVE EXISTING CABINET FOUNDATION.
 - REMOVE AND SALVAGE EXISTING VDOT CABINET B131M, CABINET B131 AND MVD AND RETURN TO VDOT. REMOVE EXISTING POLE AND CABINET FOUNDATIONS.
 - REMOVE AND SALVAGE EXISTING CABINET C095XRI1573D AND RETURN TO 95 EXPRESS. REMOVE EXISTING CABINET FOUNDATION.
 - REMOVE AND SALVAGE EXISTING CABINET C095LJ1575D AND RETURN TO 95 EXPRESS. REMOVE EXISTING CABINET FOUNDATION.
 - REMOVE AND SALVAGE EXISTING CCTV AND AID AND RETURN TO 95 EXPRESS. REMOVE EXISTING POLE AND FOUNDATION.
 - REMOVE AND SALVAGE EXISTING CABINET C095HJ1572A AND AID AND RETURN TO 95 EXPRESS. REMOVE EXISTING POLE AND FOUNDATION.
 - REMOVE AND SALVAGE EXISTING DMS AND RETURN TO 95 EXPRESS.
 - SEE DWG. NO. 15(9B) FOR DETAILS OF CONDUIT INSTALLATION ON THE BRIDGE.

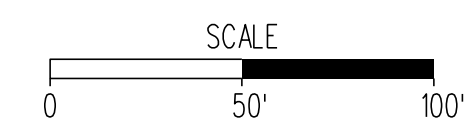
- INSTALL PROPOSED VDOT MICROWAVE VEHICLE DETECTOR AND POLE MOUNTED CABINET ON PROPOSED 45 FOOT STEEL POLE. REFER TO SECTION 805 VEHICLE DETECTION AND DATA COLLECTION SECTION 801 - ITS INFRASTRUCTURE COMPONENTS AND SECTION 803 - CCTV VIDEO EQUIPMENT OF THE VDOT ROAD AND BRIDGE SPECIFICATIONS FOR REQUIREMENTS OF THE VEHICLE DETECTOR, POLE MOUNTED CABINET, AND STEEL POLE.
- INSTALL PROPOSED VDOT BASE MOUNTED CABINET NRO-CAB-195-N-01572 ON STD. CF-3 FOUNDATION. INSTALL PROPOSED VDOT CCTV ON PROPOSED TRANSURBAN 30 FOOT STEEL POLE. REFER TO SECTION 801 - ITS INFRASTRUCTURE COMPONENTS AND SECTION 803 - CCTV VIDEO EQUIPMENT OF THE VDOT ROAD AND BRIDGE SPECIFICATIONS FOR REQUIREMENTS OF THE GROUND MOUNTED CABINET AND CCTV EQUIPMENT.
- DISCONNECT THE EX. 24 CT FIBER CABLE THAT COMES FROM THE SOUTH (ORIGINATES FROM EX. B135) IN EX. B131 AND PULL THE CABLE BACK TO THE VDOT MANHOLE LOCATED AT STA. 124+80. RE-FEED THE CABLE FROM THE EXISTING MANHOLE THROUGH PROPOSED CONDUITS AND JUNCTION BOXES AND TERMINATE/SPlice THE CABLE AT PROPOSED VDOT NRO-CAB-195-N-01572.
- DISCONNECT THE EX. 24 CT FIBER CABLE THAT COMES FROM EX. B122 IN EX. B131 AND PULL THE CABLE BACK TO THE VDOT MANHOLE LOCATED AT STA. 375+80. RE-FEED THE CABLE FROM THE EXISTING MANHOLE THROUGH PROPOSED CONDUIT AND TERMINATE/SPlice THE CABLE AT PROPOSED VDOT NRO-CAB-195-S-01572.

- SPlice THE EXISTING CONDUCTORS IN THE CONDUIT THAT RUNS NORTH TOWARDS EX. B122 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.
- TERMINATE THE PROPOSED CONDUIT FOR VDOT POWER INTO THE EXISTING JUNCTION BOX FOR VDOT POWER. SPlice THE EXISTING CONDUCTORS IN THE CONDUIT THAT RUNS SOUTH TOWARDS EX. VDOT SERVICE PANEL SP-21 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.
- SPlice THE PROPOSED CONDUCTORS IN THE CONDUIT THAT RUNS NORTH TOWARDS PR. NRO-CAB-195-S-01572 TO THE PROPOSED CONDUCTORS IN THE PROPOSED CONDUIT CROSSING I-95.
- SEE DWG. NO. 15(9C) FOR ADDITIONAL EQUIPMENT REMOVAL AND CONDUIT ABANDONED DETAILS.
- INSTALL CONCRETE PAD FOR 75KVA, 3 PHASE TRANSFORMER. TRANSFORMER TO BE PROVIDED BY NOVEC. REFER TO NOVEC ELECTRICIANS GUIDE, STD. UPI003 FOR TRANSFORMER PAD DETAILS. INSTALL (3) 3 FOOT RADIUS SWEEPS (LIGHTING, ITS, AND SPARE).



PAC PLANS

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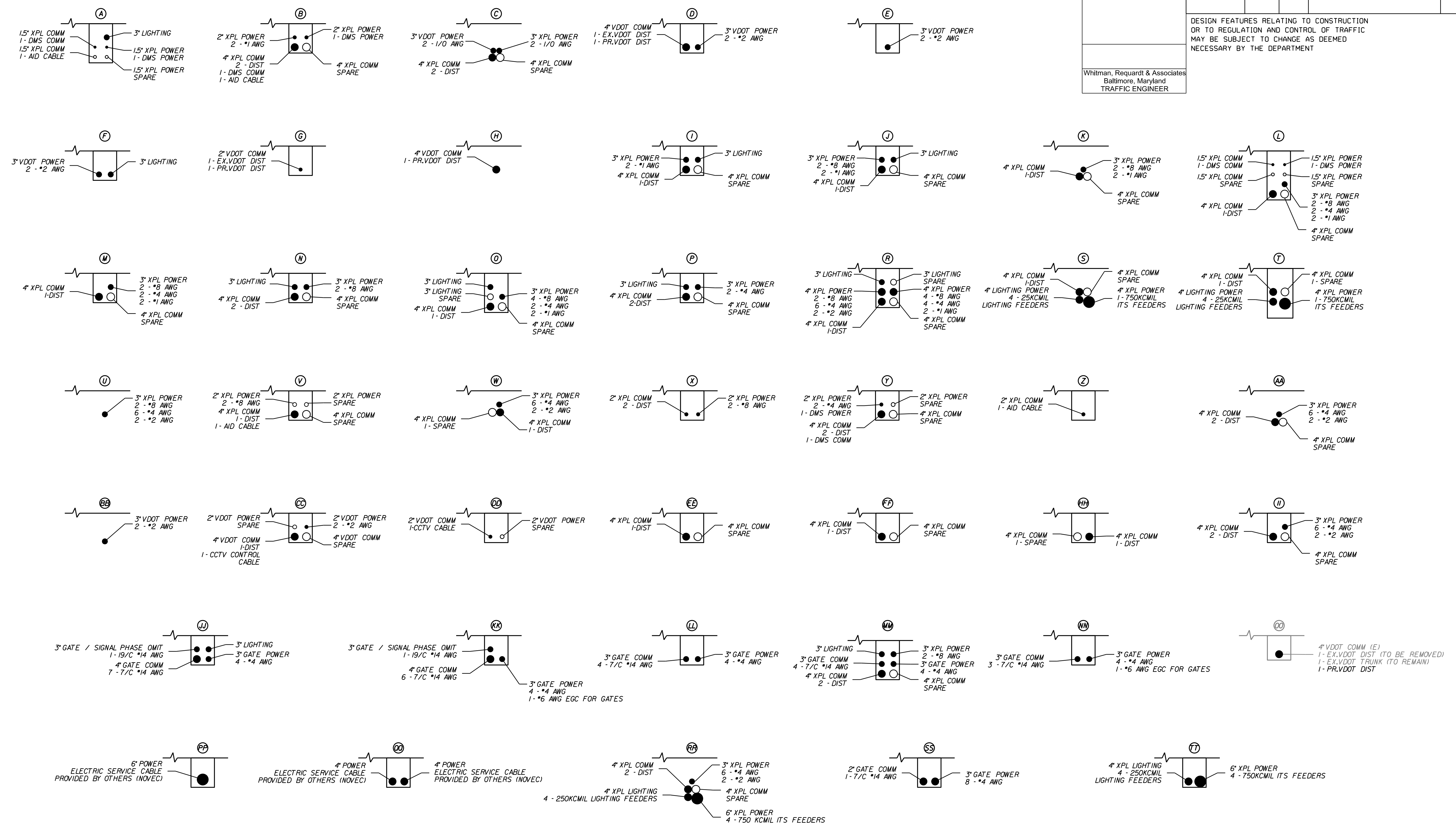
PROJECT	SHEET NO.
0095-076-299	15(9)

PROJECT MANAGER: *Bimal Shabb, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	15(9A)

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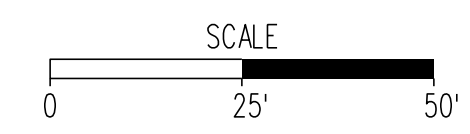
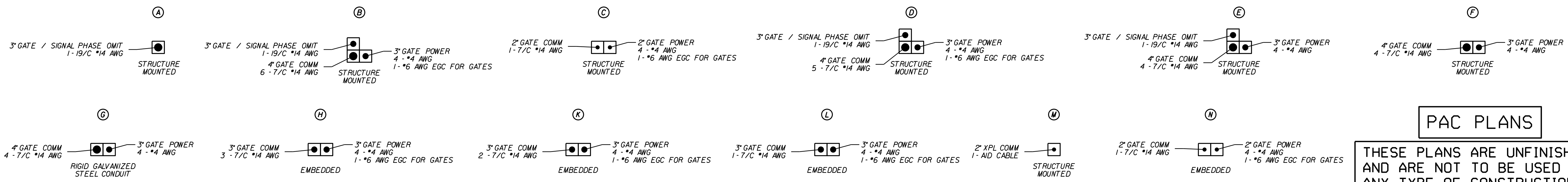
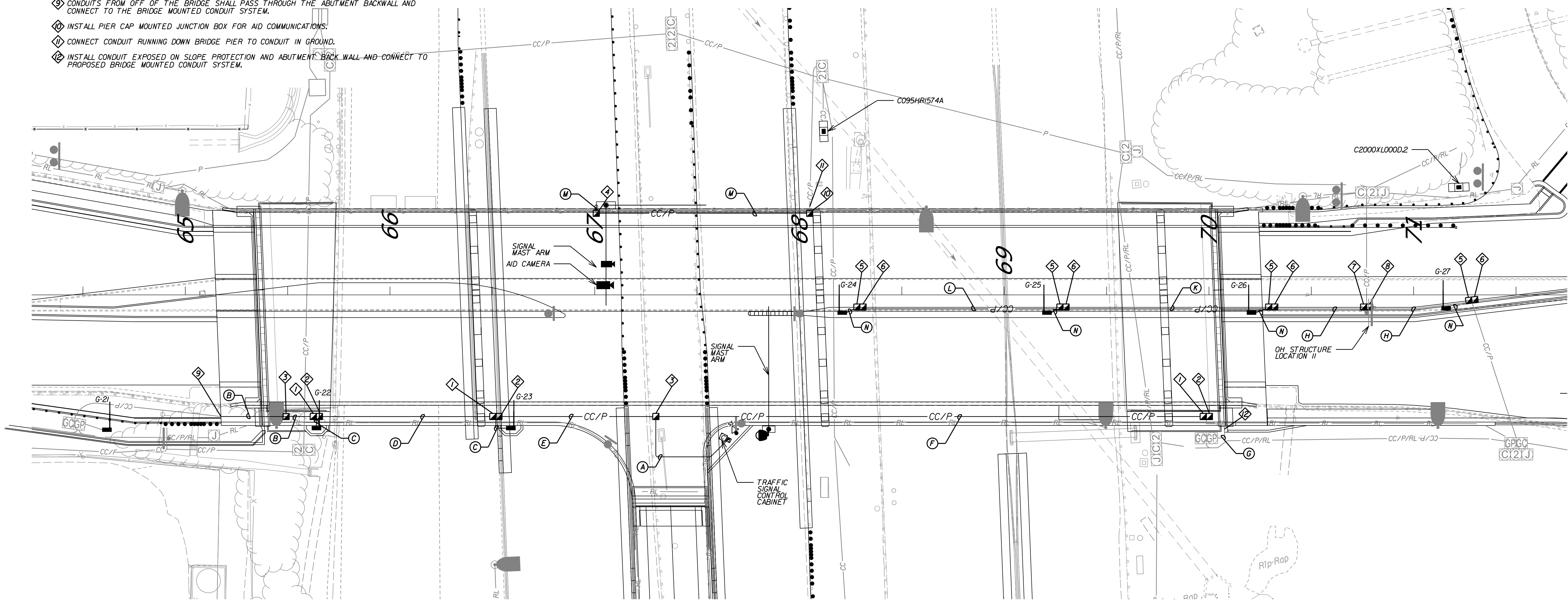
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(9B)

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- CONSTRUCTION DETAILS:**
1. INSTALL BRIDGE MOUNTED JUNCTION BOX FOR GATE POWER.
 2. INSTALL BRIDGE MOUNTED JUNCTION BOX FOR GATE COMMUNICATIONS.
 3. INSTALL BRIDGE MOUNTED JUNCTION BOX FOR GATE/TRAFFIC SIGNAL PHASE OMIT.
 4. INSTALL BRIDGE MOUNTED JUNCTION BOX FOR AID COMMUNICATIONS.
 5. INSTALL JUNCTION BOX EMBEDDED IN CONCRETE BARRIER FOR GATE POWER.
 6. INSTALL JUNCTION BOX EMBEDDED IN CONCRETE BARRIER FOR GATE COMMUNICATIONS.
 7. INSTALL JUNCTION BOX EMBEDDED IN CONCRETE BARRIER FOR DMS POWER.
 8. INSTALL JUNCTION BOX EMBEDDED IN CONCRETE BARRIER FOR DMS COMMUNICATIONS.
 9. CONDUITS FROM OFF OF THE BRIDGE SHALL PASS THROUGH THE ABUTMENT BACKWALL AND CONNECT TO THE BRIDGE MOUNTED CONDUIT SYSTEM.
 10. INSTALL PIER CAP MOUNTED JUNCTION BOX FOR AID COMMUNICATIONS.
 11. CONNECT CONDUIT RUNNING DOWN BRIDGE PIER TO CONDUIT IN GROUND.
 12. INSTALL CONDUIT EXPOSED ON SLOPE PROTECTION AND ABUTMENT BACK WALL AND CONNECT TO PROPOSED BRIDGE MOUNTED CONDUIT SYSTEM.

- NOTES:**
1. SEE DWG. NO. 15191 FOR DETAILS OF CONDUIT AND CABLE INSTALLATION OFF OF THE BRIDGE.
 2. REFER TO THE OPITZ BLVD BRIDGE PLANS FOR INSTALLATION DETAILS OF ALL CONDUITS AND JUNCTION BOXES MOUNTED TO OR EMBEDDED IN PARTS OF THE OPITZ BLVD BRIDGE STRUCTURE.



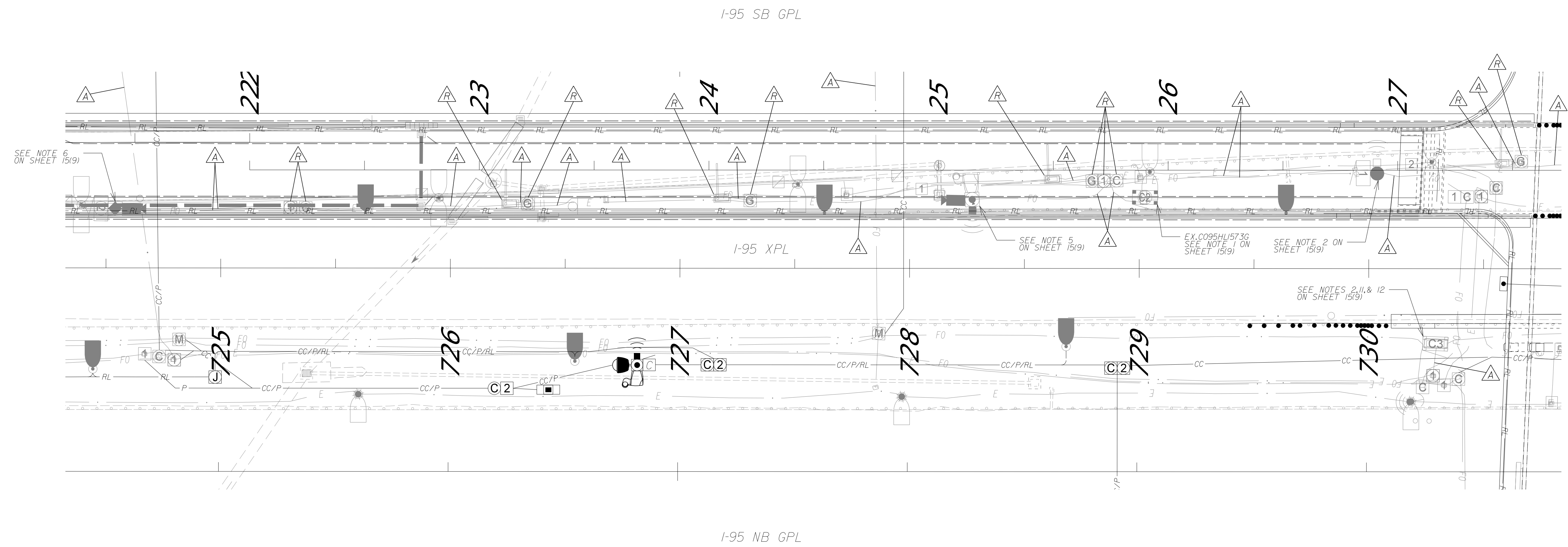
PROJECT	SHEET NO.
0095-076-299	15(9B)

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740 (07/07/2021)

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	15(9C)

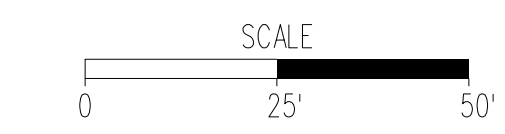
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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 TRAFFIC ENGINEER



PAC PLANS

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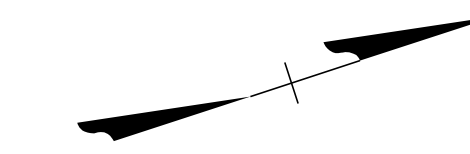
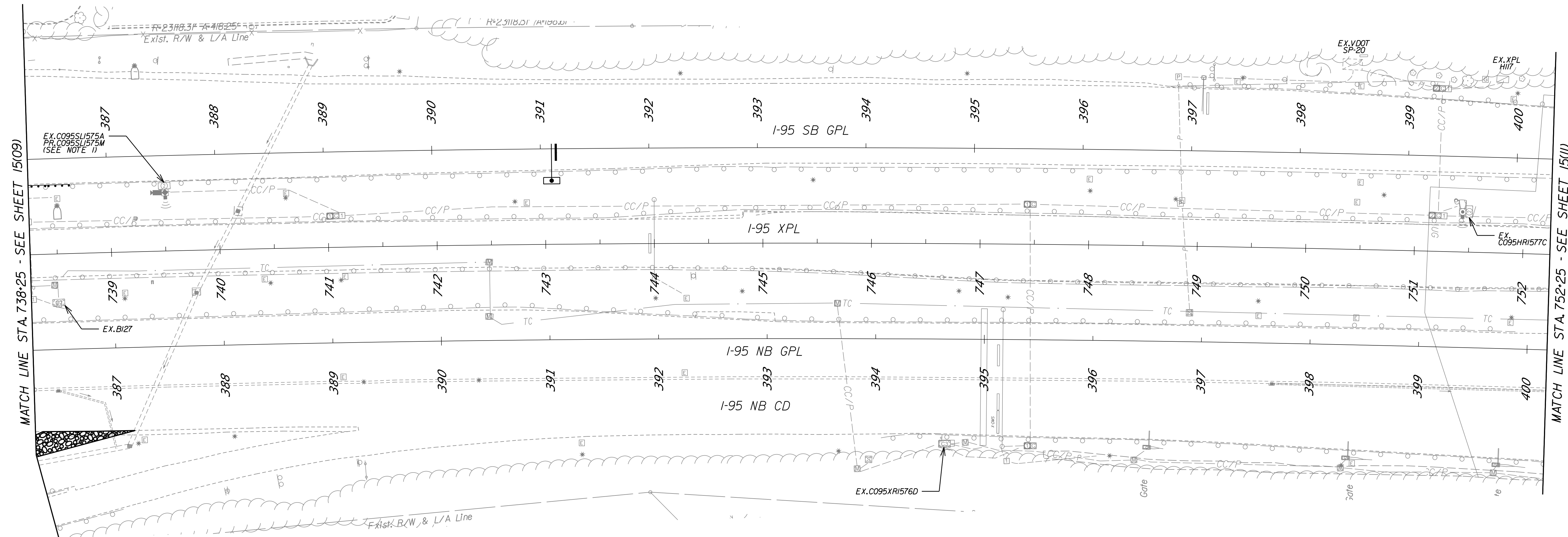
PROJECT	SHEET NO.
0095-076-299	15(9C)

PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE		PROJECT	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(10)

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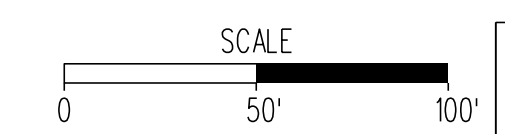
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NOTES:
 1. EXISTING CABINET, MVD, AND POLE TO REMAIN, REMOVE AND SALVAGE EX. AID AND AID CONTROL EQUIPMENT AND RETURN TO 95 EXPRESS.

PAC PLANS

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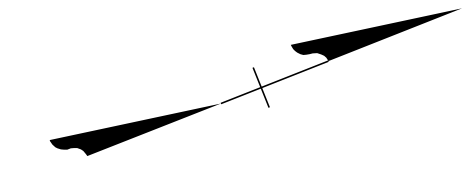
PROJECT	SHEET NO.
0095-076-299	15(10)

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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	15(11)

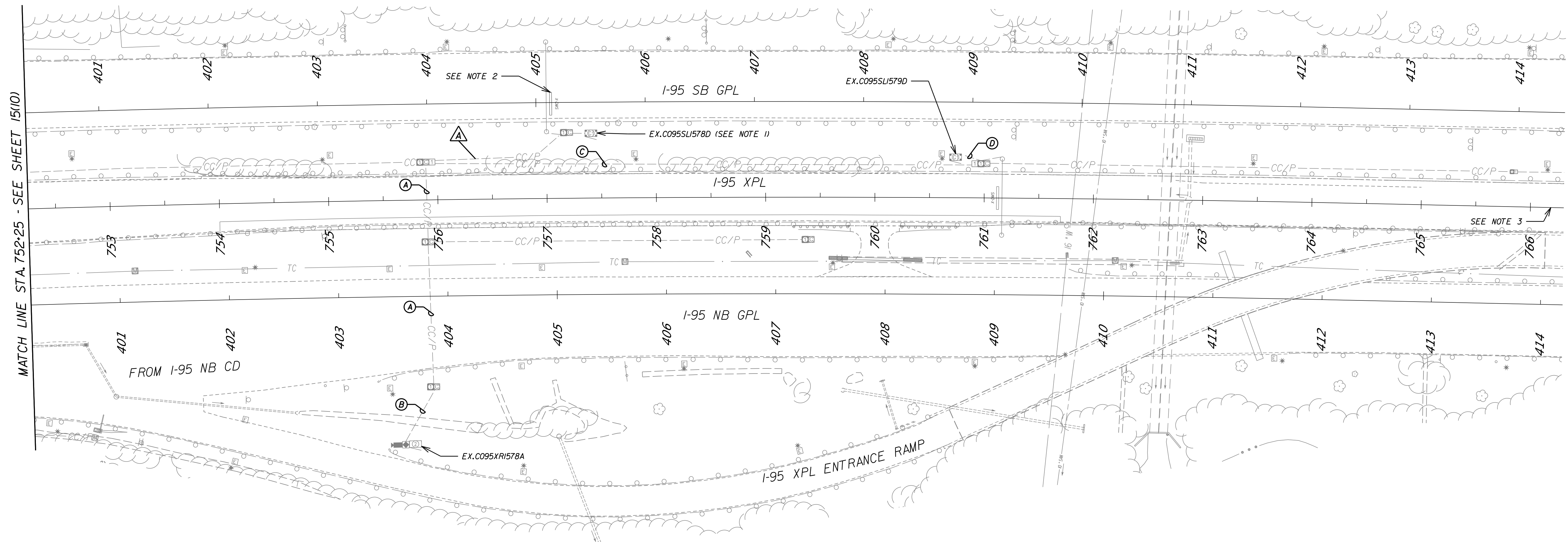
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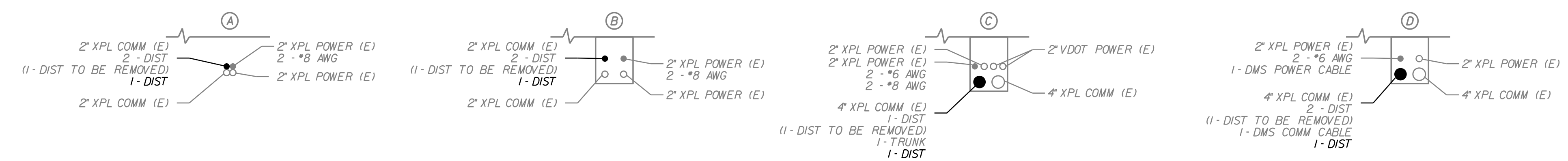


NOTES:

1. REMOVE AND SALVAGE EXISTING CABINET C095SU578D AND RETURN TO 95 EXPRESS. REMOVE EXISTING CABINET FOUNDATION.
2. REMOVE AND SALVAGE EXISTING DMS AND RETURN TO 95 EXPRESS.
3. CABINETS CONNECTED TO HIIT AT THE FOLLOWING LOCATIONS ARE NOT SHOWN ON THE PLANS SINCE THEY ARE LOCATED OUTSIDE THE LIMITS OF CONSTRUCTION: C095HR1571A (STA. 770+02).

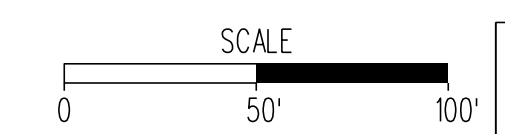


MATCH LINE STA 752+25 - SEE SHEET 15(10)



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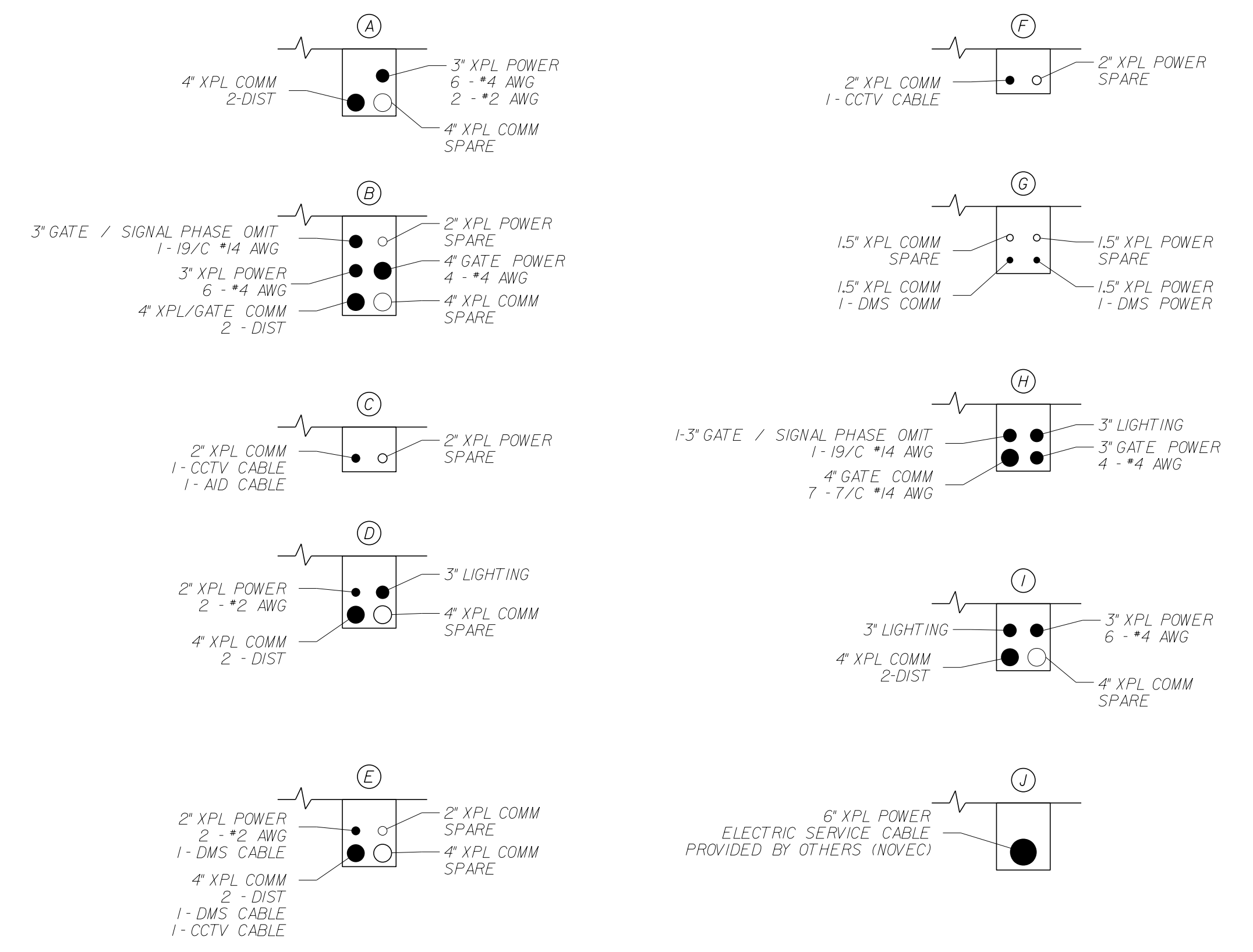
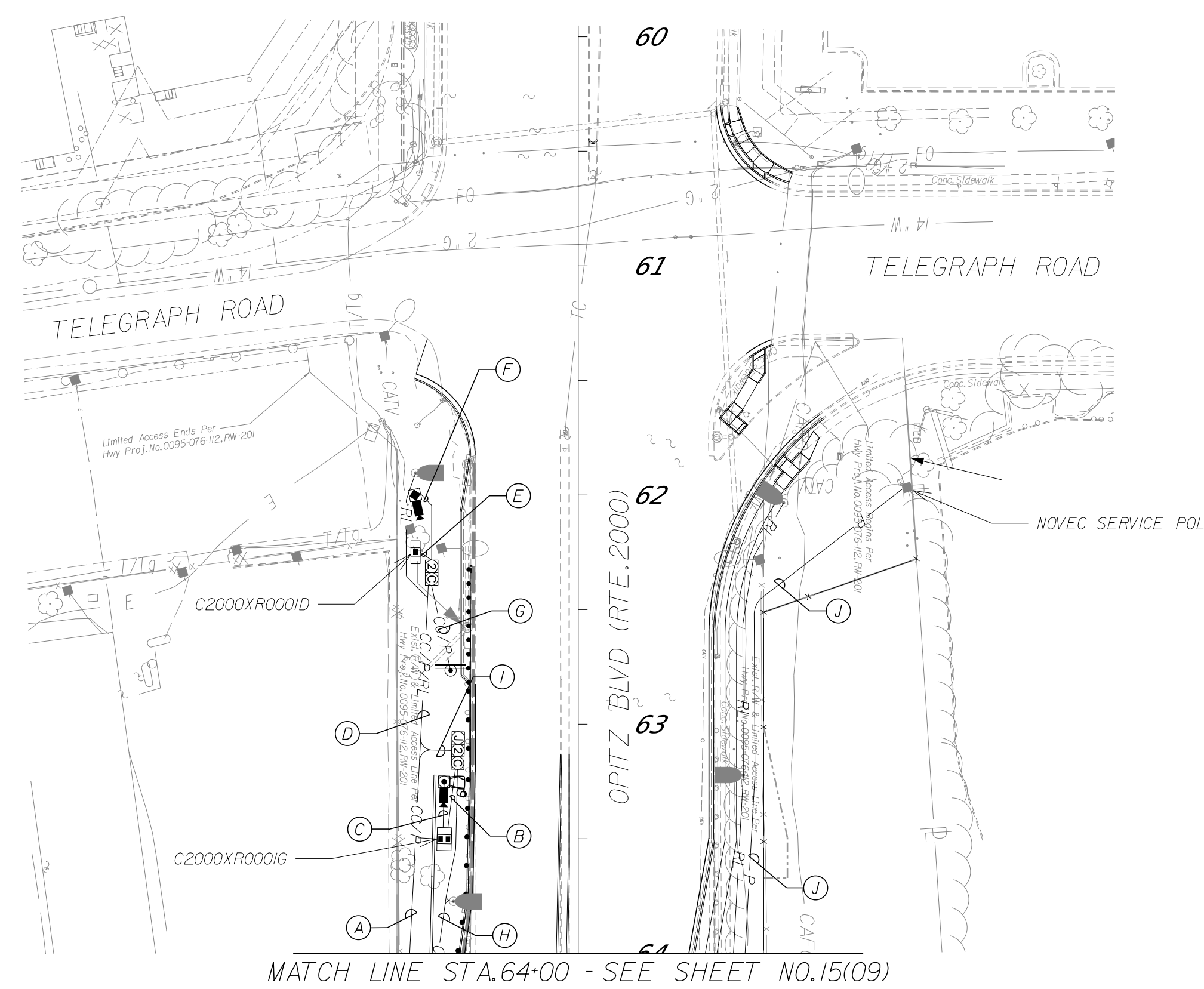
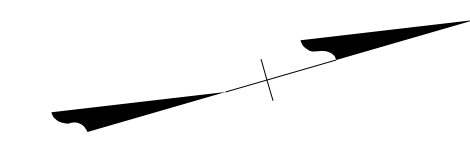
PROJECT	SHEET NO.
0095-076-299	15(11)

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REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15(12)

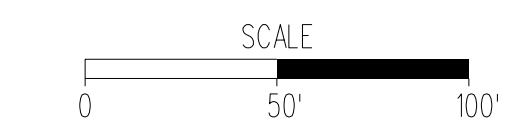
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 TRAFFIC ENGINEER



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PROJECT	SHEET NO.
0095-076-299	15(12)

PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
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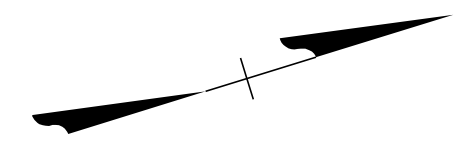
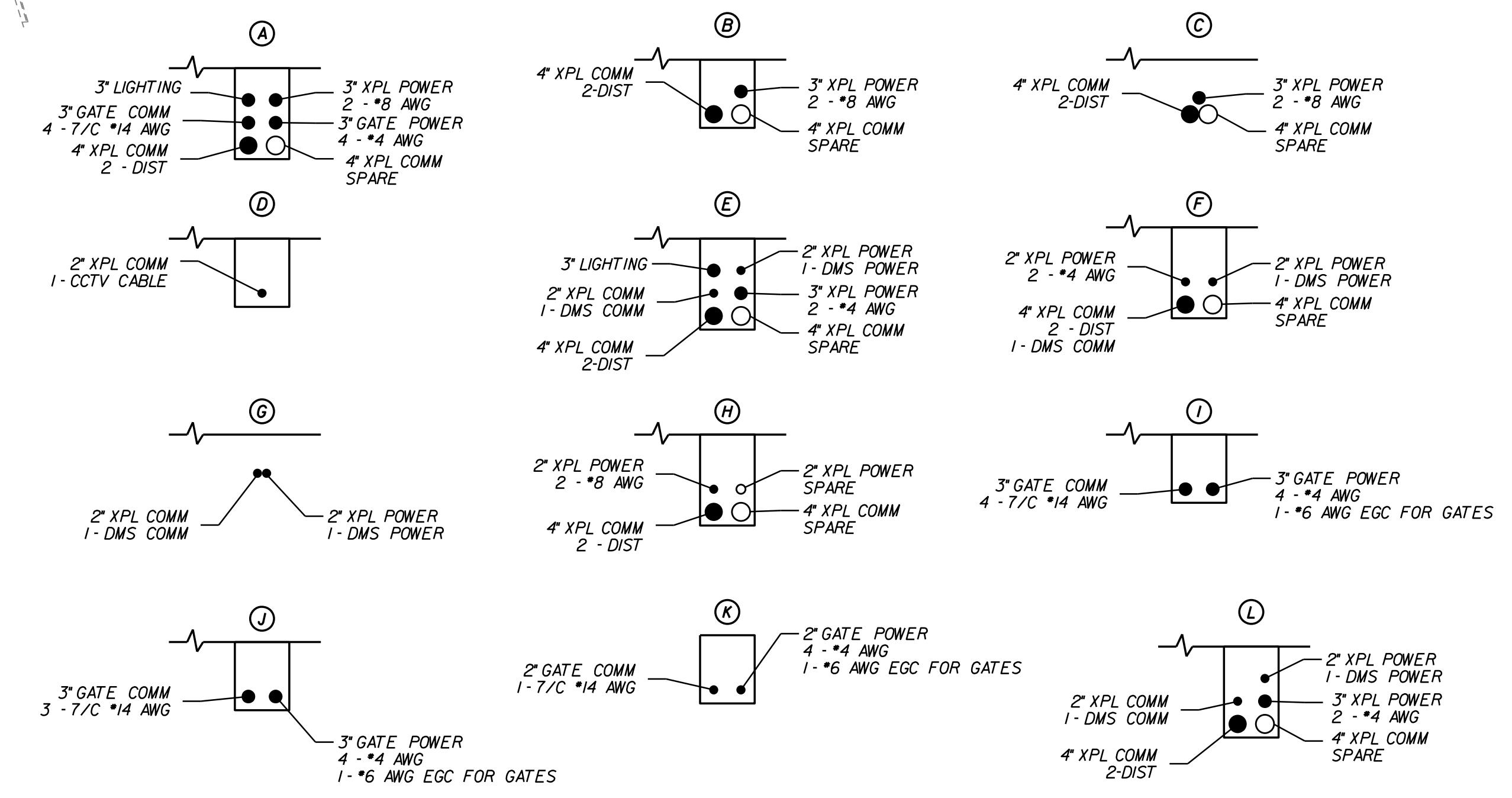
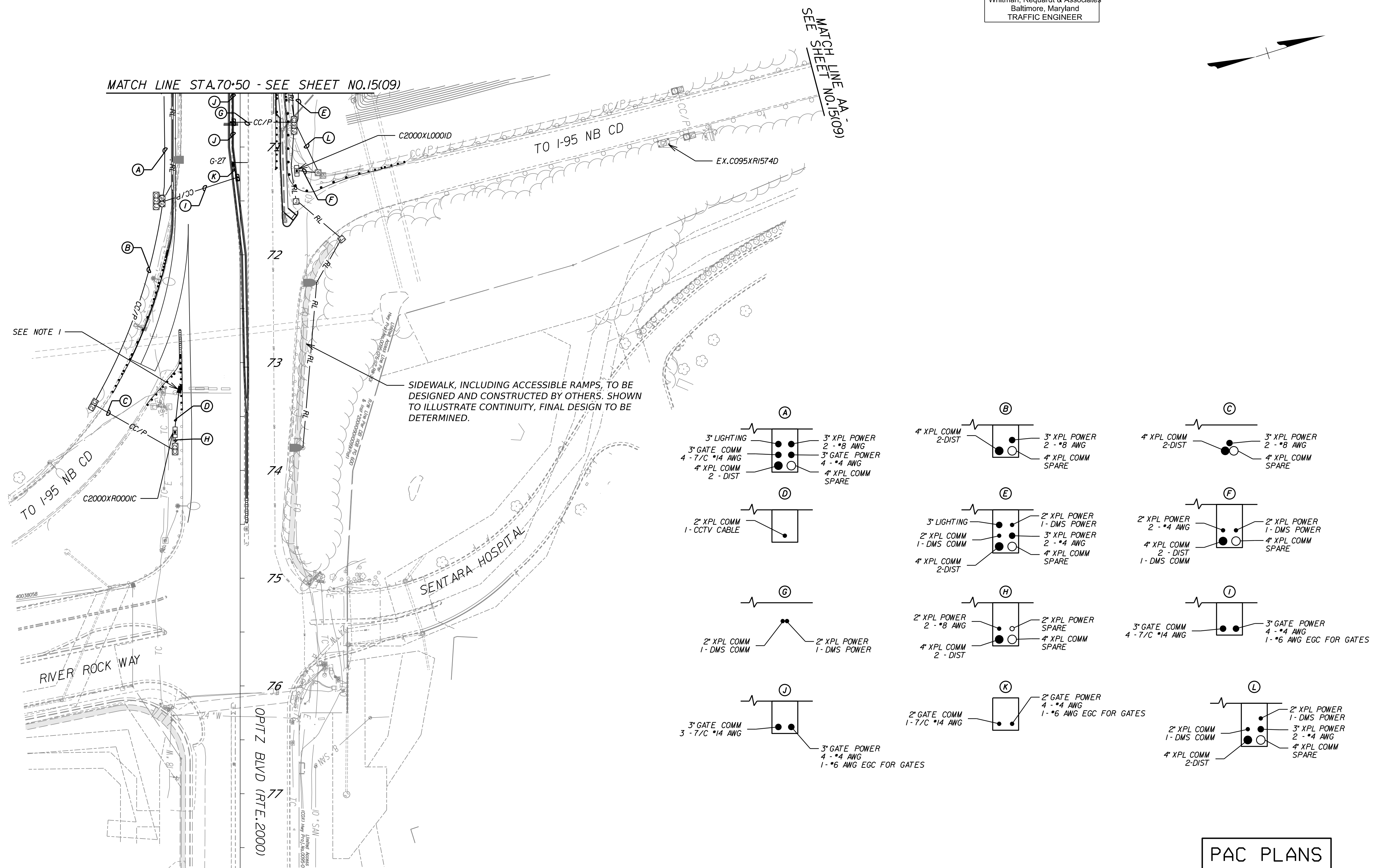
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	15(13)

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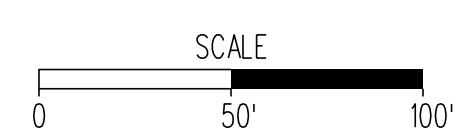
NOTES:

1. INSTALL DMS VERIFICATION CAMERA ON EXISTING CANTILEVER STRUCTURE FOLLOWING MOUNTING DETAILS ON SHEET 15(2A3). INSTALL THE CAMERA JUST BELOW THE TRUSS ON THE SIDE OF THE STRUCTURE FACING AWAY FROM OPITZ BLVD. INSTALL 2 INCH RGS CONDUIT USING STAINLESS STEEL BANDINGS FROM THE BASE OF THE STRUCTURE TO THE ELEVATION OF THE CAMERA AND TERMINATE THE CONDUIT WITH A WEATHERHEAD.



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	15(13)

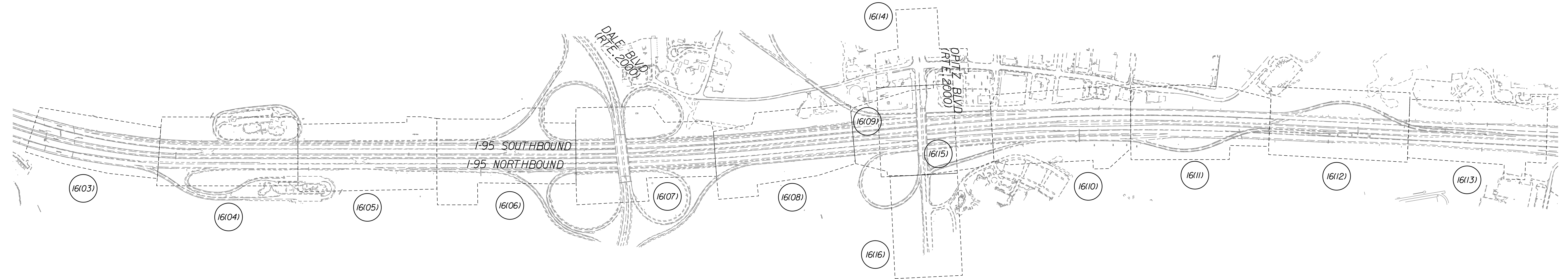
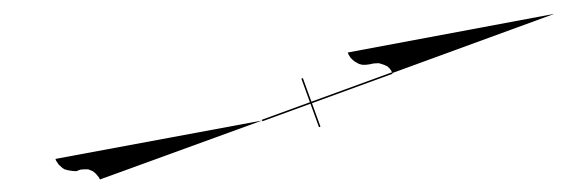
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(1)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SIGNING AND PAVEMENT MARKING KEY PLAN



SHEET INDEX

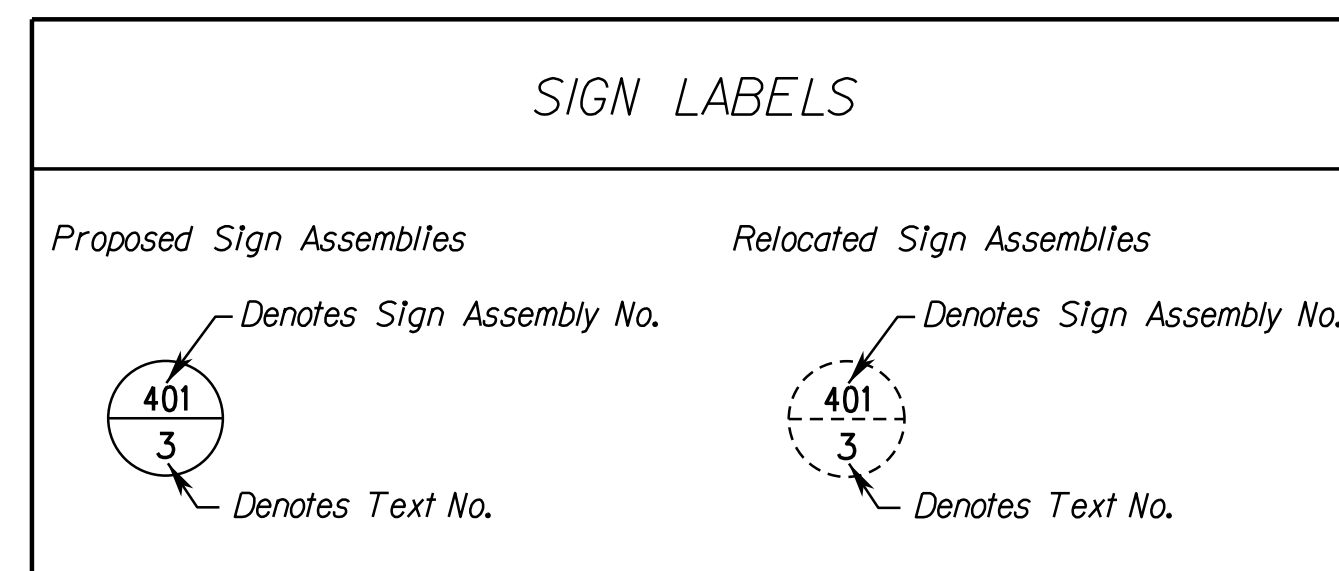
- 16(1) SIGNING SHEET INDEX, KEY PLAN, LEGEND, AND GENERAL NOTES
- 16(2) SIGNING QUANTITIES (NOT INCLUDED WITH THIS SUBMISSION)
- 16(2A1) - 16(2A4) SIGN SCHEDULE
- 16(2B1) - 16(2B9) SIGN FIGURE DETAILS
- 16(2C1) - 16(2C4) SIGN STRUCTURE ELEVATIONS
- 16(2D1) NOTES FOR SAFETY IMPROVEMENTS
- 16(3) - 16(21) PLAN SHEETS

GENERAL NOTES - SIGNING & PAVEMENT MARKINGS

1. ALL PROPOSED SIGNING AND PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH EACH OF THE FOLLOWING MANUALS, OR THE MOST RECENT REVISION THERETO:
 - A. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - B. THE VIRGINIA SUPPLEMENT TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - C. THE 2020 VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS.
 - D. THE 2020 VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS.
 - E. FHWA STANDARD HIGHWAY SIGNS MANUAL
 - F. VIRGINIA STANDARD HIGHWAY SIGNS MANUAL
2. ANY EXISTING PAVEMENT MARKINGS THAT WILL CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE COMPLETELY ERADICATED.
3. LIMITS SHOWN OF PROPOSED MARKINGS ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO ENSURE THAT PROPOSED PAVEMENT MARKINGS CONTINUE UNTIL EXISTING PAVEMENT MARKING CAN BE MATCHED.
4. EXISTING SIGNS WITHIN THE LIMITS OF THE CONTRACT WHICH HAVE NOT BEEN ACCOUNTED FOR IN THE PLAN SHALL BE RELOCATED OR REMOVED AS DIRECTED BY THE VDOT ENGINEER.
5. ALL COMPONENTS OF AN EXISTING SIGN INSTALLATION WHICH ARE REMOVED SHALL BE PROPERLY DISPOSED OF BY THE CONTRACTOR AT AN OFF-SITE LOCATION.
6. EXISTING SIGN PANELS SCHEDULED TO BE REUSED/RELOCATED MAY BE REPLACED WITH NEW SIGNS AT THE DISCRETION OF THE PROJECT ENGINEER.
7. ALL EXISTING TRAFFIC SIGNS WHICH ARE TO BE RELOCATED SHALL REMAIN IN PLACE UNTIL THE NEW SIGN STRUCTURE IS IN PLACE.
8. THE REMOVAL OR MODIFICATION OF EXISTING SIGN PANELS, STRUCTURES, OR FOUNDATIONS SHALL CONFORM TO SECTION 510 OF THE 2020 VDOT ROAD AND BRIDGE SPECIFICATIONS.
9. ALL EXISTING SIGN LOCATIONS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED. ALL PROPOSED SIGN LOCATIONS SHALL BE APPROVED BY THE ENGINEER.
10. ALL STRIPING, WHERE MATCHING TO EXISTING, SHALL BE DONE IN ACCORDANCE WITH 2016 VDOT ROAD AND BRIDGE STANDARDS.
11. ALL NEW LANE LINES, EXIT RAMP, AND ENTRANCE RAMP ALONG I-95 AND THE ASSOCIATED RAMP SHALL BE SUPPLEMENTED WITH PLASTIC INLAID MARKERS. ALL NEW LANE LINES, CENTER LINES, AND TURN LANE LINES ON ASPHALT SURFACES OF OPITZ BLVD SHALL BE SUPPLEMENTED WITH PLASTIC INLAID MARKERS. PLASTIC INLAID MARKERS SHALL NOT BE INSTALLED ON THE OPITZ BLVD BRIDGE DECK SURFACE. ALL PLASTIC INLAID MARKERS SHALL BE INSTALLED IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS PM-8 AND/OR PM-9 AND THE VIRGINIA SUPPLEMENT TO THE MUTCD. DAMAGED EXISTING PAVEMENT MARKERS OF ANY TYPE WITHIN THE PROJECT LIMITS SHALL BE REPLACED.
12. EXISTING PAVEMENT MARKINGS AND/OR MARKERS THAT CONFLICT WITH THE PROPOSED MARKINGS AND/OR MARKERS SHALL BE ERADICATED BY AN APPROVED METHOD, ACCORDING TO 2020 VDOT ROAD AND BRIDGE SPECIFICATIONS 512.03.
13. FOR ADDITIONAL INFORMATION ON LANE AND SHOULDER WIDTHS, SEE ROADWAY PLANS AND TYPICAL SECTIONS.
14. PRIOR TO FOUNDATION DESIGN, THE CONTRACTOR SHALL COORDINATE WITH ALL SUBCONTRACTORS AND UTILITIES IN PROXIMITY OF THE SIGN STRUCTURE WHERE APPLICABLE.
15. SIGN FOUNDATIONS SHALL BE STAKED OUT USING ELECTRONIC DATA TO BE PROVIDED BY THE ENGINEER. FINAL LOCATION OF SIGN FOUNDATION SHALL BE ADJUSTED IN THE FIELD AS NEEDED TO CONFORM TO THE FIELD CONDITIONS AND UTILITIES AS MARKED. EXTREME LOCATION CHANGES SHALL BE APPROVED BY THE ENGINEER.
16. THE CONTRACTOR SHALL TAKE NOTE OF SIGNS TO BE RELOCATED OR SALVAGED AS CALLED OUT IN THE PLANS. SIGNS FOR RELOCATION OR SALVAGE SHALL BE REMOVED FROM THE OVERHEAD STRUCTURE AND SUITABLY STORED AND PROTECTED PRIOR TO THE REMOVAL OF THE STRUCTURE. ANY SIGNS TO BE RELOCATED OR SALVAGED THAT ARE DAMAGED SHALL BE REPLACED BY THE CONTRACTOR AT NO COST TO 95 EXPRESS.
17. EXISTING GROUND MOUNTED SIGNS IDENTIFIED FOR REMOVAL AND DISPOSAL MAY BE REUSED IF IN GOOD CONDITION WITH THE APPROVAL OF THE ENGINEER.
18. THE CONTRACTOR SHALL FIELD VERIFY SIGN LIGHTING ELECTRICAL CIRCUITS PRIOR TO ABANDONING ELECTRICAL CONDUCTORS SHOWN ON THE PLANS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF DEMOLITION OR NEW CONSTRUCTION WILL IMPACT SERVICE TO POWERED COMPONENTS NOT DESIGNATED TO LOSE ELECTRICAL SERVICE.

STANDARD SIGN LEGEND

PLAN ITEM	PLAN SYMBOL	
	PROPOSED	EXISTING
Single Post Sign Support		
Double Post Sign Support		
O/H Cantilever Sign Support		
O/H Span Sign Support		
SIGN CALL-OUTS		
Existing Sign to Remain or to be Relocated		
Existing Sign to be Removed		
Proposed Sign Panel		



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**SIGN SCHEDULE
 PROPOSED SIGNS AND
 EXISTING SIGNS
 TO BE RELOCATED**

Whitman Reardon & Associates
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 TRAFFIC ENGINEER

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(2A)

DESIGN FEATURES RELATING TO CONSTRUCTION
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TEXT NO.	SIGN ASSEMBLY NO(s).	TEXT	MUTCD ST'D.	SIGN ASSEMBLY COMPONENTS		QTY.	SIGN PANEL AREA (s.f.)		PROP. SIGN STRUCTURE ST'D.	REMARKS
				W	H		Per ASSE-MBLY	ALL ASSEM-BLIES		
1	301		SPECIAL	48"	30"	1	10	10	SSP-VA-?	SEE SIGN FIGURE DETAIL SHEET 16(02B3)
			W4-3	48"	60"	1	20	20		
2	401A		SPECIAL	14'-0"	15'-0"	1	210	210	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B3) O/H LOCATION 1
3	402A, 503		SPECIAL	20'-0"	12'-0"	2	240	480	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B3) O/H LOCATION 2
4	401B		EI-5aP	6'-0"	2'-6"	1	15	15		
			SPECIAL	20'-0"	11'-0"	1	220	220	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B3) O/H LOCATION 1
6	501		SPECIAL	5'-6"	9'-0"	1	50.4	50.4	SSP-VA-?	SEE SIGN FIGURE DETAIL SHEET 16(02B6)
7	502		R2-1	48"	48"	1	16	16	SSP-VA-L	
8	601A		SPECIAL	14'-0"	15'-0"	1	210	210	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B2) O/H LOCATION 3

TEXT NO.	SIGN ASSEMBLY NO(s).	TEXT	MUTCD ST'D.	SIGN ASSEMBLY COMPONENTS		QTY.	SIGN PANEL AREA (s.f.)		PROP. SIGN STRUCTURE ST'D.	REMARKS
				W	H		Per ASSE-MBLY	ALL ASSEM-BLIES		
9	602A		SPECIAL	7'-6"	7'-6"	1	56.25	56.25	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B2) O/H LOCATION 4
35	603		EI-5aP	6'-0"	2'-6"	1	15	15		
			SPECIAL	20'-0"	18'-0"	1	360	360	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B2) O/H LOCATION 4
10	602B		W13-03	36"	48"	1	12	12	SSP-VA-C	
32	604		D9-2	30"	30"	1	6.25	6.25		
			SPECIAL	30"	30"	1	6.25	6.25	SSP-VA-L	SEE SIGN FIGURE DETAIL SHEET 16(02B3)
11	601B		EI-5aP	6'-0"	2'-6"	1	15	15		
			SPECIAL	20'-0"	11'-0"	1	220	220	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B4) O/H LOCATION 3
12	601C		SPECIAL	20'-0"	13'-0"	1	230	230	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B8) O/H LOCATION 3
13	801		EI-5aP	6'-0"	2'-6"	1	15	15		
			SPECIAL	16'-0"	10'-6"	1	168	168	OSS-1	SEE SIGN FIGURE DETAIL SHEET 16(02B1) CANT LOCATION 6

NOTES:

- ALL SIGNS SHALL BE ORIENTED AS SHOWN ON THE PLANS.
- SIGN COLOR COMBINATIONS SHALL BE IN ACCORDANCE WITH THE FHWA SHS BOOK AND THE 2011 VIRGINIA SHS BOOK OR AS NOTED IN THE PLANS.
- ALL POSITIVE CONTRAST GUIDE AND SPECIFIC SERVICE SIGNS SHALL UTILIZE FABRICATION LETTER TYPE L-3 OR L-4 UNLESS OTHERWISE NOTED IN THE REMARKS. ALL OTHER SIGNS SHALL UTILIZE FABRICATION LETTER TYPE L-1 OR L-2 UNLESS OTHERWISE NOTED IN THE REMARKS.
- ALL BLACK SHEETING SHALL BE NON-REFLECTIVE.
- SIGN STRUCTURES SHALL BE INSTALLED PER THE NOTED SIGN STANDARD.
- ALL ST'D. STP-1 STRUCTURES TO BE SINGLE POST UNLESS OTHERWISE NOTED.

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**SIGN SCHEDULE
 PROPOSED SIGNS AND
 EXISTING SIGNS
 TO BE RELOCATED**

Whitman Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(2A2)

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TEXT NO.	SIGN ASSEMBLY NO(s).	TEXT	SIGN ASSEMBLY COMPONENTS			SIGN PANEL AREA (s.f.)		PROP. SIGN STRUCTURE ST'D.	REMARKS
			MUTCD ST'D.	PANEL SIZE		QTY.	PER ASSEMBLY		
				W	H				
41	805		W13-2	36"	48"	1	12	12	SSP-VA-C
14	802		E1-5aP	6'-0"	2'-6"	1	15	15	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B1) O/H LOCATION 7
15	803A		E1-5aP	6'-0"	2'-6"	1	15	15	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B4) O/H LOCATION 5
16	803B		SPECIAL	18'-0"	12'-0"	1	216	216	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B4) O/H LOCATION 5
17	804		SPECIAL	5'-0"	6'-0"	1	30	30	SPECIAL SEE SIGN FIGURE DETAIL SHEET 16(02B5)
42	806		W3-3	48"	48"	1	16	16	SSP-VA-L
18	901		E1-5aP	5'-0"	2'-6"	1	12.5	12.5	SSP-VIA-AL SEE SIGN FIGURE DETAIL SHEET 16(02B1)

TEXT NO.	SIGN ASSEMBLY NO(s).	TEXT	SIGN ASSEMBLY COMPONENTS			SIGN PANEL AREA (s.f.)		PROP. SIGN STRUCTURE ST'D.	REMARKS
			MUTCD ST'D.	PANEL SIZE		QTY.	PER ASSEMBLY		
				W	H				
19	902		SPECIAL	20'-0"	16'-0"	1	320	320	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B5) O/H LOCATION 8
40	903		D9-2	30"	30"	1	6.25	6.25	SSP-VA-L
38	908		M3-2	36"	18"	1	4.5	4.5	SSP-VA-N
			MI-V2c	36"	36"	1	9	9	
			M6-IR	30"	2"	1	4.375	4.375	
39	904		M3-4	36"	18"	1	4.5	4.5	SSP-VA-N
			MI-V2c	36"	36"	1	9	9	
			M5-IL	30"	2"	1	4.375	4.375	
20	1001		E1-5aP	6'-0"	2'-6"	1	15	15	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B1) CANT LOCATION 9
			SPECIAL	16'-0"	13'-6"	1	216	216	
21	1002		SPECIAL	13'-0"	8'-0"	1	104	104	SSP-VIA-T? SEE SIGN FIGURE DETAIL SHEET 16(02B5)
22	1401, 1602		SPECIAL	5'-0"	9'-6"	2	47.5	95	(2) 2 1/2 INCH 10 GA. WITH 2 3/16 INCH 10 GA. INNER POST SEE SIGN FIGURE DETAIL SHEET 16(02B5)

NOTES:

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 2) SIGN COLOR COMBINATIONS SHALL BE IN ACCORDANCE WITH THE FHWA SHS BOOK AND THE 2011 VIRGINIA SHS BOOK OR AS NOTED IN THE PLANS.

3) ALL POSITIVE CONTRAST GUIDE AND SPECIFIC SERVICE SIGNS SHALL UTILIZE FABRICATION LETTER TYPE L-3 OR L-4 UNLESS OTHERWISE NOTED IN THE REMARKS. ALL OTHER SIGNS SHALL UTILIZE FABRICATION LETTER TYPE L-1 OR L-2 UNLESS OTHERWISE NOTED IN THE REMARKS.

4) ALL BLACK SHEETING SHALL BE NON-REFLECTIVE.
 5) SIGN STRUCTURES SHALL BE INSTALLED PER THE NOTED SIGN STANDARD.
 6) ALL ST'D. STP-1 STRUCTURES TO BE SINGLE POST UNLESS OTHERWISE NOTED.

PROJECT MANAGER: *Bimbal Shabb, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP, (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc., (804) 550-7740, 07/07/2021*

PAC PLANS

THESE PLANS ARE UNFINISHED
 AND ARE NOT TO BE USED FOR
 ANY TYPE OF CONSTRUCTION.

**SIGN SCHEDULE
 PROPOSED SIGNS AND
 EXISTING SIGNS
 TO BE RELOCATED**

Whitman Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(2A3)

DESIGN FEATURES RELATING TO CONSTRUCTION
 OR TO REGULATION AND CONTROL OF TRAFFIC
 MAY BE SUBJECT TO CHANGE AS DEEMED
 NECESSARY BY THE DEPARTMENT

TEXT NO.	SIGN ASSEMBLY NO(S).	TEXT	SIGN ASSEMBLY COMPONENTS			SIGN PANEL AREA (s.f.)		PROP. SIGN STRUCTURE ST'D.	REMARKS
			MUTCD ST'D.	PANEL SIZE		QTY.	Per ASSE-MBLY		
				W	H				
23	1402,1601		SPECIAL	5'-0"	9'-6"	2	47.5	95	(2) 2 1/2 INCH 10 GA. WITH 2 3/16 INCH 10 GA. INNER POST SEE SIGN FIGURE DETAIL SHEET 16(02B7)
24	1403		SPECIAL	5'-0"	9'-6"	2	47.5	95	(2) 2 1/2 INCH 10 GA. WITH 2 3/16 INCH 10 GA. INNER POST SEE SIGN FIGURE DETAIL SHEET 16(02B6)
25	1404		SPECIAL	13'-6"	16'-8"	1	225	225	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B6) SIGN STRUCTURE LOCATION 10
26	1405		M3-3	36"	18"	1	4.5	4.5	(1) 2 1/2 INCH 10 GA. WITH 2 3/16 INCH 10 GA. INNER POST
			M1-1	48"	48"	1	16	16	
			M6-3	30"	21"	1	4.375	4.375	
27	1501		SPECIAL	10'-6"	10'-0"	1	105	105	GM LOCATION 1 SEE SIGN FIGURE DETAIL SHEET 16(02B6)
28	1502		SPECIAL	3'-6"	9'-0"	1	31.5	31.5	(1) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B6)
29	1503		SPECIAL	10'-0"	4'-0"	1	40	40	(2) 2 1/2 INCH 10 GA. SEE SIGN FIGURE DETAIL SHEET 16(02B8)
30	1504		SPECIAL	3'-6"	9'-0"	1	31.5	31.5	(1) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B7)
31	1505		SPECIAL	13'-6"	16'-8"	1	225	225	OSS-1 SEE SIGN FIGURE DETAIL SHEET 16(02B7) SIGN STRUCTURE LOCATION 11
33	1507		SPECIAL	9'-0"	3'-0"	1	27	XX	(2) 2 1/2 INCH 10 GA. SEE SIGN FIGURE DETAIL SHEET 16(02B8)
34	1508		SPECIAL	12'-0"	8'-0"	1	96	XX	(3) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B8)
36	1702,2001, 2002,2102		SPECIAL	3'-6"	9'-0"	4	31.5	126	(1) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B9)
37	1703,1801, 2101		SPECIAL	3'-6"	9'-0"	3	31.5	94.5	(1) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B9)
38	1701		SPECIAL	3'-6"	9'-0"	1	31.5	31.5	(1) 4 INCH SQUARE TUBE SIGN (STP-2) SEE SIGN FIGURE DETAIL SHEET 16(02B9)

NOTES:

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4) ALL BLACK SHEETING SHALL BE NON-REFLECTIVE.
 5) SIGN STRUCTURES SHALL BE INSTALLED PER THE NOTED SIGN STANDARD.
 6) ALL ST'D. STP-1 STRUCTURES TO BE SINGLE POST UNLESS OTHERWISE NOTED.

PROJECT MANAGER: Bimbal Stubb, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE			SHEET NO.
	STATE	ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	16(2B4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SIGN DETAIL
1:100

SIGN NUMBER	Text No. 11
WIDTH x HIGHT.	20'-0" x 11'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
	COLOR: YellowGreen
LEGEND BORDER	TYPE: Reflective
	COLOR: BlackWhite

SYMBOL	ROT	X	Y	WID	HT

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)										LENGTH	SERIES SIZE	
L	E	F	T							E	4.8	12
51	38.4	37	48.1									
E	X	P	R	E	S	S	E	X	I	T		E
54.1	65.4	78.2	89.3	103.5	114.3	125.9	138.4	153.7	170.8	177.1	18.8	12
O	J	I	L	Z			S	I	V	S		Quarterly-5#
78.4	89.3	116	125.5	135	144.8	152.7	163	168.3	174		17.2	18.0
12	M	L	E									E
85.1	122.1	133	138.2	147.8							8.8	15.0

SIGN DETAIL
1:100

SIGN NUMBER	Text No. 12
WIDTH x HIGHT.	20'-0" x 13'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
	COLOR: Green
LEGEND BORDER	TYPE: Reflective
	COLOR: White

SYMBOL	ROT	X	Y	WID	HT
95	0	83	81	24	24
123	0	70.4	81	38	24
95	0	83	94	24	24
11	0	75.5	94	24	24

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)										LENGTH	SERIES SIZE											
E	X	P	R	E	S	S	L	A	N	E	S	E	X	I	T	S		E				
103	168	174	19	127	74	86	166	176	172	127	144	158	182	172	185	203	209	212	253	12		
1	0																				E	
42	548																				141	8
2																					Quarterly-5#	
274																					52	13
B	O	V	O	I	K	O	I	D	I												Quarterly-5#	
63	274	422	559	703	782	82	105	121	139	143											15.2	13.75
1	0																				Quarterly-5#	
35	253																				23	13
1	0																				E	
42	548																				141	8
1	1																				Quarterly-5#	
207	289																				18	13

SIGN DETAIL
1:100

SIGN NUMBER	Text No. 15
WIDTH x HIGHT.	20'-0" x 12'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
	COLOR: Blue
LEGEND BORDER	TYPE: Reflective
	COLOR: WhiteBlackWhite

SYMBOL	ROT	X	Y	WID	HT
95	15	81	8	23	3

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)										LENGTH	SERIES SIZE	
L	E	F	T							E	4.8	12
51	38.4	37	48.1									
E	X	P	R	E	S	S	E	X	I	T		E
54.1	65.4	78.2	89.3	103.5	114.3	125.9	138.4	153.7	170.8	177.1	18.8	12
O	J	I	L	Z			S	I	V	S		Quarterly-5#
78.4	89.3	116	125.5	135	144.8	152.7	163	168.3	174		17.2	18.0

SIGN DETAIL
1:100

SIGN NUMBER	Text No. 16
WIDTH x HIGHT.	18'-0" x 12'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
	COLOR: Green
LEGEND BORDER	TYPE: Reflective
	COLOR: White

SYMBOL	ROT	X	Y	WID	HT
95	0	37	6	8	8
NORTH	0	28	2	23	12
95	0	19	2	23	12

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)										LENGTH	SERIES SIZE											
E	X	P	R	E	S	S	L	A	N	E	S									E		
37	43.3	55.1	66.8	81.4	92.7	104	114	124	135	150	154									152	12	
N	O	R	T	H																	E	
10	12.6	17.8	25.3	37																	76	18.5

PAC PLANS

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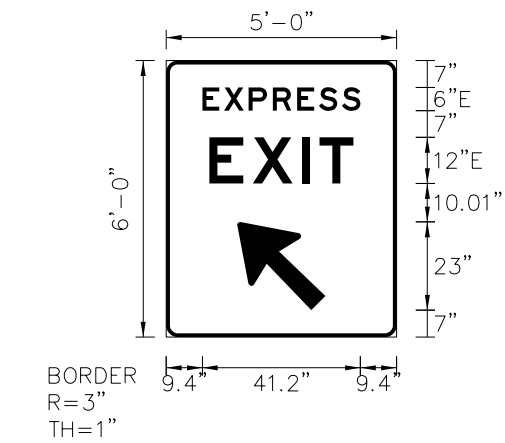
PROJECT MANAGER: *Bimbal Stab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	16(2B5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SIGN DETAIL
 1:50



SIGN NUMBER	Text No. 17
WIDTH x HIGHT.	5'-0" x 6'-0"
BORDER WIDTH	1"
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: Reflective
LEGEND/BORDER	TYPE: Reflective
	COLOR: Green
	TYPE: Reflective
	COLOR: White

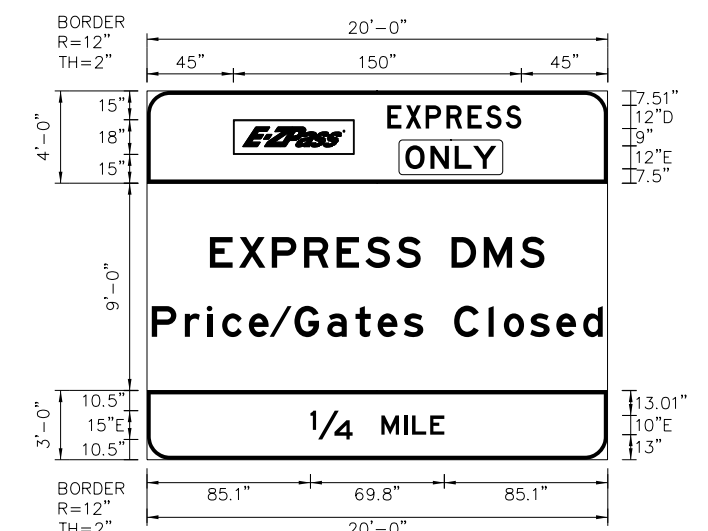
SYMBOL	ROT	X	Y	WD	HT
ARRD	0	63	7	18	26

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths

Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)												LENGTH	SERIES SIZE
E	X	P	R	E	S	S						42	6
34	51	85	278	941	988	458							
E	X	I	T									35	12
82	28	84	393										

SIGN DETAIL
 1:100



SIGN NUMBER	Text No. 19
WIDTH x HIGHT.	20'-0" x 9'-0"
BORDER WIDTH	23.49"
CORNER RADIUS	0"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
LEGEND/BORDER	TYPE: Reflective
	COLOR: Purple/Yellow
	TYPE: Reflective
	COLOR: White/Black

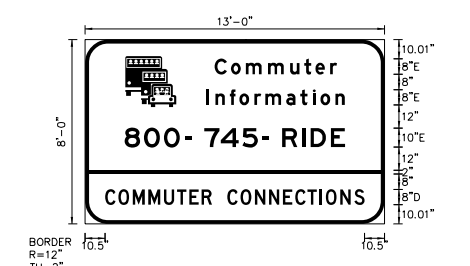
SYMBOL	ROT	X	Y	WD	HT
ARRD	0	63	87	16	53

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths

Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)												LENGTH	SERIES SIZE						
E	X	P	R	E	S	S						88	12						
153	164	162	161	127	128	127													
R												77							
124																			
O	N	L	Y									413	12						
141	147	163	170																
E	X	P	R	E	S	S						142	6						
39	43	46	819	863	133	133	147	167	155	164									
P	r	i	c	e	/	G	a	l	e	s	e	d				26	190		
25	16	33	282	531	64	76	89	186	222	239	14	180	178	183	184	213	223		
R	M	I	L	E														88	15.9
83	127	133	182	145															

SIGN DETAIL
 1:100



SIGN NUMBER	Text No. 21
WIDTH x HIGHT.	5'-0" x 8'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Ground
BACKGROUND	TYPE: Reflective
LEGEND/BORDER	TYPE: Reflective
	COLOR: Blue
	TYPE: Reflective
	COLOR: White

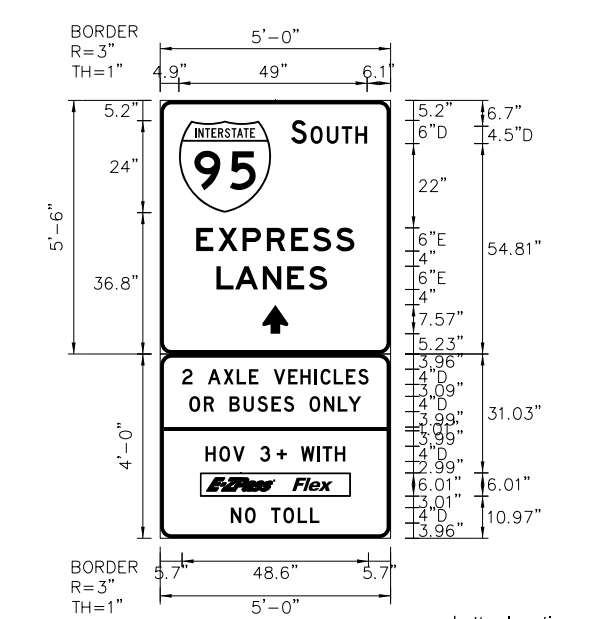
SYMBOL	ROT	X	Y	WD	HT
ARRD	0	327	83	43	127

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths

Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)												LENGTH	SERIES SIZE									
C	O	N	N	U	I	E	T					88	16									
83	76	87	83	164	162	100	175															
I	r	e	r	m	a	t	i	o	n			73	16									
83	83	75	84	181	169	148	121	167	125	133												
S	O	S	-	T	A	S	-	R	I	D	E				147	10						
269	307	41	59	62	157	179	163	139	132	174	138											
C	O	M	M	U	T	E	R	C	O	N	N	E	C	T	I	O	N	S			161	4
115	173	183	16	4	45	543	487	81	71	11	85	164	102	125	153	122	124	129	142			

SIGN DETAIL
 1:50



SIGN NUMBER	Text No. 22
WIDTH x HIGHT.	5'-0" x 5'-6"
BORDER WIDTH	1"
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: Reflective
LEGEND/BORDER	TYPE: Reflective
	COLOR: Green/White
	TYPE: Reflective
	COLOR: White/Black

SYMBOL	ROT	X	Y	WD	HT
ARRD	0	43	33	24	31

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths

Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)												LENGTH	SERIES SIZE									
S	O	U	T	H								167	14.5									
142	142	424	473	553																		
E	X	P	R	E	S	S						412	6									
94	161	215	278	341	389	458																
L	A	N	E	S								358	6									
147	165	268	331	367																		
2	A	X	L	E								468	4									
137	84	124	165	20	217	254	284	314	365	422	438	462	484	516								
O	R	B	U	S	E	S															418	4
76	14	141	181	217	254	29	322	349	389	427	483	48										
H	O	V																			364	4
118	155	16	22	28	287	327	367	4	424	465												
N	O	T	O	L	L																211	4
164	221	249	289	331	369	381																

PAC PLANS

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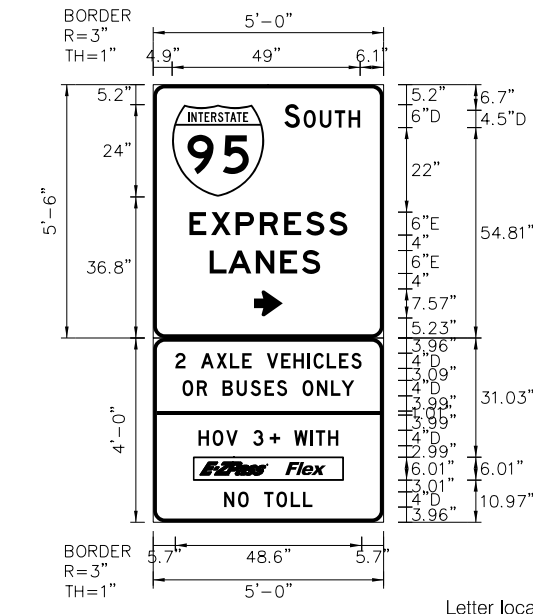
PROJECT MANAGER: *Bimbal Stubb, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7140, 07/07/2021*

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	16(2B6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SIGN DETAIL
 1:50



SIGN NUMBER	Text No. 24
WIDTH x HIGHT.	5'-0" x 5'-0"
BORDER WIDTH	1"
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: Reflective COLOR: Green/White
LEGEND/BORDER	TYPE: Reflective COLOR: White/Black

SYMBOL	ROT	X	Y	WID	HT
W1	0	49	368	36	36
1	0	34	133	16	34
1	0	133	1	36	6
1	0	133	1	36	6
1	0	133	1	36	6

Panel Style: Guide Sign.ssi
 Dimensions are in inches, tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)

SYMBOL	ROT	X	Y	WID	HT
S	0	31	10	10	10
O	0	31	20	10	10
U	0	31	30	10	10
T	0	31	40	10	10
H	0	31	50	10	10
E	0	31	60	10	10
X	0	31	70	10	10
P	0	31	80	10	10
R	0	31	90	10	10
E	0	31	100	10	10
S	0	31	110	10	10
S	0	31	120	10	10
L	0	31	130	10	10
A	0	31	140	10	10
N	0	31	150	10	10
E	0	31	160	10	10
S	0	31	170	10	10
2	0	31	180	10	10
A	0	31	190	10	10
X	0	31	200	10	10
L	0	31	210	10	10
E	0	31	220	10	10
V	0	31	230	10	10
E	0	31	240	10	10
H	0	31	250	10	10
I	0	31	260	10	10
C	0	31	270	10	10
L	0	31	280	10	10
E	0	31	290	10	10
S	0	31	300	10	10
D	0	31	310	10	10
R	0	31	320	10	10
B	0	31	330	10	10
U	0	31	340	10	10
S	0	31	350	10	10
E	0	31	360	10	10
S	0	31	370	10	10
D	0	31	380	10	10
N	0	31	390	10	10
L	0	31	400	10	10
L	0	31	410	10	10
N	0	31	420	10	10
O	0	31	430	10	10
V	0	31	440	10	10
H	0	31	450	10	10
I	0	31	460	10	10
T	0	31	470	10	10
R	0	31	480	10	10
W	0	31	490	10	10
I	0	31	500	10	10
T	0	31	510	10	10
R	0	31	520	10	10
H	0	31	530	10	10
O	0	31	540	10	10
V	0	31	550	10	10
S	0	31	560	10	10
E	0	31	570	10	10
S	0	31	580	10	10
E	0	31	590	10	10
S	0	31	600	10	10
D	0	31	610	10	10
N	0	31	620	10	10
L	0	31	630	10	10
L	0	31	640	10	10
N	0	31	650	10	10
O	0	31	660	10	10
T	0	31	670	10	10
D	0	31	680	10	10
L	0	31	690	10	10
L	0	31	700	10	10
N	0	31	710	10	10
O	0	31	720	10	10
V	0	31	730	10	10
H	0	31	740	10	10
I	0	31	750	10	10
T	0	31	760	10	10
R	0	31	770	10	10
W	0	31	780	10	10
I	0	31	790	10	10
T	0	31	800	10	10
R	0	31	810	10	10
H	0	31	820	10	10
O	0	31	830	10	10
V	0	31	840	10	10
S	0	31	850	10	10
E	0	31	860	10	10
S	0	31	870	10	10
E	0	31	880	10	10
S	0	31	890	10	10
D	0	31	900	10	10
N	0	31	910	10	10
L	0	31	920	10	10
L	0	31	930	10	10
N	0	31	940	10	10
O	0	31	950	10	10
V	0	31	960	10	10
S	0	31	970	10	10
E	0	31	980	10	10
S	0	31	990	10	10
E	0	31	1000	10	10
S	0	31	1010	10	10
D	0	31	1020	10	10
N	0	31	1030	10	10
L	0	31	1040	10	10
L	0	31	1050	10	10
N	0	31	1060	10	10
O	0	31	1070	10	10
V	0	31	1080	10	10
S	0	31	1090	10	10
E	0	31	1100	10	10
S	0	31	1110	10	10
E	0	31	1120	10	10
S	0	31	1130	10	10
D	0	31	1140	10	10
N	0	31	1150	10	10
L	0	31	1160	10	10
L	0	31	1170	10	10
N	0	31	1180	10	10
O	0	31	1190	10	10
V	0	31	1200	10	10
S	0	31	1210	10	10
E	0	31	1220	10	10
S	0	31	1230	10	10
E	0	31	1240	10	10
S	0	31	1250	10	10
D	0	31	1260	10	10
N	0	31	1270	10	10
L	0	31	1280	10	10
L	0	31	1290	10	10
N	0	31	1300	10	10
O	0	31	1310	10	10
V	0	31	1320	10	10
S	0	31	1330	10	10
E	0	31	1340	10	10
S	0	31	1350	10	10
E	0	31	1360	10	10
S	0	31	1370	10	10
D	0	31	1380	10	10
N	0	31	1390	10	10
L	0	31	1400	10	10
L	0	31	1410	10	10
N	0	31	1420	10	10
O	0	31	1430	10	10
V	0	31	1440	10	10
S	0	31	1450	10	10
E	0	31	1460	10	10
S	0	31	1470	10	10
E	0	31	1480	10	10
S	0	31	1490	10	10
D	0	31	1500	10	10
N	0	31	1510	10	10
L	0	31	1520	10	10
L	0	31	1530	10	10
N	0	31	1540	10	10
O	0	31	1550	10	10
V	0	31	1560	10	10
S	0	31	1570	10	10
E	0	31	1580	10	10
S	0	31	1590	10	10
E	0	31	1600	10	10
S	0	31	1610	10	10
D	0	31	1620	10	10
N	0	31	1630	10	10
L	0	31	1640	10	10
L	0	31	1650	10	10
N	0	31	1660	10	10
O	0	31	1670	10	10
V	0	31	1680	10	10
S	0	31	1690	10	10
E	0	31	1700	10	10
S	0	31	1710	10	10
E	0	31	1720	10	10
S	0	31	1730	10	10
D	0	31	1740	10	10
N	0	31	1750	10	10
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N	0	31	1780	10	10
O	0	31	1790	10	10
V	0	31	1800	10	10
S	0	31	1810	10	10
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D	0	31	1860	10	10
N	0	31	1870	10	10
L	0	31	1880	10	10
L	0	31	1890	10	10
N	0	31	1900	10	10
O	0	31	1910	10	10
V	0	31	1920	10	10
S	0	31	1930	10	10
E	0	31	1940	10	10
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E	0	31	1960	10	10
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D	0	31	1980	10	10
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V	0	31	2160	10	10
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S	0	31	2290	10	10
E	0	31	2300	10	10
S	0	31	2310	10	10
E	0	31	2320	10	10
S	0	31	2330	10	10
D	0	31	2340	10</	

PROJECT MANAGER *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *AccuMark, Inc. (804) 550-7740 07/07/2021*

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(2B10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SIGN DETAIL
1:100

SIGN NUMBER	Text No. 40
WIDTH x HIGHT.	17'-0" x 7'-0"
BORDER WIDTH	2"
CORNER RADIUS	12"
MOUNTING	Overhead
BACKGROUND	TYPE: Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Reflective
	COLOR: Black

SYMBOL	ROT	X	Y	WD	HT	
ROW 1		1	16	155	33	22
ROW 2		1	68	155	33	22

Panel Style: Guide Sign.ssi
 Dimensions are in inches.tenths
 Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)													LENGTH	SERIES SIZE
A	L	L	T	R	A	F	F	I	C				123	18
20	34	34	84	84	84	103	103	123	123	187				

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

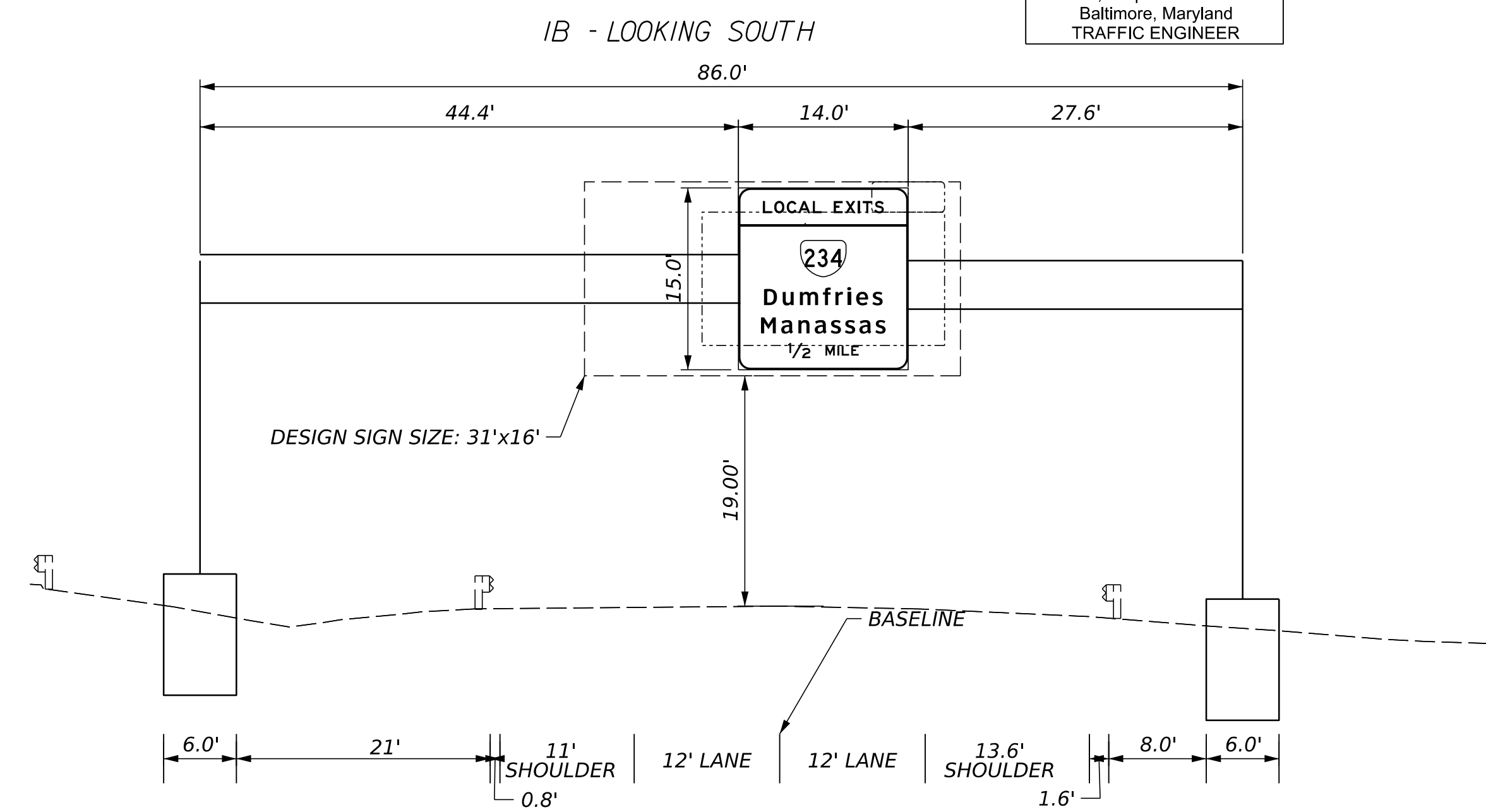
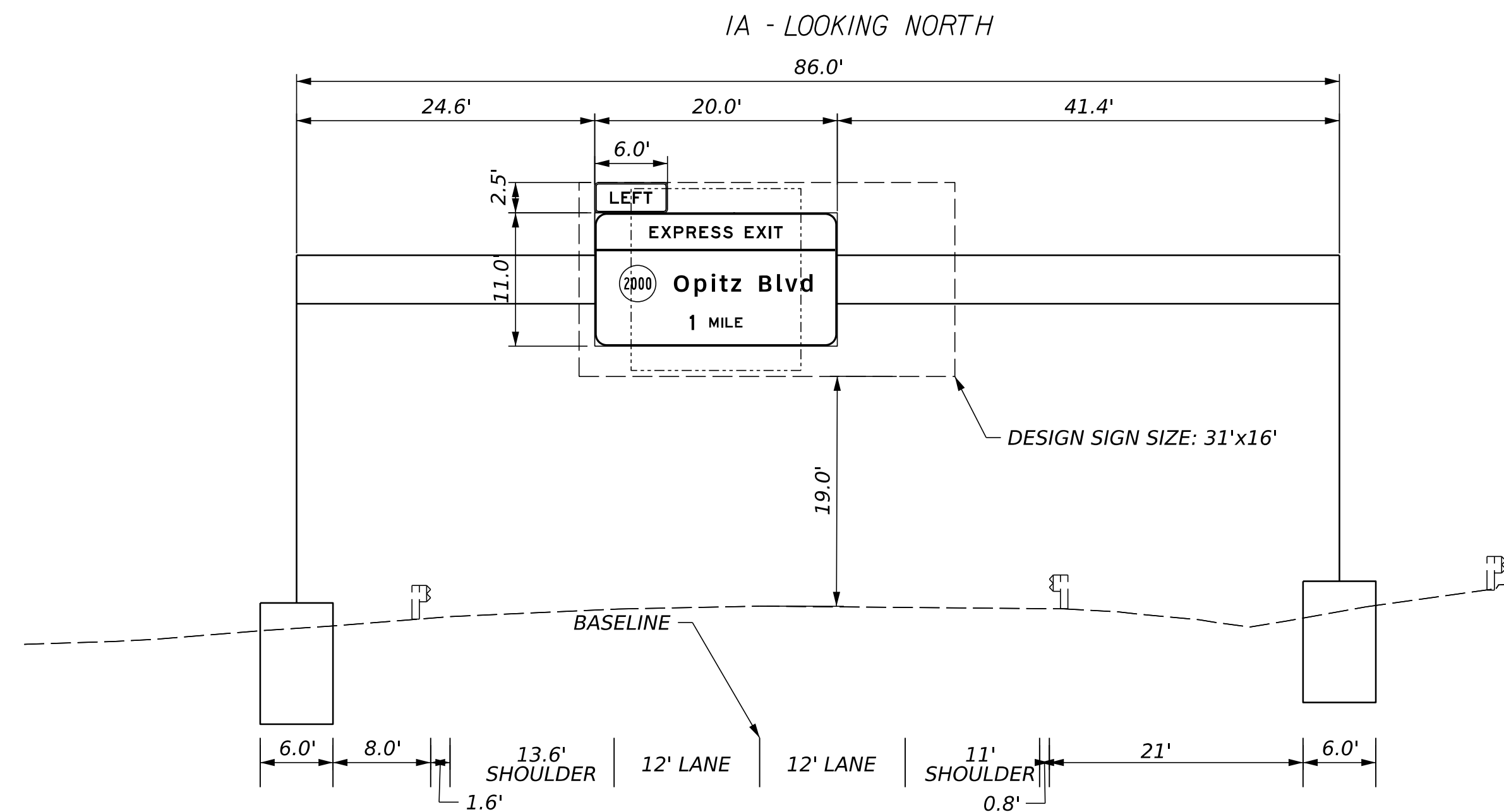
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(2C1)

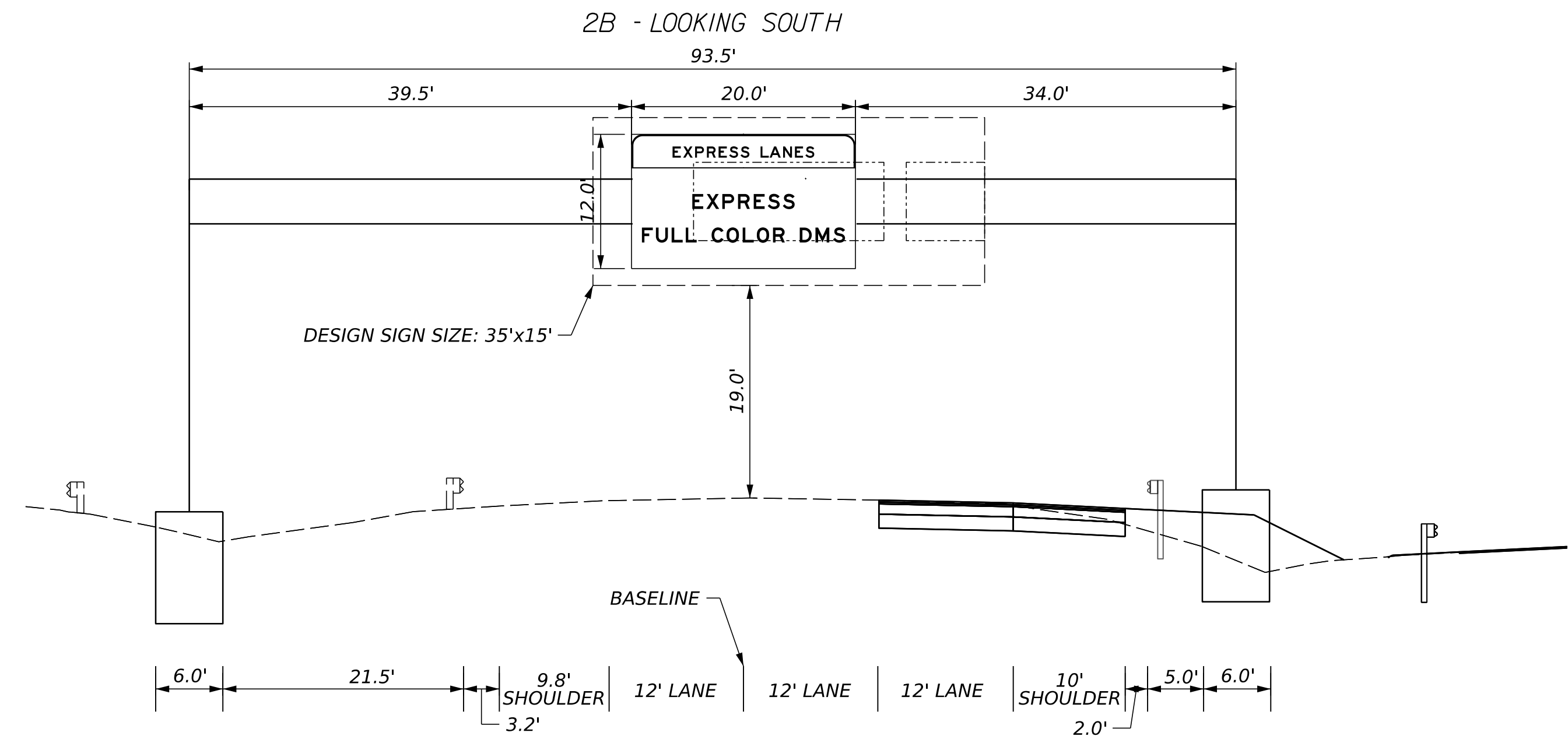
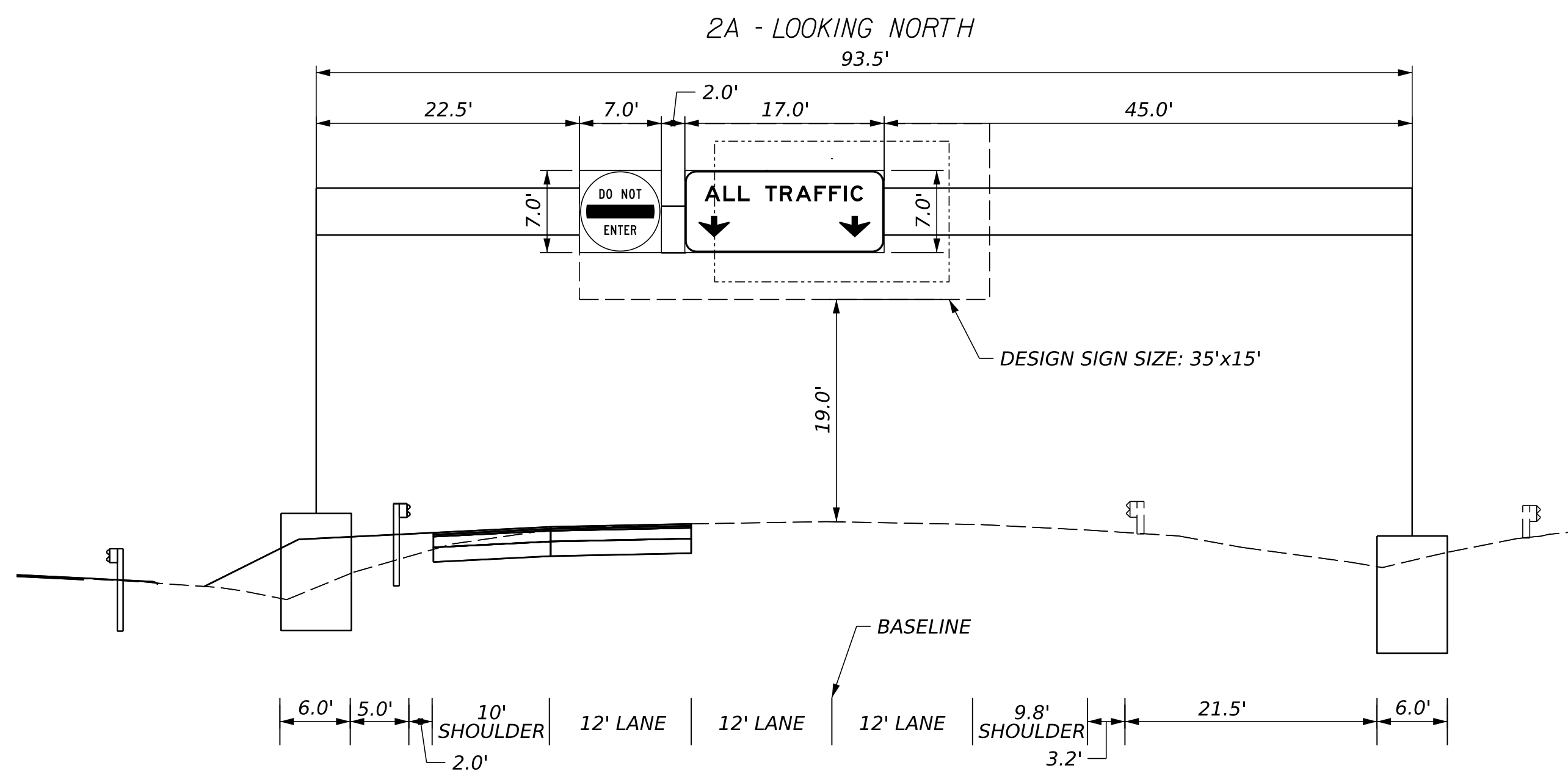
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

OH STRUCTURE LOCATION 1
 STA. 658+70', I-95 XPL CONST. @



OH STRUCTURE LOCATION 2
 STA. 667+00', I-95 XPL CONST. @



SIGN STRUCTURE GENERAL NOTES:

- ALL DIMENSIONS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO FABRICATION.
- ALL NEW FULL SPAN SIGN STRUCTURES AND FOUNDATIONS SHALL BE DESIGNED TO ACCOMMODATE AN ADDITIONAL STATIC SIGN LOAD OF AT LEAST 200 SQUARE FEET FOR FUTURE USE. ALL CANTILEVER AND BUTTERFLY SIGN STRUCTURES AND FOUNDATIONS SHALL BE DESIGNED TO ACCOMMODATE AN ADDITIONAL STATIC SIGN LOAD OF AT LEAST 50 SQUARE FEET OR A 25% INCREASE IN THE SIGN PANEL AREA SHOWN ON THE PLANS, WHICHEVER IS GREATER, FOR FUTURE USE. DESIGN SIGN SIZES SHOWN.
- CONCEPTUAL FOUNDATION CONFIGURATIONS ARE SHOWN ON THE PLANS. ACTUAL FOUNDATION CONFIGURATIONS AND DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR DURING THE FOUNDATION DESIGN PROCESS. IN SOME FOUNDATION LOCATIONS THERE ARE CONTROLLING FEATURES OR DIMENSIONS SHOWN ON THE PLANS (E.G. A FOUNDATION LOCATED WITHIN CONCRETE TRAFFIC BARRIER). THE CONTRACTOR SHALL ACCOUNT FOR THESE CONTROLLING FEATURES AND DIMENSIONS DURING THE FOUNDATION DESIGN PROCESS, AS APPLICABLE.

PAC PLANS

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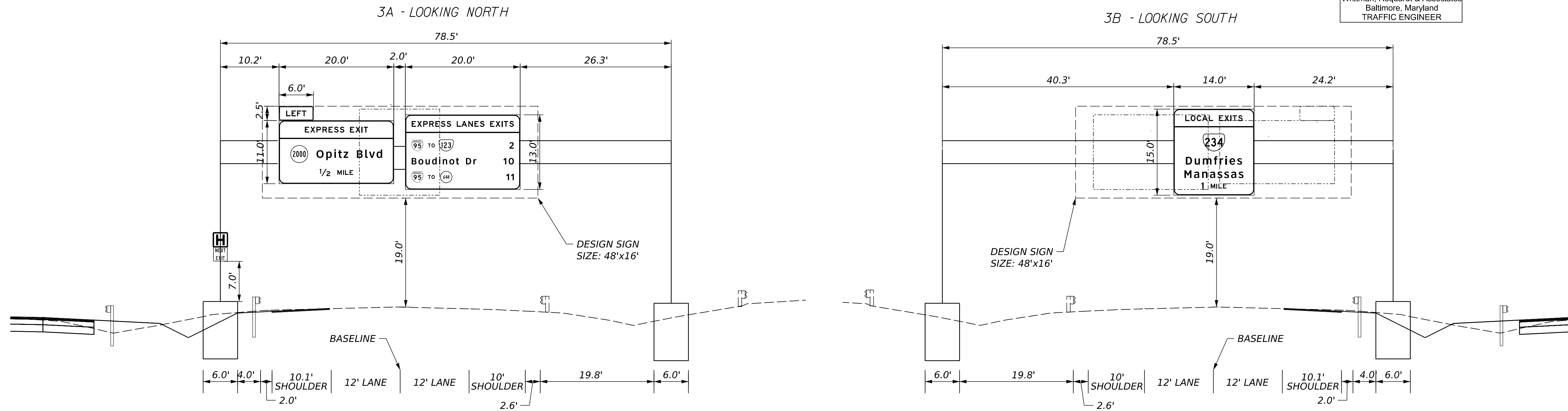
PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(2C2)

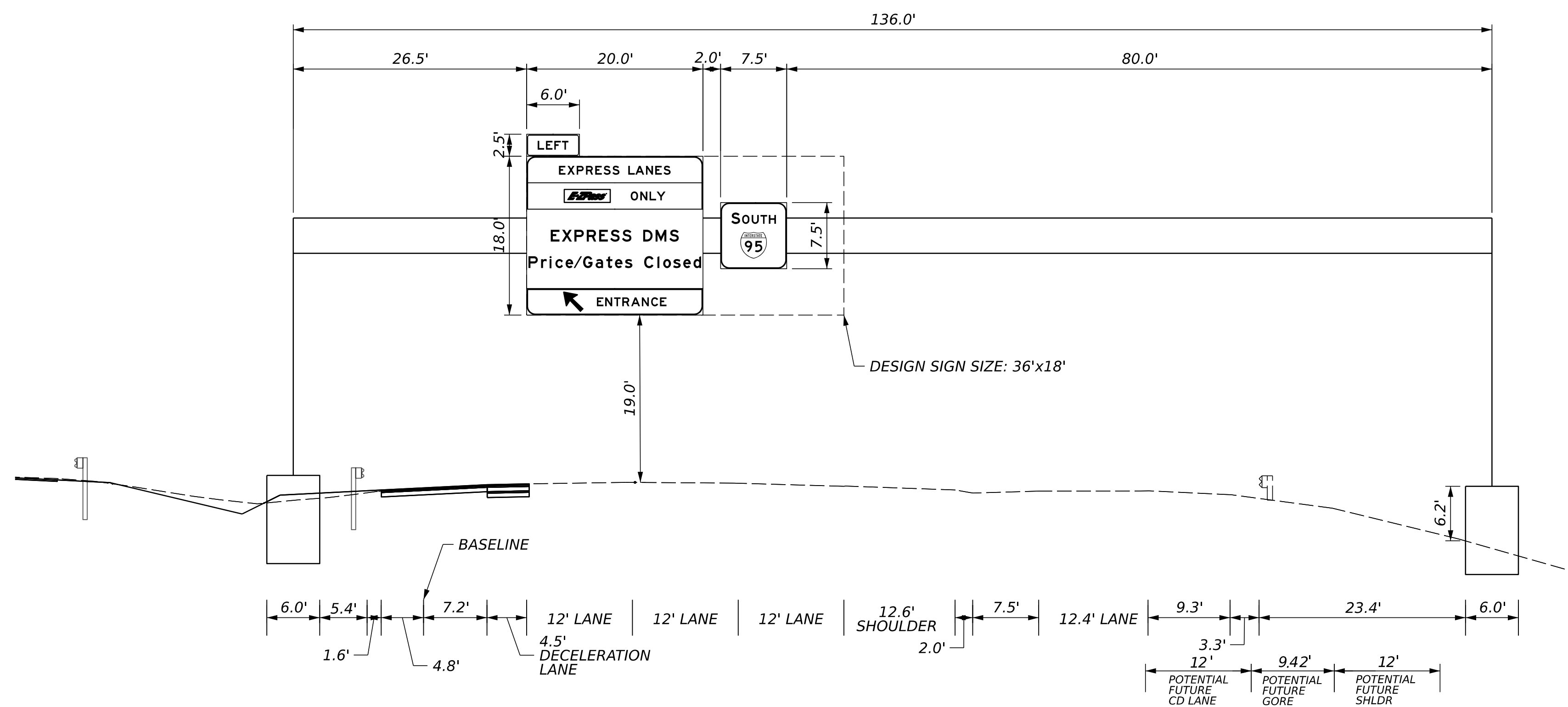
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

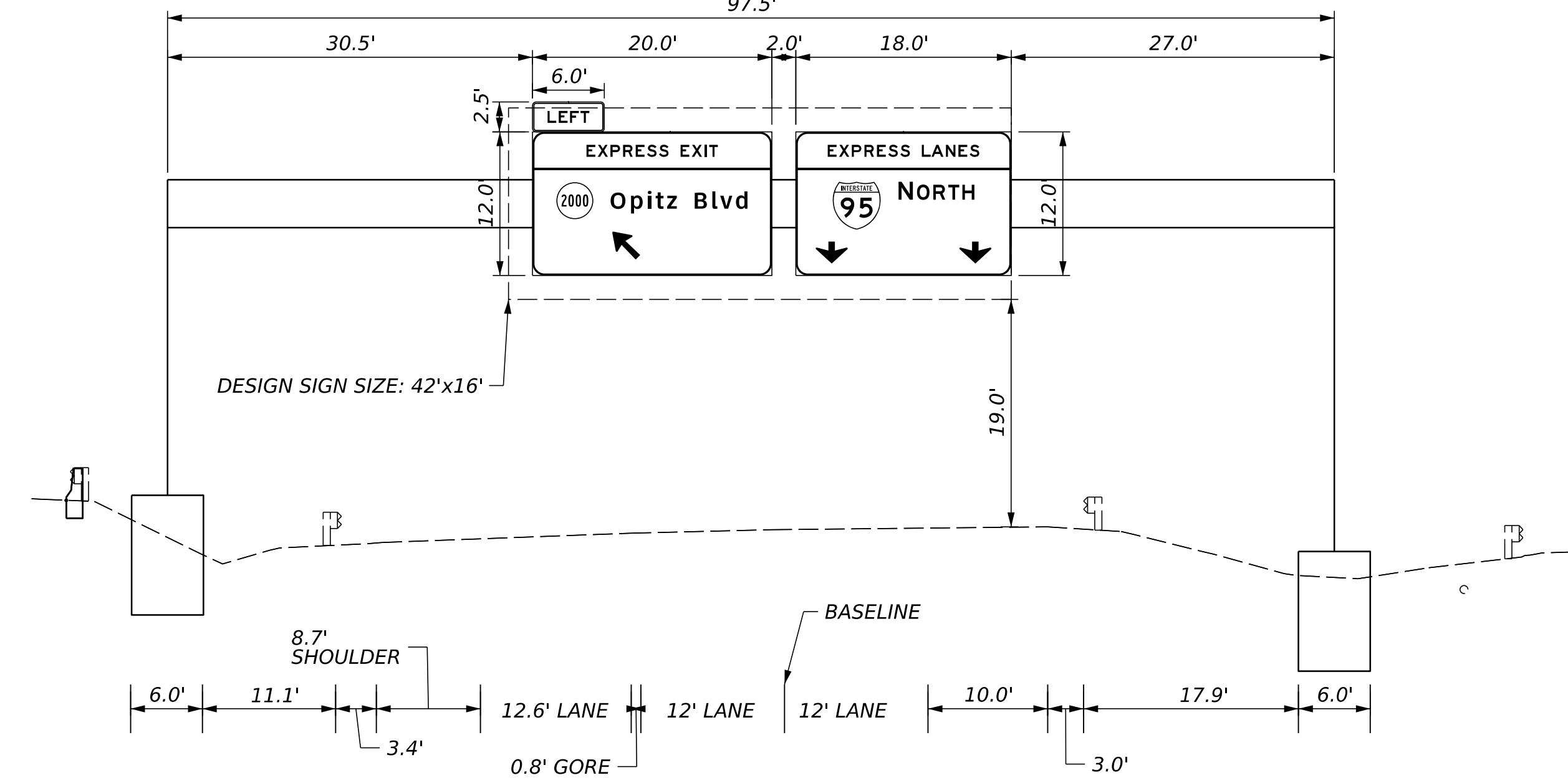
OH STRUCTURE LOCATION 3
 STA. 686+35', I-95 XPL CONST.



OH STRUCTURE LOCATION 4
 STA. 42+75', RAMP DBSR CONST.
 LOOKING SOUTH



OH STRUCTURE LOCATION 5
 STA. 714+35', I-95 XPL CONST.
 LOOKING NORTH



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

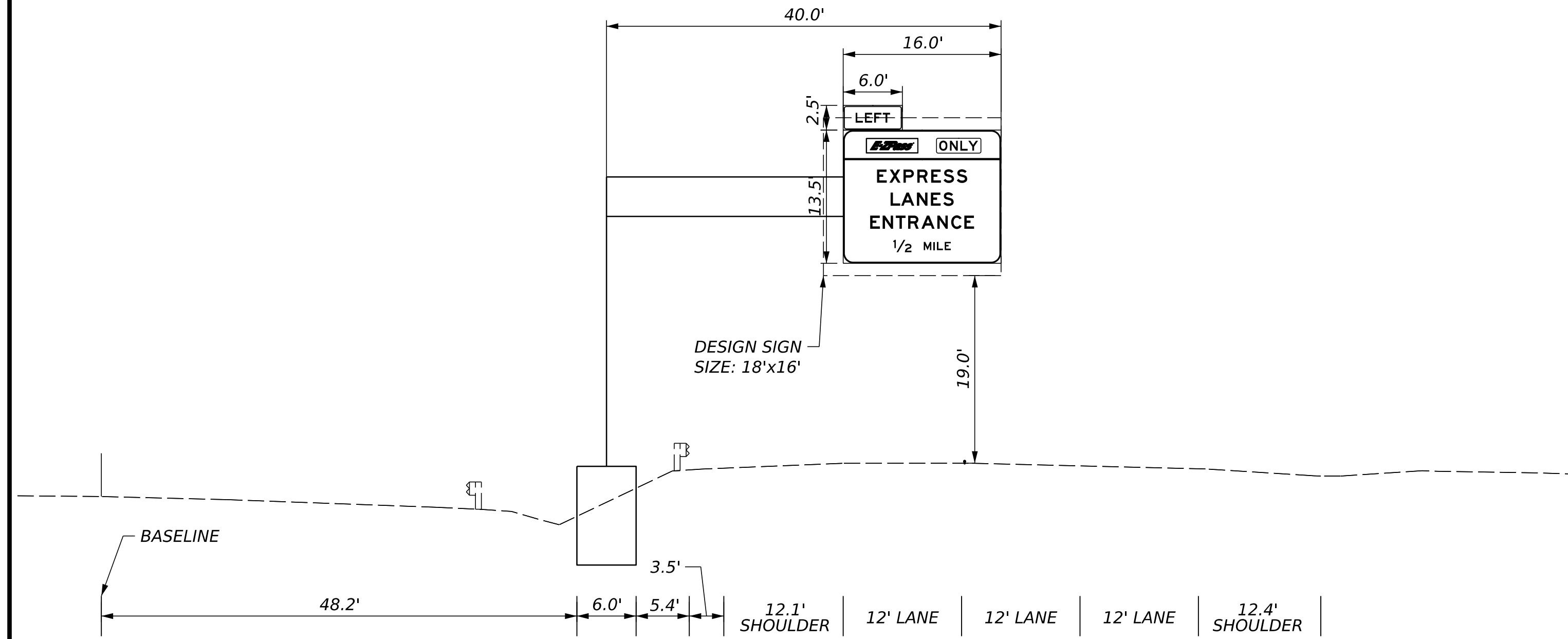
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(2C3)

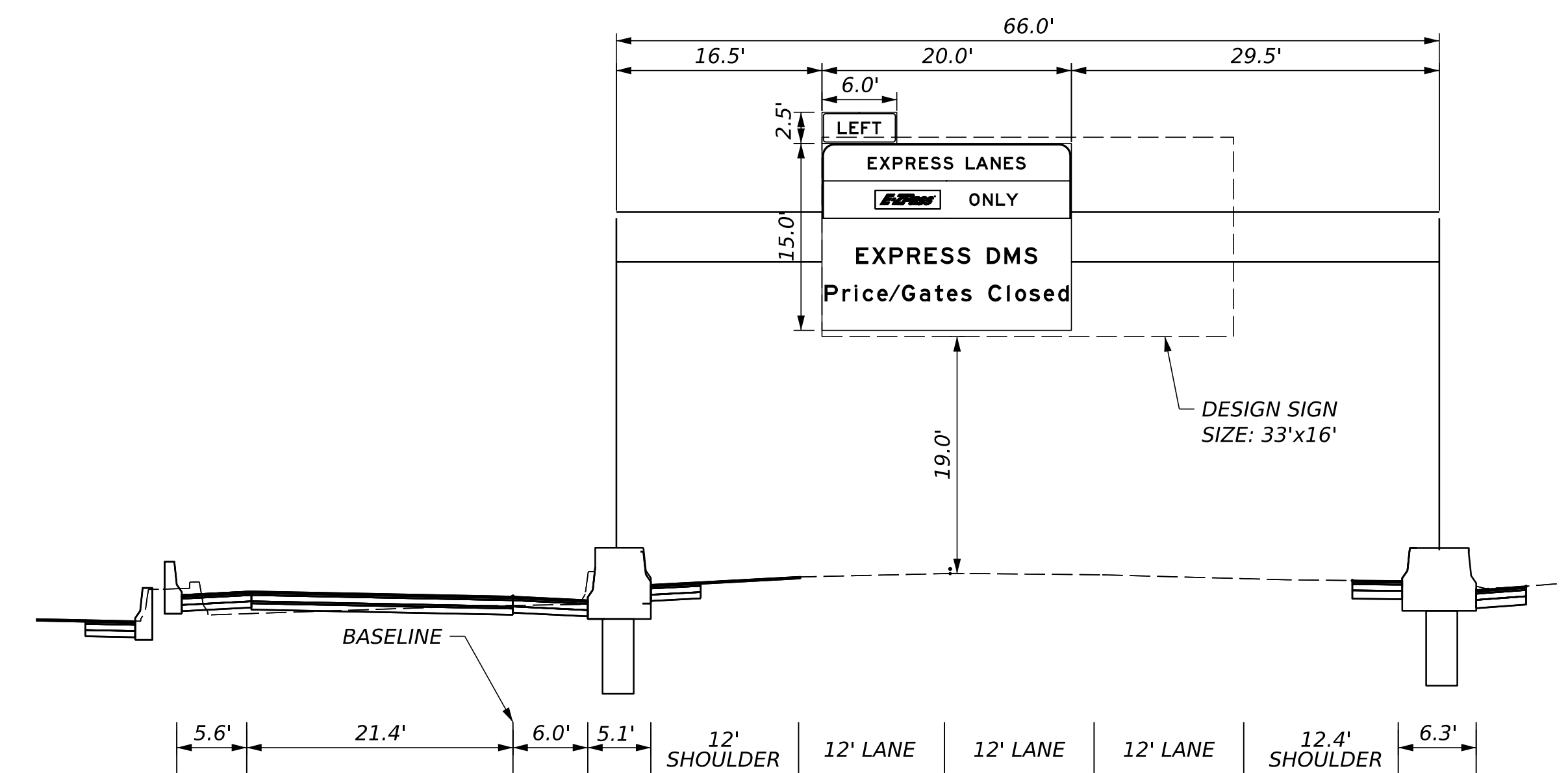
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

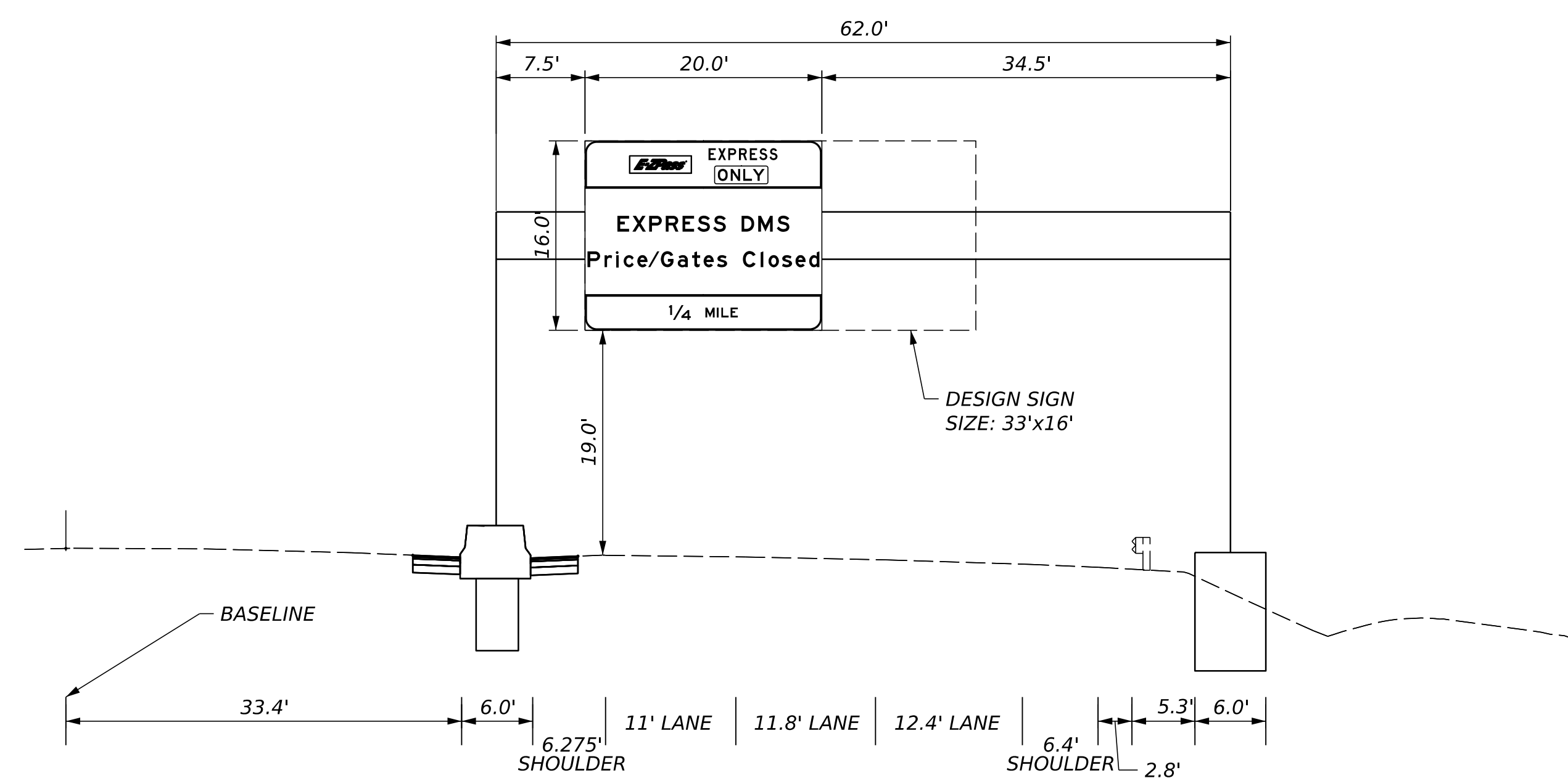
OH STRUCTURE LOCATION 6
 STA. 714+67', I-95 XPL CONST. @
 LOOKING SOUTH



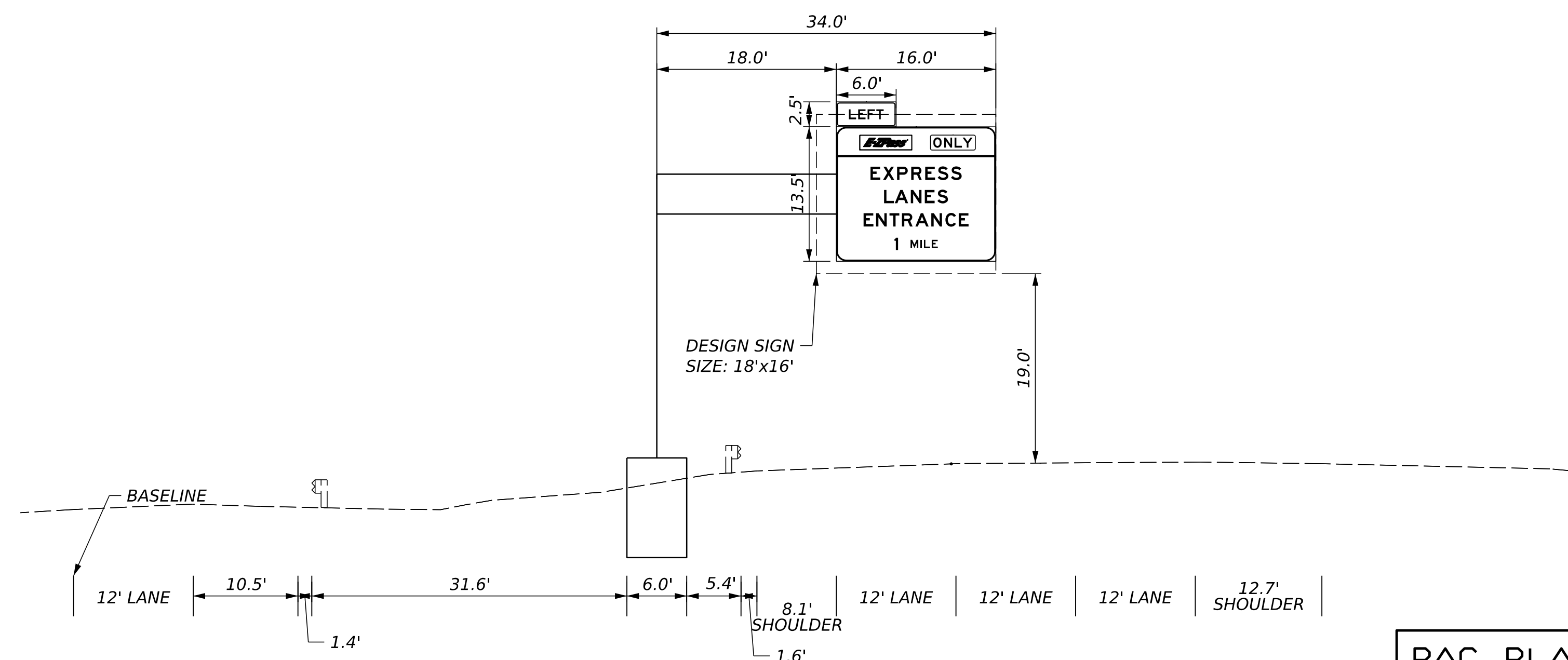
OH STRUCTURE LOCATION 7
 STA. 19+50', RAMP OBTR CONST. @
 LOOKING SOUTH



OH STRUCTURE LOCATION 8
 STA. 729+51', I-95 XPL CONST. @
 LOOKING NORTH



OH STRUCTURE LOCATION 9
 STA. 743+06', I-95 XPL CONST. @
 LOOKING SOUTH



PAC PLANS

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PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

NOTES:

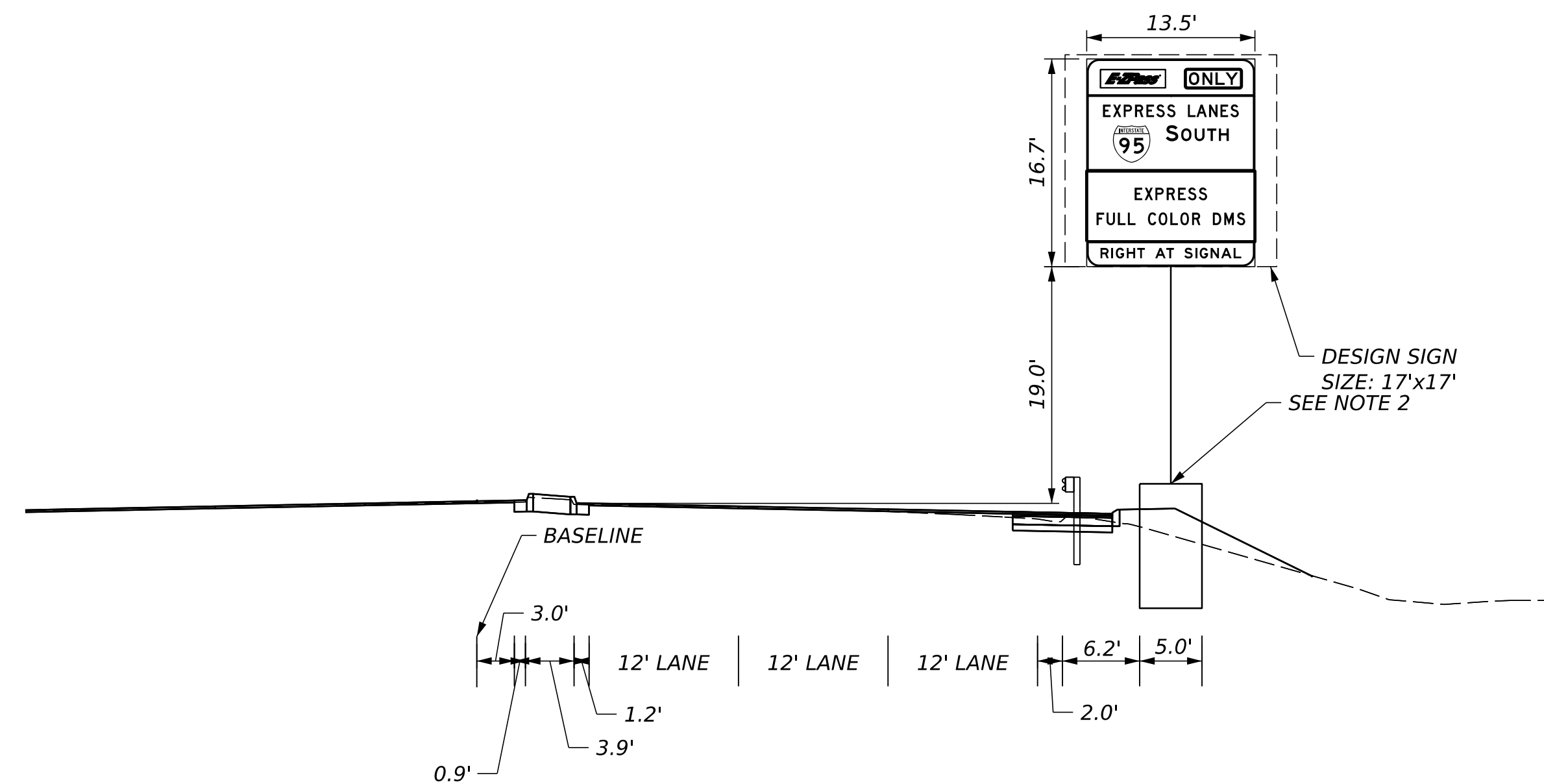
1. THE FOUNDATION DESIGN SHALL ACCOMMODATE ITS CONDUITS THAT MUST PASS THROUGH THE BARRIER FOR THE ROADWAY GATES AND FOR THE DMS POWER AND COMMUNICATIONS. REFER TO ITS PLANS FOR DETAILS.
2. PROPOSED BUTTERFLY STRUCTURE SHALL BE DESIGNED AND INSTALLED SO THAT THE SIGN PANEL IS PERPENDICULAR TO OPITZ BLVD.
3. CONTRACTOR SHALL INSTALL 1/4" FIBER JOINT SEALER ON ALL SIDES WHERE SIGN STRUCTURE FOUNDATION INTERSECTS WITH THE CONCRETE MEDIAN BARRIER CAP.
4. THE EDGE OF THE GM LOCATION FOUNDATION SHALL BE LOCATED 1 FOOT FROM THE EDGE OF THE RETAINING WALL AND THE FOUNDATION SHALL BE CENTERED LONGITUDINALLY BETWEEN THE RETAINING WALL PILES.

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(2C4)

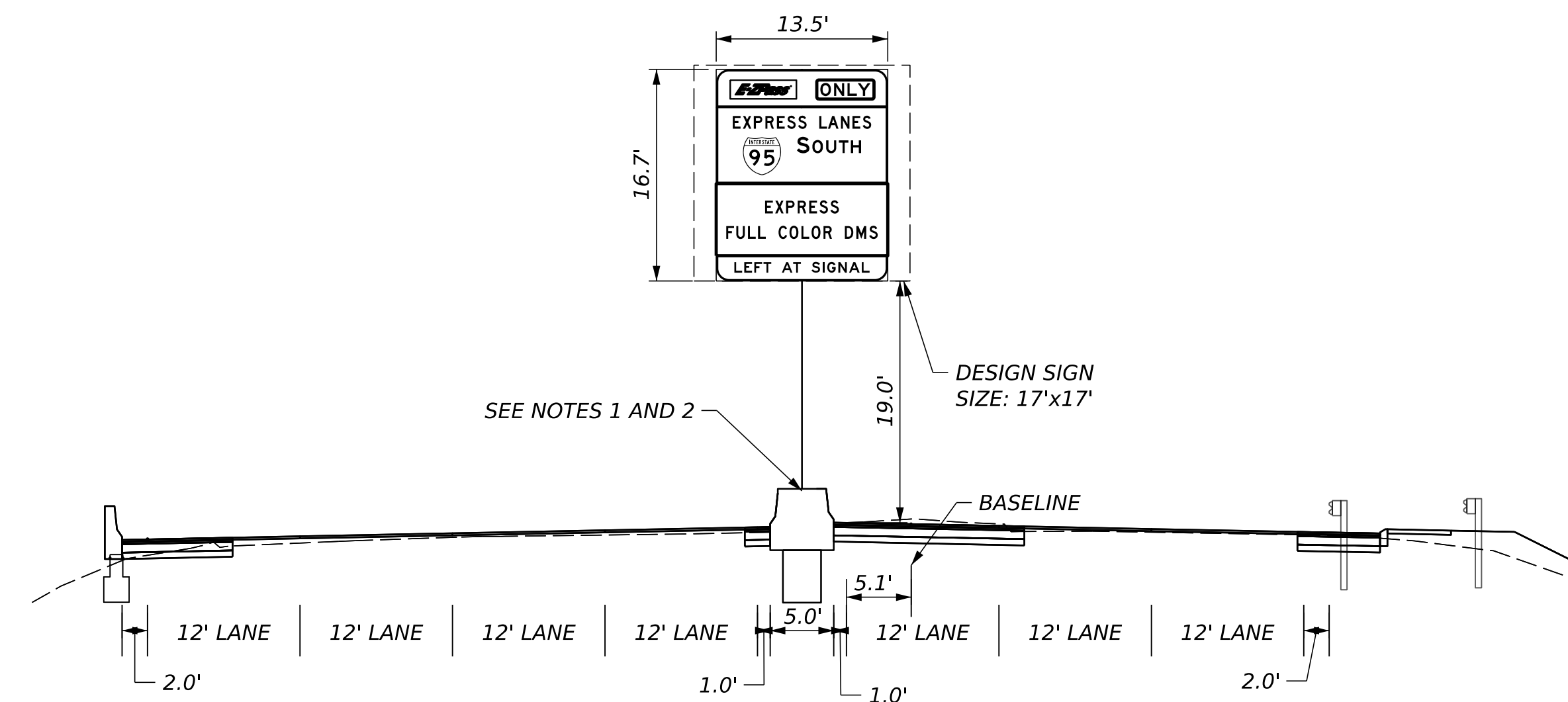
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

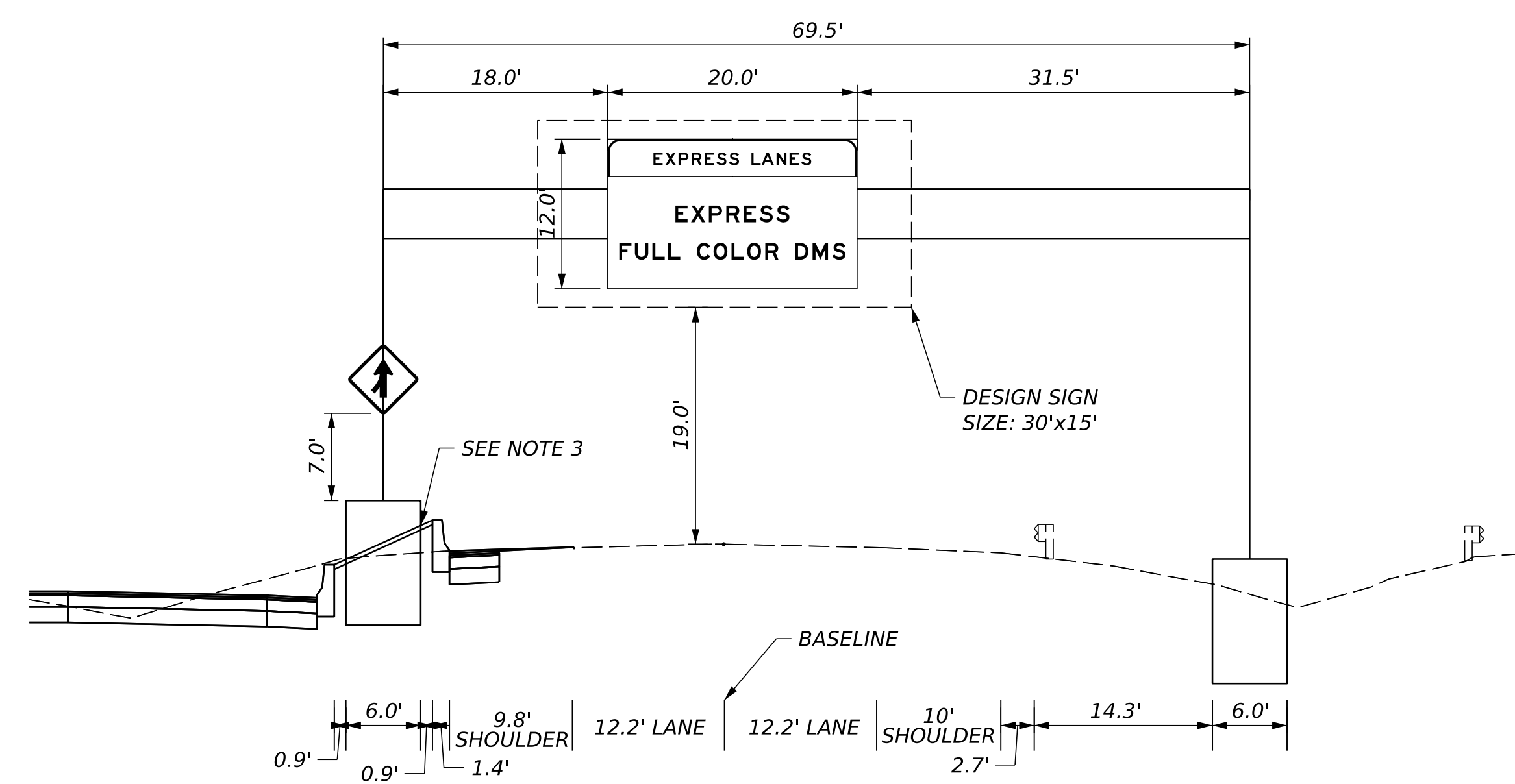
OH STRUCTURE LOCATION 10
 STA. 62+77, OPITZ BLVD CONST. @
 LOOKING EAST



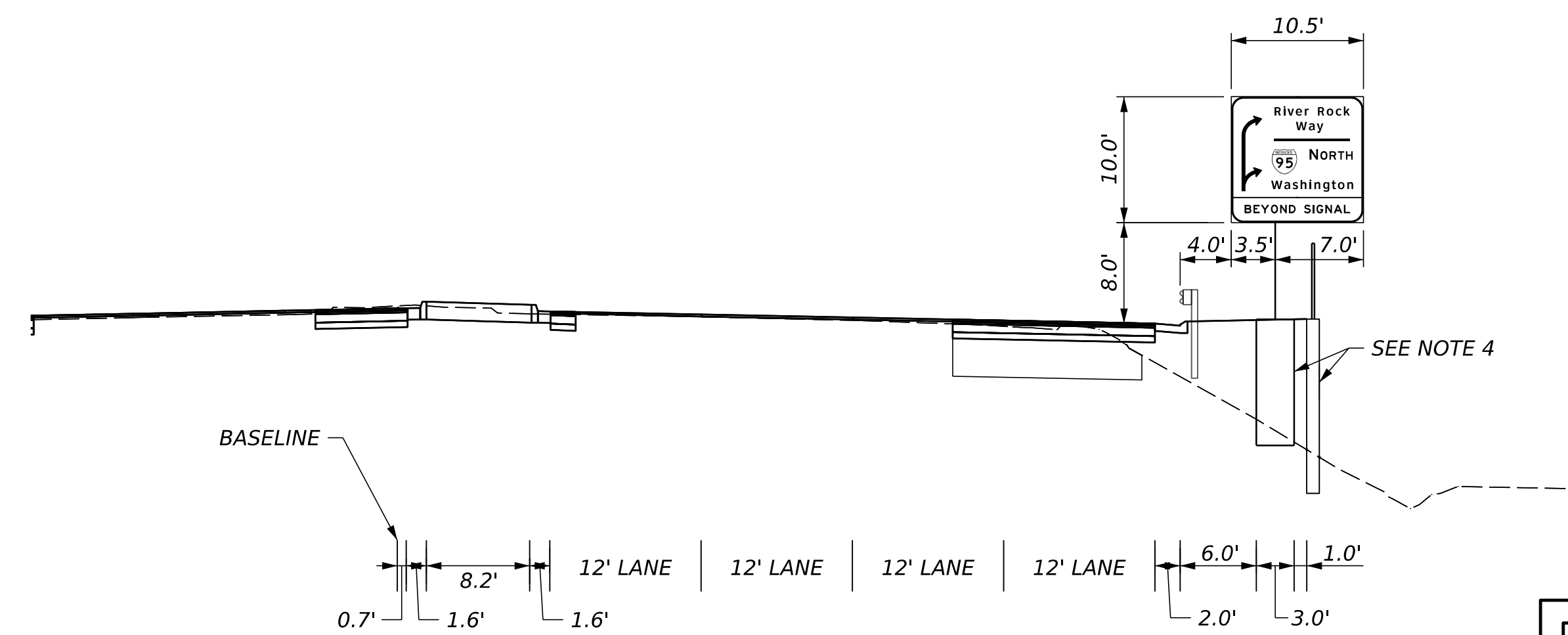
OH STRUCTURE LOCATION 11
 STA. 70+77, OPITZ BLVD CONST. @
 LOOKING WEST



OH STRUCTURE LOCATION 12
 STA. 678+20, I-95 XPL CONST. @
 LOOKING NORTH



GM LOCATION 1
 STA. 64+92, OPITZ BLVD CONST. @
 LOOKING EAST



PAC PLANS

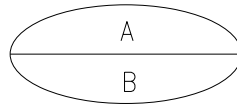
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PROJECT MANAGER *Bimbal Stubb, P.E., (703) 259-2362 (NOVA District) -----*
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700 -----*
 SUBSURFACE UTILITY BY, DATE *Accumark, Inc. (804) 550-7140, 07/07/2021*

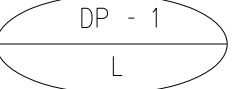
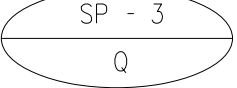
NOTES FOR SAFETY IMPROVEMENT ITEMS

GENERAL NOTES

- Unless otherwise specified, the Contractor shall have the option of re-furbishing framing members on existing sign panels or furnishing new sign panels with corresponding sign message for mounting on new breakaway post.
- Unless otherwise approved by the Engineer, existing traffic signs which are to be removed shall remain in place until the new sign structure and critical sign message are in place.
- Existing lights shall be relocated or adjusted to conform with the new sign location(s). All costs for relocation or adjustment of existing lights shall be included in price bid for replacement of sign.
- Salvaged materials shall be properly stored as directed by the Engineer and be delivered during the Departments normal work hours and days. The Contractor shall notify the Engineer at least five days prior to the proposed delivery date.
- All sign panels, framing members, and miscellaneous hardware shall be salvaged by the Contractor for the Department and delivered intact to the Bristol Sign Shop, 870 Bonham Road Bristol, Virginia 24201
- Any delineators or mile posts which will be disturbed by installation of proposed guardrail shall be reset back of proposed guardrail as directed by the Engineer. The cost of which shall be included in the price bid per lin. ft. of guardrail.
- Relocated sign panels, as designated on the plans, shall be provided with back panel. The size of the back panel shall be determined by the contractor according to the type ZEE bar and the following formula:
 For Panel with "A" zee bar - Area of backing = (b-[flange width + 2"]) (d + 1")
 For Panel with "B" zee bar - Area of backing = (b - [flange width + 2"]) (d+2")
 For sign details see Sheet
- Definition of Symbols:

	A. The top section indicates the type of structure. (SEE DEFINITION OF TYPES)
	B. The bottom section indicates the measurement & payment item. (SEE MEASUREMENT & PAYMENT ITEMS)

EXAMPLE :

	O/H Double Pole 50-75 L.F. REMOVE AND DISPOSE OF O/H SIGN STRUCTURE, TYPE ()
	Sign Panel 201-300 S.F. RELOCATE EXISTING SIGN PANEL, TYPE ()
- All educational panels are to be removed.
- Unless otherwise indicated on the plans, all breakaway sign structures shall be located within 25 feet of the signs current field location or as directed by the Engineer.
- Delineators are to be spaced at one tenth of a mile intervals between milepost markers, unless otherwise indicated.

MEASUREMENT & PAYMENT ITEMS

- RELOCATE EXISTING SIGN STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for dismantling and removing existing sign and support(s), backfilling resulting holes, installing existing sign and support(s) in the new location with special backfill material, furnishing new miscellaneous nuts, bolts, and washers, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REPLACE WITH SIGN TYPE () ON O/H STRUCTURE - SALVAGE,
 will be measured in units of each per sign type and paid for at the contract unit price per each, which price shall be full compensation for dismantling, removal, and salvage of existing sign panels and framing members, for furnishing and mounting new sign panels, sign message and framing members, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REPLACE WITH SIGN TYPE () ON O/H STRUCTURE - DISPOSAL,
 will be measured in units of each per sign type and paid for at the contract unit price per each, which price shall be full compensation for dismantling, removal, and disposal of existing sign panels and framing members, for furnishing and mounting new sign panels, sign message and framing members, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- RELOCATE EXISTING SIGN TYPE () AND LIGHTS TO O/H STRUCTURE,
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for relocation of sign panel and lighting system, furnishing and installing additional buried cable and boxes, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- RELOCATE EXISTING SIGN TYPE () TO O/H STRUCTURE,
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for relocation of sign panel, and for all materials, labor, tools, equipment and incidentals necessary to complete
- MODIFY EXISTING SIGN MESSAGE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for drilling new holes, plugging of unused holes with compatible material, relocation of sign message, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND DISPOSE OF SIGN STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and disposal of sign panels, posts and foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND SALVAGE SIGN STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and salvage of sign panels, posts and foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- MODIFY EXISTING O/H STRUCTURE, LOCATION NO. (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for furnishing, installing and/or relocating sign panels, framing members, supports, light fixtures and supports electrical conduit, boxes, and conductors, and for all materials, labor, tools, equipment and incidentals necessary to
- REMOVE AND DISPOSE OF O/H STRUCTURE AND LIGHTS, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and disposal of sign panels, lighting systems, supports, and concrete foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND SALVAGE O/H STRUCTURE AND LIGHTS, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and salvage of sign panels, lighting systems, supports, and concrete foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND DISPOSE OF O/H SIGN STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and disposal of sign panels, supports, and concrete foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND SALVAGE O/H SIGN STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and salvage of sign panels, supports, and concrete foundations to at least two feet below existing ground line, backfilling and restoration (topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REWIRE EXISTING O/H STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removing existing conductor wiring, furnishing and installing all conductors, connections and ground assemblies, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

- REPLACE AND DISPOSE OF LIGHTS ON O/H STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and disposal of existing lighting system, for furnishing and installing new lighting system with supports, for rewiring the structure, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REPLACE AND SALVAGE LIGHTS ON O/H STRUCTURE, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and salvage of existing lighting system, for furnishing and installing new lighting system with supports, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- RELOCATE EXISTING SIGN PANEL, TYPE (),
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removing existing panel, refurbishing framing members, furnishing and installing necessary back panels, erecting existing sign panel to new breakaway posts, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND SALVAGE SIGN TYPE () FROM O/H STRUCTURE,
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for dismantling, removal and salvage of existing sign panels and framing members, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE AND DISPOSE OF DELINEATORS,
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for removal and disposal of delineators, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.
- REMOVE EXISTING CONCRETE FOUNDATION AND POLE,
 will be measured in units of each and paid for at the contract unit price per each, which price shall be full compensation for all necessary excavation, demolition and removal of concrete to at least two feet below existing ground line, disposal of waste materials, backfilling with suitable materials, compaction and restoration (grading, topsoiling and seeding), and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

REVISED	STATE	STATE		SHEET NO.
	VA.	ROUTE	PROJECT	
		95	0095-076-299, C-501	16(2D1)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				

DEFINITION OF TYPES

TYPE	DESCRIPTION	SIZE
DP-1	O/H Double Pole	50 - 75 L. F.
DP-2	O/H Double Pole	76 - 101 L. F.
DP-3	O/H Double Pole	102 - 127 L. F.
DP-4	O/H Double Pole	128 - 153 L. F.
DP-5	O/H Double Pole	154 - 179 L. F.
DP-6	O/H Double Pole	180 - 205 L. F.
DC-1	O/H Double Pole & Cantilever	75 - 100 L. F.
DC-2	O/H Double Pole & Cantilever	101 - 126 L. F.
DC-3	O/H Double Pole & Cantilever	127 - 152 L. F.
DC-4	O/H Double Pole & Cantilever	153 - 178 L. F.
DC-5	O/H Double Pole & Cantilever	179 - 204 L. F.
DC-6	O/H Double Pole & Cantilever	205 - 230 L. F.
CS-1	O/H Single Arm Cantilever	25 - 40 L. F.
CS-2	O/H Single Arm Cantilever	41 - 60 L. F.
CD-1	O/H Double Arm Cantilever	50 - 74 L. F.
CD-2	O/H Double Arm Cantilever	75 - 125 L. F.
CD-3	O/H Double Arm Cantilever	126 - 175 L. F.
CD-4	O/H Double Arm Cantilever	176 - 225 L. F.
BM	O/H Bridge Mount	EA.
I	Non-breakaway Single Metal Pole	EA.
II	Non-breakaway Two Metal Poles	EA.
III	Non-breakaway Three Metal Poles	EA.
V	Breakaway Single Round Metal Pole	EA.
VA	Breakaway Single Metal Pole	EA.
VA	Breakaway Two Metal Poles	EA.
VA3	Breakaway Three Metal Poles	EA.
VA3	3/2" Rolled Rail Steel Pole	EA.
WP-1	Single Wood Post	EA.
WP-2	Two Wood Posts	EA.
STP-1	Square Tube Post	EA.
STP-2	Two Square Tube Posts	EA.
SP-1	Sign Panel	0 - 100 S. F.
SP-2	Sign Panel	101 - 200 S. F.
SP-3	Sign Panel	201 - 300 S. F.
SP-4	Sign Panel	301 - 400 S. F.
SP-5	Sign Panel	401 - 500 S. F.
SP-6	Sign Panel	501 - 600 S. F.

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

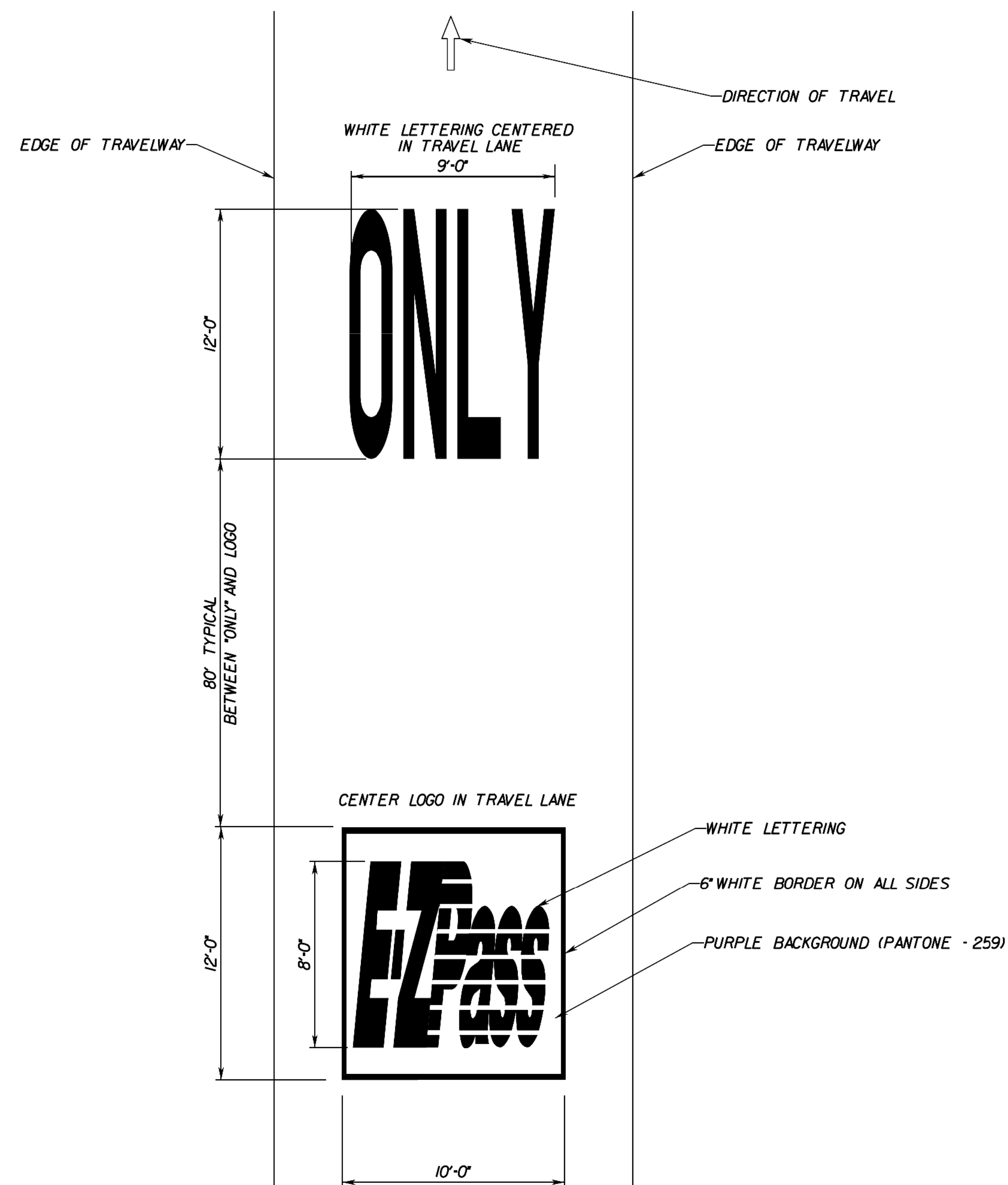
PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

PAVEMENT MARKING DETAILS

REVISED	STATE		STATE	SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	16(2D2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



E-ZPASS LOGO
 NOT TO SCALE
 TYPICAL INSTALLATION
 THERMOPLASTIC PAINT
 SEE PLANS FOR ACTUAL LOCATION

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

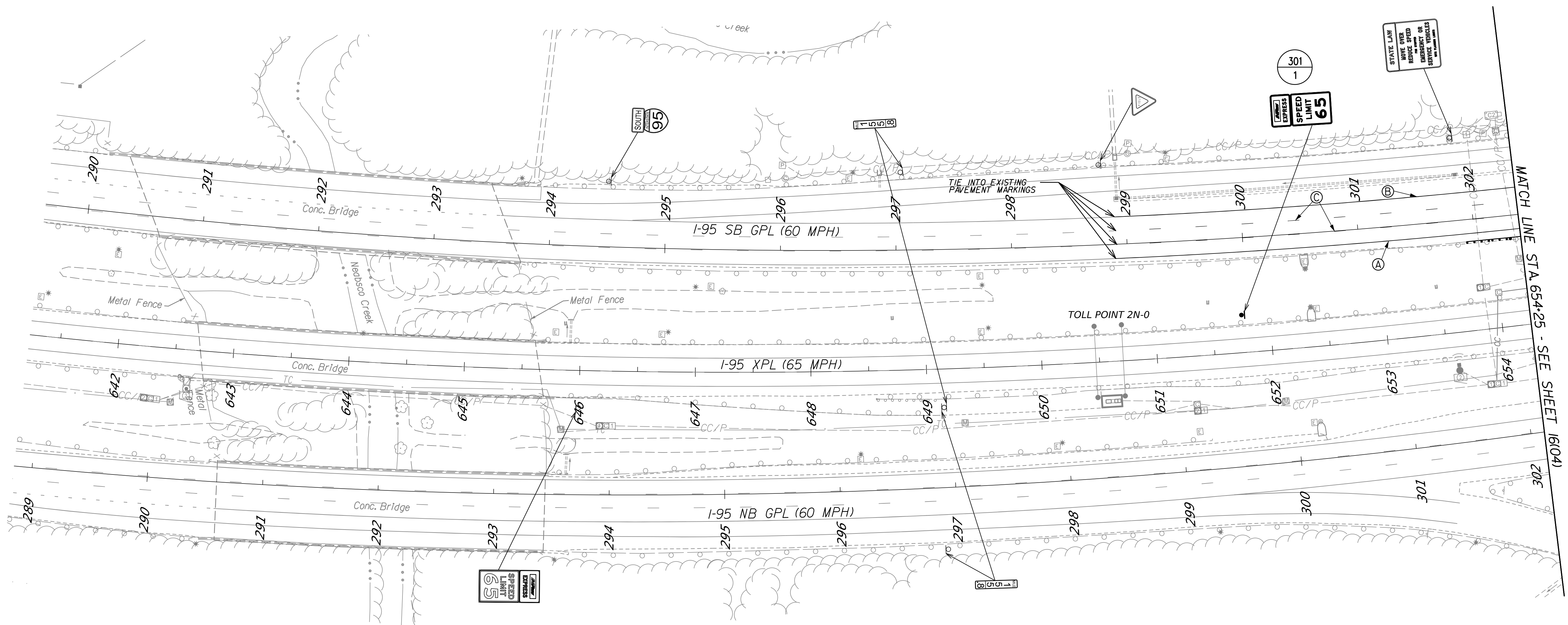
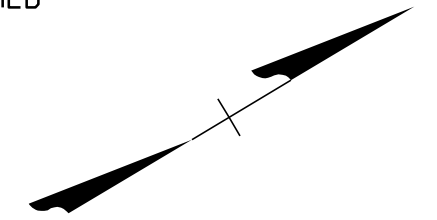
N.T.S.	PROJECT 0095-076-299	SHEET NO. 16(2D2)
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PROJECT MANAGER _____
 SURVEYED BY, DATE _____
 DESIGN BY _____
 SUBSURFACE UTILITY BY, DATE _____

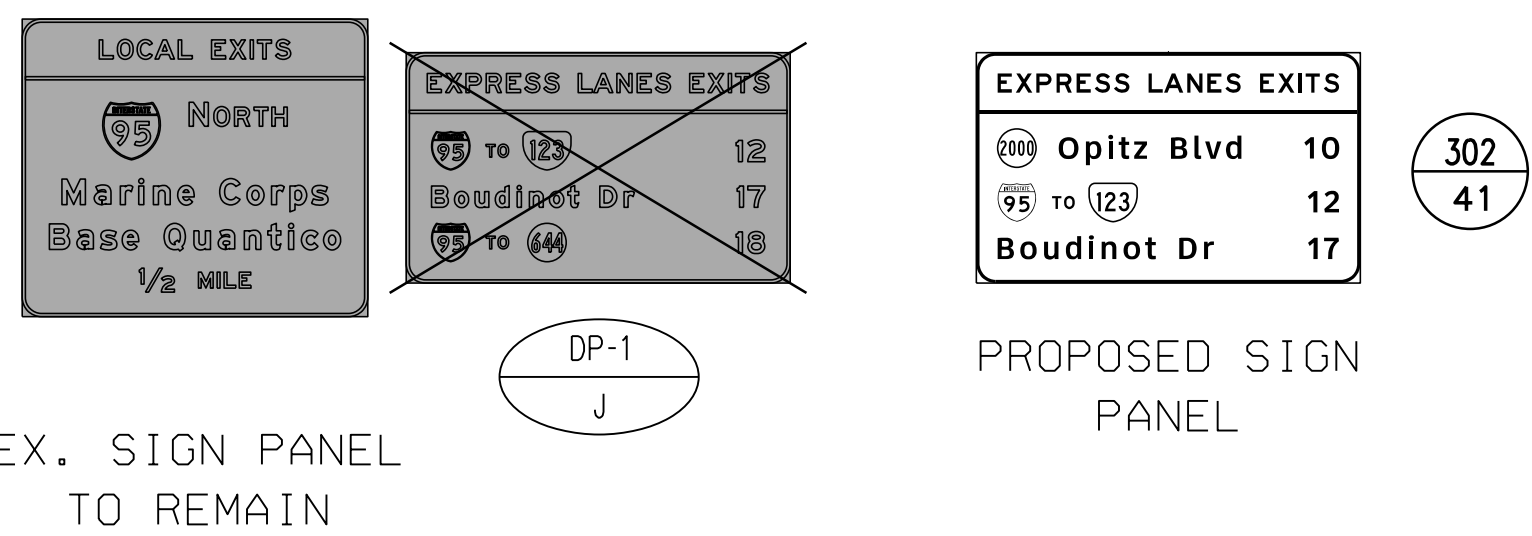
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299,C-501	16(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 10000 Merglen Rd
 Fort Belvoir, VA 22031



EXISTING O/H SIGN STRUCTURE LOCATED AT MILE MARKER 146.39

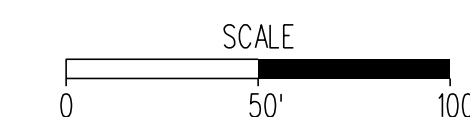


PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
- (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
- (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
- (G) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- (H) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (J) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

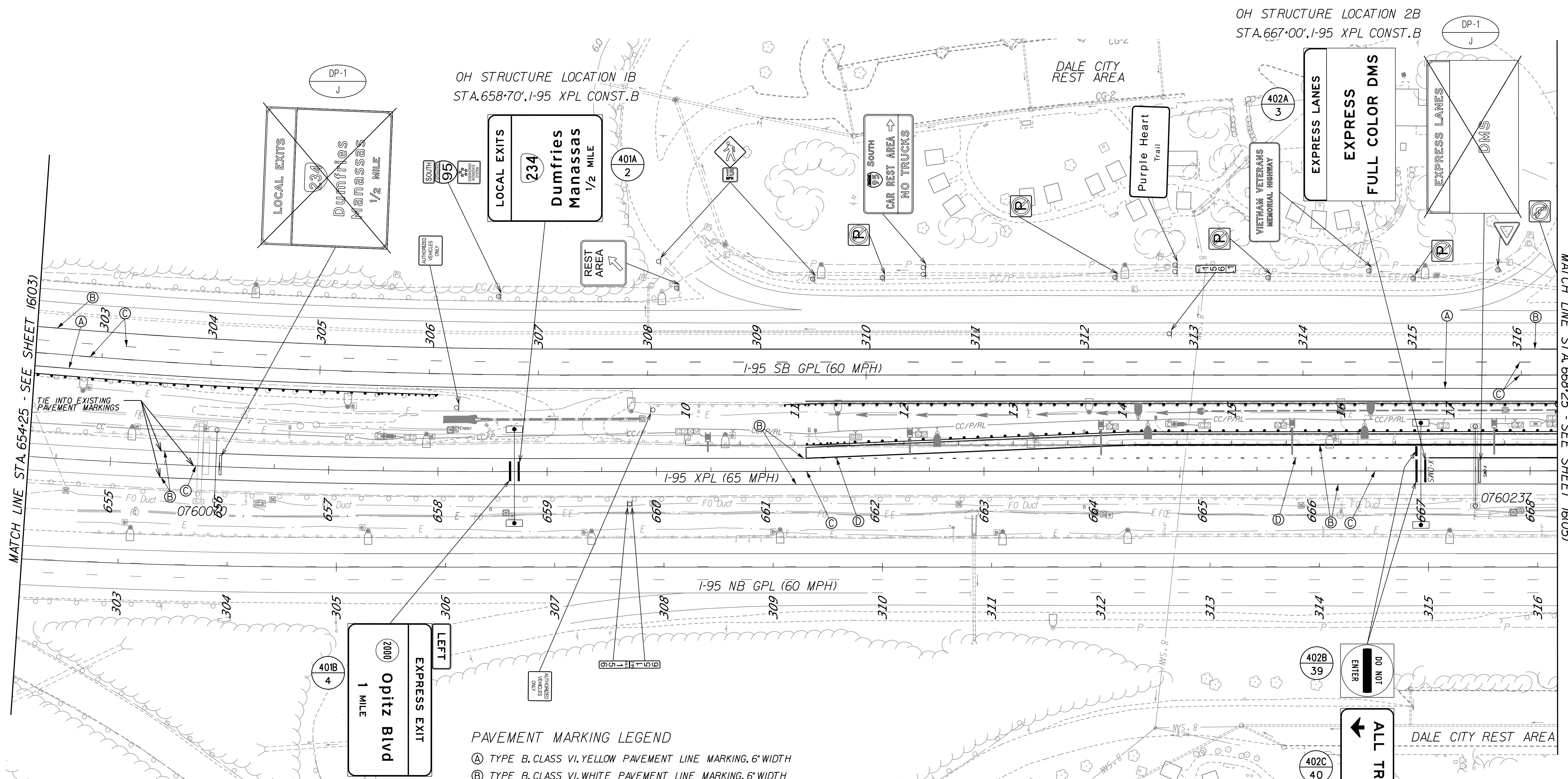
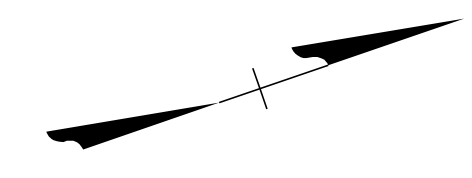


PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(4)

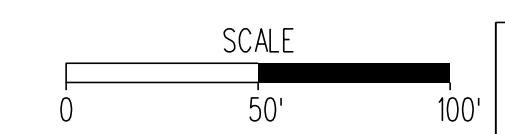
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



- PAVEMENT MARKING LEGEND**
- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
 - (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
 - (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
 - (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
 - (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
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 - (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
 - (J) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

OH STRUCTURE LOCATION 2A
 STA. 667+00', I-95 XPL CONST. B



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PAC PLANS

PROJECT	SHEET NO.
0095-076-299	16(4)

MATCH LINE STA. 654+25 - SEE SHEET 16(03)

MATCH LINE STA. 668+25 - SEE SHEET 16(05)

OH STRUCTURE LOCATION 1A
 STA. 655+31', I-95 XPL CONST. B

OH STRUCTURE LOCATION 1B
 STA. 658+70', I-95 XPL CONST. B

OH STRUCTURE LOCATION 2B
 STA. 667+00', I-95 XPL CONST. B

PROJECT MANAGER: Bipal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

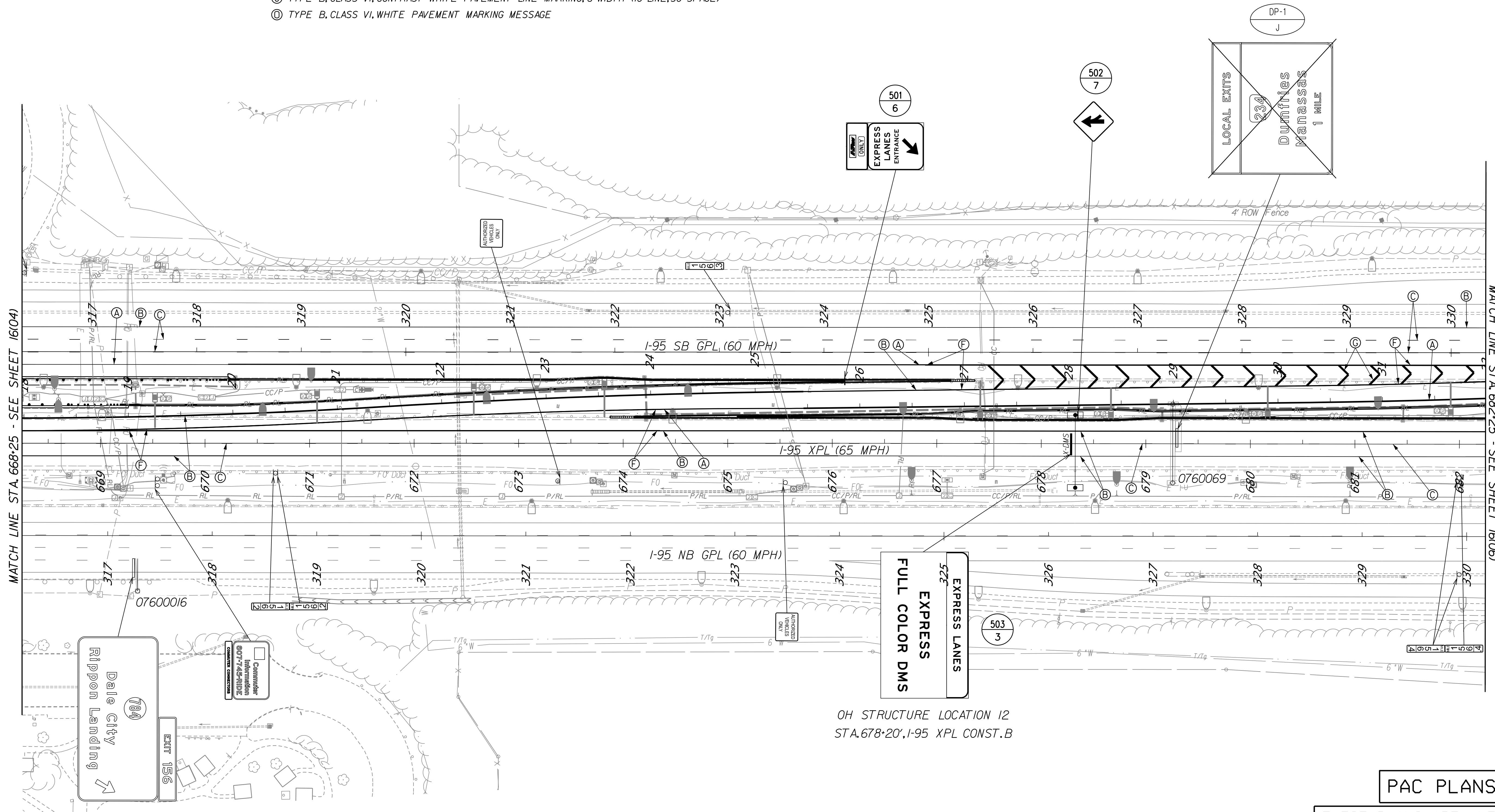
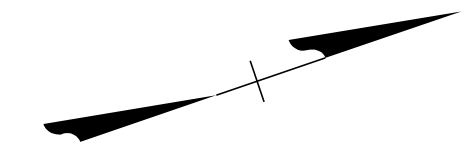
PAVEMENT MARKING LEGEND

- Ⓐ TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- Ⓑ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- Ⓒ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- Ⓓ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
- Ⓔ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
- Ⓕ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
- Ⓖ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- Ⓘ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- Ⓢ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- Ⓣ TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

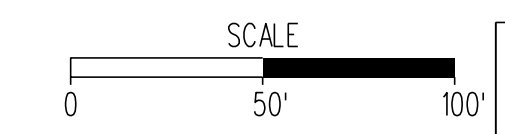
Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



OH STRUCTURE LOCATION 12
 STA. 678+20, I-95 XPL CONST. B

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



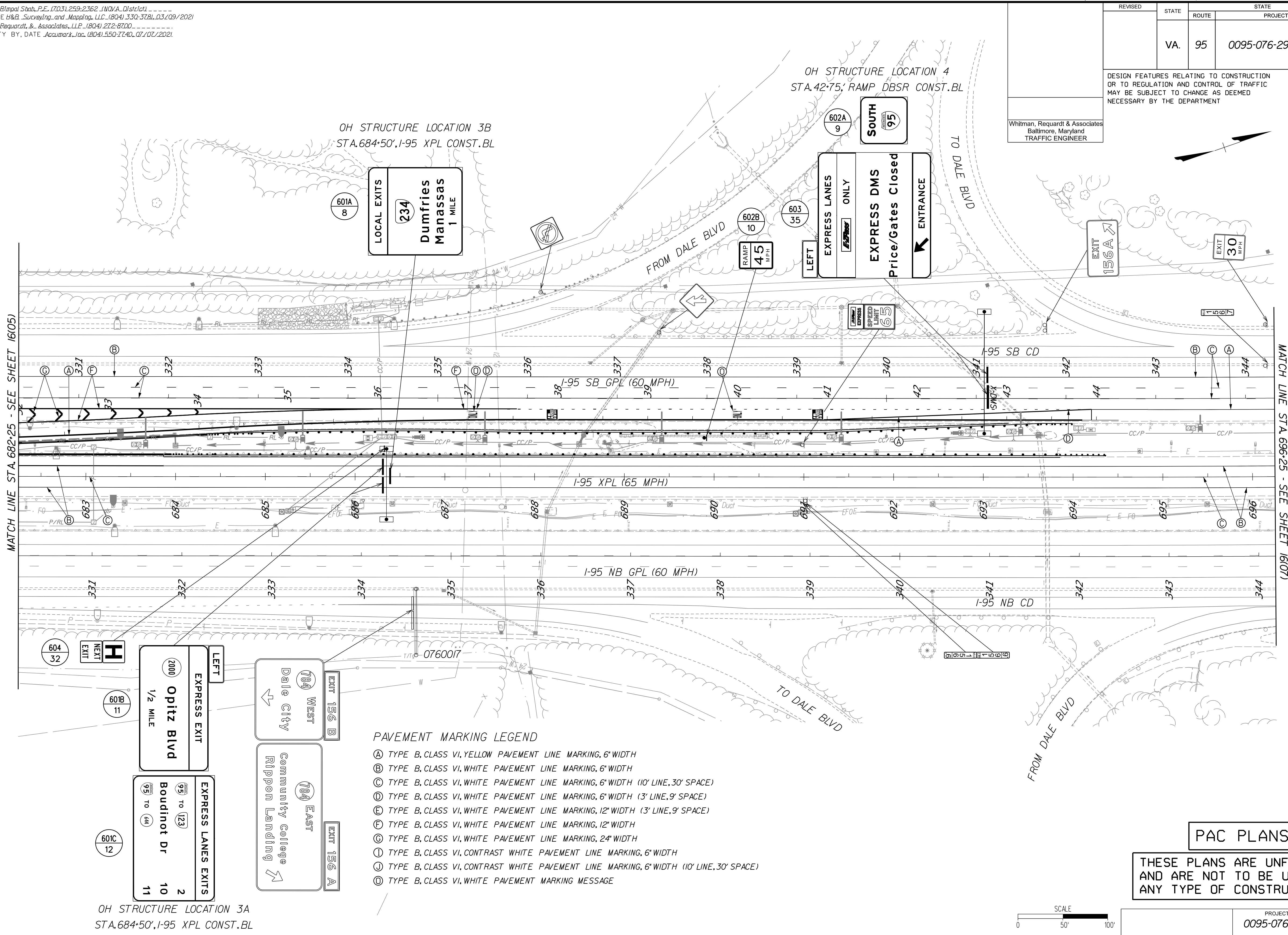
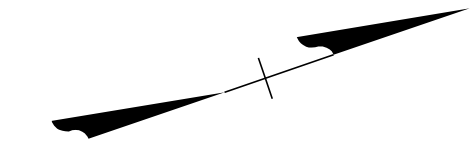
PROJECT	SHEET NO.
0095-076-299	16(5)

PROJECT MANAGER: *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY: DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY: DATE: *Accumark, Inc. (804) 550-7140, 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1616

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



MATCH LINE STA. 682+25 - SEE SHEET 1605

MATCH LINE STA. 696+25 - SEE SHEET 1607

- PAVEMENT MARKING LEGEND**
- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
 - (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
 - (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
 - (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
 - (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
 - (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
 - (G) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
 - (H) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
 - (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
 - (Q) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

OH STRUCTURE LOCATION 3A
 STA. 684+50', I-95 XPL CONST. BL

604
32
NEXT EXIT

601A
8
LOCAL EXITS

234
Dumfries
Manassas
1 MILE

602A
9
SOUTH
95

602B
10
RAMP
45 MPH

603
35

EXPRESS LANES ONLY

EXPRESS DMS
Price/Gates Closed

ENTRANCE

TO DALE BLVD

EXIT 156A

EXIT 30
30 MPH

601B
11
LEFT

200
Opitz Blvd
1/2 MILE

784 WEST
Dale City

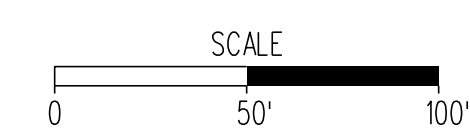
784 EAST
Community College
Ribbon Landing

95 to 123
Boudinot Dr
10 to 11

601C
12
EXPRESS LANES EXITS

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



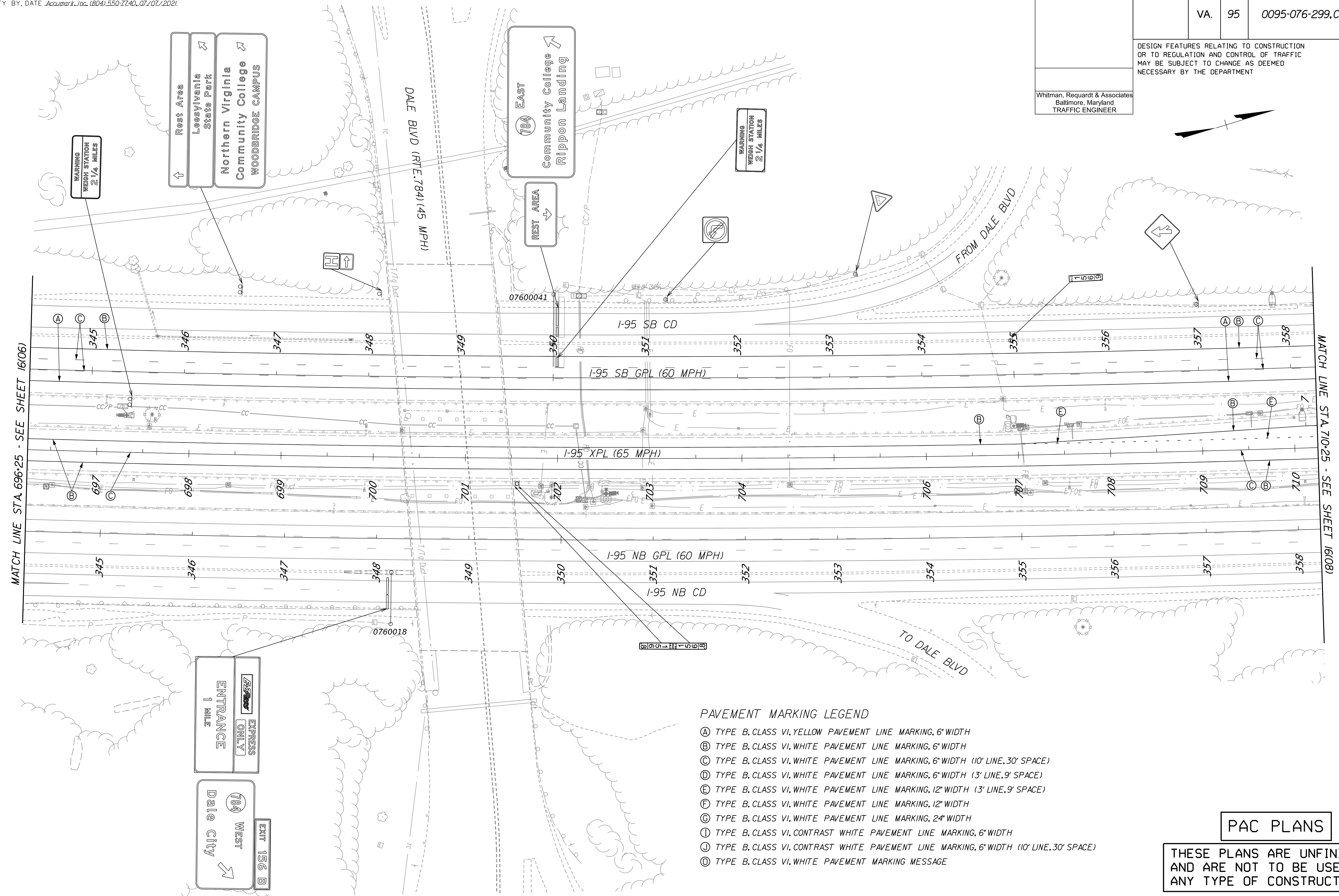
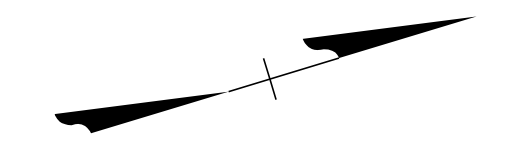
PROJECT	SHEET NO.
0095-076-299	1616

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	167

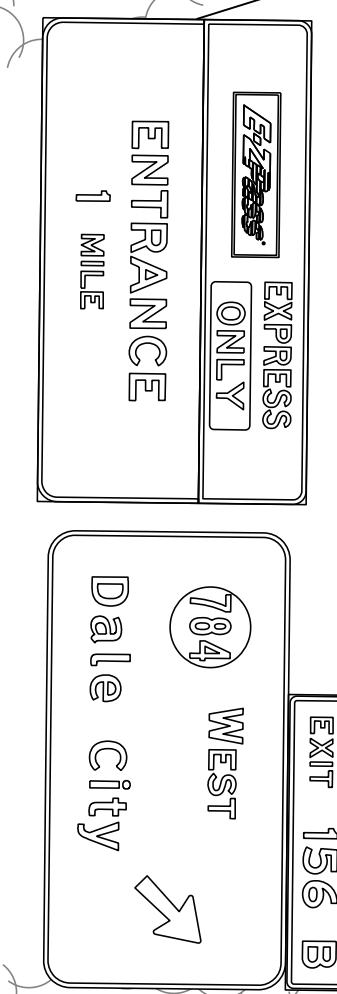
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



MATCH LINE STA. 696+25 - SEE SHEET 16(06)

MATCH LINE STA. 710+25 - SEE SHEET 16(08)

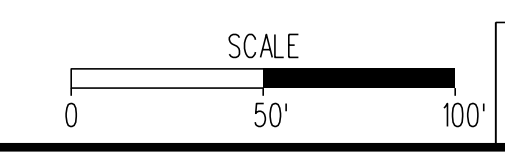


PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
- (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
- (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
- (G) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- (H) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (J) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

PAC PLANS

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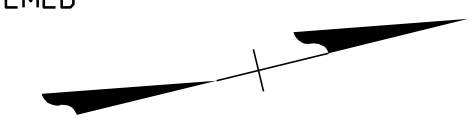
PROJECT	SHEET NO.
0095-076-299	167

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1618

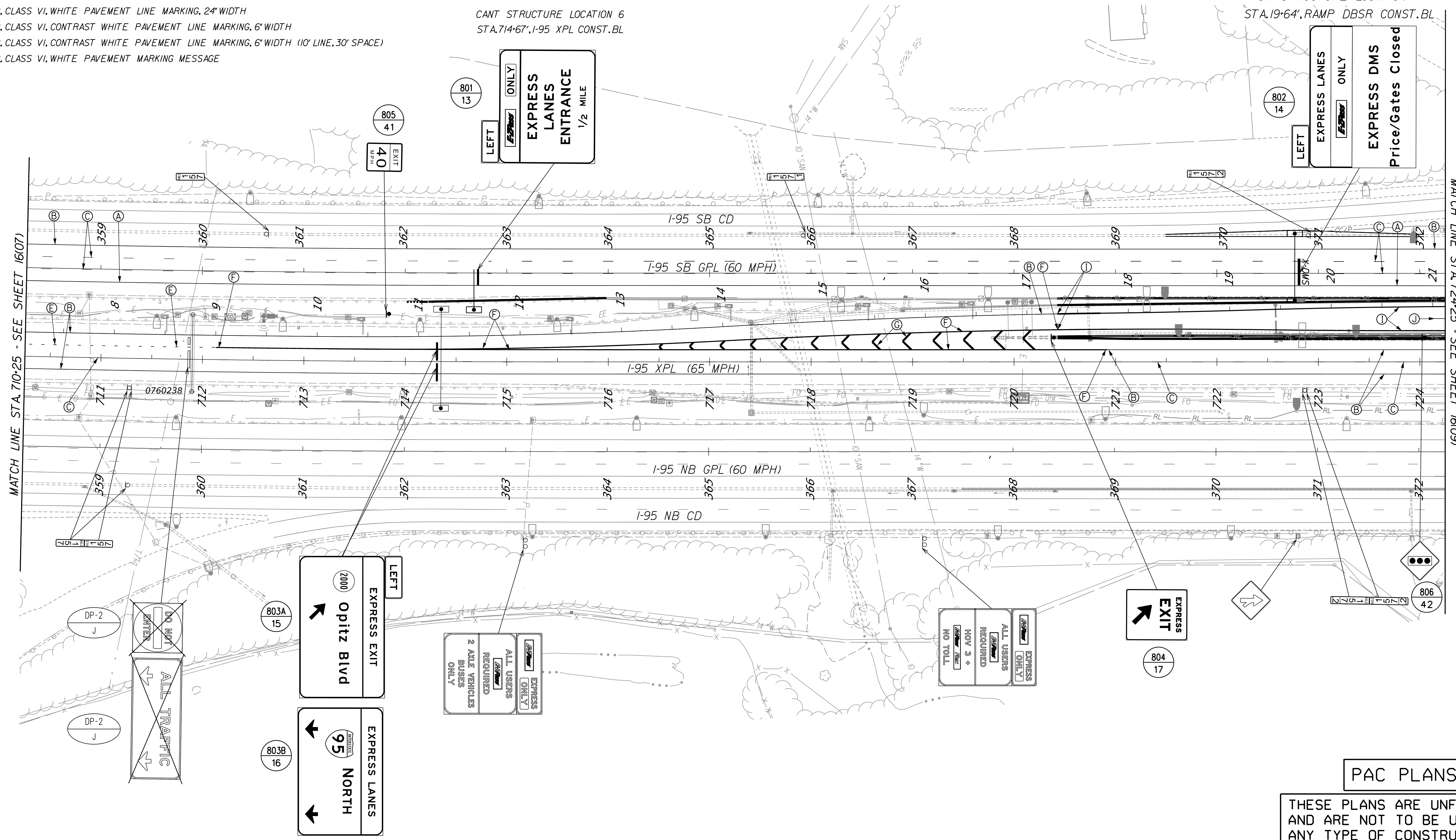
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
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- (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
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- (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (J) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (M) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE



OH STRUCTURE LOCATION 7
 STA. 19+64, RAMP DBSR CONST. BL

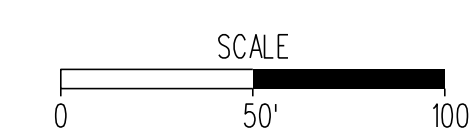
CANT STRUCTURE LOCATION 6
 STA. 714+67, I-95 XPL CONST. BL

MATCH LINE STA. 724+25 - SEE SHEET 161091

MATCH LINE STA. 710+25 - SEE SHEET 161071

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	1618

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140, 07/07/2021

NOTES:

1. SEE SHEETS NOS. 16(14) THROUGH 16(16) FOR SIGNING AND PAVEMENT MARKING DETAILS ALONG OPITZ BLVD.

2. CONNECTION BOLTS ANCHORED INTO THE CONCRETE BARRIER SHALL BE MECHANICALLY CUT FLUSH WITH THE SURFACE AND REMOVED BY MECHANICAL DRILLING TO A DEPTH OF ONE-HALF INCH BELOW THE SURFACE. THE HOLES SHALL BE PATCHED TO MATCH THE COLOR AND TEXTURE OF THE EXISTING CONCRETE SURFACE WITH HYDRAULIC CEMENT MORTAR OR GROUT CONFORMING TO SECTION 218 OF THE ROAD AND BRIDGE SPECIFICATIONS.

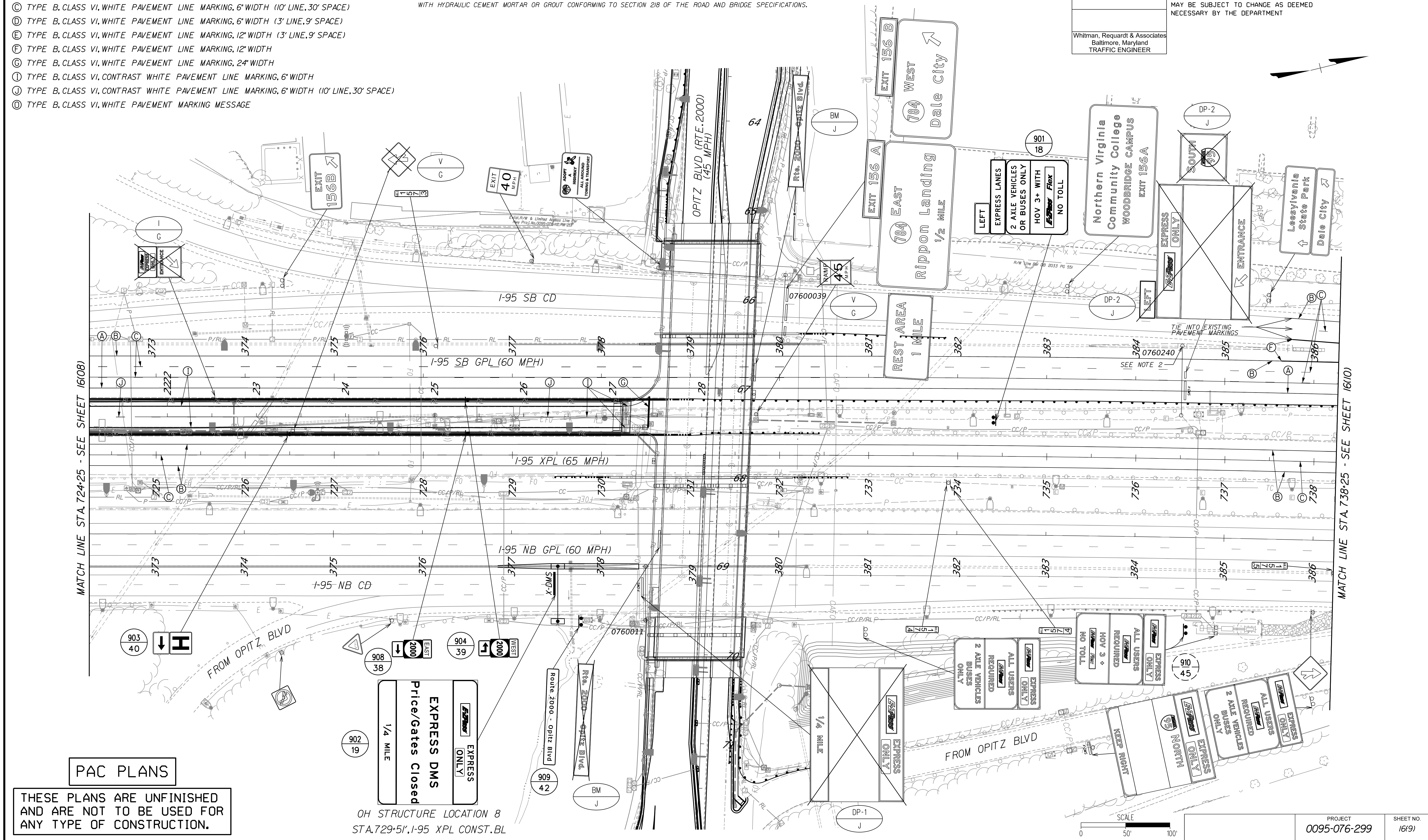
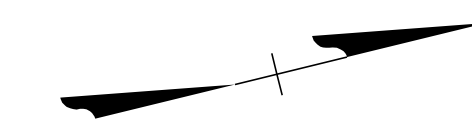
PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
- (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
- (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
- (G) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- (1) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (2) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (3) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



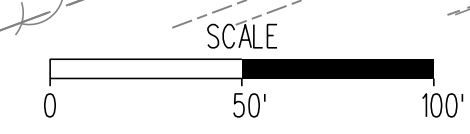
MATCH LINE STA. 724+25 - SEE SHEET 16(08)

MATCH LINE STA. 738+25 - SEE SHEET 16(10)

PAC PLANS

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OH STRUCTURE LOCATION 8
 STA. 729+51, I-95 XPL CONST. BL



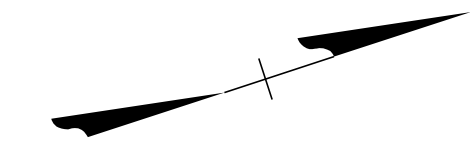
PROJECT	0095-076-299	SHEET NO.	16(9)
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PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	16(10)

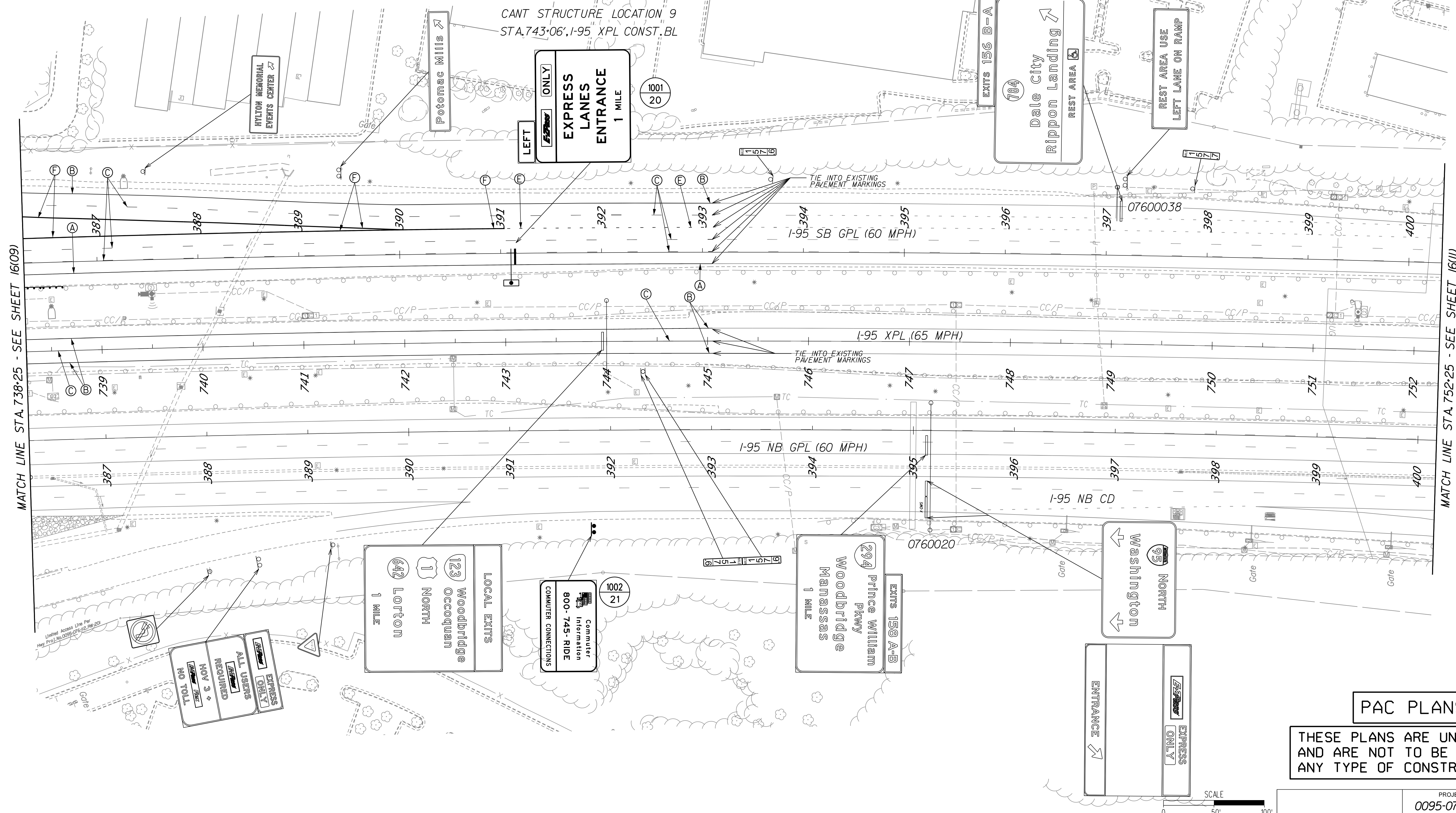
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS VI, YELLOW PAVEMENT LINE MARKING, 6" WIDTH
- (B) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (C) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (D) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 6" WIDTH (3' LINE, 9' SPACE)
- (E) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH (3' LINE, 9' SPACE)
- (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 12" WIDTH
- (G) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- (I) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH
- (J) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 6" WIDTH (10' LINE, 30' SPACE)
- (K) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE



MATCH LINE STA. 738-25 - SEE SHEET 16(09)

MATCH LINE STA. 752-25 - SEE SHEET 16(11)

ALL USERS
 EXPRESS ONLY
 HOV 3+ REQUIRED
 NO TOLL

LOCAL EXITS
 123 Woodbridge
 1 Occoquan
 642 Lorton
 1 MILE NORTH

Computer Information
 800-745-RIDE
 COMPUTER CONNECTIONS

EXITS 158 A-B
 294 Prince William Pkwy
 Woodbridge
 Manassas
 1 MILE

EXITS 156 B-A
 784 Dale City
 Rippon Landing
 REST AREA

EXITS 95 NORTH
 Washington
 ENTRANCE

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



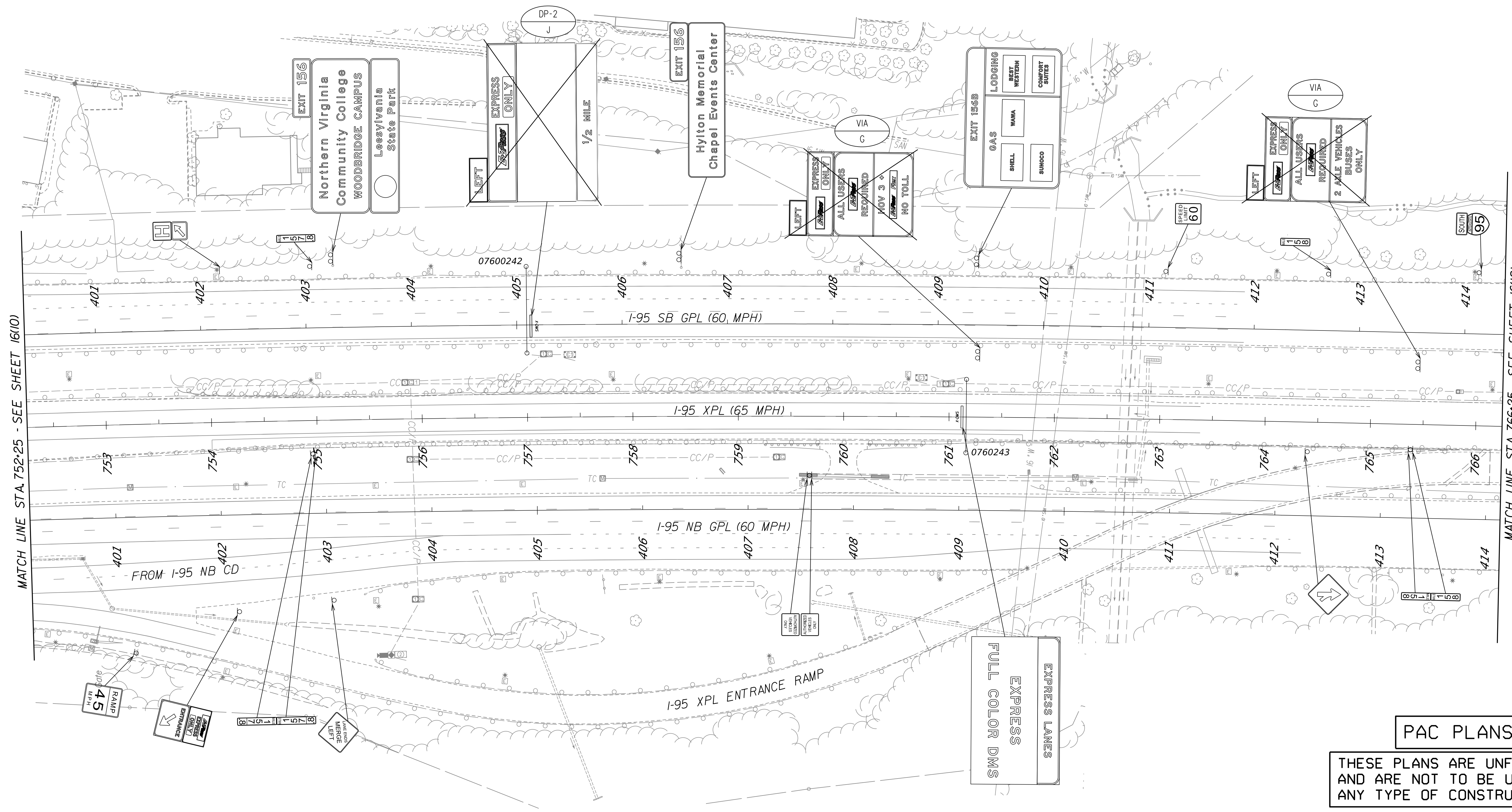
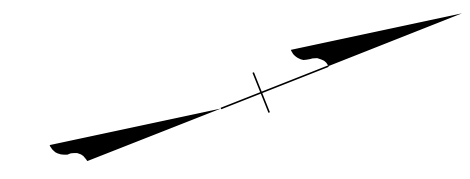
PROJECT	SHEET NO.
0095-076-299	16(10)

PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140 (07/07/2021)

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(11)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

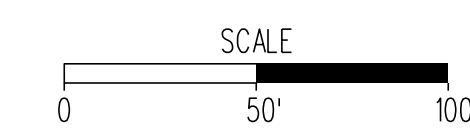


MATCH LINE STA. 752+25 - SEE SHEET 16(10)

MATCH LINE STA. 766+25 - SEE SHEET 16(12)

PAC PLANS

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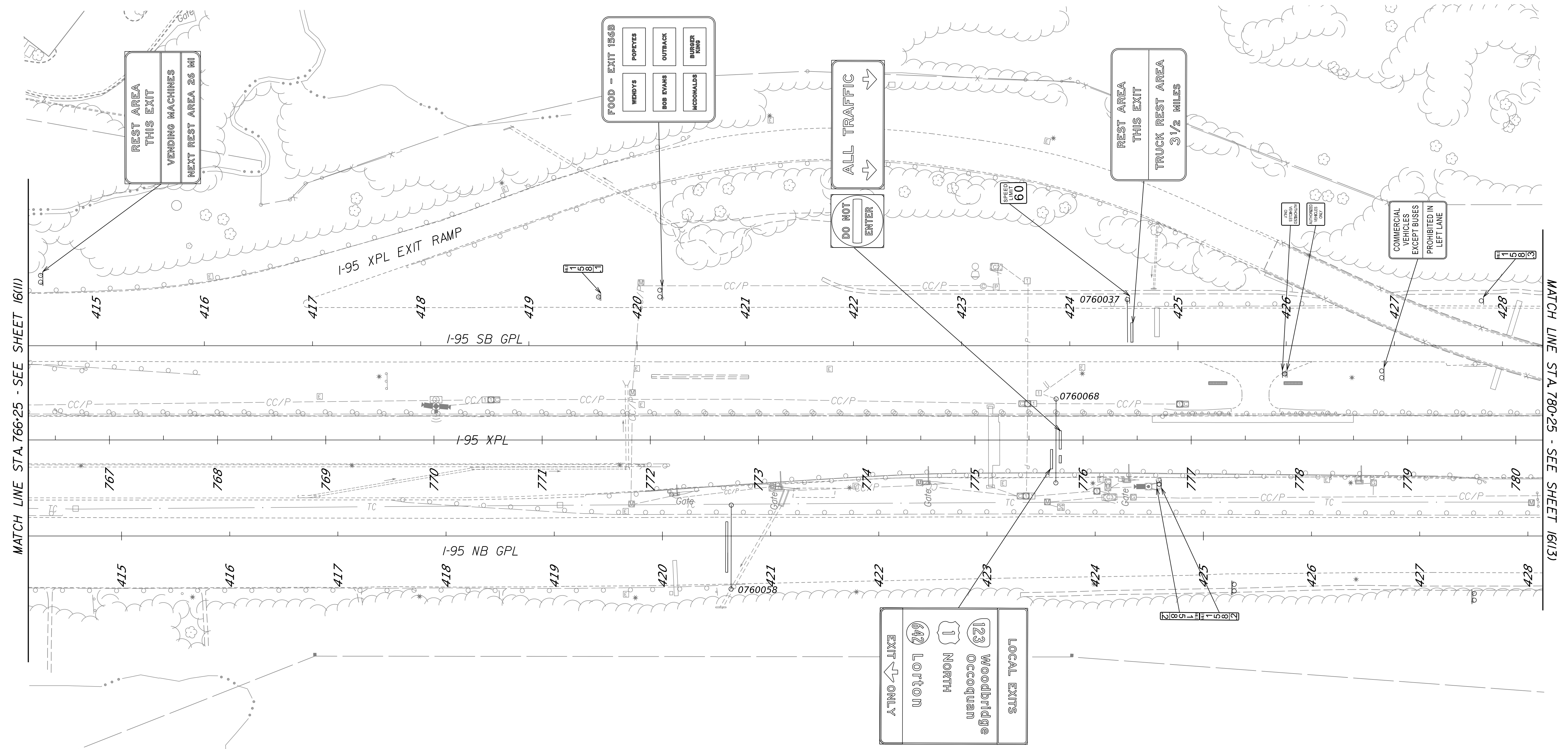
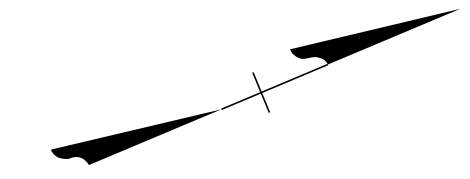
PROJECT	SHEET NO.
0095-076-299	16(11)

PROJECT MANAGER: *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
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 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

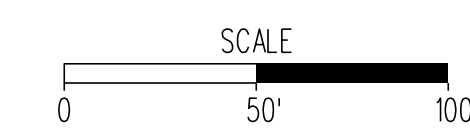
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	VA.	95		0095-076-299, C-501	16(12)

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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



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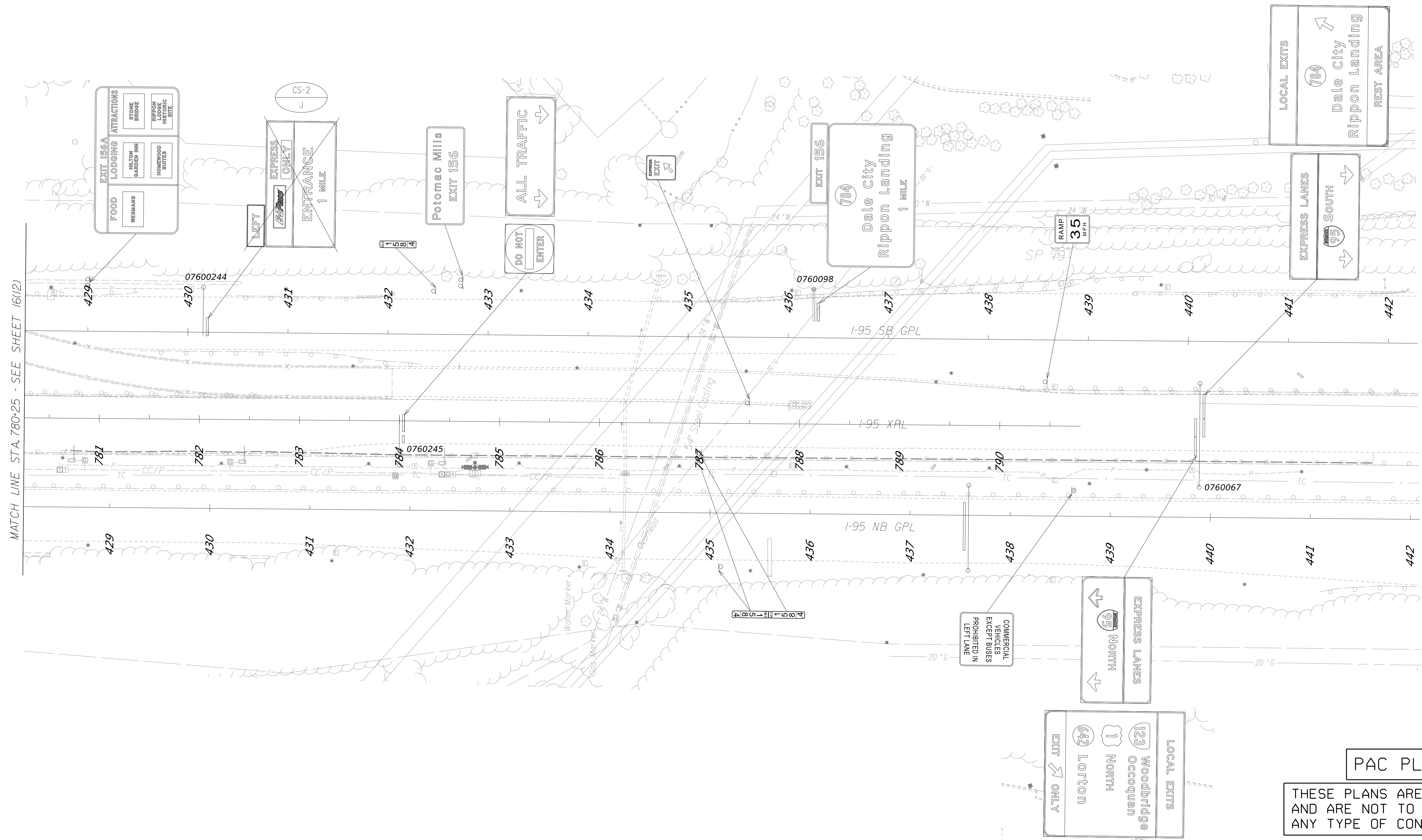
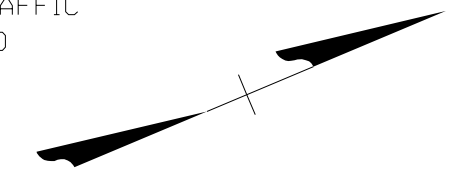
PROJECT	SHEET NO.
0095-076-299	16(12)

PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(13)

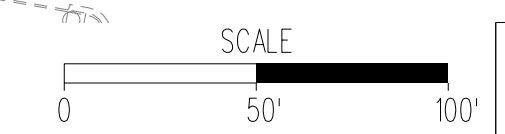
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

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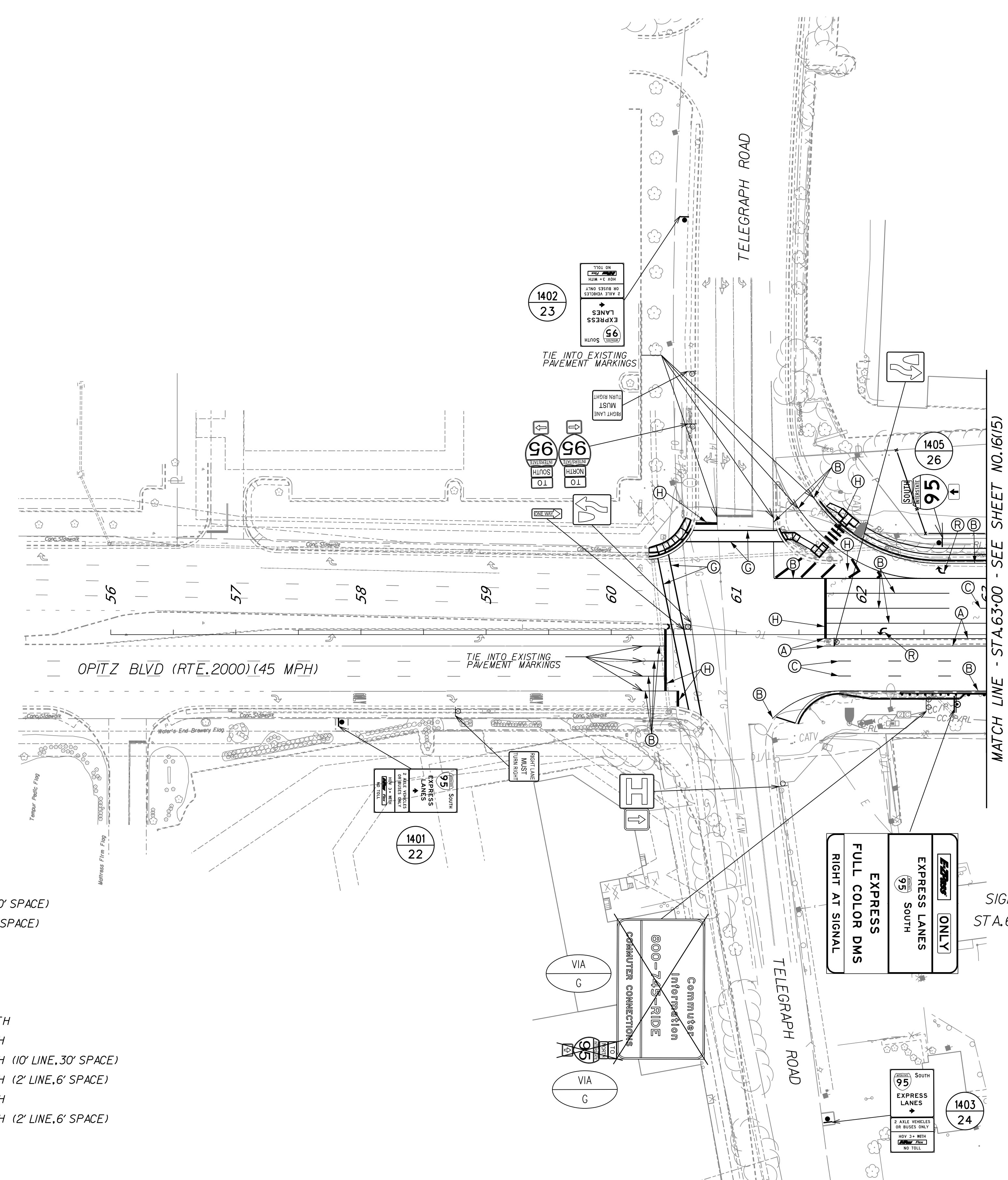
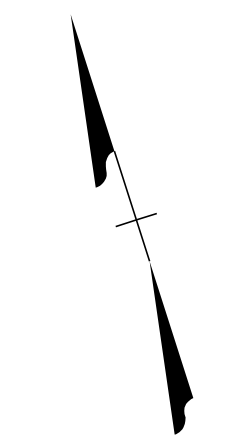
PROJECT	SHEET NO.
0095-076-299	16(13)

PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
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 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

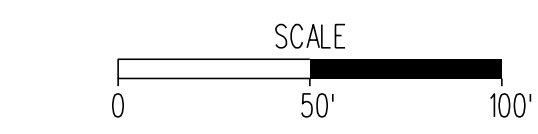
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	16(14)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



- PAVEMENT MARKING LEGEND**
- (A) TYPE B, CLASS I, YELLOW PAVEMENT LINE MARKING, 4" WIDTH
 - (B) TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH
 - (C) TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH (10' LINE, 30' SPACE)
 - (D) TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH (2' LINE, 6' SPACE)
 - (E) TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 8" WIDTH
 - (F) TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
 - (G) TYPE B, CLASS II, WHITE PAVEMENT LINE MARKING, 6" WIDTH
 - (H) TYPE B, CLASS II, WHITE PAVEMENT LINE MARKING, 24" WIDTH
 - (J) TYPE B, CLASS VI, CONTRAST YELLOW PAVEMENT LINE MARKING, 4" WIDTH
 - (K) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (10' LINE, 30' SPACE)
 - (L) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (2' LINE, 6' SPACE)
 - (M) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH
 - (N) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH (2' LINE, 6' SPACE)
 - (O) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE
 - (P) TYPE B, CLASS VI, WHITE PAVEMENT MARKING SYMBOL
 - (Q) TYPE B, CLASS II, WHITE PAVEMENT MARKING MESSAGE
 - (R) TYPE B, CLASS II, WHITE PAVEMENT MARKING SYMBOL



PAC PLANS
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PROJECT 0095-076-299	SHEET NO. 16(14)
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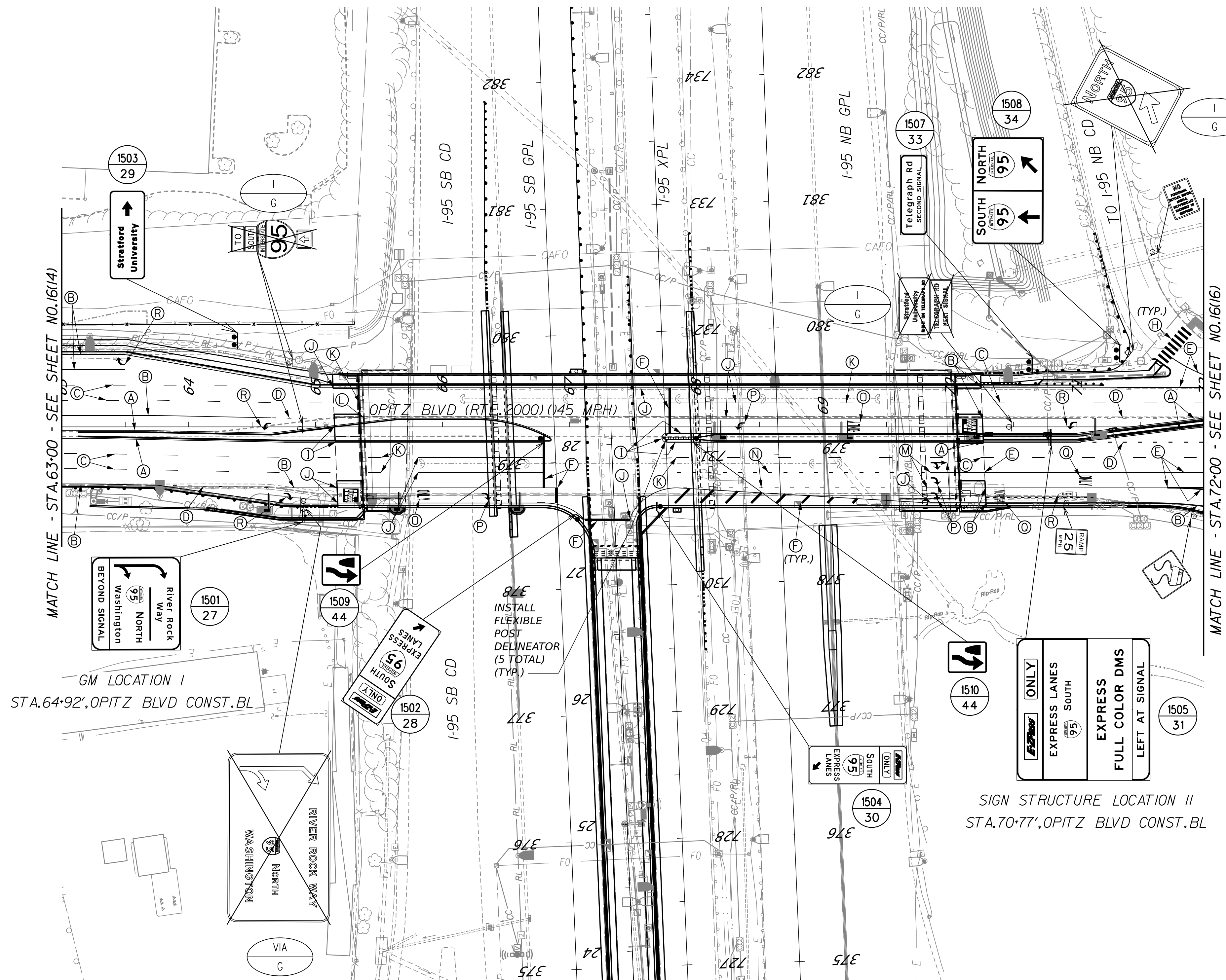
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140 (07/07/2021)

NOTES:
 1. SEE SHEET NO.16(09) FOR SIGNING ALONG I-95 LANES.

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	16(15)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



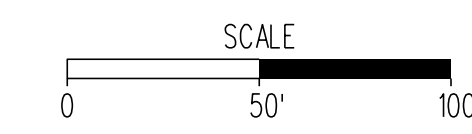
PAVEMENT MARKING LEGEND

- Ⓐ TYPE B, CLASS I, YELLOW PAVEMENT LINE MARKING, 4" WIDTH
- Ⓑ TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH
- Ⓒ TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH (10' LINE, 30' SPACE)
- Ⓓ TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH (2' LINE, 6' SPACE)
- Ⓔ TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 8" WIDTH
- Ⓕ TYPE B, CLASS VI, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- Ⓖ TYPE B, CLASS II, WHITE PAVEMENT LINE MARKING, 6" WIDTH
- Ⓗ TYPE B, CLASS II, WHITE PAVEMENT LINE MARKING, 24" WIDTH
- Ⓛ TYPE B, CLASS VI, CONTRAST YELLOW PAVEMENT LINE MARKING, 4" WIDTH
- Ⓜ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH
- Ⓨ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (10' LINE, 30' SPACE)
- Ⓩ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (2' LINE, 6' SPACE)
- ⓐ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH
- ⓑ TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH (2' LINE, 6' SPACE)
- Ⓒ TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE
- Ⓖ TYPE B, CLASS VI, WHITE PAVEMENT MARKING SYMBOL
- Ⓞ TYPE B, CLASS II, WHITE PAVEMENT MARKING MESSAGE
- Ⓡ TYPE B, CLASS II, WHITE PAVEMENT MARKING SYMBOL

SIGN STRUCTURE LOCATION II
 STA. 70+77', OPITZ BLVD CONST. BL

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	16(15)

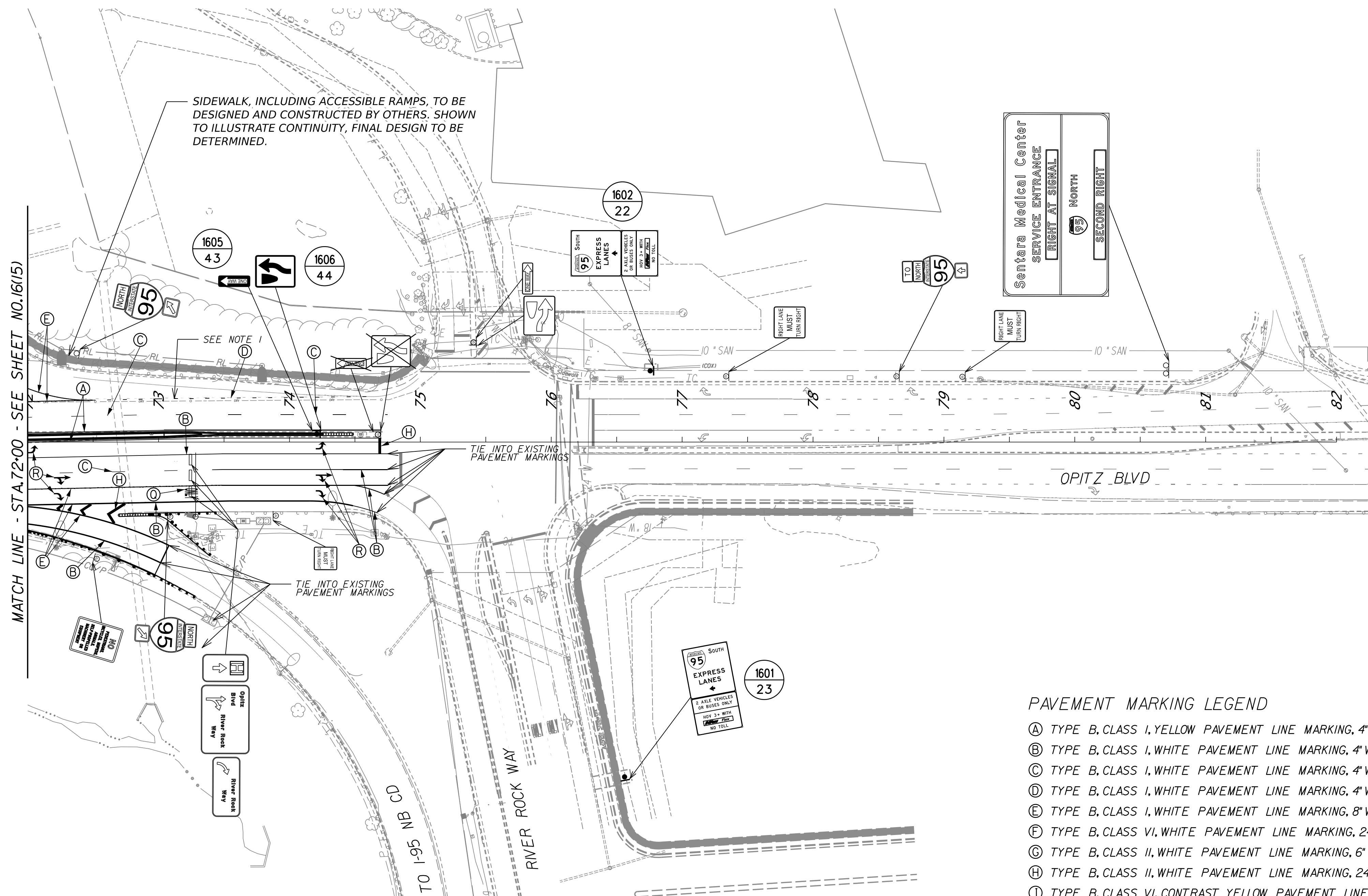
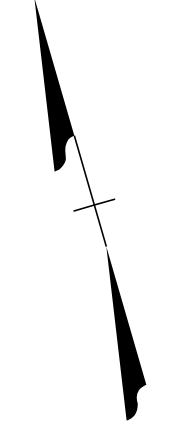
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 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

NOTES:
 1. CONTRACTOR SHALL COORDINATE THE INSTALLATION OF PAVEMENT MARKINGS FOR THE I-95 NORTHBOUND ON RAMP WITH PRINCE WILLIAM COUNTY'S NEABSCO-POTOMAC GARAGE PROJECT.

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	16(16)

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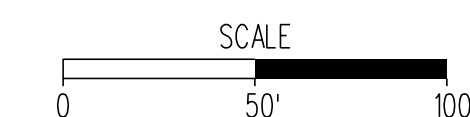


PAVEMENT MARKING LEGEND

- (A) TYPE B, CLASS I, YELLOW PAVEMENT LINE MARKING, 4" WIDTH
- (B) TYPE B, CLASS I, WHITE PAVEMENT LINE MARKING, 4" WIDTH
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- (K) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (10' LINE, 30' SPACE)
- (L) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 4" WIDTH (2' LINE, 6' SPACE)
- (M) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH
- (N) TYPE B, CLASS VI, CONTRAST WHITE PAVEMENT LINE MARKING, 8" WIDTH (2' LINE, 6' SPACE)
- (O) TYPE B, CLASS VI, WHITE PAVEMENT MARKING MESSAGE
- (P) TYPE B, CLASS VI, WHITE PAVEMENT MARKING SYMBOL
- (Q) TYPE B, CLASS II, WHITE PAVEMENT MARKING MESSAGE
- (R) TYPE B, CLASS II, WHITE PAVEMENT MARKING SYMBOL

PAC PLANS

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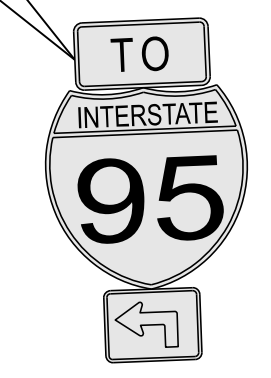
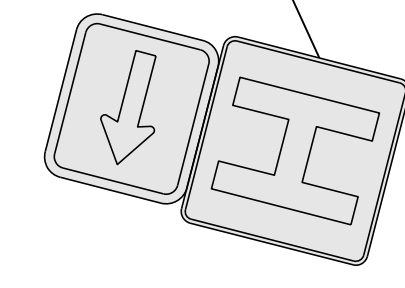
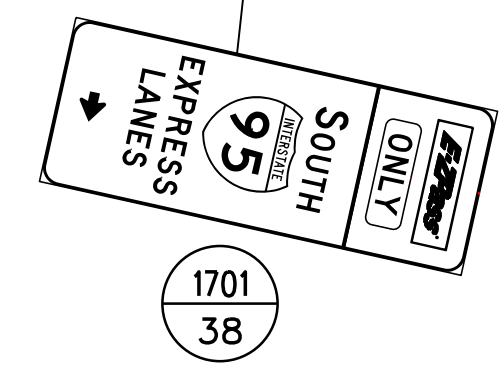
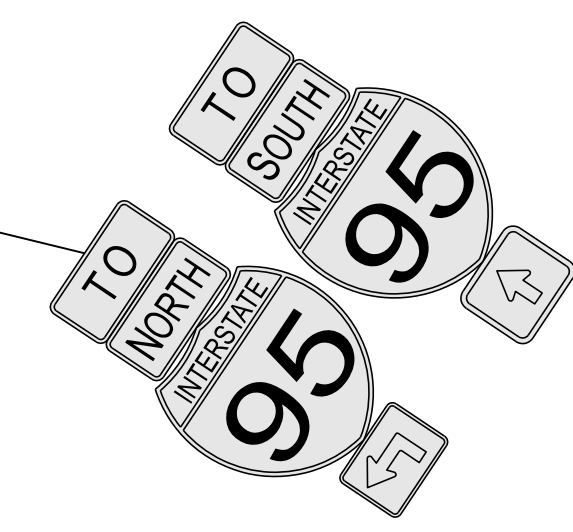
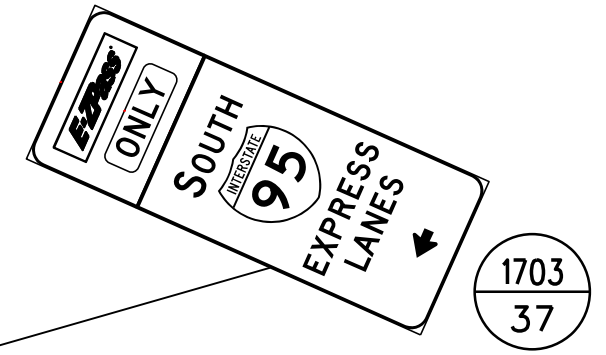
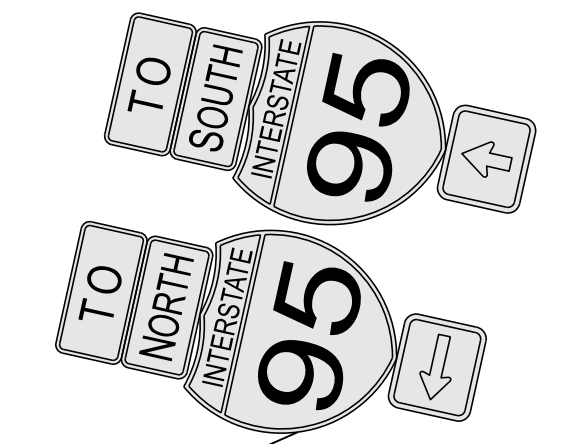
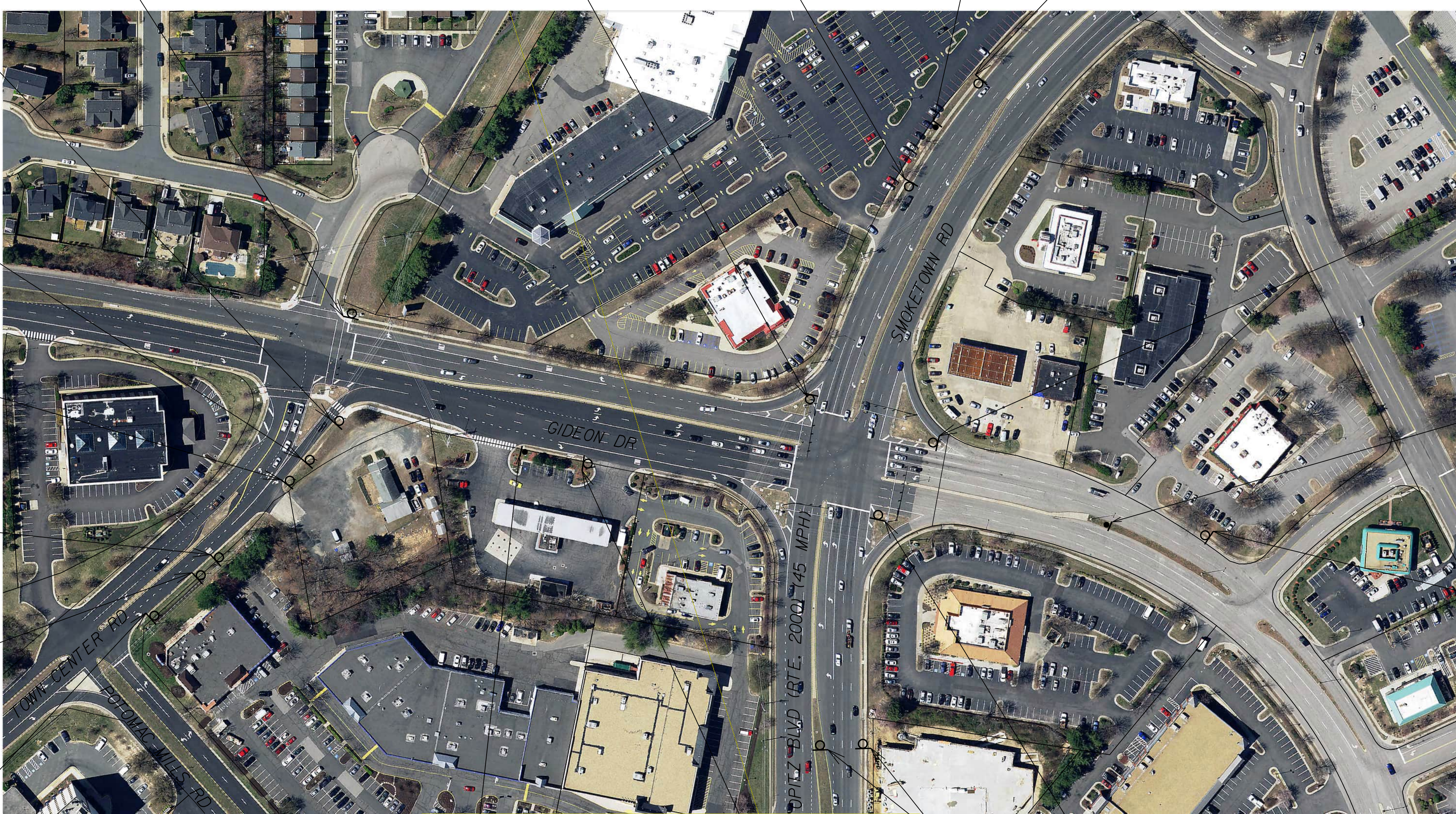
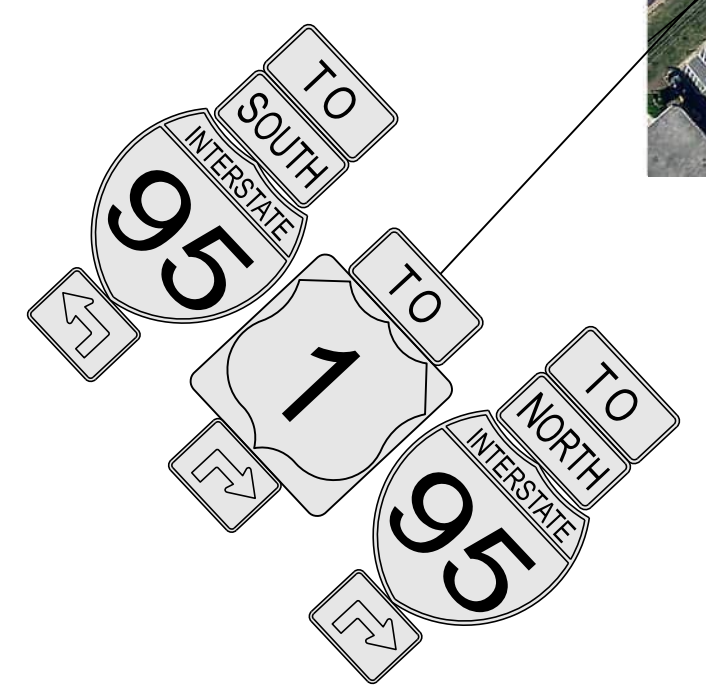
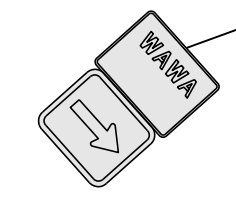
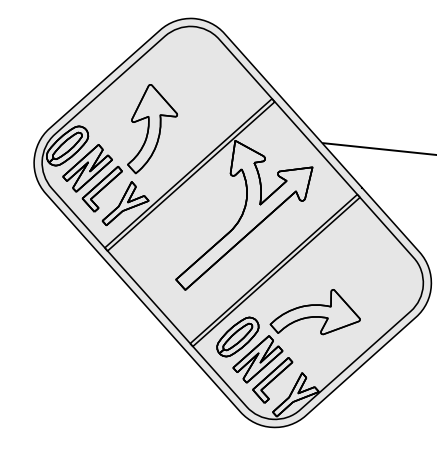
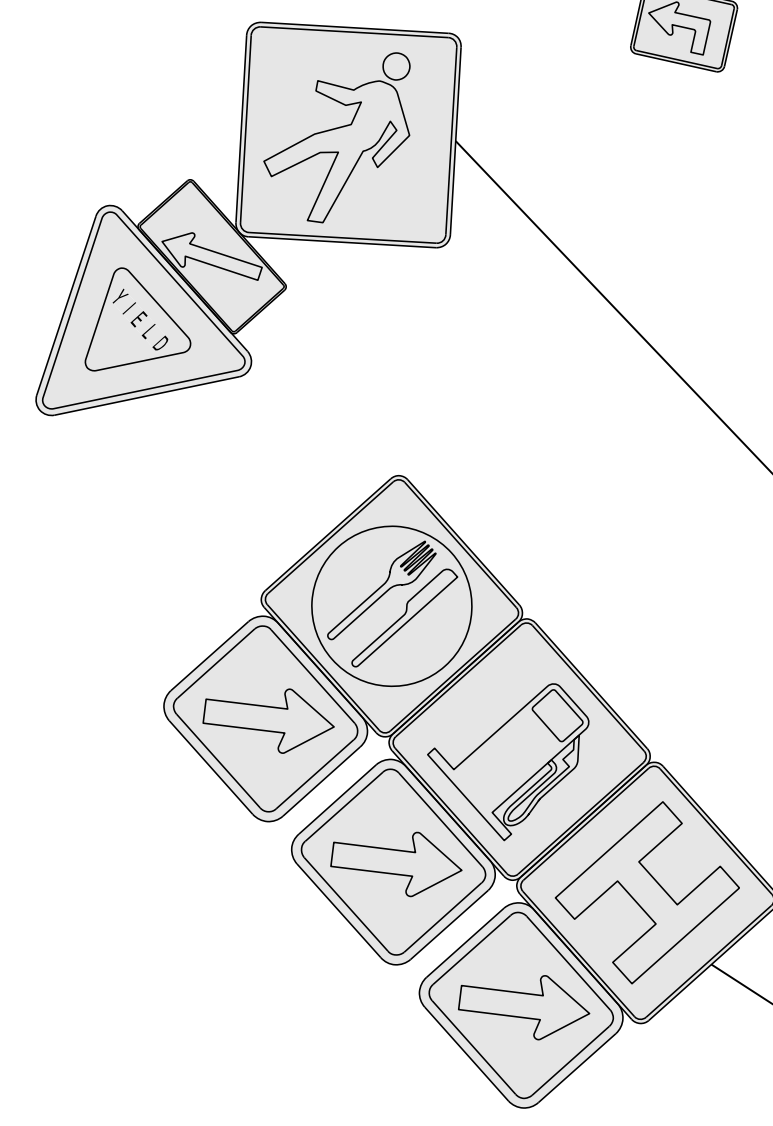
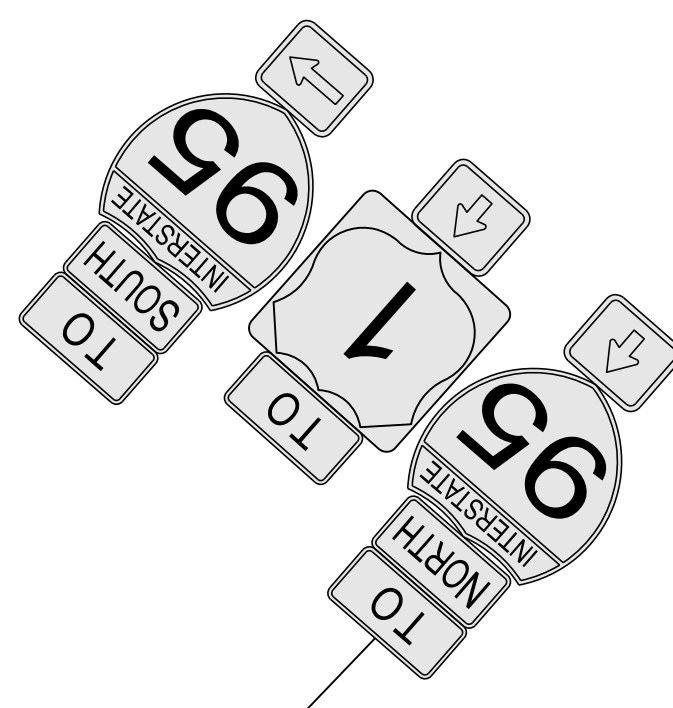
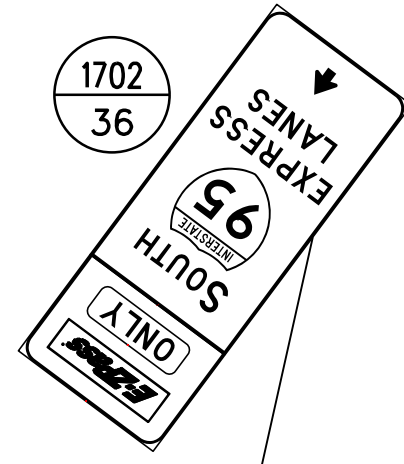
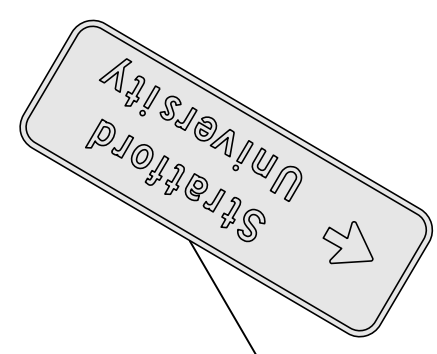
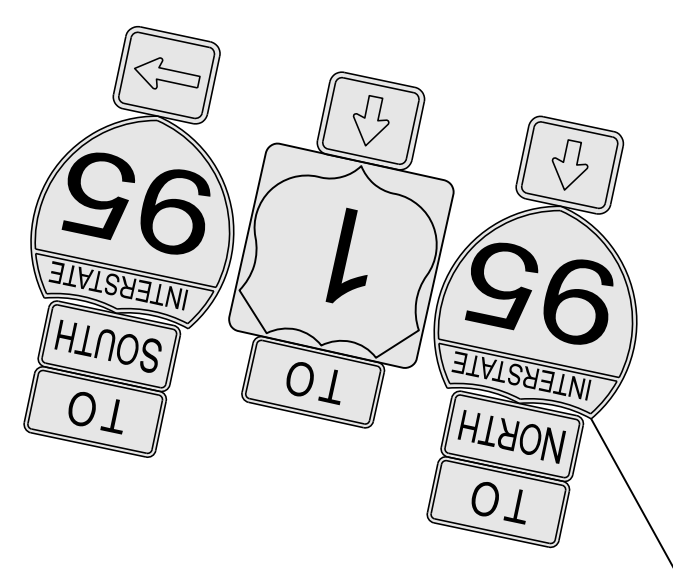
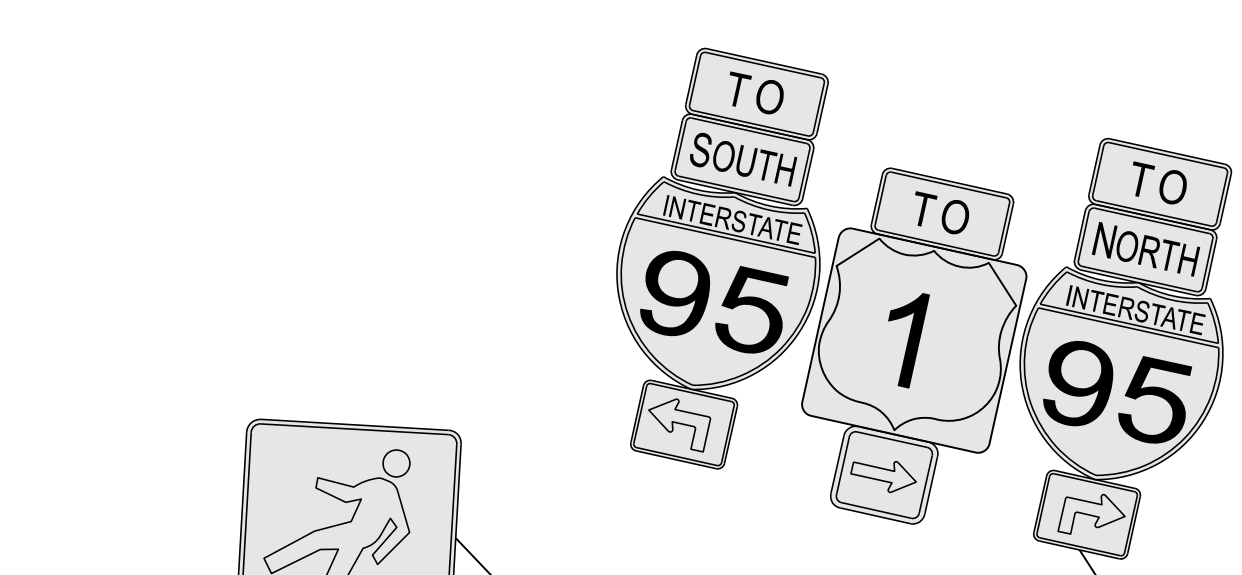
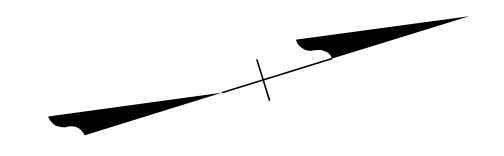
PROJECT	SHEET NO.
0095-076-299	16(16)

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	1617

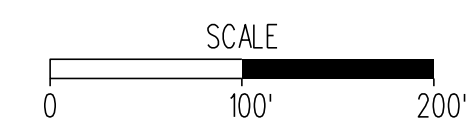
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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

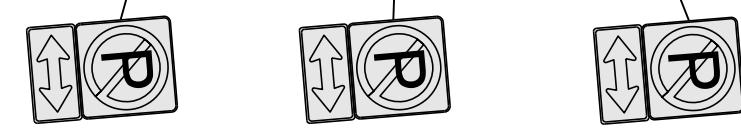
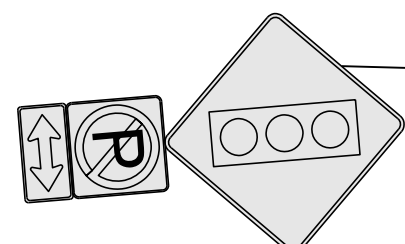
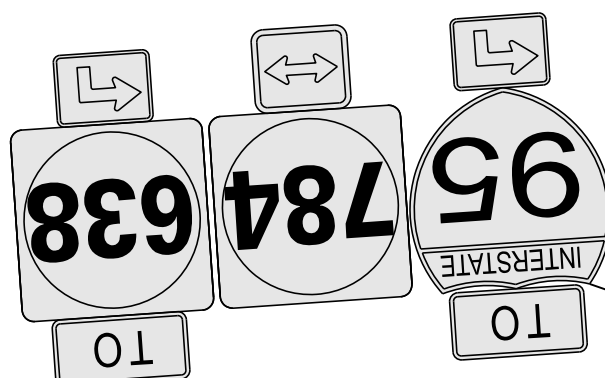
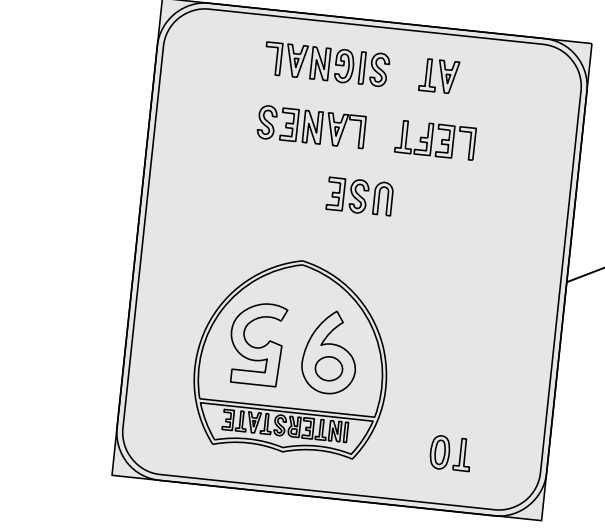
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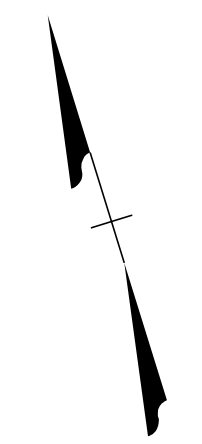
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	ROUTE	PROJECT		
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DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				

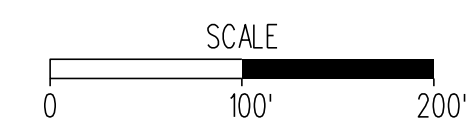


MATCH LINE - SEE SHEET NO. 16(19)



PAC PLANS

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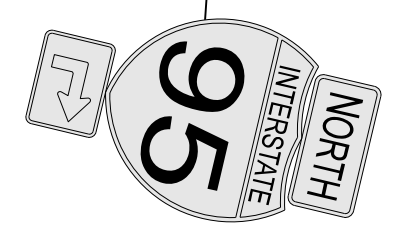
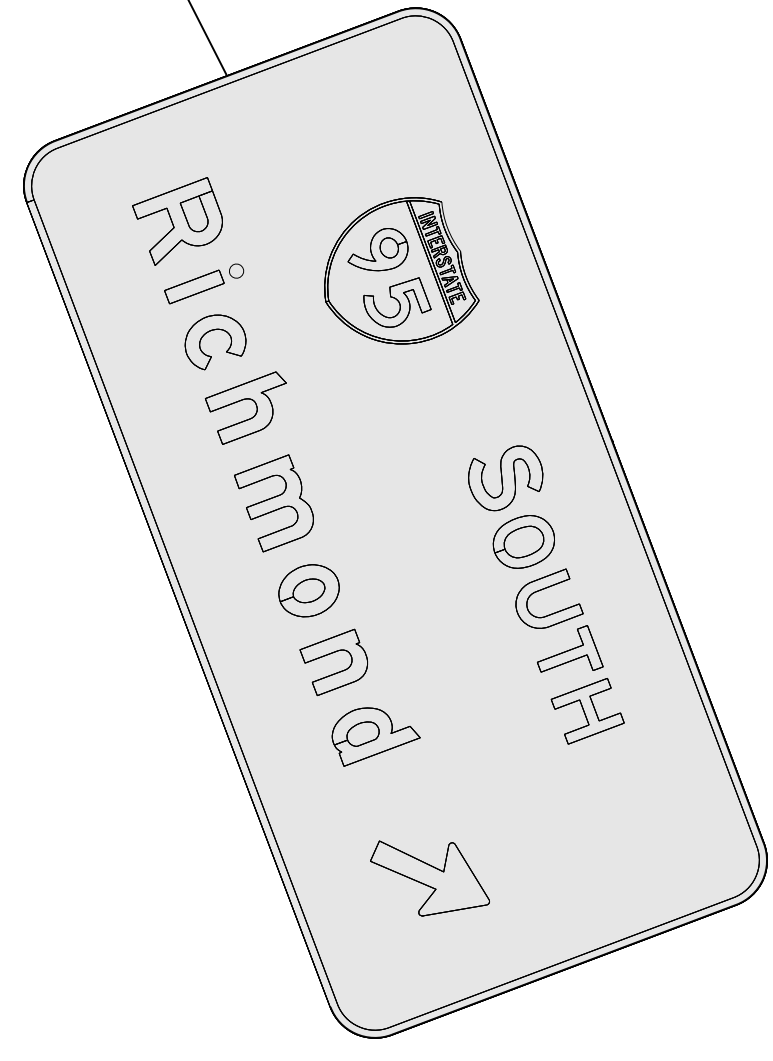
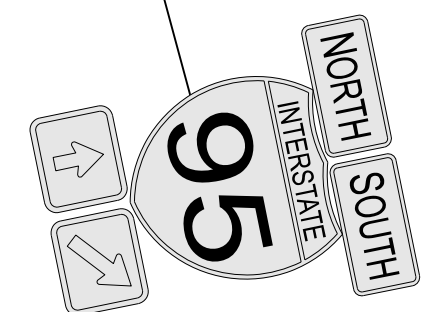
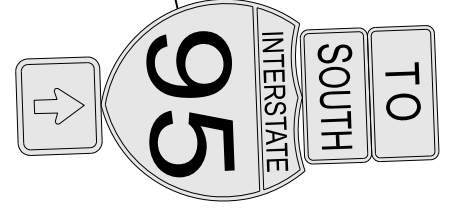
PROJECT	SHEET NO.
0095-076-299	16(18)

PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Reardon & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	16(19)

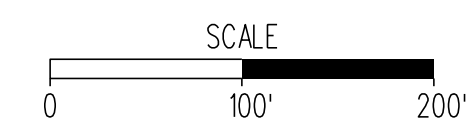
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Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

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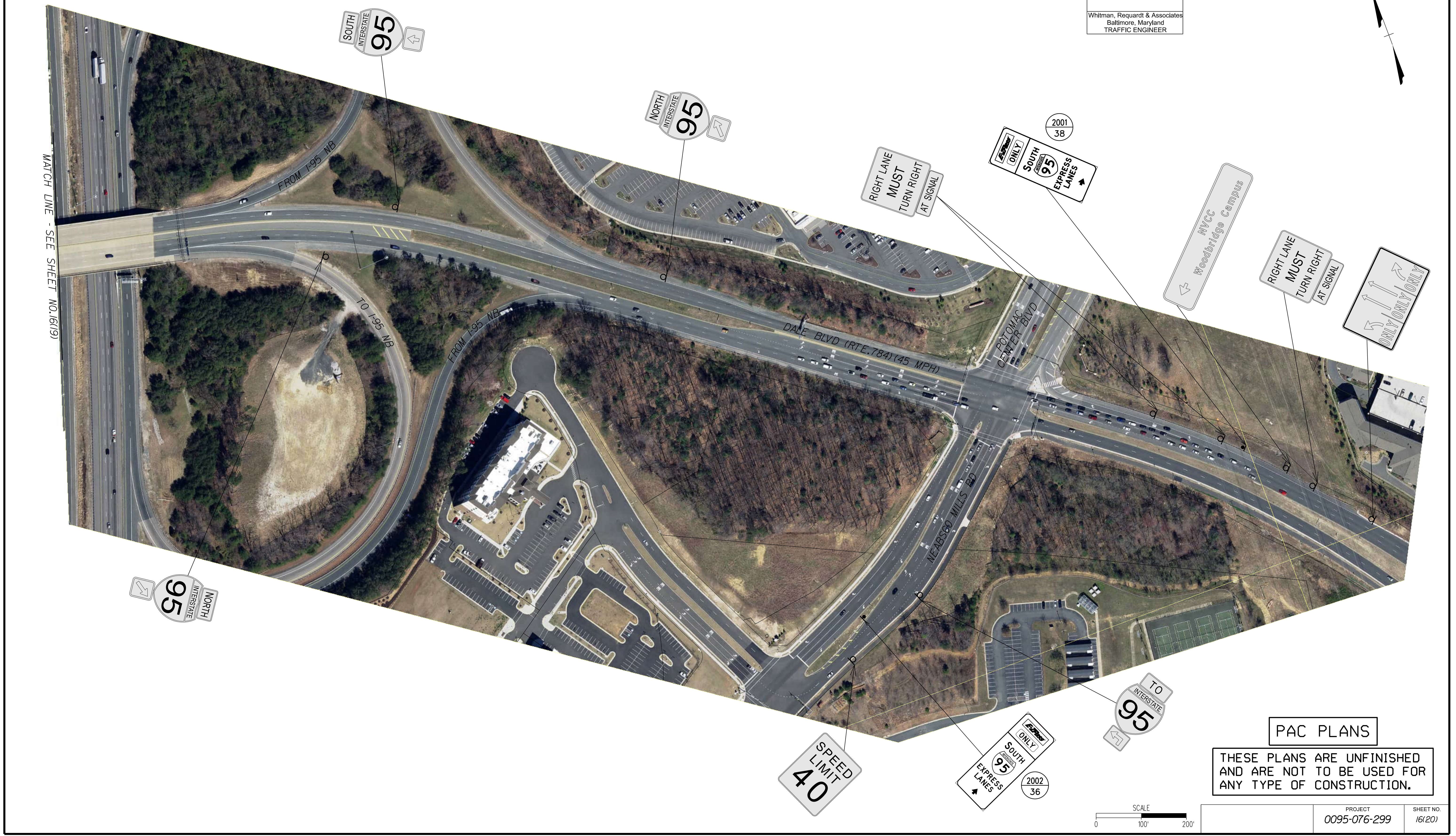
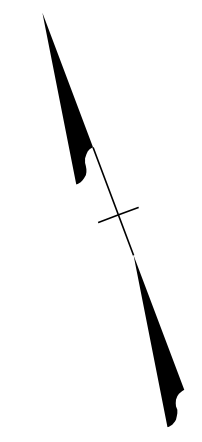
PROJECT	SHEET NO.
0095-076-299	16(19)

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 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

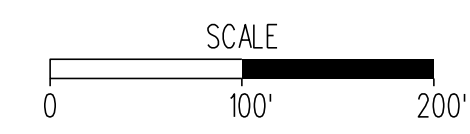
REVISED	STATE	STATE	SHEET NO.
	ROUTE	PROJECT	
	VA.	0095-076-299, C-501	16(20)

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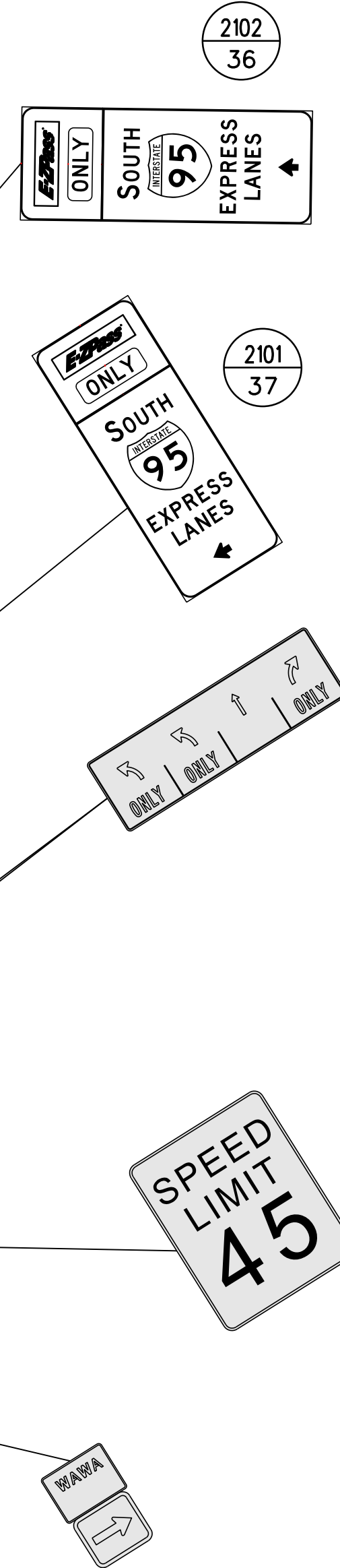
PAC PLANS
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PROJECT	SHEET NO.
0095-076-299	16(20)

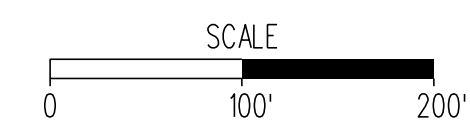
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	
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Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER				



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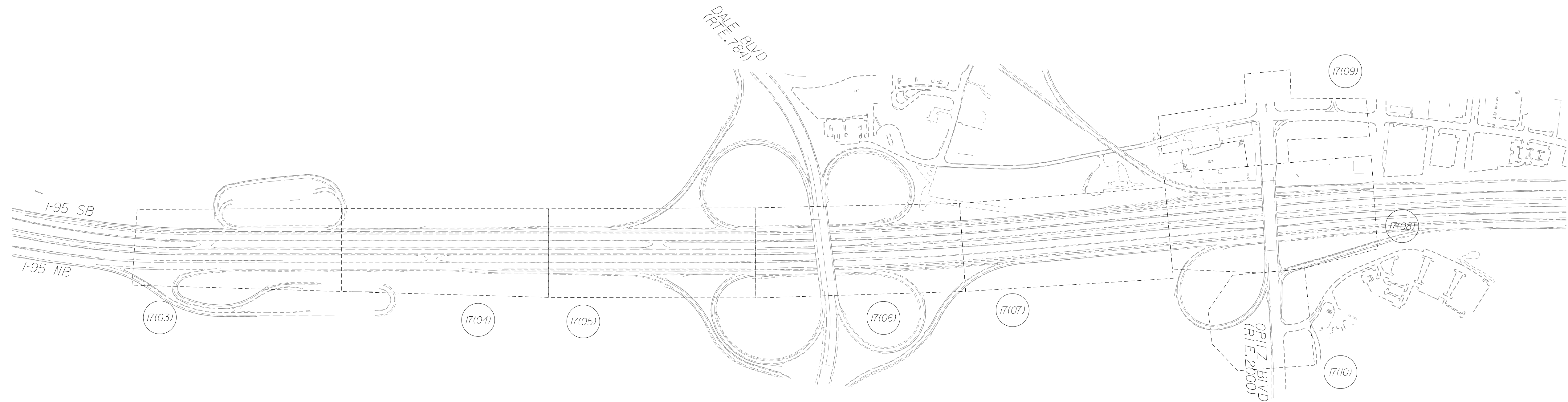
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		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	17(1)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

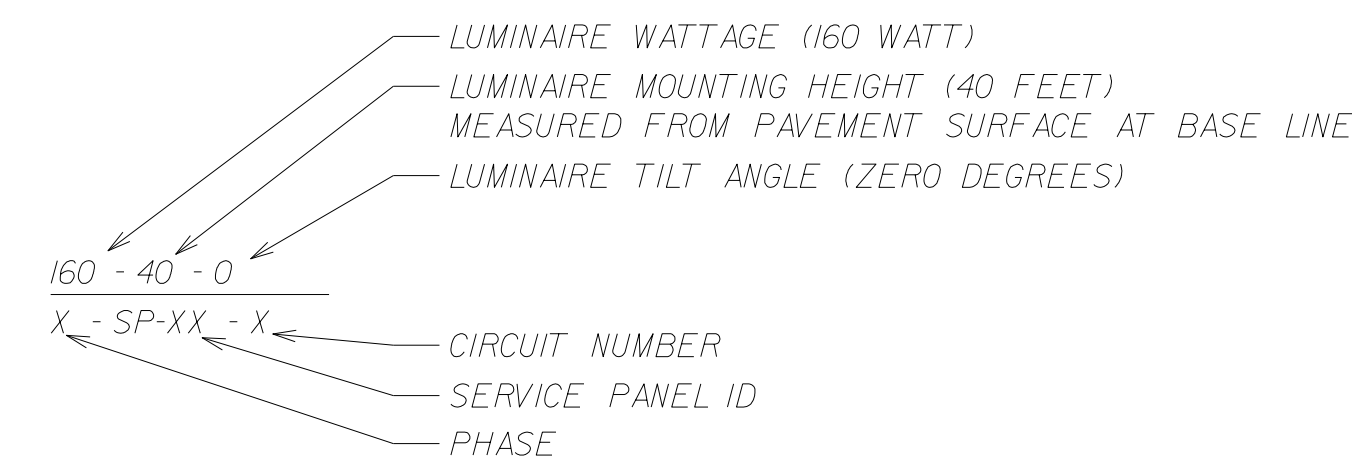
LIGHTING KEY PLAN



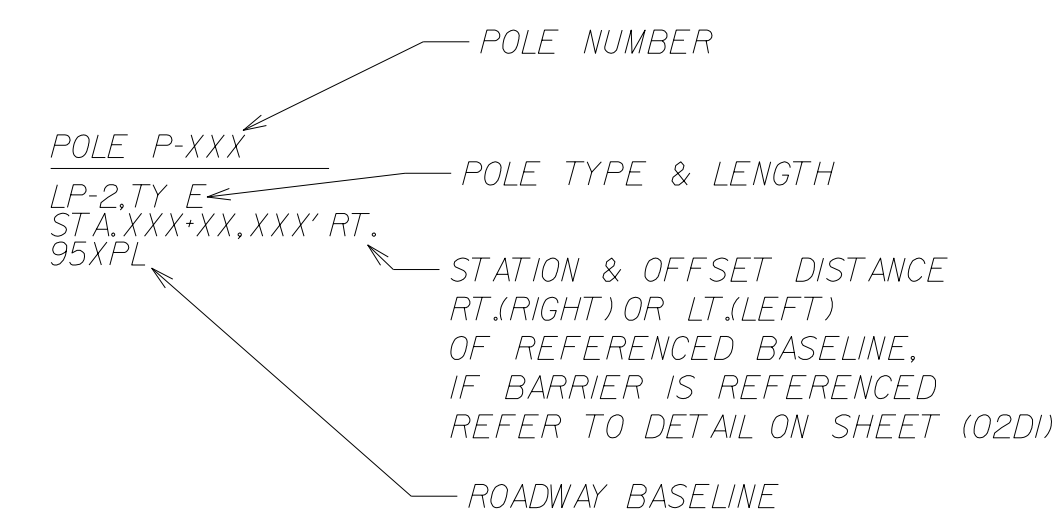
LIGHTING LEGEND

EXISTING	PROPOSED	DESCRIPTION	ACTIONS
		STD. LP-2 CONVENTIONAL LIGHT POLE AND LUMINAIRE ON FOUNDATION	EXISTING LIGHT POLE AND LUMINAIRE TO BE REMOVED
		STD. LP-2 CONVENTIONAL LIGHT POLE AND LUMINAIRE ON BARRIER/STRUCTURE MOUNTED SUPPORT	EXISTING LUMINAIRE TO BE UPGRADED TO LED
		SIGNAL POLE MOUNTED LED LUMINAIRE AND ARM	EXISTING CONDUIT WITH CABLES TO BE REMOVED AND CONDUIT TO BE ABANDONED
		STD. LP-1 CONVENTIONAL LIGHT POLE ON FOUNDATION WITH LUMINAIRE	EXISTING LEASED UTILITY POLE MOUNTED LUMINAIRE, ARM, AND UTILITY POLE TO BE REMOVED BY NOVEC
		UTILITY POLE MOUNTED LEASED LUMINAIRE AND ARM	EXISTING JUNCTION BOX TO BE REMOVED
		HIGH MAST POLE WITH LUMINAIRES	
		UNDERPASS LUMINAIRE	
		ELECTRICAL JUNCTION CHAMBER IN STRUCTURE	
		ELECTRICAL JUNCTION BOX (JB-R2 UNLESS OTHERWISE NOTED)	
		ELECTRICAL JUNCTION BOX MOUNTED ON STRUCTURE	
		CONTROL CENTER (SERVICE PANEL)	
		METERED ELECTRICAL SERVICE	
		ROADWAY LIGHTING CONDUIT	
		ROADWAY LIGHTING/ITS CONDUIT	
		STRUCTURE MOUNTED LIGHTING CONDUIT	
		OVERHEAD SIGN STRUCTURE	

LUMINAIRE CALLOUT INFORMATION



POLE CALLOUT INFORMATION



SHEET INDEX

- 17(1)
- 17(2)
- 17(2A)
- 17(2B1) - 17(2B3)
- 17(2C1) - 17(2C3)
- 17(2C4) - 17(2C6)
- 17(2D1)
- 17(2D2)
- 17(3) - 17(10)

- LIGHTING KEY PLAN, SHEET INDEX, LEGEND, CALLOUT INFORMATION
- LIGHTING GENERAL NOTES
- LUMINAIRE DETAILS
- PHOTOMETRIC CALCULATIONS
- ONE LINE DIAGRAM & VOLTAGE DROP CALCULATIONS
- PANELBOARD SCHEDULES
- FOUNDATION IN BARRIER DETAIL
- CONDUIT & JUNCTION CHAMBER IN BARRIER DETAIL
- PLAN SHEETS

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	17(1)

PROJECT MANAGER: Bimol Shab, P.E. (703) 259-2362 (NOVA District) -----
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REVISED	STATE		STATE		SHEET NO.
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	VA.	95	0095-076-299, C-501		17(2)
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Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER					

LIGHTING GENERAL NOTES

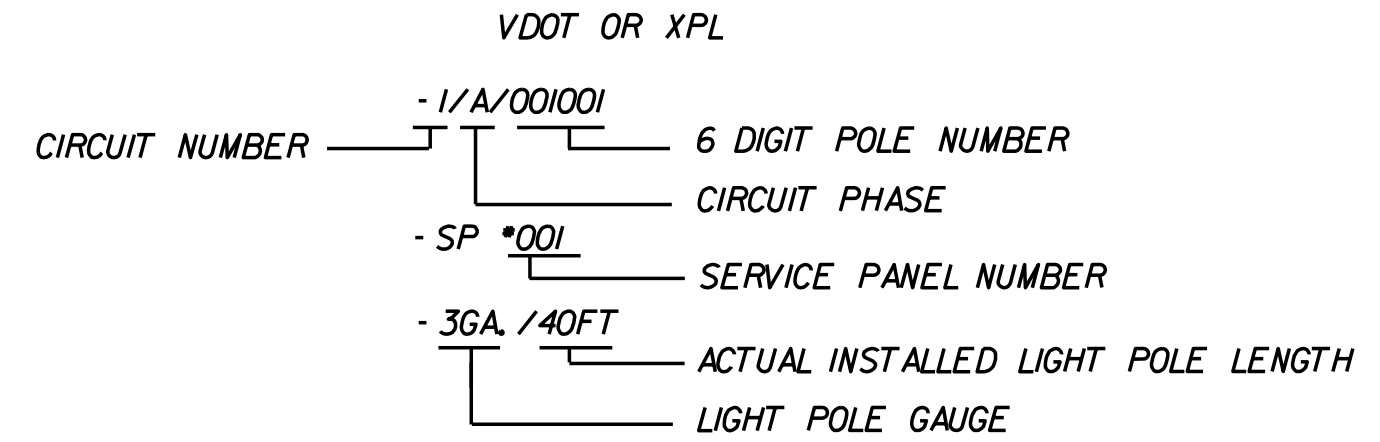
GENERAL NOTES:

- THE EXISTING UNDERGROUND UTILITIES AND STORM SEWERS ARE NOT SHOWN IN THEIR EXACT LOCATION AND MAY NOT BE COMPLETE. ALL UTILITIES SHALL BE MARKED PRIOR TO INITIATION OF CONSTRUCTION. ARRANGE FOR MISS UTILITY TO MARK UNDERGROUND UTILITIES. IN ADDITION, CONTACT THE 95 EXPRESS LANES PROJECT ENGINEER TO ARRANGE FOR VDOT TO MARK VDOT'S CABLES AND CONDUITS, PROVIDING TWO WORKING DAYS' NOTICE.

FOR VDOT UTILITY MARKINGS CONTACT:
LARRY POSEY
OFFICE: (703) 334-0878
MOBILE: (804) 931-8795
LARRY.POSEY@VDOT.VIRGINIA.GOV

INFORMATION NEEDED TO REQUEST VDOT UTILITY MARKINGS WILL BE PROVIDED BY LARRY.
- CONDUIT SHALL BE DIRECTIONALLY BORED WHERE THE PLANS SHOW BORED CONDUIT.
- CONDUIT SHOWN AS TRENCHED MAY BE BORED ONLY WITH THE APPROVAL OF THE PROJECT ENGINEER.
- CONDUIT RUNS SHOWN ON THE PLANS ARE DIAGRAMMATIC. THE CONDUIT SHALL BE STAKED OUT USING ELECTRONIC COORDINATE DATA TO BE PROVIDED BY 95 EXPRESS LANES. FINAL LAYOUT OF CONDUIT AND JUNCTION BOXES SHALL BE ADJUSTED IN THE FIELD AS NEEDED TO CONFORM TO FIELD CONDITIONS AND UTILITIES, AS MARKED.
- CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL EXISTING MANHOLES AND JUNCTION BOXES BEFORE COMMENCING ANY WORK WITH THEM. IN CASE THE JUNCTION BOXES COULD NOT BE VERIFIED OR ARE NOT IN PLACE AS SHOWN IN PLANS, CONTACT THE 95 EXPRESS LANES ENGINEER FOR FURTHER ACTION.
- TRENCH EXCAVATION IN EARTH AREAS SHALL CONFORM TO STANDARD DRAWING ECH UNLESS OTHERWISE NOTED. THE REQUIRED DEPTH OF THE TRENCH IS MEASURED FROM THE LOW POINT OF THE SLOPE ABOVE.
- USE EXISTING CONDUIT STUB-OUTS WHERE AVAILABLE IN LIEU OF INSTALLING NEW CONDUIT INTO EXISTING MANHOLES, JUNCTION BOXES, AND FOUNDATIONS.
- USE FRE CONDUIT FOR EXPOSED HORIZONTAL RUNS ON BRIDGES, RIGID GALVANIZED STEEL (RGS) CONDUIT FOR OTHER EXPOSED RUNS, PVC CONDUIT FOR TRENCH RUNS, RGS FOR CONDUIT RUNS BETWEEN SERVICE PANEL AND CLOSEST JUNCTION BOX, AND HDPE CONDUIT FOR BORED RUNS.
- THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS TO AVOID CONFLICTS WITH OTHER WORK. CONDUITS SHALL AVOID BRIDGE PIERS, ABUTMENTS, GUARDRAILS, FOUNDATIONS, AND OTHER CIVIL WORKS.
- A MINIMUM 2' SEPARATION SHALL BE MAINTAINED BETWEEN THE TRENCH RUNNING LINE AND EXISTING/PROPOSED GUARDRAIL.
- CONDUITS AT MSE WALL SHALL BE COORDINATED WITH MSE WALL INSTALLER.
- DIRECTIONAL BORING UNDER ROADWAY SHALL BE AT A MINIMUM DEPTH OF 5' BELOW SURFACE ELEVATION.
- DE-WATER ALL EXISTING JUNCTION BOXES BEFORE PERFORMING ANY WORK INSIDE THEM.
- VERIFY THE DEPTH OF ALL EXISTING UNDERGROUND UTILITIES AT LOCATIONS WHERE PROPOSED CONDUIT BORE OR TRENCH IS CROSSING TO AVOID ANY DISRUPTION TO THE EXISTING UNDERGROUND UTILITIES.
- AVOID IMPACTING ANY EXISTING UNDER-DRAIN SYSTEMS AT LOCATIONS WHERE PROPOSED CONDUIT BORE OR TRENCH IS CROSSING.
- EXISTING WIRING SHALL BE SAFELY ABANDONED PER INDUSTRY STANDARDS AND AS SHOWN ON THE PLANS. ABANDONED CABLES SHALL BE REMOVED IN THE FIELD.
- THE EQUIPMENT GROUNDING CONDUCTOR (EGC) SHALL BE SIZED TO MATCH THE LARGEST CONDUCTOR IN ANY LIGHTING CIRCUIT.

- THE CONTRACTOR SHALL PROVIDE ELEVATIONS AT THE TOP OF EACH LIGHT POLE FOUNDATION TO THE 95 EXPRESS LANES ENGINEER FOR REVIEW PRIOR TO ORDERING ANY NEW LIGHT POLES OR REMOVING ANY EXISTING LIGHT POLES FOR RELOCATION TO NEW FOUNDATIONS. ELEVATIONS SHALL BE PROVIDED WITHIN 48 HOURS OF FOUNDATION INSTALLATION. THE 95 EXPRESS LANES ENGINEER WILL REVIEW ELEVATION DATA AGAINST LIGHTING CALCULATIONS TO ENSURE FINISHED GRADES AND FOUNDATION ELEVATIONS ARE SUITABLE FOR LIGHT POLE LENGTHS AS DESIGNED.
- INSTALLED LUMINAIRE MOUNTING HEIGHTS FOR PROPOSED POLES SHOWN ON THE PLANS SHALL BE ADHERED TO WITHIN A TOLERANCE OF 1 FT AND IN NO CASE LESS THAN THE MOUNTING HEIGHT SHOWN.
- ALL INFRASTRUCTURE FOR RELOCATED OR REPLACEMENT LIGHT POLES SHALL BE INSTALLED, CONNECTED AND TESTED BEFORE EXISTING POLES ARE TAKEN OUT OF SERVICE.
- ALL NEW LIGHT POLES THROUGHOUT THE PROJECT SHALL BE PROVIDED WITH NON-CORROSIVE, METALLIC IDENTIFICATION TAGS, SIZED AS REQUIRED, BEARING THE POLE OWNER, VDOT OR XPL, THE GAUGE AND LENGTH OF THE POLE, THE CIRCUIT NUMBER(S), CIRCUIT PHASE(S), CIRCUIT(S) AND PHASE(S) TO WHICH THE POLE LUMINAIRES ARE CONNECTED; AND A SIX-DIGIT NUMBER (FIRST 3 DIGITS INDICATE THE NUMBER OF THE SERVICE PANEL FROM WHICH THE POLE IS FED AND THE SECOND THREE ARE THE SEQUENTIAL NUMBERS (I-N) OF THE POLES FED FROM EACH SERVICE PANEL). THE IDENTIFICATION TAGS SHALL BE ARRANGED AS FOLLOWS:



- THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO VERIFY SERVICE PANEL AND LIGHT POLE NUMBERS. SERVICE PANEL AND LIGHT POLE NUMBERS SHOWN ON THE PLANS ARE CONSTRUCTION NUMBERS AND ARE NOT NECESSARILY THE PERMANENT PANEL OR POLE ID.
- POLE NUMBERS SHALL BE COORDINATED WITH THE POLE OWNER TO ACCOUNT FOR EXISTING POLES ON THE CIRCUIT THAT WILL NOT BE MODIFIED BY THE PROJECT.
- ALL LIGHT POLES SHALL BE PROVIDED WITH INDIVIDUAL NUMBER IDENTIFICATION DECALS PLACED ABOVE THE IDENTIFICATION TAG FACING THE DIRECTION OF APPROACHING TRAFFIC AND FORMATTED AS FOLLOWS:

3 DIGIT SERVICE PANEL NUMBER TO BE PLACED HORIZONTALLY
3 DIGIT POLE NUMBER TO BE PLACED VERTICALLY

EXAMPLE: 001
0
0
1
- FOR LIGHTING CIRCUITS CONNECTED TO VDOT SERVICE PANELS, JUNCTION BOX LIDS SHALL BE LABELED "VDOT ELEC". FOR LIGHTING CIRCUITS CONNECTED TO 95 EXPRESS SERVICE PANELS, JUNCTION BOXES SHALL BE LABELED "XPL ELEC".
- THE FOUNDATIONS OF ALL EXISTING LIGHT POLES DESIGNATED TO BE REMOVED SHALL BE REMOVED TO A DEPTH OF 2 FEET BELOW FINISHED GRADE AND BACKFILLED.
- THE CONTRACTOR/VENDOR SHALL PROVIDE A 10 YEAR MINIMUM WARRANTY AGAINST ANY FAILURE RESULTING FROM MATERIALS AND DEFECTS OF THE LUMINAIRES, AS IN ACCORDANCE WITH VDOT'S SPECIAL PROVISION FOR LIGHT EMITTING DIODE (LED) LUMINAIRES.
- ALL PROPOSED LIGHTING JUNCTION BOXES FOR VDOT OR I-95 EXPRESS SHALL BE STD. JB-R2 UNLESS OTHERWISE NOTED ON THE PLANS.

PAC PLANS

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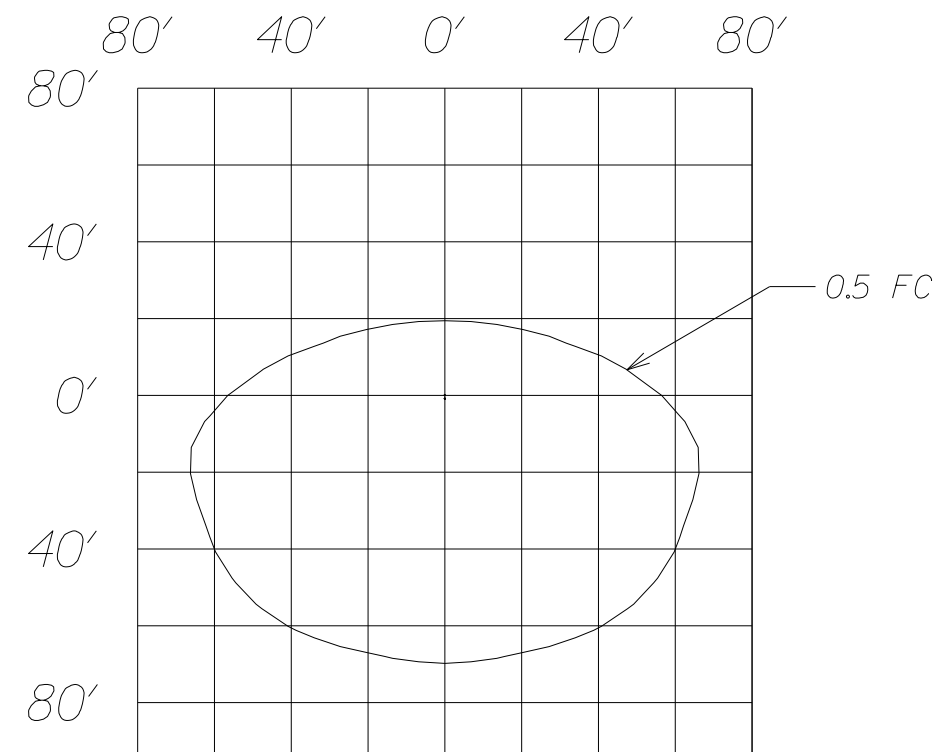
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(2A)

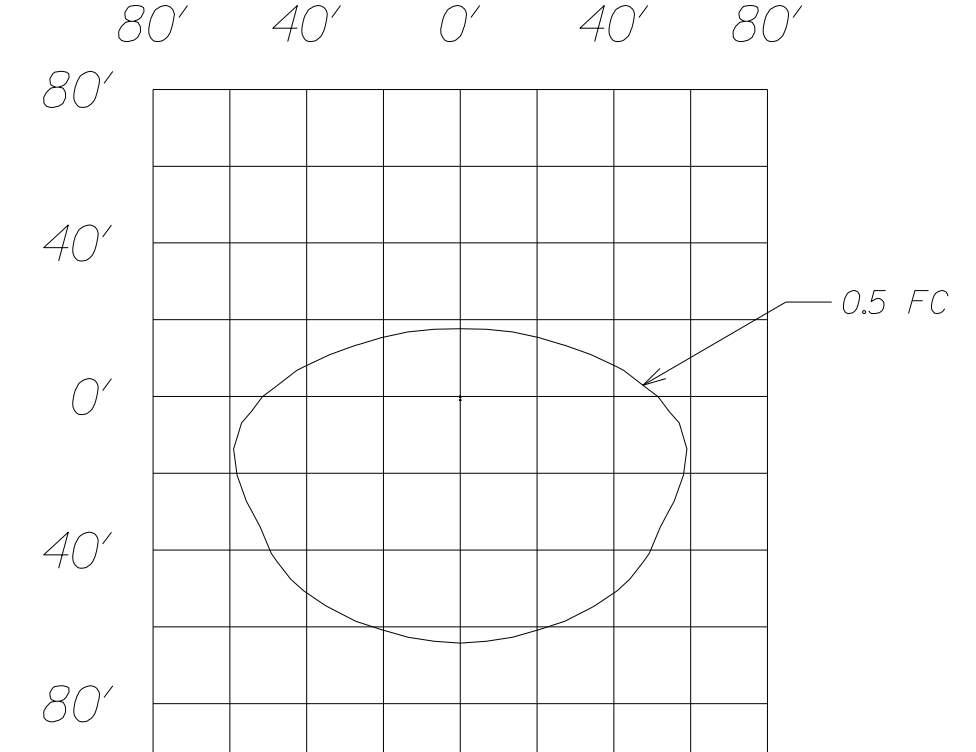
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

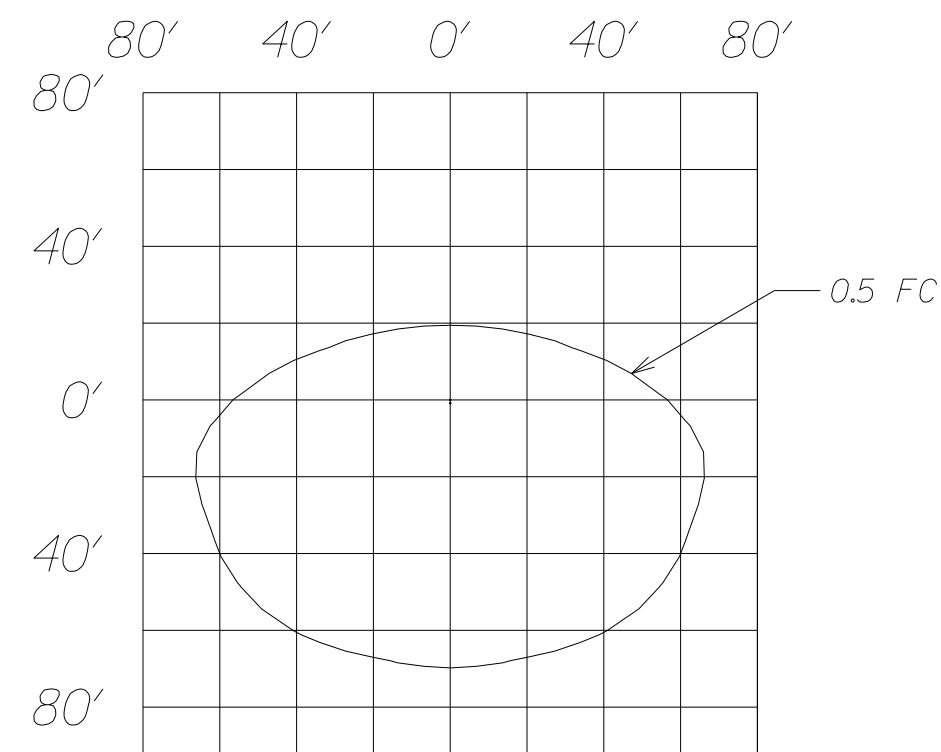
LUMINAIRE DETAILS



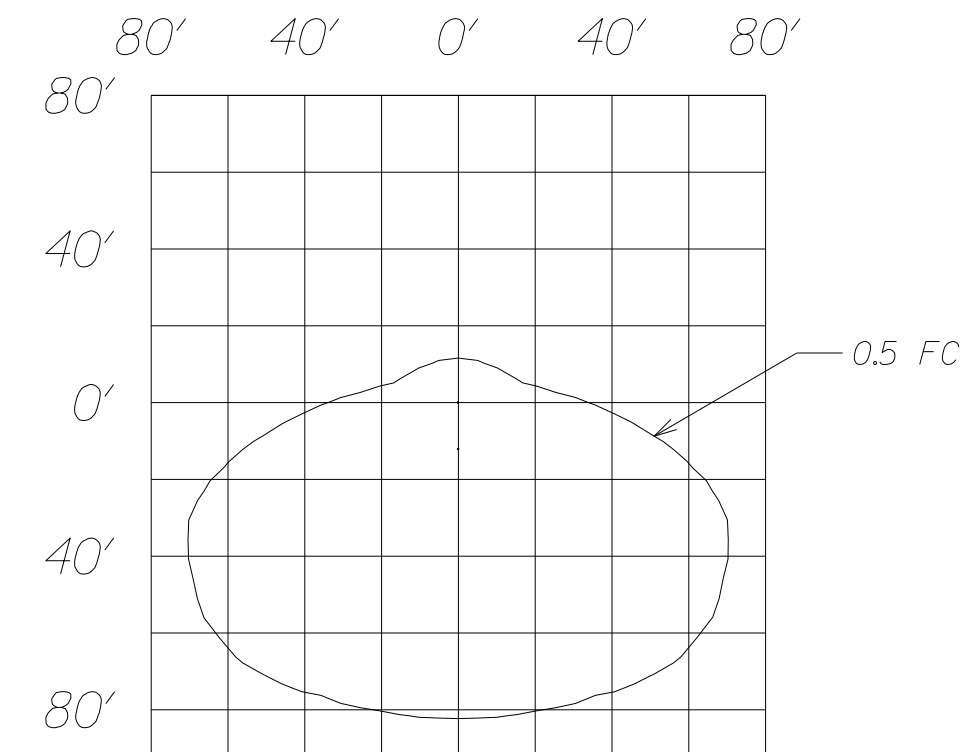
PHILIPS RFL LUMINAIRE PRODUCT NO.: RFL-160W96LED4K-G2-4
 DISTRIBUTION: TYPE 4
 LAMP: 160W LED
 MOUNTING HEIGHT: 40'



PHILIPS RFL LUMINAIRE PRODUCT NO.: RFL-145W64LED4K-G2-4
 DISTRIBUTION: TYPE 4
 LAMP: 145W LED
 MOUNTING HEIGHT: 40'



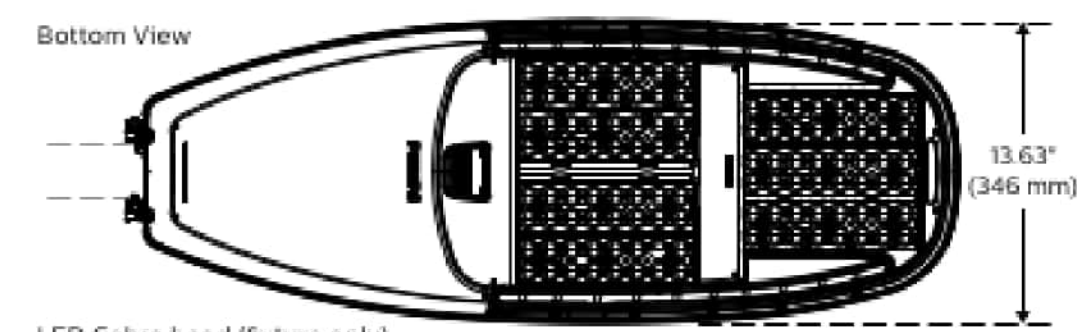
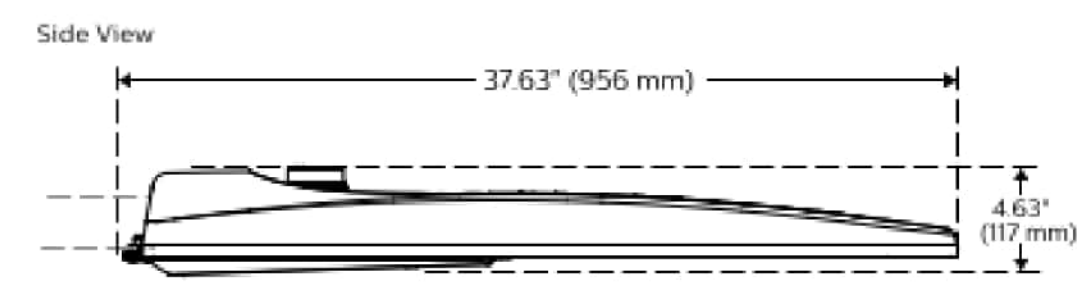
PHILIPS RFL LUMINAIRE PRODUCT NO.: RFL-90W80LED4K-G2-R2M
 DISTRIBUTION: TYPE 2M
 LAMP: 90W LED
 MOUNTING HEIGHT: 40'



PHILIPS RFL LUMINAIRE PRODUCT NO.: RFL-160W96LED4K-G2-4
 DISTRIBUTION: TYPE 4
 LAMP: 160W LED
 MOUNTING HEIGHT: 30'

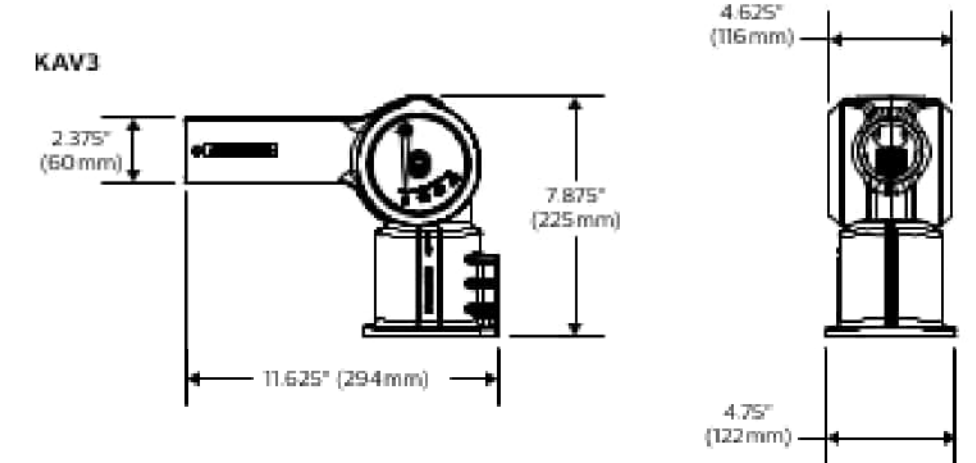
ISO FOOTCANDLE DIAGRAMS

Dimensions



LED Cobra head (fixture only)
 Weight: 27.3 Lbs
 EPA: 0.92 sq. ft.

Adaptors



RFL + Adaptor	Effective Projected Area (EPA-ft²)		Weight
	0° Aim	45° Aim	
	1.24	3.16	33.6 lb

PAC PLANS

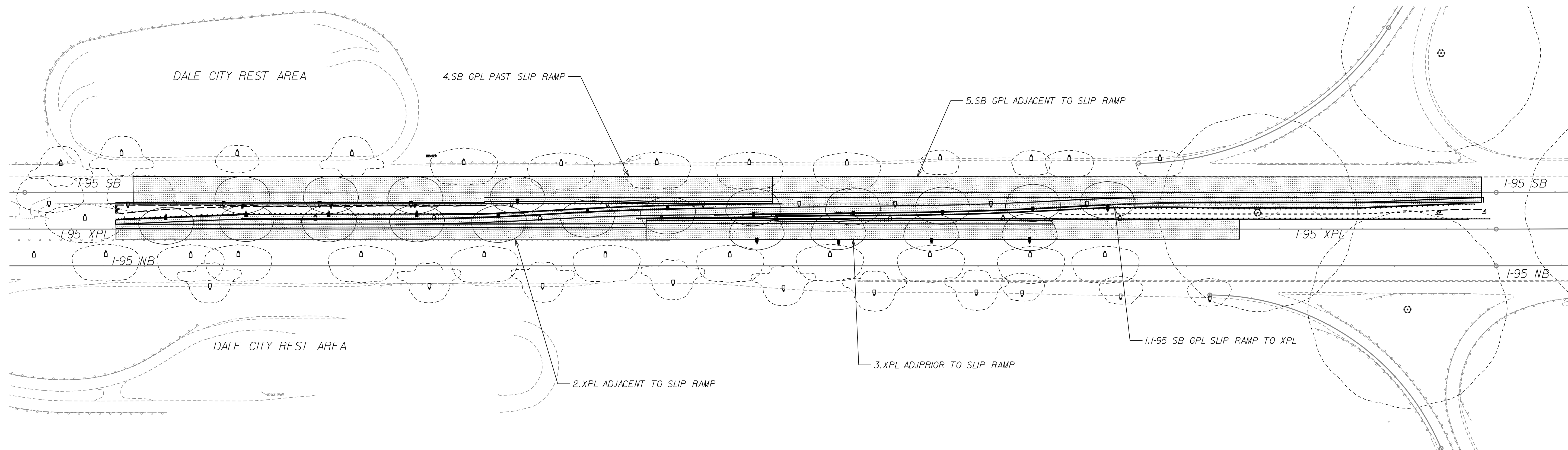
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PROJECT	SHEET NO.
0095-076-299	17(2A)

PROJECT MANAGER: *Bimal Shabb, P.E. (703) 259-2362 (NOVA District)*
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	VA.	95		0095-076-299, C-501	17(2B1)
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Whitman, Reardon & Associates Baltimore, Maryland TRAFFIC ENGINEER					

PHOTOMETRIC CALCULATIONS
 SLIP RAMP



FREEWAY DESIGN CRITERIA							
ROAD	PAVEMENT CLASS	CALC. TYPE	UNITS	AVG	AVG/MIN	LV RATIO	MAX/MIN
FREEWAY CLASS A	R2 & R3	ILLUMINANCE	FC	0.9	3	N/A	N/A
FREEWAY CLASS A	R2 & R3	LUMINANCE	CD/SQ. M	0.6	3.5	0.3	6.0:1

PHOTOMETRIC CALCULATION RESULTS								
LABEL	DESIGN CRITERIA	CALC. TYPE	UNITS	AVG	MIN	AVG/MIN	LV RATIO	MAX/MIN
1. I-95 SB GPL Slip Ramp to XPL	FREEWAY CLASS A	ILLUMINANCE	FC	1.2	0.4	3.0	N/A	N/A
2. XPL adjacent to Slip Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.6	0.3	2.0	0.3	3.3
3. XPL prior to Slip Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.8	0.3	2.7	0.3	6
4. SB GPL past Slip Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.7	0.3	2.3	-	6
5. SB GPL adjacent to Slip Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.8	0.4	2.0	-	4.5

PHOTOMETRIC LEGEND

EXISTING	PROPOSED	DESCRIPTION
		ISO-ILLUMINANCE TEMPLATES AT 0.5 FOOT-CANDLES

PAC PLANS

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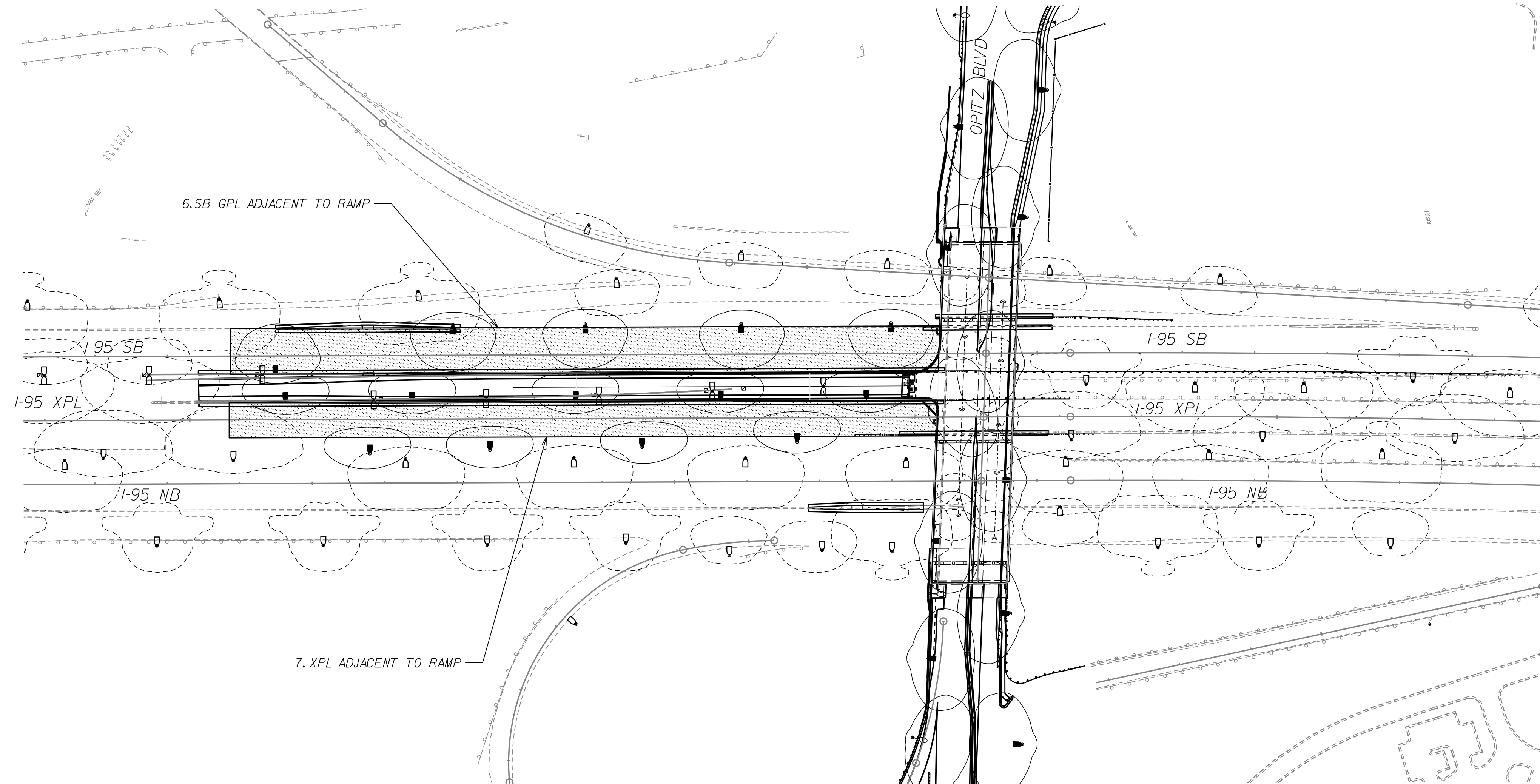
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

**PHOTOMETRIC CALCULATIONS
 EXPRESS AND GENERAL PURPOSE LANES**



FREEWAY DESIGN CRITERIA							
ROAD	PAVEMENT CLASS	CALC. TYPE	UNITS	AVG	AVG/MIN	LV RATIO	MAX/MIN
FREEWAY CLASS A	R2 & R3	ILLUMINANCE	FC	0.9	3	N/A	N/A
FREEWAY CLASS A	R2 & R3	LUMINANCE	CD/SQ. M	0.6	3.5	0.3	6.0:1

PHOTOMETRIC CALCULATION RESULTS								
LABEL	DESIGN CRITERIA	CALC. TYPE	UNITS	AVG	MIN	AVG/MIN	LV RATIO	MAX/MIN
6. SB GPL adjacent to Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.7	0.3	2.3	0.2	6
7. XPL adjacent to Ramp	FREEWAY CLASS A	Luminance	CD/SQ. M	0.7	0.3	2.3	0.2	5

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PHOTOMETRIC LEGEND		
EXISTING	PROPOSED	DESCRIPTION
		ISO-ILLUMINANCE TEMPLATES AT 0.5 FOOT-CANDLES

PROJECT 0095-076-299	SHEET NO. 17(2B2)
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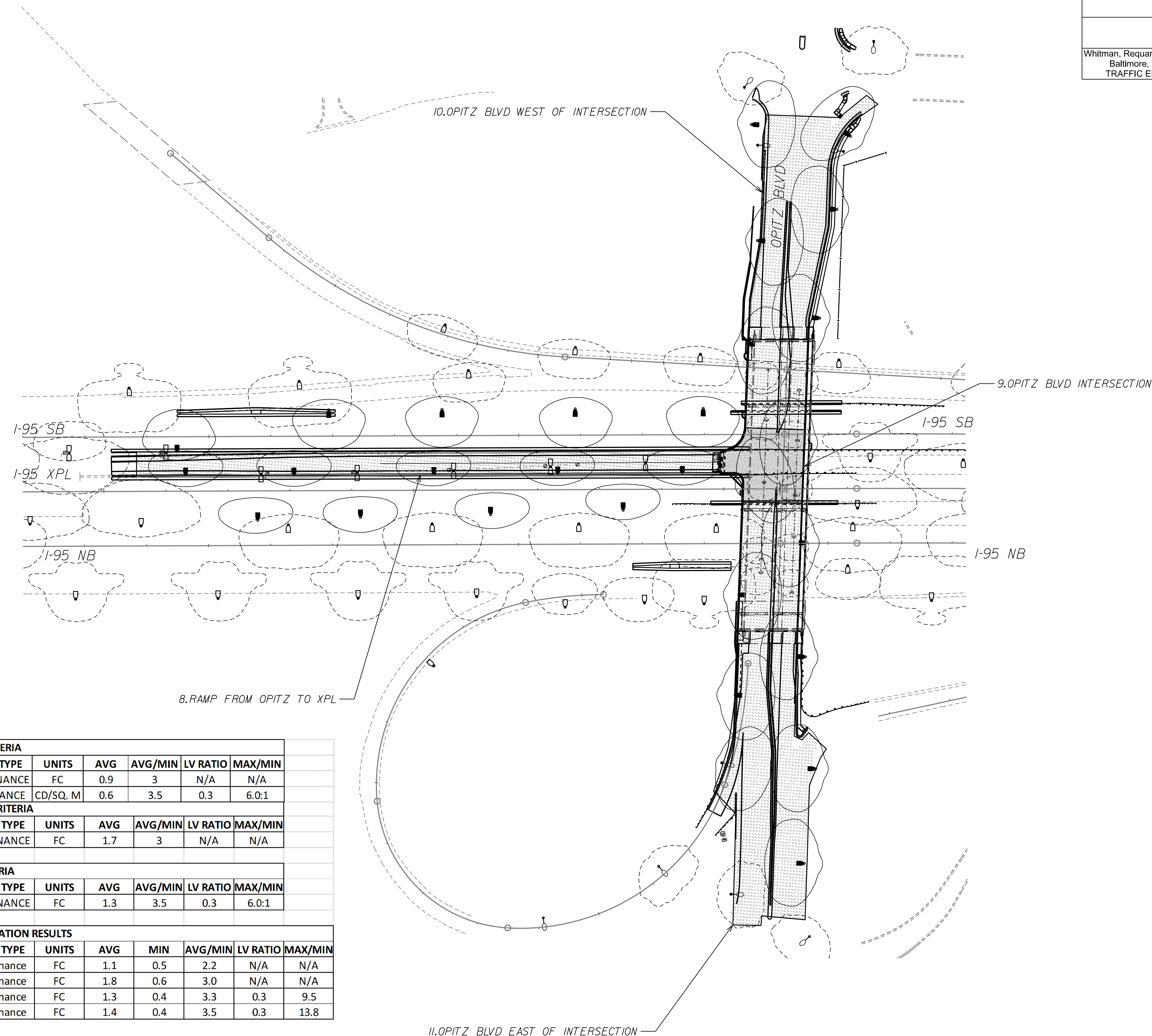
PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(2B3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PHOTOMETRIC CALCULATIONS
 OPITZ BLVD AND T-RAMP



FREEWAY DESIGN CRITERIA								
ROAD	PAVEMENT CLASS	CALC. TYPE	UNITS	AVG	AVG/MIN	LV RATIO	MAX/MIN	
FREEWAY CLASS A	R2 & R3	ILLUMINANCE	FC	0.9	3	N/A	N/A	
FREEWAY CLASS A	R2 & R3	LUMINANCE	CD/SQ. M	0.6	3.5	0.3	6.0:1	
INTERSECTION DESIGN CRITERIA								
INTERSECTION	PEDESTRIAN ACTIVITY	CALC. TYPE	UNITS	AVG	AVG/MIN	LV RATIO	MAX/MIN	
MAJOR/MAJOR	LOW	ILLUMINANCE	FC	1.7	3	N/A	N/A	
STREET DESIGN CRITERIA								
STREET	PEDESTRIAN ACTIVITY	CALC. TYPE	UNITS	AVG	AVG/MIN	LV RATIO	MAX/MIN	
MAJOR	LOW	ILLUMINANCE	FC	1.3	3.5	0.3	6.0:1	
PHOTOMETRIC CALCULATION RESULTS								
LABEL	DESIGN CRITERIA	CALC. TYPE	UNITS	AVG	MIN	AVG/MIN	LV RATIO	MAX/MIN
8. Ramp from Opitz to XPL	FREEWAY CLASS A	ILLUMINANCE	FC	1.1	0.5	2.2	N/A	N/A
9. Opitz Blvd Intersection	INTERSECTION - MAJOR/MAJOR	ILLUMINANCE	FC	1.8	0.6	3.0	N/A	N/A
10. Opitz Blvd West of Intersection	STREET - MAJOR	ILLUMINANCE	FC	1.3	0.4	3.3	0.3	9.5
11. Opitz Blvd East of Intersection	STREET - MAJOR	ILLUMINANCE	FC	1.4	0.4	3.5	0.3	13.8

PHOTOMETRIC LEGEND		
EXISTING	PROPOSED	DESCRIPTION
		ISO-ILLUMINANCE TEMPLATES AT 0.5 FOOT-CANDLES

PAC PLANS

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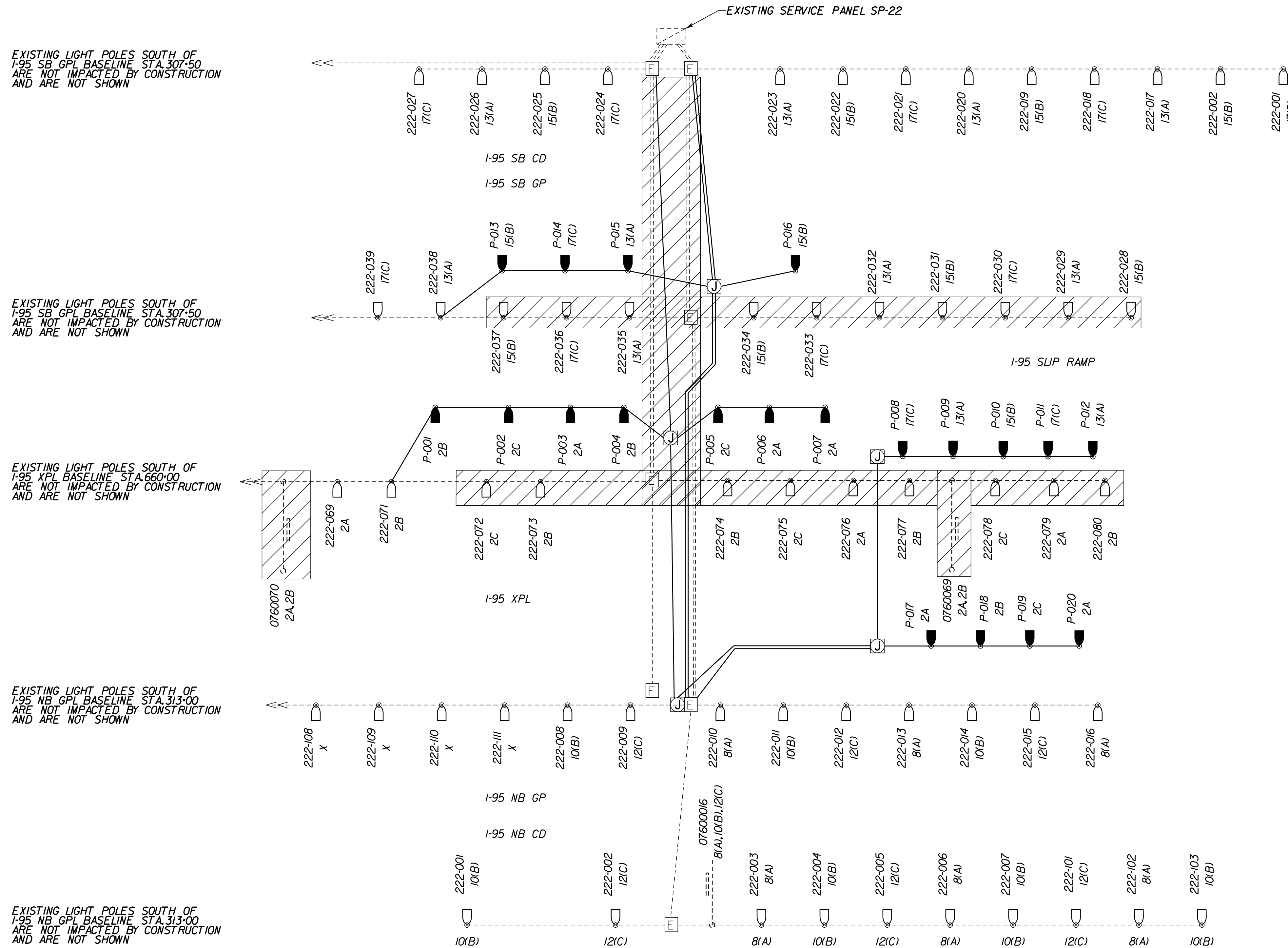
PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	17(2C1)

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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

ONE LINE DIAGRAM & VOLTAGE DROP
 VDOT SERVICE PANEL SP-22



LEGEND

- PROPOSED CIRCUIT(S)
- - - EXISTING CIRCUIT(S)
- P-XXX POLE NUMBER
- A . B . C CIRCUIT PHASE
- ▨ IMPACTED EXISTING EQUIPMENT

NOTES:

1. THE SINGLE LINE DIAGRAM DOES NOT REFLECT ALL EXISTING LIGHT POLES, SIGNING LIGHTING, OR CIRCUITS ON THE ENTIRE LIGHTING SYSTEM. EXISTING LIGHT POLES, SIGNING LIGHTING, AND CIRCUITS WHICH ARE PERTINENT TO THIS PROJECT'S WORK ONLY ARE SHOWN. OTHER EXISTING LIGHT POLES, SIGNING LIGHTING, AND CIRCUITS MAY BE PRESENT AND CONNECTED TO THE OVERALL LIGHTING SYSTEM.
2. POLE NUMBERS AND CIRCUITRY SHOWN ABOVE ARE BASED ON AVAILABLE AS-BUILT PLAN INFORMATION AND FIELD INVENTORY.

PAC PLANS

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PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

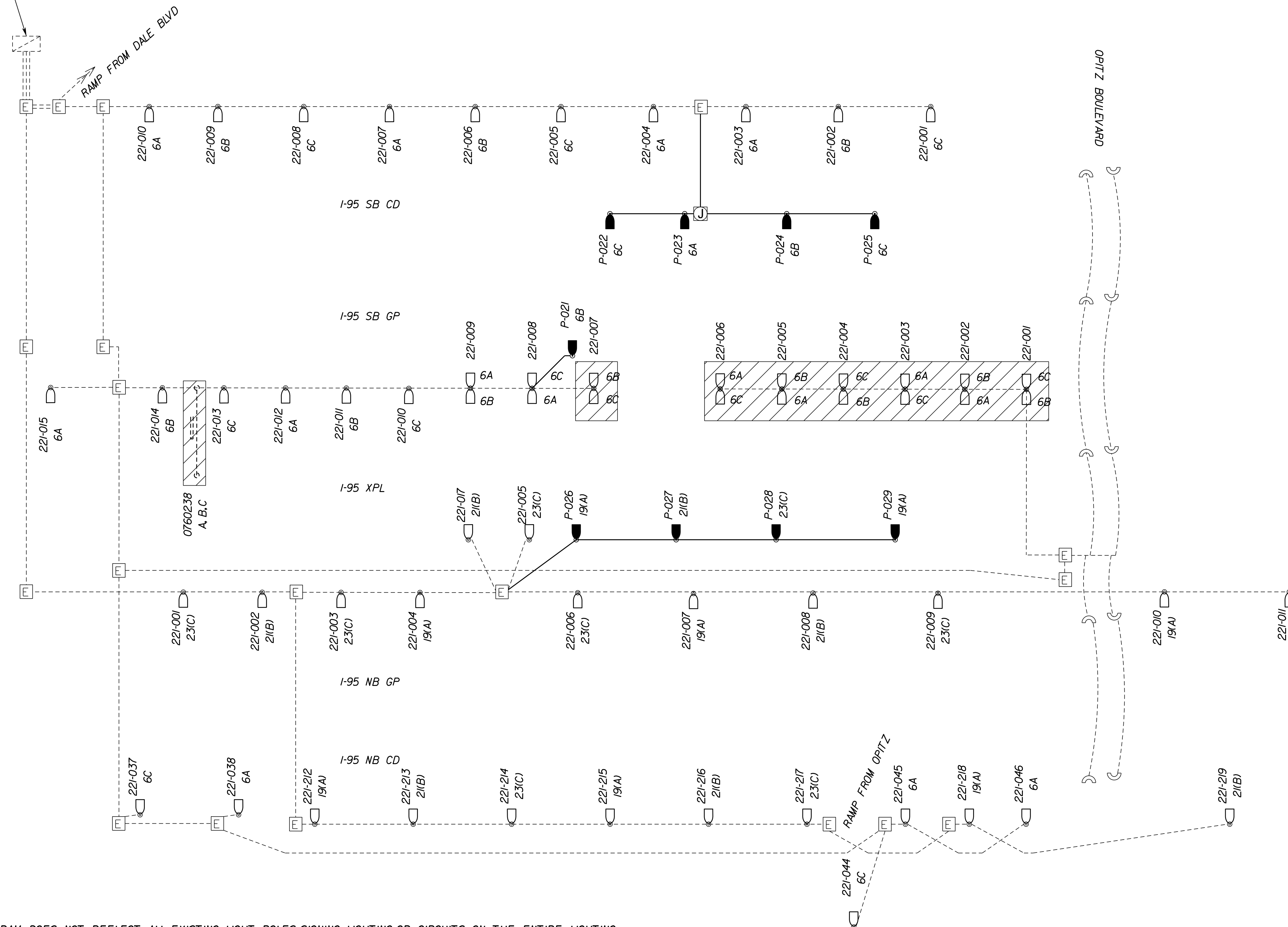
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	17(2C2)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

ONE LINE DIAGRAM & VOLTAGE DROP
 VDOT SERVICE PANEL SP-21

EXISTING SERVICE PANEL SP-21



LEGEND

- PROPOSED CIRCUIT(S)
- - - EXISTING CIRCUIT(S)
- P-XXX POLE NUMBER
- A . B . C CIRCUIT PHASE
- ▨ IMPACTED EXISTING EQUIPMENT

NOTES:

1. THE SINGLE LINE DIAGRAM DOES NOT REFLECT ALL EXISTING LIGHT POLES, SIGNING LIGHTING, OR CIRCUITS ON THE ENTIRE LIGHTING SYSTEM. EXISTING LIGHT POLES, SIGNING LIGHTING, AND CIRCUITS WHICH ARE PERTINENT TO THIS PROJECT'S WORK ONLY ARE SHOWN. OTHER EXISTING LIGHT POLES, SIGNING LIGHTING, AND CIRCUITS MAY BE PRESENT AND CONNECTED TO THE OVERALL LIGHTING SYSTEM.
2. POLE NUMBERS AND CIRCUITRY SHOWN ABOVE ARE BASED ON AVAILABLE AS-BUILT PLAN INFORMATION AND FIELD INVENTORY.

PAC PLANS

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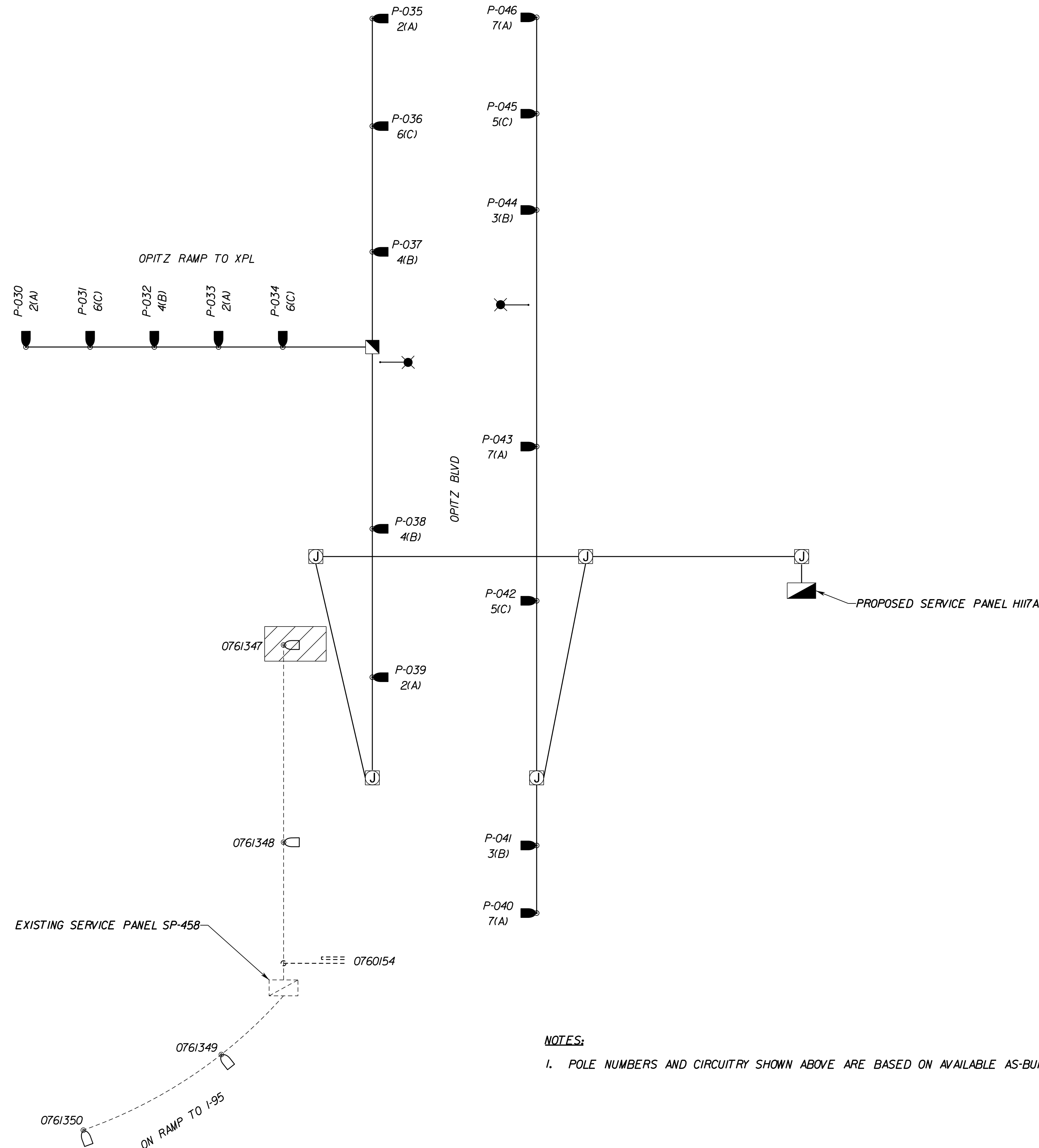
PROJECT MANAGER: Bimal Shabb, P.E. (703) 259-2362 (NOVA District)
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 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(2C3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

SINGLE LINE DIAGRAM & VOLTAGE DROP
XPL SERVICE PANEL H117A



LEGEND

- PROPOSED CIRCUIT(S)
- - - - - EXISTING CIRCUIT(S)
- P-XXX POLE NUMBER
- A, B, C CIRCUIT PHASE
- [Hatched Box] IMPACTED EXISTING EQUIPMENT

NOTES:
 1. POLE NUMBERS AND CIRCUITRY SHOWN ABOVE ARE BASED ON AVAILABLE AS-BUILT PLAN INFORMATION AND FIELD INVENTORY.

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	17(2C3)

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District) -----
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(2C4)

PANELBOARD SCHEDULE
VDOT SERVICE PANEL SP-22

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PANELBOARD SCHEDULE																
EXISTING PANEL SP-22 (SHEET 17(4))																
LOAD DESCRIPTION	LOAD (AMPS)			BRKR (AMPS)	WIRE	CKT NO.	ØA	ØB	ØC	CKT NO.	WIRE	BRKR (AMPS)	LOAD (AMPS)			LOAD DESCRIPTION
	ØA	ØB	ØC										ØA	ØB	ØC	
EXISTING	-			20	-	1				2 (2A)	*1	20	-0.43*			EXISTING 1-95 XPL LIGHTING REMOVED: (2) 205W LED, (2) 150W HPS SIGN LUMINAIRES ADDED: (4) 160W LED
EXISTING		-		20	-	3				4 (2B)	*1	20	-2.1*			EXISTING 1-95 XPL LIGHTING REMOVED: (4) 205W LED, (2) 150W HPS SIGN LUMINAIRES ADDED: (4) 160W LED
EXISTING			-	20	-	5				6 (2C)	*1	20		-0.54*		EXISTING 1-95 XPL LIGHTING REMOVED: (3) 205W LED ADDED: (3) 160W LED
EXISTING	-			20	-	7				8	-	30	-			EXISTING 1-95 NB GPL LIGHTING
EXISTING		-		20	-	9				10	-	30	-			EXISTING 1-95 NB GPL LIGHTING
EXISTING			-	20	-	11				12	-	30	-			EXISTING 1-95 NB GPL LIGHTING
EXISTING 1-95 SB GPL LIGHTING REMOVED: (3) 210W LED ADDED: (3) 160W LED	-0.60*			30	*2	13				14	-	15	-			EXISTING
EXISTING 1-95 SB GPL LIGHTING REMOVED: (4) 210W LED ADDED: (3) 160W LED		-1.44*		30	*2	15				16	-	15	-			EXISTING
EXISTING 1-95 SB GPL LIGHTING REMOVED: (3) 210W LED ADDED: (3) 160W LED			-0.60*	30	*2	17				18	-	15	-			EXISTING

BREAKER MINIMUM INTERRUPTING CAPACITY 22,000 AMPS SYMM.

MAINS: 225A MAIN CIRCUIT BREAKER
 VOLTAGE: 277/480Y VAC, 3 PHASE, 4 WIRE
 MOUNTING: BASE MOUNTED CONTROL CABINET

CONTACTORS: 60 AMP, 3 POLE

NOTE: NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING USED AND NUMBER OF SPARE CIRCUIT BREAKERS SHOWN

* INDICATES THE AMPERAGE DELTA ON THE CIRCUIT DUE TO CONSTRUCTION AND NOT THE TOTAL AMPERAGE

NOTES:

1. CIRCUIT LOAD, AMPERAGE, AND WIRE SIZE IS NOT PROVIDED FOR LIGHT POLES WHICH ARE NOT IMPACTED BY CONSTRUCTION.

PAC PLANS

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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	17(2C5)
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT				
Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				

PANELBOARD SCHEDULE
VDOT SERVICE PANEL SP-21

PANELBOARD SCHEDULE																
EXISTING PANEL SP-21 (SHEET 17(16))																
LOAD DESCRIPTION	LOAD (AMPS)			BRKR (AMPS)	WIRE	CKT NO.	ØA	ØB	ØC	CKT NO.	WIRE	BRKR (AMPS)	LOAD (AMPS)			LOAD DESCRIPTION
	ØA	ØB	ØC										ØA	ØB	ØC	
EXISTING	-			40	-	1				2	*1	40	-			EXISTING
EXISTING		-		40	-	3				4	*1	40		-		EXISTING
EXISTING			-	40	-	5				6	*1	40			-	EXISTING
EXISTING	-			40	-	7				8	-	40	-			EXISTING
EXISTING		-		40	-	9				10	-	40		-		EXISTING
EXISTING			-	40	-	11				12	-	40			-	EXISTING
EXISTING	-			40	-	13				14 (6A)	-	40	-2.78*			EXISTING REMOVED: (2) 205W LED, (2) 130W LED, (1) 150W HPS SIGN LUMINAIRE ADDED: (1) 145W LED
EXISTING		-		40	-	15				16 (6B)	-	40	-2.73*			EXISTING REMOVED: (2) 205W LED, (3) 130W LED, (1) 150W HPS SIGN LUMINAIRE ADDED: (2) 145W LED
EXISTING			-	40	-	17				18 (6C)	-	40		-3.03*		EXISTING REMOVED: (3) 205W LED, (2) 130W LED, (1) 150W HPS SIGN LUMINAIRE ADDED: (2) 145W LED
EXISTING ADDED: (2) 90W LED	5.78			30	*2	19				20	-	-				SPACE
EXISTING ADDED: (1) 90W LED		6.24		30	*2	21				22	-	-				SPACE
EXISTING ADDED: (1) 90W LED			6.24	30	*2	23				24	-	-				SPACE

BREAKER MINIMUM INTERRUPTING CAPACITY 22,000 AMPS SYMM.

MAINS: 225A MAIN CIRCUIT BREAKER
 VOLTAGE: 277/480Y VAC, 3 PHASE, 4 WIRE
 MOUNTING: BASE MOUNTED CONTROL CABINET

NOTE: NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING USED AND NUMBER OF SPARE CIRCUIT BREAKERS SHOWN

CONTACTORS: 60 AMP, 3 POLE

* INDICATES THE AMPERAGE DELTA ON THE CIRCUIT DUE TO CONSTRUCTION AND NOT THE TOTAL AMPERAGE

NOTES:

1. CIRCUIT LOAD, AMPERAGE, AND WIRE SIZE IS NOT PROVIDED FOR LIGHT POLES WHICH ARE NOT IMPACTED BY CONSTRUCTION.

PAC PLANS

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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	17(2C6)
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Whitman, Requardt & Associates Baltimore, Maryland TRAFFIC ENGINEER				

**PANELBOARD SCHEDULE
 XPL SERVICE PANEL H117A**

PANELBOARD SCHEDULE																
PANEL H117A (CCW-1 TYPE "H" MODIFIED) (SHEET 17(18))																
LOAD DESCRIPTION	LOAD (AMPS)			BRKR (AMPS)	WIRE	CKT NO.	ØA	ØB	ØC	CKT NO.	WIRE	LOAD (AMPS)			LOAD DESCRIPTION	
	ØA	ØB	ØC									ØA	ØB	ØC		
PHOTOCONTROL	0.7			10	*10	1				2	*6	20	2.01			(1) 160W LED, (2) 24W LED, (1) 250W HPS
(1) 24W LED, (2) 250W HPS, (1) 150W HPS		1.28		20	*6	3				4	*6	20	1.64			(2) 24W LED, (1) 250W HPS
(2) 24W LED, (1) 250W HPS, (1) 150W HPS			1.28	20	*6	5				6	*6	20		1.36		(2) 24W LED, (1) 250W HPS
(2) 24W LED, (1) 250W HPS, (2) 150W HPS	1.93			20	*6	7				8		20				SPARE
SPARE				20		9				10		20				SPARE
SPARE				20		11				12		20				SPARE
SPARE				20		13				14		20				SPARE
SPARE				20		15				16		20				SPARE
SPARE				20		17				18		20				SPARE

BREAKER MINIMUM INTERRUPTING CAPACITY 22,000 AMPS SYMM.

MAINS: 200A MAIN CIRCUIT BREAKER
 VOLTAGE: 277/480Y VAC, 3 PHASE, 4 WIRE
 MOUNTING: BASE MOUNTED CONTROL CABINET

CONTACTORS: 60 AMP, 3 POLE

NOTE: NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING USED AND NUMBER OF SPARE CIRCUIT BREAKERS SHOWN

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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(2D2)

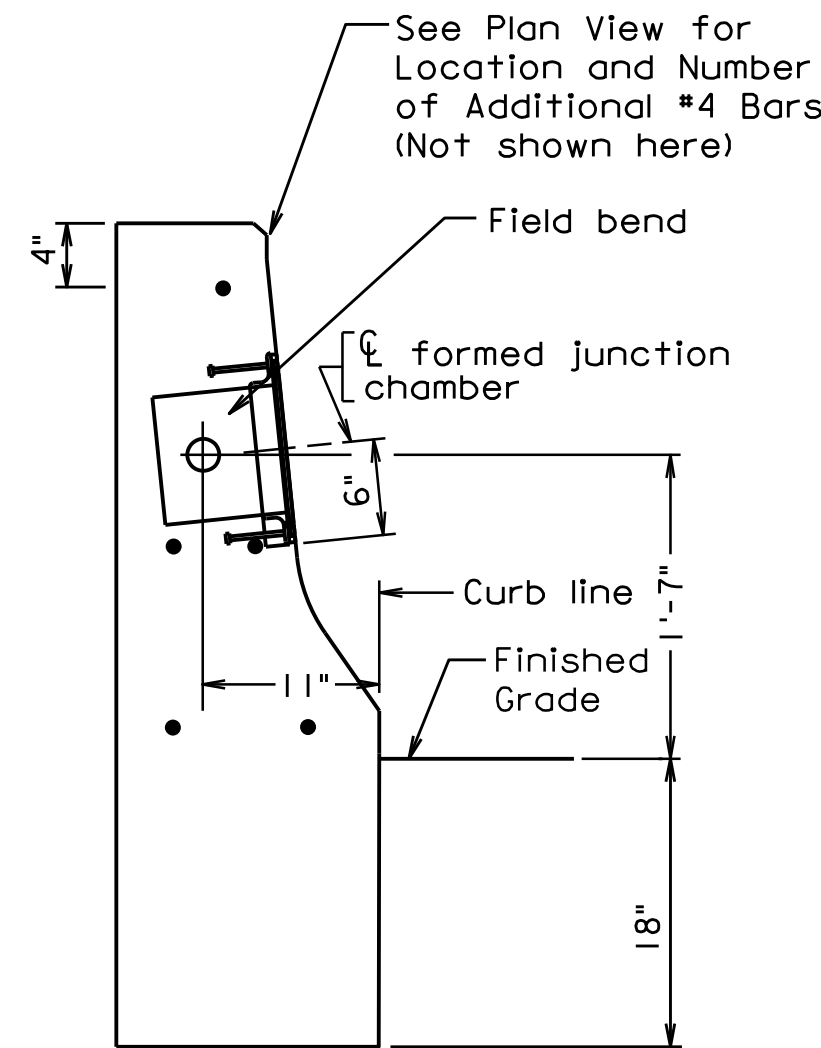
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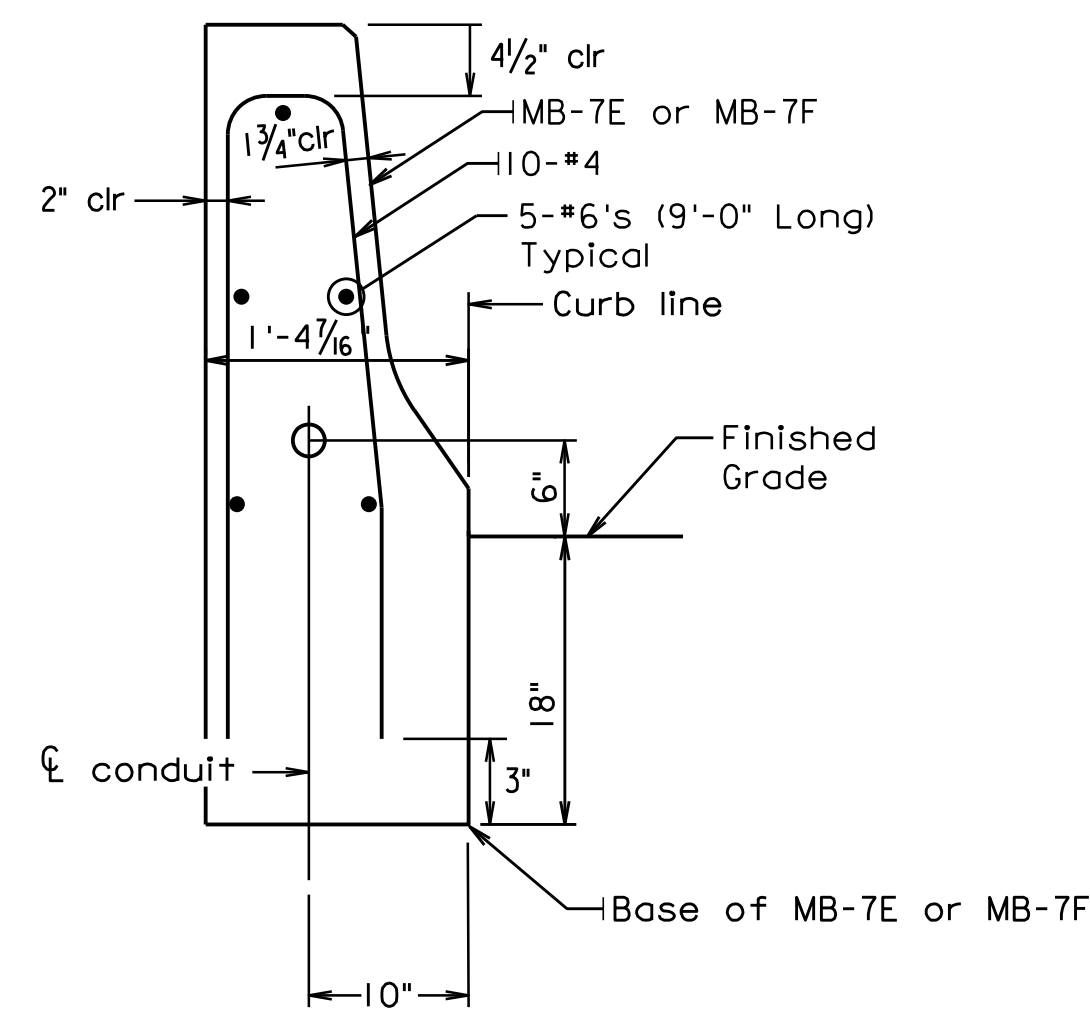
CONDUIT & JUNCTION CHAMBER IN BARRIER DETAIL

GENERAL NOTES:

1. CONDUITS, FOUNDATIONS, AND JUNCTION CHAMBER SHALL BE COORDINATED BY THE CONTRACTOR PRIOR TO THE CONSTRUCTION OF SPECIAL MEDIAN BARRIERS.
2. SEE LIGHTING PLANS FOR NUMBER, SIZE, TYPE AND ORIENTATION OF CONDUITS REQUIRED.
3. SEE STANDARD DETAIL BCS-29A FOR DETAILS OF 8"x8"x16" JUNCTION CHAMBER. THE CONTRACTOR SHALL USE HEX HEAD BOLTS IN LIEU OF FLAT HEAD SCREWS FOR FASTENING COVER PLATE TO CHAMBER.
4. DETAILS ON THIS DRAWING ARE FOR GENERAL INFORMATION ONLY. REINFORCEMENT SHOWN IS THE MINIMUM STEEL REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND DETAILING WITHIN THE FINAL FOUNDATION LIMITS IN ACCORDANCE WITH SECTIONS 700 AND 502 OF THE SPECIFICATIONS. THE LIGHTING POLE FOUNDATION IS COMPRISED OF THE ANCHOR BOLTS, THE BARRIER, AND THE CASSIONS.

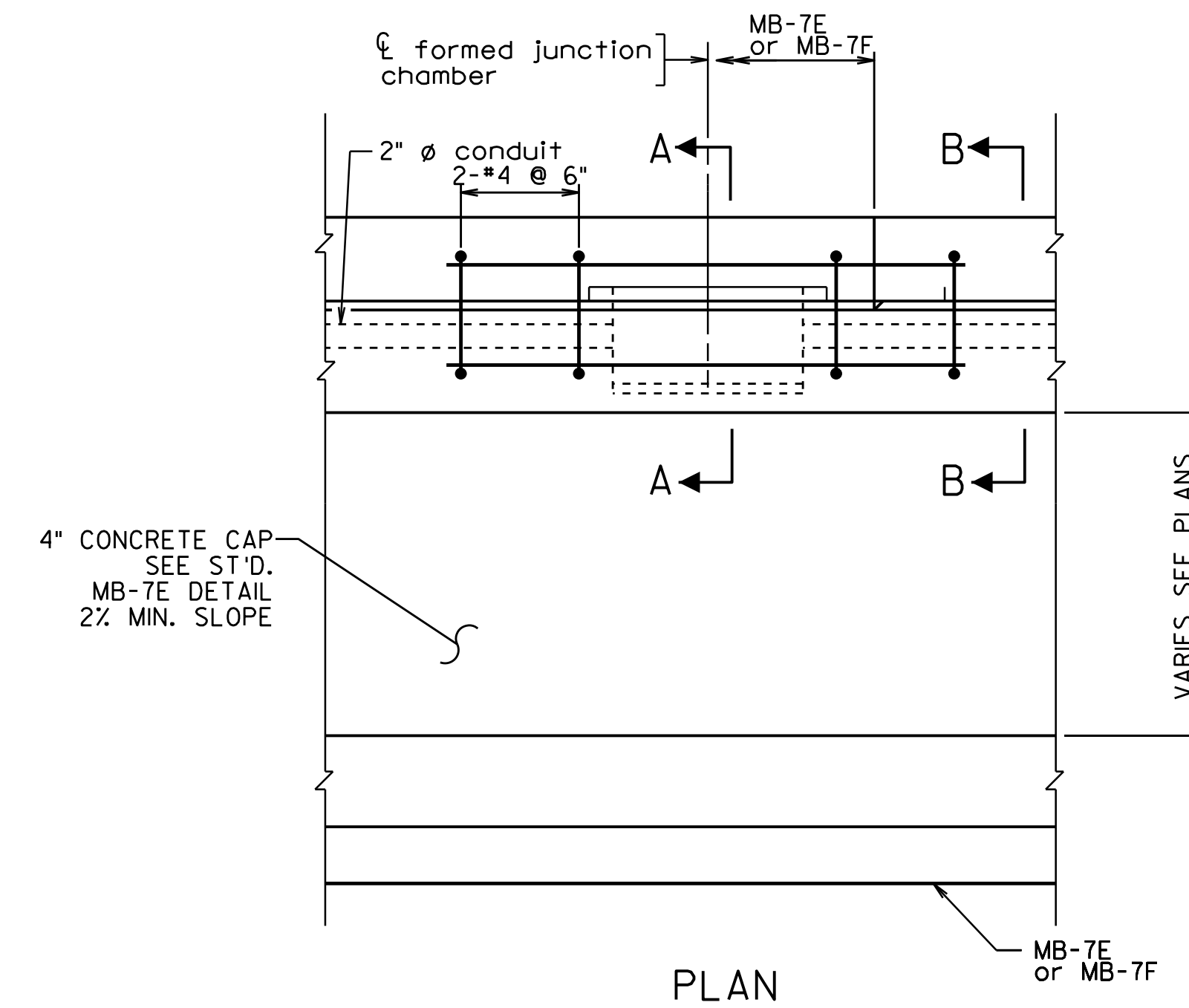


SECTION A-A



SECTION B-B

Note A:
 Adjust ties as required to comply with face of Barrier.



PLAN

- Plan Notes:
1. All concrete to be Class A3.
 2. All reinforcing to be per ASTM A615, Grade 60.

PAC PLANS

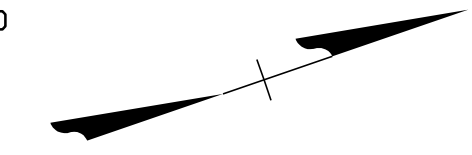
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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	17(3)

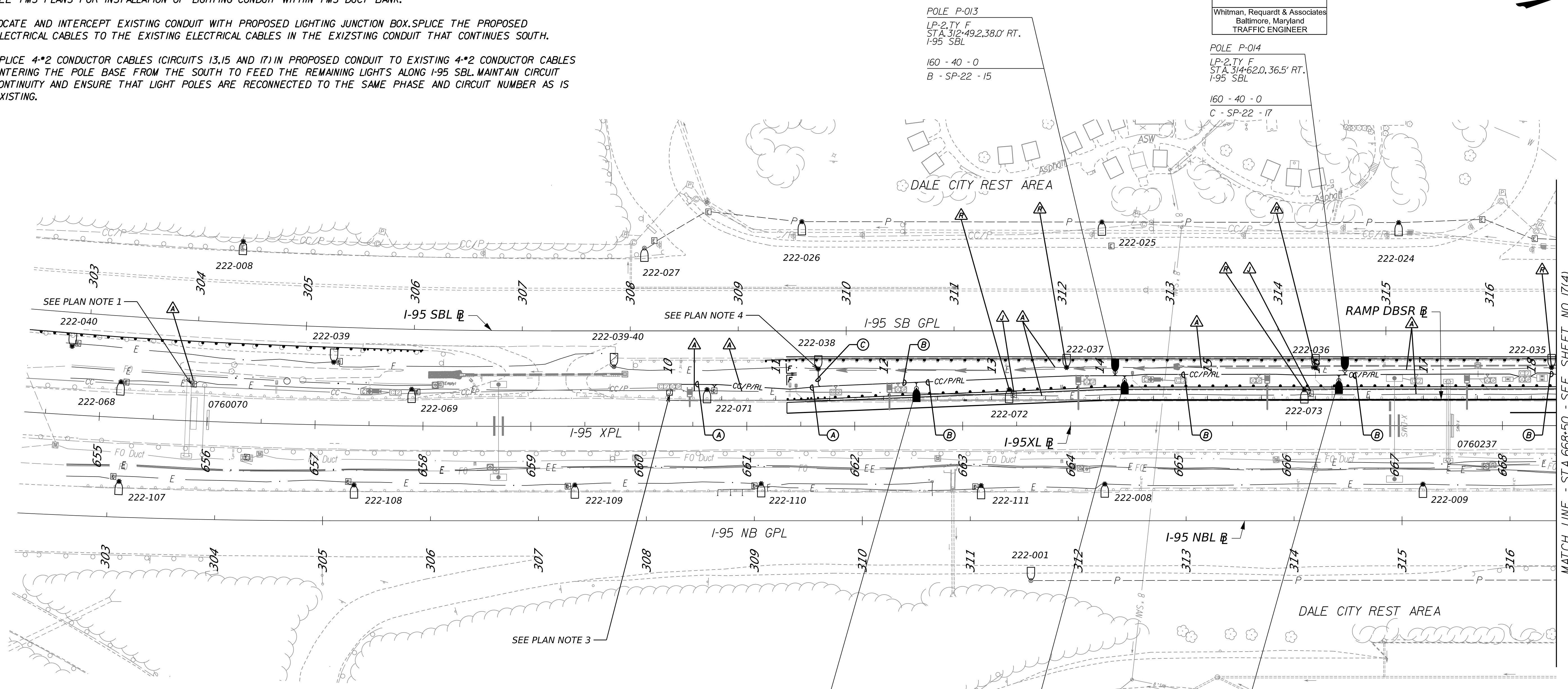
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 Baltimore, Maryland
 TRAFFIC ENGINEER

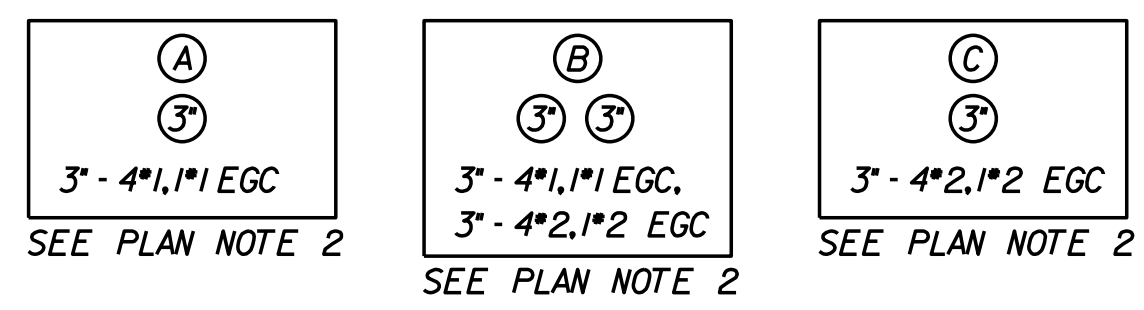


PLAN NOTES:

- DISCONNECT EXISTING SIGN LIGHTING CABLES AND REMOVE BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. ABANDON EXISTING CONDUIT BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. MAINTAIN LIGHTING CABLES HEADING NORTH AND SOUTH AND RE-SPLICE AS NECESSARY TO MAINTAIN CIRCUIT CONTINUITY.
- SEE TMS PLANS FOR INSTALLATION OF LIGHTING CONDUIT WITHIN TMS DUCT BANK.
- LOCATE AND INTERCEPT EXISTING CONDUIT WITH PROPOSED LIGHTING JUNCTION BOX. SPLICE THE PROPOSED ELECTRICAL CABLES TO THE EXISTING ELECTRICAL CABLES IN THE EXISTING CONDUIT THAT CONTINUES SOUTH.
- SPLICE 4*2 CONDUCTOR CABLES (CIRCUITS 13, 15 AND 17) IN PROPOSED CONDUIT TO EXISTING 4*2 CONDUCTOR CABLES ENTERING THE POLE BASE FROM THE SOUTH TO FEED THE REMAINING LIGHTS ALONG I-95 SBL. MAINTAIN CIRCUIT CONTINUITY AND ENSURE THAT LIGHT POLES ARE RECONNECTED TO THE SAME PHASE AND CIRCUIT NUMBER AS IS EXISTING.

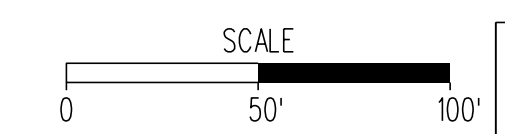


MATCH LINE - STA. 668+50 - SEE SHEET NO. 17(4)



PAC PLANS

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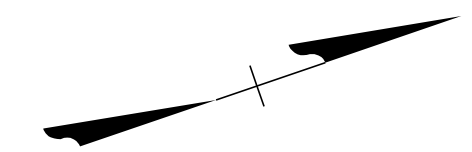
PROJECT	SHEET NO.
0095-076-299	17(3)

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140, 07/07/2021

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	17(4)

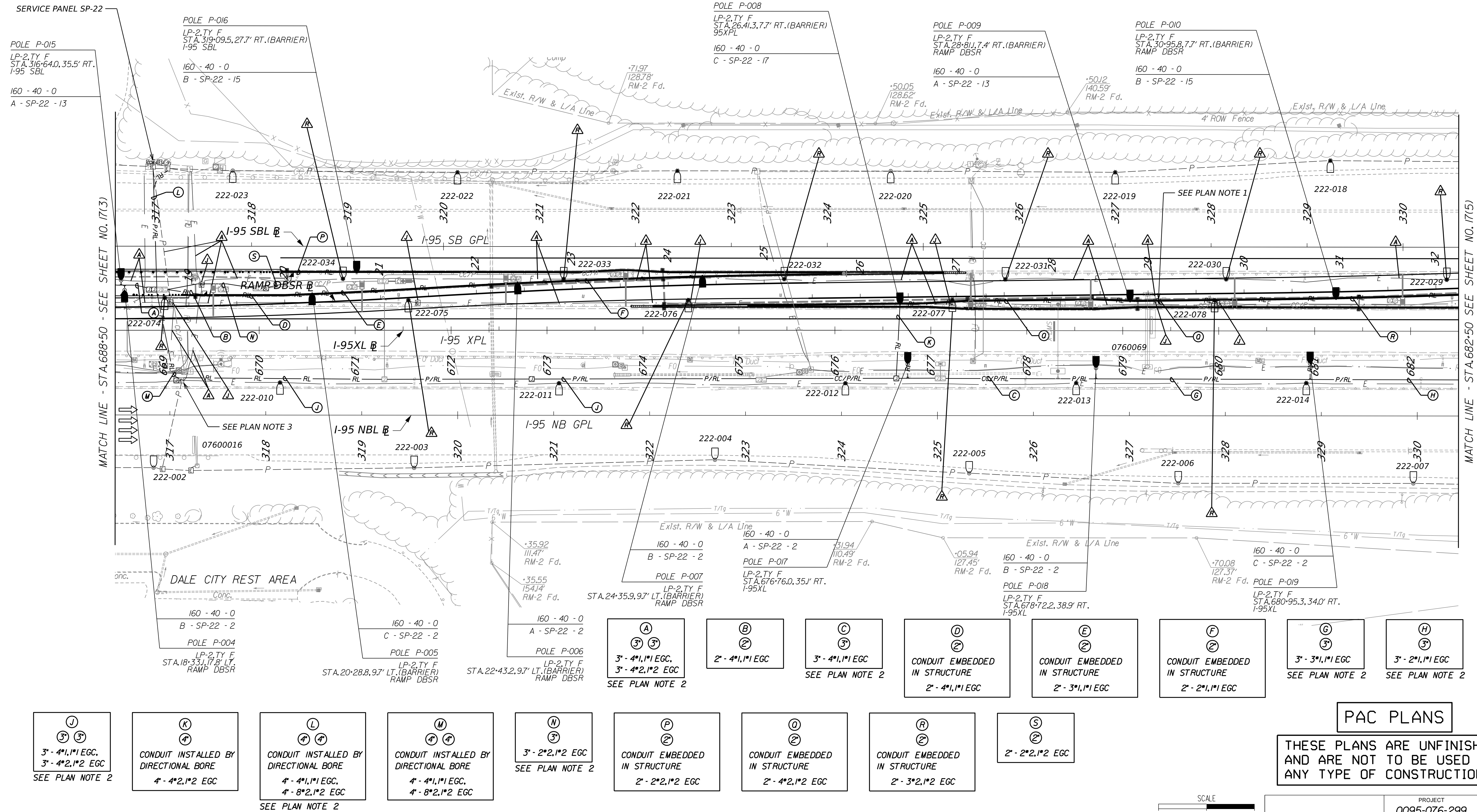
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Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PLAN NOTES:

- DISCONNECT EXISTING SIGN LIGHTING CABLES AND REMOVE BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. ABANDON EXISTING CONDUIT BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX.
- SEE TMS PLANS FOR INSTALLATION OF LIGHTING CONDUIT WITHIN TMS DUCT BANK.
- SPLICE 4*2 CONDUCTOR CABLES (CIRCUITS 8, 10 AND 12) IN PROPOSED CONDUIT TO 4*2 CONDUCTOR CABLES ENTERING THE JUNCTION BOX FROM THE EXISTING CONDUITS FROM THE NORTH, SOUTH AND EAST TO FEED THE LIGHTS ALONG I-95 NBL. MAINTAIN CIRCUIT CONTINUITY AND ENSURE THAT LIGHT POLES ARE RECONNECTED TO THE SAME PHASE AND CIRCUIT NUMBER AS IS EXISTING.



MATCH LINE - STA. 688+50 - SEE SHEET NO. 17(3)

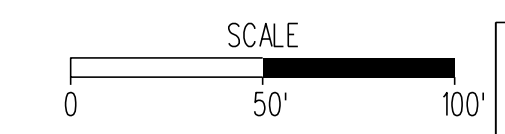
MATCH LINE - STA. 682+50 - SEE SHEET NO. 17(5)

- | | | | | | | | |
|--|-------------------------------|--|---|---|---|--|--|
| (A)
3 - 4*1.1*1 EGC,
3 - 4*2.1*2 EGC
SEE PLAN NOTE 2 | (B)
2 - 4*1.1*1 EGC | (C)
3 - 4*1.1*1 EGC
SEE PLAN NOTE 2 | (D)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 4*1.1*1 EGC | (E)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 3*1.1*1 EGC | (F)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 2*1.1*1 EGC | (G)
3 - 3*1.1*1 EGC
SEE PLAN NOTE 2 | (H)
3 - 2*1.1*1 EGC
SEE PLAN NOTE 2 |
|--|-------------------------------|--|---|---|---|--|--|

- | | | | | | | | | |
|--|---|--|---|--|---|---|---|-------------------------------|
| (J)
3 - 4*1.1*1 EGC,
3 - 4*2.1*2 EGC
SEE PLAN NOTE 2 | (K)
CONDUIT INSTALLED BY
DIRECTIONAL BORE
4 - 4*2.1*2 EGC | (L)
CONDUIT INSTALLED BY
DIRECTIONAL BORE
4 - 4*1.1*1 EGC,
4 - 8*2.1*2 EGC
SEE PLAN NOTE 2 | (M)
CONDUIT INSTALLED BY
DIRECTIONAL BORE
4 - 4*1.1*1 EGC,
4 - 8*2.1*2 EGC | (N)
3 - 2*2.1*2 EGC
SEE PLAN NOTE 2 | (P)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 2*2.1*2 EGC | (O)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 4*2.1*2 EGC | (R)
CONDUIT EMBEDDED
IN STRUCTURE
2 - 3*2.1*2 EGC | (S)
2 - 2*2.1*2 EGC |
|--|---|--|---|--|---|---|---|-------------------------------|

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	17(4)

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7140 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	17(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

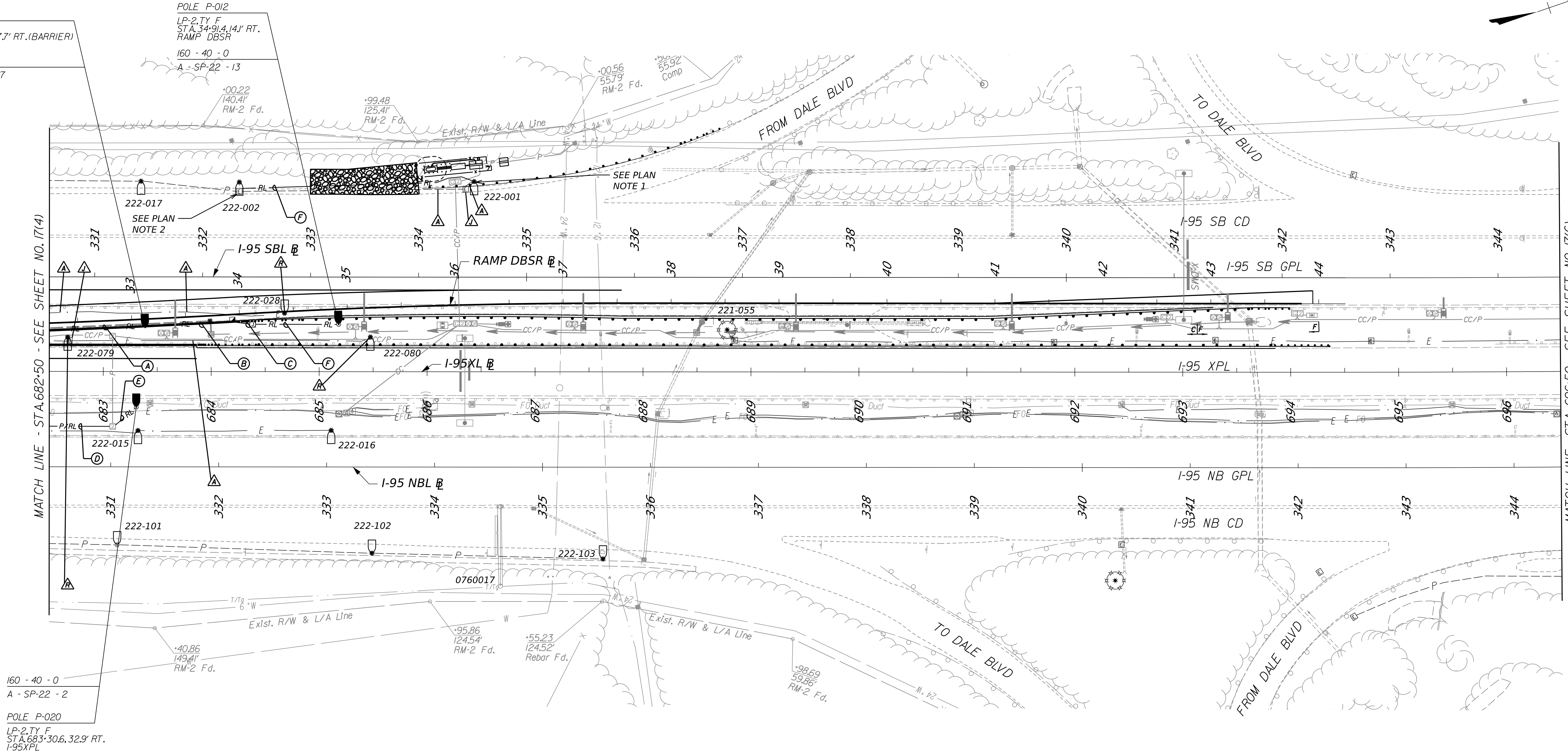
Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PLAN NOTES:

- DISCONNECT EXISTING 2*6 CONDUCTOR CABLES IN ADJACENT JUNCTION BOX AND PULL INTO EXISTING LIGHT POLE BASE. COUPLE PROPOSED CONDUIT TO EXISTING CONDUIT BEND IN LIGHT POLE FOUNDATION. WITHIN LIGHT POLE BASE, SPLICE EXISTING CONDUCTOR CABLES TO 2*2 CONDUCTOR CABLES FROM PROPOSED CONDUIT. MAINTAIN CIRCUIT CONTINUITY AND ENSURE THAT LIGHT POLES ARE RECONNECTED TO THE SAME PHASE AND CIRCUIT NUMBERS AS IS EXISTING. PERFORM LOCALIZED GRADING TO ACHIEVE POSITIVE DRAINAGE AWAY FROM LIGHT POLE BASE.
- DISCONNECT AND REMOVE EXISTING 4*2 CONDUCTOR CABLES WHICH CONTINUE NORTH IN EXISTING JUNCTION BOX. SPLICE EXISTING CONDUCTOR CABLES FROM THE SOUTH TO 2*2 CONDUCTOR CABLES IN PROPOSED CONDUIT. MAINTAIN CIRCUIT CONTINUITY AND ENSURE THAT LIGHT POLES ARE RECONNECTED TO THE SAME PHASE AND CIRCUIT NUMBERS AS IS EXISTING.

POLE P-011
 LP-2 TY F
 STA 33+122.7' RT. (BARRIER)
 RAMP DBSR
 160 - 40 - 0
 C - SP-22 - 17

POLE P-012
 LP-2 TY F
 STA 34+91.4, 141' RT.
 RAMP DBSR
 160 - 40 - 0
 A - SP-22 - 13



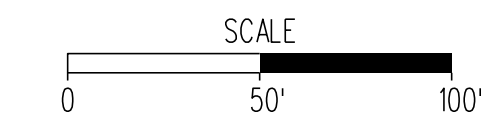
160 - 40 - 0
 A - SP-22 - 2

POLE P-020
 LP-2 TY F
 STA 683+30.6, 32.9' RT.
 I-95 XPL

(A) (2)	(B) (2)	(C) (2)	(D) (3)	(E) (3)	(F) (3)
CONDUIT EMBEDDED IN STRUCTURE 2" - 3*2,1*2 EGC	CONDUIT EMBEDDED IN STRUCTURE 2" - 2*2,1*2 EGC	2" - 2*2,1*2 EGC	3" - 2*1,1*1 EGC SEE PLAN NOTE 2	3" - 2*1,1*1 EGC	3" - 2*2,1*2 EGC

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



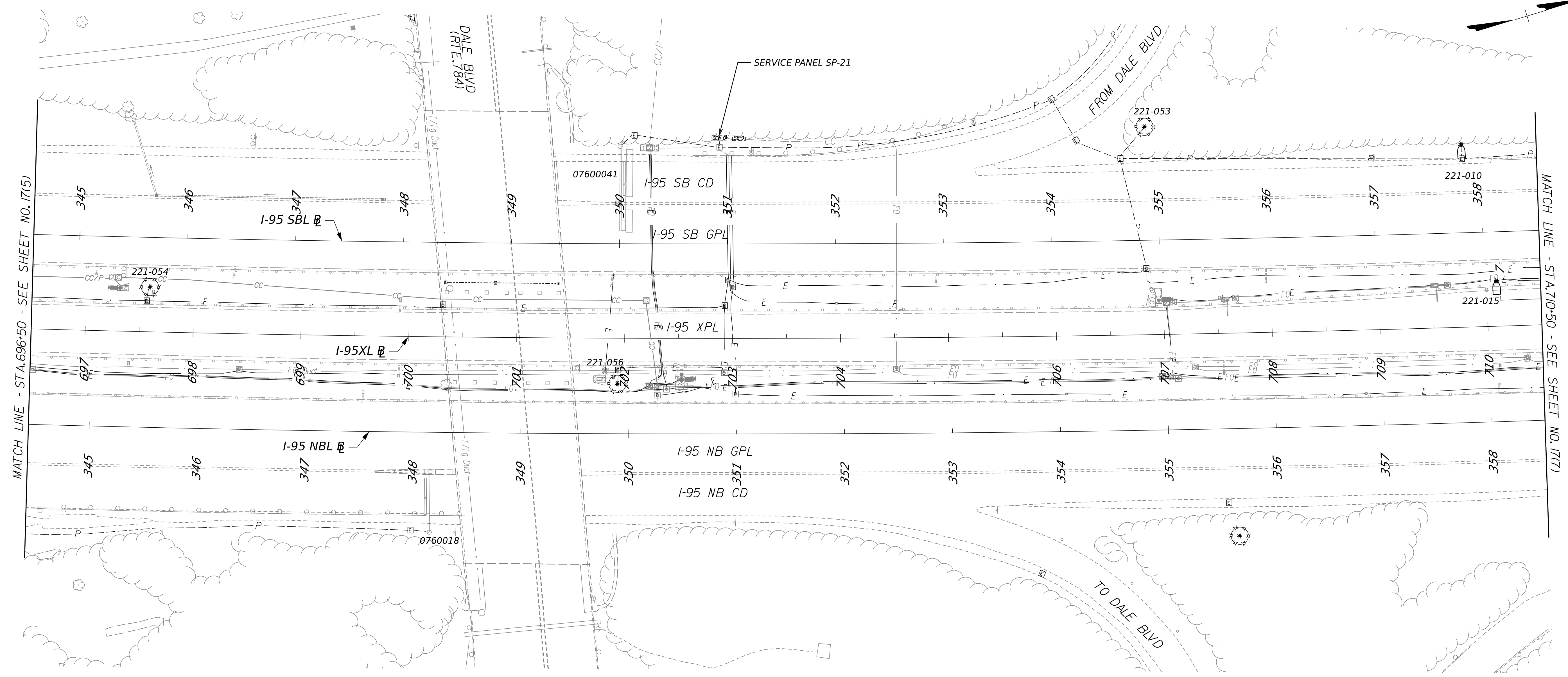
PROJECT	SHEET NO.
0095-076-299	17(5)

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	1716

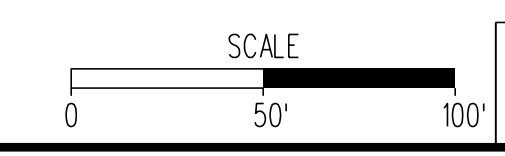
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	1716

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140 (07/07/2021)

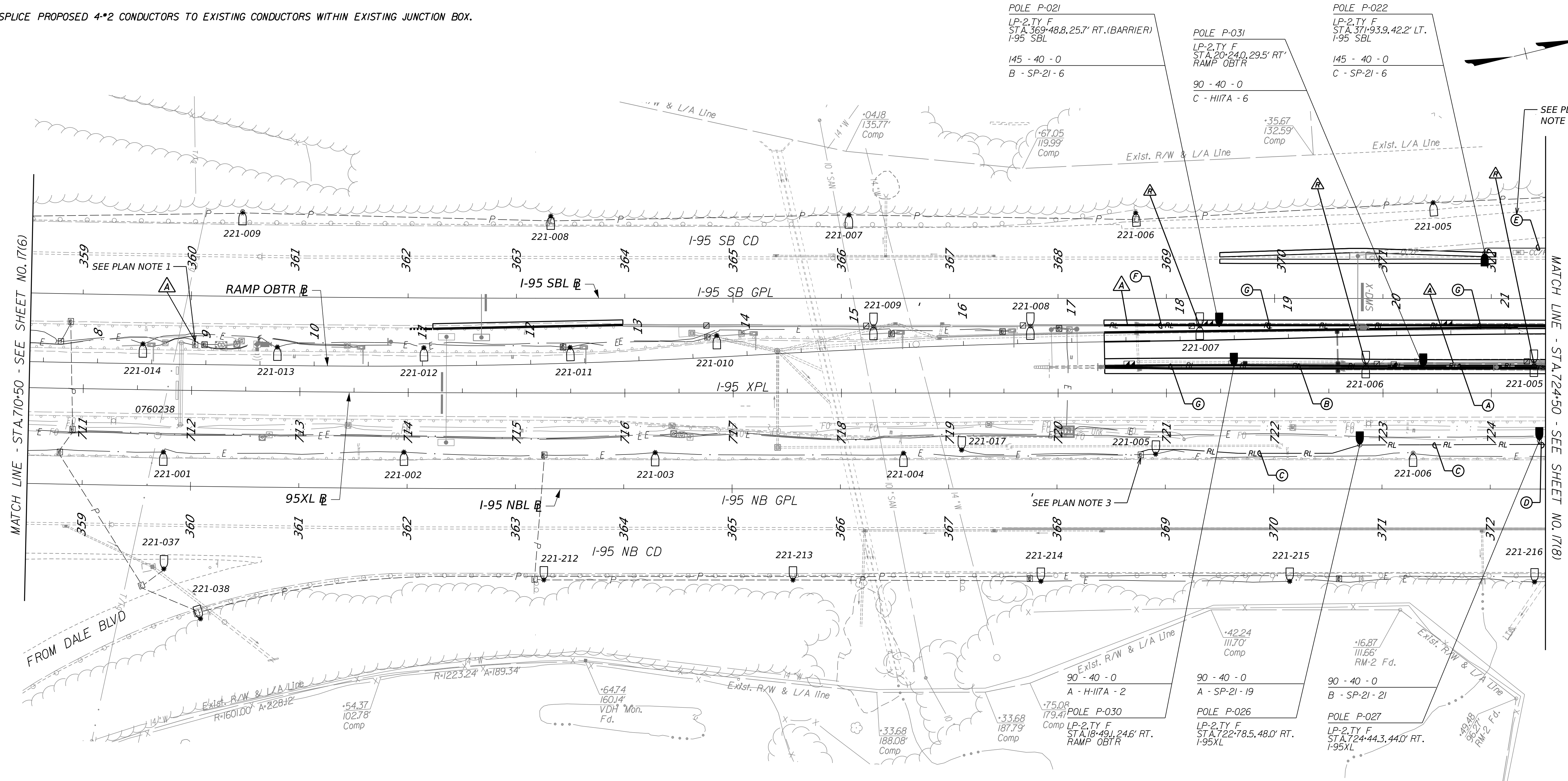
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	17(7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER

PLAN NOTES:

- DISCONNECT EXISTING SIGN LIGHTING CABLES AND REMOVE BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. ABANDON EXISTING CONDUIT BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. MAINTAIN LIGHTING CABLES HEADING NORTH AND SOUTH AND RE-SPLICE AS NECESSARY TO MAINTAIN CIRCUIT CONTINUITY.
- CONDUIT SHALL BE INSTALLED FOLLOWING STANDARD ECI-2.
- SPLICE PROPOSED 4*2 CONDUCTORS TO EXISTING CONDUCTORS WITHIN EXISTING JUNCTION BOX.



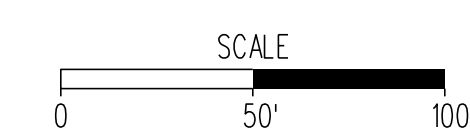
MATCH LINE - STA 710+50 - SEE SHEET NO. 17(6)

MATCH LINE - STA 724+50 - SEE SHEET NO. 17(8)

<p>(A) ② ②</p> <p>CONDUIT EMBEDDED IN STRUCTURE 2' - 3*6, 1*6 EGC, 2' - EMPTY</p>	<p>(B) ② ②</p> <p>CONDUIT EMBEDDED IN STRUCTURE 2' - 2*6, 1*6 EGC, 2' - EMPTY</p>	<p>(C) ③ ③</p> <p>3' - 4*2, 1*2 EGC</p>	<p>(D) ③ ③</p> <p>3' - 3*2, 1*2 EGC</p>	<p>(E) ③ ③</p> <p>3' - 2*6, 1*6 EGC</p>	<p>(F) ② ②</p> <p>CONDUIT EMBEDDED IN STRUCTURE 2' - 2*6, 1*6 EGC</p>	<p>(G) ② ②</p> <p>CONDUIT EMBEDDED IN STRUCTURE 2' - EMPTY 2' - EMPTY</p>
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PAC PLANS

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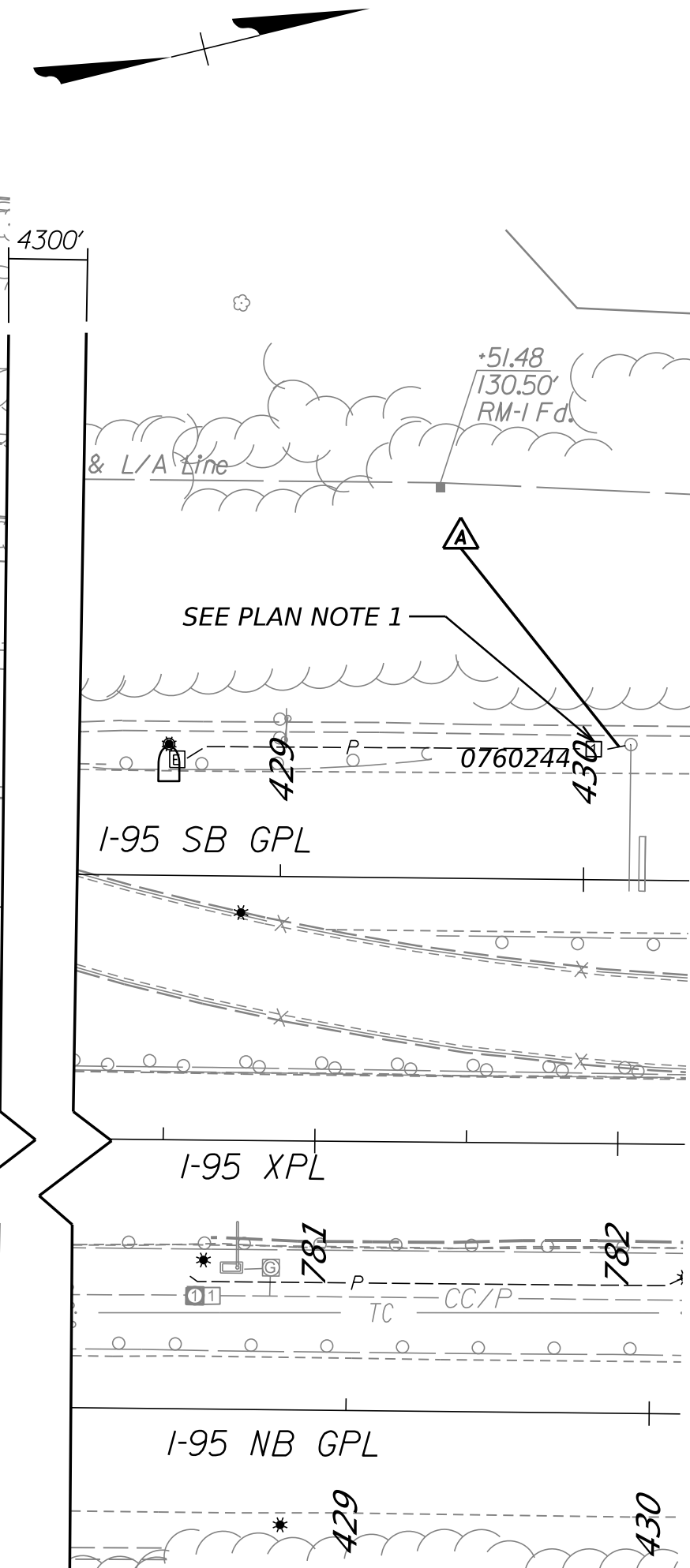
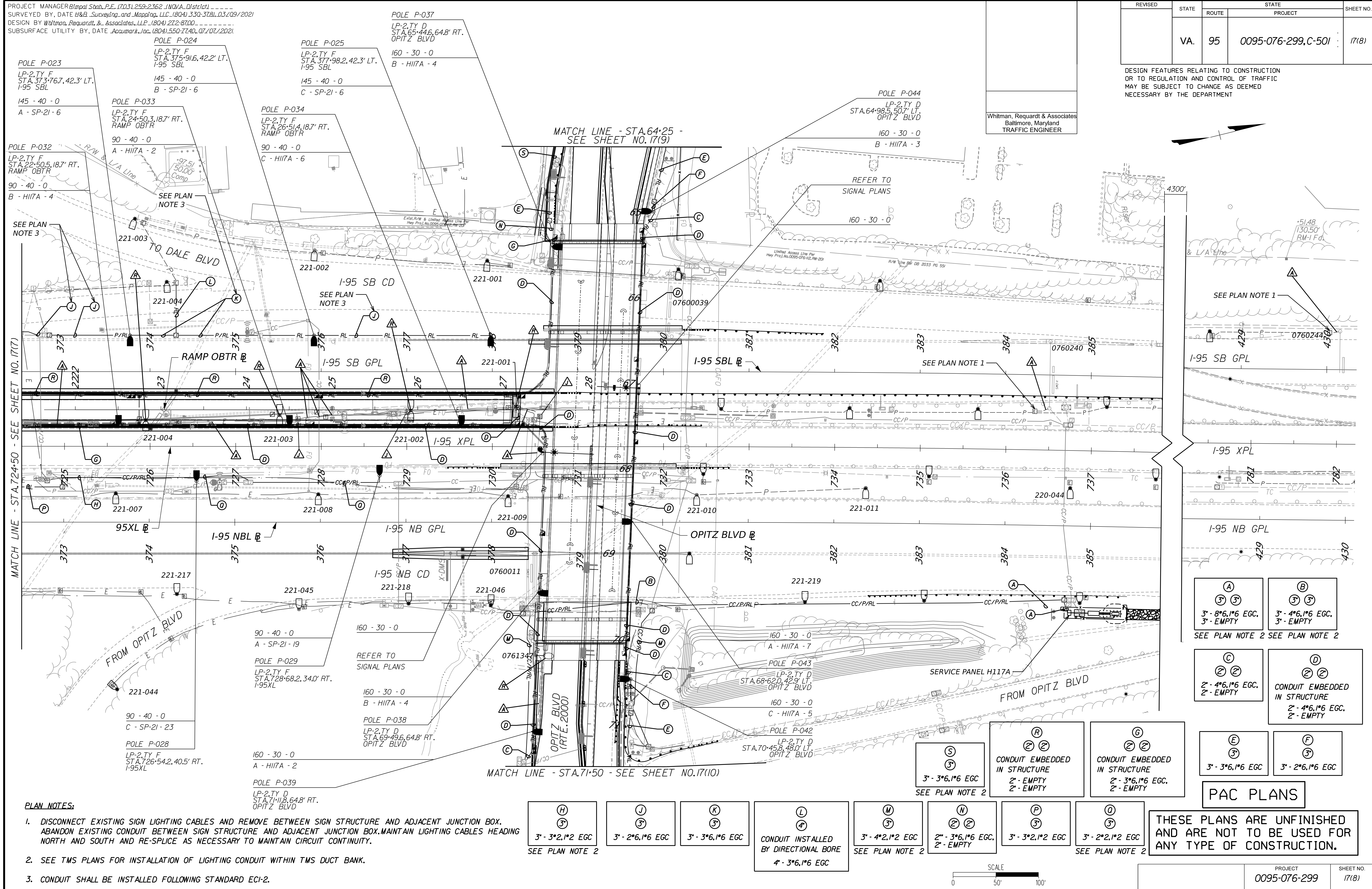
PROJECT	SHEET NO.
0095-076-299	17(7)

PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781.03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE AccuMark, Inc. (804) 550-7440.07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	17(8)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



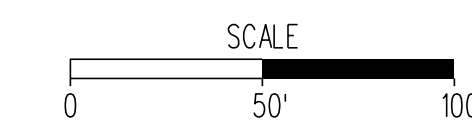
<p>(A) (3) (3) 3" - 8" x 6.1" EGC, 3" - EMPTY</p>	<p>(B) (3) (3) 3" - 4" x 6.1" EGC, 3" - EMPTY</p>
<p>(C) (2) (2) 2" - 4" x 6.1" EGC, 2" - EMPTY</p>	<p>(D) (2) (2) CONDUIT EMBEDDED IN STRUCTURE 2" - 4" x 6.1" EGC, 2" - EMPTY</p>
<p>(E) (3) (3) 3" - 3" x 6.1" EGC</p>	<p>(F) (3) (3) 3" - 2" x 6.1" EGC</p>

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

- PLAN NOTES:**
- DISCONNECT EXISTING SIGN LIGHTING CABLES AND REMOVE BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. ABANDON EXISTING CONDUIT BETWEEN SIGN STRUCTURE AND ADJACENT JUNCTION BOX. MAINTAIN LIGHTING CABLES HEADING NORTH AND SOUTH AND RE-SPLICE AS NECESSARY TO MAINTAIN CIRCUIT CONTINUITY.
 - SEE TMS PLANS FOR INSTALLATION OF LIGHTING CONDUIT WITHIN TMS DUCT BANK.
 - CONDUIT SHALL BE INSTALLED FOLLOWING STANDARD ECI-2.

<p>(H) (3) (3) 3" - 3" x 2.1" EGC SEE PLAN NOTE 2</p>	<p>(J) (3) (3) 3" - 2" x 6.1" EGC</p>	<p>(K) (3) (3) 3" - 3" x 6.1" EGC</p>	<p>(L) (4) (4) CONDUIT INSTALLED BY DIRECTIONAL BORE 4" - 3" x 6.1" EGC</p>	<p>(M) (3) (3) 3" - 4" x 2.1" EGC SEE PLAN NOTE 2</p>	<p>(N) (2) (2) 2" - 3" x 6.1" EGC, 2" - EMPTY</p>	<p>(P) (3) (3) 3" - 3" x 2.1" EGC</p>	<p>(O) (3) (3) 3" - 2" x 2.1" EGC SEE PLAN NOTE 2</p>
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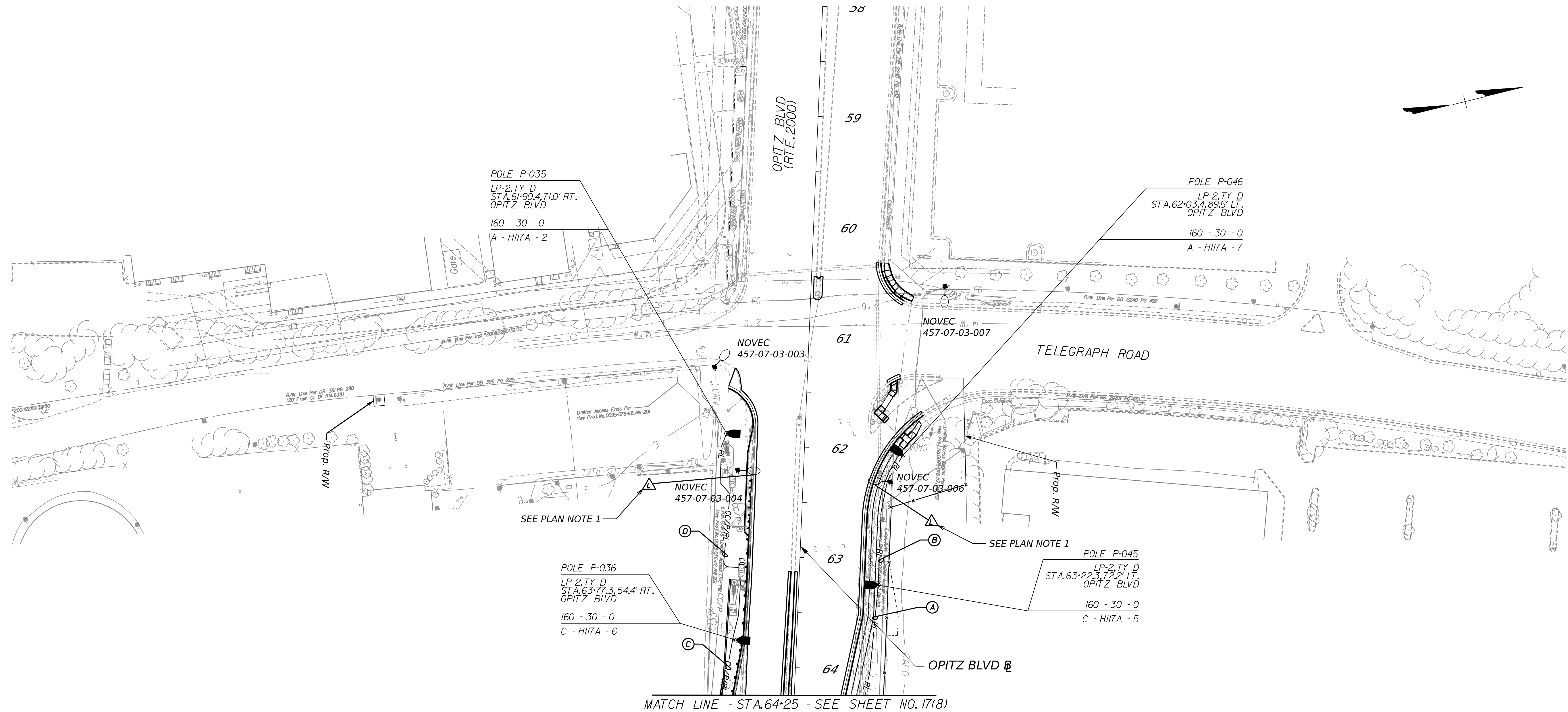


PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740, 07/07/2021*

REVISED	STATE		PROJECT	SHEET NO.
	STATE	ROUTE		
	VA.	95	0095-076-299, C-501	17(9)

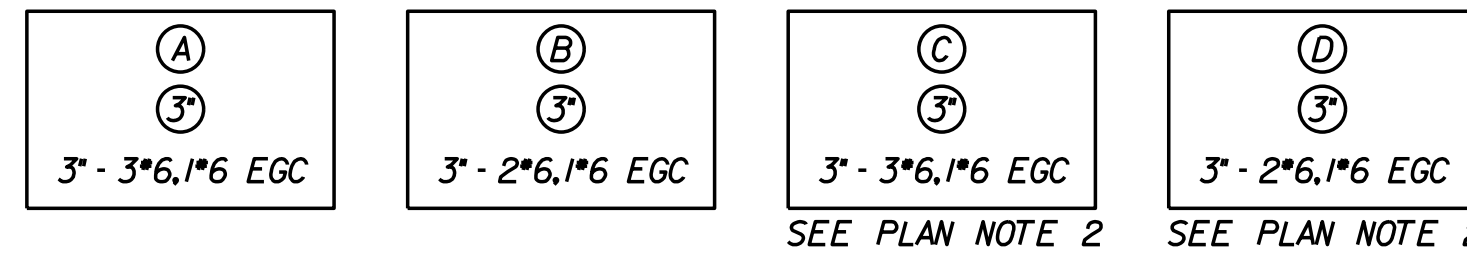
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



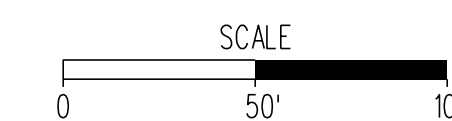
PLAN NOTES:

- COORDINATE THE REMOVAL OF THE UTILITY POLE MOUNTED LEASED LIGHTS WITH PRINCE WILLIAM COUNTY STREET LIGHTING COORDINATOR RICHARD HAGSTROM (703-792-6823).
- SEE TMS PLANS FOR INSTALLATION OF LIGHTING CONDUIT WITHIN TMS DUCT BANK.



PAC PLANS

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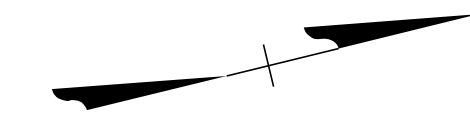
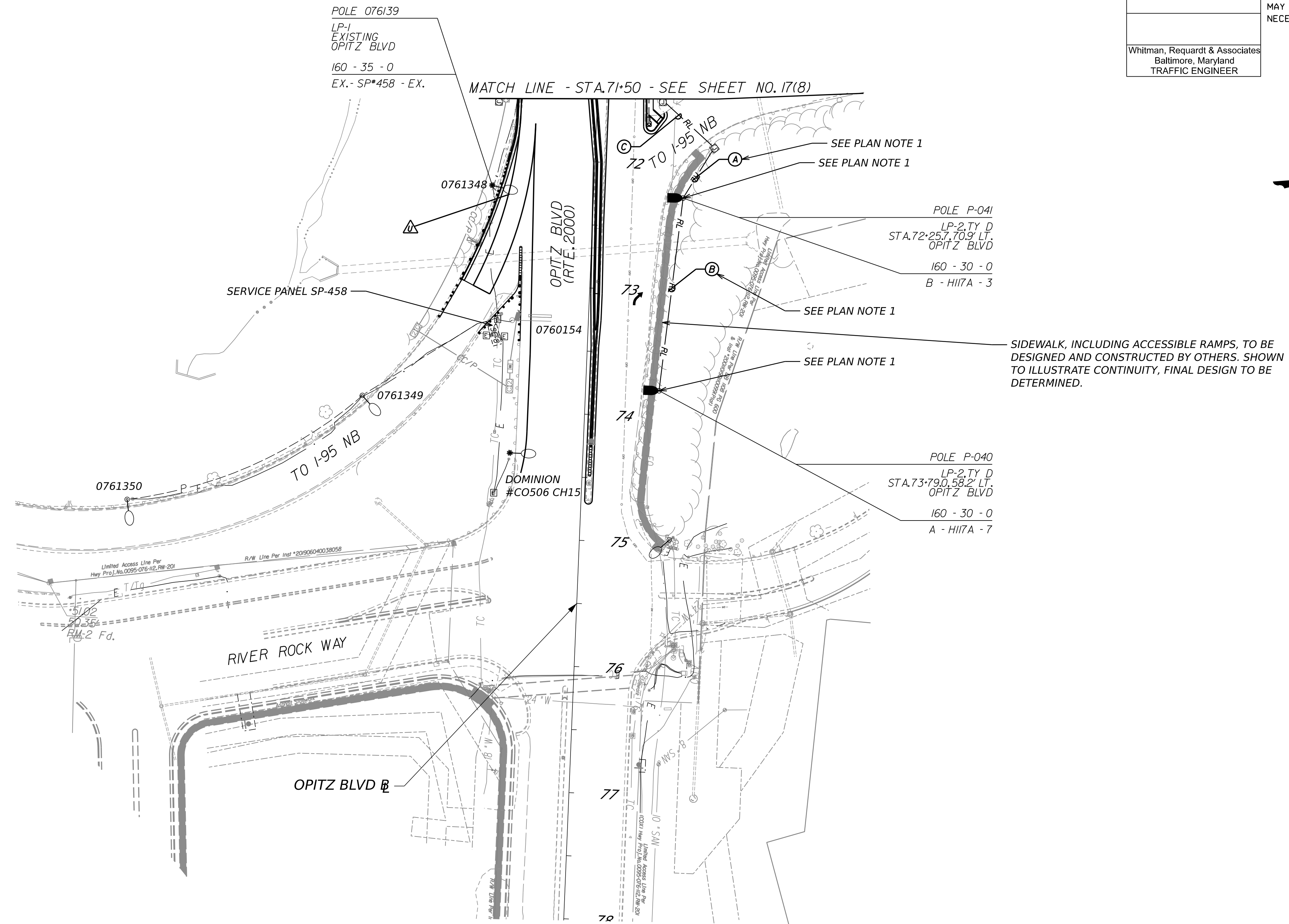
PROJECT	SHEET NO.
0095-076-299	17(9)

PROJECT MANAGER: Bimal Shaha, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	17(10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Baltimore, Maryland
 TRAFFIC ENGINEER



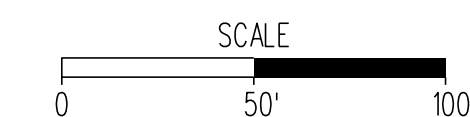
PLAN NOTES:

- CONDUIT, ELECTRICAL CABLE, LIGHT POLE, FOUNDATION AND LUMINAIRES TO BE INSTALLED BY OTHERS.

(A) (3) 3" - 3*6, 1*6 EGC	(B) (3) 3" - 2*6, 1*6 EGC	(C) (4) CONDUIT INSTALLED BY DIRECTIONAL BORE 4" - 3*6, 1*6 EGC
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PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	17(10)

PROJECT MANAGER *Ritpal Shah, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE *R&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE *Accurmark, Inc. (804) 550-0740, 07/07/2021*

TRAFFIC SIGNAL GENERAL NOTES

SIGNAL NOTES

GENERAL NOTES - SIGNAL

- ALL WORK SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE CURRENT EDITION OF THE VIRGINIA SUPPLEMENT TO THE MUTCD, THE CURRENT EDITION OF THE VDOT ROAD AND BRIDGE STANDARDS, THE CURRENT EDITION OF VDOT ROAD AND BRIDGE SPECIFICATIONS, AND SPECIAL PROVISIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY AND SCHEDULING THE LOCATING OF UNDERGROUND UTILITIES, AS WELL AS NOTIFYING VDOT'S ENGINEER WHO WILL CONTACT DAVID ROUTH (703-334-0230) TO LOCATE AND MARK ANY SIGNAL CABLES OR TRAFFIC EQUIPMENT WITHIN 1,000 FT OF THE PROJECT'S LIMITS. ALL UTILITIES AND EXISTING SIGNAL EQUIPMENT SHALL BE MARKED PRIOR TO INITIATION OF ANY CONSTRUCTION.
- PRIOR TO BEGINNING ANY SIGNALIZATION WORK, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING FIVE WORKING DAYS PRIOR TO COMMENCING ANY WORK AT AN EXISTING SIGNAL, AND PROVIDE THE FOLLOWING:
 - CONTRACTOR DAYTIME AND EMERGENCY TELEPHONE NUMBERS.
 - LOCATION OF INTERSECTION WHERE WORK IS TAKING PLACE.
- THE CONTRACTOR SHALL MAINTAIN ALL EXISTING TRAFFIC SIGNAL EQUIPMENT (INCLUDING POWER AND COMMUNICATIONS) UNLESS OTHERWISE NOTED ON THE PLANS. INSTALLATION OF EQUIPMENT SHALL NOT DISRUPT OPERATION OF EXISTING SIGNAL UNLESS APPROVED BY THE ENGINEER.
- ALL PROPOSED SIGNAL EQUIPMENT SHALL BE INSTALLED PRIOR TO DEACTIVATION OF EXISTING SIGNAL FOR WIRING SWITCH OVER. THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO HAVE VDOT'S NROIC PERSONNEL PRESENT DURING SWITCHOVER (703-334-0882, BETWEEN 5:00 AM AND 7:00 PM, MONDAY-FRIDAY), A MINIMUM OF 48 HOURS ADVANCE NOTICE IS REQUIRED. THE CONTRACTOR SHALL HAVE HIS QUALIFIED REPRESENTATIVE PRESENT TO MONITOR TRAFFIC FLOW AND ADJUST TIMINGS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.
- THE PROJECT IS RESPONSIBLE FOR OBTAINING THE LATEST VDOT APPROVED CONTROLLER, UPS ASSEMBLY AND CABINET THROUGH THE VDOT NORTHERN REGIONAL OPERATIONAL INSTALLATION & CONSTRUCTION (NROIC) SECTION OF THE NOVA DISTRICT. PAYMENT(S) FOR THE CONTROLLER, UPS ASSEMBLY AND CABINET IS REQUIRED PRIOR TO THE PROJECT RECEIVING THE EQUIPMENT. IN ORDER TO AVOID DELAYS IN OBTAINING THE CONTROLLER, UPS ASSEMBLY AND CABINET, NROIC REQUIRES NOTIFICATION AND PAYMENT TWO (2) MONTHS PRIOR TO THE START OF ANY CONSTRUCTION. THE PROJECT SHALL CONTACT NROIC (CLIFFORD MERRICK @ 703.334.0366) TO ARRANGE FOR THE PURCHASE AND PICK-UP OF THE CONTROLLER, UPS ASSEMBLY AND CABINET. TWO (2) WEEKS PRIOR TO THE AGREED UPON PICK-UP DATE, THE PROJECT SHALL CONTACT NROIC TO VERIFY EQUIPMENT AVAILABILITY. THE PROJECT SHALL PICK-UP THE CONTROLLER, UPS ASSEMBLY AND CABINET AT NROIC'S TFO FACILITY AT 8010 MASON KING COURT, MANASSAS VA 20109. UPON RECEIPT OF THE 2070 SPEC CONTROLLER, UPS ASSEMBLY AND CABINET FROM VDOT, THE PROJECT'S QUALIFIED REPRESENTATIVE SHALL WIRE THE CABINET, PROGRAM AND TEST THE PHASING OF THE INTERSECTION AS SHOWN ON THE PLAN. THE PROJECT SHALL PROVIDE A CERTIFICATION LETTER TO VDOT INDICATING THAT THE WORK IS IN COMPLIANCE WITH VDOT STANDARDS AND IS CONSISTENT WITH THE PHASING AS PER THE SIGNAL PLAN. AS PART OF THE INSTALLATION, THE PROJECT IS RESPONSIBLE FOR PROVIDING THE CONCRETE FOUNDATION SPECIFIED AS ST'D CF-3 MODIFIED PER THE STRUCTURAL PLANS (SEE SHEET NO. 67) AND THE COMMUNICATIONS COMPANY ACCESS COMPARTMENT SHOWN AS CC-2.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING DETECTION ON ALL APPROACHES TO THE INTERSECTION AT ALL TIMES AND THROUGHOUT ALL PHASES OF CONSTRUCTION. COORDINATED SIGNAL OPERATIONS SHALL BE MAINTAINED AT ALL TIMES. ONCE MODIFICATIONS ARE STARTED, IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR UNTIL THE TRAFFIC SIGNAL IS ACCEPTED INTO THE VDOT SIGNAL SYSTEM.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL MOT ASSOCIATED WITH THE INSTALLATION OF THE PROPOSED TRAFFIC SIGNAL EQUIPMENT.
- EXISTING CCTV SHALL REMAIN OPERATIONAL AND FULLY FUNCTIONAL WITHOUT INTERRUPTION FOR THE DURATION OF CONSTRUCTION.
- NO TRAFFIC SIGNAL SHALL BE PLACED INTO OPERATION UNTIL THE LOCATION IS 100% COMPLETE. THIS INCLUDES ANY NECESSARY PAVEMENT MARKINGS AND SIGNAGE SHOWN ON THE PLANS AND THAT THE TRAFFIC SIGNAL COMMUNICATION REQUIREMENTS ARE COMPLETE AND OPERATIONAL.
- NEW TRAFFIC SIGNAL INSTALLATIONS SHALL NOT BE PLACED INTO COLOR OPERATION ON MONDAYS, FRIDAYS OR DAYS PRECEDING OR FOLLOWING HOLIDAYS, UNLESS DIRECTED BY THE DISTRICT TRAFFIC ENGINEER.
- BROADBAND WIRELESS COMMUNICATION
 - THE PROJECT SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING COMMUNICATION TO THE TRAFFIC SIGNAL CONTROLLER AT ALL TIMES. THE PROJECT IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH PROVIDING COMMUNICATION TO THE TRAFFIC SIGNAL. THE PROJECT SHALL BE RESPONSIBLE FOR COORDINATING THE LOCATION AND THE INSTALLATION OF THE COMMUNICATION CIRCUIT CONDUIT(S) AND EQUIPMENT TO THE TRAFFIC SIGNAL CONTROLLER CABINET FOR THE DESIGNATED COMMUNICATION PLATFORM.
 - THE PROJECT SHALL CONTACT VDOT'S NORTHERN REGION OPERATIONS COMMUNICATIONS GROUP at NOVATFOCOMM@VDOT.VIRGINIA.GOV NINETY (90) DAYS PRIOR TO THE START OF THE TRAFFIC SIGNAL CONSTRUCTION TO IDENTIFY THE DESIGNATED COMMUNICATION PLATFORM AND TO INITIATE THE BROADBAND CIRCUIT ORDERING PROCESS.
 - THIS PROPOSED TRAFFIC SIGNAL PROJECT SHALL UTILIZE VDOT'S NORTHERN REGION WIRELESS COMMUNICATION PLATFORM. THE PROJECT SHALL CONTACT VDOTS COMM GROUP AS DETAILED IN NOTE 2 ABOVE AT NOVATFOCOMM@VDOT.VIRGINIA.GOV REGARDING THE INSTALLATION REQUIREMENTS AND WIRELESS COMMUNICATION EQUIPMENT DETAILS.
 - THE 1" METAL CONDUIT THAT IS INSTALLED AS PART OF THE COMMUNICATION CIRCUIT (ST'D CC-2 ON THE CONTROLLER CABINET) SHALL BE TERMINATED INTO A JUNCTION BOX LOCATED 12" TO 24" FROM THE CONTROLLER CABINET FOUNDATION. THE 2" CONDUIT FROM THE DESIGNATED COMMUNICATION PROVIDER CONNECTION POINT TO THE CONTROLLER CABINET SHALL BE TERMINATED INTO THIS JUNCTION BOX. THE COVER SHALL HAVE "COMM" CAST IN THE DEPRESSION ON TOP AS DETAILED IN THE JUNCTION BOX. PULL ROPE RATED AT 1100 LBS. SHALL BE INSTALLED IN ALL COMMUNICATION CONDUITS. REFER TO VDOT R&B STD CF-3 1301.31 (Revision date 2/2016).
 - NO TRAFFIC SIGNAL SHALL BE PLACED INTO OPERATION UNTIL THE TRAFFIC SIGNAL COMMUNICATION REQUIREMENTS ARE COMPLETE AND OPERATIONAL.

A. POLES AND FOUNDATIONS

- MAST ARM LENGTHS ARE TO BE INSTALLED AS SHOWN ON PLAN AND ALL MAST ARMS ARE TO BE FIELD DRILLED ONLY. MAST ARM LENGTH IS SHOWN NEXT TO EACH MAST ARM IN THE PLAN VIEW.
- SIGNAL POLES SHALL BE IN ACCORDANCE WITH VDOT ST'D.MP-3.
- SIGNAL MAST ARM POLE SUPPORTS SHALL BE AS DETAILED ON STRUCTURAL PLANS (SEE SHEET NOS. 59 & 60).
- ALL PEDESTAL POLES, ST'D PF-2, FOR PEDESTRIAN EQUIPMENT, SHALL BE 12 FT.

B. CONTROLLER AND FOUNDATION

- THE CONTROLLER CABINET FOUNDATION SHALL BE AS DETAILED ON THE STRUCTURAL DRAWINGS (SEE SHEET NO. 67). THE CONTROLLER CABINET FOUNDATION SHALL HAVE A SEPARATE 2" CONDUIT (M) TIED INTO THE SERVICE METER EQUIPMENT.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING POWER TO THE CONTROLLER AT ALL TIMES. THE CONTRACTOR IS RESPONSIBLE FOR ANY COSTS RELATED TO MAINTAINING POWER TO THE TRAFFIC SIGNAL.
- THE FINAL SIGNAL TIMING PLAN INCLUDES EIGHT (8) TIME-OF-DAY TIMING PLANS TO REFLECT CYCLE LENGTHS NECESSARY TO ACCOMMODATE CHANGES IN TRAFFIC PATTERNS FOR WEEKDAYS AND WEEKENDS. THE EIGHT TIMING PLANS CONSIST OF FOUR TIMING PLANS FOR WEEKDAYS (AM, MID, PM, OFF-PEAK) AND FOUR TIMING PLANS FOR WEEKENDS (SATURDAY PEAK, SUNDAY PEAK, WEEKEND BEFORE PEAK, AND WEEKEND AFTER PEAK). THESE TIMING PLANS SHALL BE FIRST SUBMITTED TO THE VDOT PERMITS SECTION. THE PERMIT SECTION WILL THEN NOTIFY THE NRO TRAFFIC SIGNAL OPERATIONS SECTION FOR REVIEW AND APPROVAL NO MORE THAN SIX (6) MONTHS PRIOR TO PROJECT COMPLETION AND NO LESS THAN SIXTY (60) DAYS PRIOR TO THE ACTIVATION OF THE TRAFFIC SIGNAL.

C. TRAFFIC SIGNAL HEADS

- ALL TRAFFIC SIGNAL HEADS SHALL BE CAST ALUMINUM.
- ALL SIGNAL HEADS SHALL HAVE POLYCARBONATE BACKPLATES. BACKPLATE HARDWARE SHALL BE STAINLESS STEEL.
- PEDESTRIAN SIGNAL HEADS SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD SMB-3.
- PEDESTAL MOUNTED TRAFFIC SIGNAL HEADS SHALL BE MOUNTED IN ACCORDANCE WITH STANDARD SMB-1.
- PEDESTRIAN PUSHBUTTONS SHALL BE ACCESSIBLE PEDESTRIAN SYSTEM (APS) EQUIPMENT MEETING ALL OF THE REQUIREMENTS OF THE MUTCD, VIRGINIA SUPPLEMENT TO THE MUTCD, ADA AND THE CONTRACT SPECIAL PROVISIONS. PEDESTRIAN PUSHBUTTONS SHALL BE INSTALLED IN ACCORDANCE WITH PA-2 OR PA-4 AS SPECIFIED AND SHALL BE IN ACCORDANCE WITH MUTCD, ADA, AND VDOT SPECIFICATIONS.

D. DETECTORS

- 6'X40' LOOP DETECTORS SHALL BE INSTALLED IN ACCORDANCE WITH ST'D TD-1C AND SHALL BE PLACED 5' IN FRONT OF THE STOP BAR. 6'X6' LOOP DETECTORS SHALL BE INSTALLED IN ACCORDANCE WITH VDOT ST'D TD-1B.
- 14'/1 ENCLOSED CONDUCTOR CABLE LEAD IN REQUIRES A 5/8" SAW CUT.
- LOOP DETECTOR AMPLIFIERS SHALL BE ONE FOR EACH LOOP EXCEPT THAT WHEN THERE ARE SETS OF 6' X 6' LOOPS, ONLY THE SET FARTHEST FROM THE STOP BAR SHALL HAVE SEPARATE AMPLIFIER UNITS. ALL OTHER 6' X 6' SETS SHALL BE SPLICED IN SERIES.

E. CONDUIT, CONDUCTORS, AND ELECTRICAL

- THE PROJECT SHALL BE RESPONSIBLE FOR MAINTAINING ELECTRICAL SERVICE TO THE CONTROLLER AT ALL TIMES. THE PROJECT SHALL BE RESPONSIBLE FOR ANY COSTS ASSOCIATED WITH MAINTAINING ELECTRICAL SERVICE TO THE TRAFFIC SIGNAL. THE PROJECT SHALL BE RESPONSIBLE FOR COORDINATING THE LOCATION AND THE INSTALLATION OF THE ELECTRICAL SERVICE FOR THE TRAFFIC SIGNAL WITH THE LOCAL UTILITY COMPANY. THE NOVA SPEC. SE-5 ELECTRICAL SERVICE SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD SE-5 SHOWN ON THE PLAN AND SECTION 238.02(H) OF THE VDOT ROADS AND BRIDGES SPECIFICATIONS. ELECTRICAL SERVICE SHALL BE METERED. DEDICATED CIRCUIT BREAKERS SHALL BE PROVIDED FOR THE EXPRESS LANES RAMP TRAFFIC SIGNAL AND THE ROADWAY LIGHTING.
- TRAFFIC SIGNAL AND ROADWAY LIGHTING CONDUCTORS MAY BE INSTALLED TOGETHER IN CONDUITS AND JUNCTION BOXES. ROADWAY LIGHTING CONDUCTORS SHALL BE CLEARLY IDENTIFIED AT EACH JUNCTION BOX AND SHALL BE INSTALLED IN NON-METALLIC FLEXIBLE CONDUIT INSIDE EACH MAST ARM POLE FROM THE BASE TO THE ROADWAY LIGHTING LUMINAIRE ARM.
- JUNCTION BOX COVERS SHALL HAVE THE LETTERS "TRAF" CAST IN THE TOP SURFACE DEPRESSION FOR ALL THE SIGNAL RELATED JUNCTION BOXES CONTAINING CABLE WITH LESS THAN 50 VOLTS. ALL OTHER JUNCTION BOX COVERS SHALL HAVE THE LETTERS "ELEC" CAST IN THE TOP SURFACE DEPRESSION.
- ALL JUNCTION BOXES SHALL BE INSTALLED IN ACCORDANCE WITH ST'D JB-S2 UNLESS OTHERWISE NOTED. SEE SHEET NO. 91 FOR INSTALLATION OF JUNCTION BOXES ON THE BRIDGE.
- NO JB-S1, S2, OR S3 SHALL BE INSTALLED IN A PAVED SHOULDER, SIDEWALK, OR MULTI-PURPOSE TRAIL.
- (S) DENOTES SHIELDED CABLE, (M) DENOTES METAL CONDUIT, (EGC) DENOTES EQUIPMENT GROUNDING CONDUCTOR, (E) DENOTES EXISTING.
- ALL UNDERGROUND CONDUITS SHALL BE INSTALLED IN ACCORDANCE WITH ST'D. ECI-1.
- FOR INSTALLATION OF CONDUIT, NO OPEN CUT WILL BE ALLOWED IN ROADWAY SURFACE. SEE SHEET NO. 91 FOR INSTALLATION OF CONDUIT ON THE BRIDGE.
- ALL EXISTING CONDUIT NOT SHOWN FOR REUSE SHALL BE CAPPED AND ABANDONED.
- ALL EXISTING WIRING NOT SHOWN FOR REUSE SHALL BE COMPLETELY REMOVED.
- ALL PULL ROPE SHALL BE RATED AT 1100 LBS.
- THE TRAFFIC SIGNAL WIRING AND SIGNAL PREEMPTION WIRING SHALL USE SEPARATE CONDUITS AND JUNCTION BOXES.

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	18(1)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
TRAFFIC ENGINEER

F. SIGNS AND PAVEMENT MARKINGS

- ALL MAST ARM MOUNTED SIGNS SHALL BE MOUNTED IN ACCORDANCE WITH ST'D. SMD-2.
- PAVEMENT MARKINGS SHALL BE MODIFIED TO REFLECT THE MARKINGS SHOWN ON THE PLAN WHEN THE SIGNAL IS INSTALLED.
- ANY EXISTING PAVEMENT MARKINGS THAT ARE IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE COMPLETELY ERADICATED.
- LIMITS SHOWN ON PROPOSED MARKING ARE APPROXIMATE AND SHALL BE MODIFIED IN THE FIELD TO ENSURE THAT PROPOSED PAVEMENT MARKINGS CONTINUE UNTIL EXISTING PAVEMENT MARKINGS CAN BE MATCHED.

MOT NOTES

- ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND SHALL BE REMOVED OR RELOCATED AS THE WORK IS COMPLETED OR WORK CONDITIONS CHANGE. THE CONTRACTOR SHALL ENSURE THAT ALL TEMPORARY TRAFFIC CONTROL DEVICES REMAIN IN PLACE AND OPERATING AT ALL TIMES.
- THE CONTRACTOR SHALL VERIFY PROPOSED GEOMETRICS PRIOR TO INSTALLING SIGNAL EQUIPMENT.
- ALL JUNCTION BOXES SHALL BE INSTALLED AT FINAL GRADE.
- THE CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING SIDEWALKS CAUSED BY THE INSTALLATION OF THE SIGNAL EQUIPMENT.
- ALL EXISTING SIGNS NOT RELOCATED OR REMOVED SHALL REMAIN UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- THE CONTRACTOR SHALL INSTALL CONDUIT AT SUFFICIENT DEPTH TO AVOID DISTURBANCE DURING ROADWAY CONSTRUCTION. CONDUIT SHALL BE INSTALLED PRIOR TO BEGINNING ROADWAY CONSTRUCTION.
- NEW TRAFFIC SIGNAL HEADS AND OVERHEAD TRAFFIC SIGNAL SIGNAGE SHALL BE COVERED WITH DURABLE NON-TRANSPARENT COVER UPON INSTALLATION. THE CONTRACTOR SHALL MAINTAIN THE COVERS UNTIL THE NEW TRAFFIC SIGNAL SYSTEM IS OPERATIONAL.
- THE CONTRACTOR SHALL NOT BLOCK THE VIEW OF EXISTING SIGNAL INDICATIONS DURING INSTALLATION OF THE MAST ARMS.
- MAINTENANCE AND REPAIR OF THE TRAFFIC SIGNAL AND ANY NECESSARY MODIFICATIONS DURING CONSTRUCTION SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

STANDARD TRAFFIC SIGNAL LEGEND

PLAN ITEM	PLAN SYMBOL		LABELS
	PROPOSED	EXISTING	
Metal Signal Pole & Foundation and Mast Arm (As noted in Signal Pole Legend)			Proposed Signal Head Existing Signal Head
Pedestal Pole and Foundation (ST'd, PF-2)			Proposed Pedestrian Signal Head Existing Pedestrian Signal Head
Pedestal Pole and Foundation (ST'd, PA-3)			Signal Pole or Controller
Traffic Signal Head w/ Backplate w/o Backplate			Cable and Conduit
Pedestrian Signal Head			Construction Notes
Pedestrian Pushbutton & Sign			Signal Phasing Sign
Traffic Signal Sign Mast Arm or Span Wire Mt'd. Pole Mounted			
CCTV Camera			
Video Detection Camera			
360 Video Detection Camera			
GPS Emergency Vehicle Pre-emption (EVP) Sensor w/ Conf. Light w/o Conf. Light			
Wireless Radio			
Controller Cabinet & Foundation (Std, CF-3)			
Junction Box (ST'd, as noted on plans)			
Signal Luminaire (250 W) and Arm			
Signal Luminaire (400 W) and Arm			
Loop Detector (Size as noted on plans)			
Video Detection Zone (Size as noted on plans)			
Conduit			

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

INDEX OF SHEETS

Sheet No.	Sheet Description:
18(1)	Index of Sheets, General Notes & Legend
18(2)	Summary of Quantities (Not Provided)
18(3)	Traffic Signal Plan - Optiz Blvd. (Rte. 2000) & Telegraph Rd. (Rte. 1781)
18(4)	Traffic Signal Plan - Optiz Blvd. (Rte. 2000) & I-95 Express Lanes Ramp
18(5)	Traffic Signal Plan - Optiz Blvd. (Rte. 2000) & I-95 Express Lanes Ramp

TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL INDEX OF SHEETS, GENERAL NOTES & LEGEND(S)

PRINCE WILLIAM COUNTY	
PROJECT	SHEET NO.
0095-076-299	18(1)

PROJECT MANAGER: Bimol Saha, P.E. (203) 259-2362 (NOVA District)
SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
SUBSURFACE UTILITY BY: DATE Accurate, Inc. (804) 550-7740, 01/07/2021

INITIAL TIMING CHART								
PHASE	1	2	3	4	5	6	7	8
MOVEMENT	OPITZ BLVD WB LEFT	OPITZ BLVD EB	TELEGRAPH ROAD SB	TELEGRAPH ROAD NB	OPITZ BLVD EB LEFT	OPITZ BLVD WB	FFU	FFU
PHASE ON	X	X	X	X	X	X		
PHASE OFF							X	X
INTERVAL	PHASE TIMINGS							
MIN GR	5.0	20.0	7.0	7.0	8.0	20.0	-	-
AMBER	3.6	5.1	3.9	4.0	4.1	4.4	-	-
RED	3.3	1.0	4.1	4.0	3.1	1.0	-	-
MAX	15.0	45.0	40.0	30.0	20.0	45.0	-	-
PASSAGE	3.0	4.0	3.0	3.0	3.0	4.0	-	-
MIN GAP	0.0	0.0	0.0	0.0	0.0	0.0	-	-
PED WALK	-	-	8.0	-	-	7.0	-	-
PED FDW	-	-	33.0	-	-	18.0	-	-
LPI	-	-	-	-	-	-	-	-
MODE	NON LOCK	MIN RECALL	NON LOCK	NON LOCK	NON LOCK	MIN RECALL	NON LOCK	NON LOCK

Signal Pole & Controller Legend

- (ALL DIMENSIONS ARE TO CENTER OF POLE)
- A PEDESTAL POLE (PF-2), 12' 73.2' RT. of Rte. 2000 Constr. @ Sta. 60+65
 - B PEDESTAL POLE (PF-2), 12' 73.2' LT. of Rte. 2000 Constr. @ Sta. 60+36
 - C PEDESTAL POLE (PF-2), 12' 84.8' LT. of Rte. 2000 Constr. @ Sta. 60+52
 - D PEDESTAL POLE (PF-2), 12' 83.4' LT. of Rte. 2000 Constr. @ Sta. 61+43

SIGNAL NOTES

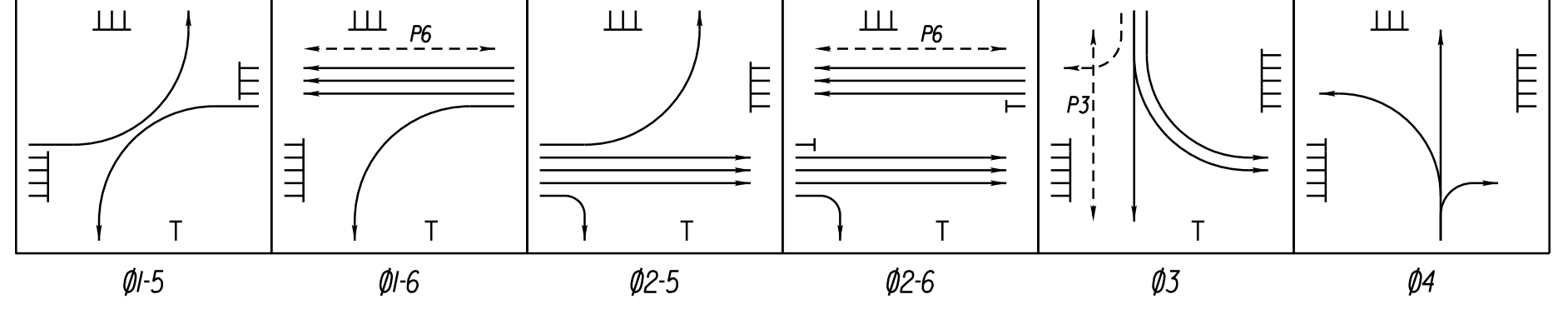
- REMOVE EXISTING JUNCTION BOX.
- INSTALL VDOT ST'D JB-S3 JUNCTION BOX.
- SPICE EXISTING 14/2c LOOP DETECTOR CABLE TO PROPOSED 14/1 LOOP WIRE CABLE.
- SEE SHEET 18(5) FOR INSTALLATION OF POWER AND COMMUNICATION SERVICE EQUIPMENT AND CONDUIT.
- INSTALL WIRELESS RADIO ON SIGNAL POLE.

Color Sequence Chart

SIGNAL	PHASES						COMBINATIONS				FLASH
	1	2	3	4	5	6	1-5	1-6	2-5	2-6	
1	-G						-G	-G	G	G	-R
2		G							G	G	Y
3			G								R
3A			-G								R
3B			G								-R
4				G							R
4A				-G							R
5					-G		-G	-G	-G		-R
6						G	G	G	G		Y
P3 (APS)	DW	DW	W	DW	DW	DW	DW	DW	DW	DW	BLANK
P6 (APS)	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	BLANK

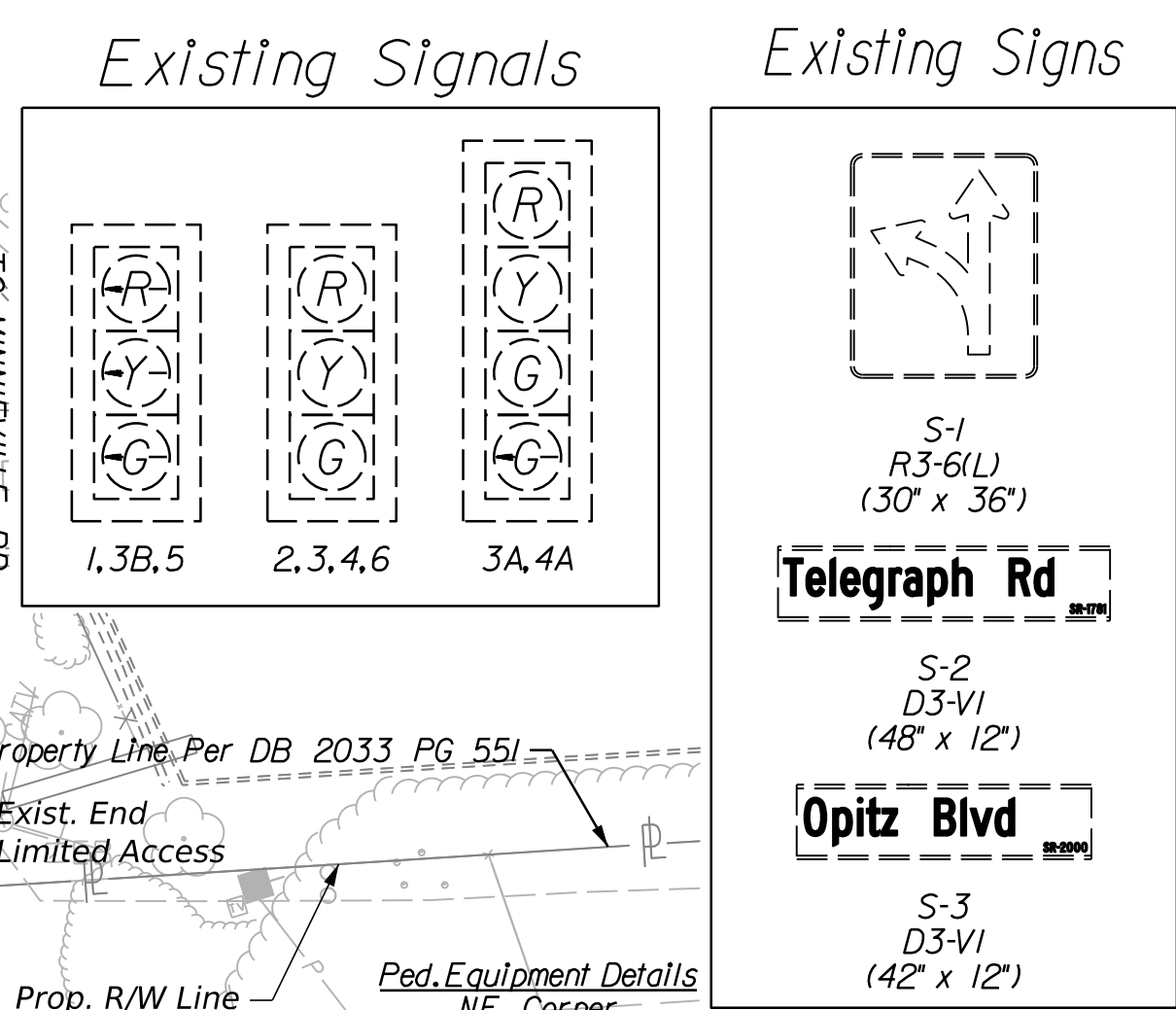
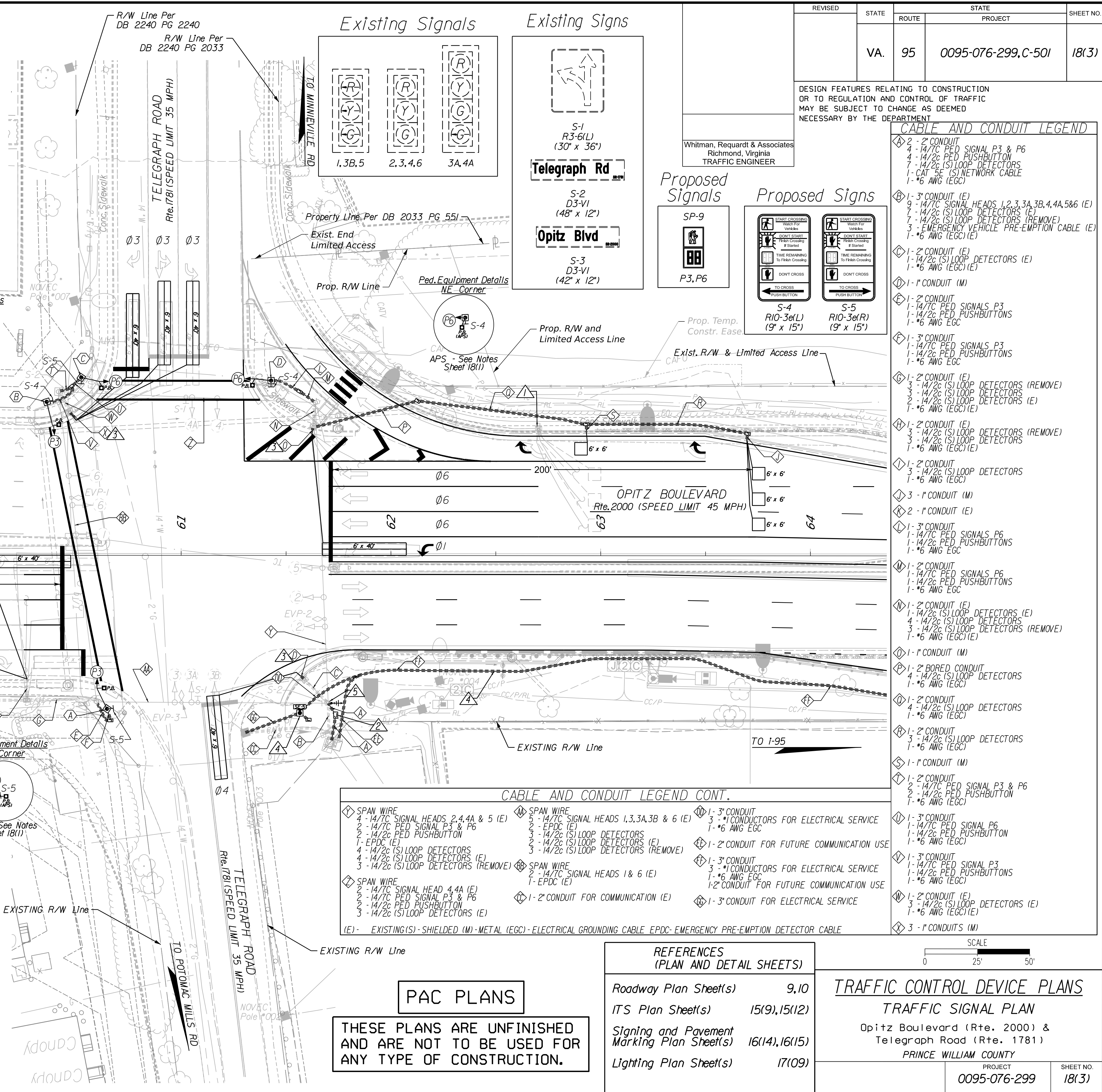
Empty box denotes RED indication. The solid red arrow shall occur at the end of the solid yellow arrow for the Flashing Yellow Arrow (FYA) signal. All FYA signals shall have the red interval.

Phasing Diagram



APS Audible Indications Chart

PUSHBUTTON (QUADRANT)	SPEECH PB INFORMATION MESSAGE	AUDIBLE WALK INDICATION
P6 (NE), P6 (NW)	TELEGRAPH AT OPITZ	PERCUSSIVE TONE
P3 (NW), P3 (SW)	WAY TO CROSS OPITZ AT TELEGRAPH	PERCUSSIVE TONE



REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	18(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

CABLE AND CONDUIT LEGEND

- 2 - 2" CONDUIT
- 4 - 14/7C PED SIGNAL P3 & P6
- 4 - 14/2c (S) LOOP DETECTORS (E)
- 1 - CAT 5E (S) NETWORK CABLE
- 1 - *6 AWG (EGC)
- 1 - 3" CONDUIT (E)
- 9 - 14/7C SIGNAL HEADS 1, 2, 3, 3A, 3B, 4, 4A, 5, 6 (E)
- 7 - 14/2c (S) LOOP DETECTORS (E)
- 7 - 14/2c (S) LOOP DETECTORS (REMOVE)
- 3 - EMERGENCY VEHICLE PRE-EMPTION CABLE (E)
- 1 - *6 AWG (EGC) (E)
- 1 - 2" CONDUIT (E)
- 1 - 14/2c (S) LOOP DETECTORS (E)
- 1 - *6 AWG (EGC) (E)
- 1 - 1" CONDUIT (M)
- 1 - 2" CONDUIT
- 1 - 14/7C PED SIGNALS P3
- 1 - 14/2c PED PUSHBUTTONS
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNALS P3
- 1 - 14/2c PED PUSHBUTTONS
- 1 - *6 AWG EGC
- 1 - 2" CONDUIT (E)
- 3 - 14/2c (S) LOOP DETECTORS (REMOVE)
- 2 - 14/2c (S) LOOP DETECTORS (E)
- 1 - *6 AWG (EGC) (E)
- 1 - 2" CONDUIT (E)
- 3 - 14/2c (S) LOOP DETECTORS (REMOVE)
- 3 - 14/2c (S) LOOP DETECTORS
- 1 - *6 AWG (EGC) (E)
- 3 - 1" CONDUIT (M)
- 2 - 1" CONDUIT (E)
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNALS P6
- 1 - 14/2c PED PUSHBUTTONS
- 1 - *6 AWG EGC
- 1 - 2" CONDUIT
- 3 - 14/2c (S) LOOP DETECTORS (E)
- 4 - 14/2c (S) LOOP DETECTORS
- 3 - 14/2c (S) LOOP DETECTORS (REMOVE)
- 1 - *6 AWG (EGC) (E)
- 1 - 1" CONDUIT (M)
- 1 - 2" BORED CONDUIT
- 4 - 14/2c (S) LOOP DETECTORS
- 1 - *6 AWG (EGC)
- 1 - 2" CONDUIT
- 4 - 14/2c (S) LOOP DETECTORS
- 1 - *6 AWG (EGC)
- 1 - 2" CONDUIT
- 3 - 14/2c (S) LOOP DETECTORS
- 1 - *6 AWG (EGC)
- 1 - 1" CONDUIT (M)
- 1 - 2" CONDUIT
- 2 - 14/7C PED SIGNAL P3 & P6
- 2 - 14/2c PED PUSHBUTTON
- 1 - *6 AWG (EGC)
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNAL P6
- 1 - 14/2c PED PUSHBUTTON
- 1 - *6 AWG (EGC)
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNAL P3
- 1 - 14/2c PED PUSHBUTTONS
- 1 - *6 AWG (EGC)
- 1 - 2" CONDUIT (E)
- 3 - 14/2c (S) LOOP DETECTORS (E)
- 1 - *6 AWG (EGC) (E)
- 3 - 1" CONDUITS (M)

CABLE AND CONDUIT LEGEND CONT.

- SPAN WIRE
- 2 - 14/7C SIGNAL HEADS 2, 4, 4A & 5 (E)
- 2 - 14/2c PED SIGNAL P3 & P6
- 1 - EPDC (E)
- 1 - EPDC (E)
- 4 - 14/2c (S) LOOP DETECTORS
- 4 - 14/2c (S) LOOP DETECTORS (E)
- 3 - 14/2c (S) LOOP DETECTORS (REMOVE)
- SPAN WIRE
- 2 - 14/7C SIGNAL HEAD 4, 4A (E)
- 2 - 14/7C PED SIGNAL P3 & P6
- 3 - 14/2c (S) LOOP DETECTORS (E)
- SPAN WIRE
- 5 - 14/7C SIGNAL HEADS 1, 3, 3A, 3B & 6 (E)
- 2 - EPDC (E)
- 3 - 14/2c (S) LOOP DETECTORS
- 2 - 14/2c (S) LOOP DETECTORS (E)
- 3 - 14/2c (S) LOOP DETECTORS (REMOVE)
- SPAN WIRE
- 2 - 14/7C SIGNAL HEADS 1 & 6 (E)
- 1 - EPDC (E)
- 1 - 2" CONDUIT FOR COMMUNICATION (E)
- 1 - 3" CONDUIT
- 3 - *1 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 2" CONDUIT FOR FUTURE COMMUNICATION USE
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNAL P6
- 1 - 14/2c PED PUSHBUTTON
- 1 - *6 AWG (EGC)
- 1 - 3" CONDUIT
- 1 - 14/7C PED SIGNAL P3
- 1 - 14/2c PED PUSHBUTTONS
- 1 - *6 AWG (EGC)
- 1 - 2" CONDUIT (E)
- 3 - 14/2c (S) LOOP DETECTORS (E)
- 1 - *6 AWG (EGC) (E)
- 3 - 1" CONDUITS (M)

(E) - EXISTING (S) - SHIELDED (M) - METAL (EGC) - ELECTRICAL GROUNDING CABLE EPDC - EMERGENCY PRE-EMPTION DETECTOR CABLE

REFERENCES (PLAN AND DETAIL SHEETS)

Roadway Plan Sheet(s)	9, 10
ITS Plan Sheet(s)	15(9), 15(12)
Signing and Pavement Marking Plan Sheet(s)	16(14), 16(15)
Lighting Plan Sheet(s)	17(09)

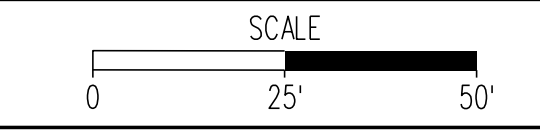
TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL PLAN
Opitz Boulevard (Rte. 2000) & Telegraph Road (Rte. 1781)
PRINCE WILLIAM COUNTY

PROJECT	SHEET NO.
0095-076-299	18(3)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



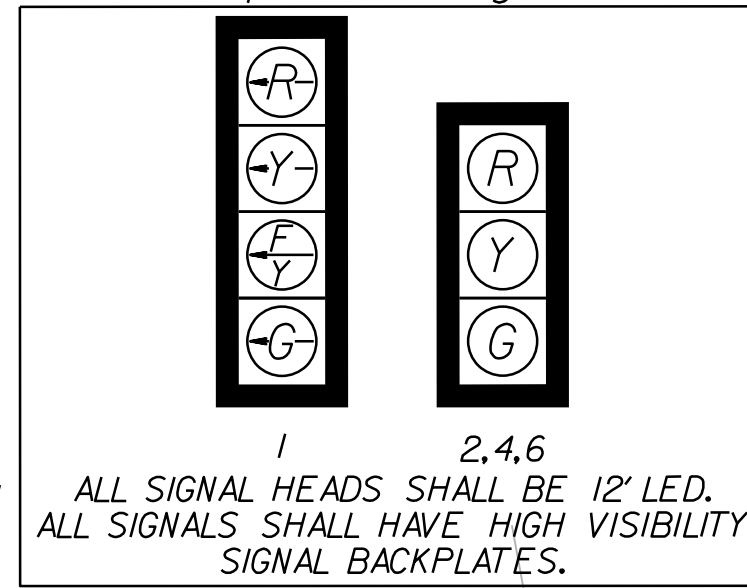
PROJECT: MANAGER Bimol Sab, P.E. (203) 259-2362 (NOVA District)
SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
SUBSURFACE UTILITY BY: DATE Accurmark, Inc. (804) 550-7740, 07/07/2021

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA	95		0095-076-299, C-501	18(4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

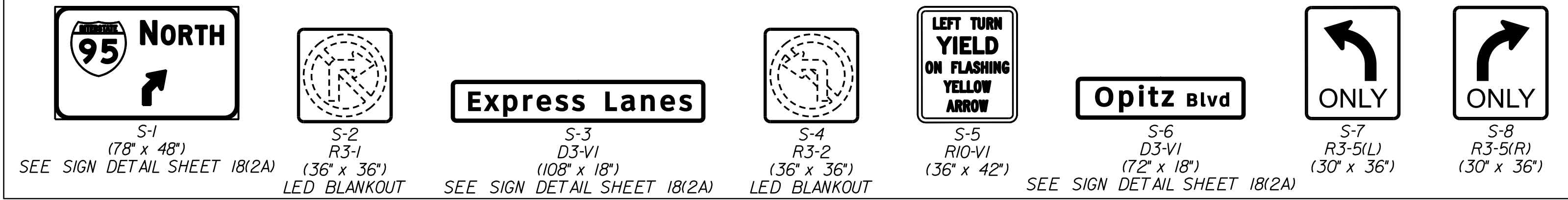
Whitman, Reardon & Associates
Richmond, Virginia
TRAFFIC ENGINEER

Proposed Signals



Signal Pole & Controller Legend
(ALL DIMENSIONS ARE TO CENTER OF POLE)

Proposed Signs

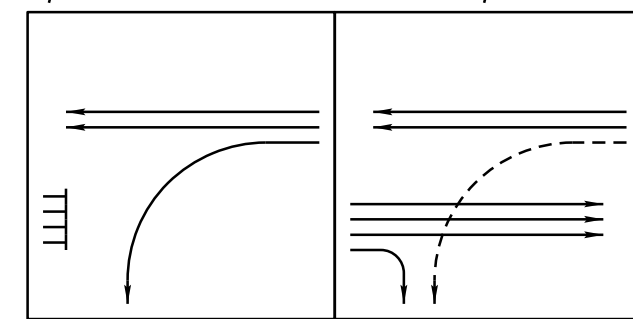


- A MAST ARM POLE, TYPE EI MODIFIED (MP-3)
63.7' RT. of Rte. 2000 Constr. @ Sta. 67+85
60' Arm 27° Angle to Rte. 2000 Constr. @
Signal Placement: 24.0', 36.0', 48.0'
Emergency Pre-emption Placement: 30.0'
Video Camera Placement: 40.0'
Wireless Radio Placement: Pole
CCTV Camera: Pole
Sign Placement: 5.0', 12.0', 18.0'
12' Luminaire Arm 27° Angle to Rte. 2000 Constr. @
- B MAST ARM POLE, TYPE F MODIFIED (MP-3)
43.8' LT. of Rte. 2000 Constr. @ Sta. 67+06
49' Arm 0° Angle to Rte. 2000 Constr. @
Signal Placement: 25.0', 37.0'
Sign Placement: 11.0', 22.0', 34.0'
49' Arm 90° Angle to Rte. 2000 Constr. @
Signal Placement: 17.5', 31.5', 43.5'
Sign Placement: 9.5', 40.5', 47.5'
Emergency Pre-emption Placement: 25.5'
Video Camera Placement: 22.5'
360 Video Camera Placement: 36.5'
12' Luminaire Arm 90° Angle to Rte. 2000 Constr. @
- C 160 Watt LED Luminaire with 30' Mounting Height
CONTROLLED CABINET & FOUNDATION
69.5' RT. of Rte. 2000 Constr. @ Sta. 67+63
Cabinet door hinge located on right side of pad.
- D PEDESTAL POLE 6'
67.5' RT. of Rte. 2000 Constr. @ Sta. 67+69
Install Electrical Service, SE-5 Modified (Safety Switch) on Pedestal Pole.

SIGNAL NOTES

- 1 INSTALL STD. SE-5. REPLACE THE METER BASE WITH A FUSED SAFETY DISCONNECT SWITCH FUSED AT 40A. PROVIDE A BREAKER BOX WITH (1) 40A 1 POLE BREAKER FOR THE SIGNAL LUMINAIRES, THE TRAFFIC SIGNAL BREAKER AND SIGNAL LUMINAIRE BREAKERS SHALL BE CONNECTED TO DIFFERENT PHASES (LEGS) OF THE 120/240V FEED FROM THE SE-5 LOCATED AT TELEGRAPH ROAD.
- 2 INSTALL BRIDGE MOUNTED JUNCTION BOX FOR SIGNAL CABLES. SEE SHEET NO. 9I FOR DETAILS.
- 3 INSTALL BRIDGE MOUNTED JUNCTION BOX FOR PRE-EMPTION CABLES. SEE SHEET NO. 9I FOR DETAILS.
- 4 INSTALL BRIDGE MOUNTED JUNCTION BOX FOR POWER CABLES. SEE SHEET NO. 9I FOR DETAILS.
- 5 INSTALL BRIDGE MOUNTED JUNCTION BOX FOR FUTURE COMMUNICATION. SEE SHEET NO. 9I FOR DETAILS.
- 6 EXPRESS LANES GATE MONITORING VIDEO DETECTION CAMERA. SEE SHEET NO. 15I91.
- 7 LUMINAIRE TO INCLUDE PHOTOCELL. REFER TO LIGHTING PLANS FOR DETAILS OF SIGNAL MAST ARM POLE MOUNTED LUMINAIRES. SEE SHEET NO. 17I2A.
- 8 INSTALL CCTV CAMERA (RISE SERIES 4220HD MODEL)

Phasing Diagram Express Lanes Open SB

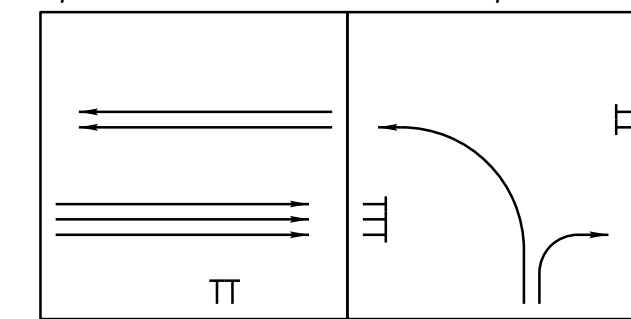


Color Sequence Chart Express Lanes Open SB

SIGNAL	PHASES	COMB.	FLASH
	1 2 6 1-6 2-6		
1	-G -FYA -FYA -G -FYA -FYA		
2	G	G	Y
4			R
6	G G G G		Y

Empty box denotes RED indication. The solid red arrow shall occur at the end of the solid yellow arrow for the Flashing Yellow Arrow (FYA) signal. All FYA signals shall have the red interval.

Phasing Diagram Express Lanes Open NB



Color Sequence Chart Express Lanes Open NB

SIGNAL	PHASES	COMB.	FLASH
	2 4 6 2-6 4		
1			R
2	G	G	Y
4	G	G	R
6	G G G G		Y

Empty box denotes RED indication.

PHASE	1	2	3	4	5	6	7	8
MOVEMENT	OPITZ BLVD WB LEFT	OPITZ BLVD EB	FFU	FFU	FFU	OPITZ BLVD WB	FFU	FFU
PHASE ON	X	X				X		
PHASE OFF			X	X	X		X	X
INTERVAL	PHASE TIMINGS							
MIN GR	8.0	20.0				20.0		
AMBER	4.7	4.7				4.7		
RED	3.5	3.5				3.5		
MAX	15.0	45.0				45.0		
PASSAGE	3.0	4.0				4.0		
MIN GAP	0.0	0.0				0.0		
PED WALK								
PED FDW								
LPI								
MODE	NON LOCK	MIN RECALL	NON LOCK	NON LOCK	NON LOCK	MIN RECALL	NON LOCK	NON LOCK

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

PHASE	1	2	3	4	5	6	7	8
MOVEMENT	FFU	OPITZ BLVD EB	FFU	NB I-95 EXP. RAMP	FFU	OPITZ BLVD WB	FFU	FFU
PHASE ON		X		X		X		
PHASE OFF	X		X		X		X	X
INTERVAL	PHASE TIMINGS							
MIN GR		20.0		10.0		20.0		
AMBER		4.7		3.0		4.7		
RED		3.5		3.6		3.5		
MAX		45.0		30.0		45.0		
PASSAGE		4.0		3.0		4.0		
MIN GAP		0.0		0.0		0.0		
PED WALK								
PED FDW								
LPI								
MODE	NON LOCK	MIN RECALL	NON LOCK	NON LOCK	NON LOCK	MIN RECALL	NON LOCK	NON LOCK

REFERENCES (PLAN AND DETAIL SHEETS)

Roadway Plan Sheet(s)	9
ITS Plan Sheet(s)	15(9)
Signing and Pavement Marking Plan Sheet(s)	16(15)
Lighting Plan Sheet(s)	17(08)

TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL PLAN
Opitz Blvd. (Rte. 2000) &
I-95 Express Lanes Ramp
PRINCE WILLIAM COUNTY

SCALE	PROJECT	SHEET NO.
0 25' 50'	0095-076-299	18(4)

CABLE AND CONDUIT LEGEND

- 2 - 3" CONDUIT
- 4 - 14/7C SIGNAL HEADS 1, 2, 4, & 6
- 2 - 14/4C BLANKOUT SIGN CABLE
- 3 - VIDEO DETECTION CAMERA CABLE
- 1 - CAT 6 (S) NETWORK CABLE
- 1 - CAT 6 (S) OUTDOOR NETWORK CABLE (CCTV)
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 2 - EMERGENCY VEHICLE PRE-EMPTION CABLE
- 1 - 2" CONDUIT
- 2 - EMERGENCY VEHICLE PRE-EMPTION CABLE
- 2 - 3" CONDUIT
- 4 - 14/7C SIGNAL HEADS 1, 2, 4, & 6
- 2 - 14/4C BLANKOUT SIGN CABLE
- 3 - VIDEO DETECTION CAMERA CABLE
- 1 - CAT 6 (S) NETWORK CABLE
- 1 - CAT 6 (S) OUTDOOR NETWORK CABLE (CCTV)
- 1 - 10/3C FOR LUMINAIRE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 2 - EMERGENCY VEHICLE PRE-EMPTION CABLE
- 1 - 3" CONDUIT
- 1 - 14/7C SIGNAL HEADS 2
- 1 - 14/4C BLANKOUT SIGN CABLE
- 1 - VIDEO DETECTION CAMERA CABLE
- 1 - CAT 6 (S) NETWORK CABLE
- 1 - CAT 6 (S) OUTDOOR NETWORK CABLE (CCTV)
- 1 - 10/3C FOR LUMINAIRE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 3 - 14/7C SIGNAL HEADS 1, 4, & 6
- 1 - 14/4C BLANKOUT SIGN CABLE
- 2 - VIDEO DETECTION CAMERA CABLE
- 1 - 10/3C FOR LUMINAIRE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 1 - EMERGENCY VEHICLE PRE-EMPTION CABLE
- 1 - 4" CONDUIT
- 3 - 14/7C SIGNAL HEADS 1, 4, & 6
- 1 - 14/4C BLANKOUT SIGN CABLE
- 2 - VIDEO DETECTION CAMERA CABLE
- 1 - 10/3C FOR LUMINAIRE
- 1 - *6 AWG EGC
- 1 - 4" CONDUIT
- 1 - EMERGENCY VEHICLE PRE-EMPTION CABLE
- 1 - 3" CONDUIT
- 3 - 14/7C SIGNAL HEADS 1, 4, & 6
- 1 - 14/4C BLANKOUT SIGN CABLE
- 2 - VIDEO DETECTION CAMERA CABLE
- 1 - 10/3C FOR LUMINAIRE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT
- 3 - *6 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT FOR COMMUNICATIONS
- 1 - 3" CONDUIT
- 3 - *6 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT FOR FUTURE COMMUNICATION USE
- 1 - 3" CONDUIT
- 3 - *6 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 3" CONDUIT FOR FUTURE COMMUNICATION USE
- 1 - 4" CONDUIT
- 3 - *6 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 4" CONDUIT FOR FUTURE COMMUNICATION USE
- 1 - 3" CONDUIT
- 3 - *6 CONDUCTORS FOR ELECTRICAL SERVICE
- 1 - *6 AWG EGC
- 1 - 2" CONDUIT FOR FUTURE COMMUNICATION USE

USE PVC CONDUIT FOR TRENCH RUNS AND EXPOSED HORIZONTAL RUNS ON BRIDGES AND RIGID GALVANIZED STEEL (RGS) CONDUIT FOR OTHER EXPOSED RUNS. SEE SHEET NO. 9I FOR DETAILS. (EGC) - ELECTRICAL GROUNDING CABLE.

PROJECT MANAGER *Rimol Shab, P.E.* (203) 259-2362 (NOVA District)
 SURVEYED BY, DATE *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
 DESIGN BY *Whitman, Reardon & Associates, LLP* (804) 272-8700
 SUBSURFACE UTILITY BY, DATE *Accurmark, Inc.* (804) 550-7740, 07/07/2021.

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299,C-501	18(5)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
Richmond, Virginia
TRAFFIC ENGINEER

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

CABLE AND CONDUIT LEGEND

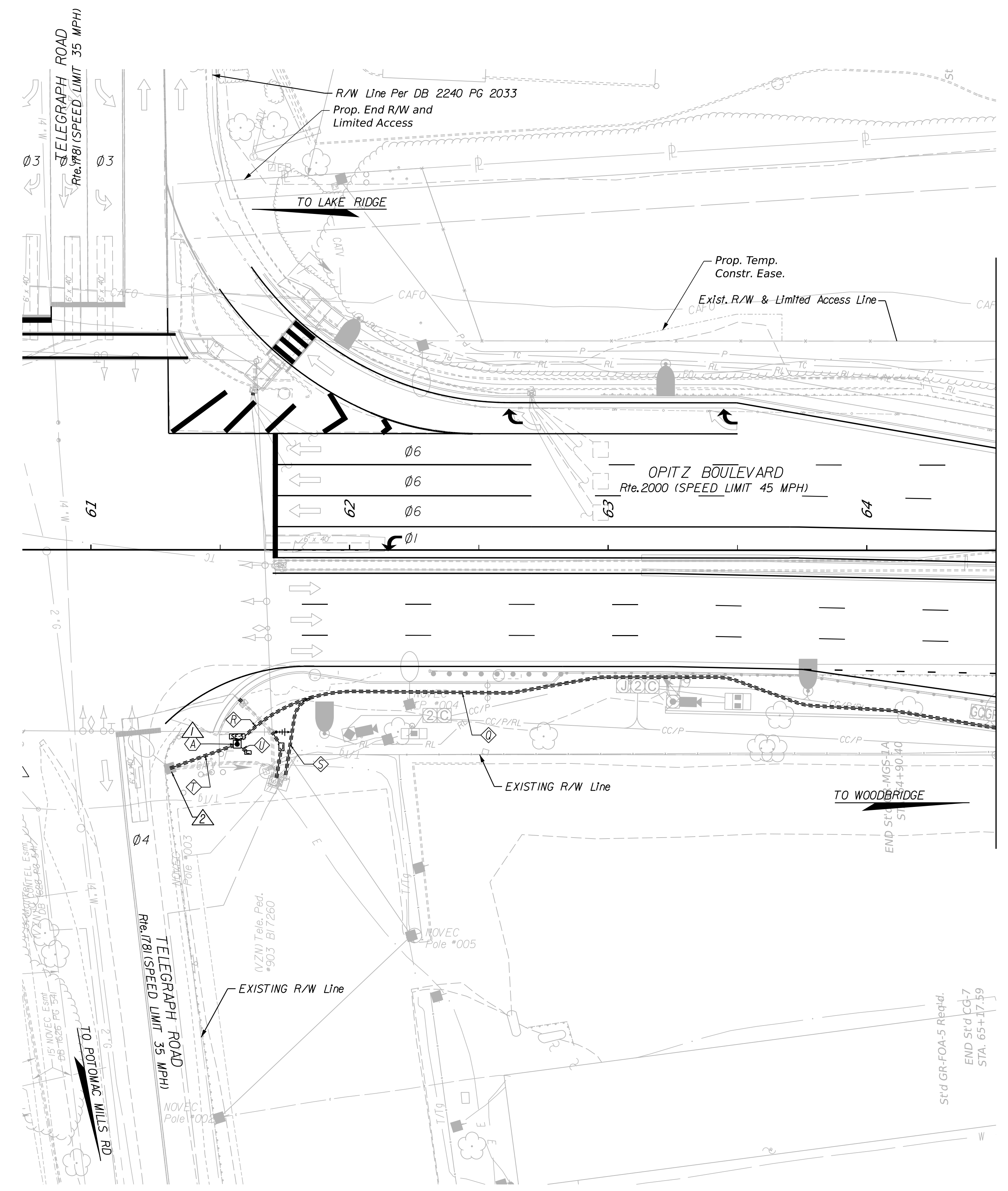
- ① 1- 3" CONDUIT
3 - #1 CONDUCTORS FOR ELECTRICAL SERVICE
1 - #6 AWG EGC
1 - 2" CONDUIT FOR FUTURE COMMUNICATION USE
- ② 1- 3" CONDUIT
3 - #1 CONDUCTORS FOR ELECTRICAL SERVICE
1 - #6 AWG EGC
- ③ 1- 2" CONDUIT FOR FUTURE COMMUNICATION USE
- ④ 1- 3" CONDUIT FOR ELECTRICAL SERVICE
- ⑤ 1- 1" CONDUIT
1 - #6 CABLES FOR ELECTRICAL SERVICE
GROUNDING

Signal Pole & Controller Legend

(ALL DIMENSIONS ARE TO CENTER OF POLE)
 Ⓐ ELECTRICAL SERVICE (SE-5)
 75' RT. of Rte.2000 Constr. Ⓑ Sta.61+56

SIGNAL NOTES

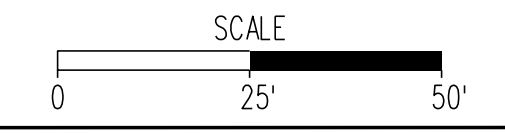
- 1. INSTALL VDOT ST'D SE-5 ELECTRICAL SERVICE (METERED). CONTRACTOR TO PROVIDE A FUSED SAFETY DISCONNECT SWITCH FUSED AT 40A.
- 2. CONTRACTOR TO COORDINATE ELECTRICAL SERVICE AND COMMUNICATIONS SERVICE INSTALLATION TO POWER POLE #457 OF 3 003.



MATCH LINE - STA.64+50 - SEE SHEET NO. 18(4)

**REFERENCES
(PLAN AND DETAIL SHEETS)**

Roadway Plan Sheet(s)	9,10
ITS Plan Sheet(s)	15(9),15(12)
Signing and Pavement Marking Plan Sheet(s)	16(14),16(15)
Lighting Plan Sheet(s)	17(08),17(09)



TRAFFIC CONTROL DEVICE PLANS
TRAFFIC SIGNAL PLAN
 Opitz Blvd. (Rte. 2000) &
 1-95 Express Lanes Ramp
 PRINCE WILLIAM COUNTY
 PROJECT 0095-076-299
 SHEET NO. 18(5)

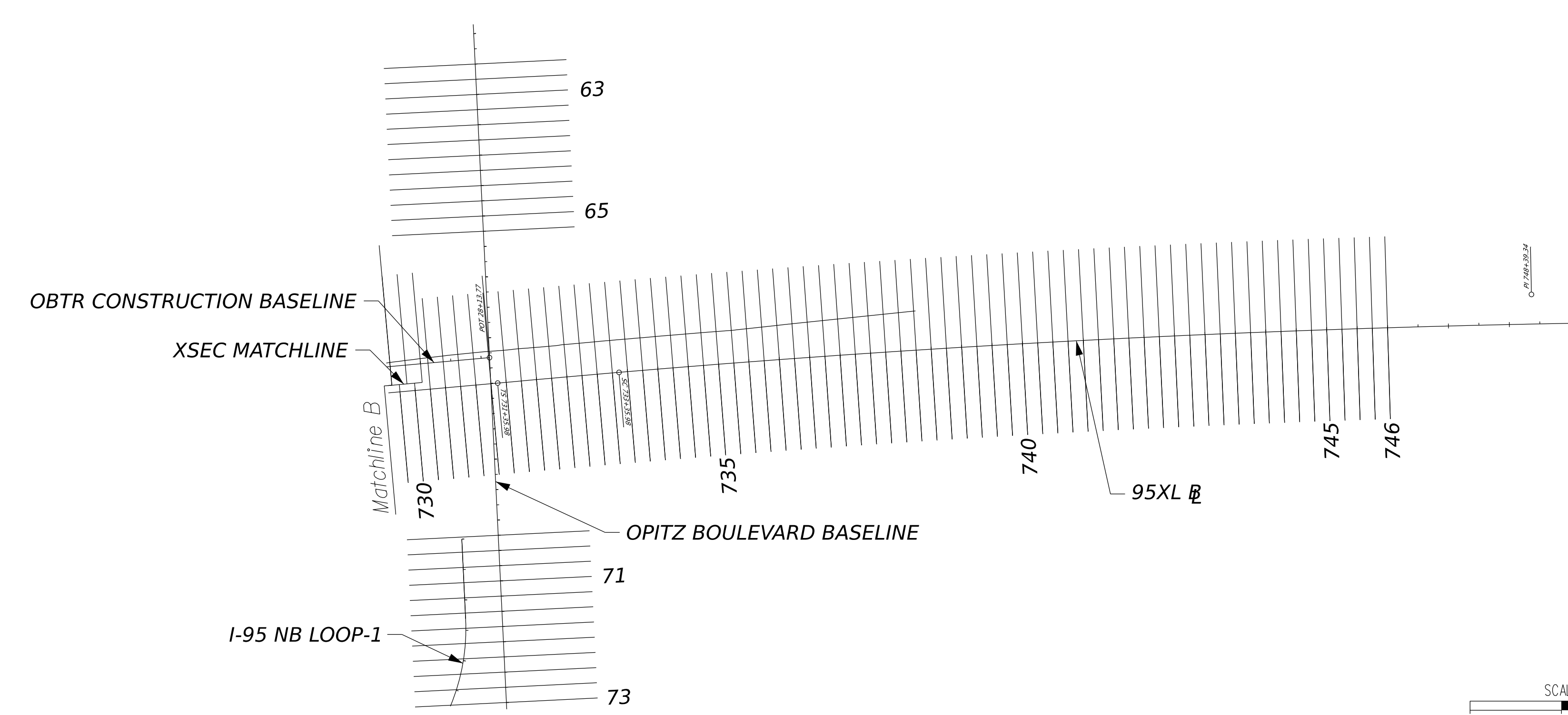
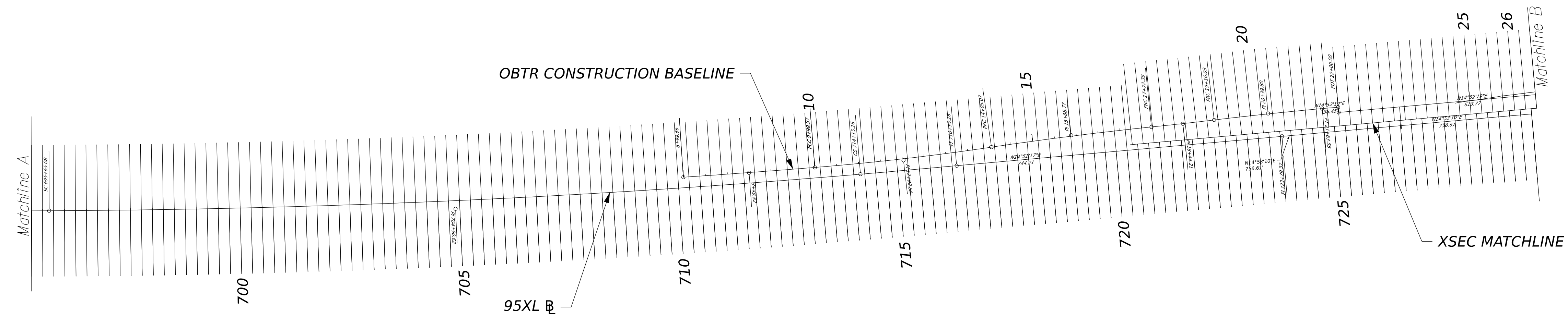
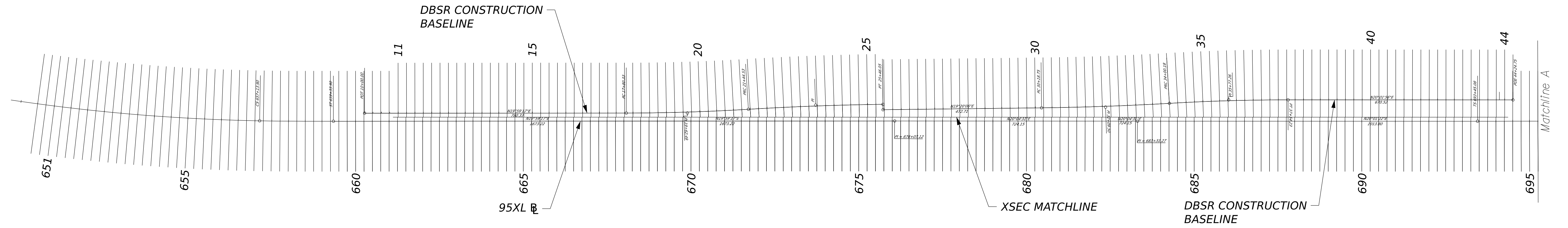
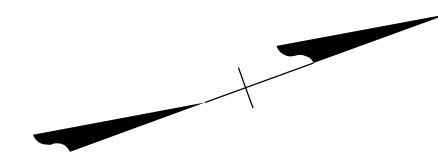
PROJECT MANAGER: *Bimal Shab, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

METHOD OF SECTIONS

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
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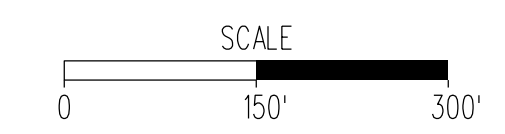
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	1A

PROJECT MANAGER: *Bhupal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

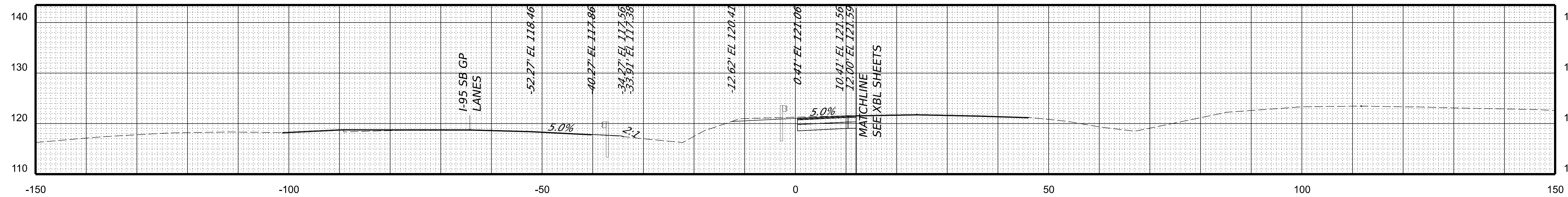
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1 IN. = 10 FT (V)

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	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	1

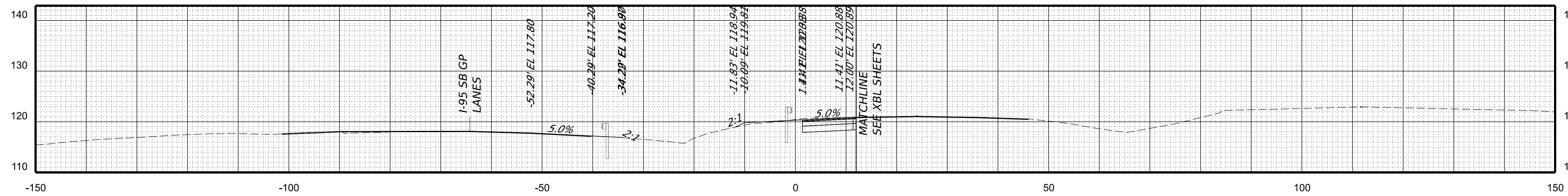
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INDEX

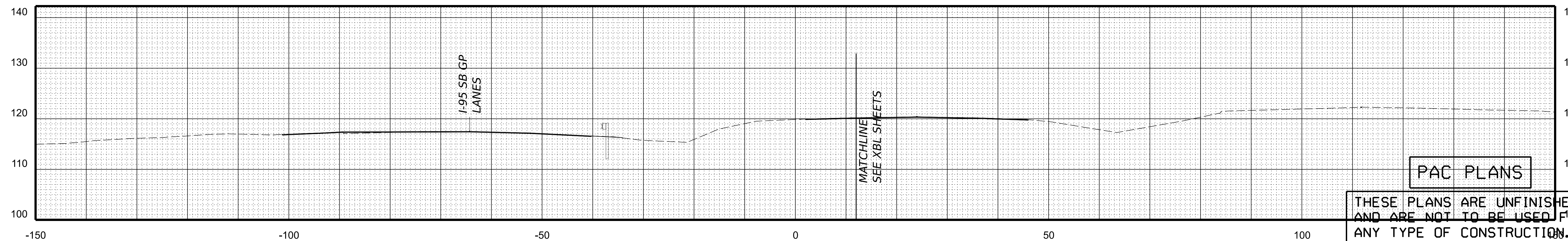
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RAMP DBSR	1-50
RAMP OBTR	51-67
OPITZ BLVD	68-85
EXPRESS LANES	86-213



STA 11+50.00



STA 11+25.00



STA 11+00.00

PAC PLANS
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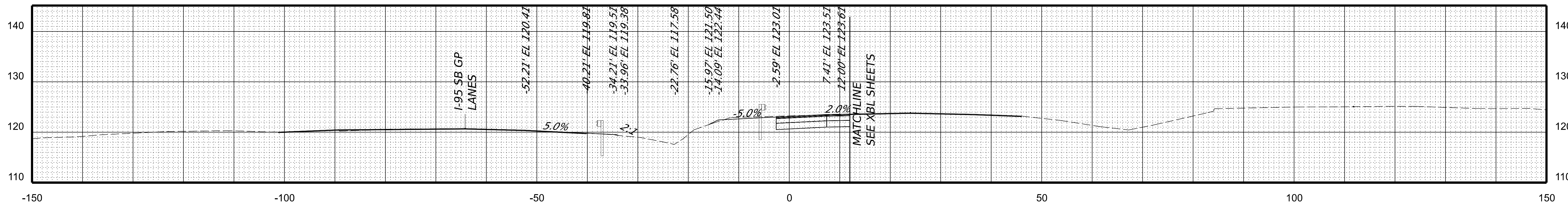
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

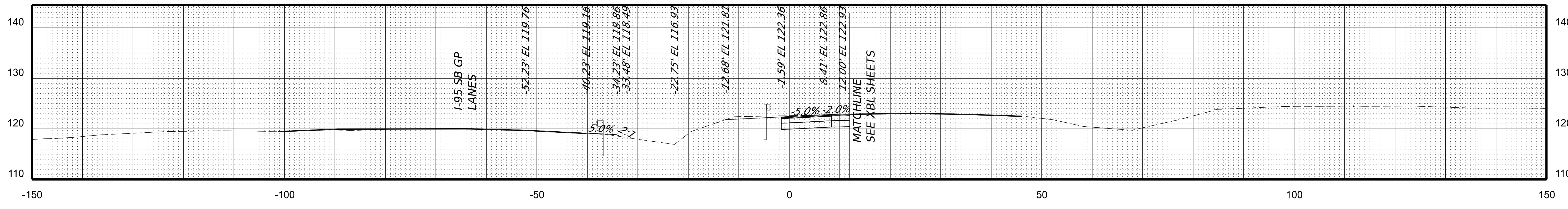
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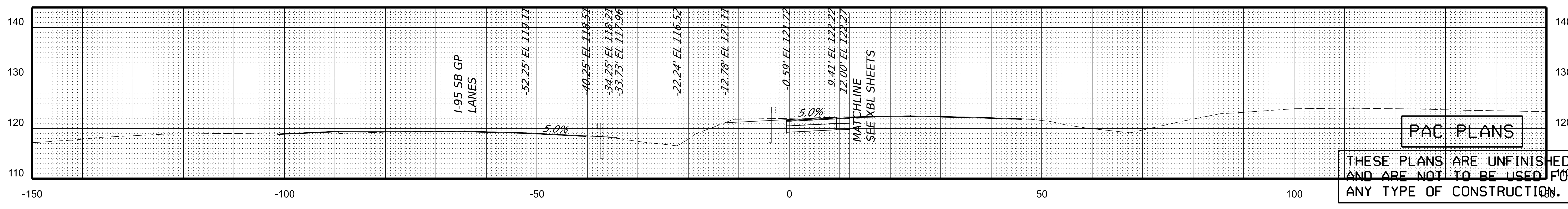
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STA 12+25.00



STA 12+00.00



STA 11+75.00

PAC PLANS

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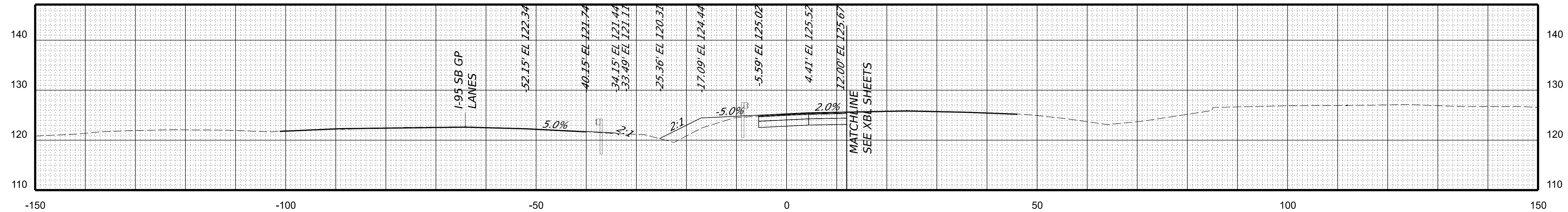
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SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

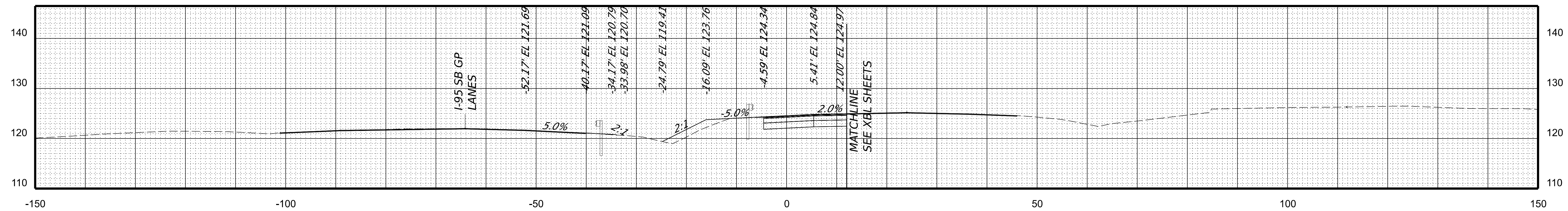
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	VA.	95	0095-076-299, C-501	3

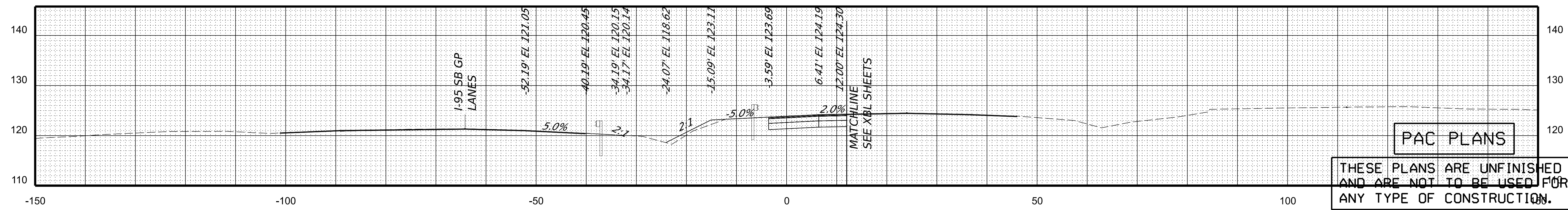
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STA 13+00.00



STA 12+75.00



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PAC PLANS

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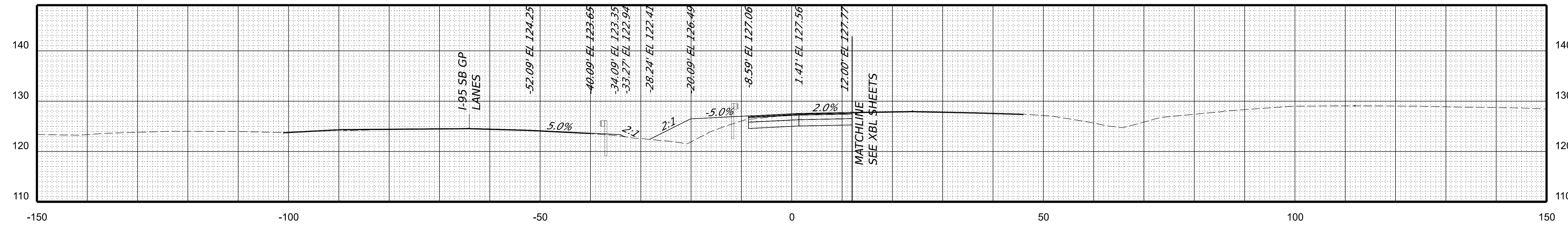
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
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DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

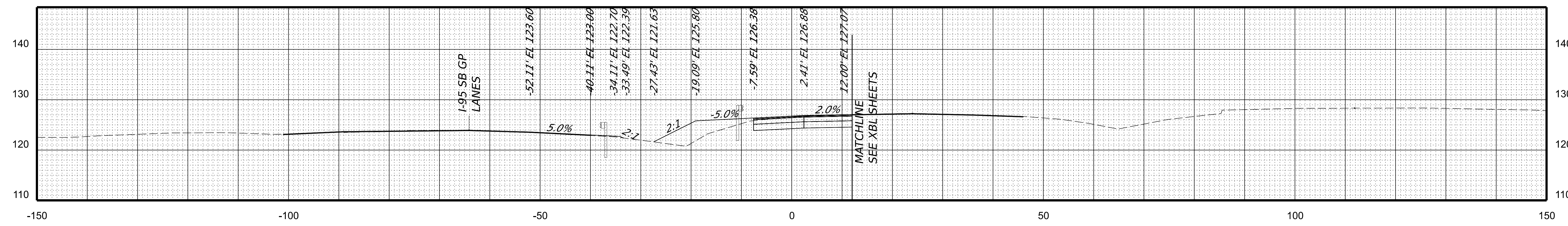
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REVISED	STATE	ROUTE	STATE	SHEET NO.
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	VA.	95	0095-076-299, C-501	4

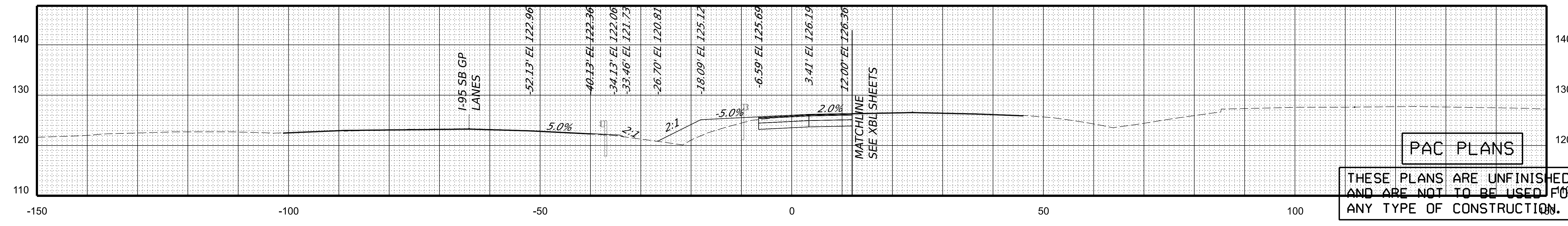
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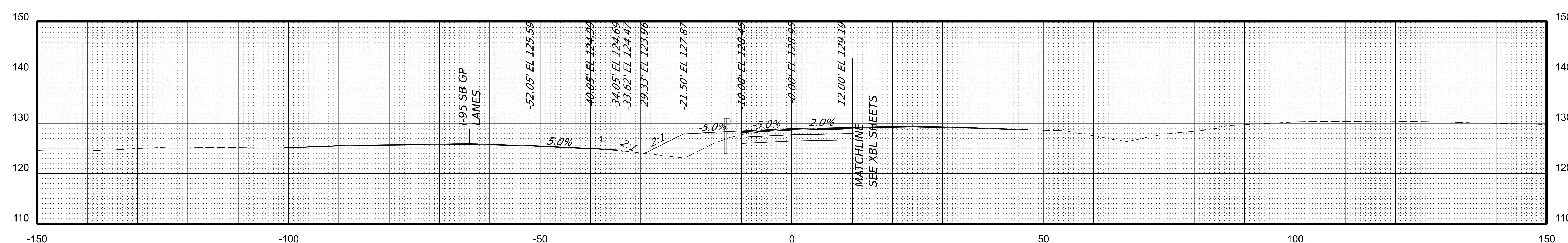
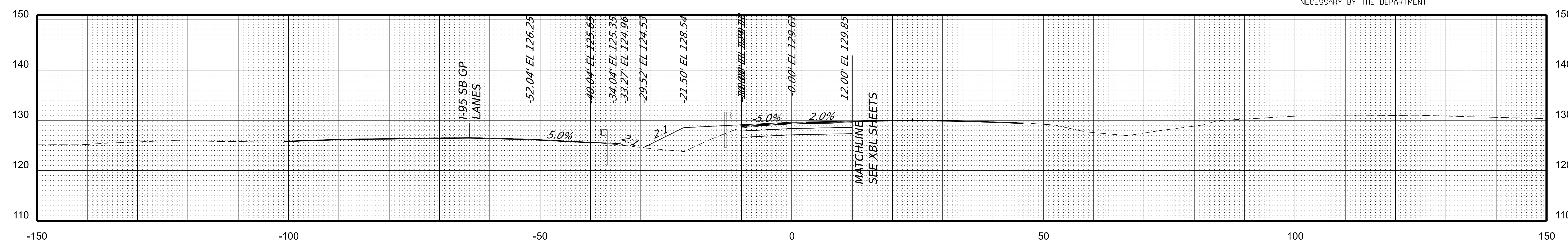
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SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

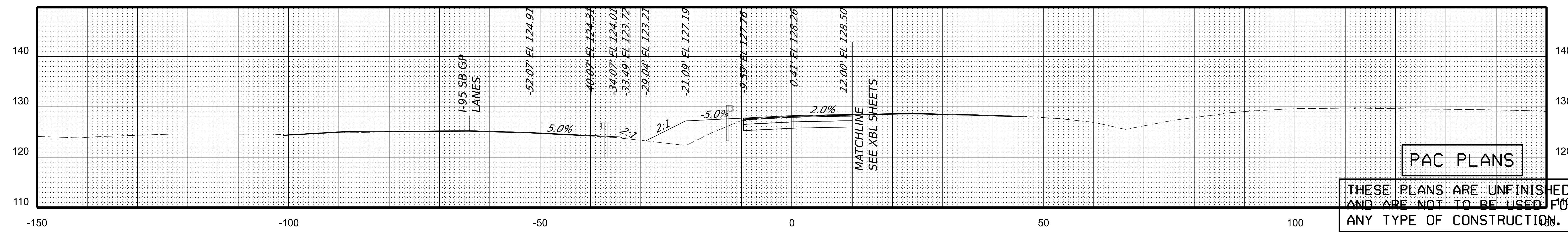
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	5

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



BEGIN RAMP DBSR
STA. 14+10.33



PAC PLANS

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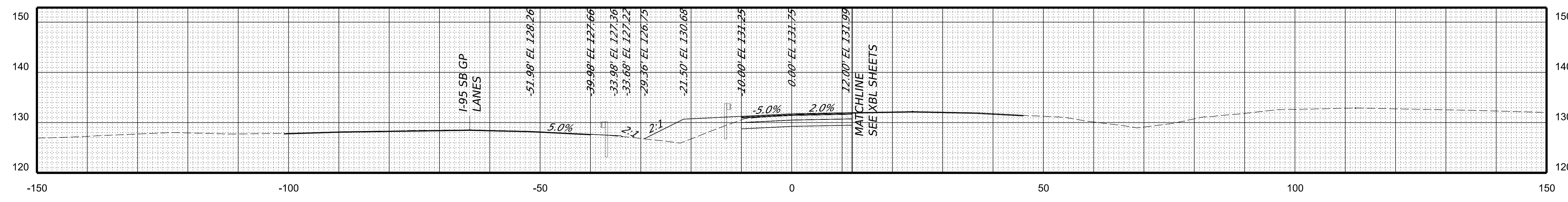
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

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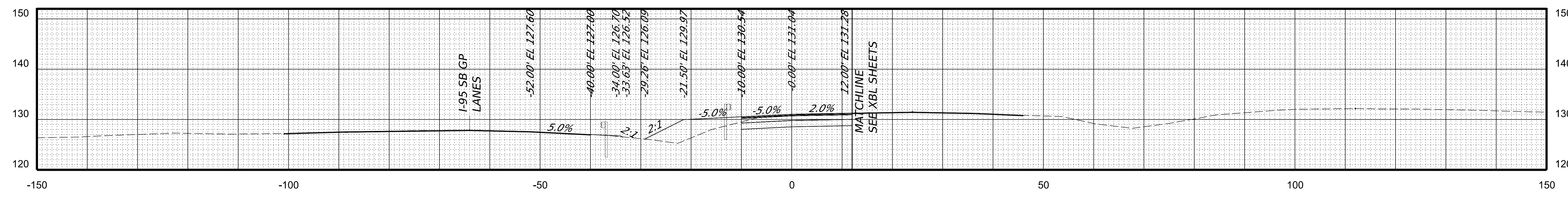
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	6

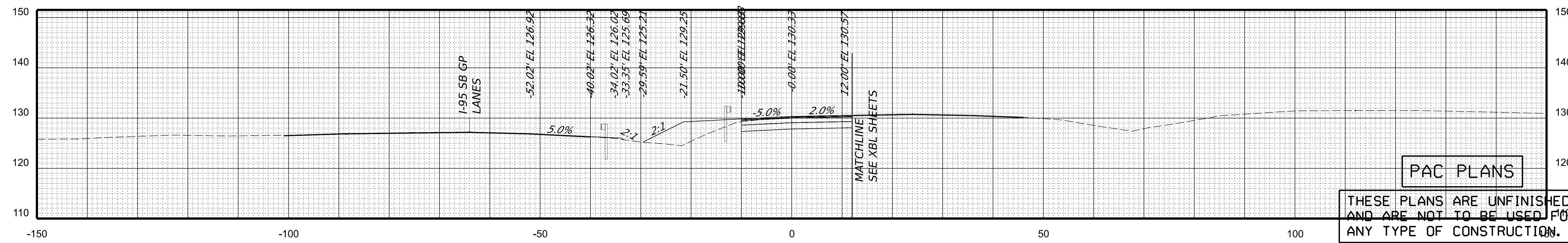
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STA 15+25.00



STA 15+00.00



STA 14+75.00

PAC PLANS
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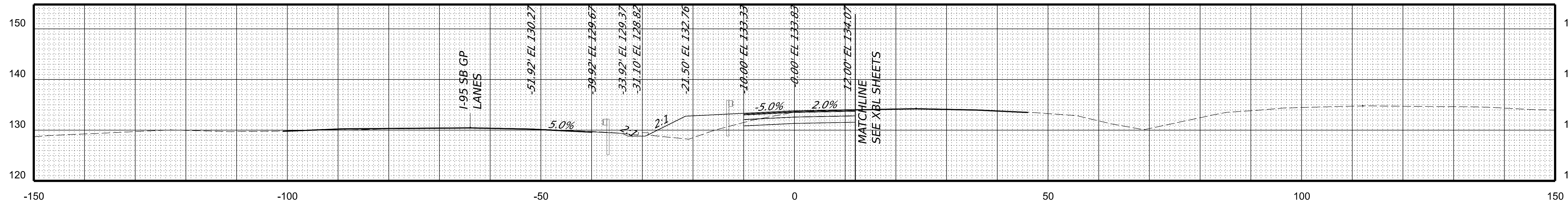
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SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

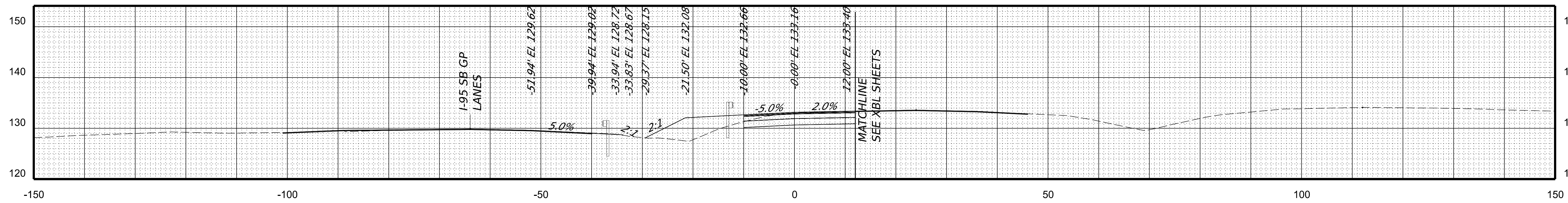
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	7

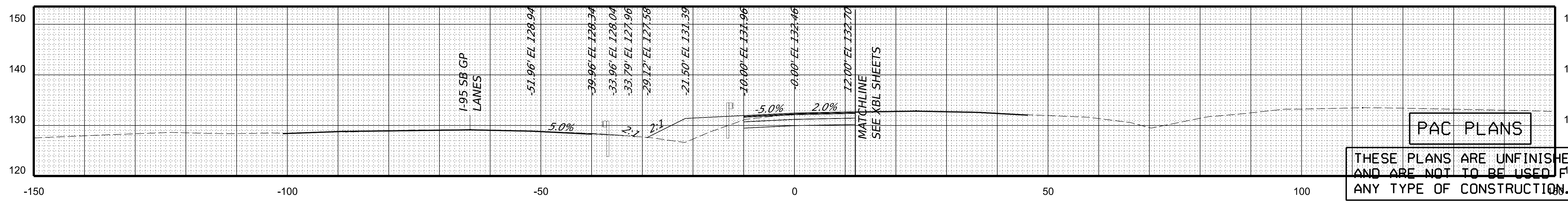
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STA 15+75.00



STA 15+50.00

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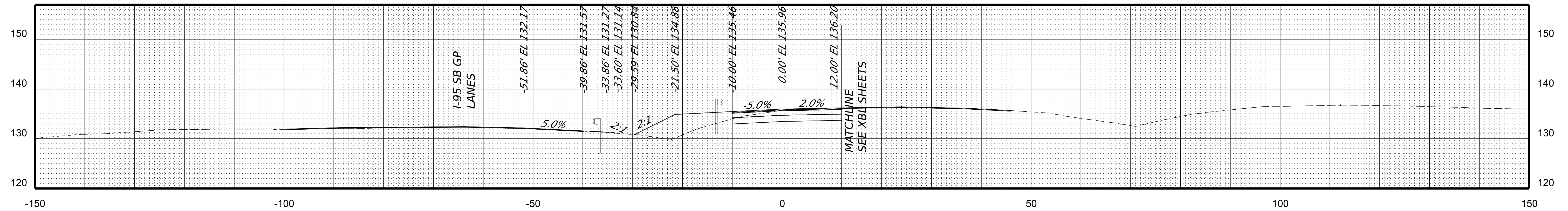
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DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
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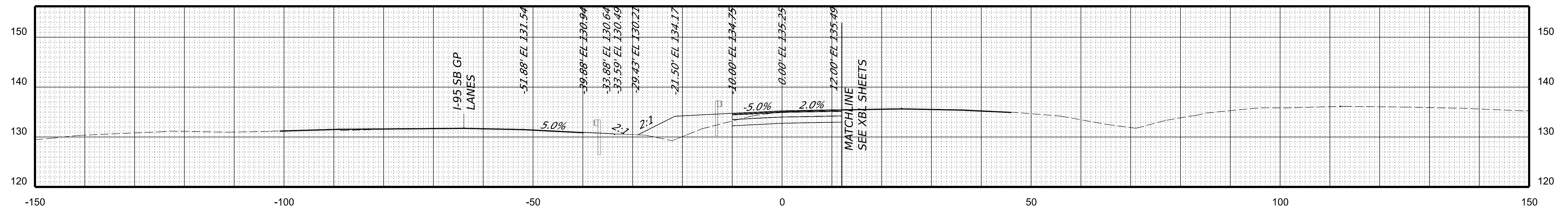
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	8

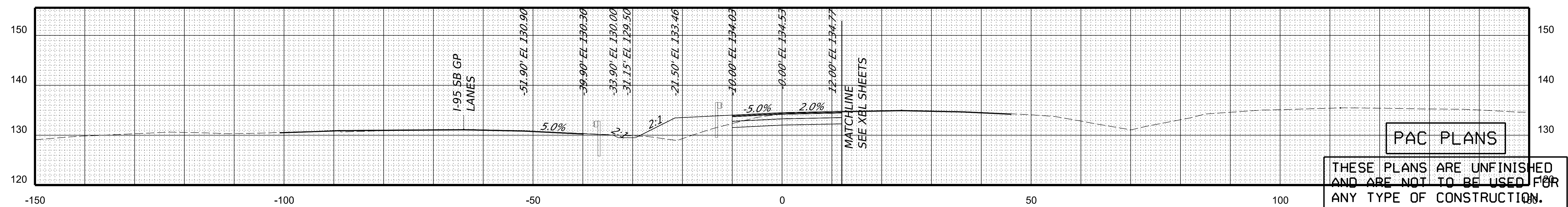
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 16+75.00



STA 16+50.00



STA 16+25.00

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

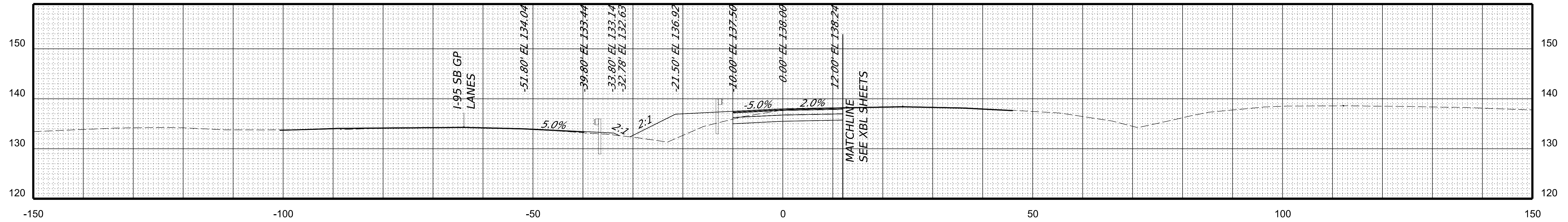
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

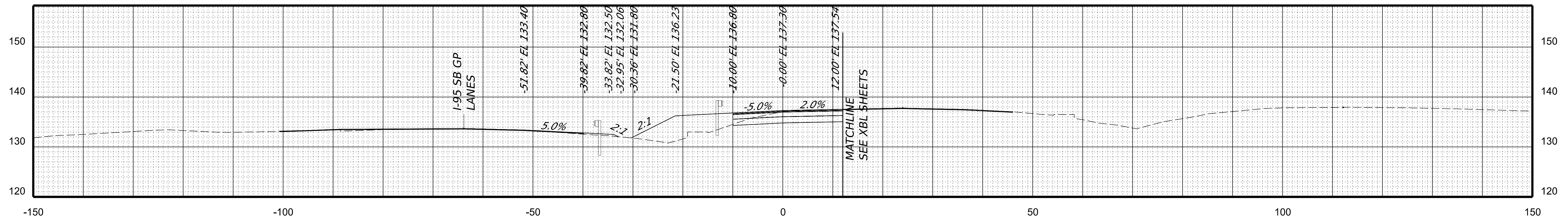
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	9

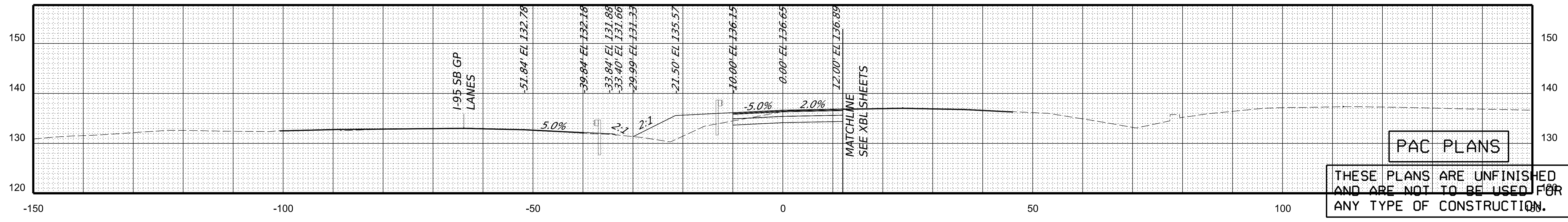
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 17+50.00



STA 17+25.00



STA 17+00.00

PAC PLANS

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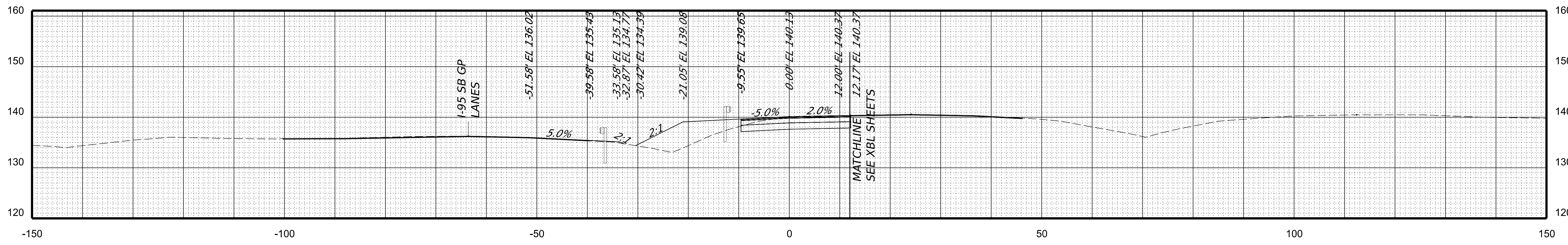
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

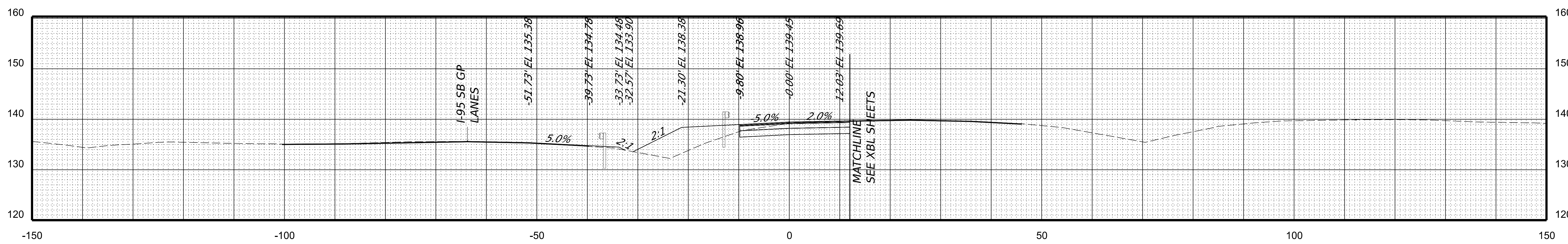
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	10

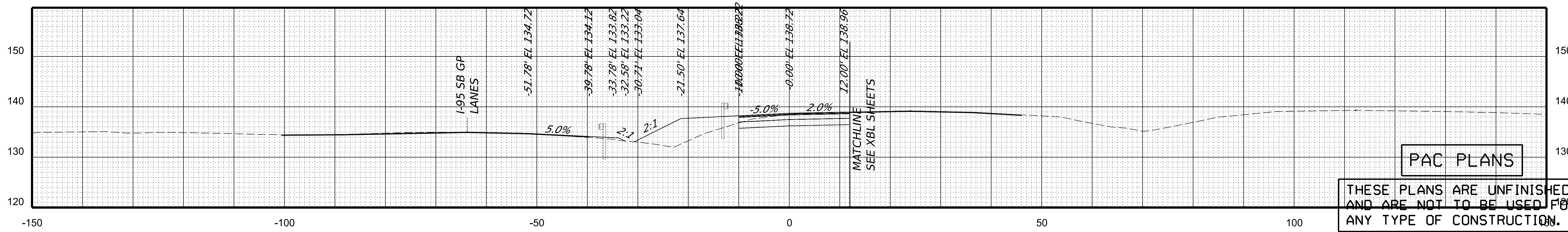
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 18+25.00



STA 18+00.00



STA 17+75.00

PAC PLANS
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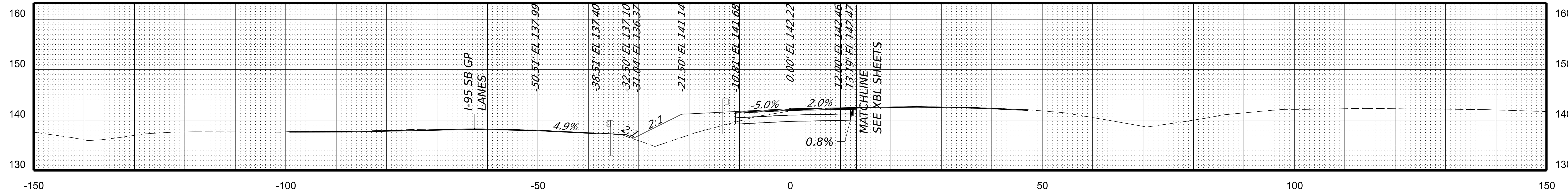
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

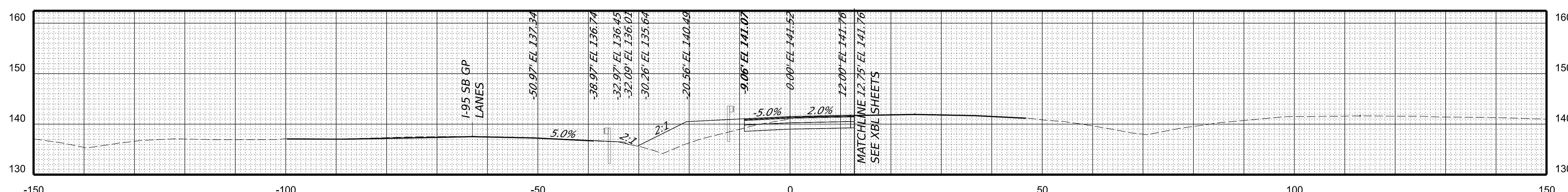
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	II

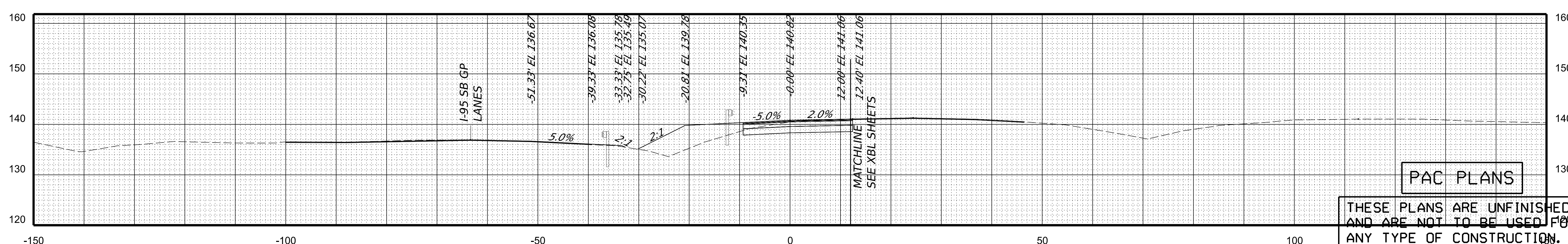
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 19+00.00



STA 18+75.00



STA 18+50.00

PAC PLANS

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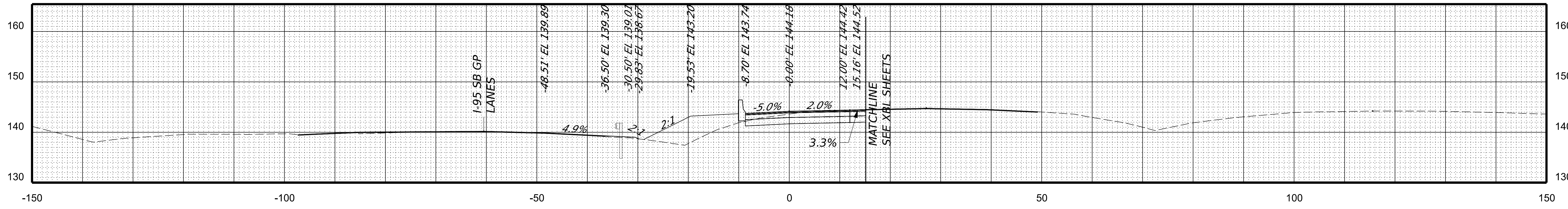
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

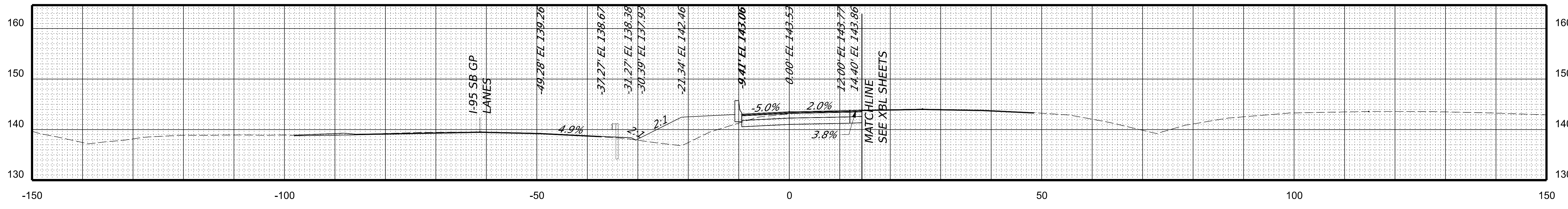
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	12

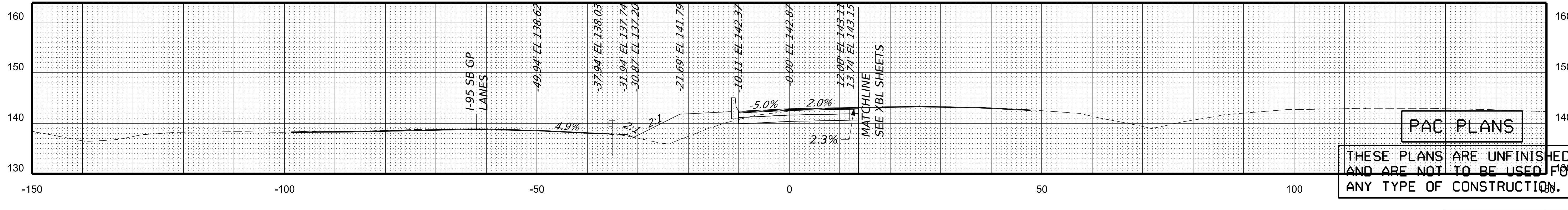
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 19+75.00



STA 19+50.00



STA 19+25.00

PAC PLANS

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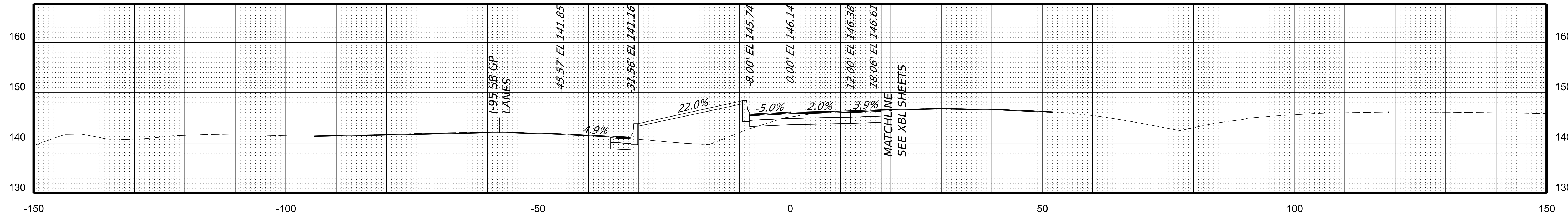
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

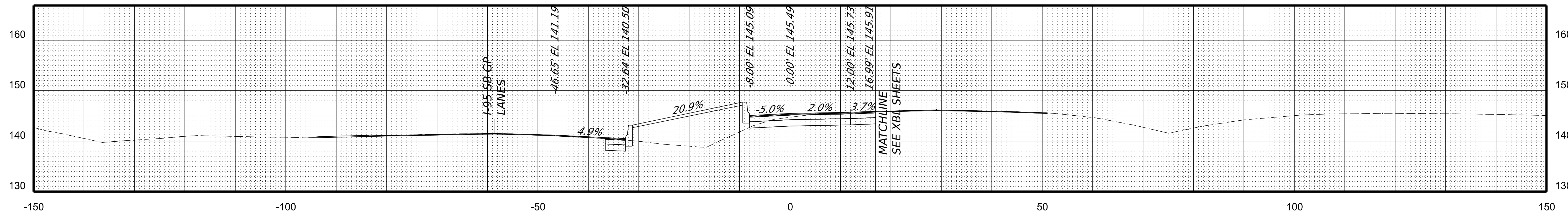
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	13

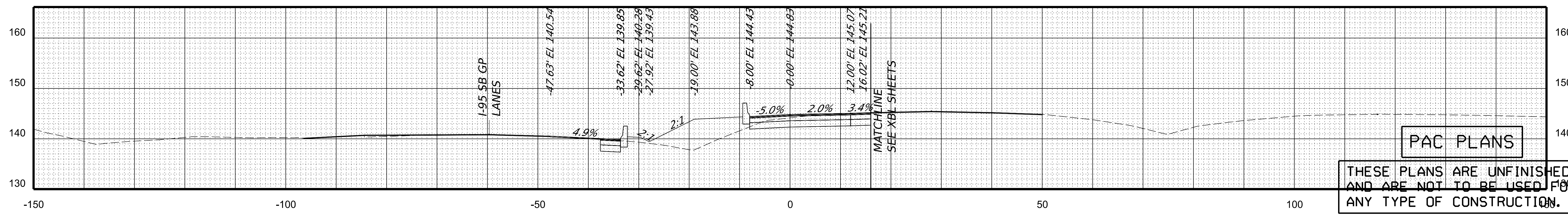
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 20+50.00



STA 20+25.00



STA 20+00.00

PAC PLANS

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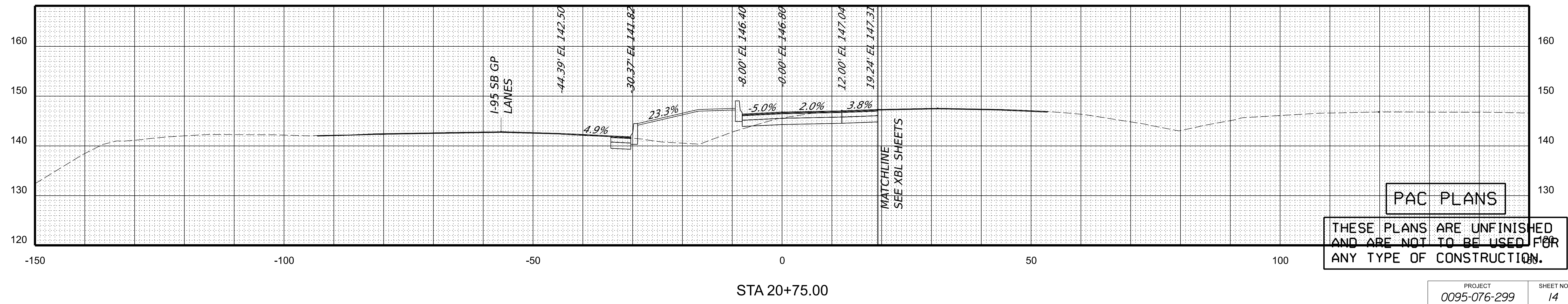
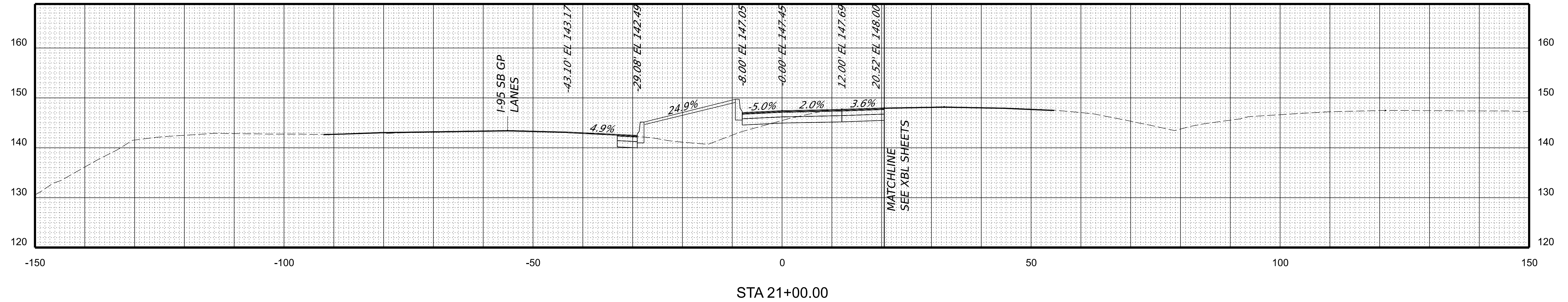
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	14

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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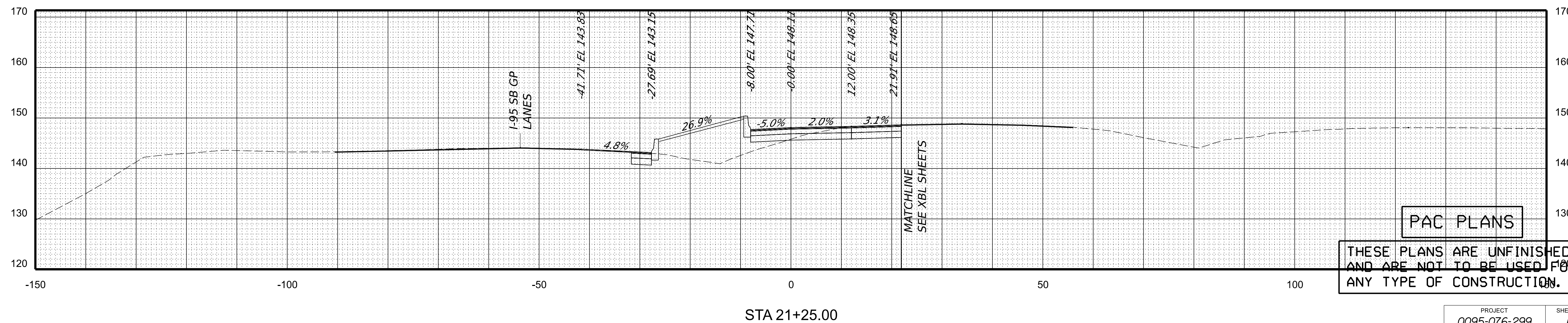
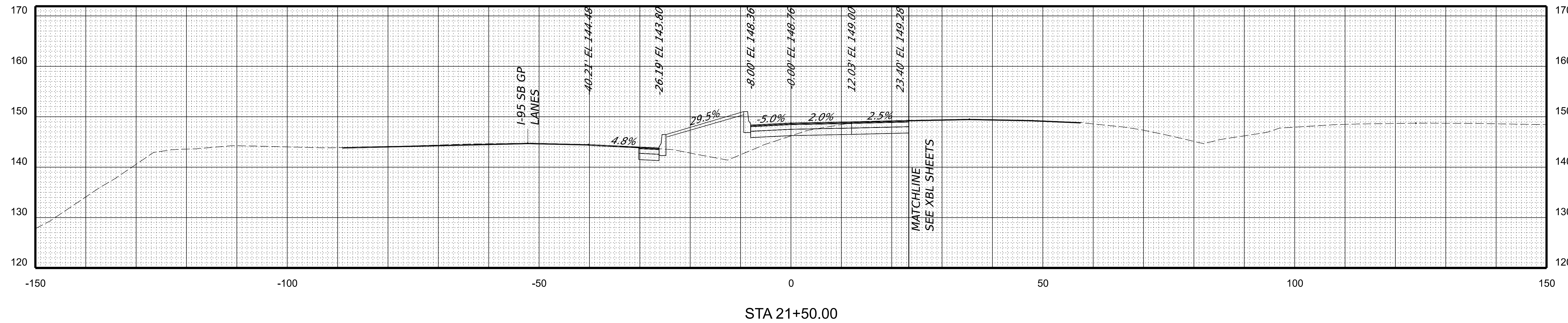
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	15

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



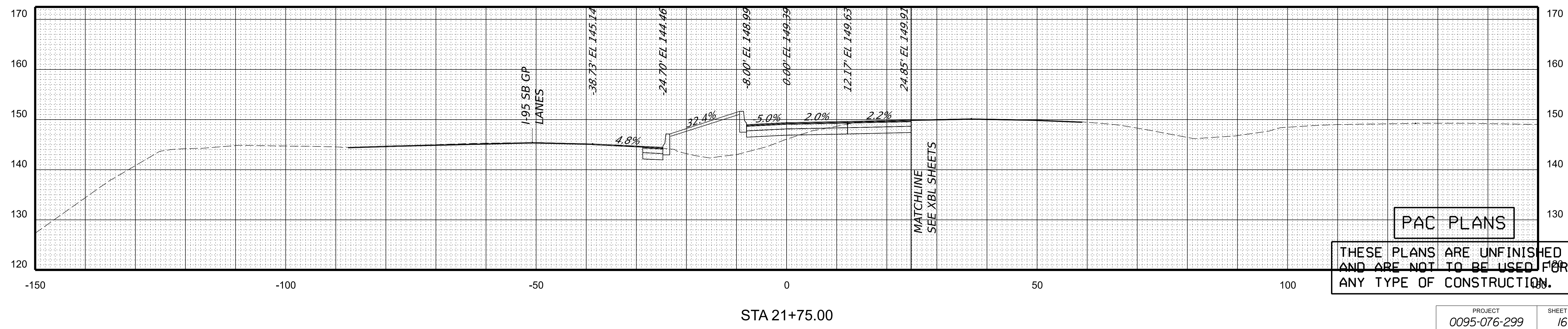
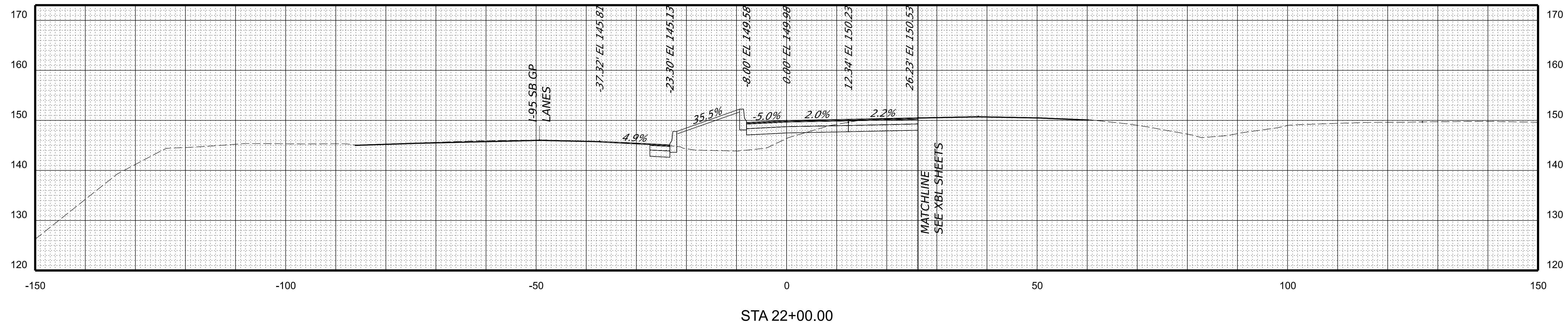
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	16

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

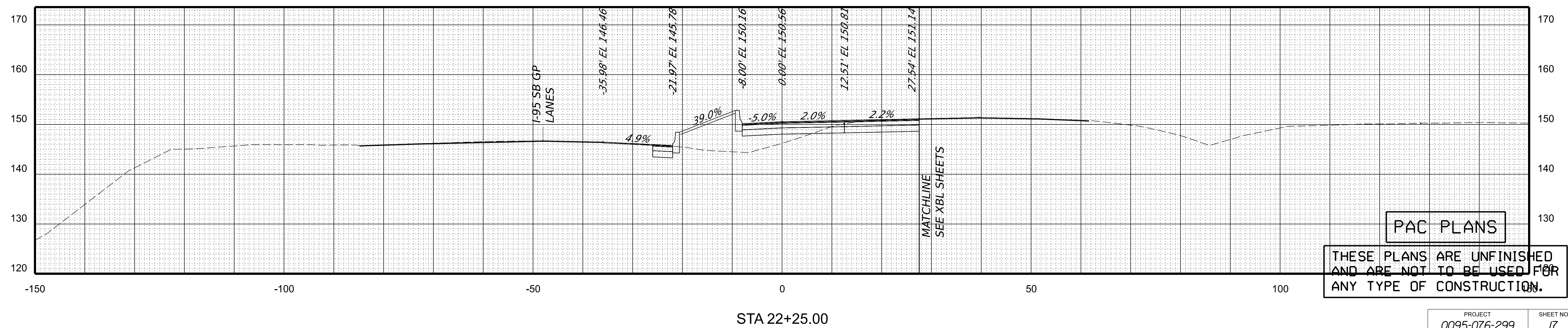
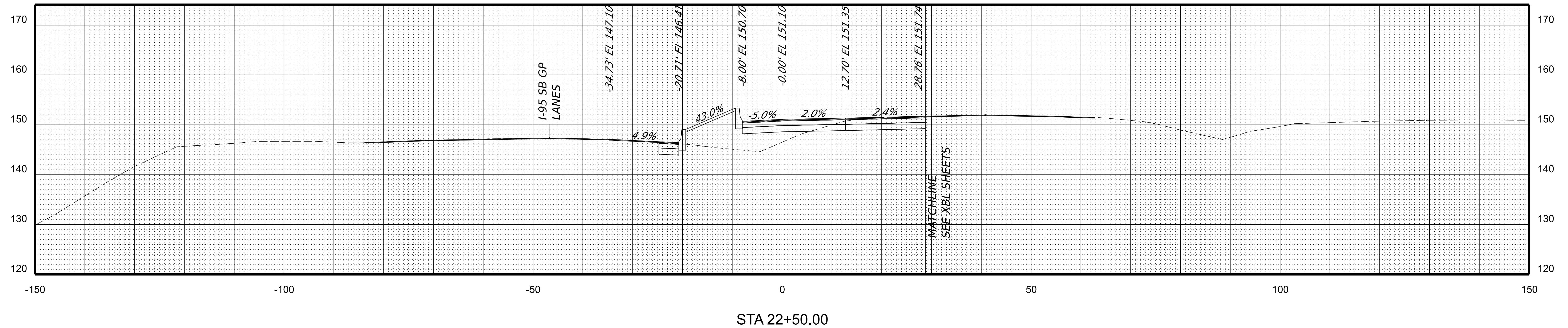
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	17

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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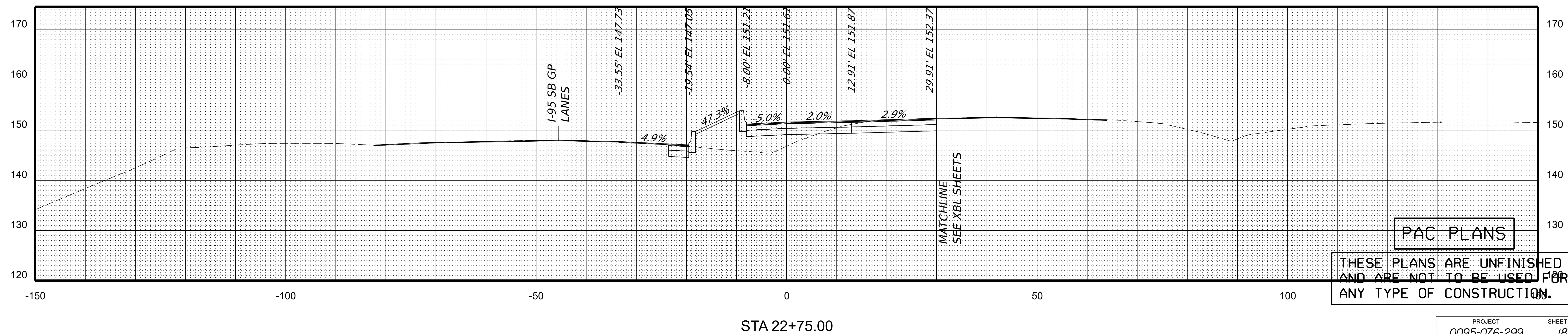
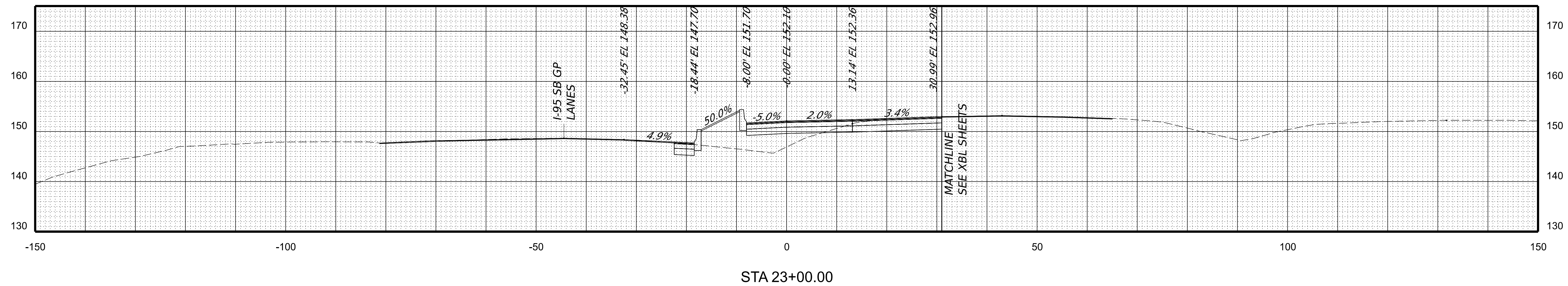
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	18

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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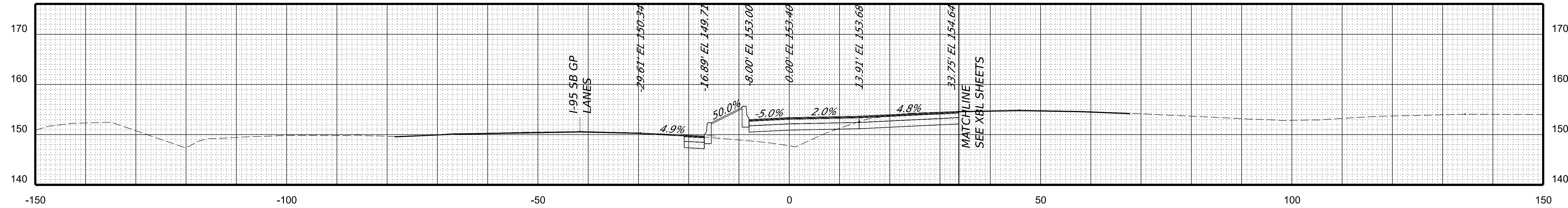
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

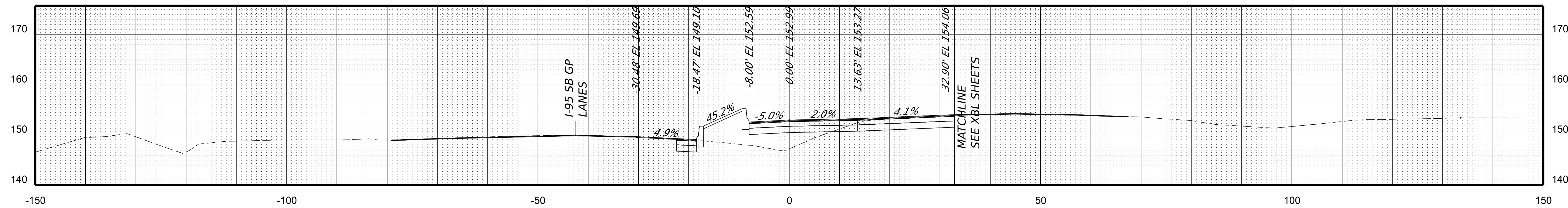
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	19

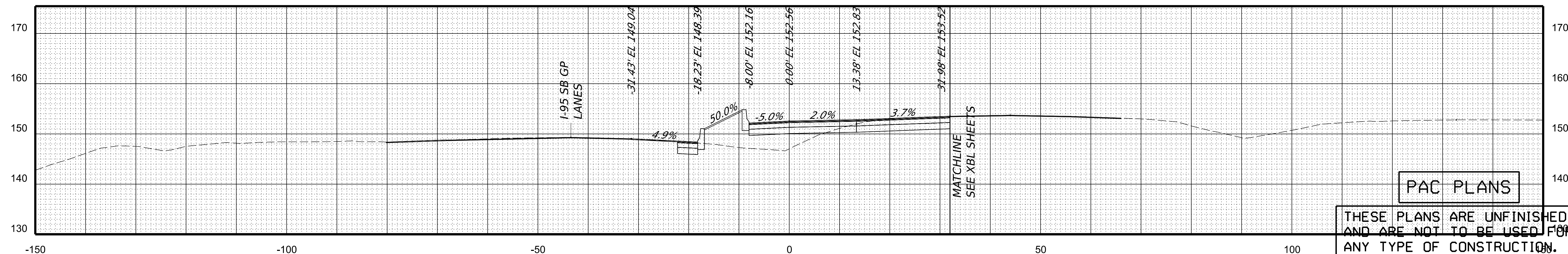
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 23+75.00



STA 23+50.00



STA 23+25.00

PAC PLANS

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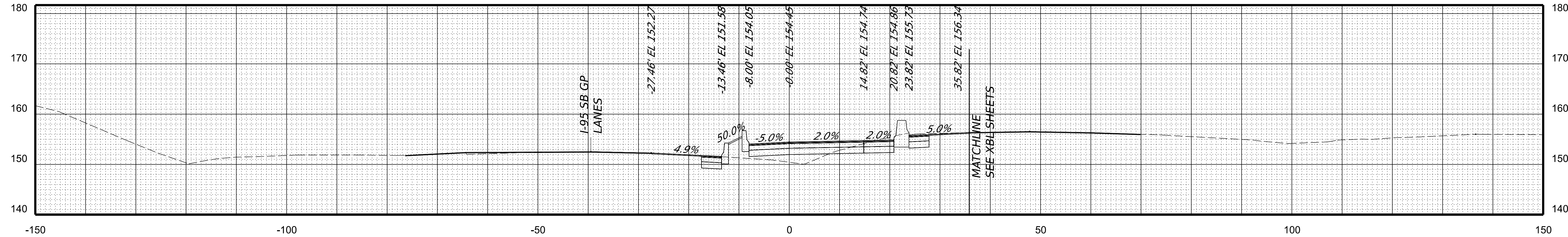
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
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CROSS SECTIONS

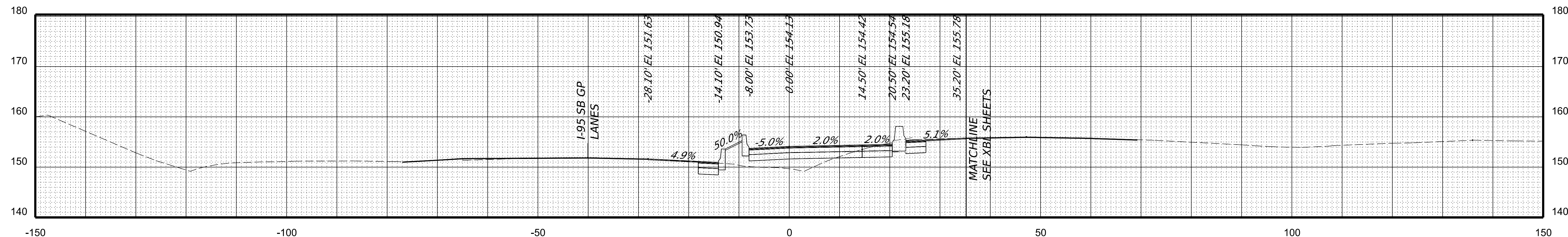
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	20

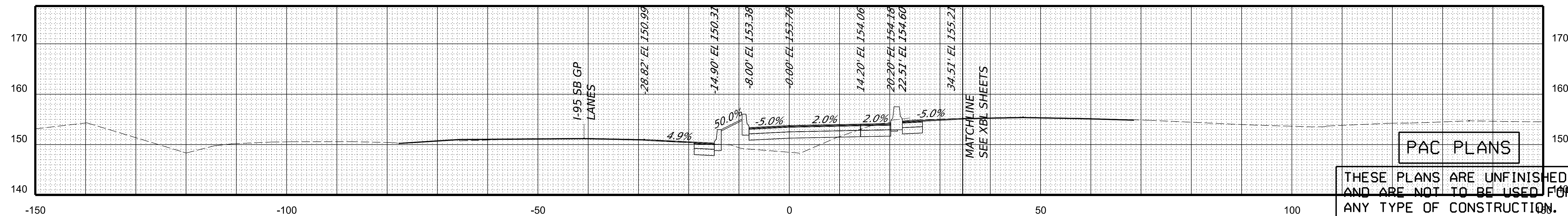
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 24+50.00



STA 24+25.00



STA 24+00.00

PAC PLANS

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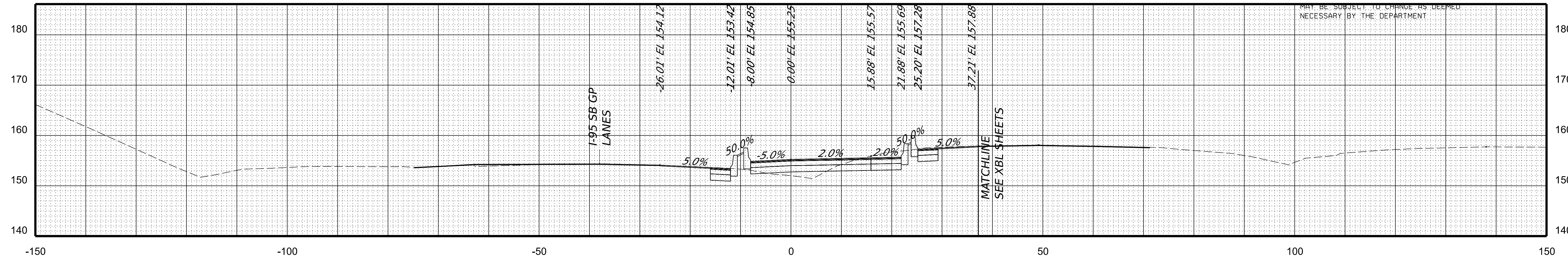
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

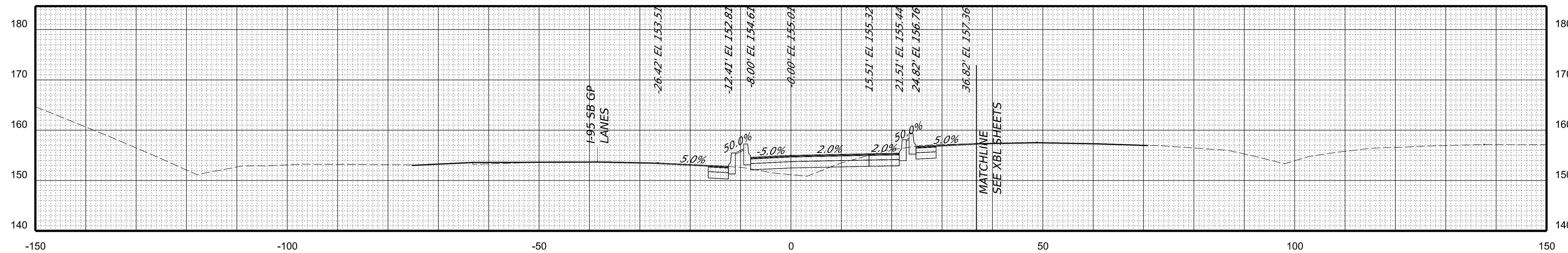
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	21

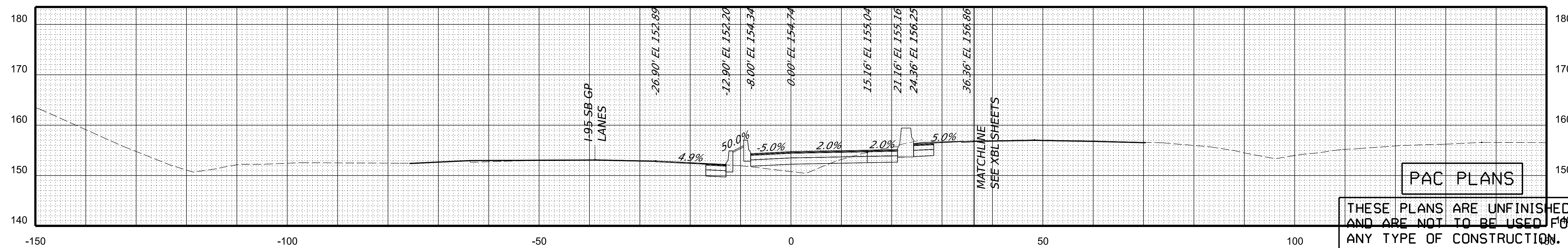
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 25+25.00



STA 25+00.00



STA 24+75.00

PAC PLANS

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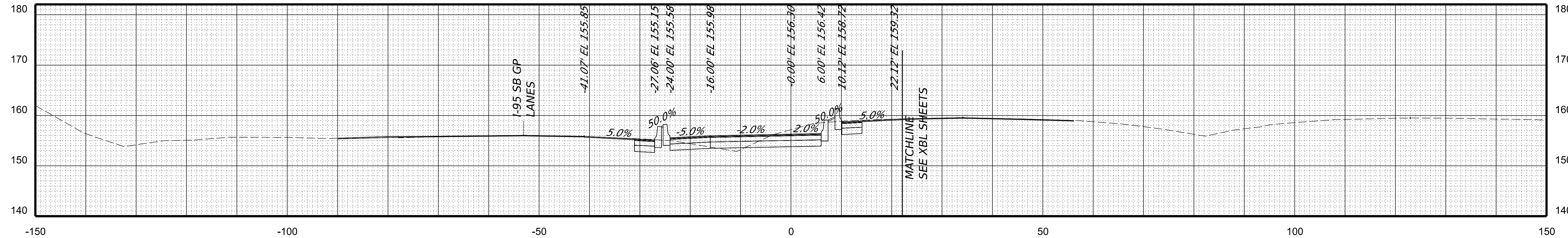
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

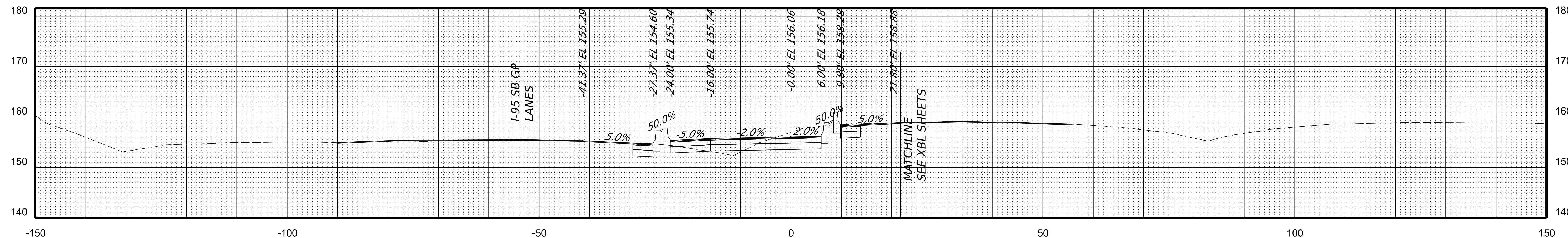
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	22

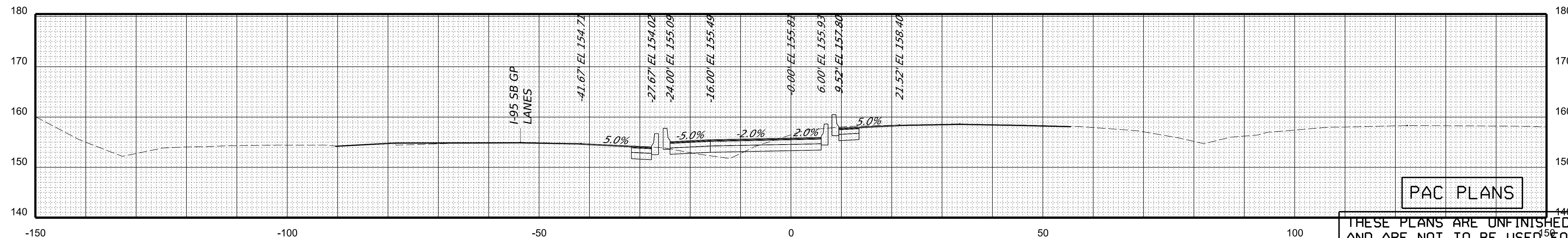
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 26+00.00



STA 25+75.00



STA 25+50.00

PAC PLANS

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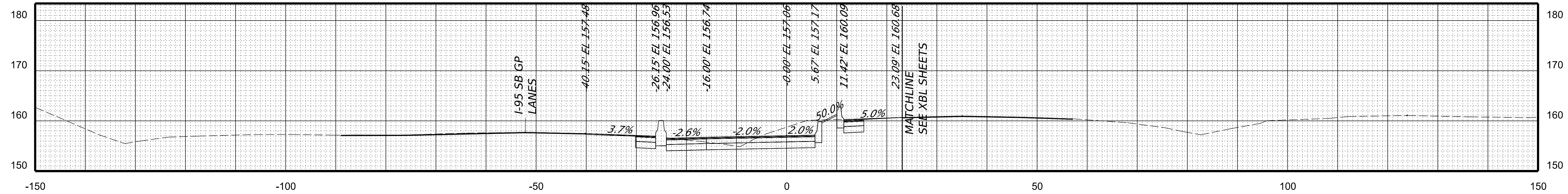
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

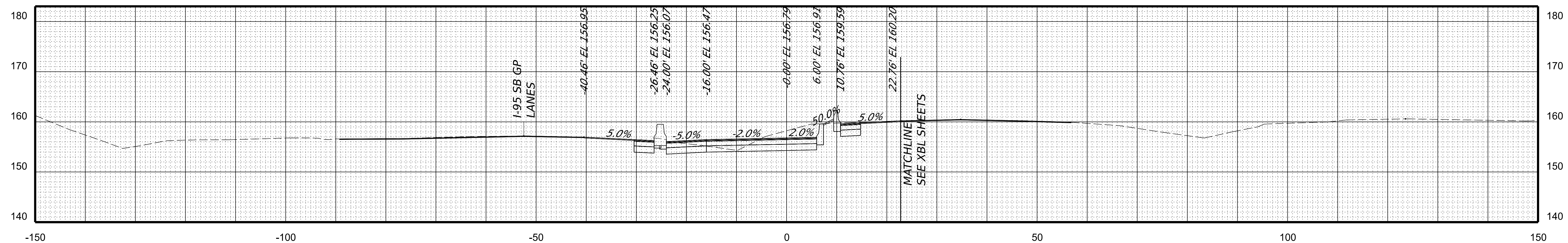
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	23

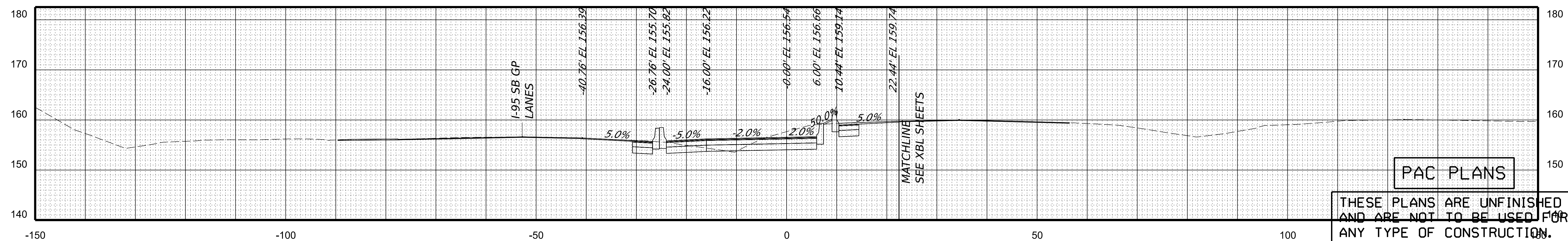
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 26+75.00



STA 26+50.00



STA 26+25.00

PAC PLANS

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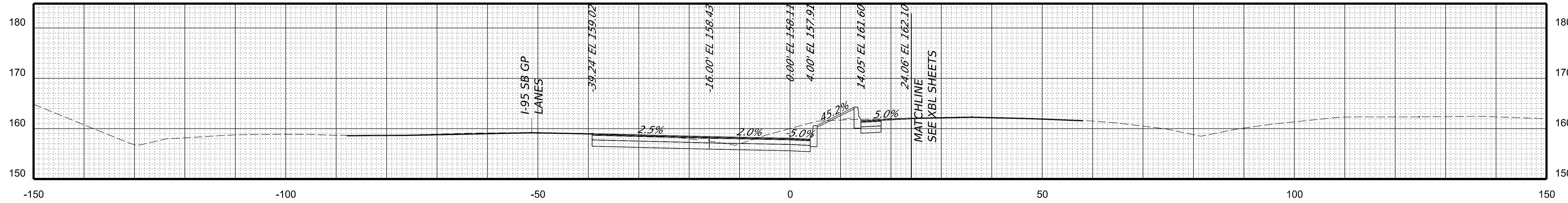
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

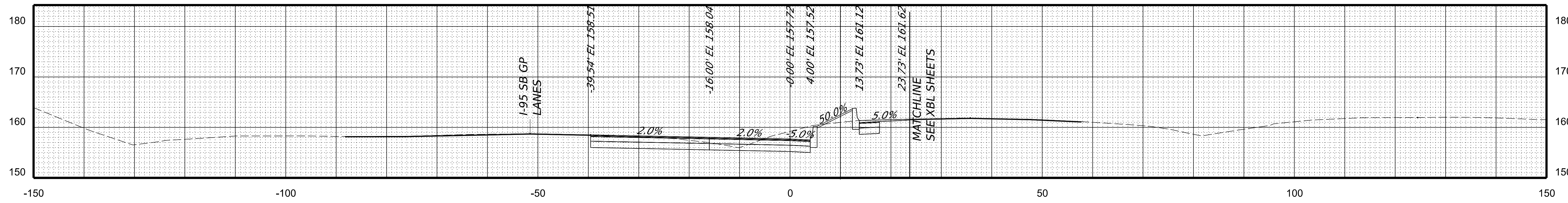
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	24

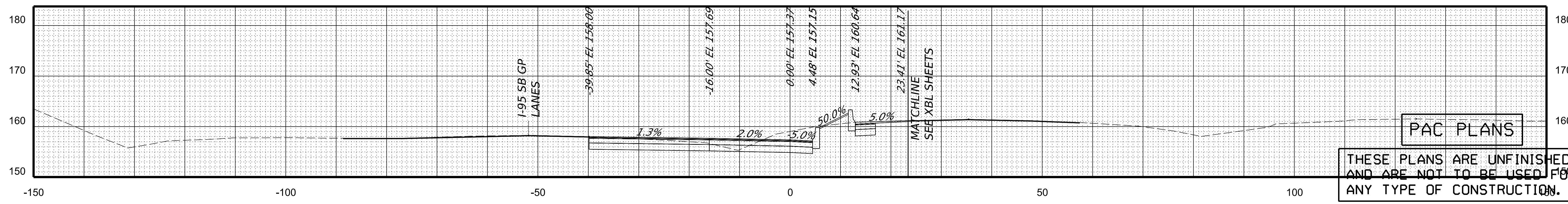
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 27+50.00



STA 27+25.00



STA 27+00.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

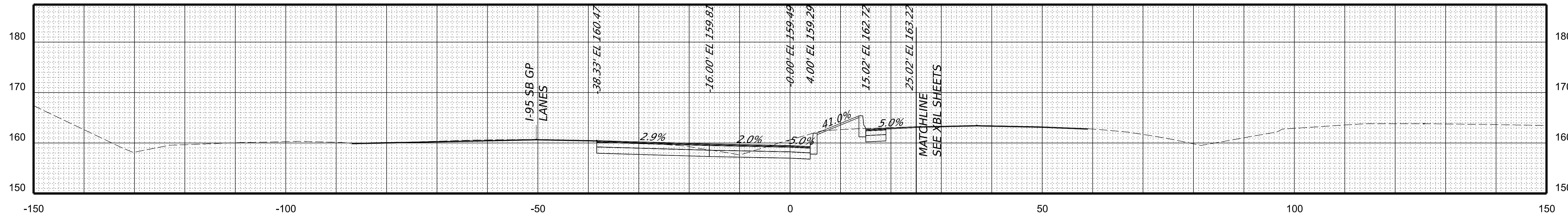
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

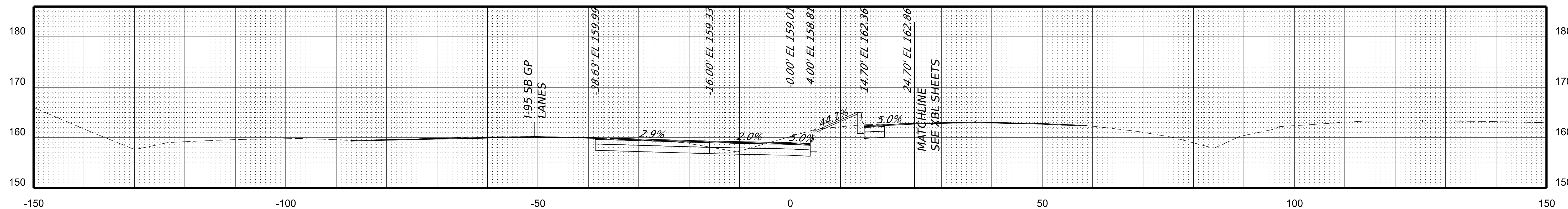
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	25

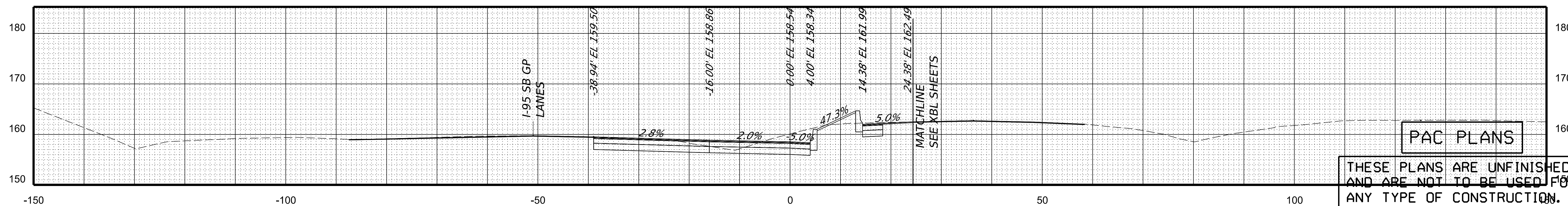
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 28+25.00



STA 28+00.00



STA 27+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

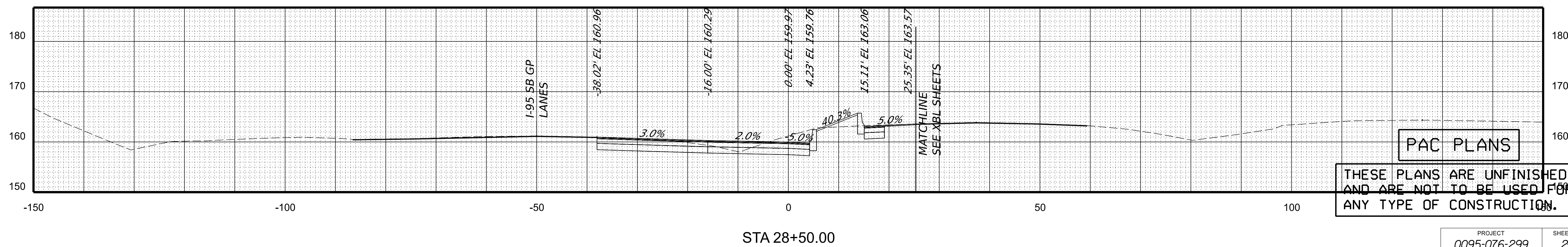
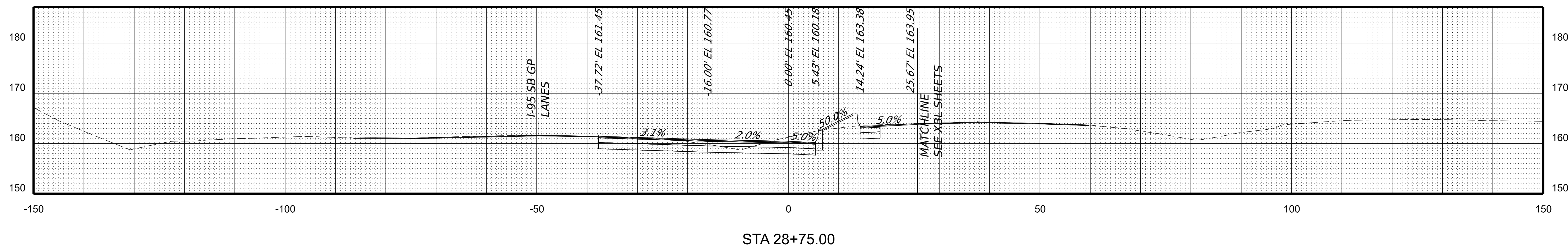
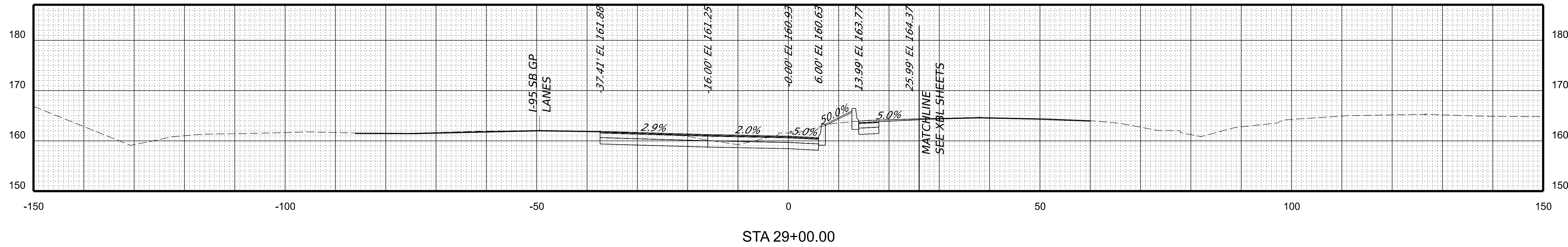
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	26

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

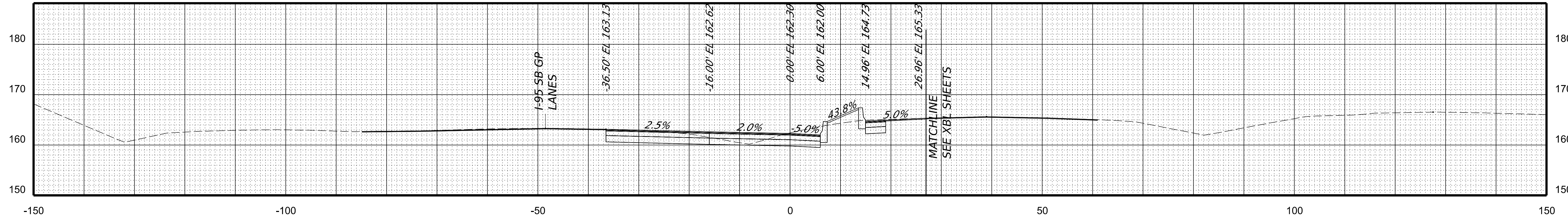
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

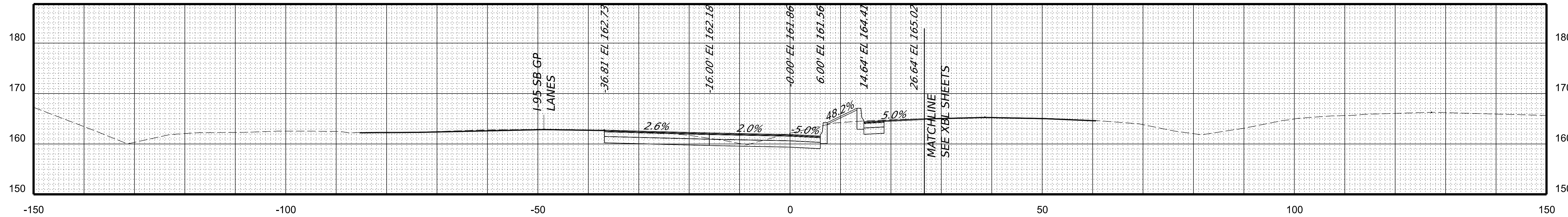
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	27

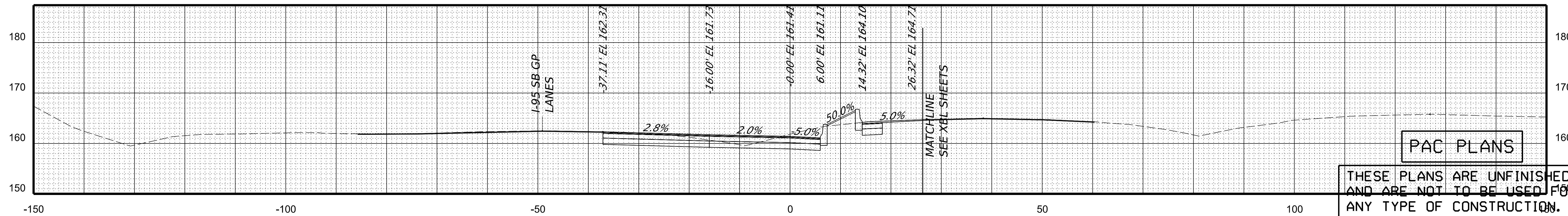
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 29+75.00



STA 29+50.00



STA 29+25.00

PAC PLANS

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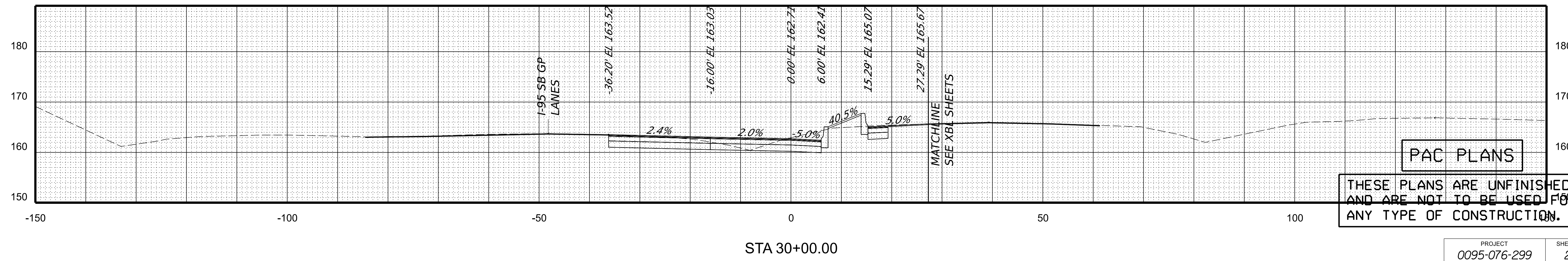
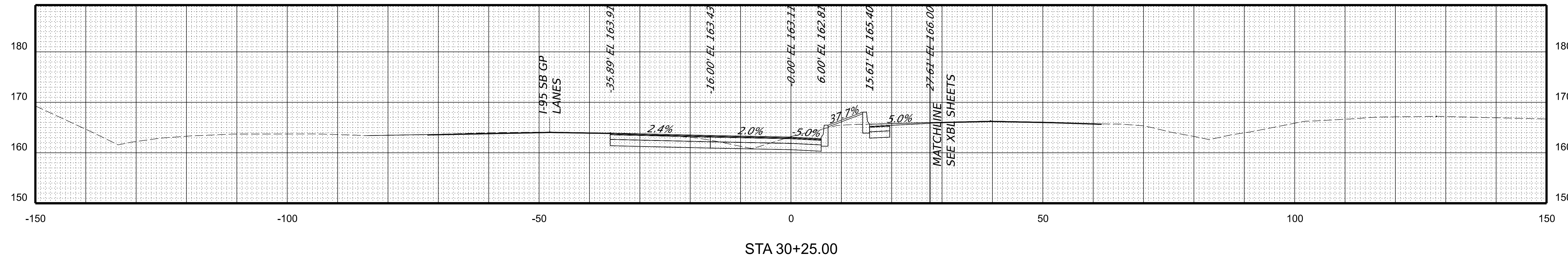
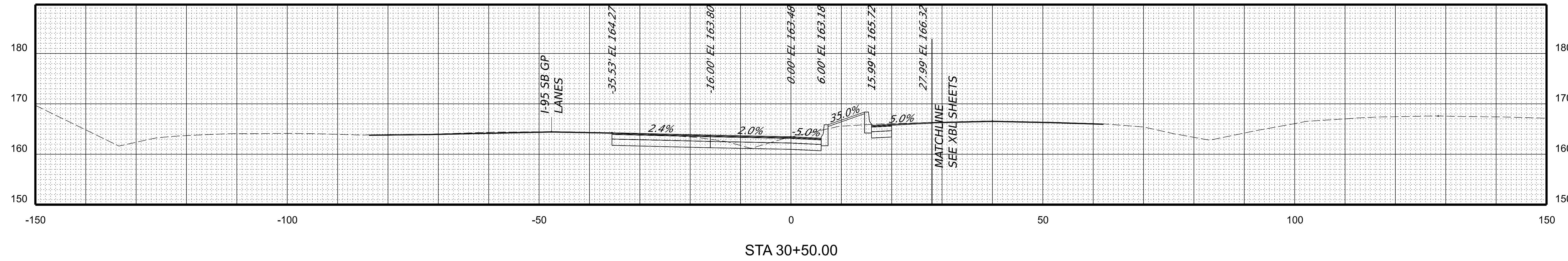
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	28

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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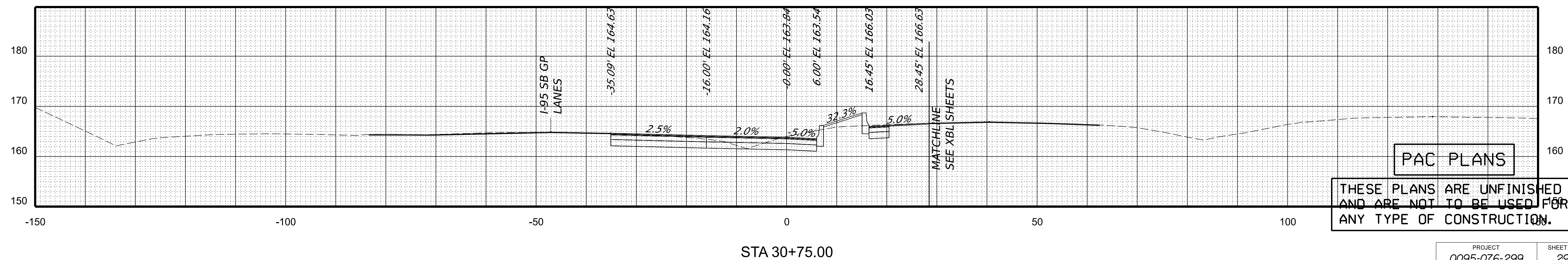
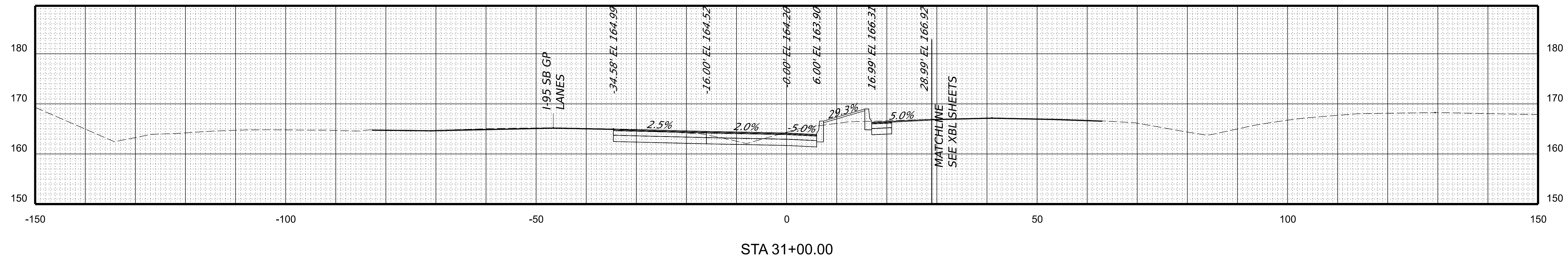
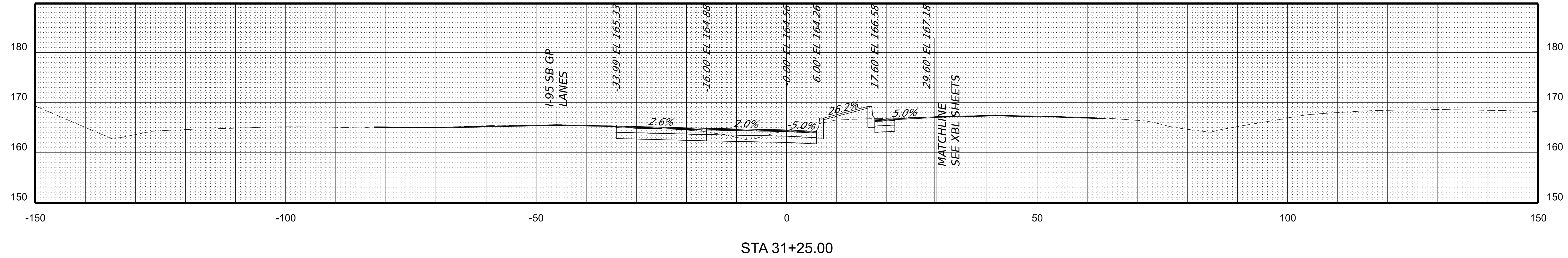
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	29

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

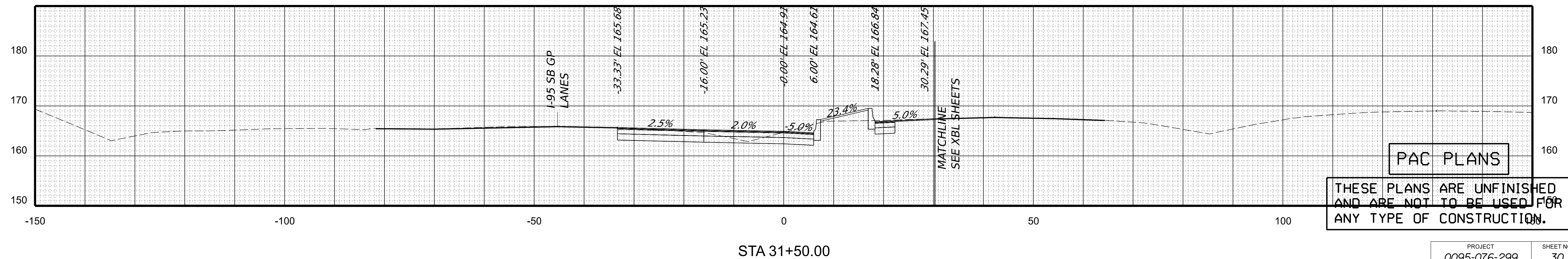
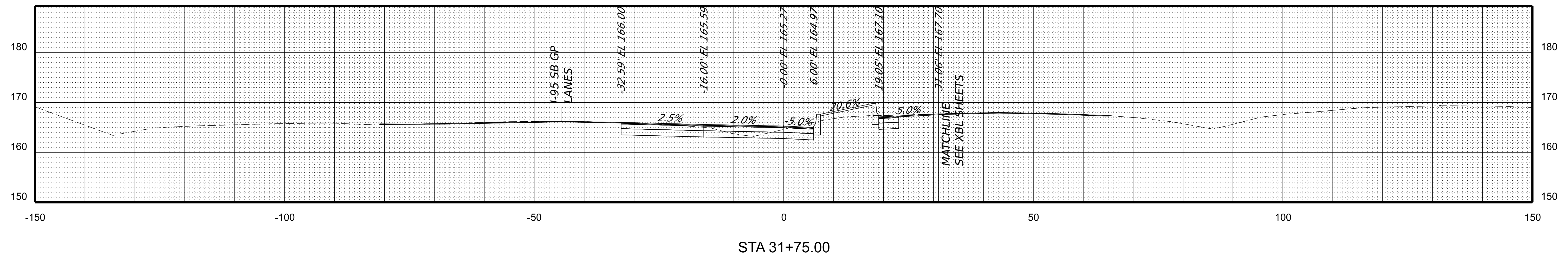
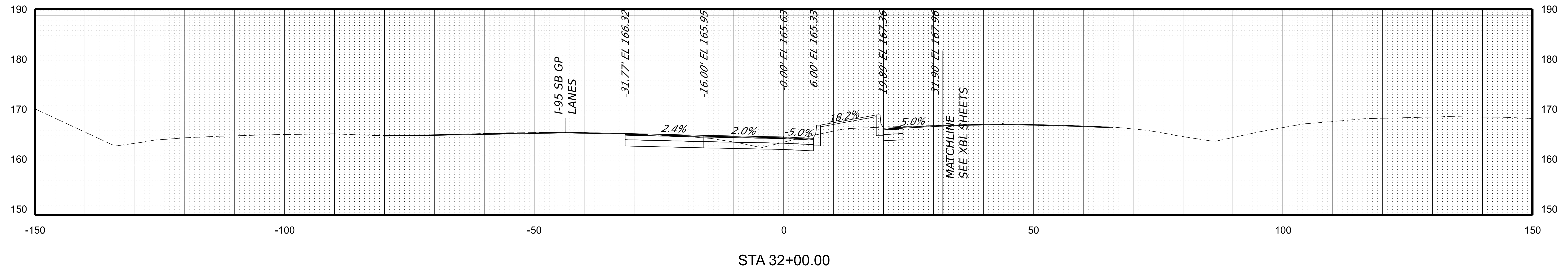
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	30

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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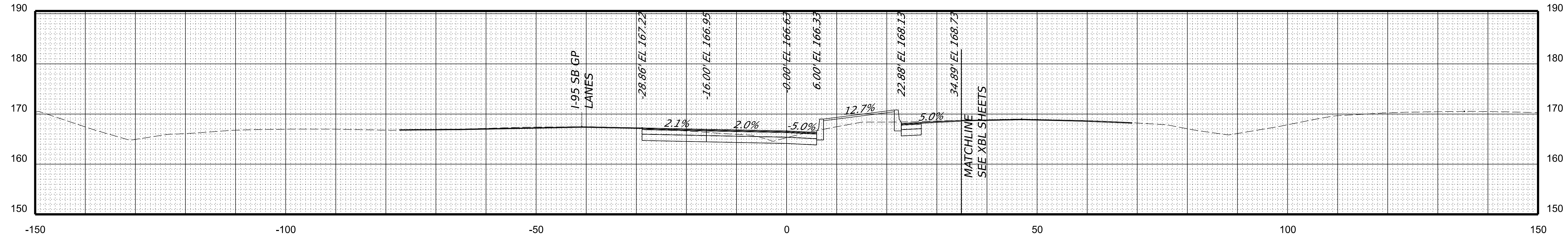
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

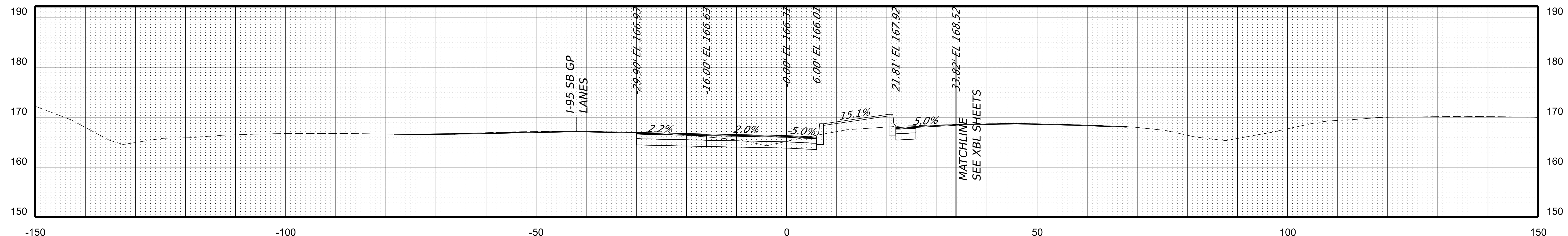
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	31

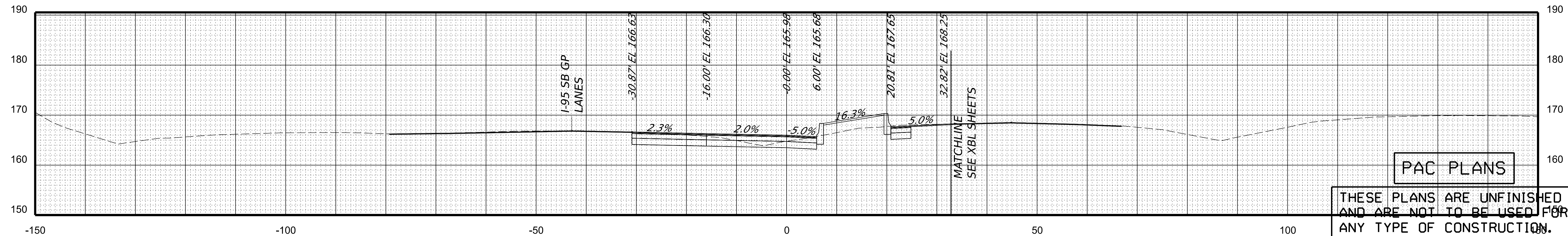
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 32+75.00



STA 32+50.00



STA 32+25.00

PAC PLANS

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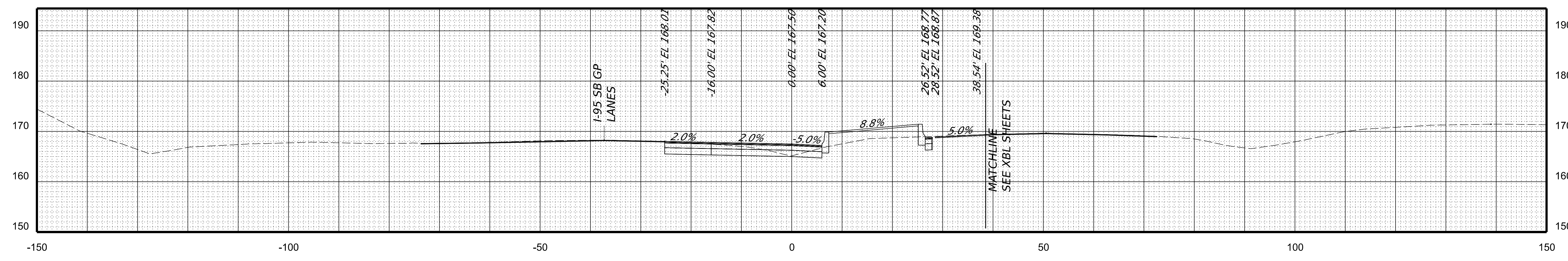
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

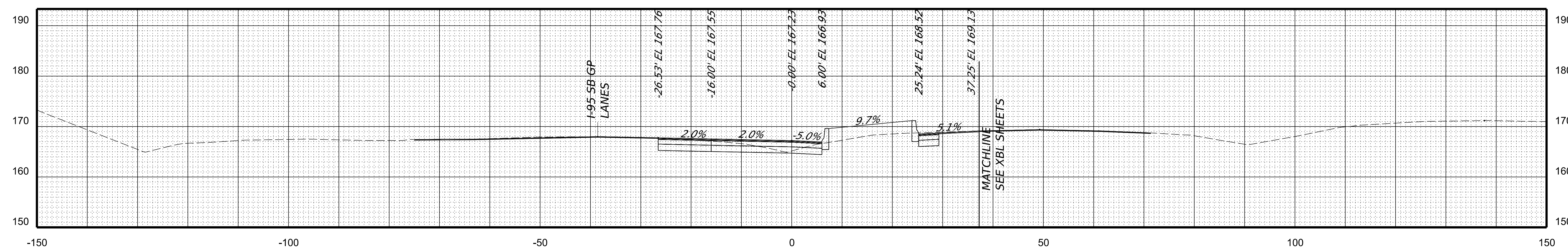
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	32

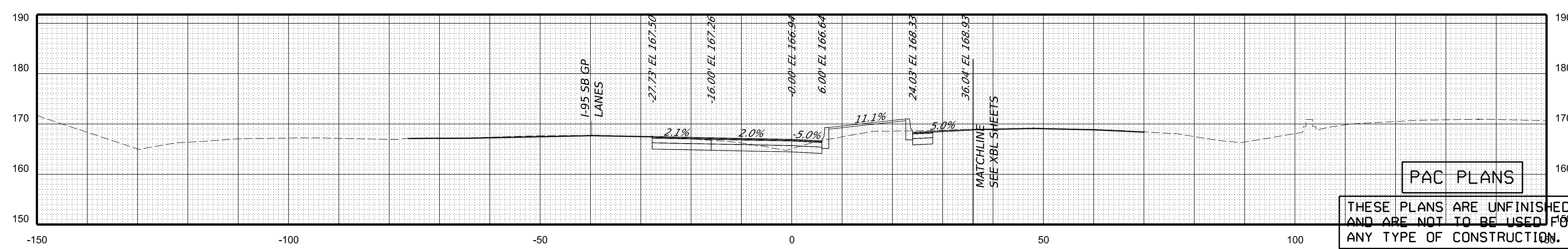
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 33+50.00



STA 33+25.00



STA 33+00.00

PAC PLANS

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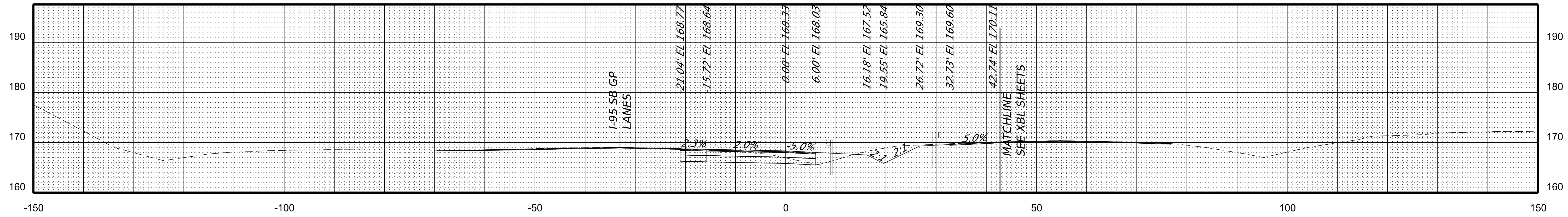
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

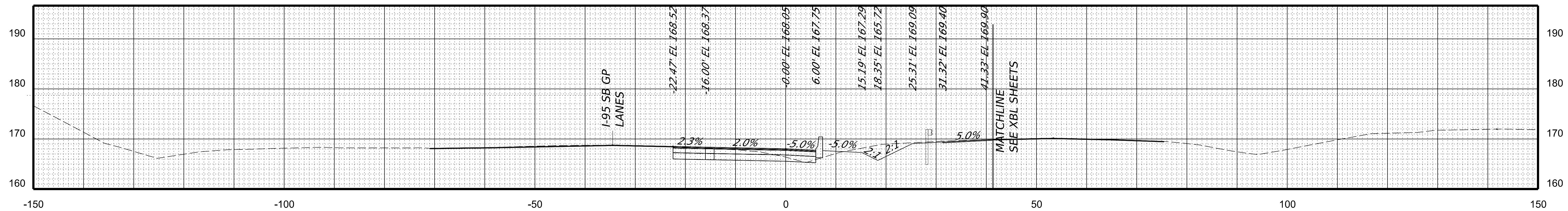
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	33

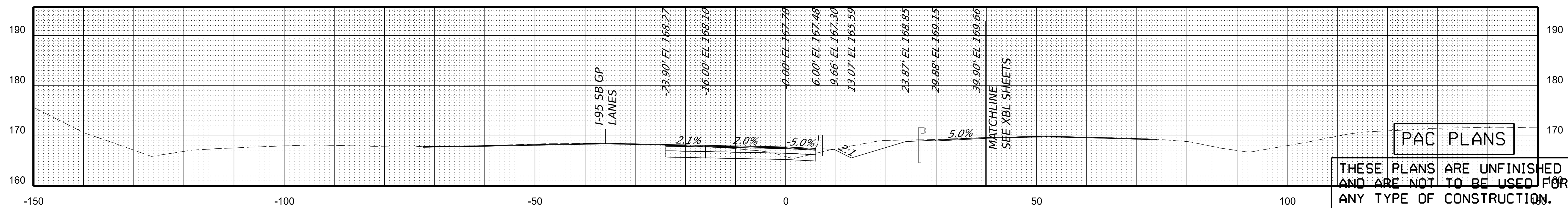
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 34+25.00



STA 34+00.00



STA 33+75.00

PAC PLANS

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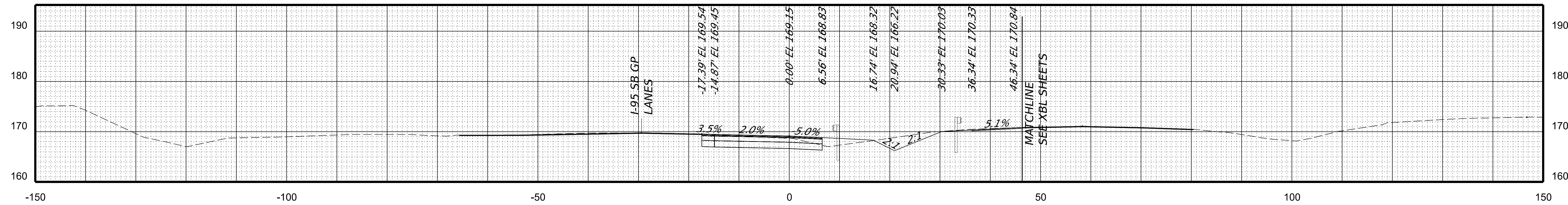
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

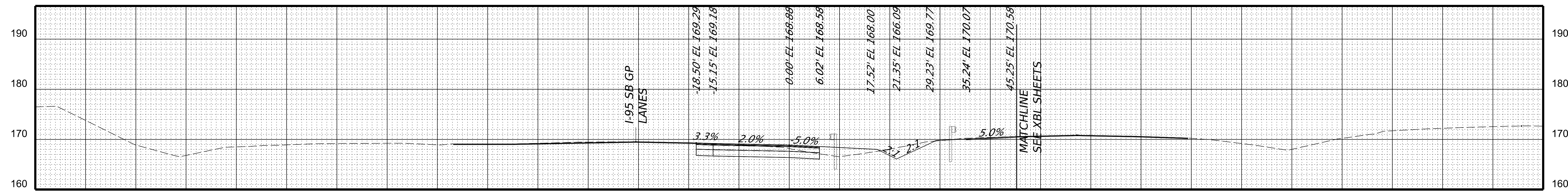
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	34

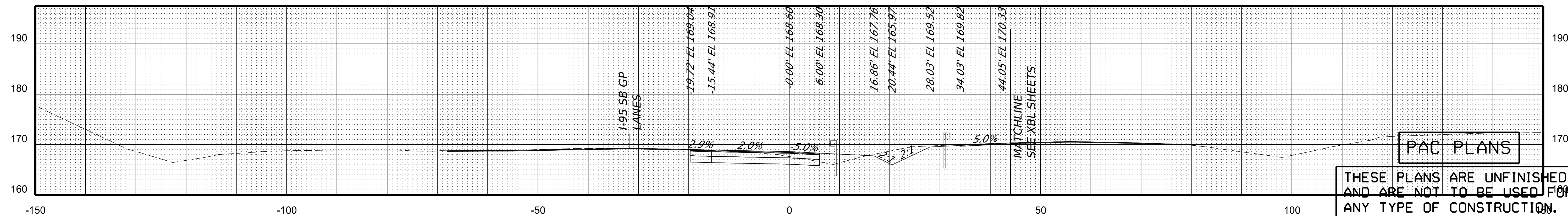
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 35+00.00



STA 34+75.00



STA 34+50.00

PAC PLANS

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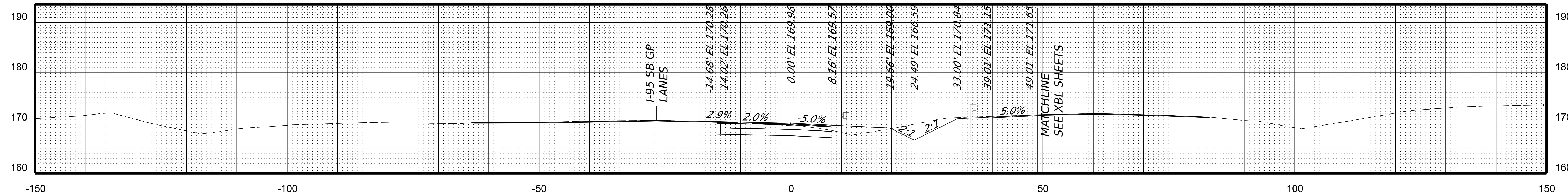
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

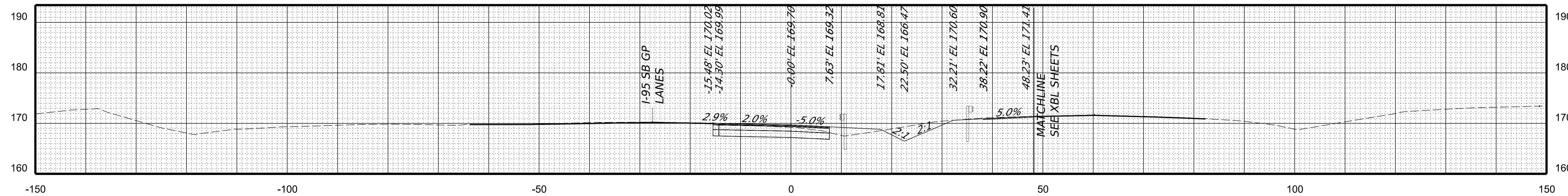
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	35

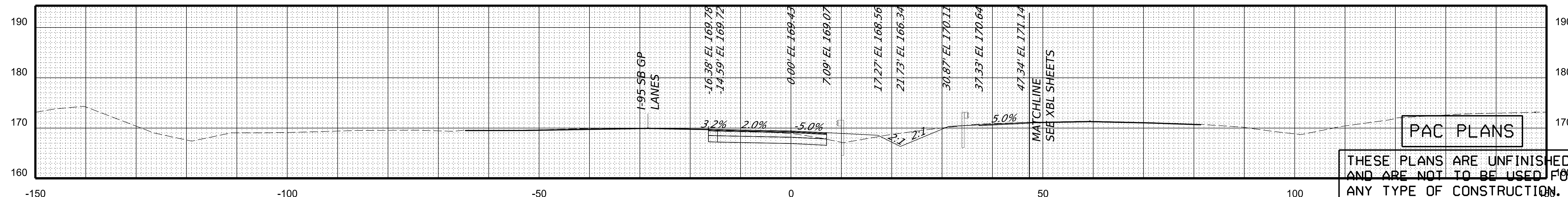
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 35+75.00



STA 35+50.00



STA 35+25.00

PAC PLANS
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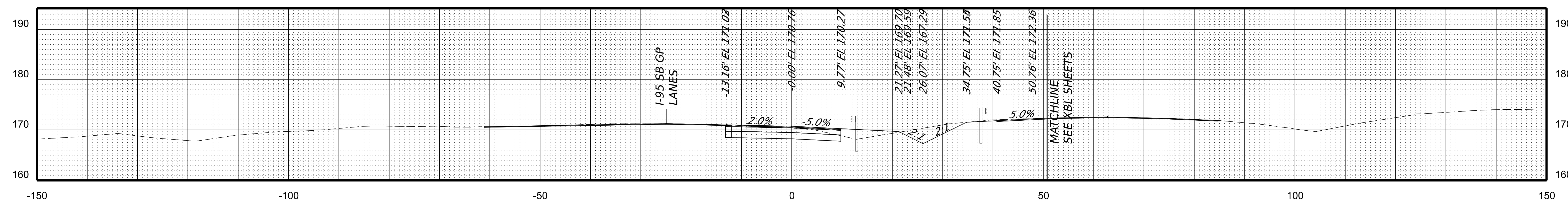
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INQA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

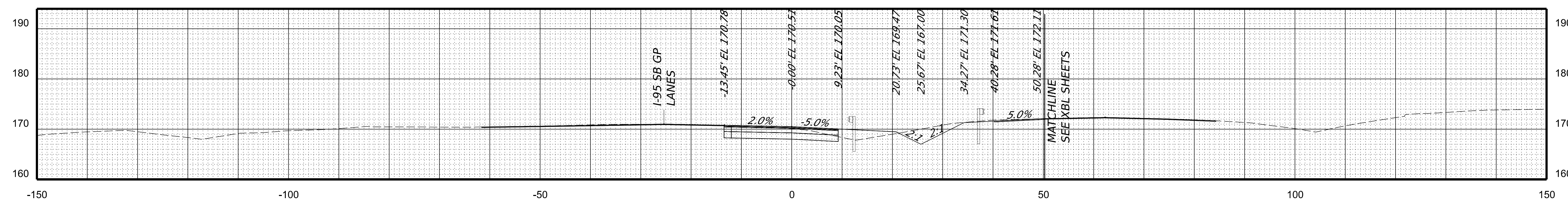
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	36

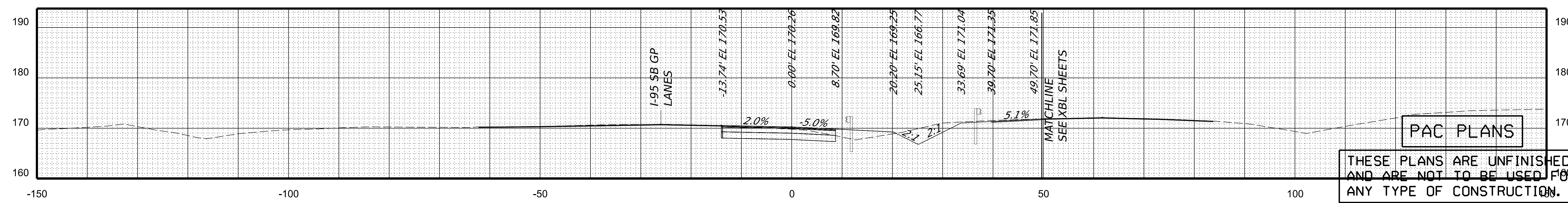
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 36+50.00



STA 36+25.00



STA 36+00.00

PAC PLANS
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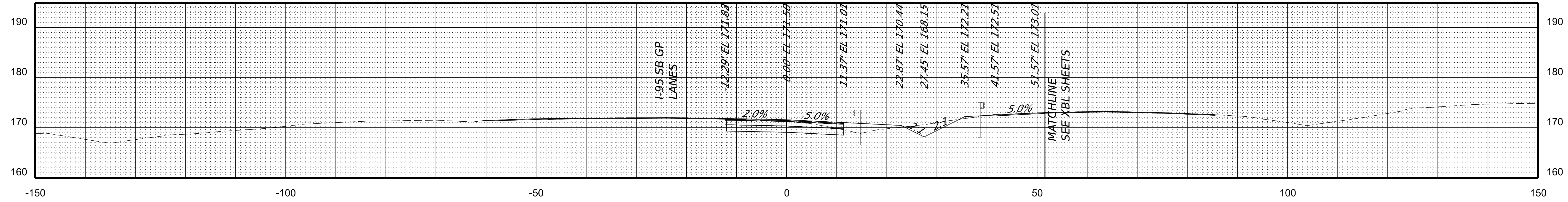
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

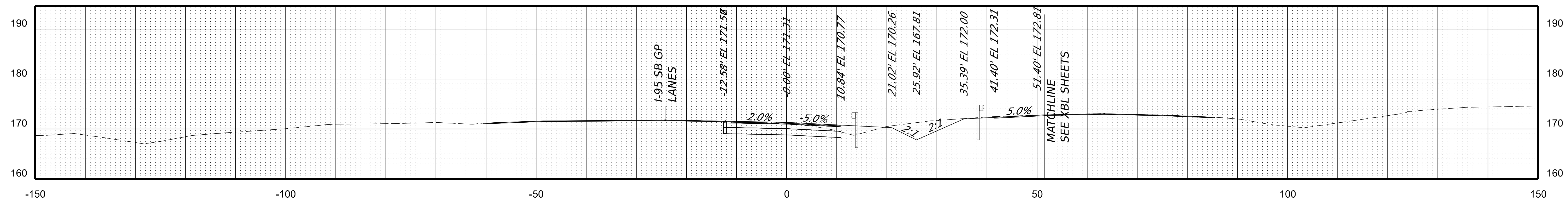
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	37

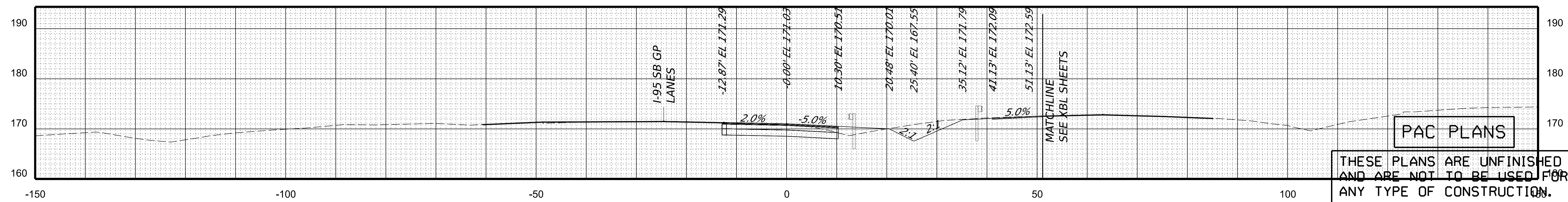
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 37+25.00



STA 37+00.00



STA 36+75.00

PAC PLANS

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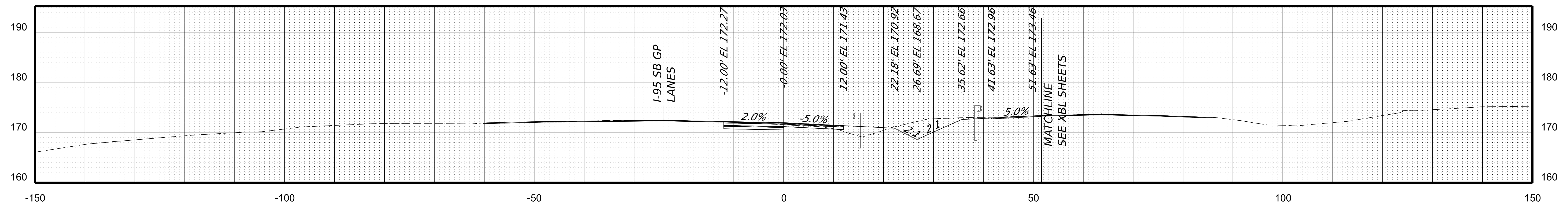
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

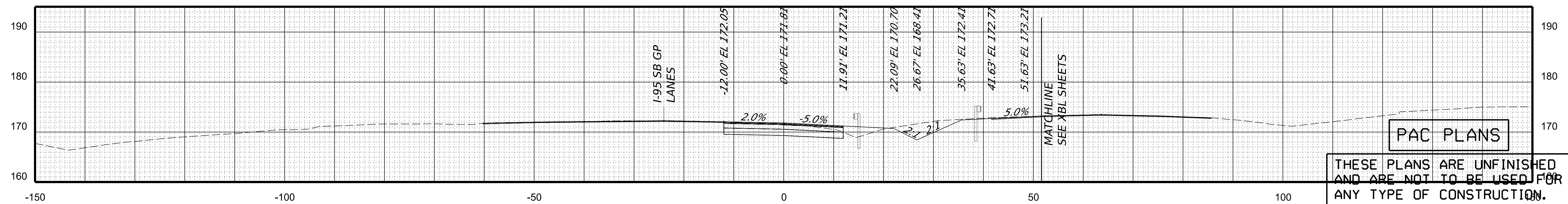
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	38

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 37+75.00



STA 37+50.00

PAC PLANS

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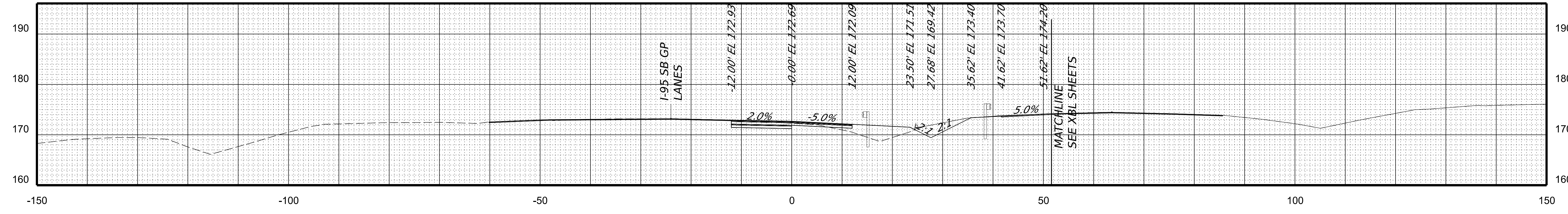
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

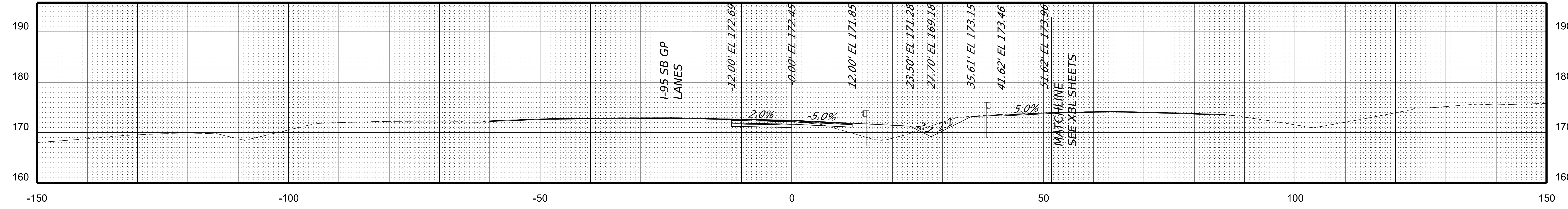
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	39

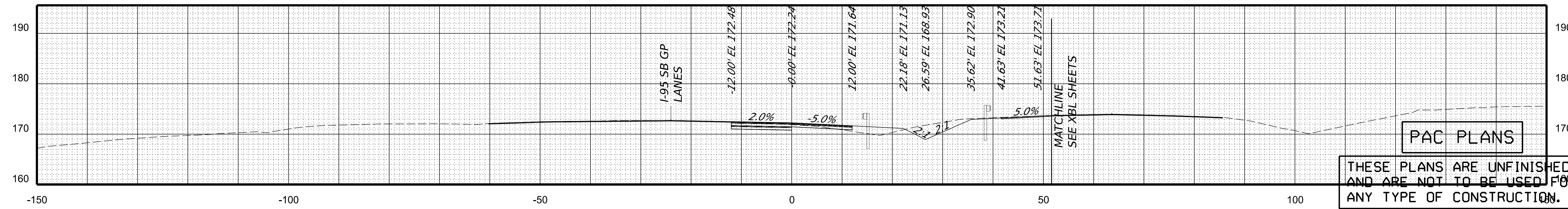
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 38+50.00



STA 38+25.00



STA 38+00.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

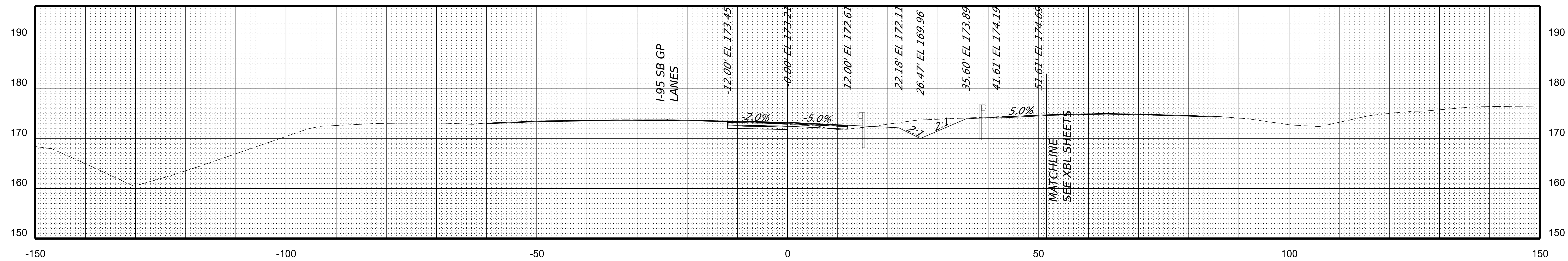
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

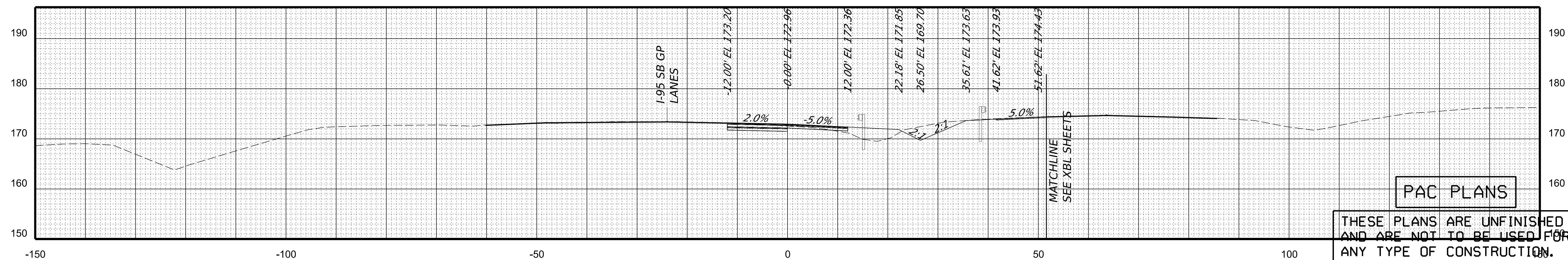
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	40

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 39+00.00



STA 38+75.00

PAC PLANS

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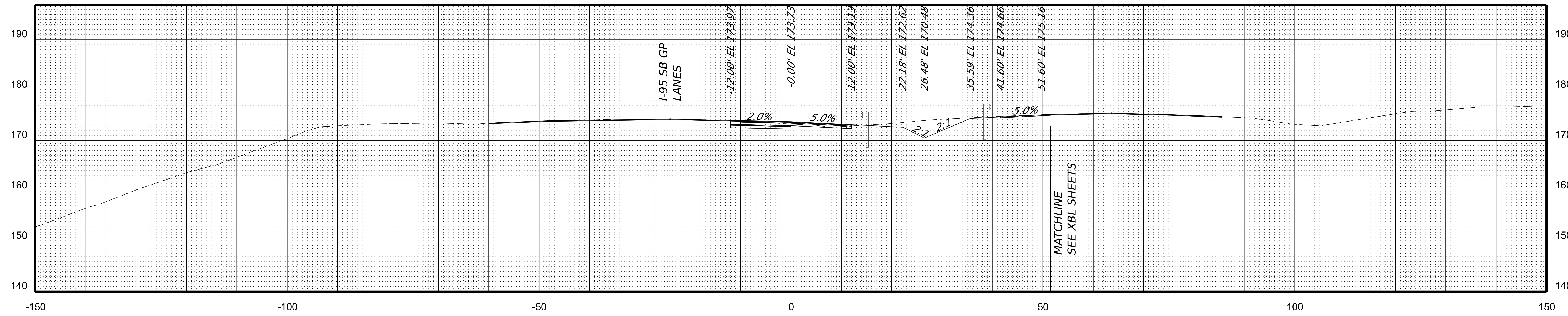
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

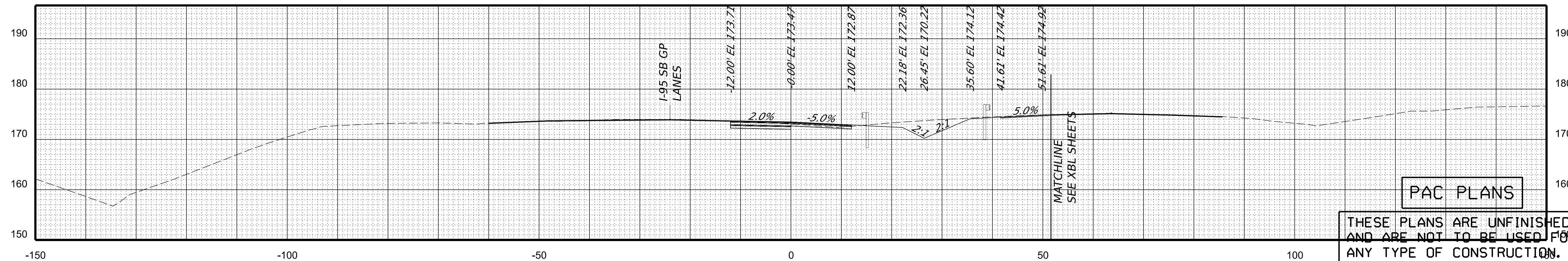
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	41

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 39+50.00



STA 39+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

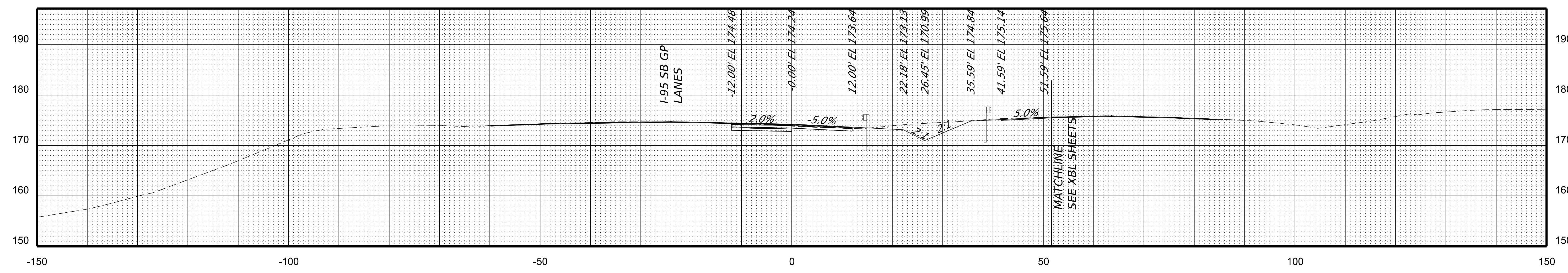
PROJECT MANAGER: *Bimbal Stah, P.E.* (703) 259-2362 (NOVA District)
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC* (804) 330-3781, 03/09/2021
DESIGN BY: *Whitman, Requardt, & Associates, LLP* (804) 272-8700
SUBSURFACE UTILITY BY: DATE *Accumark, Inc.* (804) 550-7740, 07/07/2021

CROSS SECTIONS

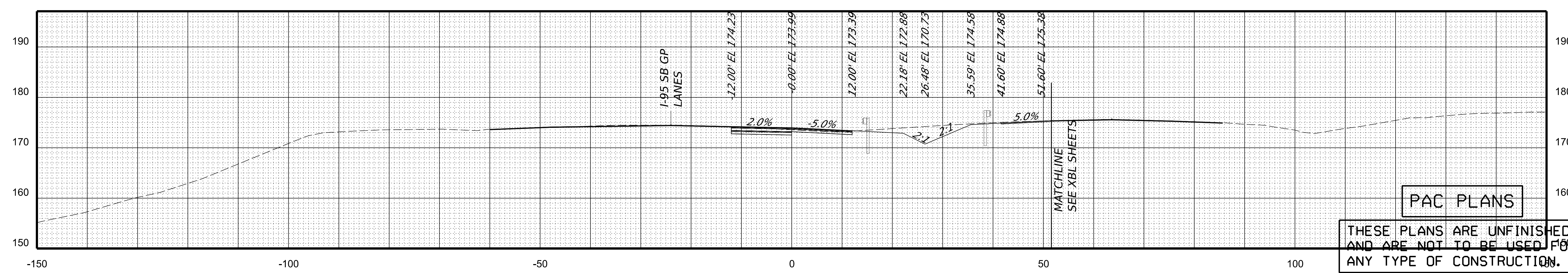
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1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	42

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 40+00.00



STA 39+75.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

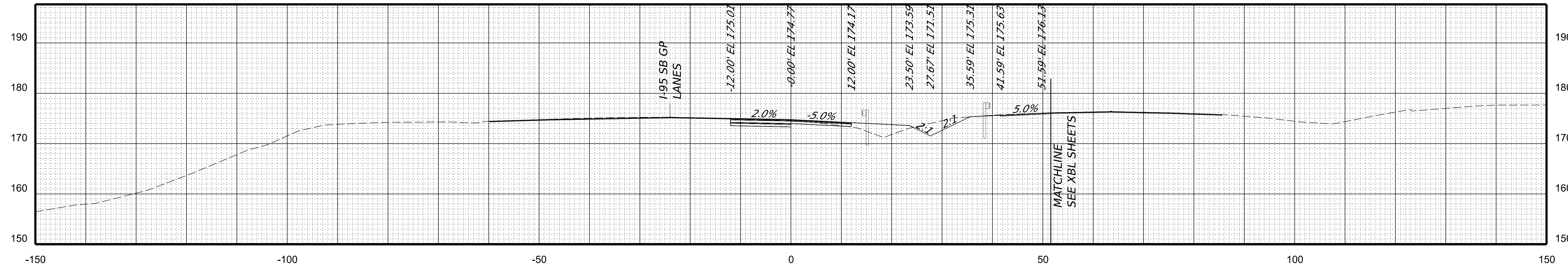
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

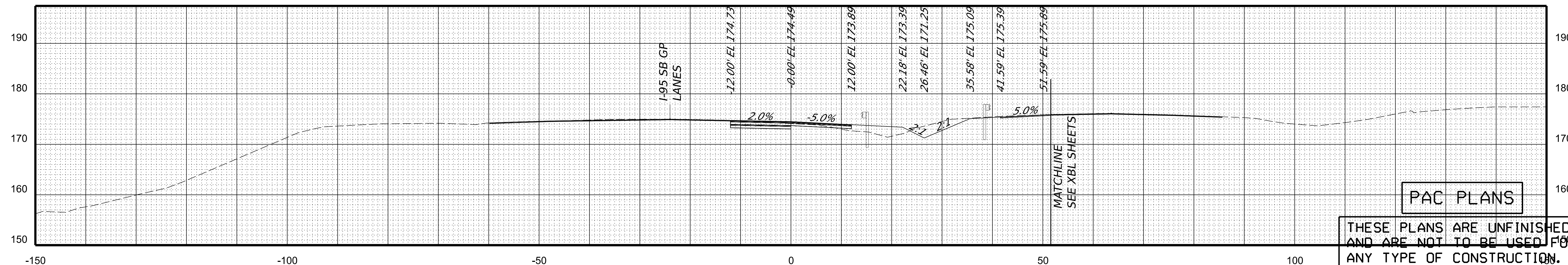
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	43

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 40+50.00



STA 40+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

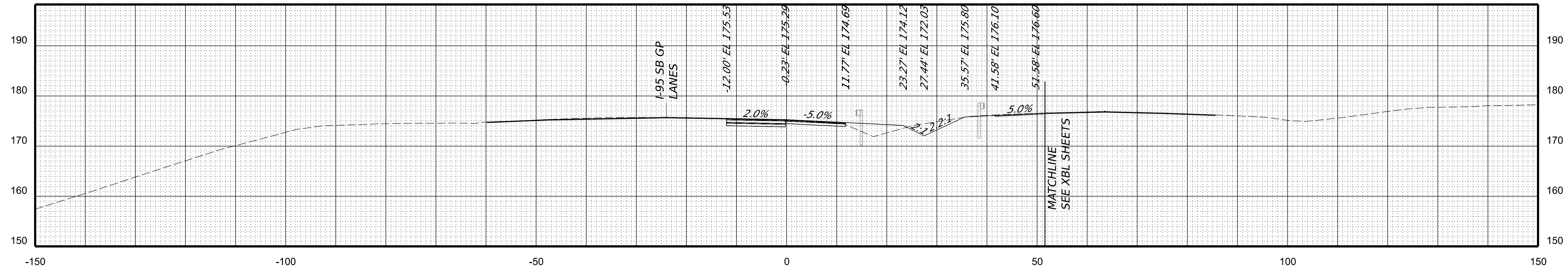
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

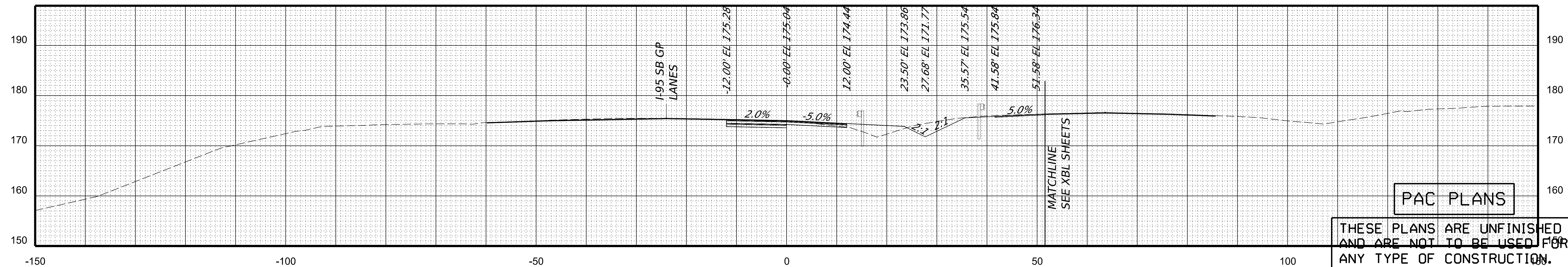
REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	44

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 41+00.00

END RAMP DBSR
STA. 40+94.48



STA 40+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

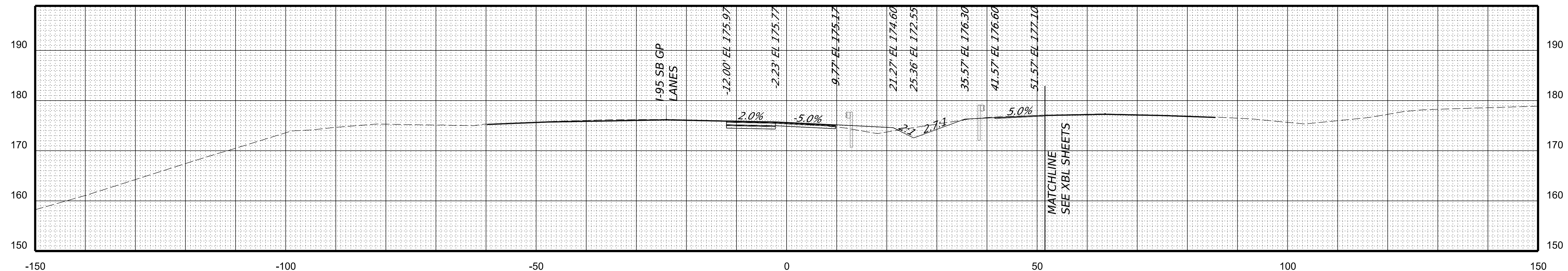
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8000*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

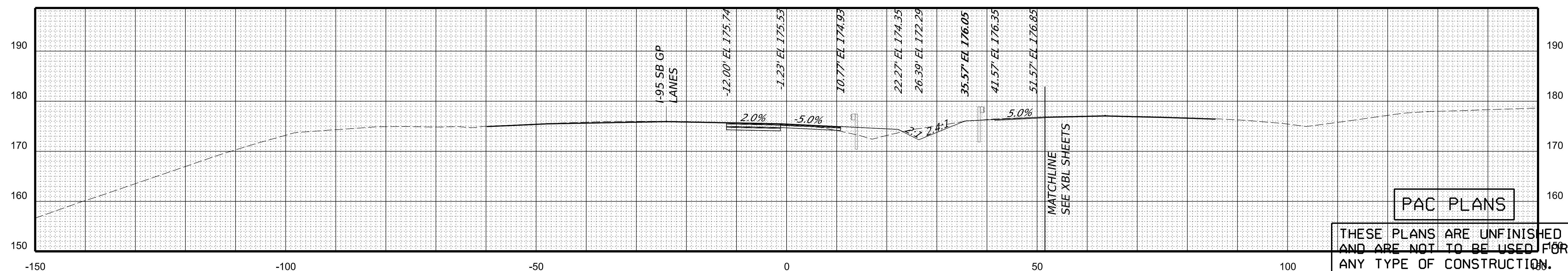
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	45

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 41+50.00



STA 41+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

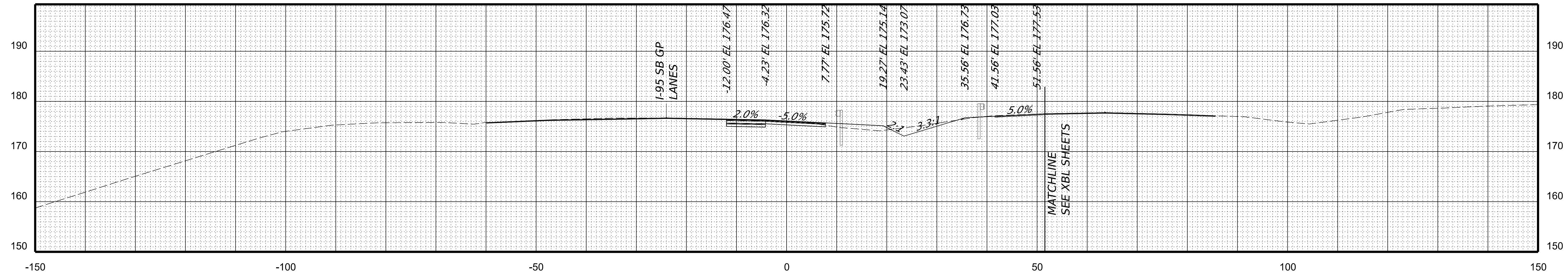
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

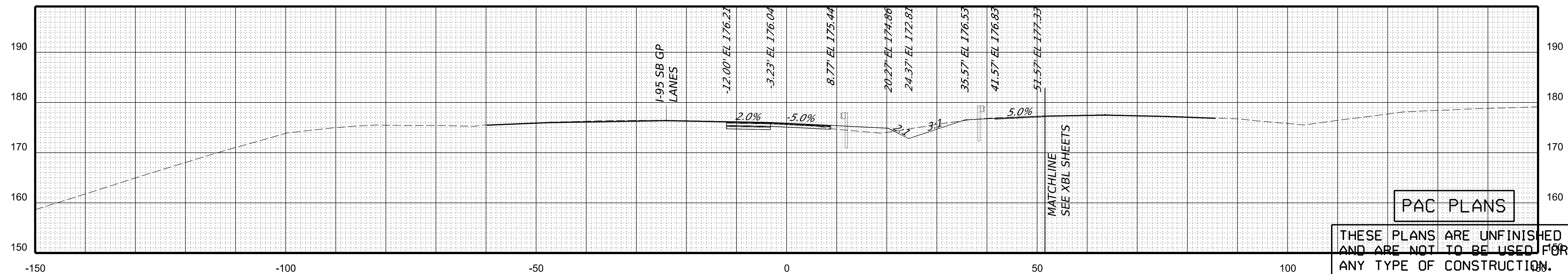
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	46

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 42+00.00



STA 41+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

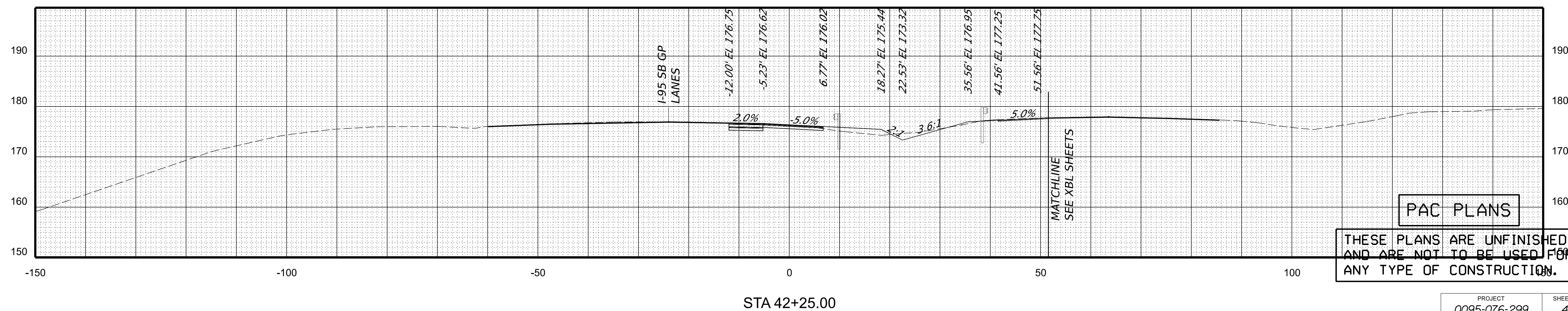
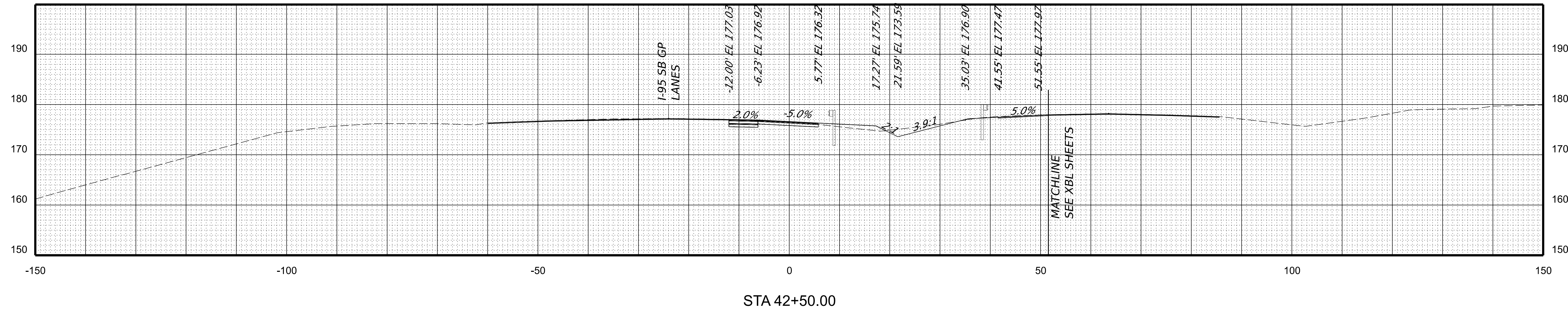
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	47

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

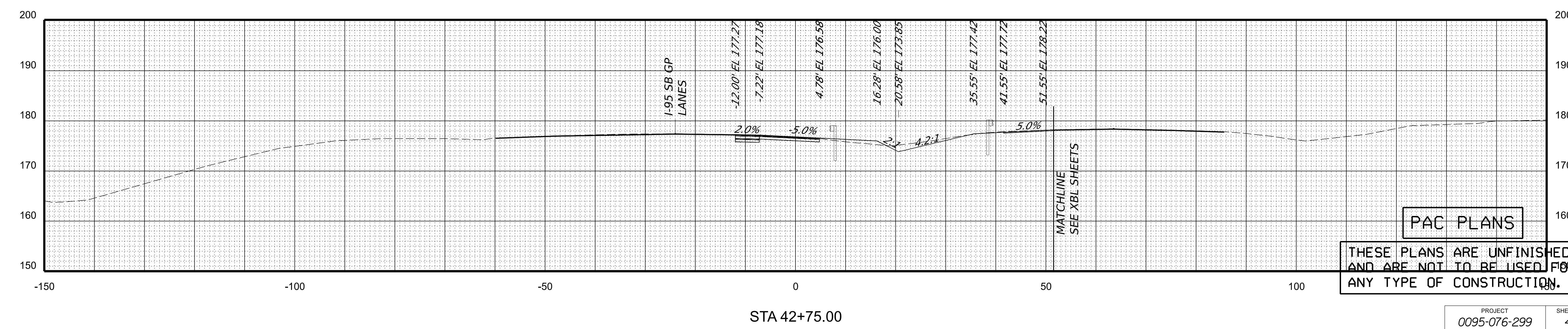
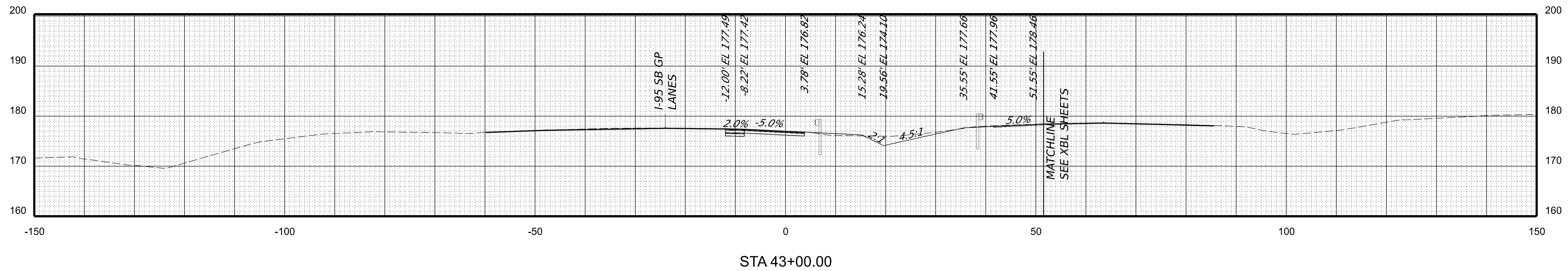
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	48

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

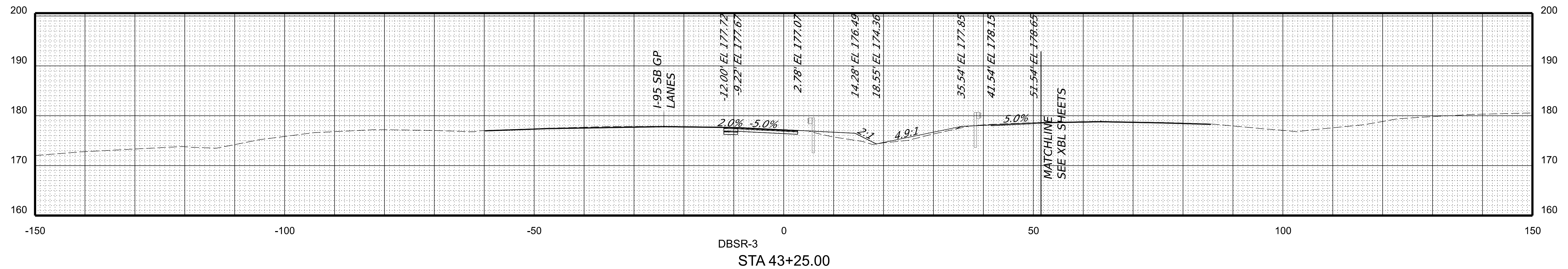
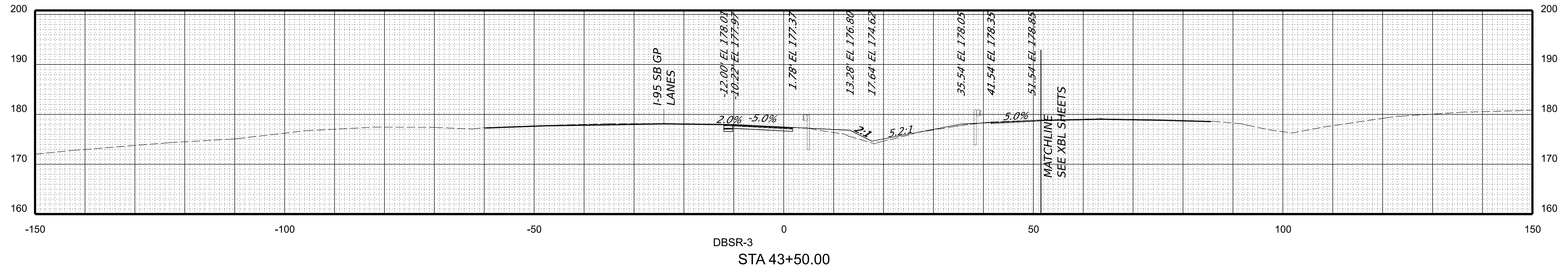
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	49

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

By Resolution of the Highway Commission dated October 4, 1956
By Resolution of the Highway Commission dated January 18, 1973
By Resolution of the Commonwealth Transportation Board dated January 18, 2001
By Resolution of the Commonwealth Transportation Board dated TBD (Anticipated February 2022)

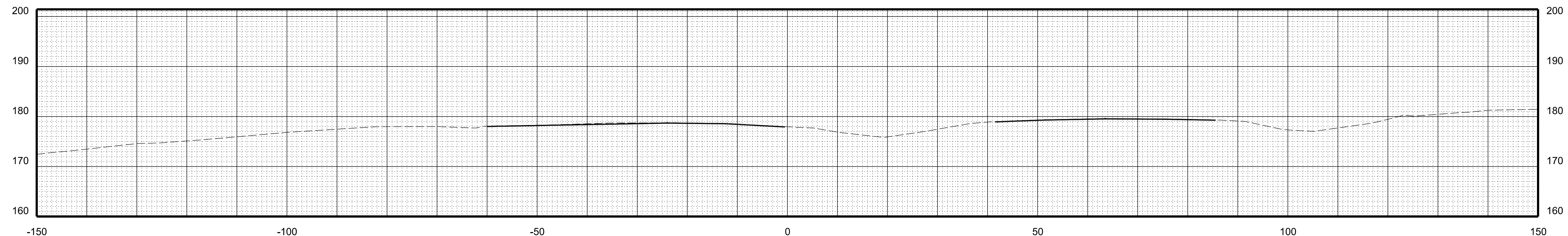
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

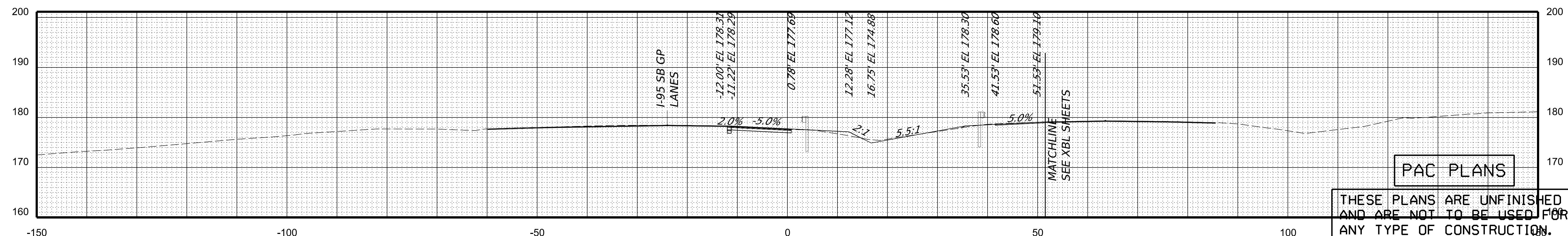
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	50

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 44+00.00



STA 43+75.00

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

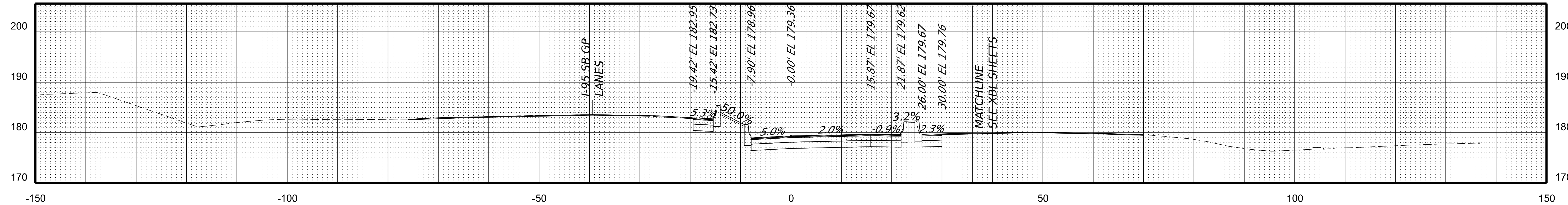
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

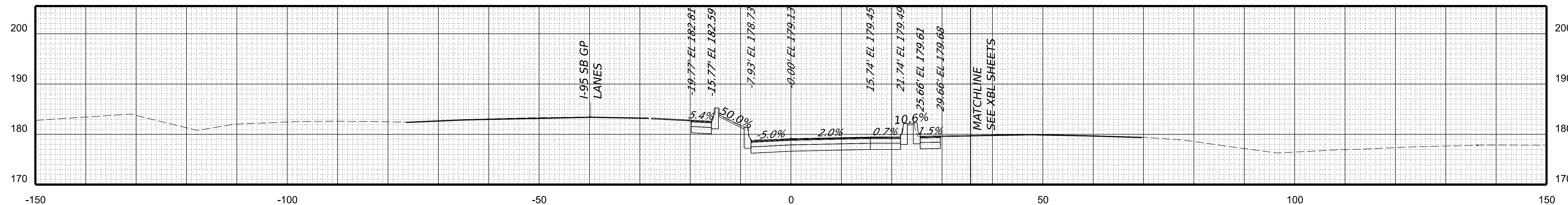
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	51

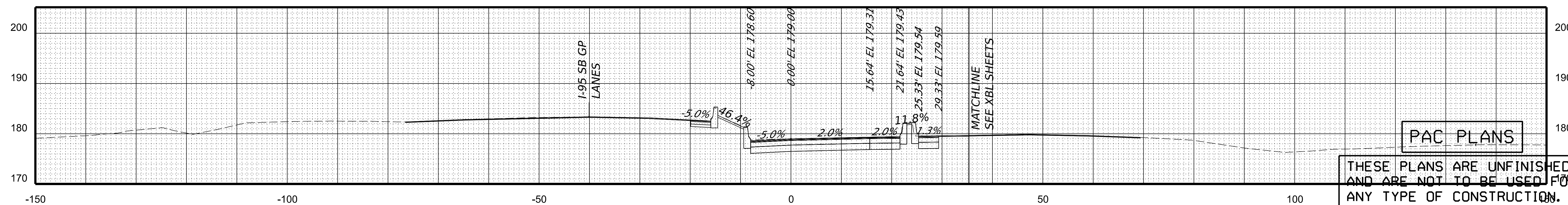
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 17+75.00



STA 17+50.00



BEGIN RAMP OBTR
STA 17+30.00

PAC PLANS

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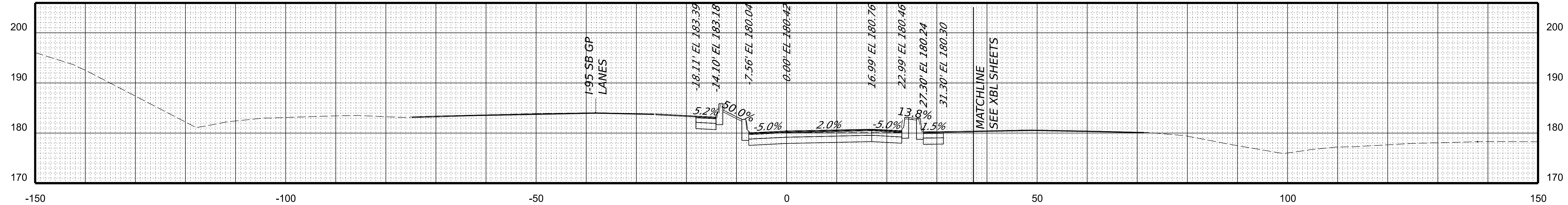
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

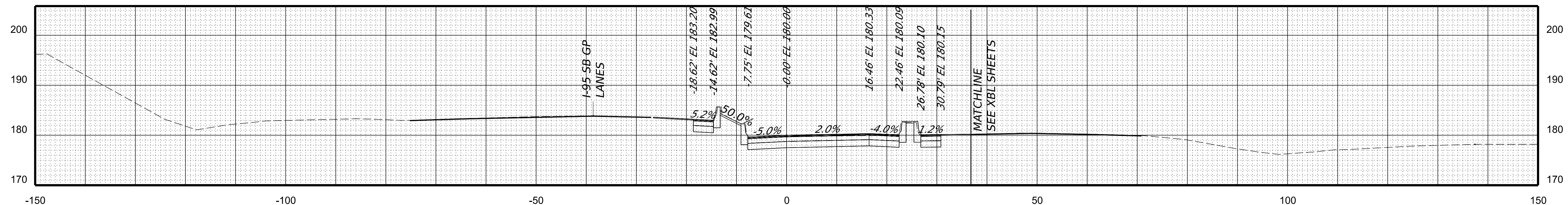
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	52

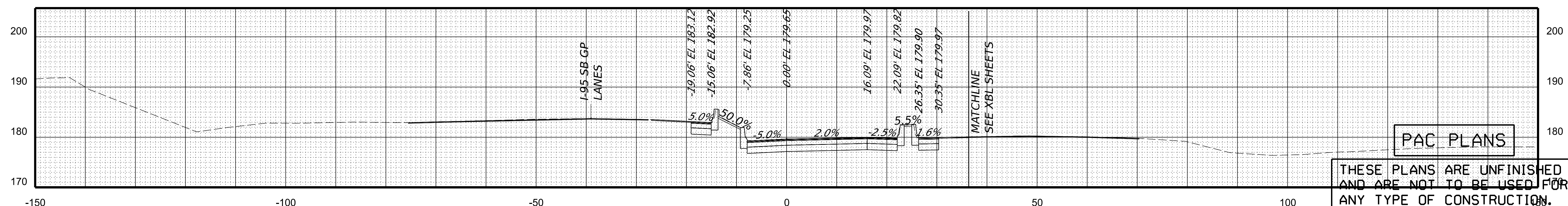
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 18+50.00



STA 18+25.00



STA 18+00.00

PAC PLANS

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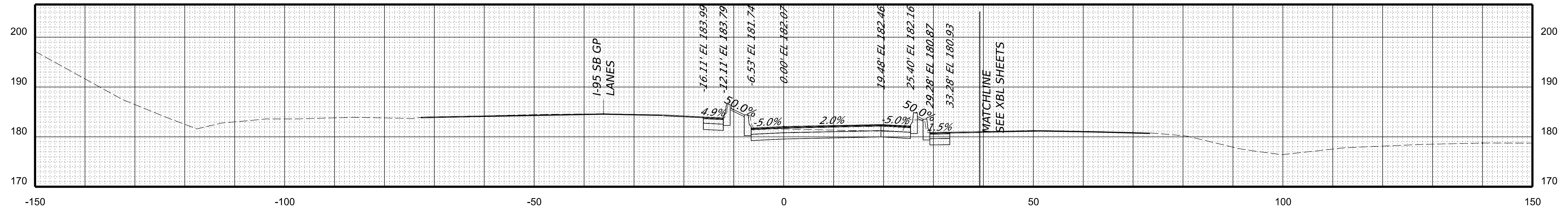
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

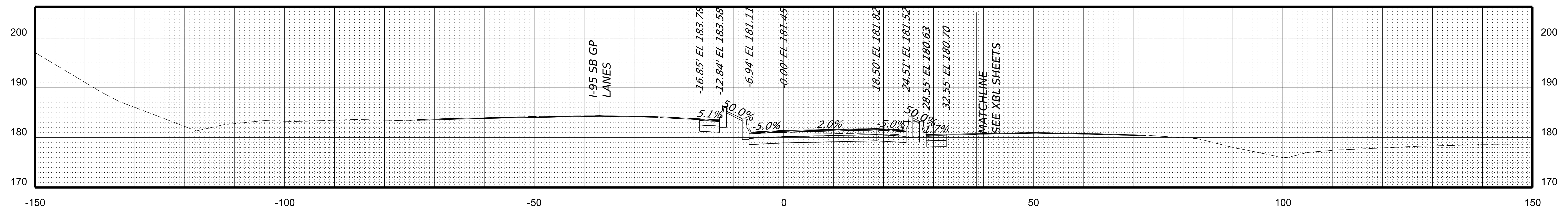
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	53

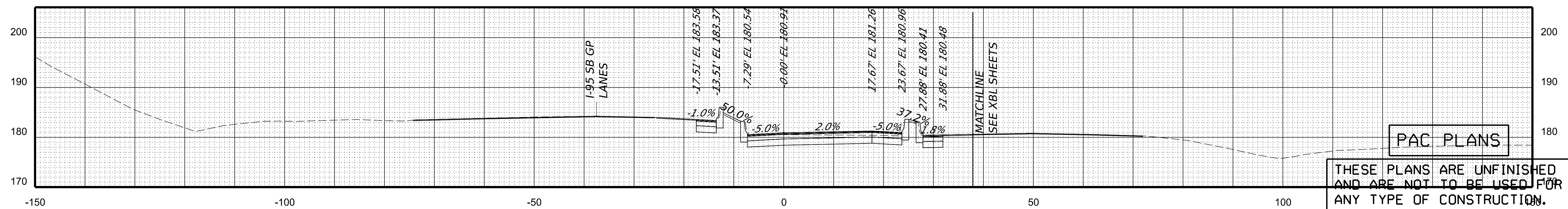
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 19+25.00



STA 19+00.00



STA 18+75.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

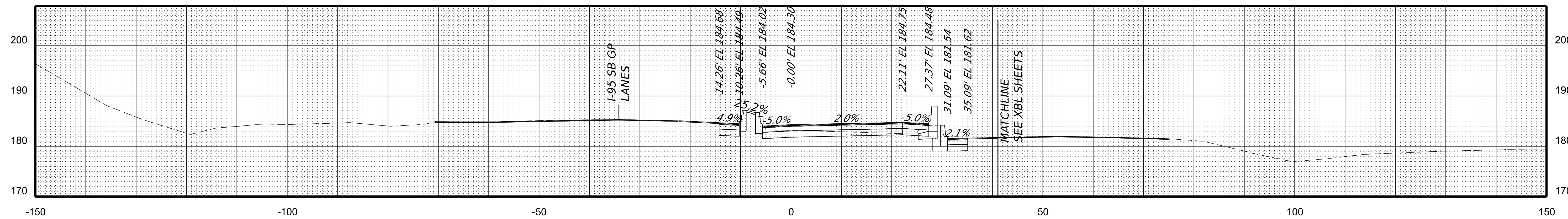
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

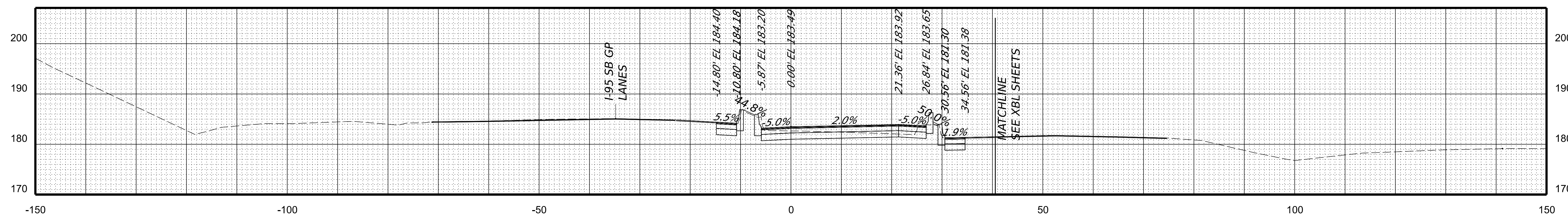
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	54

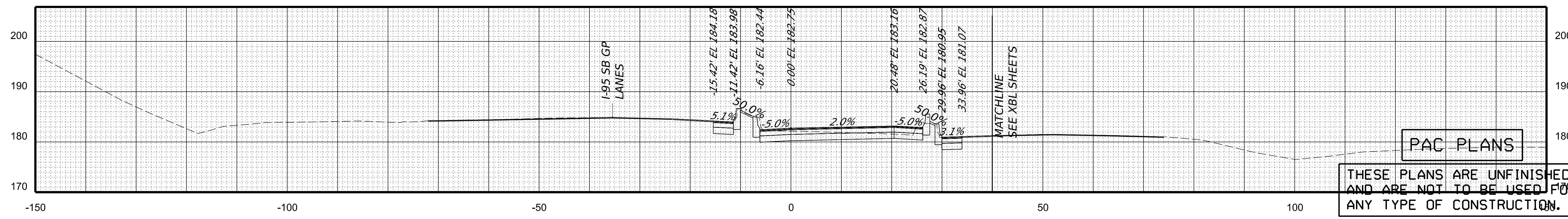
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 20+00.00



STA 19+75.00



STA 19+50.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

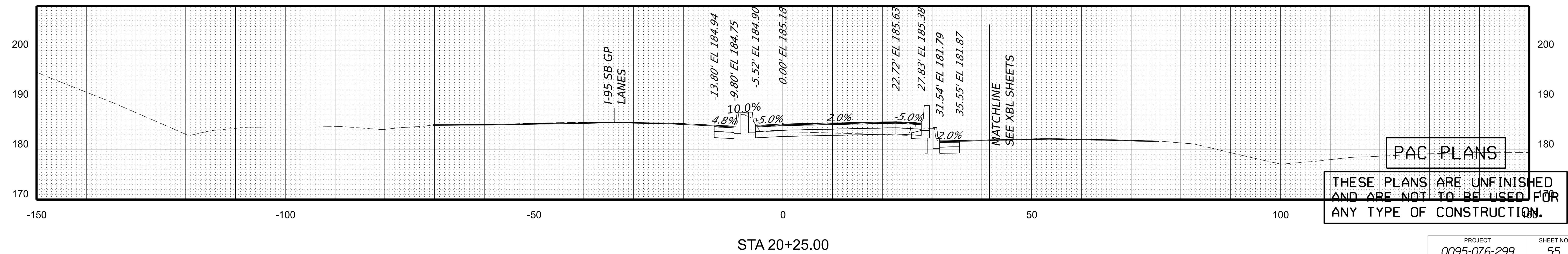
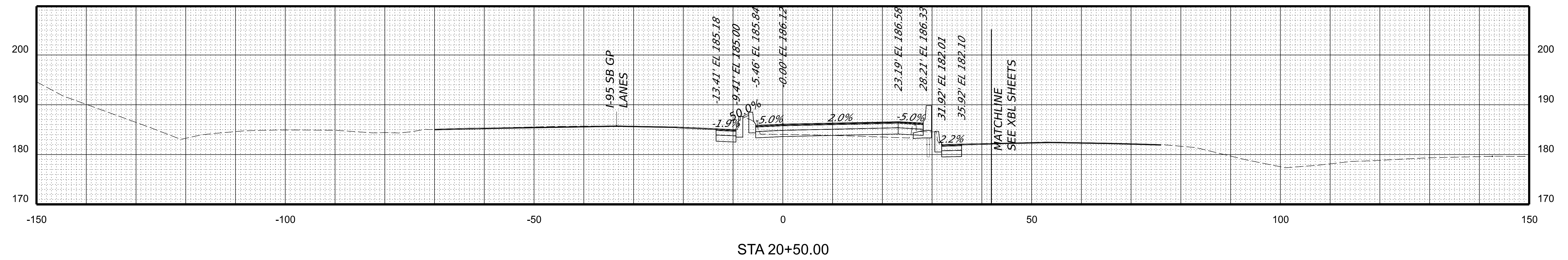
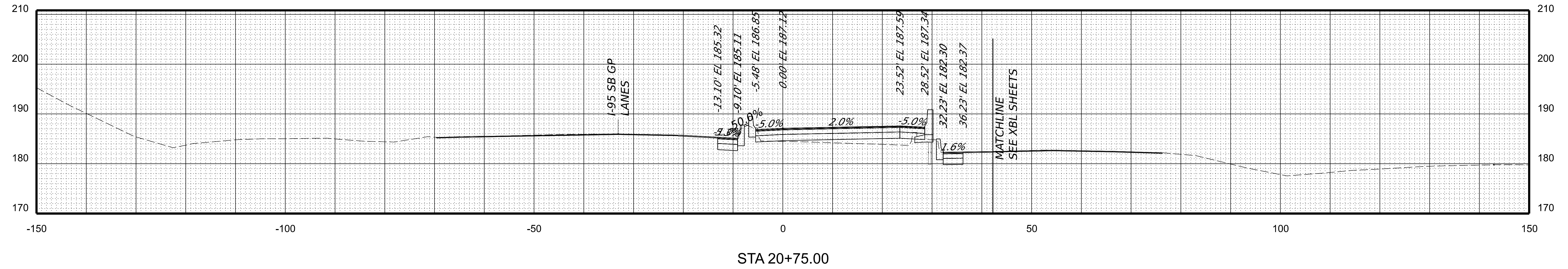
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	55

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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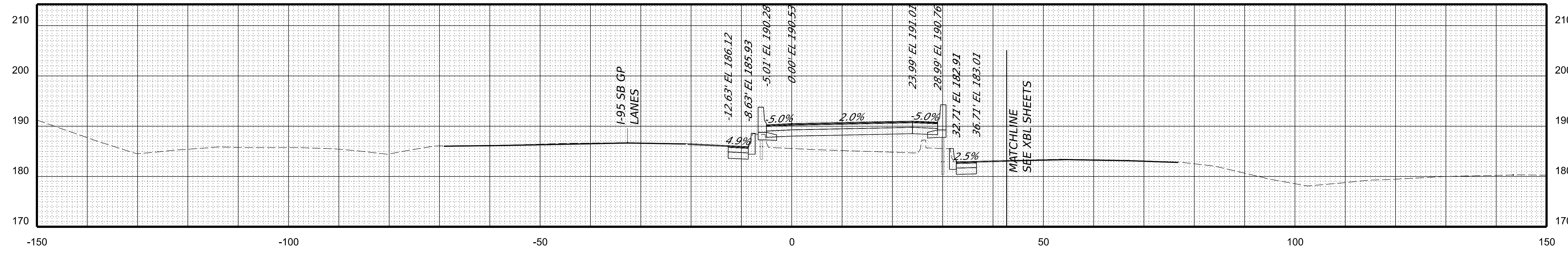
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

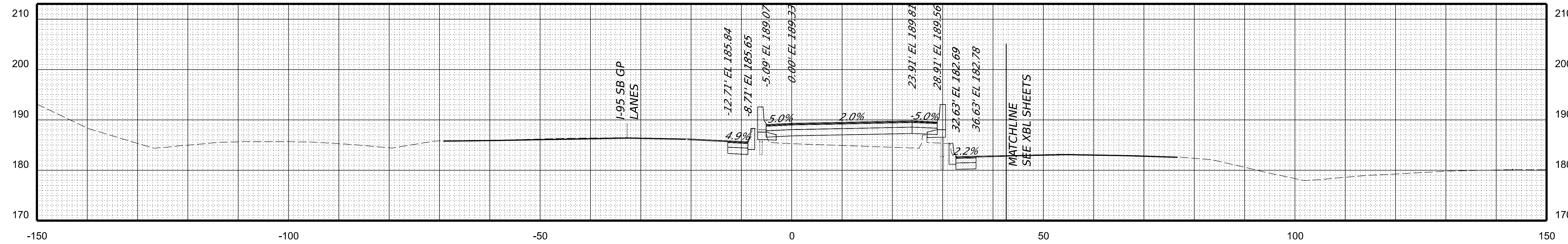
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	56

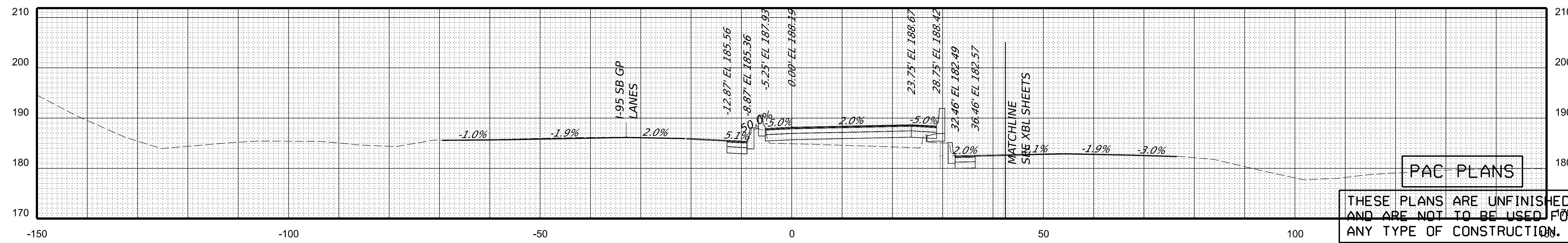
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 21+50.00



STA 21+25.00



STA 21+00.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

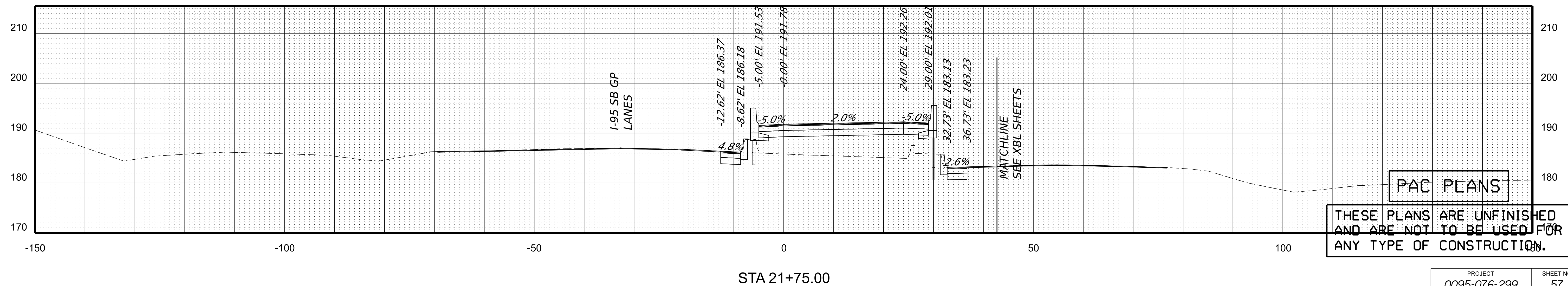
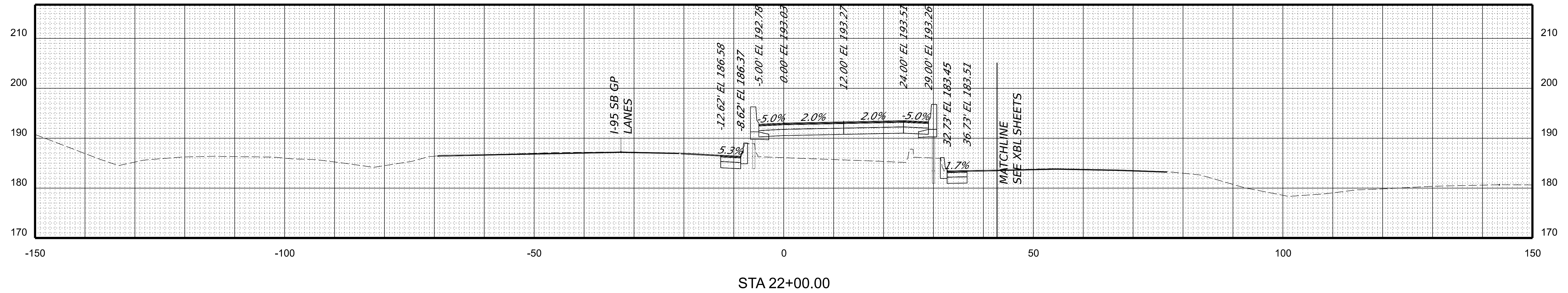
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	57

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

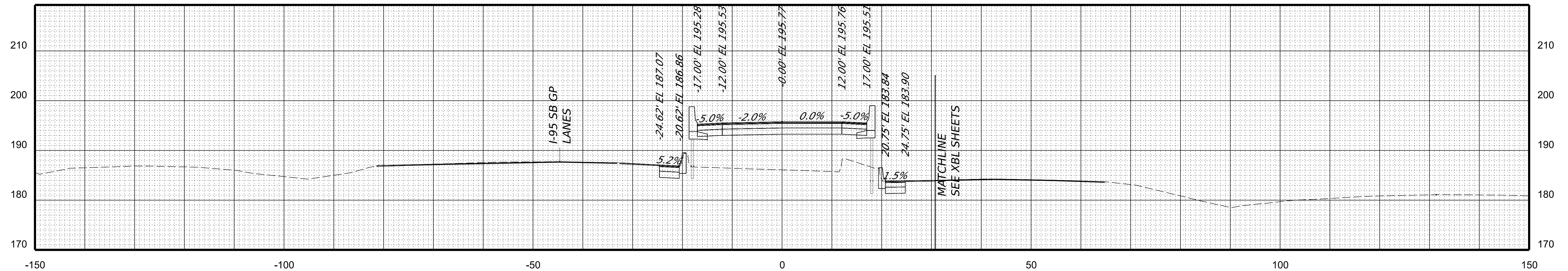
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

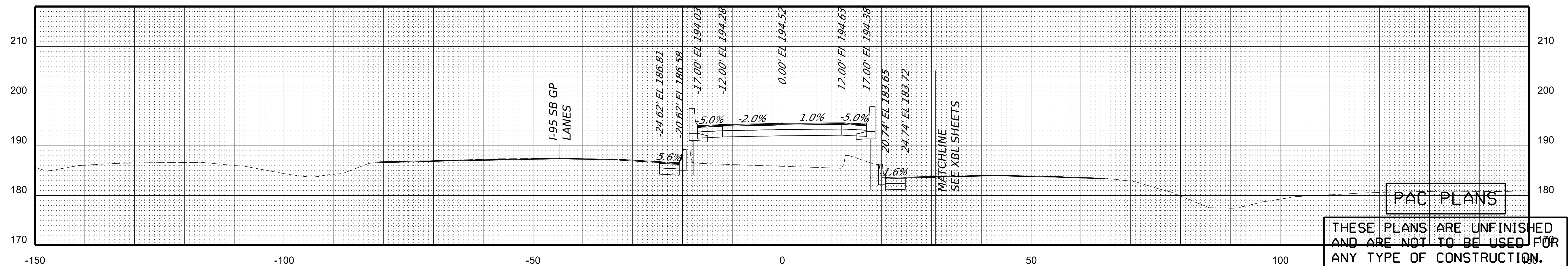
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	58

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 22+50.00



STA 22+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

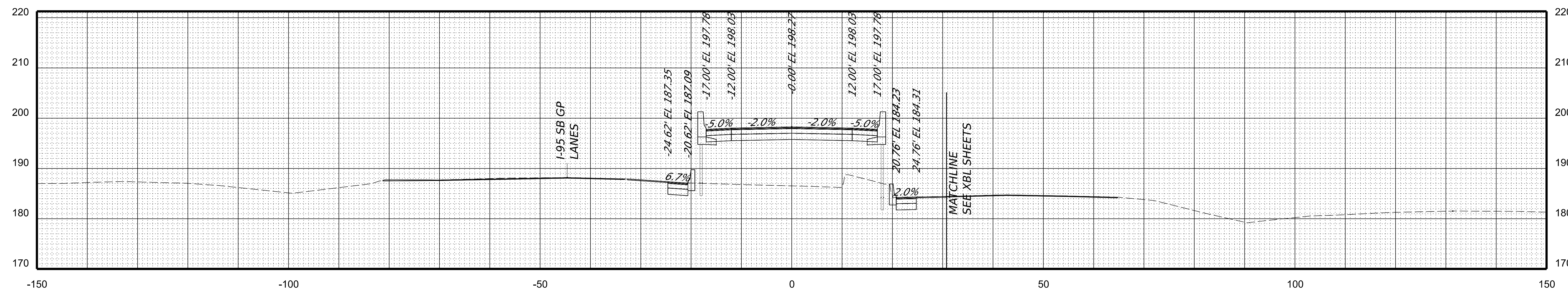
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

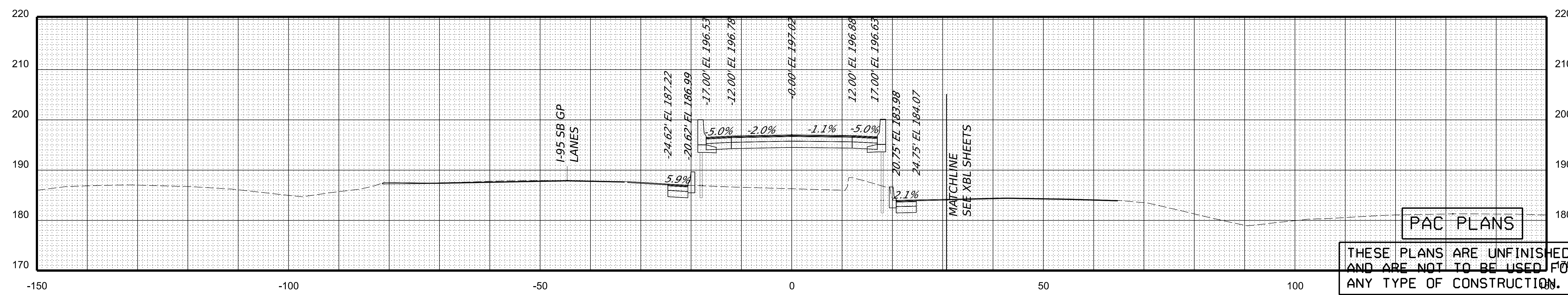
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	59

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 23+00.00



STA 22+75.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

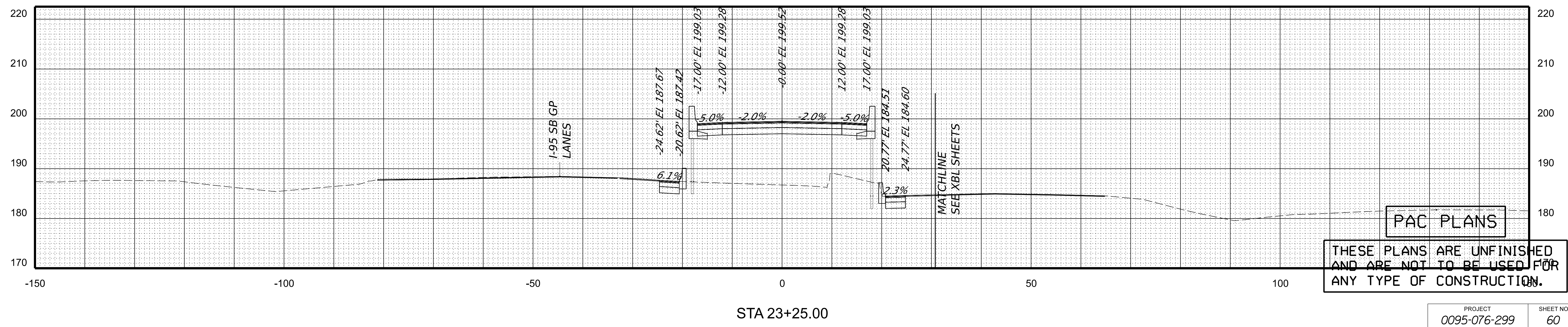
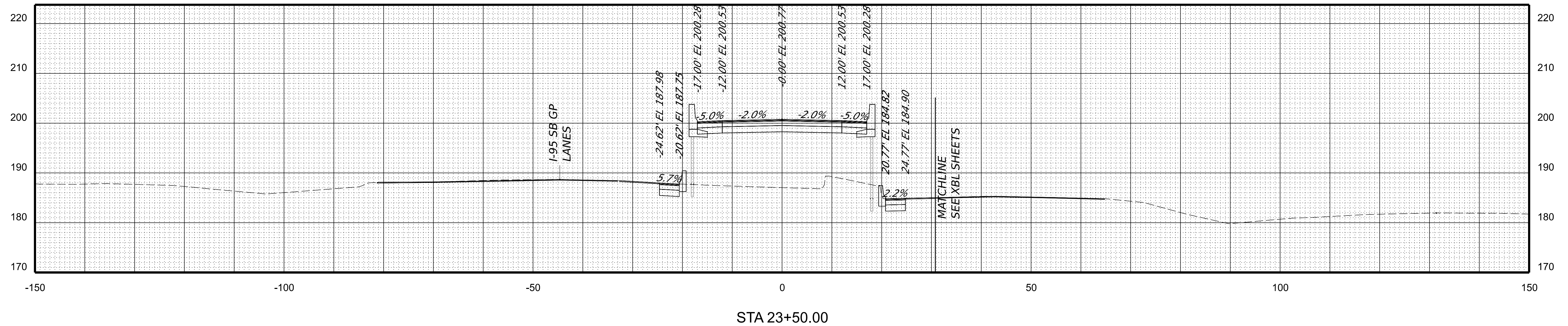
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	60

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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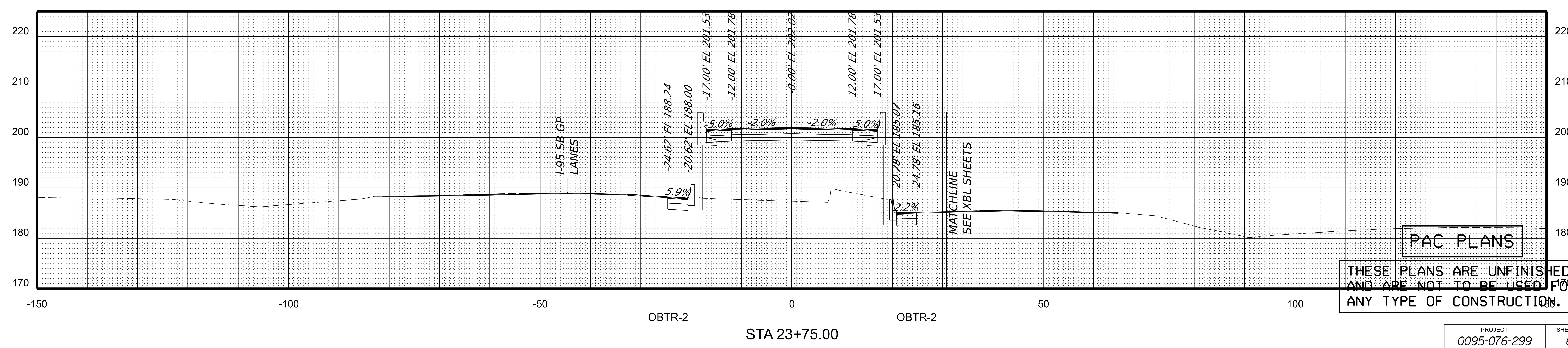
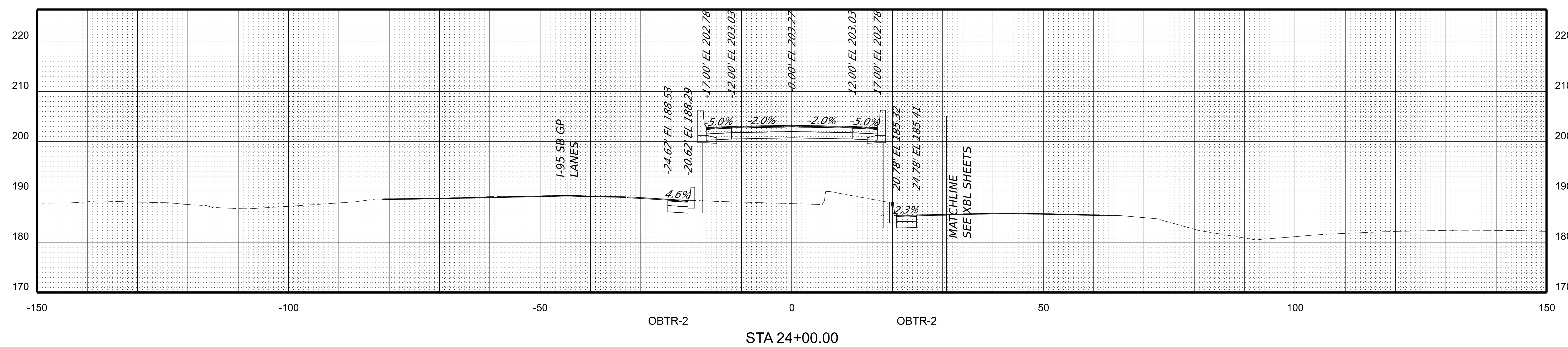
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
 SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
 1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	61

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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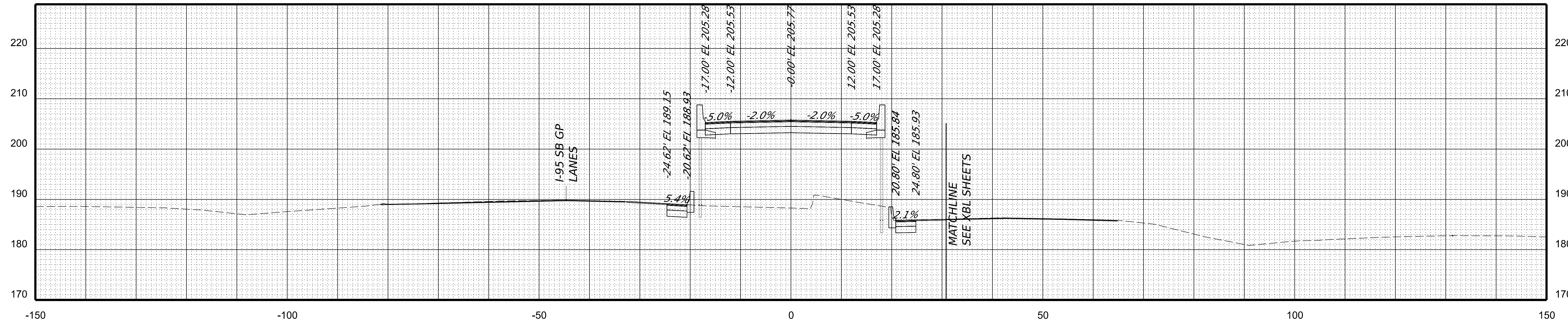
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

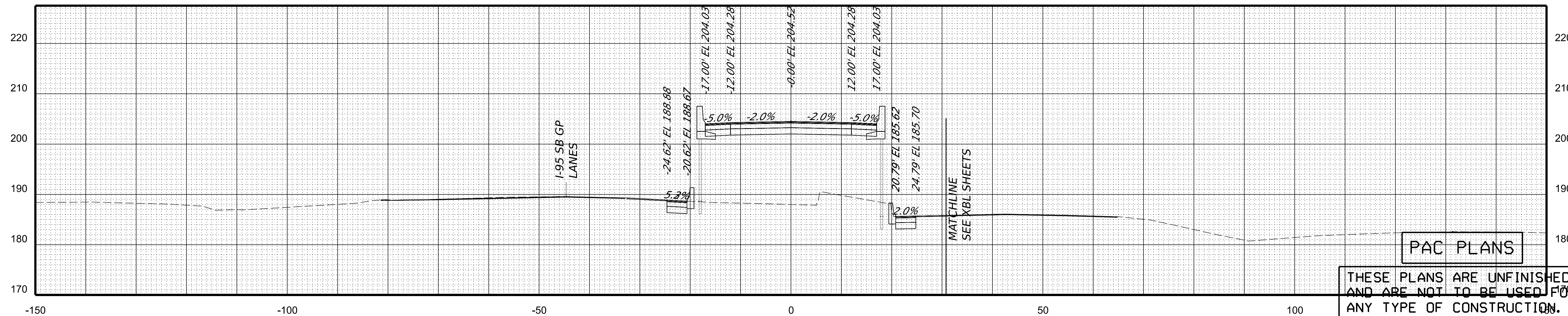
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	62

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 24+50.00



STA 24+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

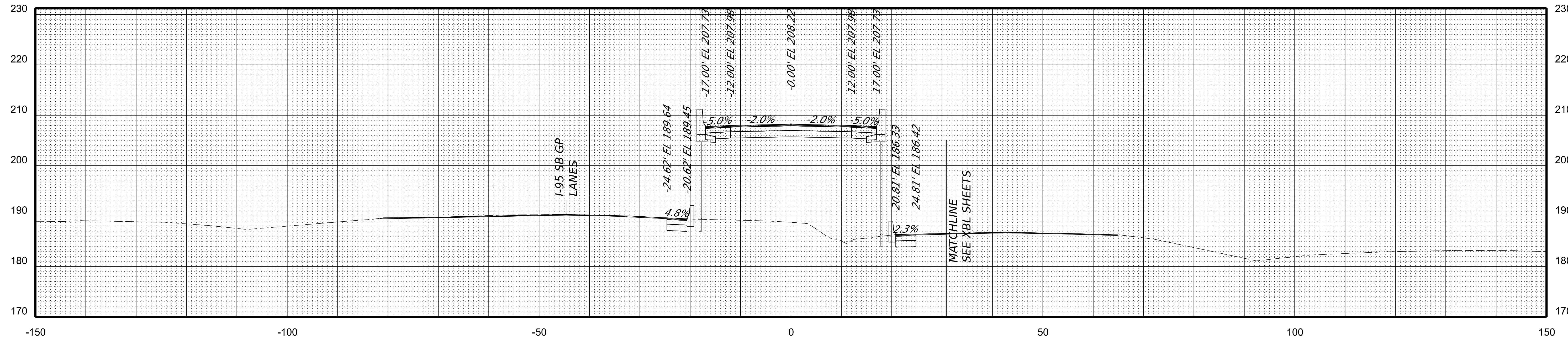
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

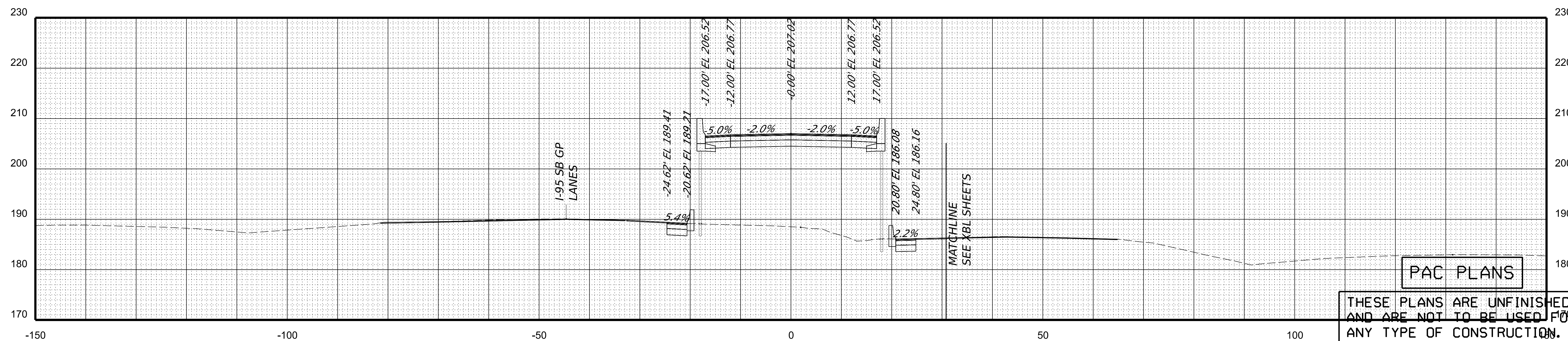
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	63

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 25+00.00



STA 24+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

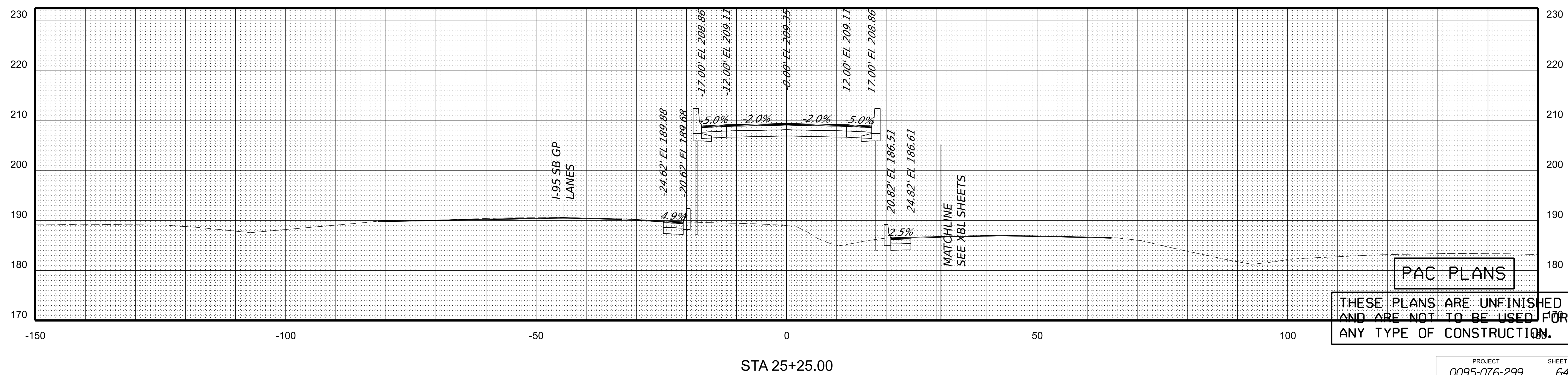
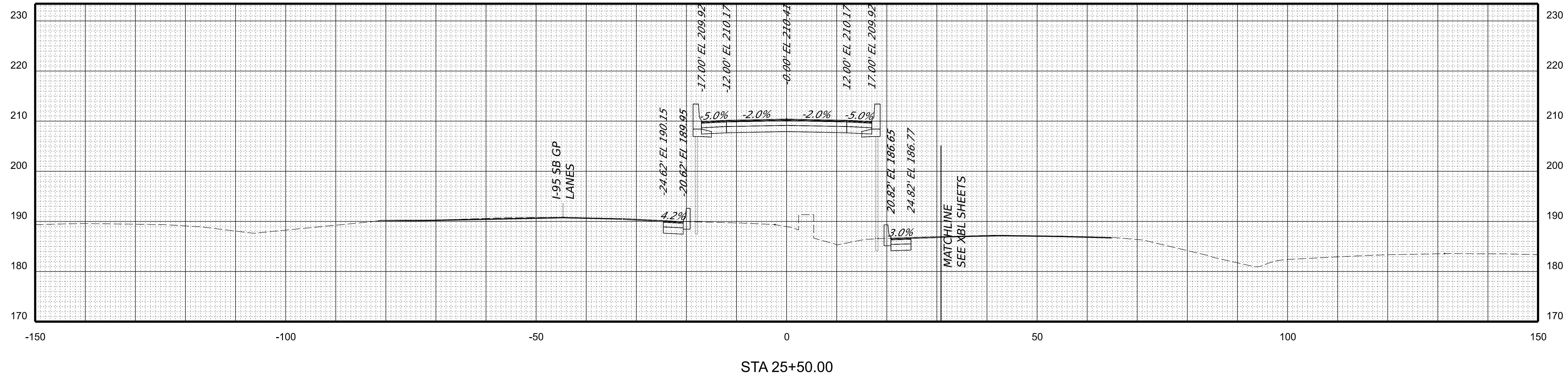
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	64

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

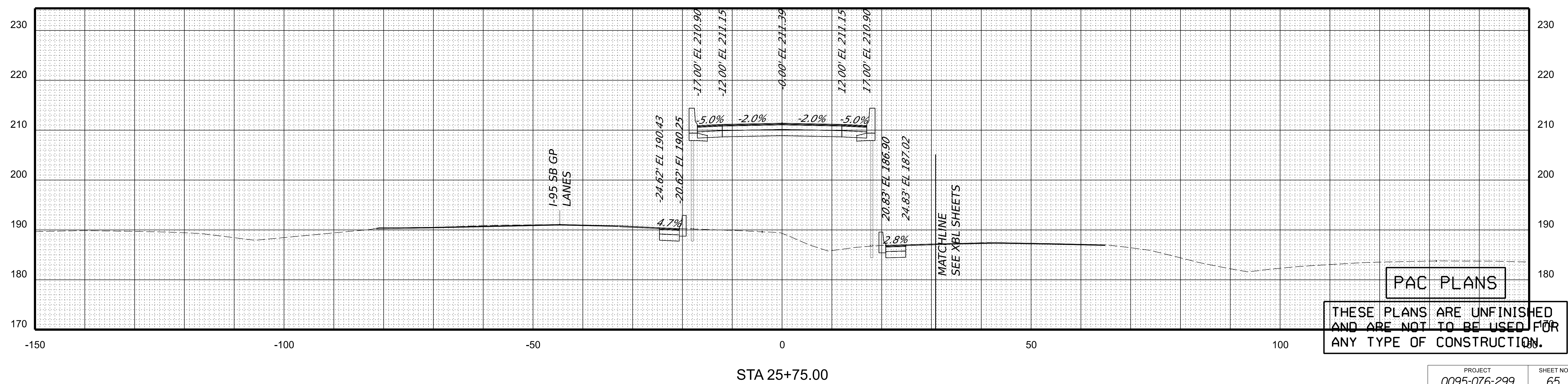
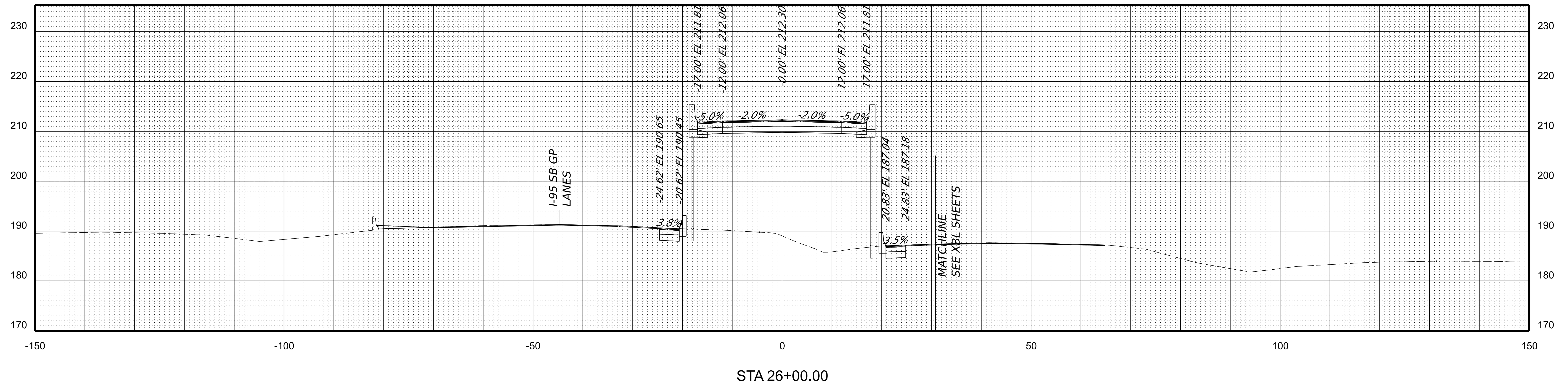
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	65

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

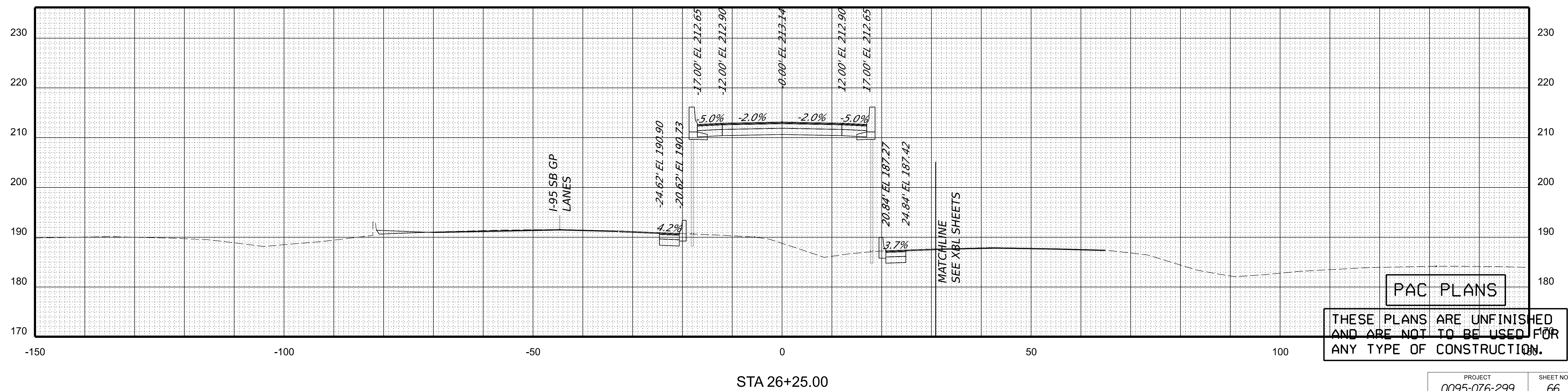
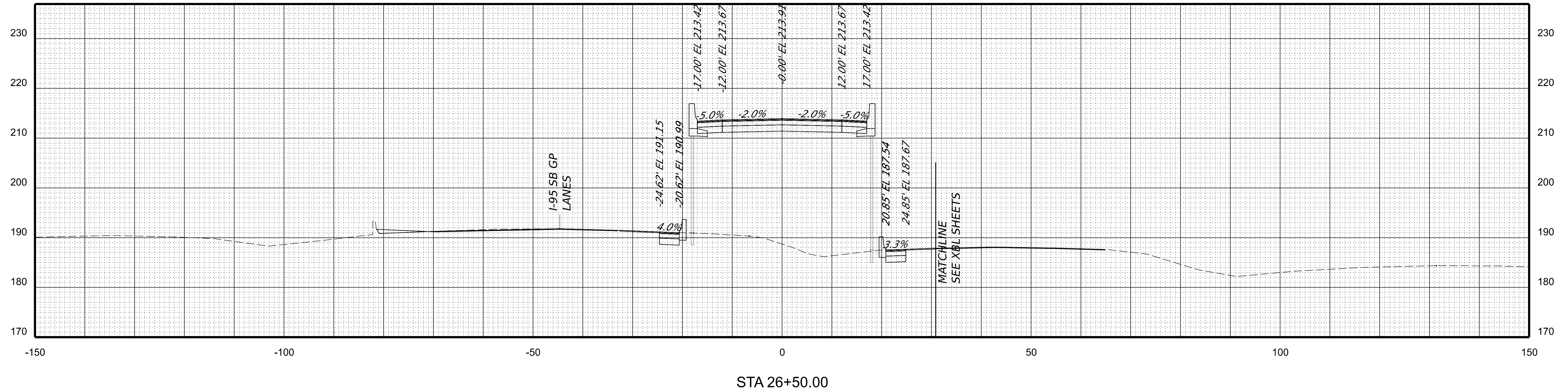
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	66

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

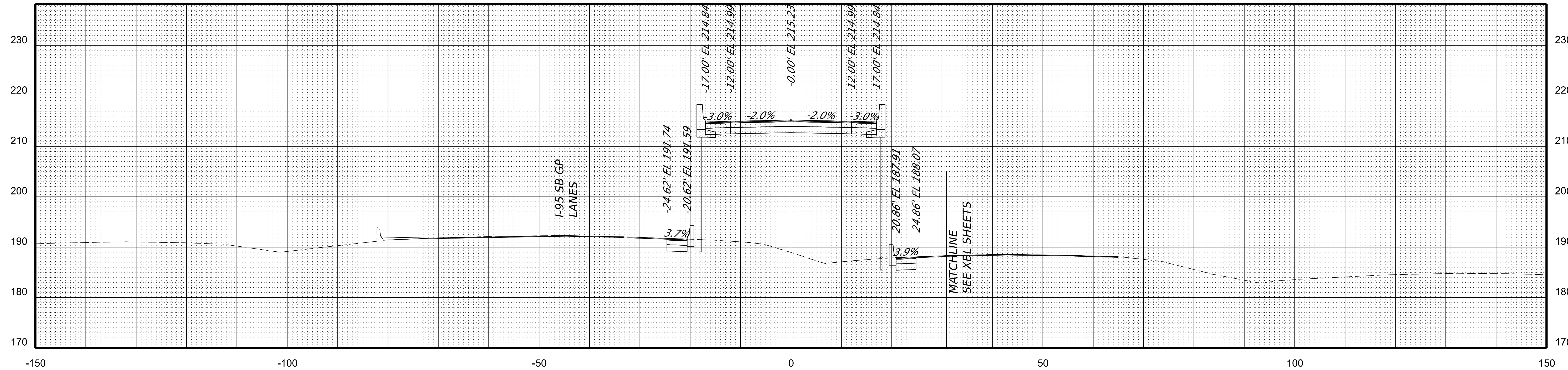
CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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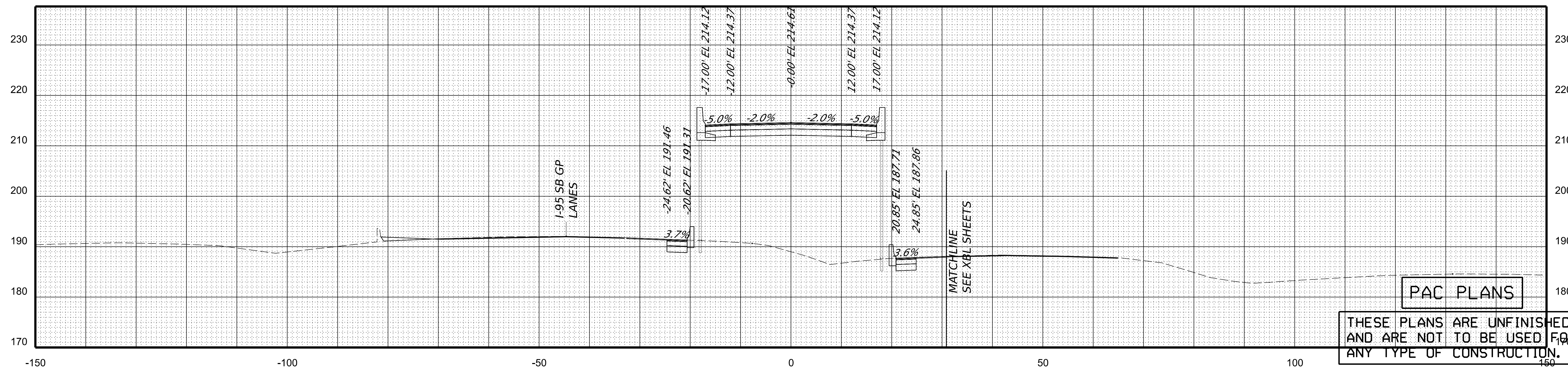
REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	67

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

END RAMP OBTR
BEGIN PROJECT 0095-076-299, B-688
STA. 27+10.43



STA 27+00.00



STA 26+75.00

PAC PLANS

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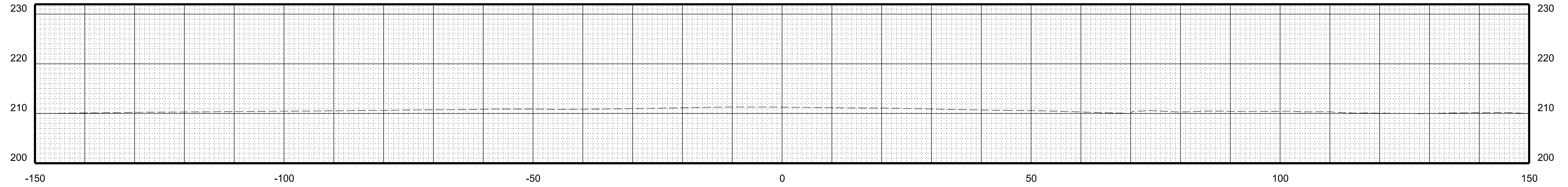
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

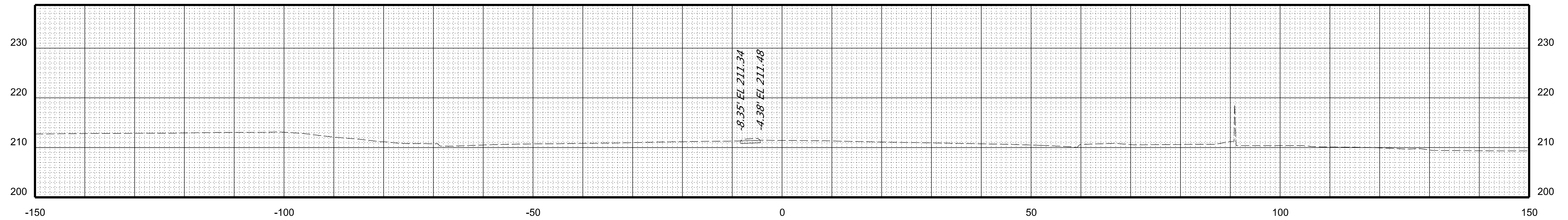
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	68

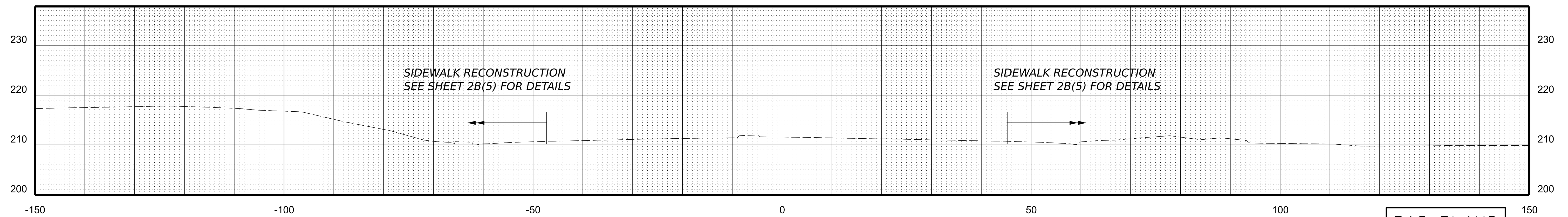
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 60+75.00



STA 60+50.00



STA 60+25.00

BEGIN CONSTRUCTION
STA. 60+30.14 OPITZ BLVD

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

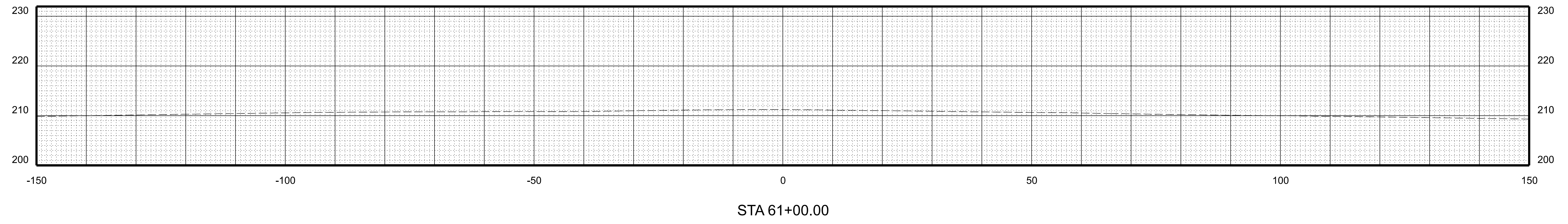
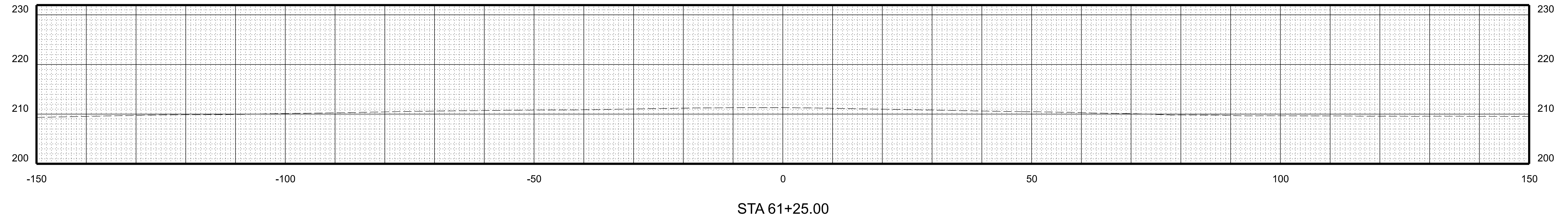
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	69

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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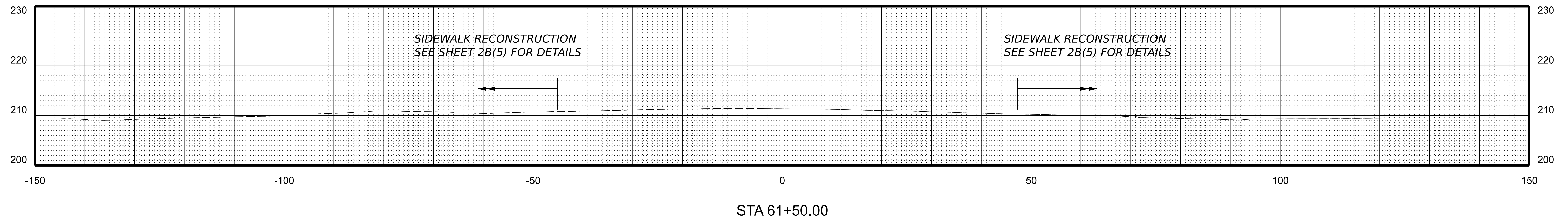
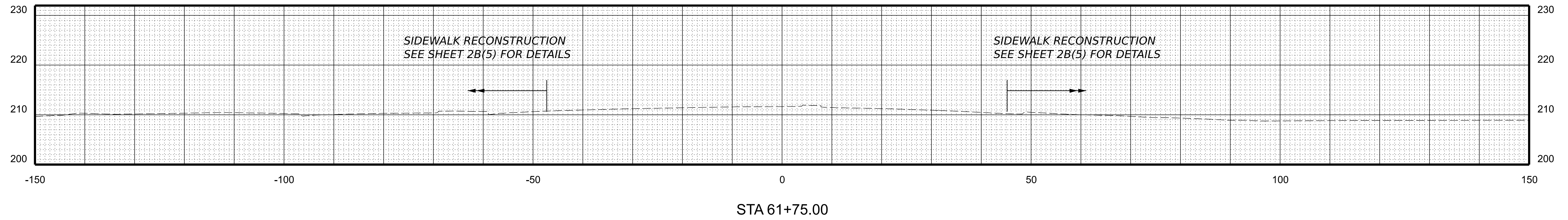
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	70

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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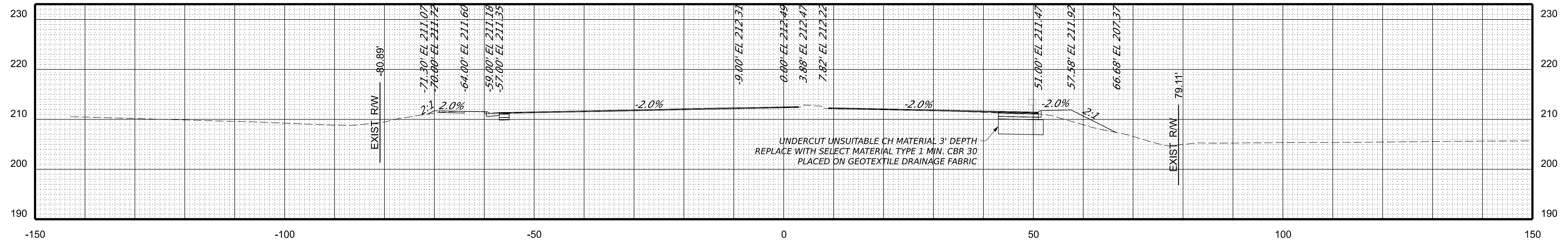
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

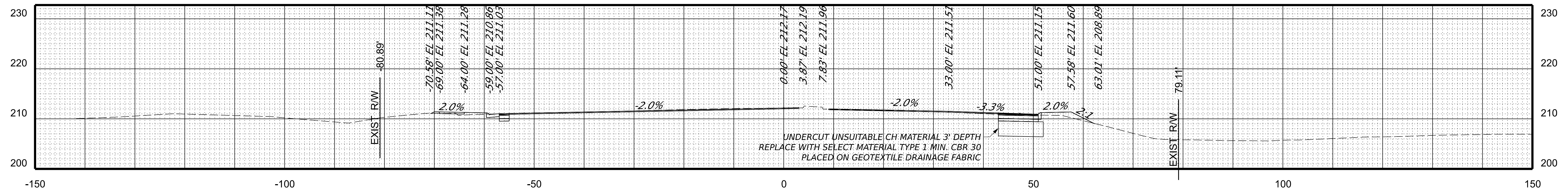
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	71

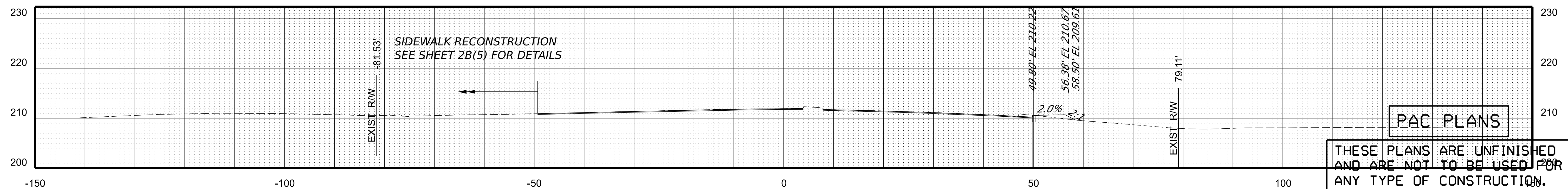
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 62+50.00



STA 62+25.00



STA 62+00.00

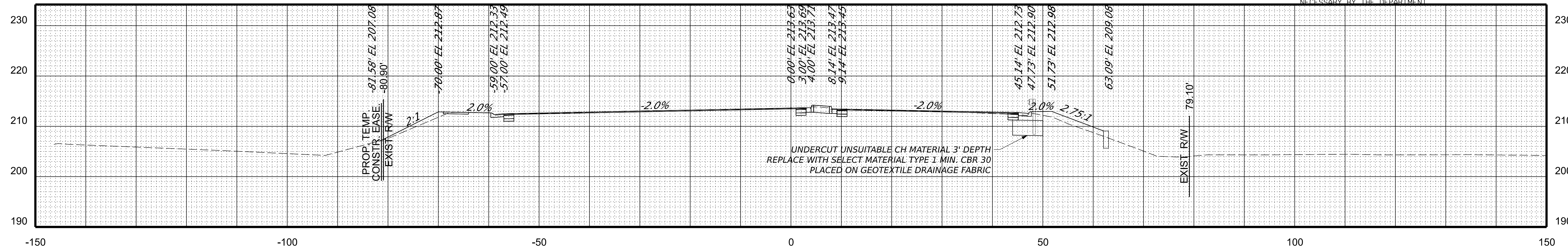
PROJECT MANAGER: *Bimpal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

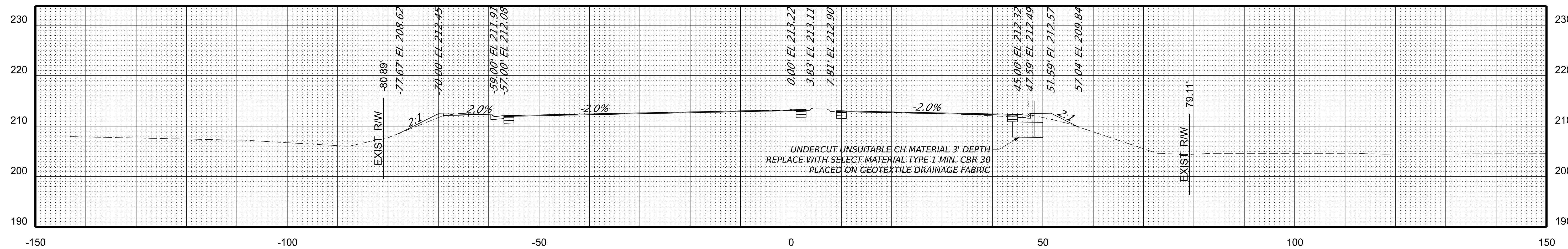
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	72

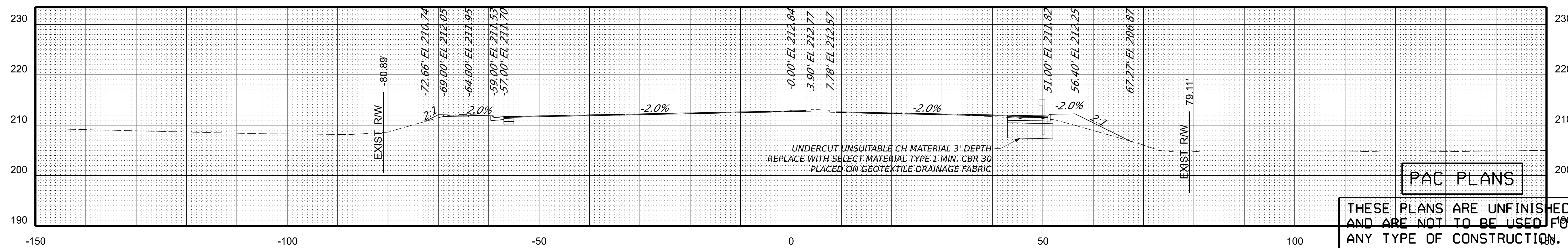
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 63+25.00



STA 63+00.00



STA 62+75.00

PAC PLANS

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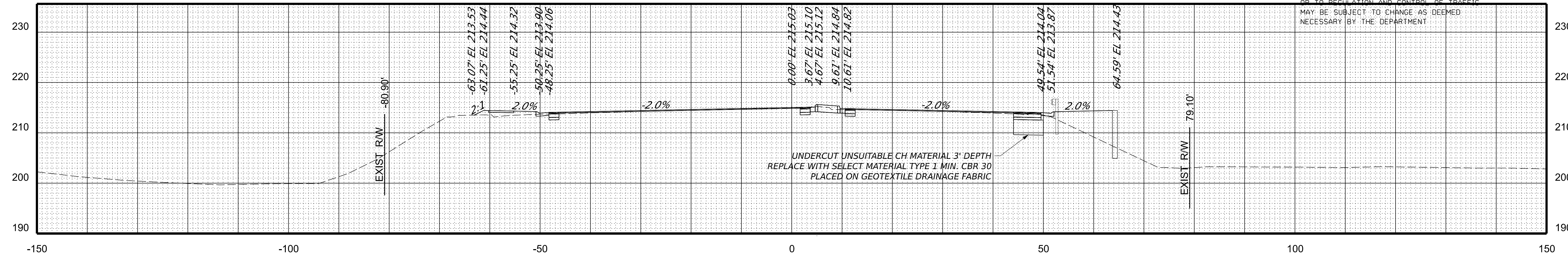
PROJECT MANAGER: Bipal Shah, P.E. (703) 259-2362 (NOVA District)
SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
DESIGN BY: Whitman, Requardt, & Associates, LLP (804) 272-8700
SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7740, 07/07/2021

CROSS SECTIONS

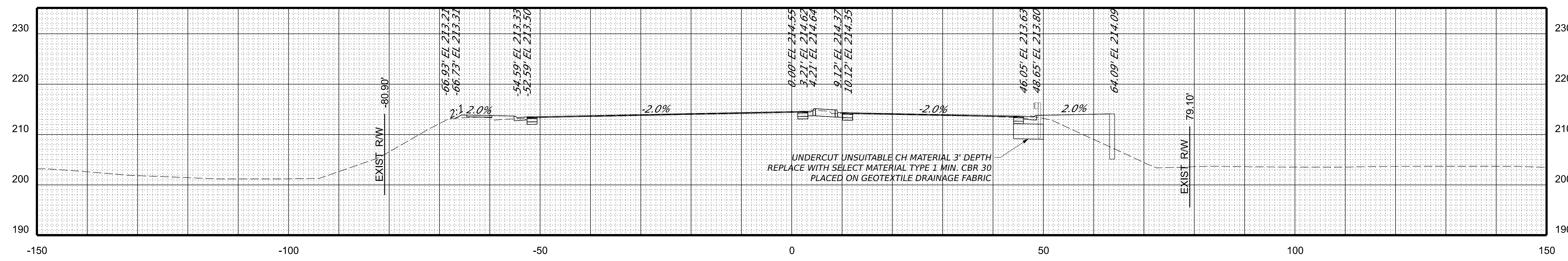
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	73

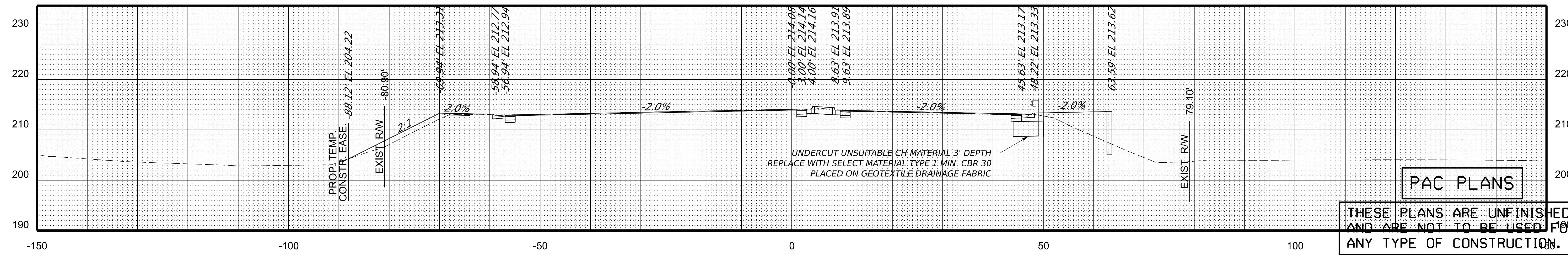
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 64+00.00



STA 63+75.00



STA 63+50.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

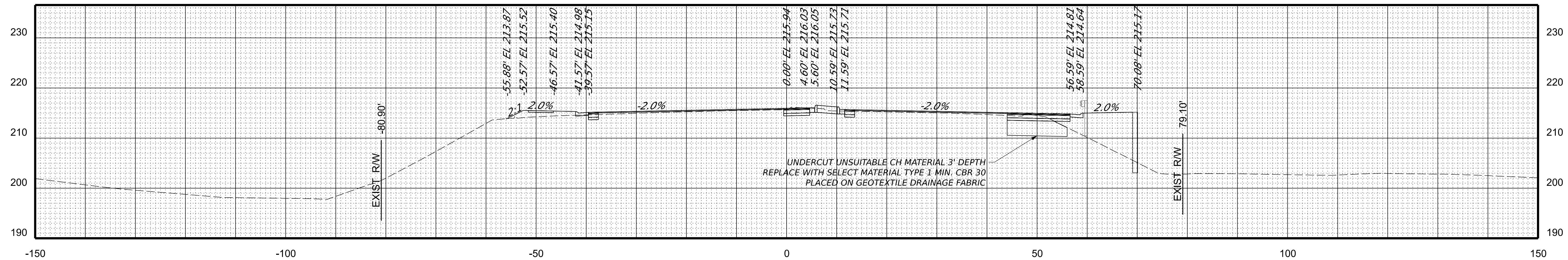
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

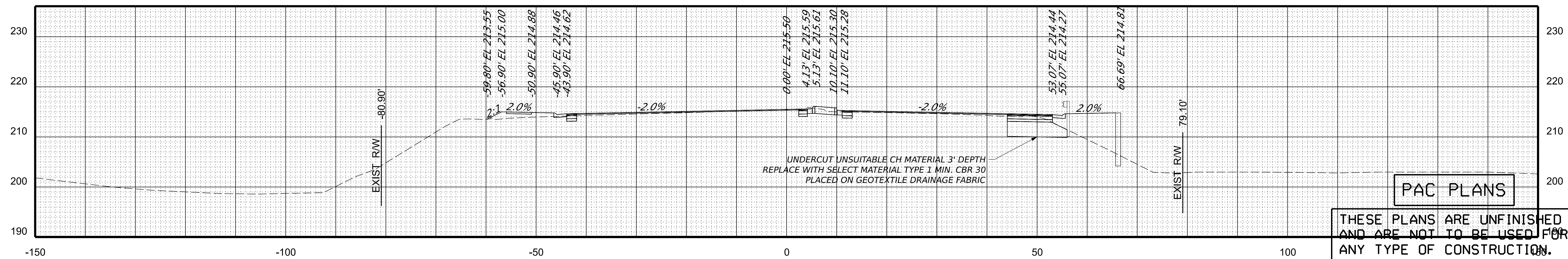
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	74

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 64+50.00



STA 64+25.00

PAC PLANS

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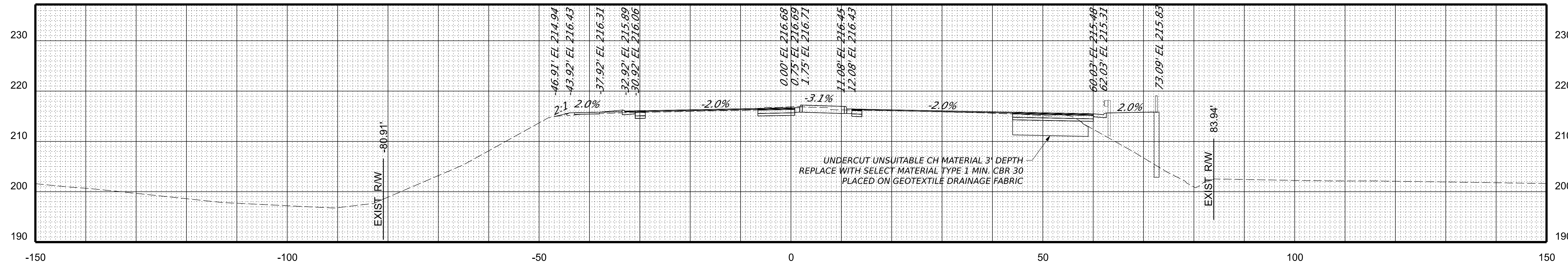
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

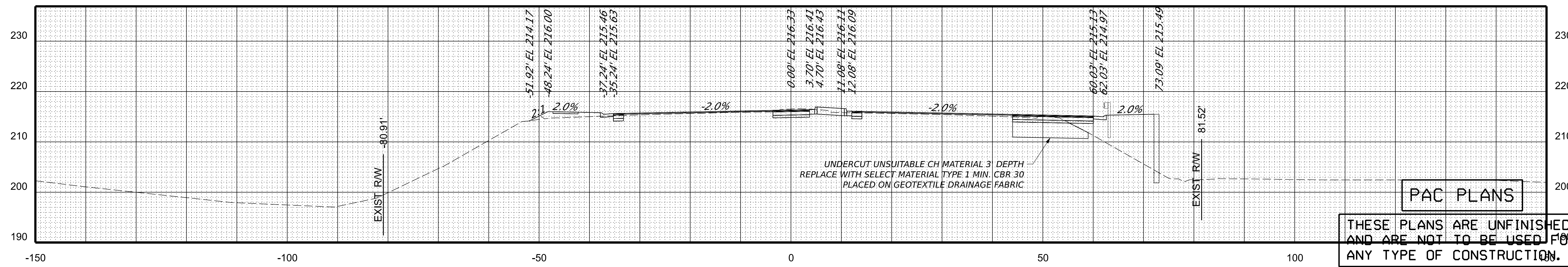
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	75

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 65+00.00



STA 64+75.00

PAC PLANS
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PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

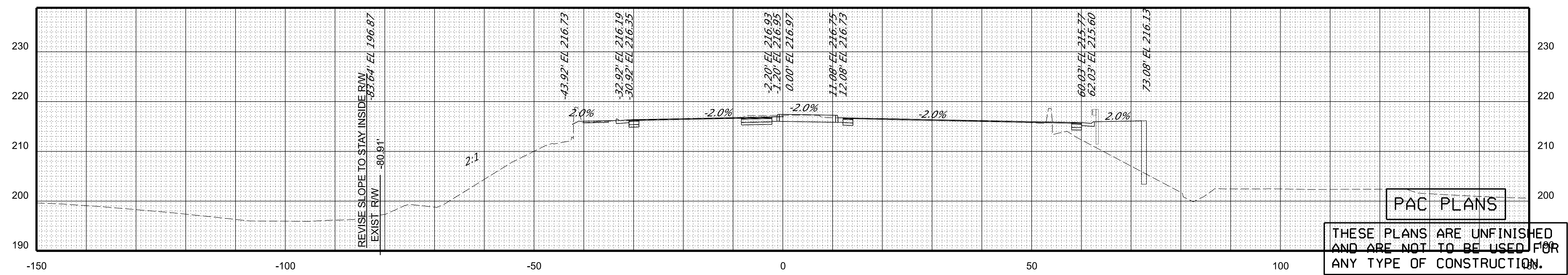
CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	76

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

BEGIN PROJECT 0095-076-299, B-688
STA. 65+35.17 OPITZ BLVD



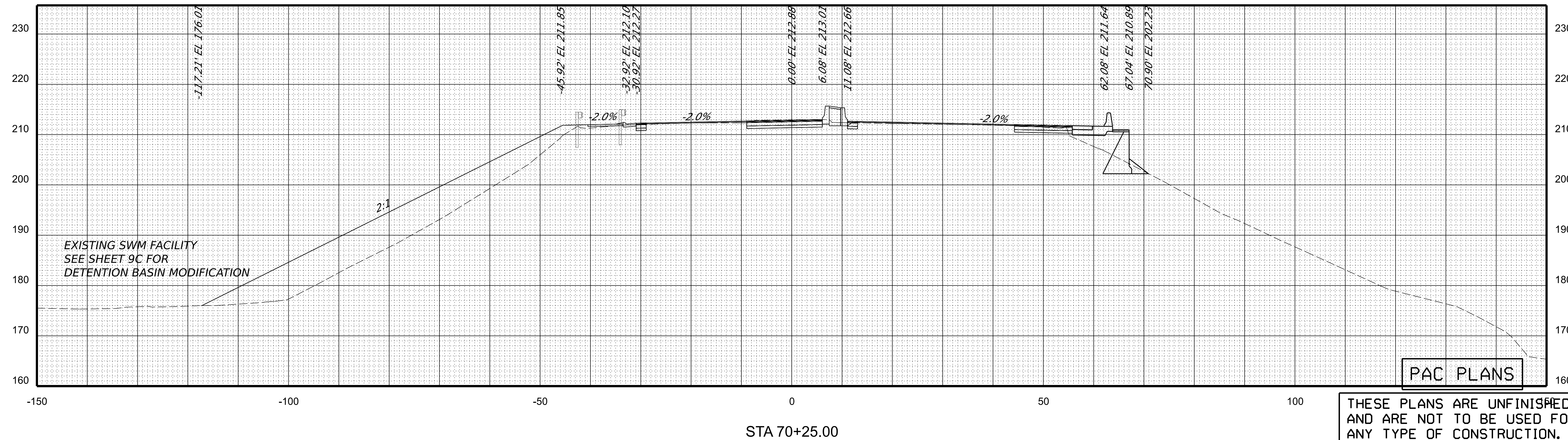
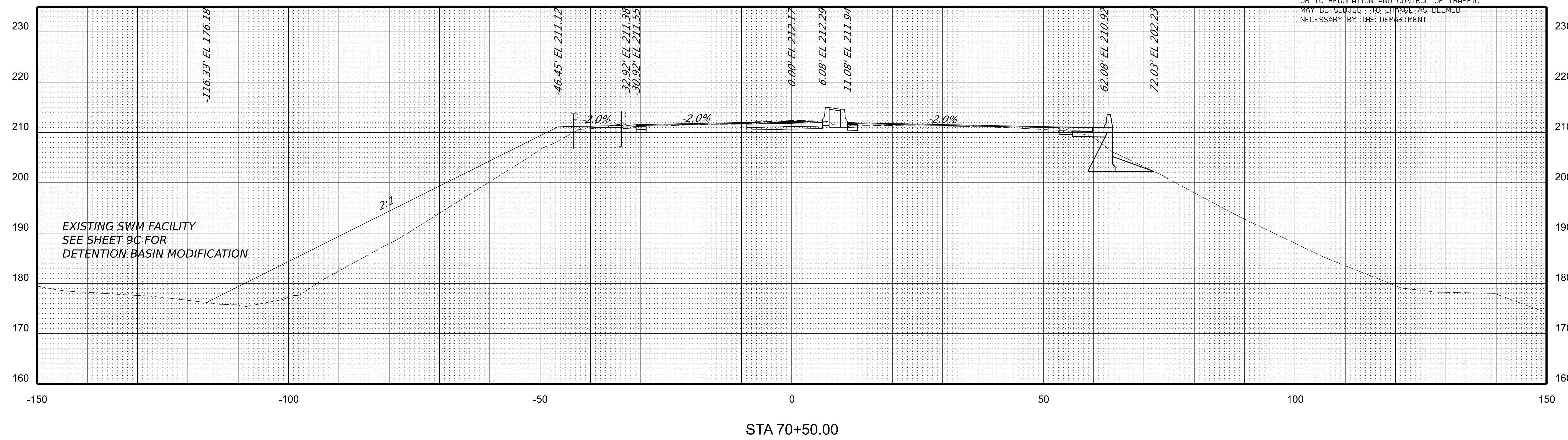
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	77

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

STA 70+25.00
END PROJECT 0095-076-299, B-688
STA. 70+05.65 OPITZ BLVD

PROJECT	SHEET NO.
0095-076-299	77

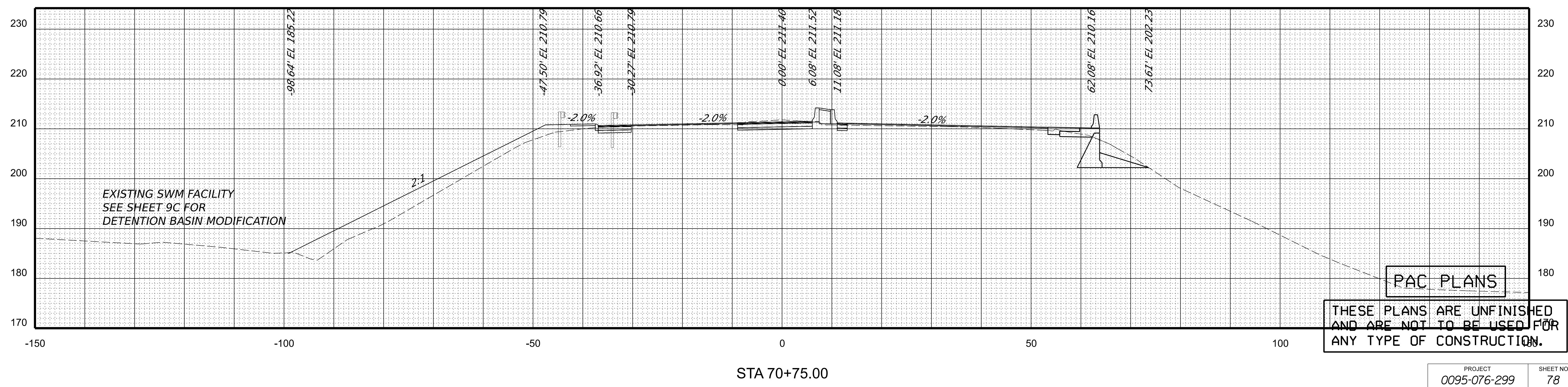
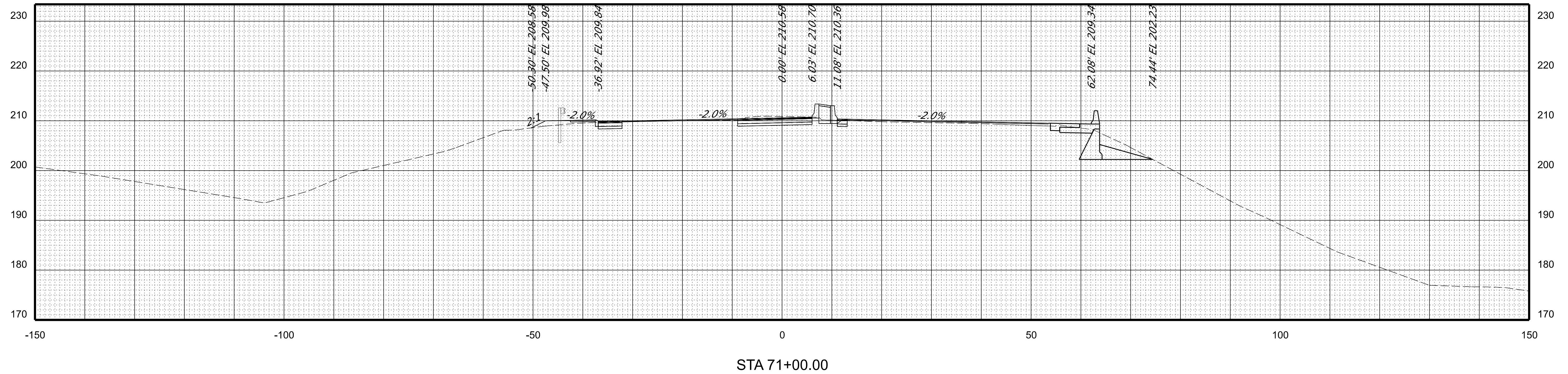
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	78

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

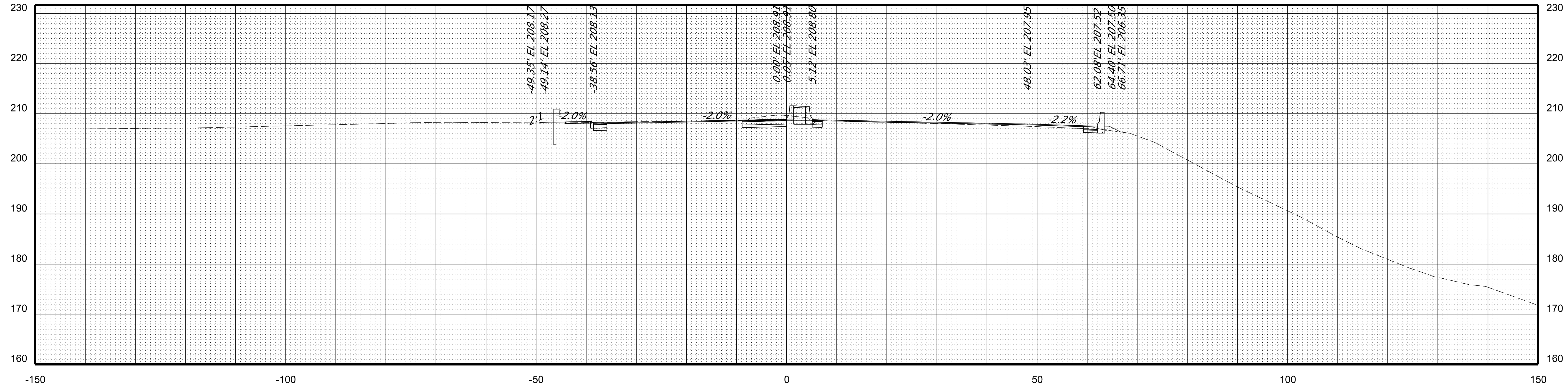
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

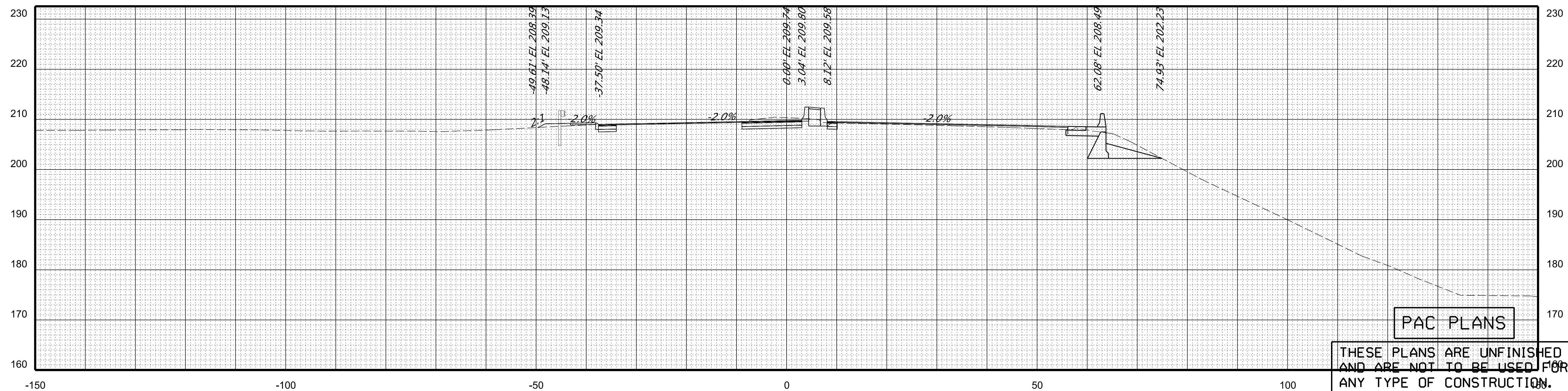
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	79

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 71+50.00



STA 71+25.00

PAC PLANS

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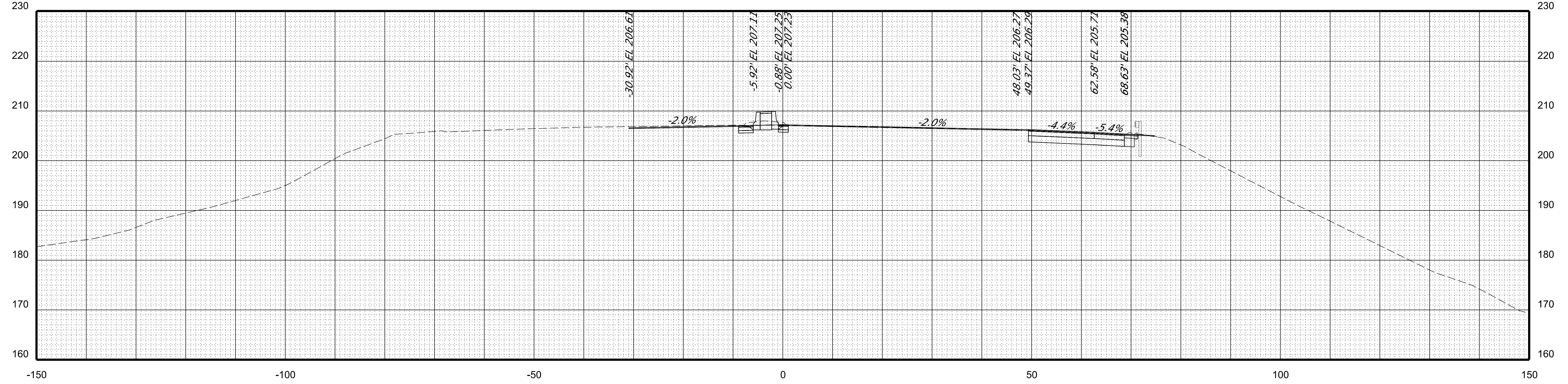
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

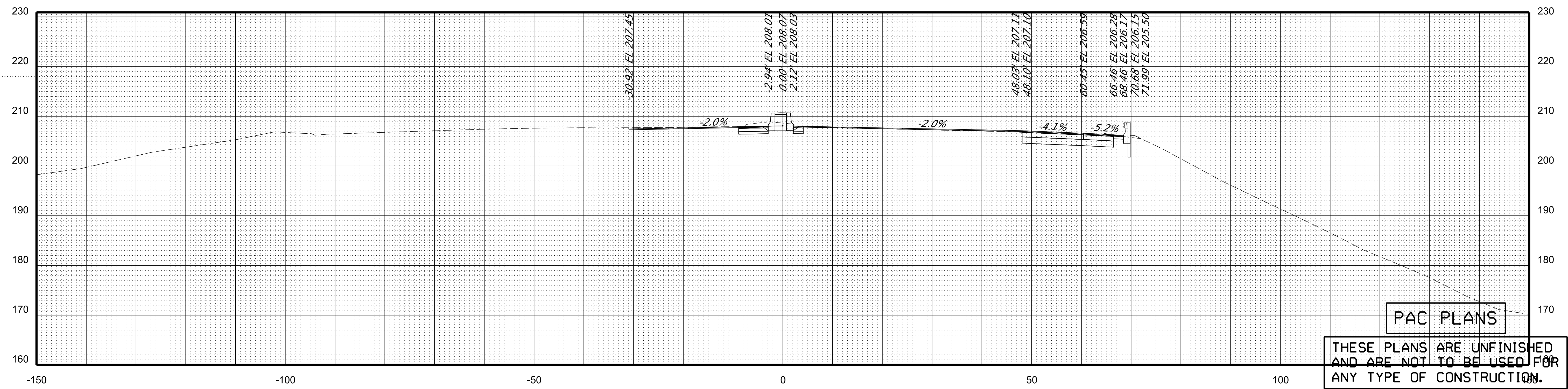
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	80

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 72+00.00



STA 71+75.00

PAC PLANS
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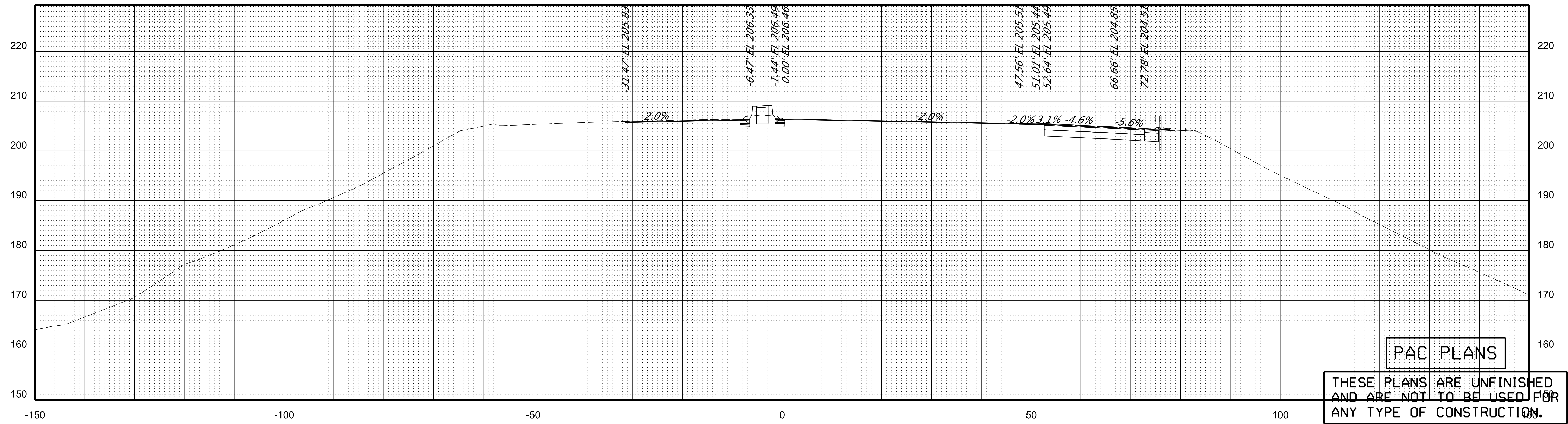
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	81

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 72+25.00

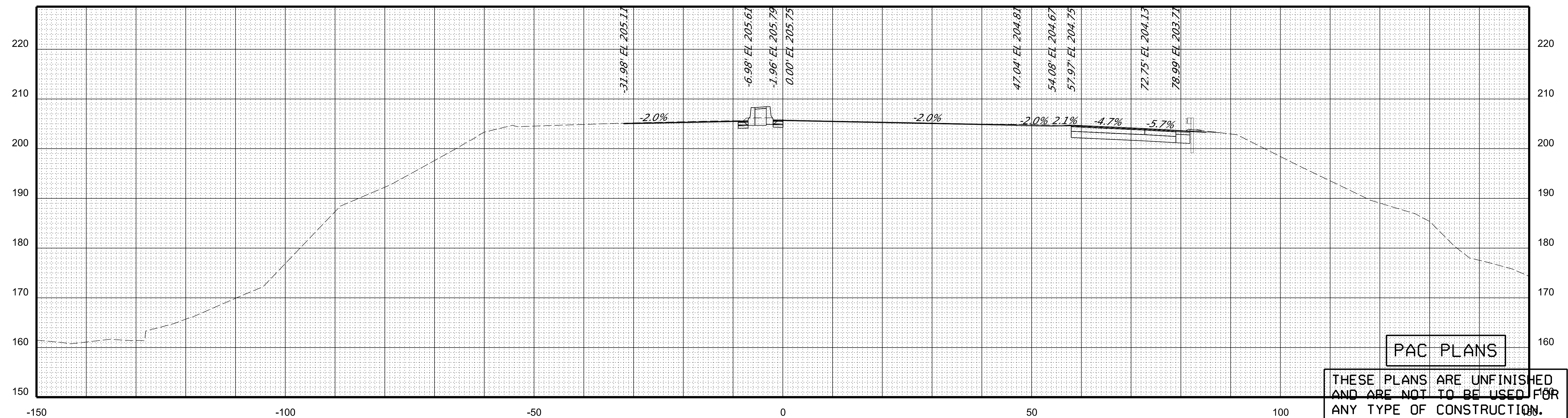
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	82

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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STA 72+50.00

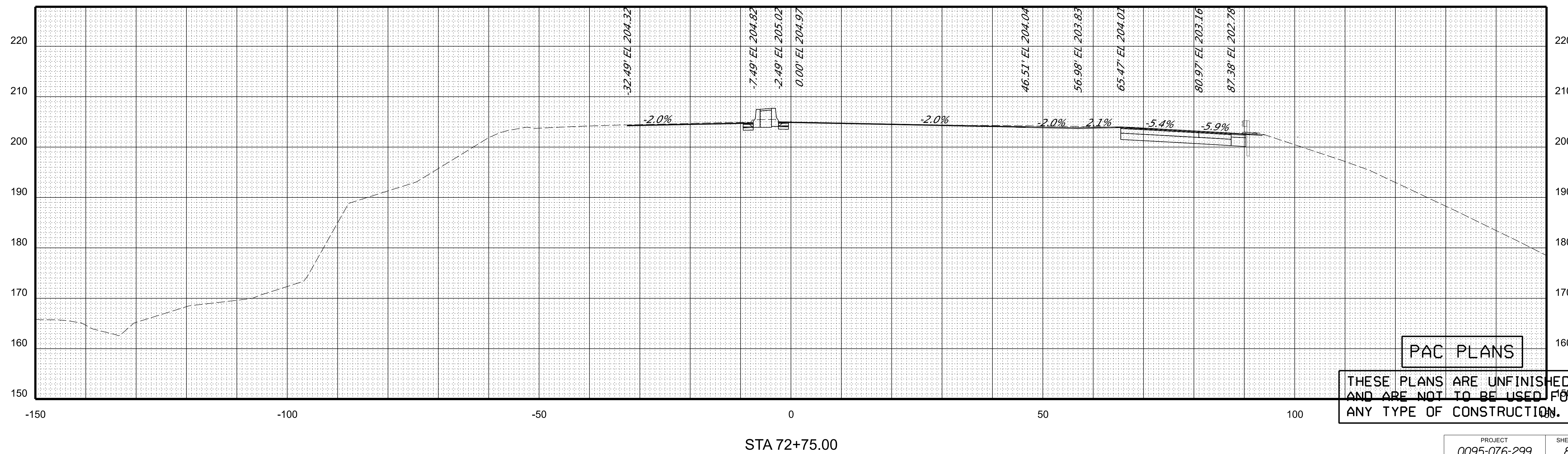
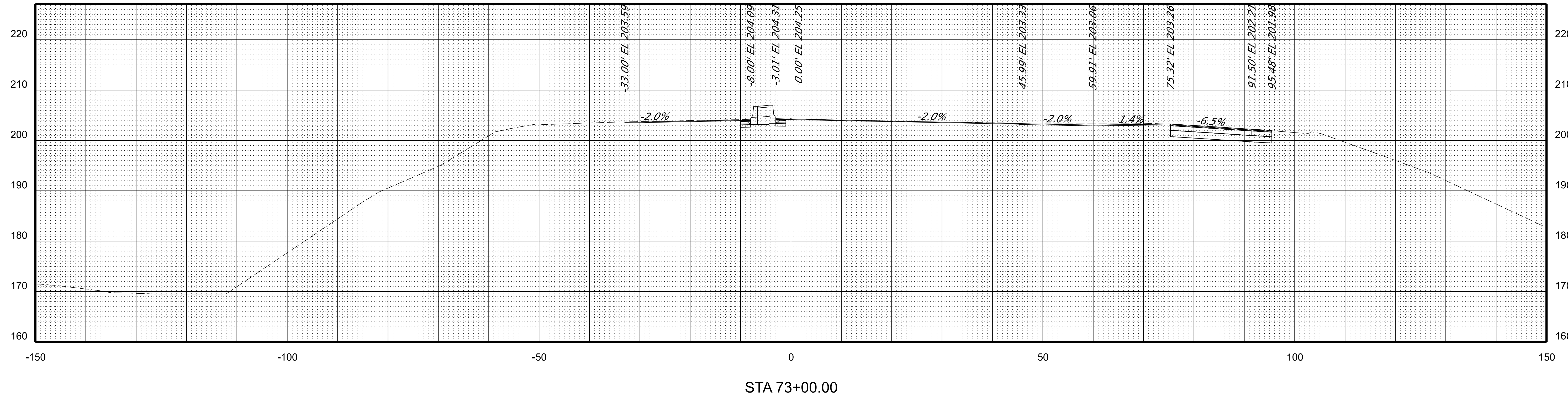
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	83

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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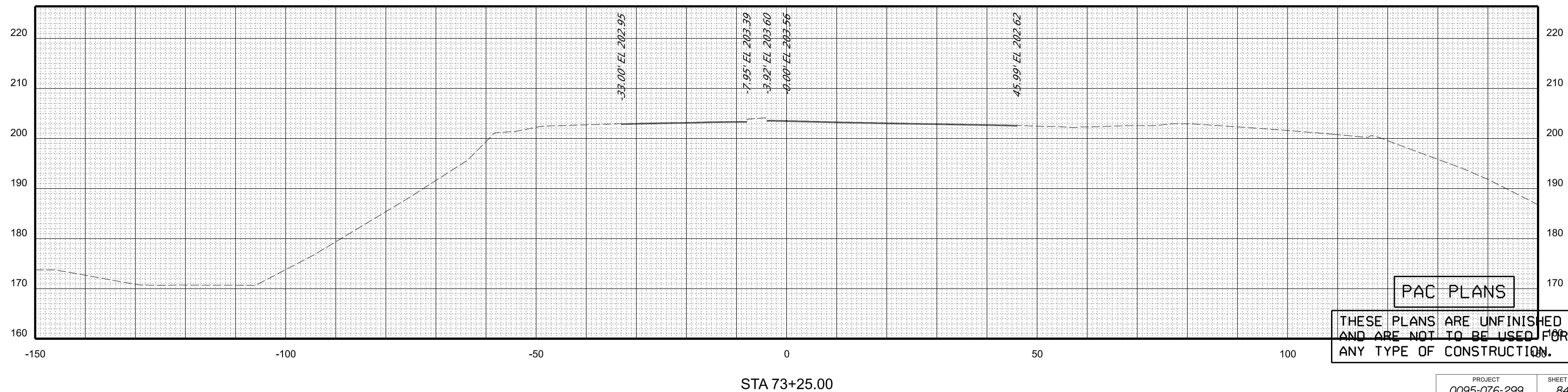
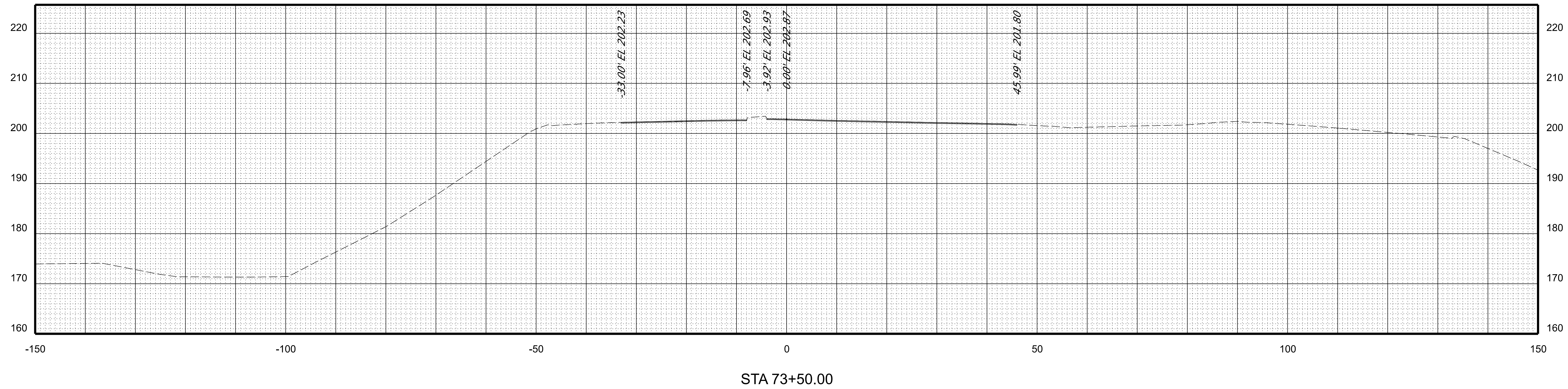
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	84

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

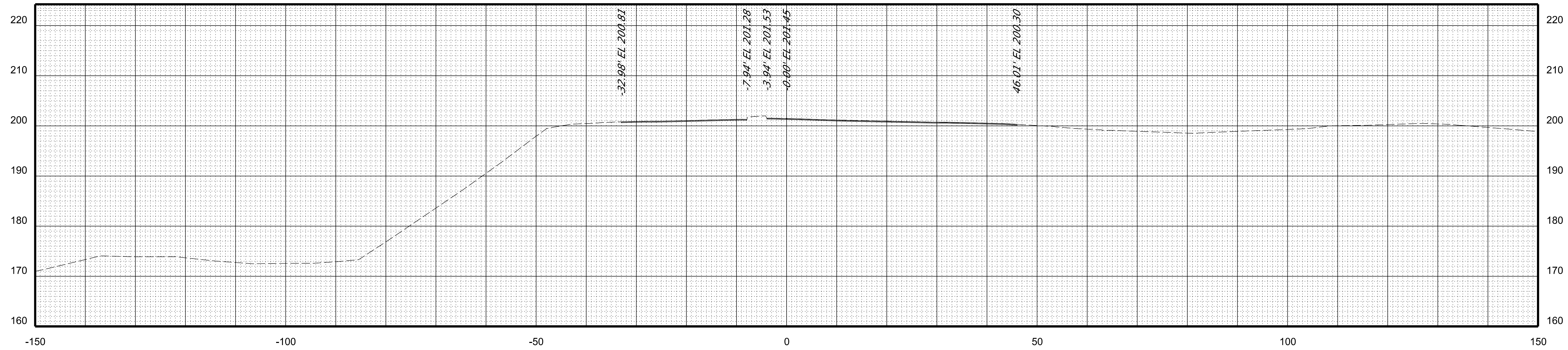
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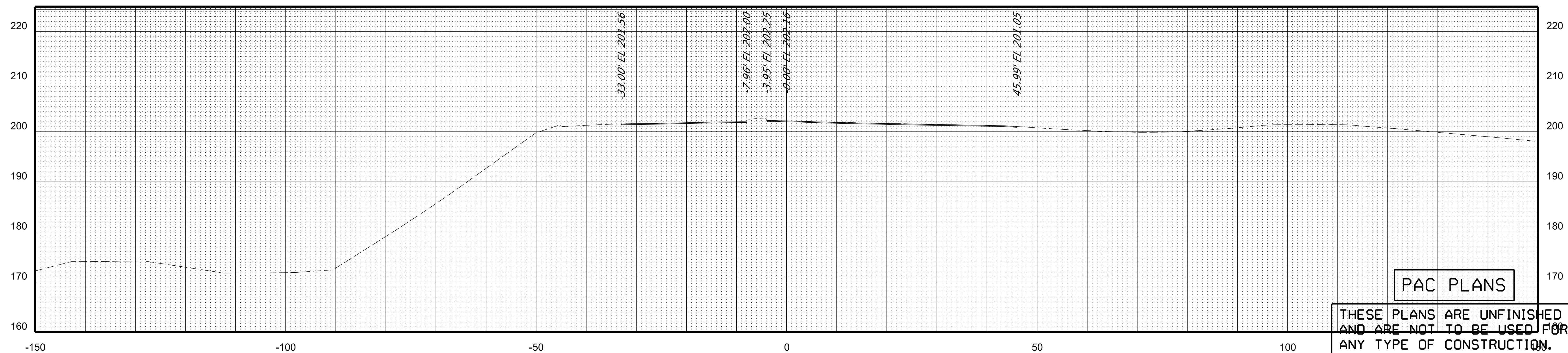
REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	85

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

END CONSTRUCTION STA. 74+70.98 OPITZ BLVD CONSTRUCTION



STA 74+00.00



STA 73+75.00

PAC PLANS

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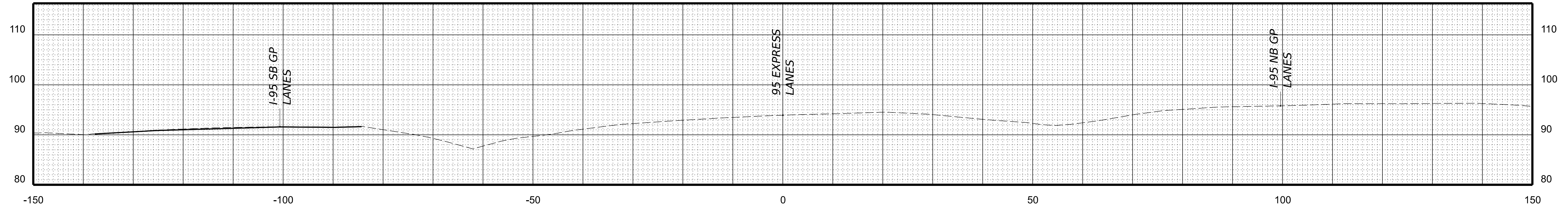
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

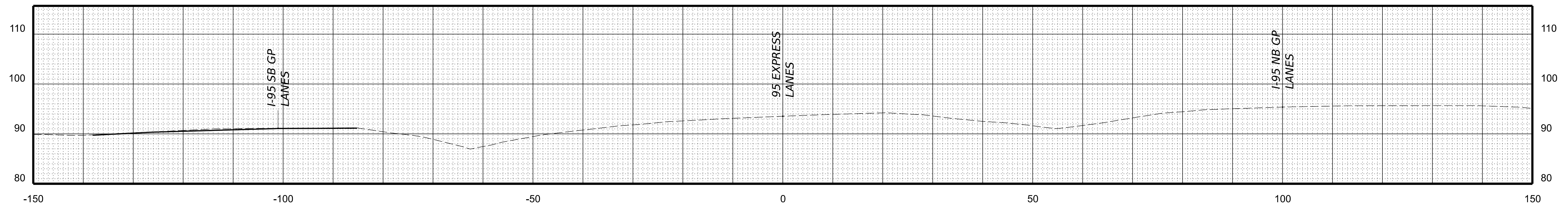
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	86

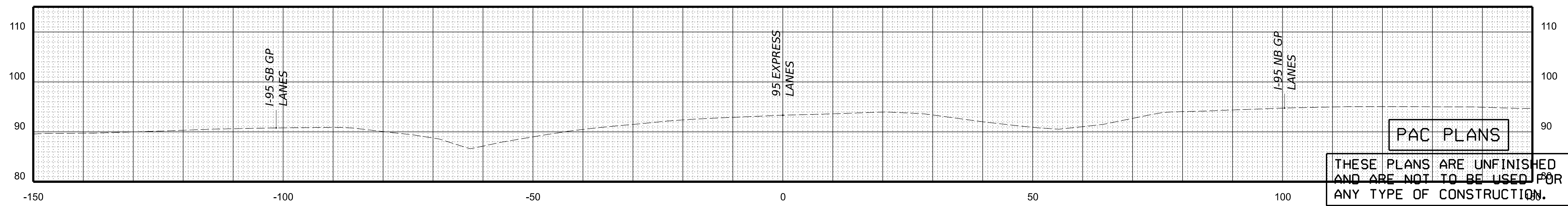
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 651+00.00



STA 650+75.00



STA 650+50.00

PAC PLANS

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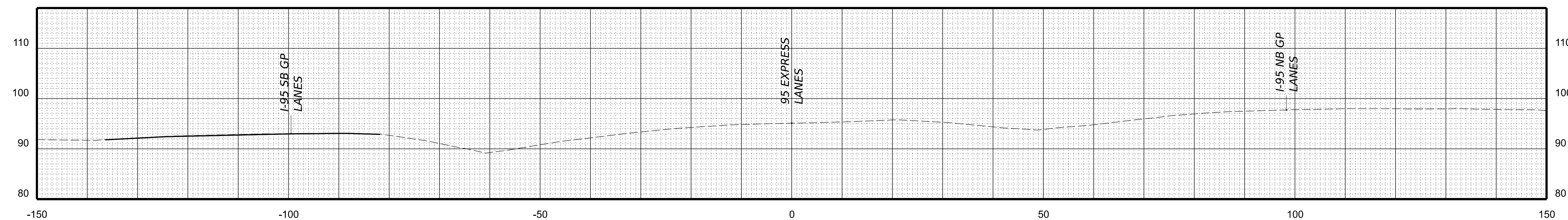
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

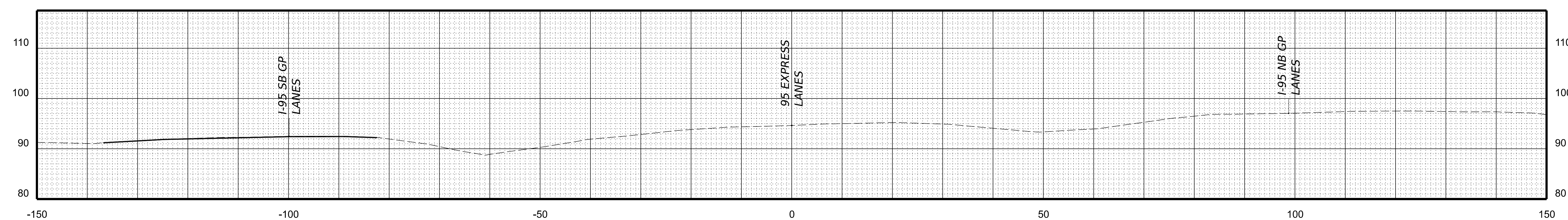
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	87

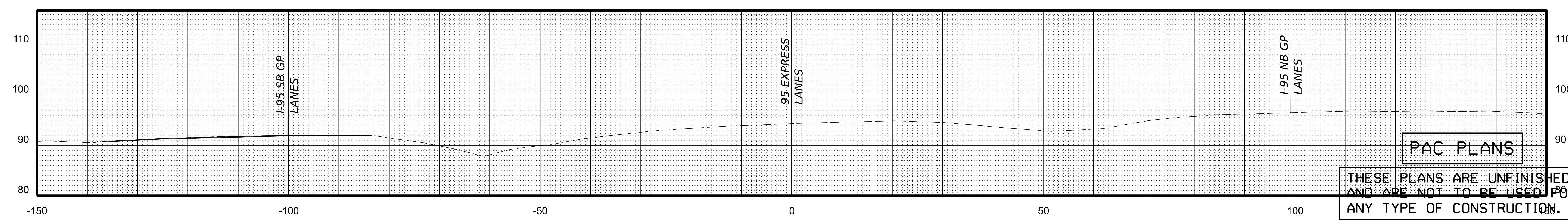
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 651+75.00



STA 651+50.00



STA 651+25.00

PAC PLANS
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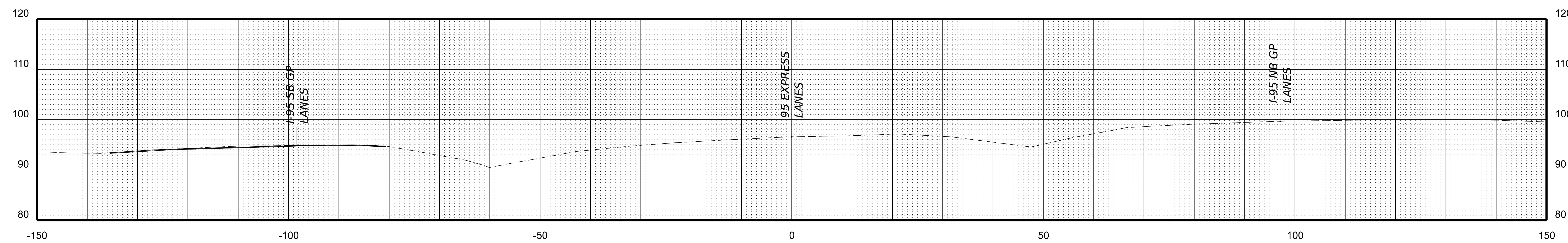
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

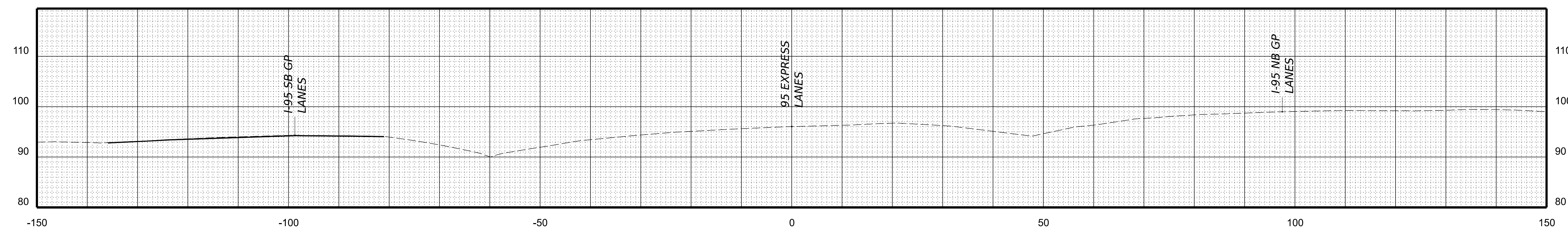
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	88

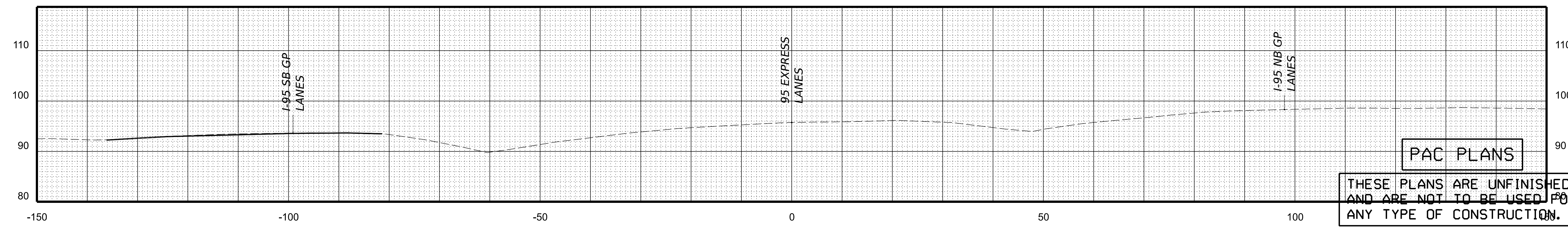
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 652+50.00



STA 652+25.00



STA 652+00.00

PAC PLANS
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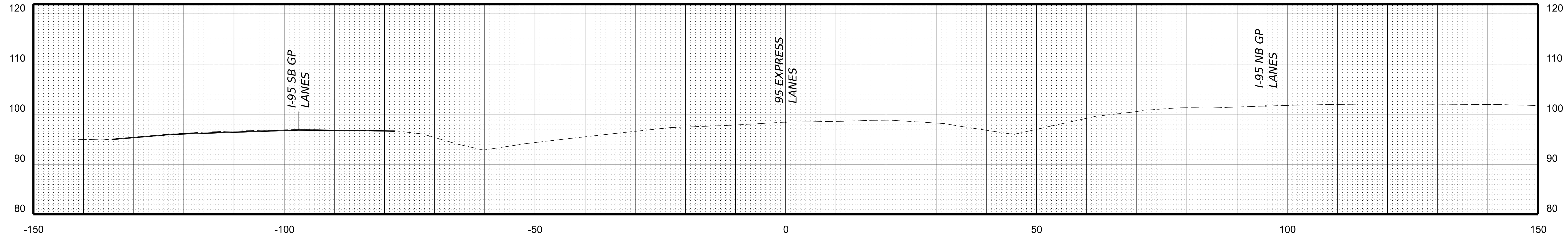
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

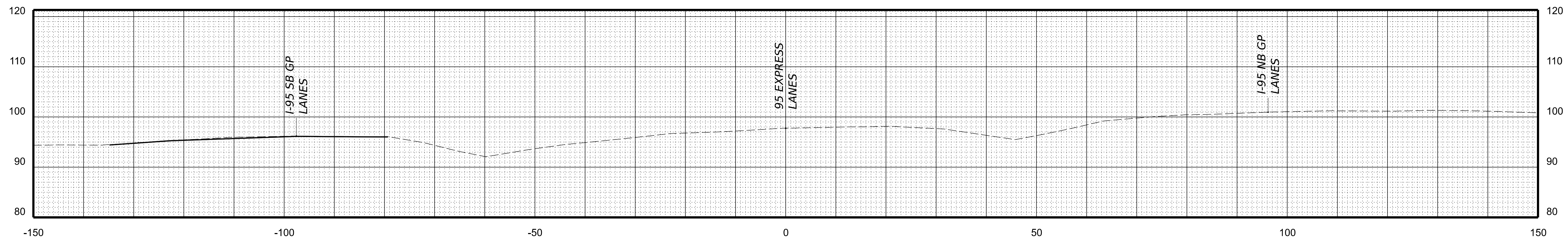
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	89

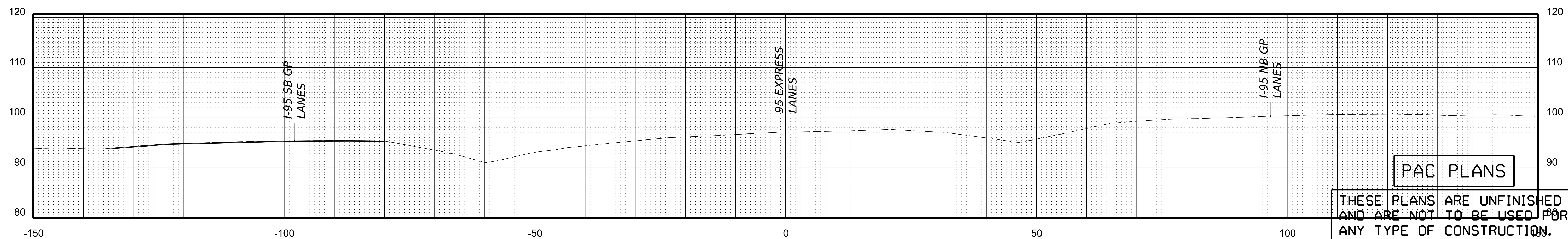
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 653+25.00



STA 653+00.00



STA 652+75.00

PAC PLANS

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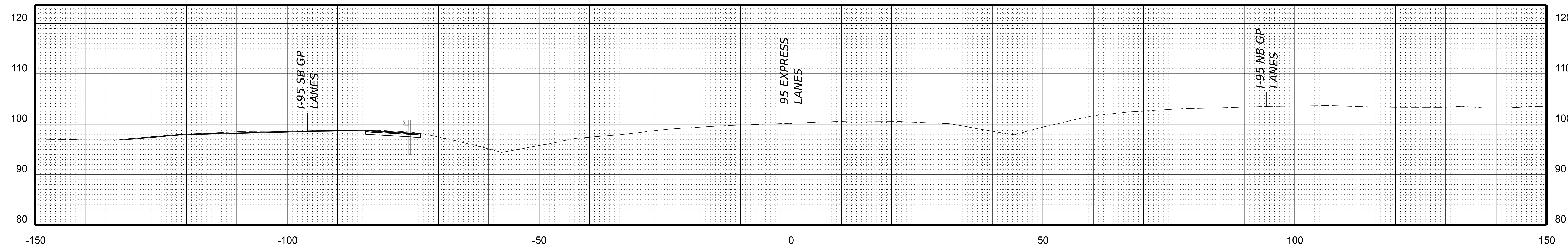
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

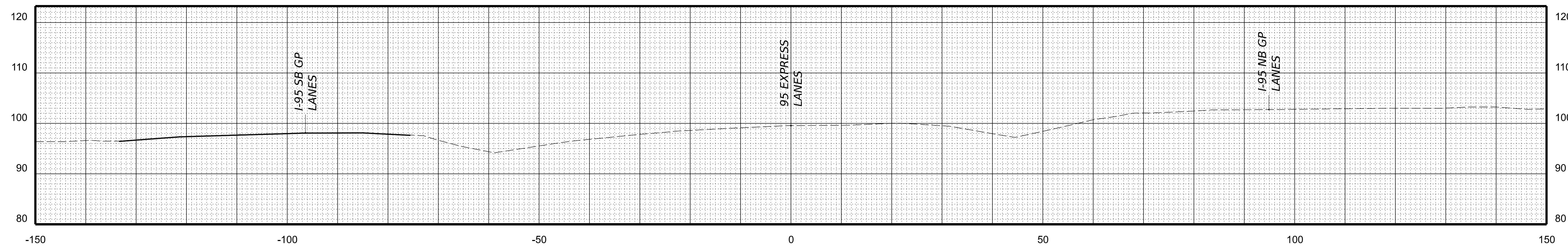
REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	90

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

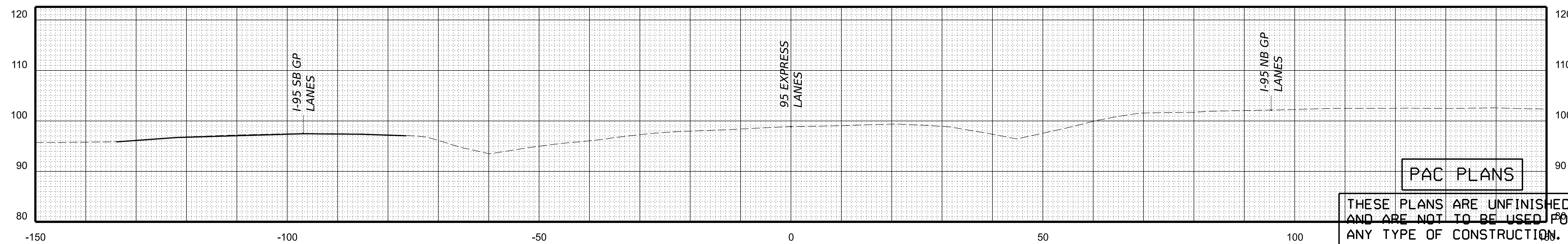


STA 654+00.00

BEGIN PROJECT 0095-076-299
C-501 STA. 653+77.04 XBL



STA 653+75.00



STA 653+50.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

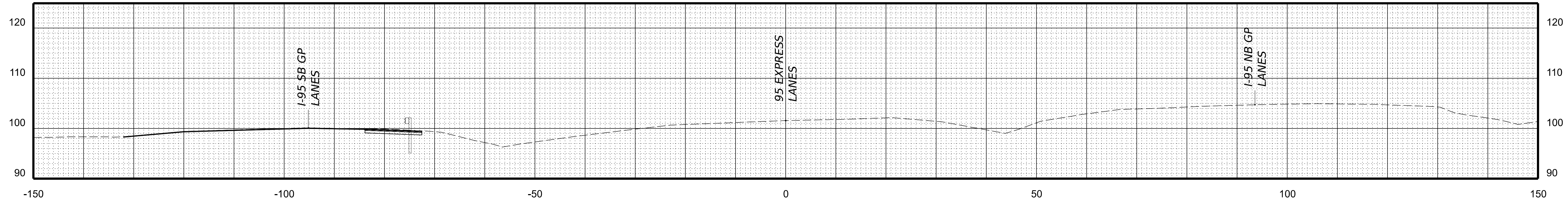
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

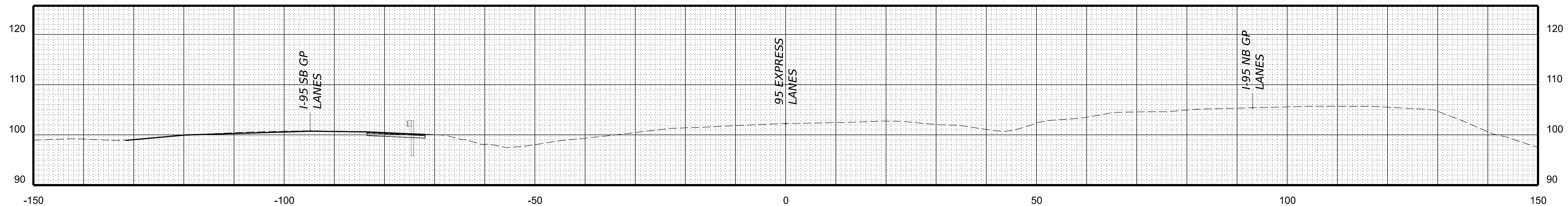
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	91

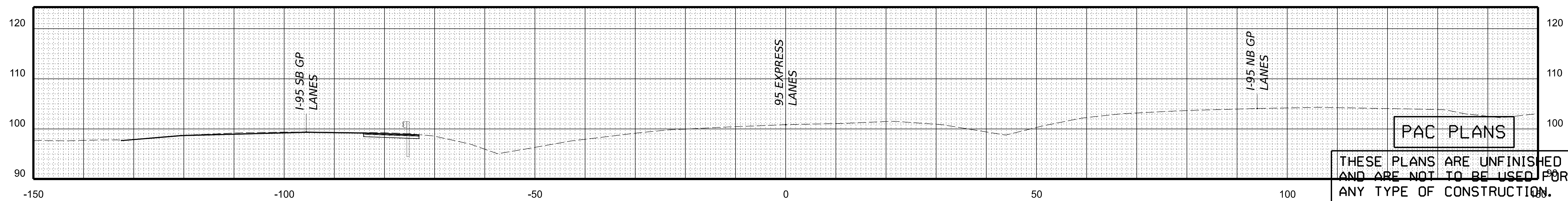
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 654+50.00



STA 654+75.00



STA 654+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

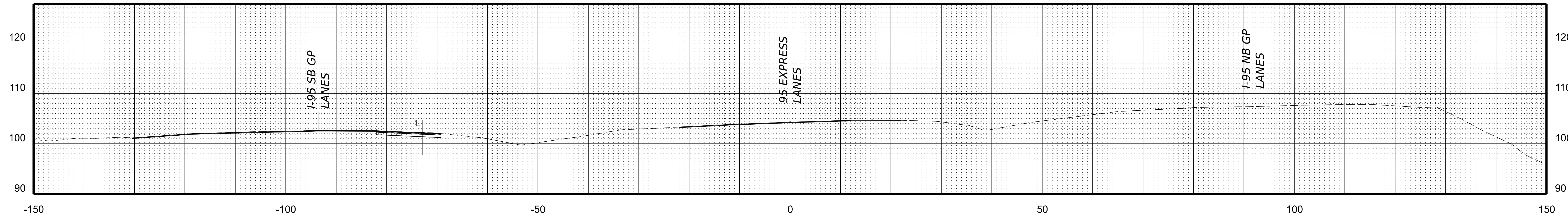
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

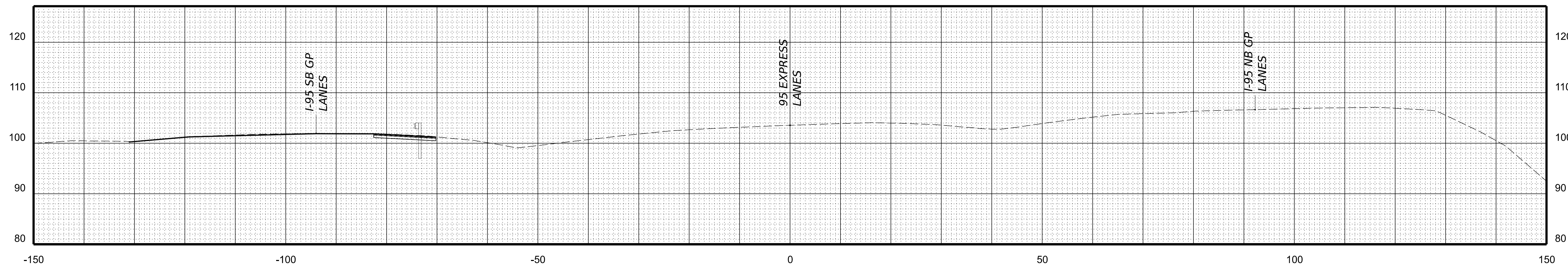
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	92

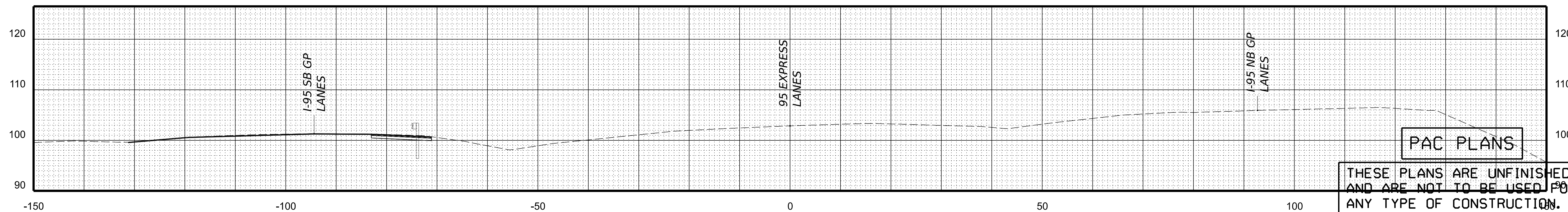
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 655+50.00



STA 655+25.00



STA 655+00.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

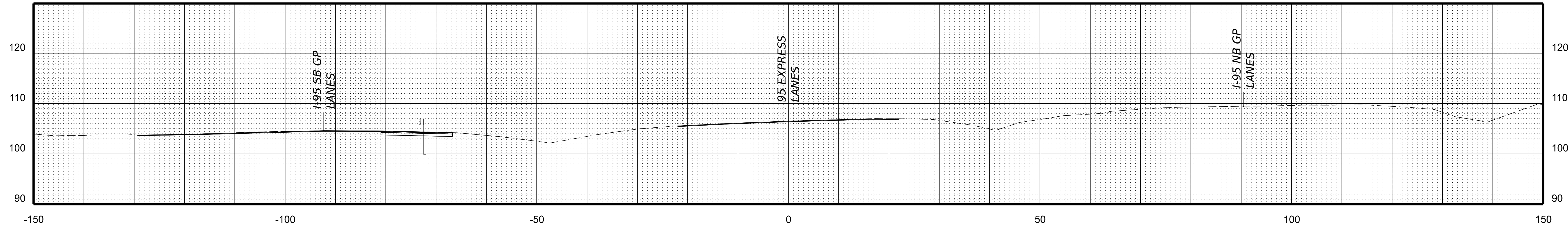
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

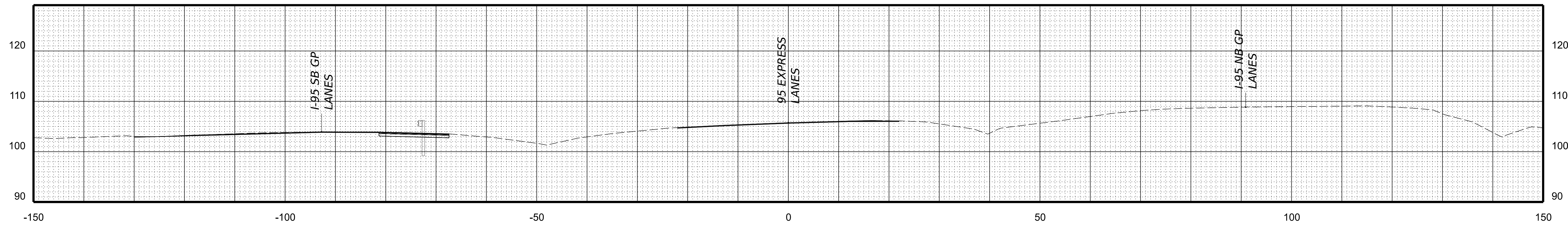
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	93

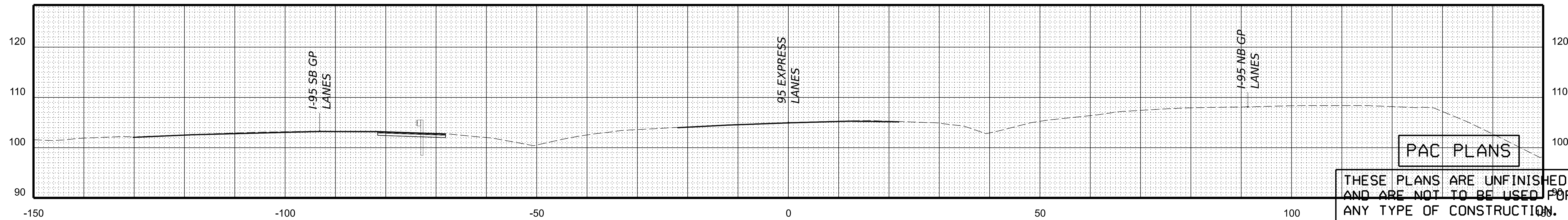
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 656+25.00



STA 656+00.00



STA 655+75.00

PAC PLANS

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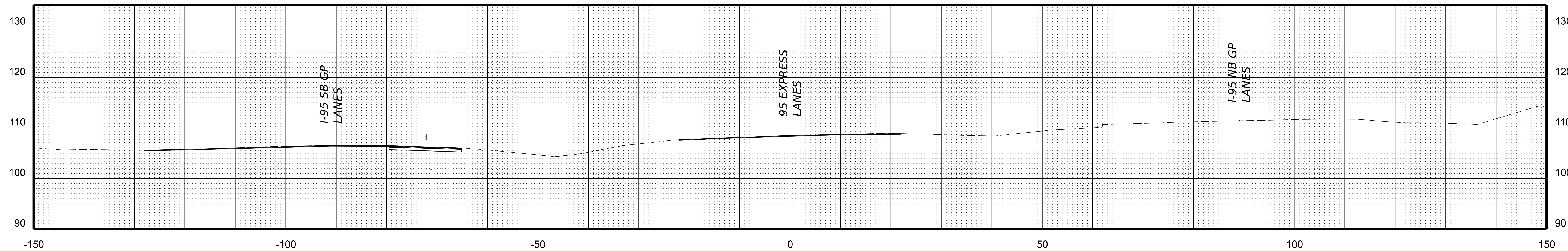
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

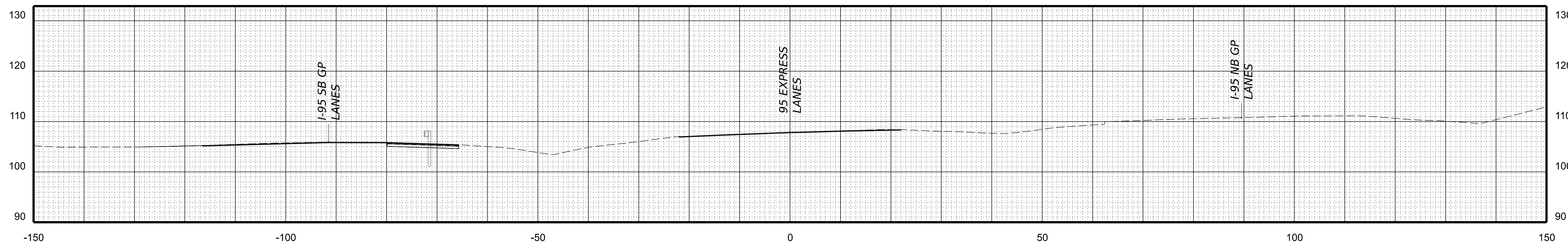
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	94

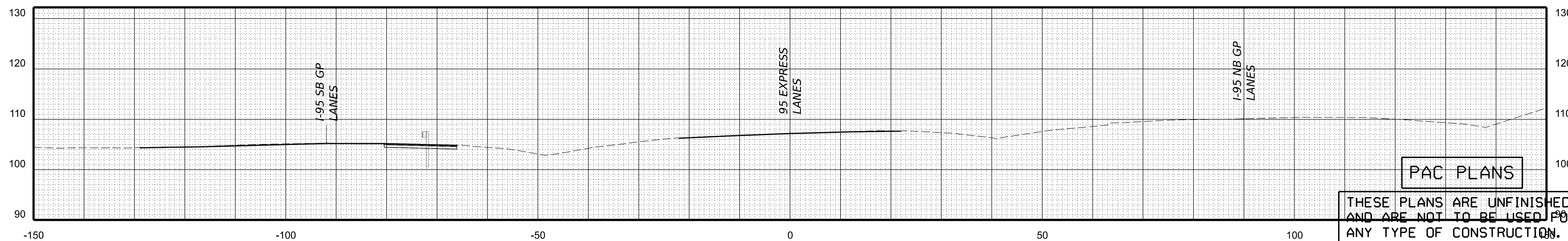
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 657+00.00



STA 656+75.00



STA 656+50.00

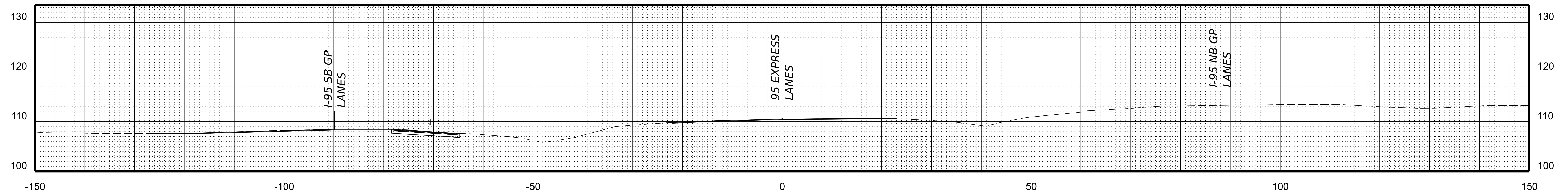
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

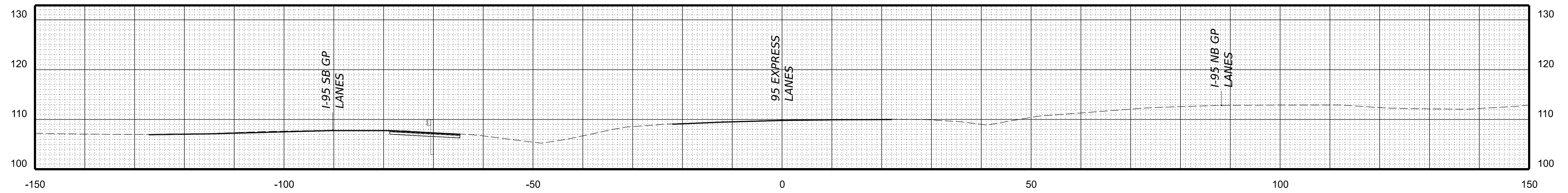
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	95

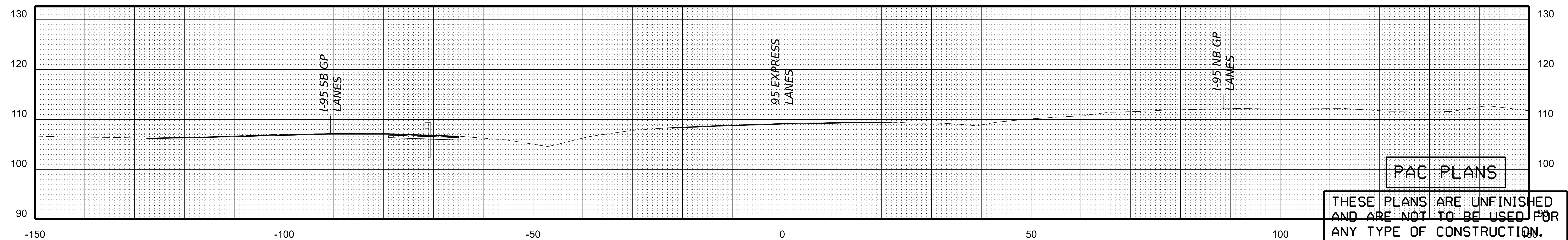
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 657+75.00



STA 657+50.00



STA 657+25.00

PAC PLANS

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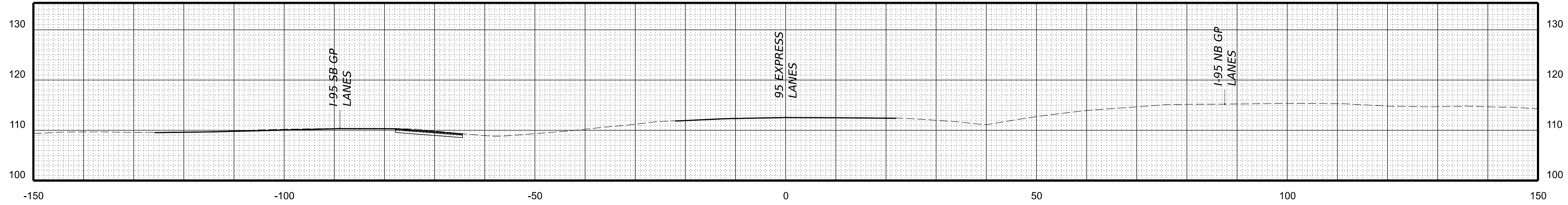
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

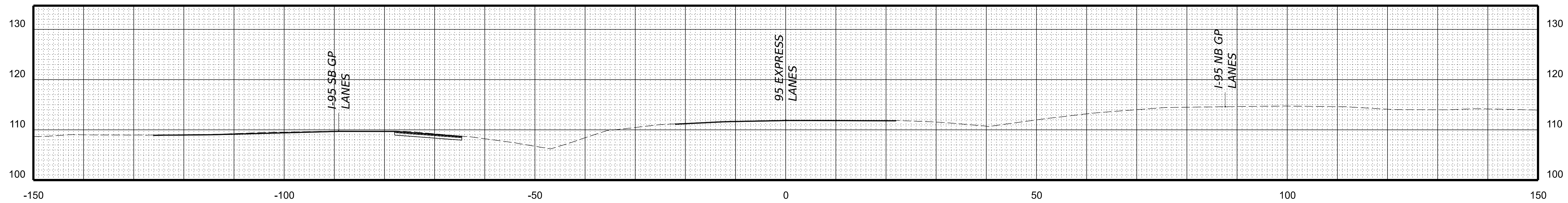
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	96

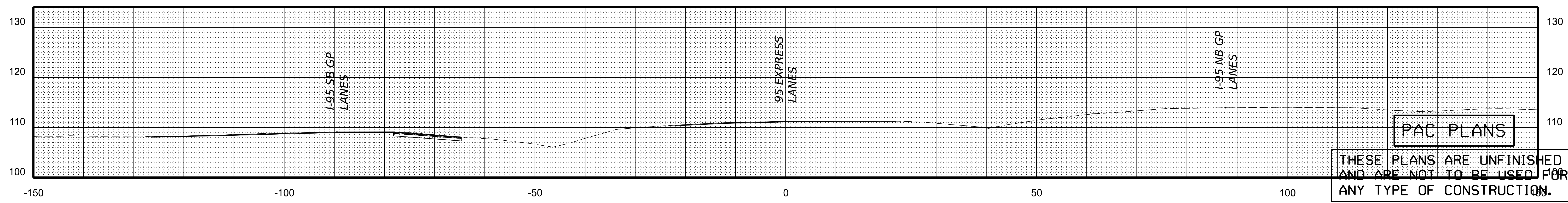
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 658+50.00



STA 658+25.00



STA 658+00.00

PAC PLANS

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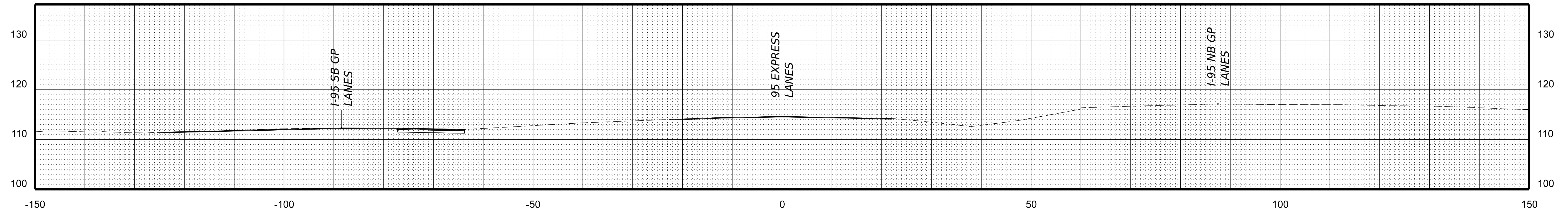
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

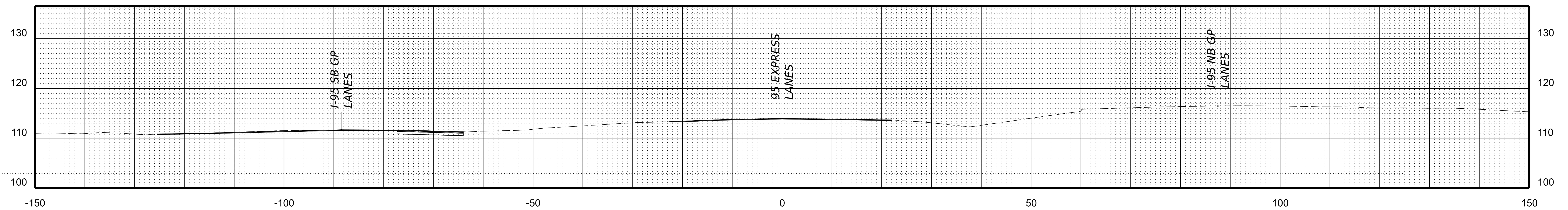
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	97

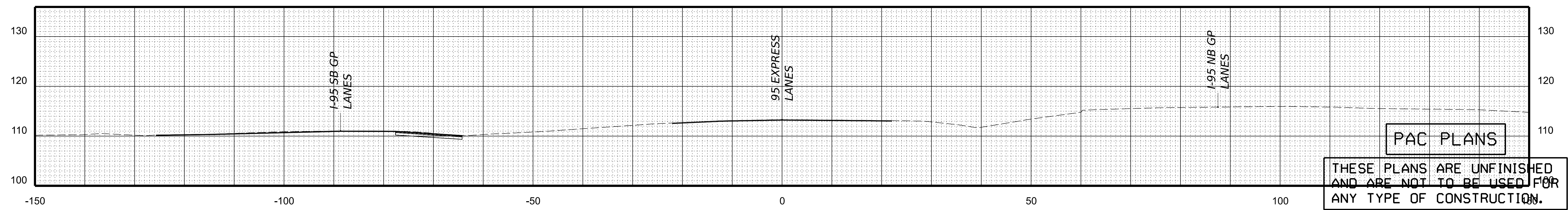
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 659+25.00



STA 659+00.00



STA 658+75.00

PAC PLANS

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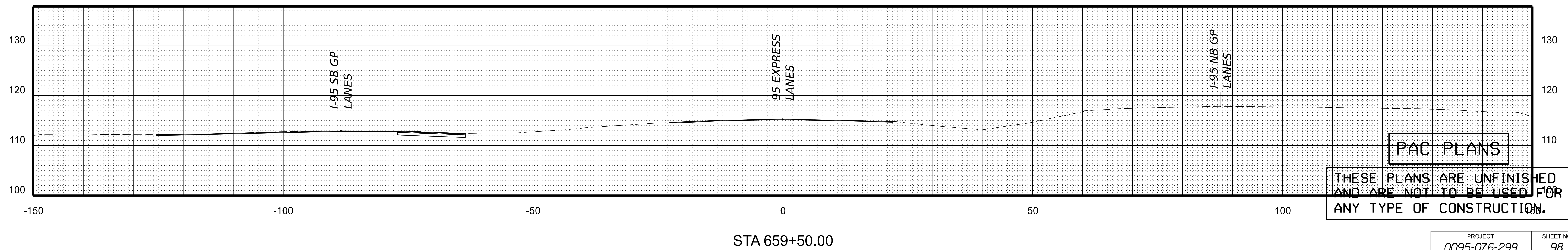
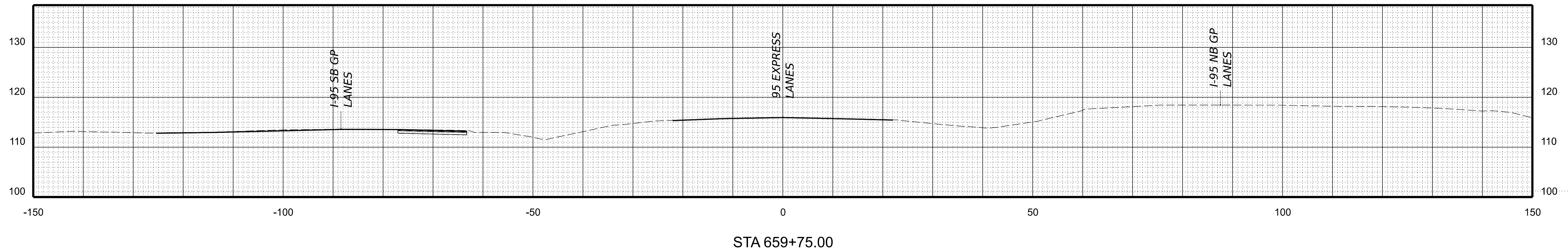
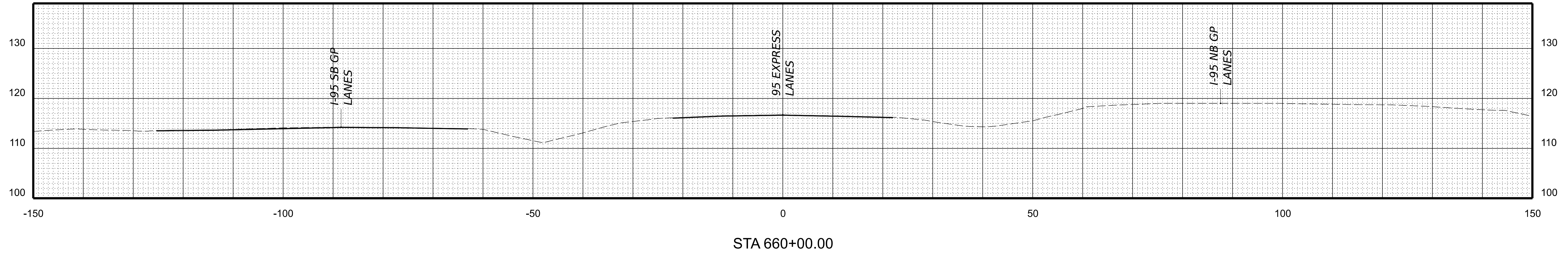
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	98

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



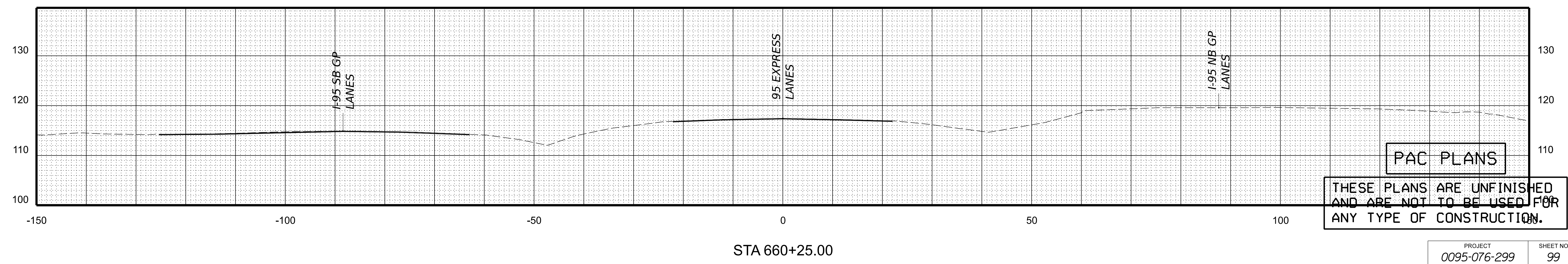
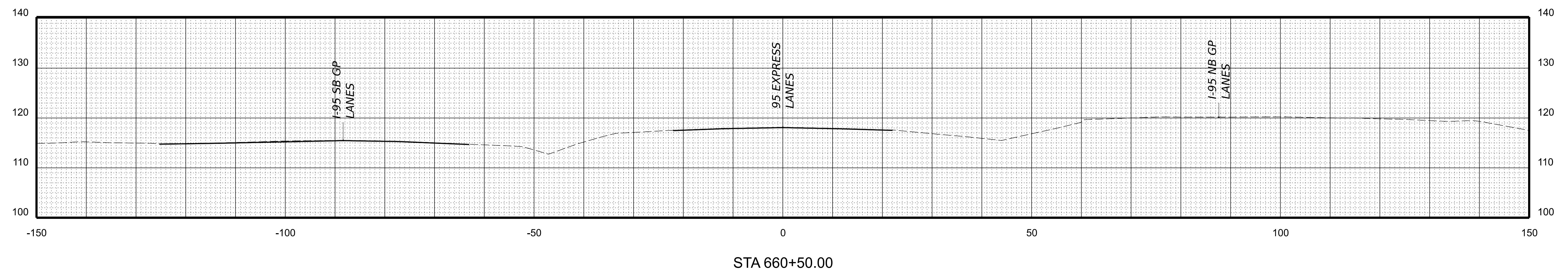
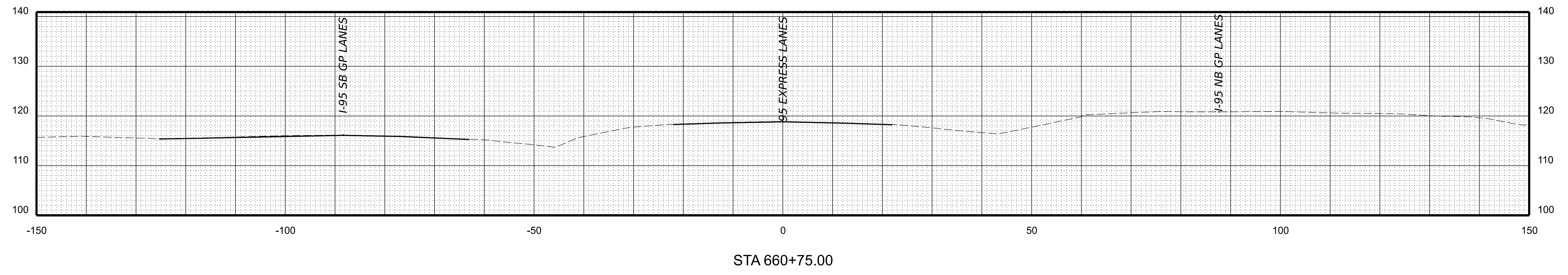
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	99

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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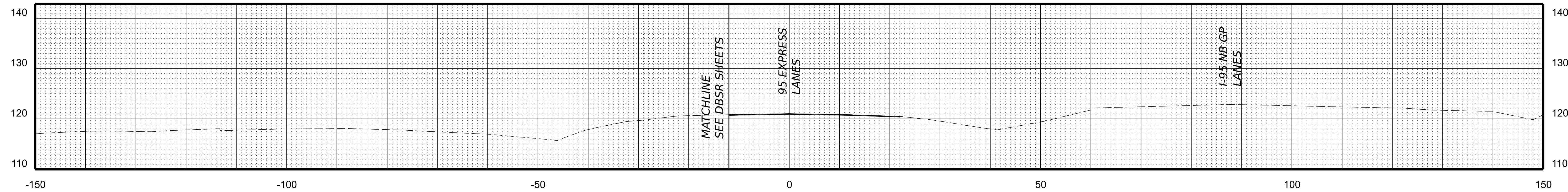
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 IN/VA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

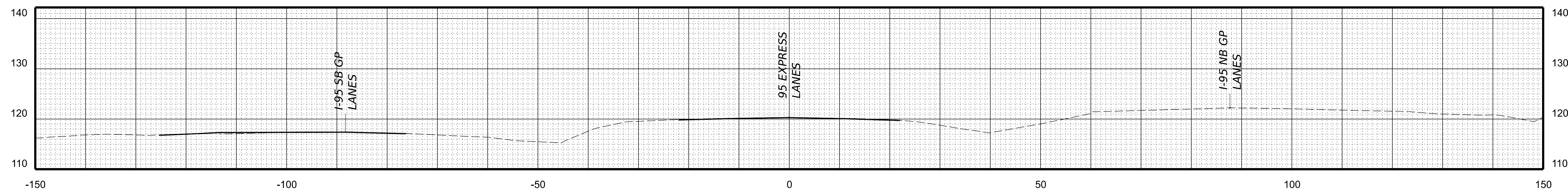
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	100

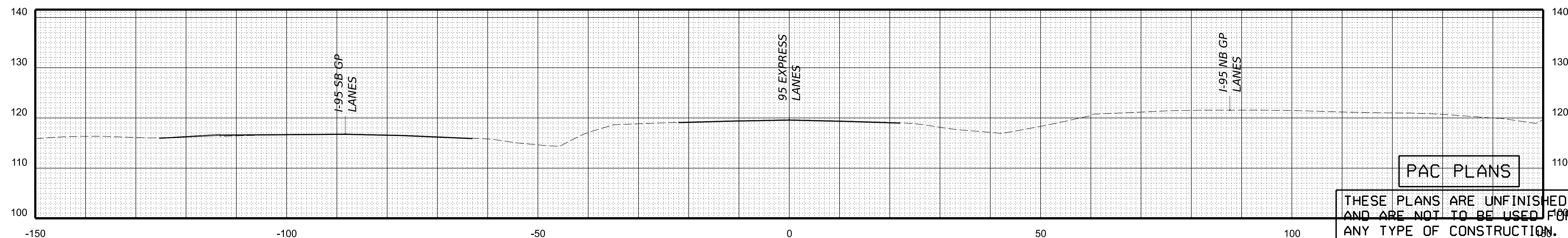
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 661+50.00



STA 661+25.00



STA 661+00.00

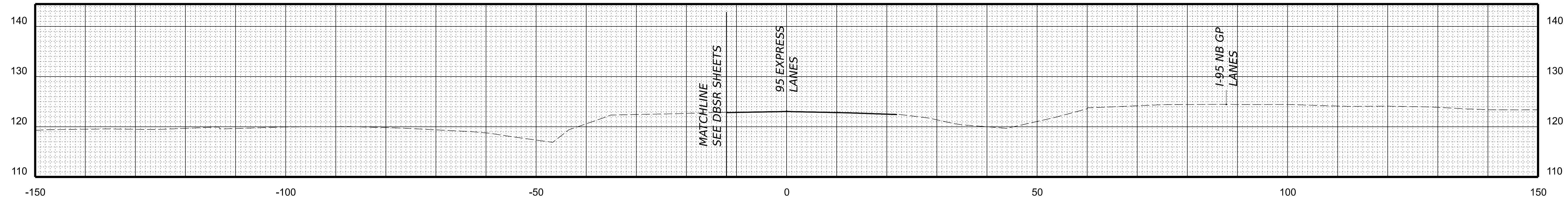
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

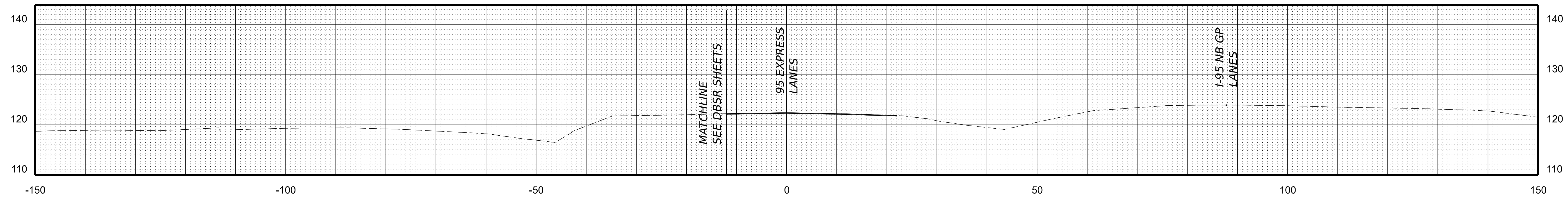
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	101

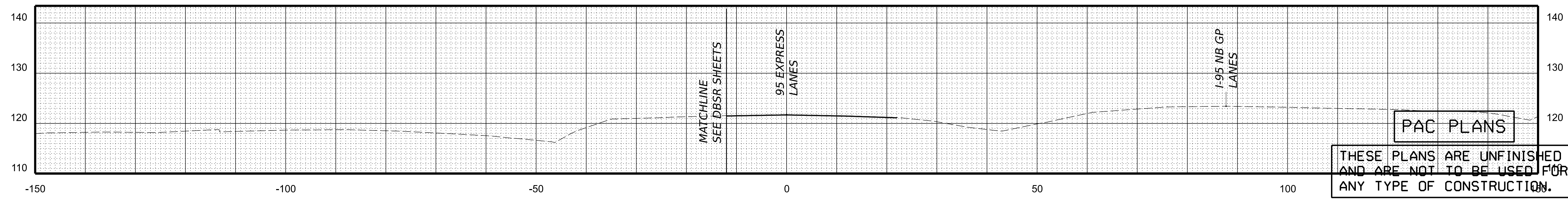
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 662+25.00



STA 662+00.00



STA 661+75.00

PAC PLANS

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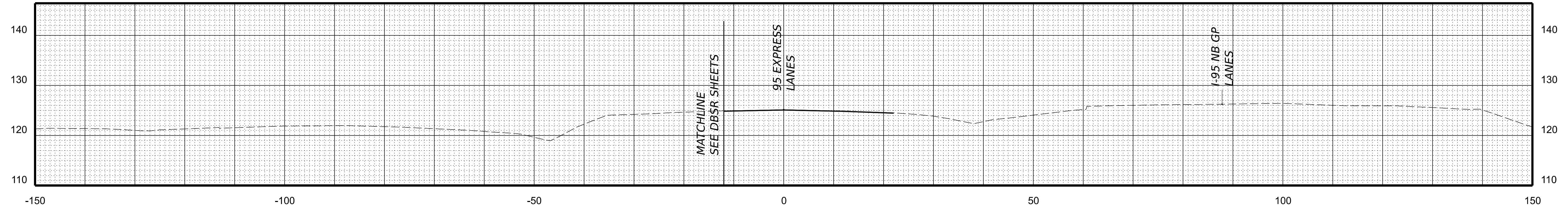
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 IN/VA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

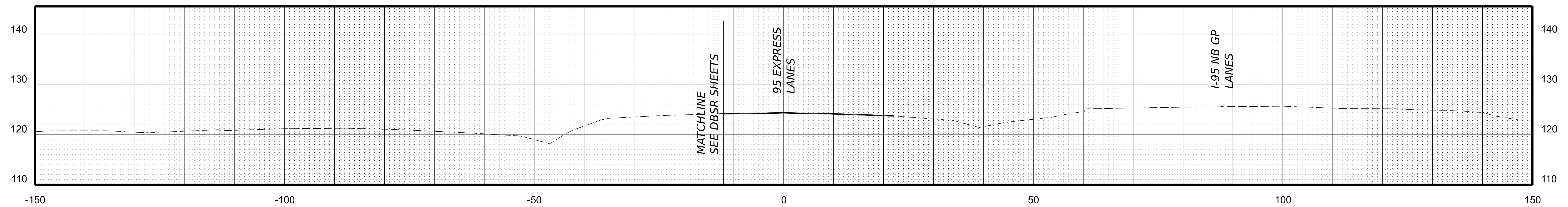
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	102

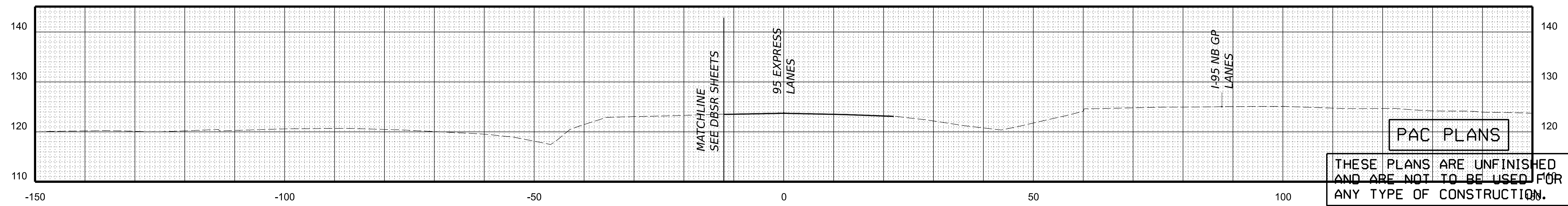
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 663+00.00



STA 662+75.00



STA 662+50.00

PAC PLANS

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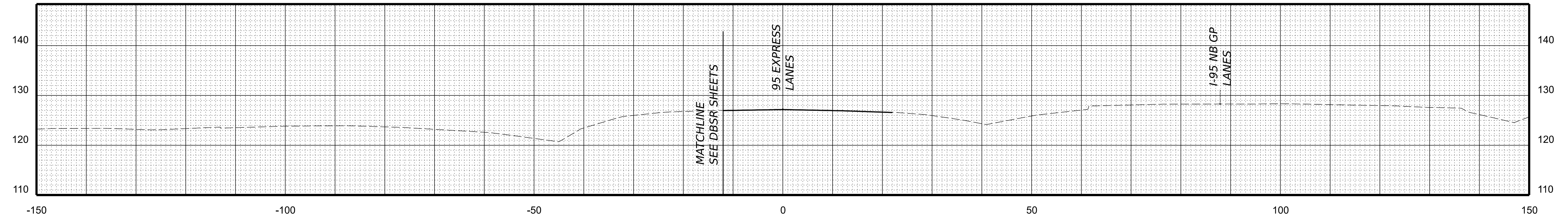
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

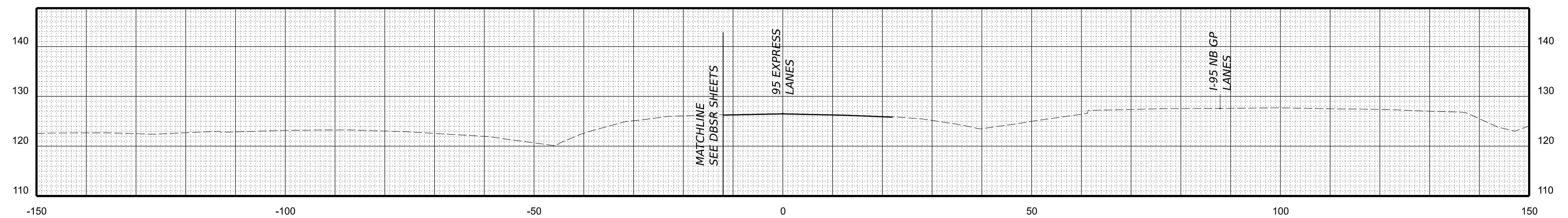
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	103

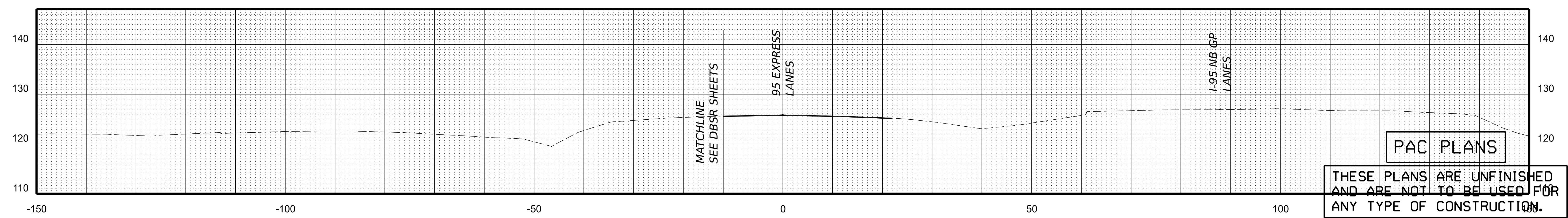
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 663+75.00



STA 663+50.00



STA 663+25.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

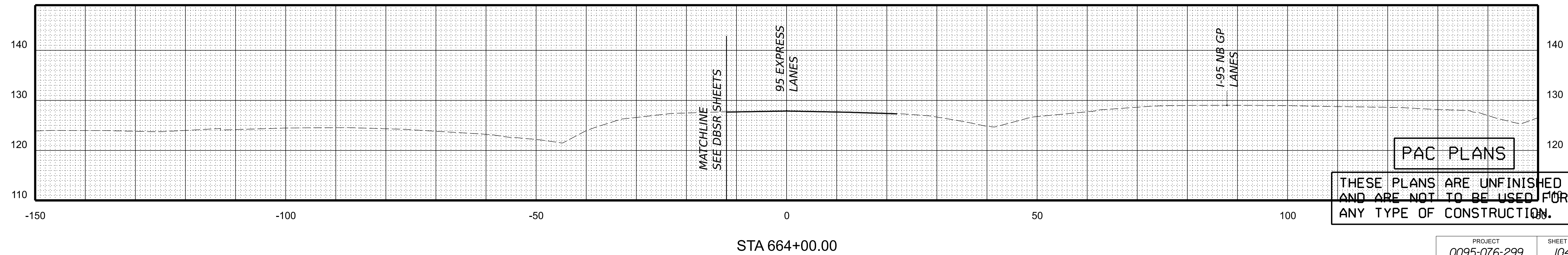
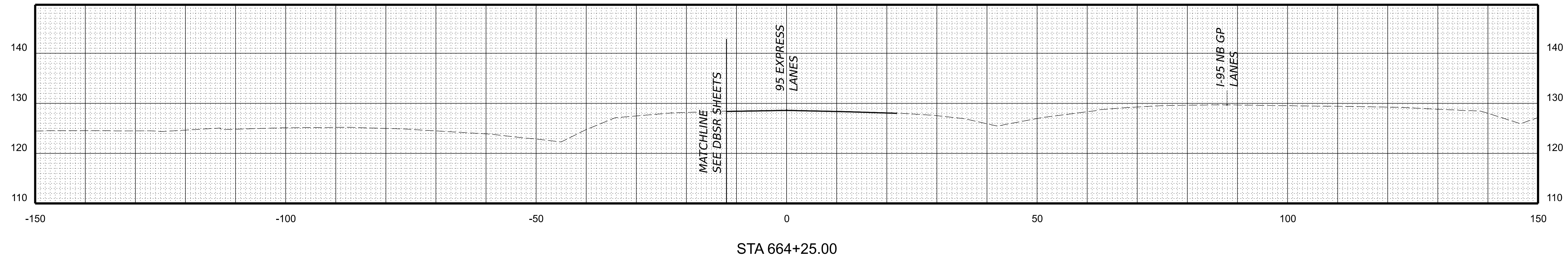
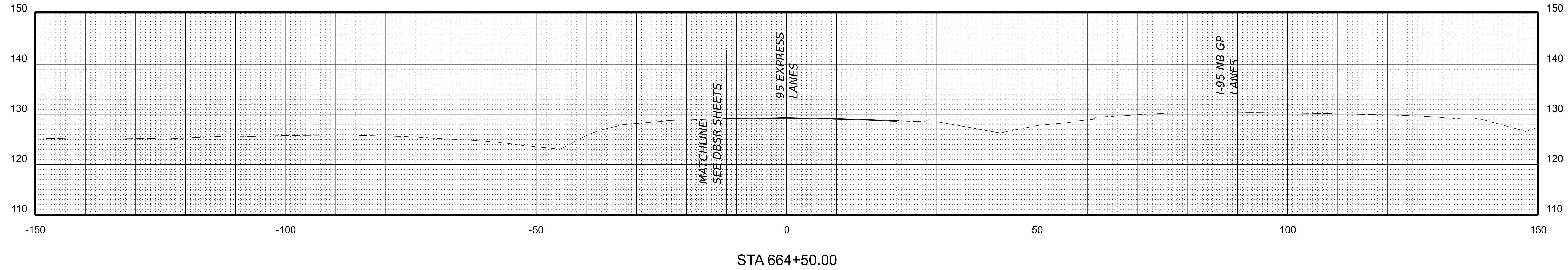
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	104

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



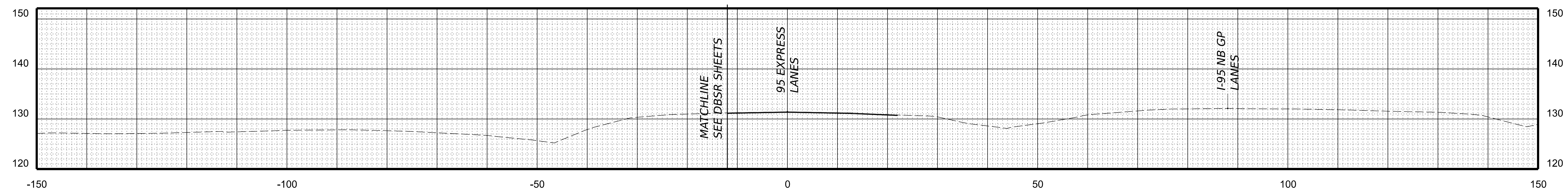
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

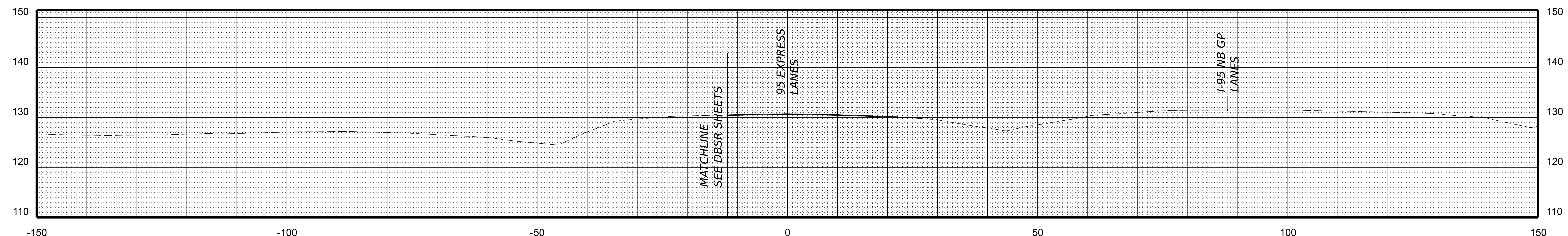
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299, C-501	105

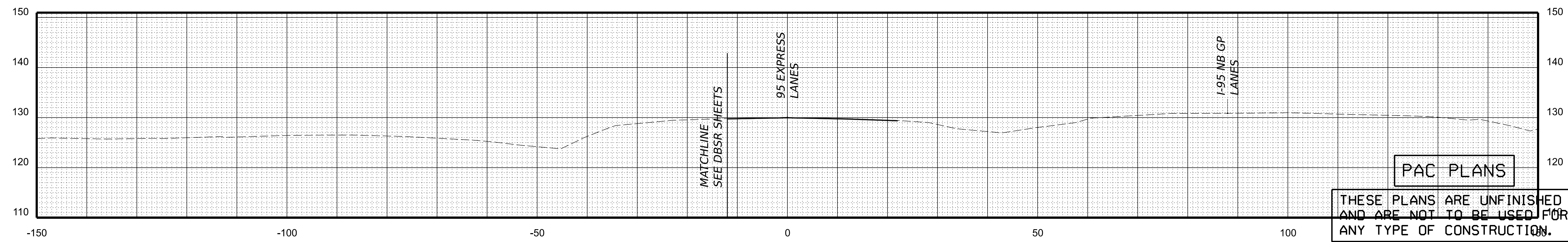
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 665+25.00



STA 665+00.00



STA 664+75.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

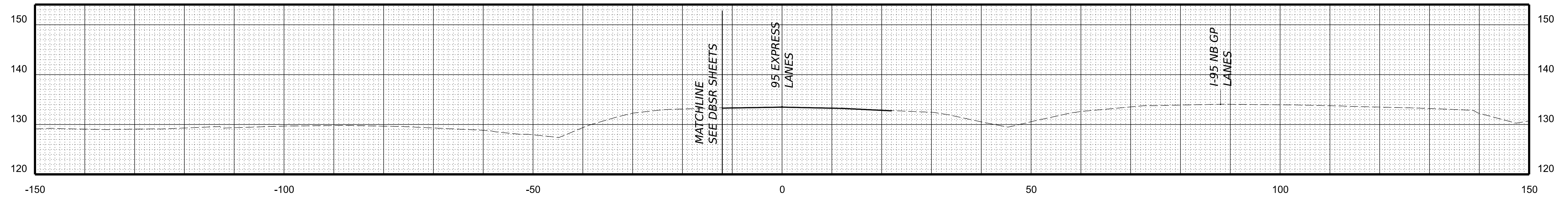
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

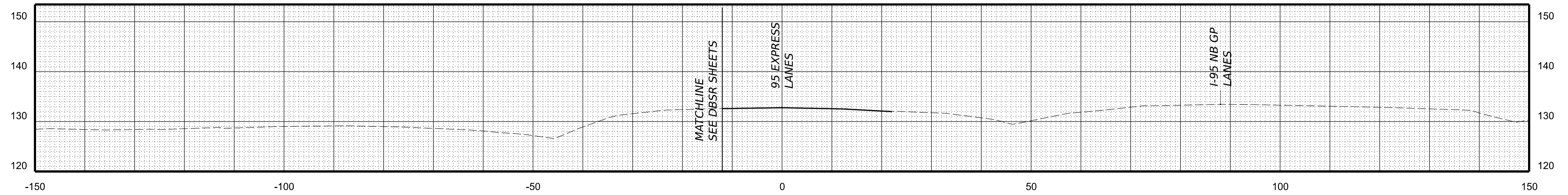
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	106

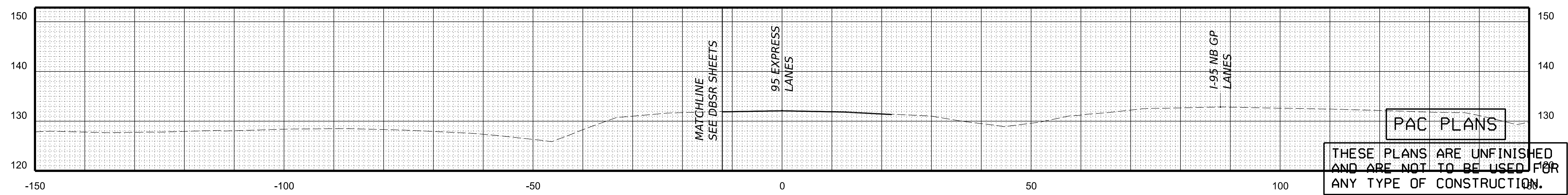
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 666+00.00



STA 665+75.00



STA 665+50.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

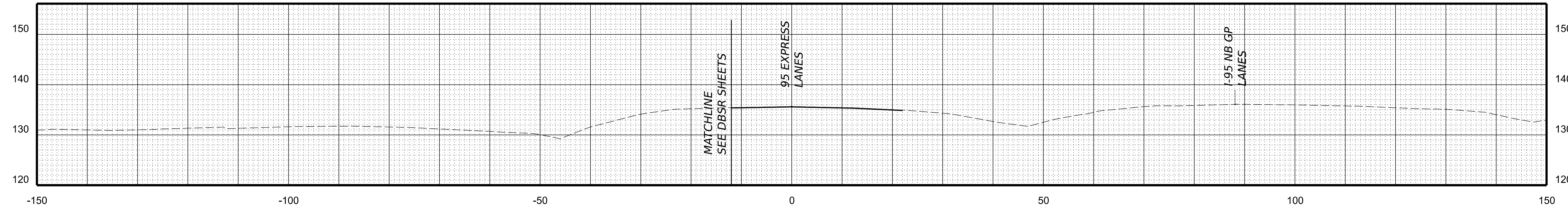
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

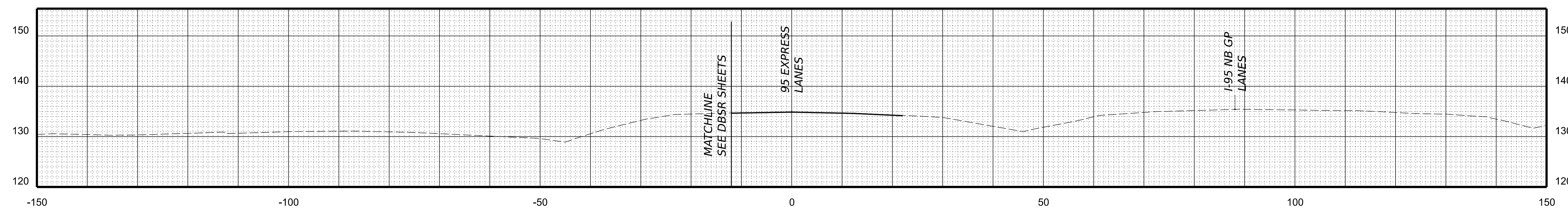
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	107

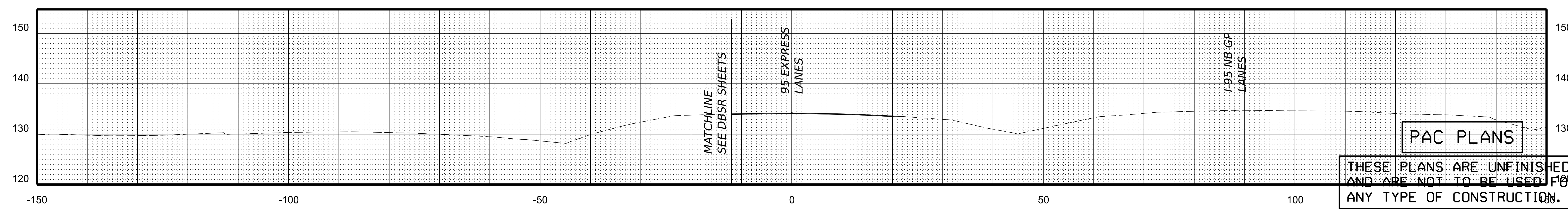
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 666+75.00



STA 666+50.00



STA 666+25.00

PAC PLANS
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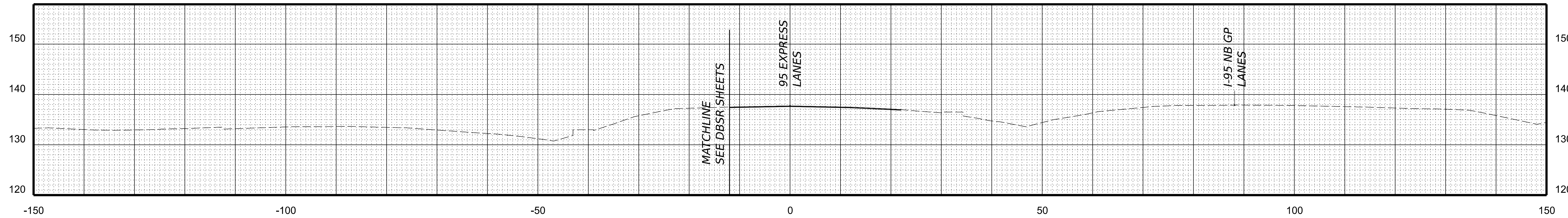
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

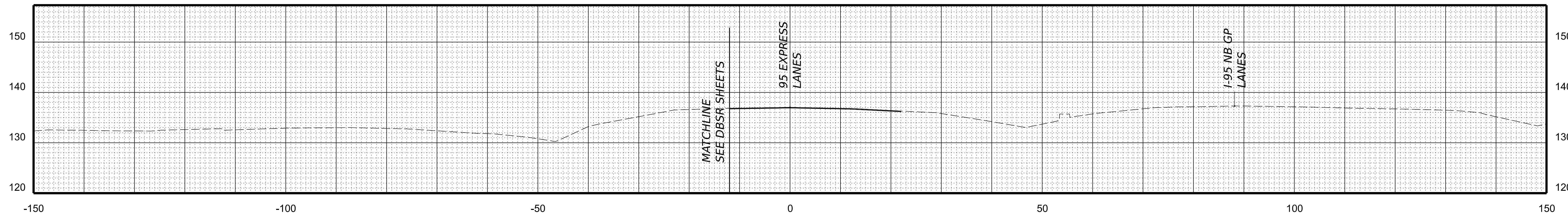
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	108

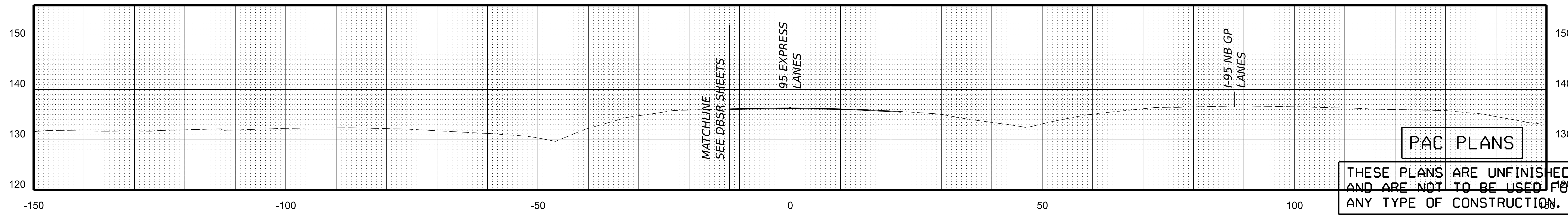
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 667+50.00



STA 667+25.00



STA 667+00.00

PAC PLANS
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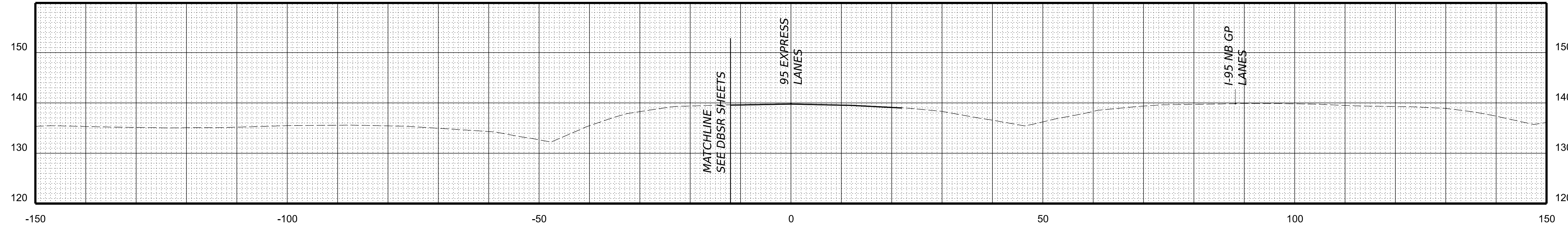
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

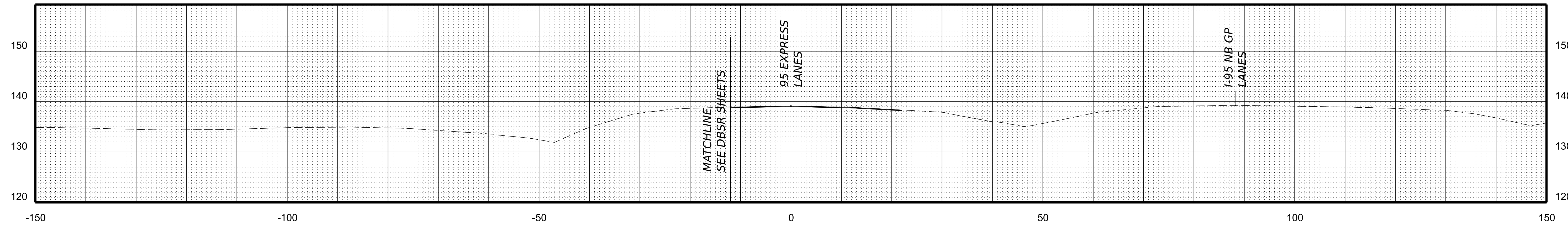
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	109

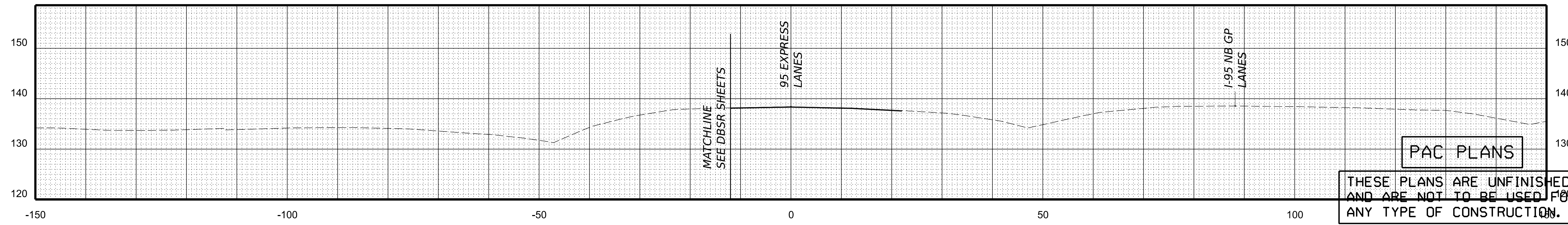
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 668+25.00



STA 668+00.00



STA 667+75.00

PAC PLANS

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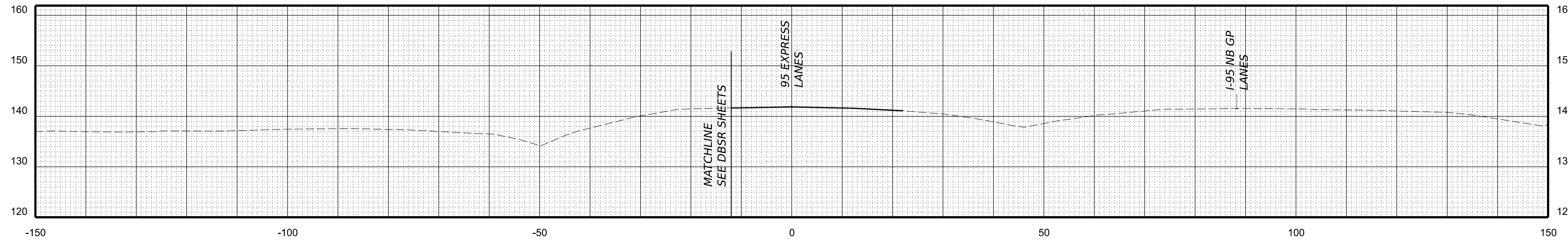
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

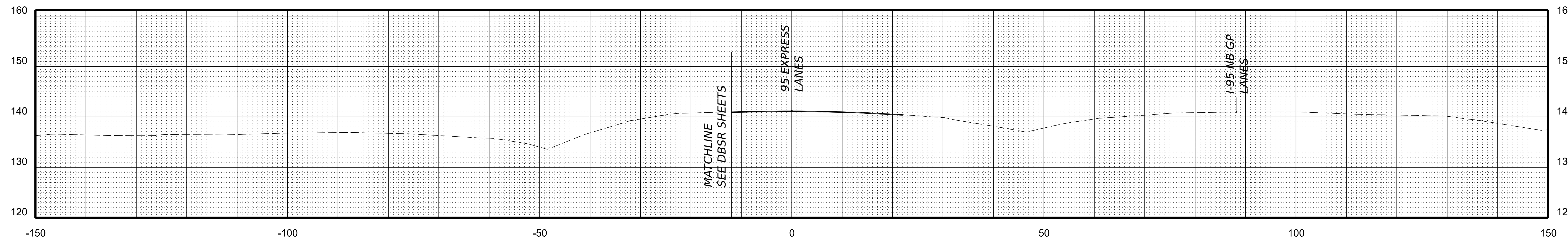
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	110

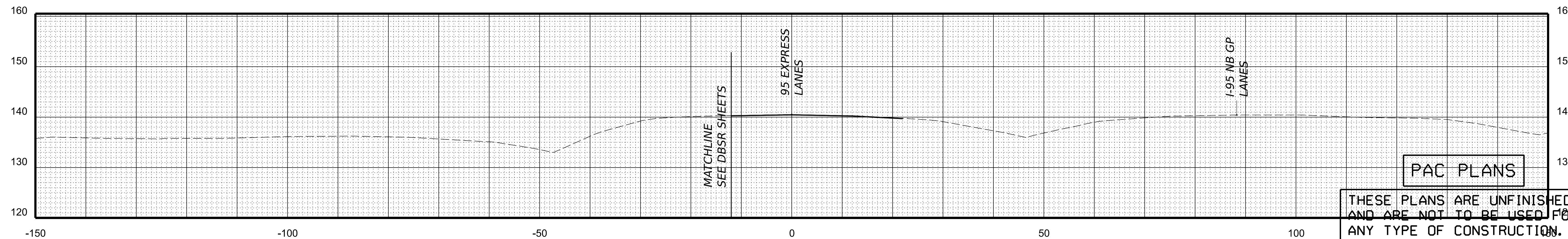
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 669+00.00



STA 668+75.00



STA 668+50.00

PAC PLANS

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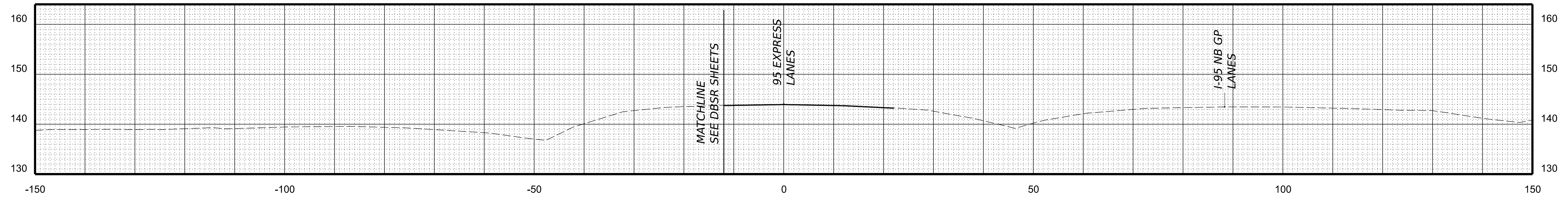
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

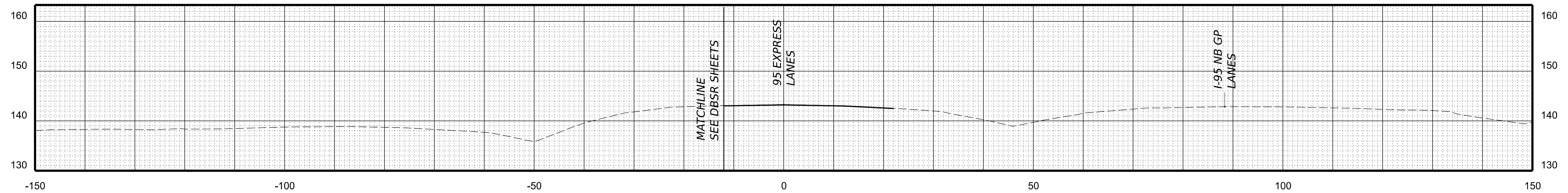
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	III

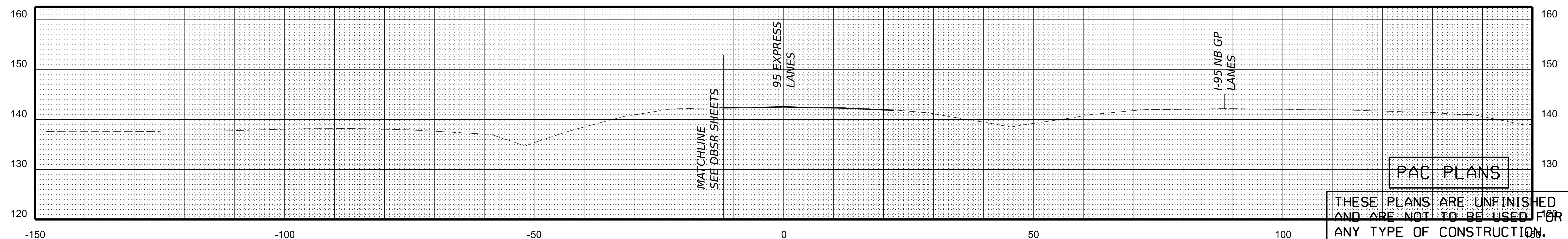
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 669+75.00



STA 669+50.00



STA 669+25.00

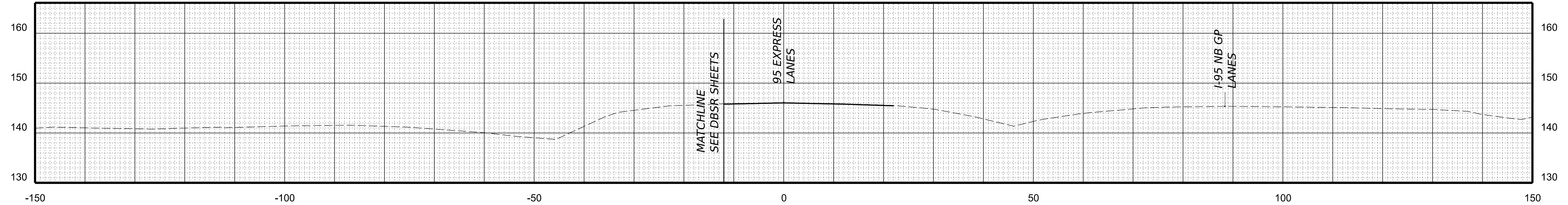
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

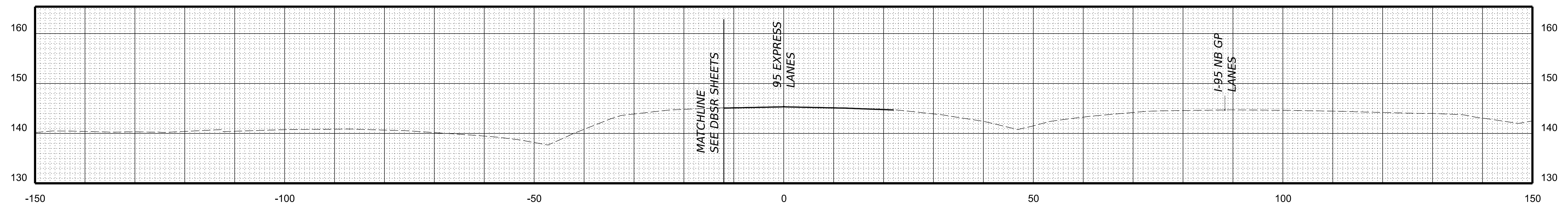
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	112

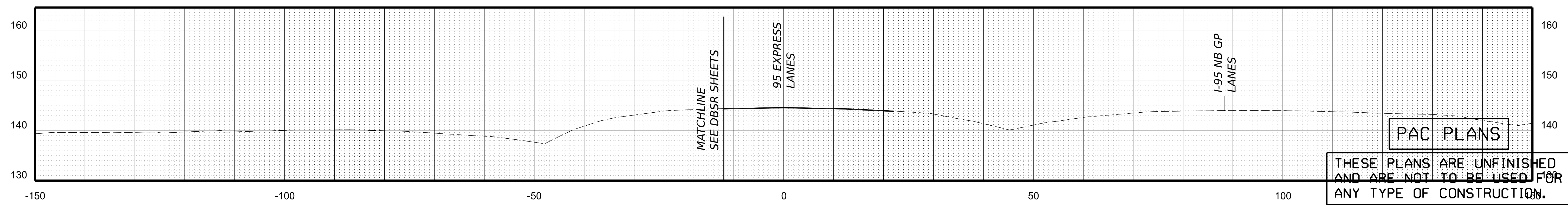
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 670+50.00



STA 670+25.00



STA 670+00.00

PAC PLANS

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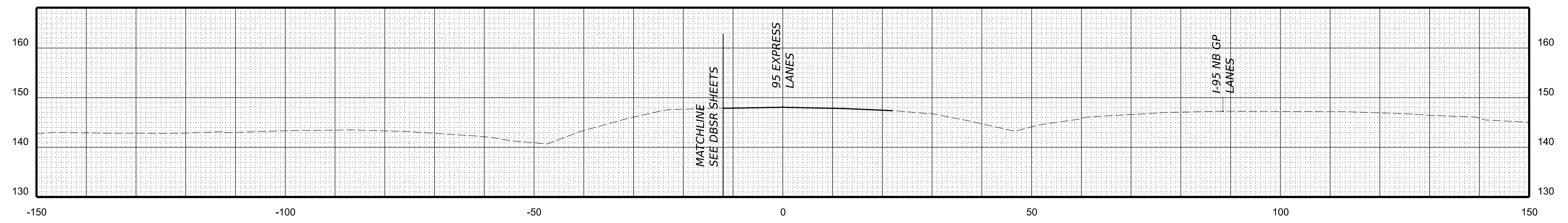
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

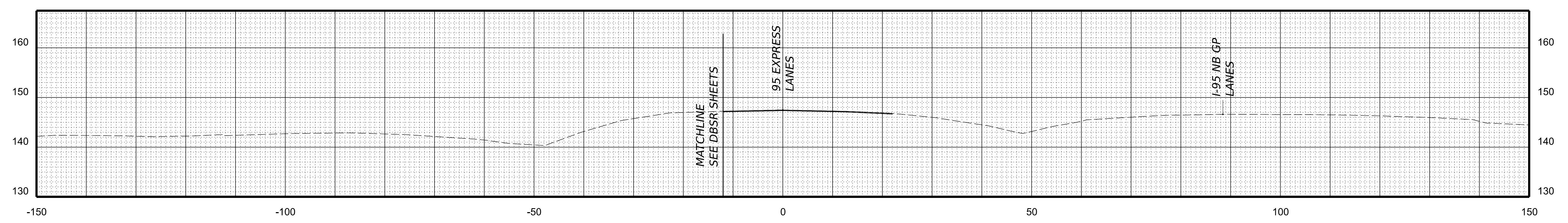
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	113

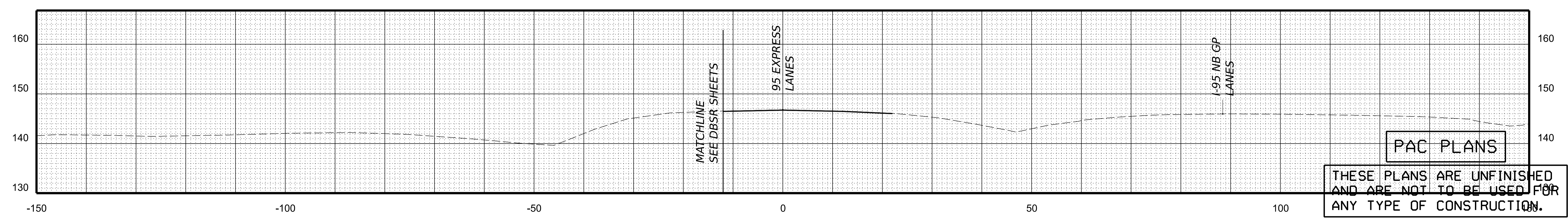
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 671+25.00



STA 671+00.00



STA 670+75.00

PAC PLANS

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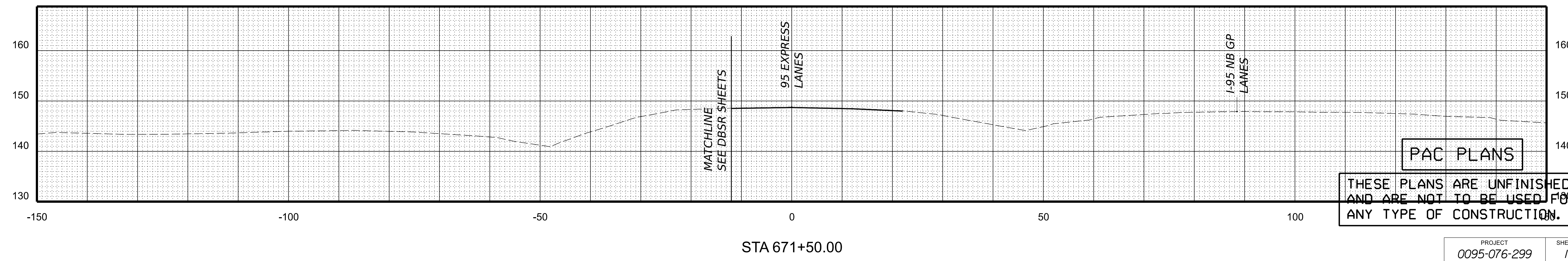
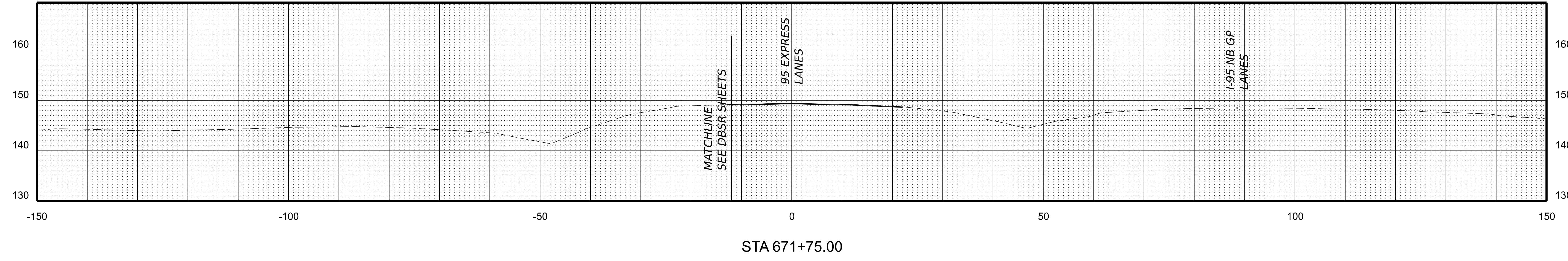
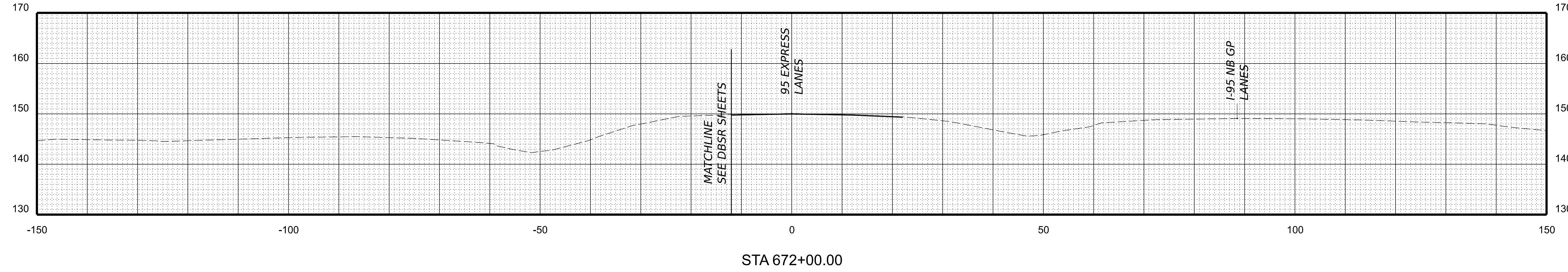
PROJECT MANAGER: *Bhupal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	114

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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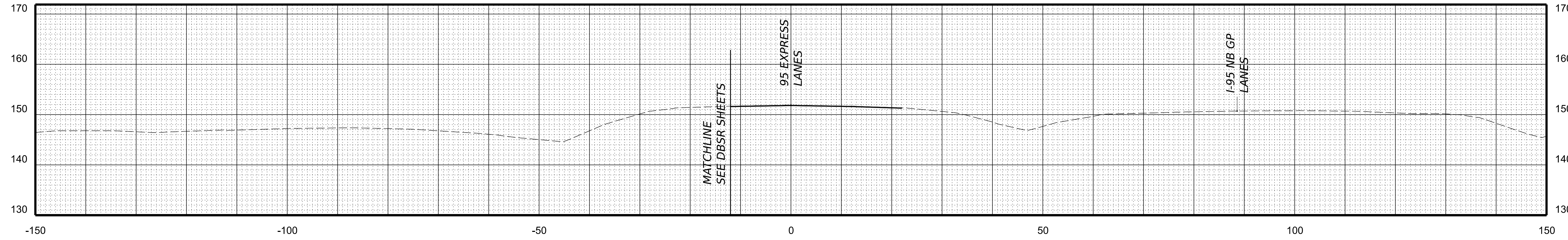
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

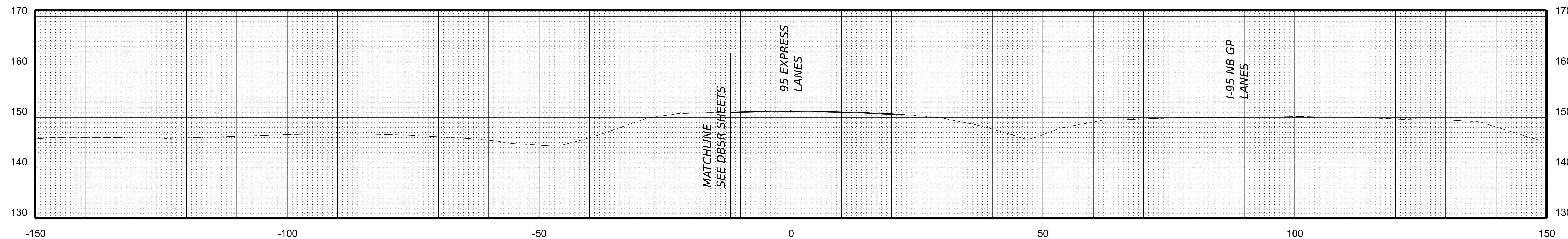
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	115

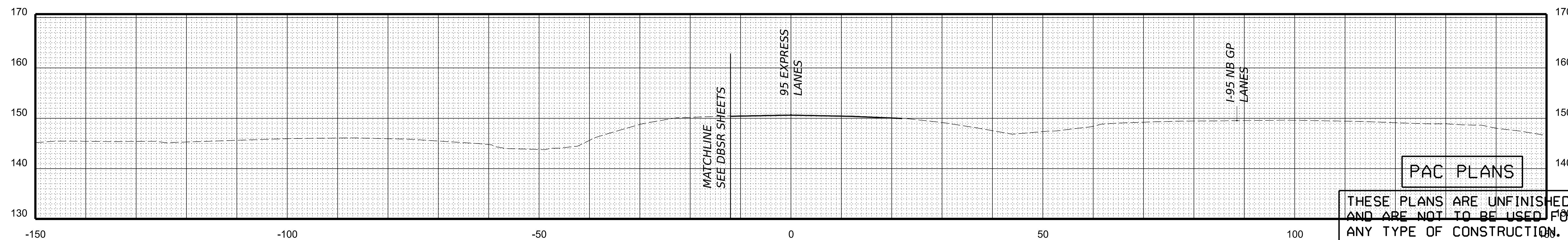
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 672+75.00



STA 672+50.00



STA 672+25.00

PAC PLANS

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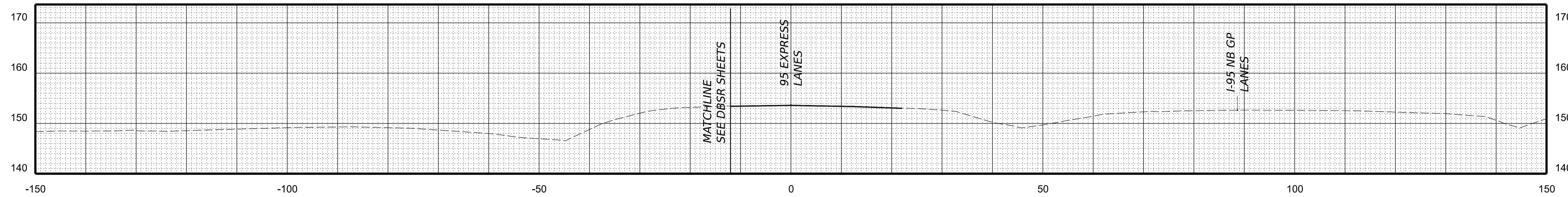
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

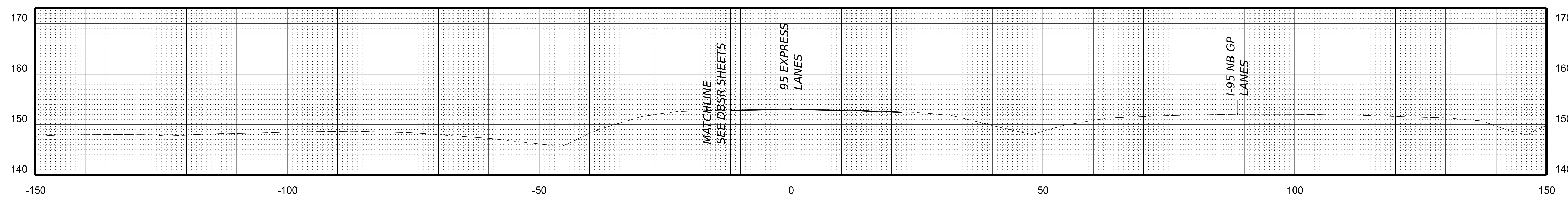
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	116

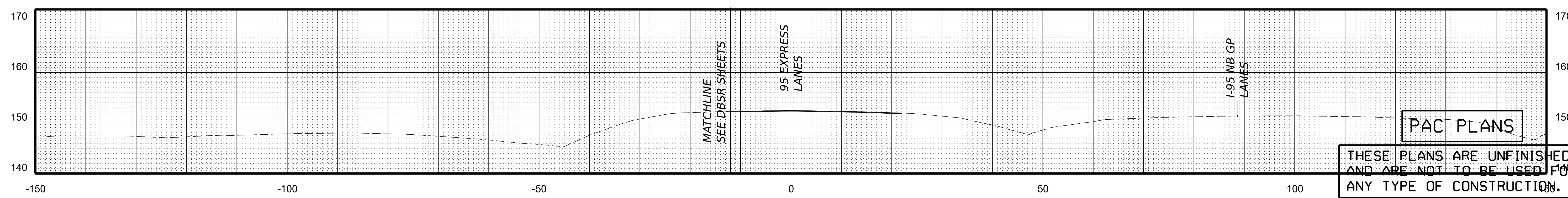
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 673+50.00



STA 673+25.00



STA 673+00.00

PAC PLANS
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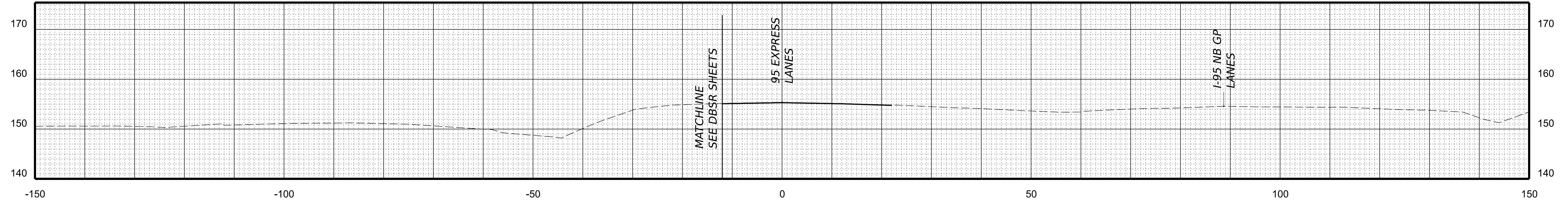
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

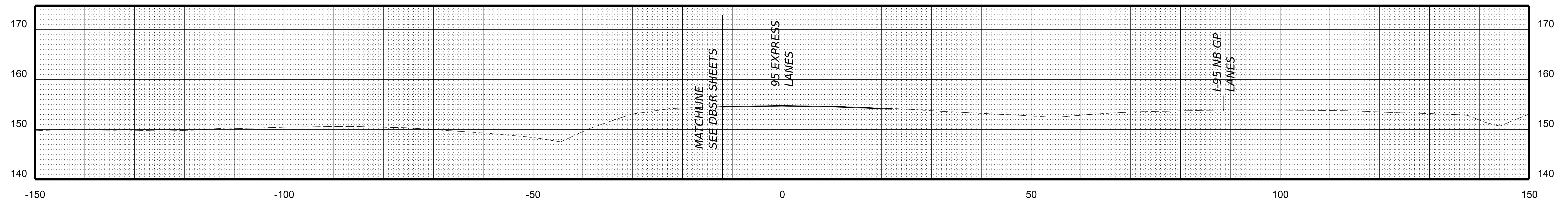
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	117

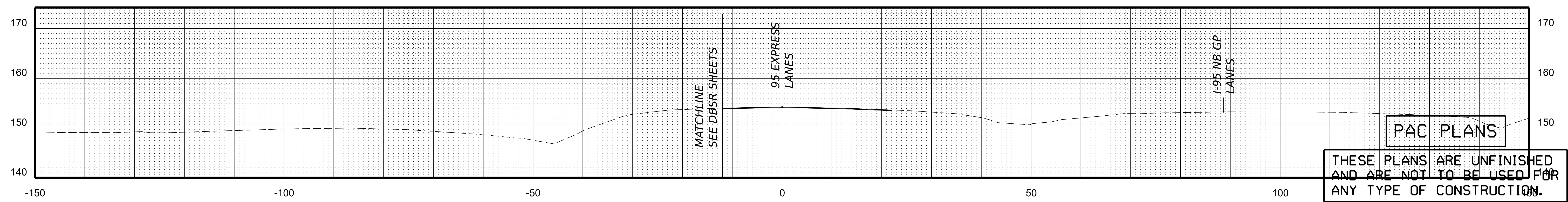
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 674+25.00



STA 674+00.00



STA 673+75.00

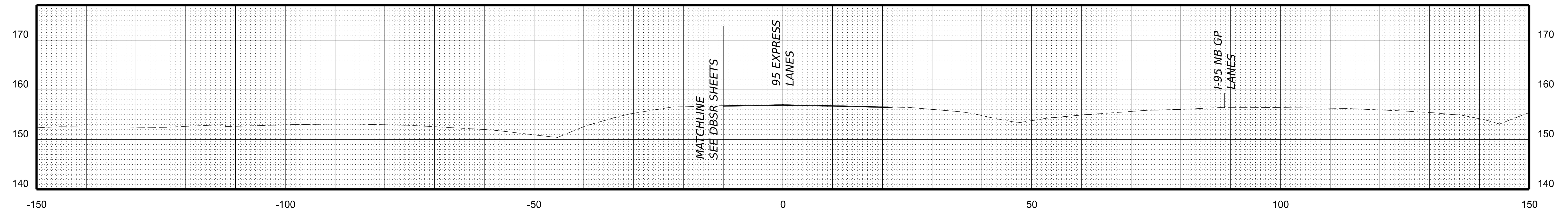
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

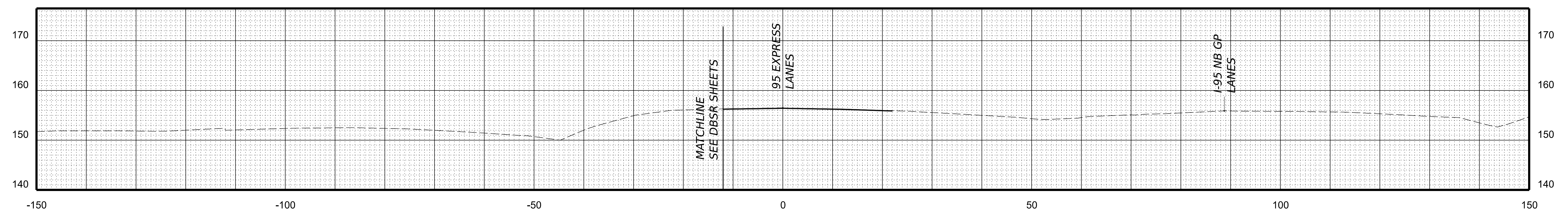
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	118

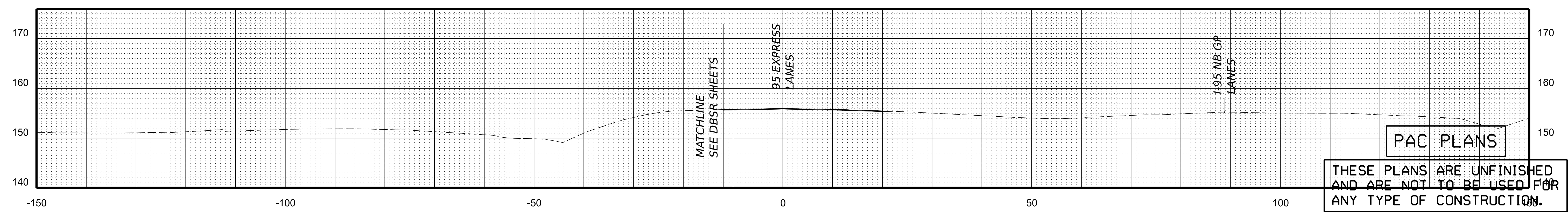
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 675+00.00



STA 674+75.00



STA 674+50.00

PAC PLANS
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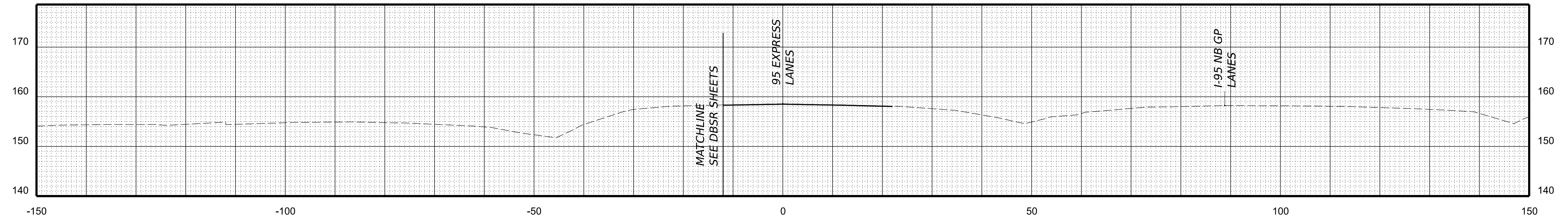
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

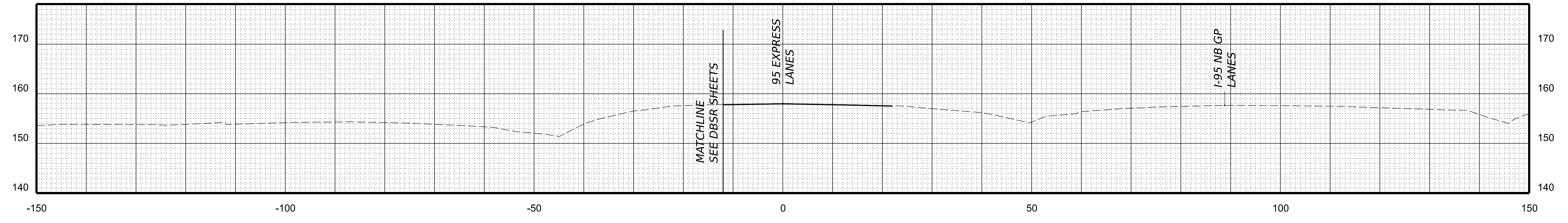
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	119

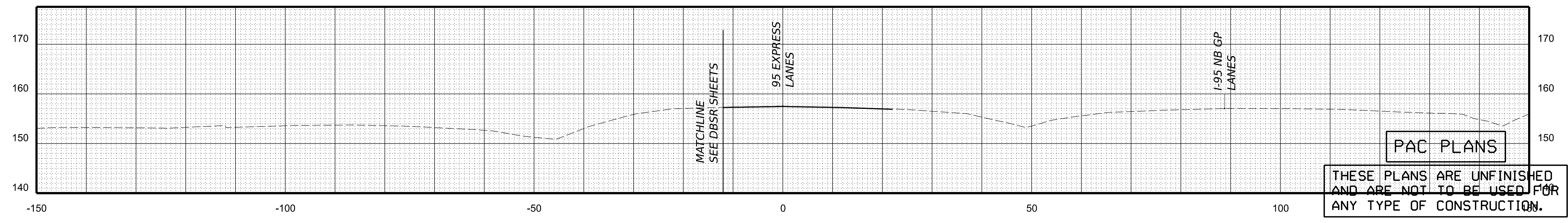
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 675+75.00



STA 675+50.00



STA 675+25.00

PAC PLANS

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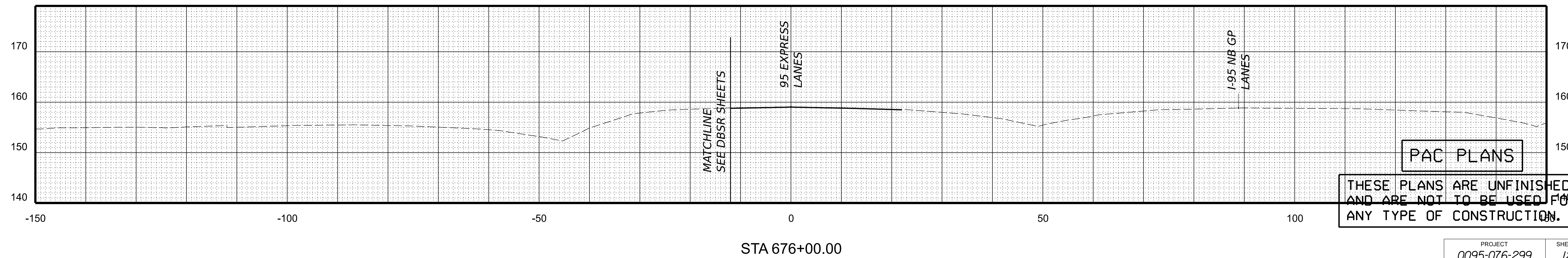
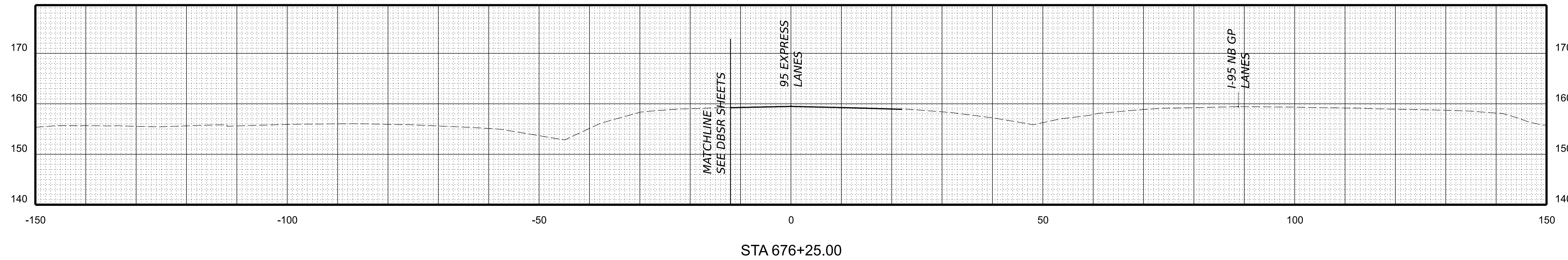
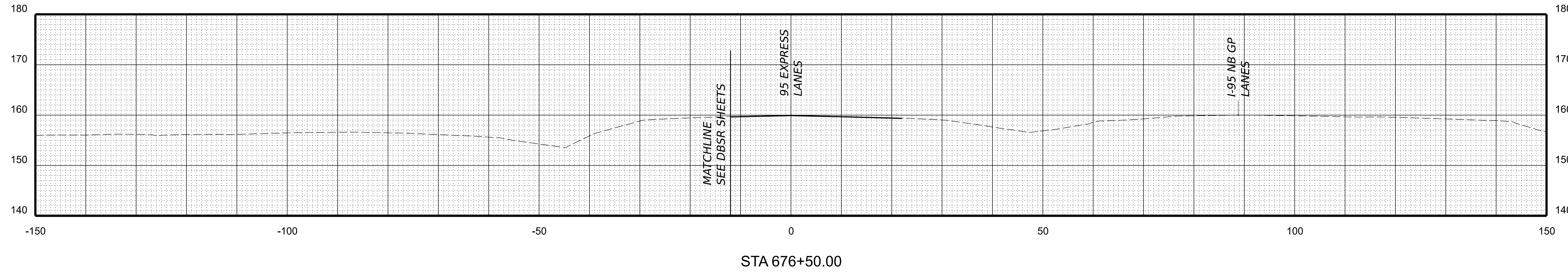
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	120

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

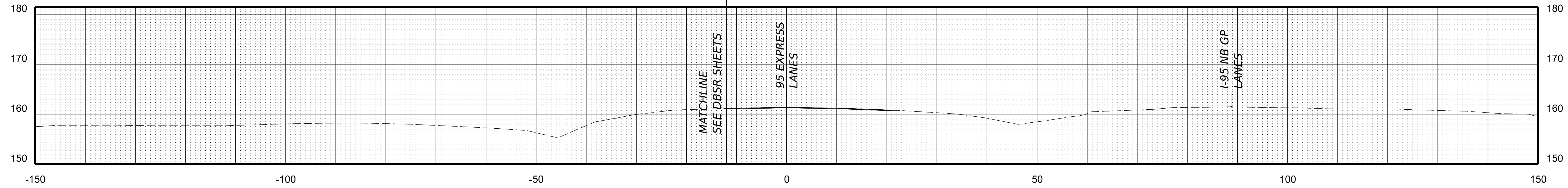
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

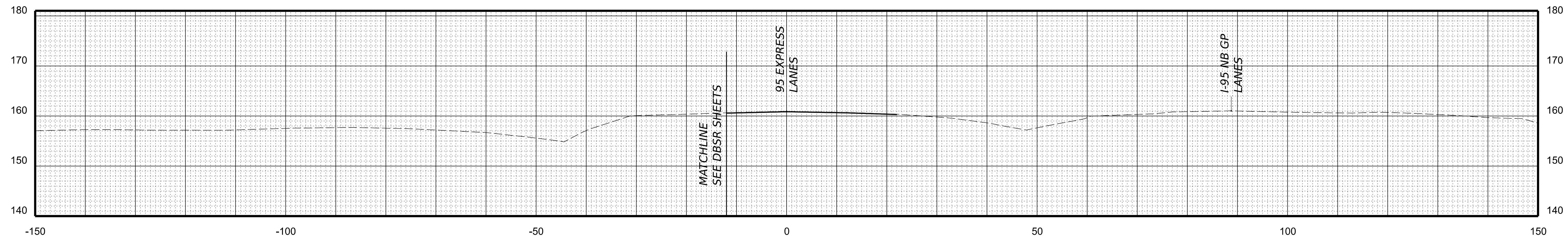
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	121

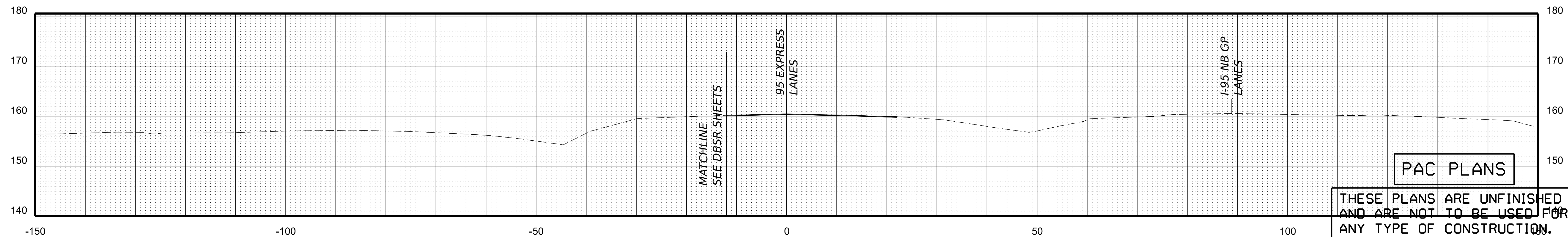
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 677+25.00



STA 677+00.00



STA 676+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

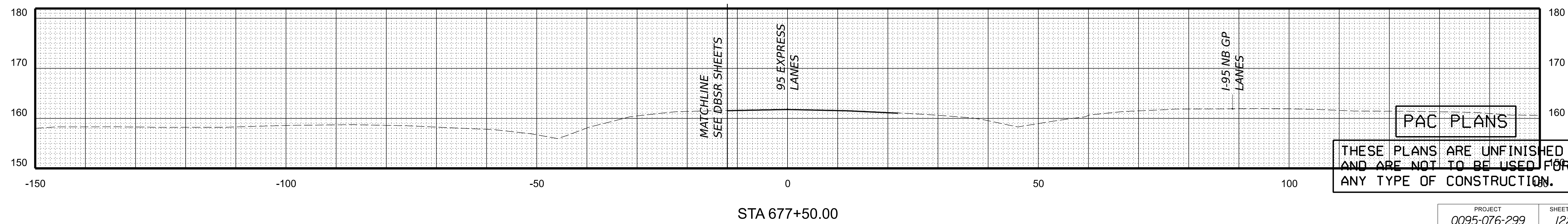
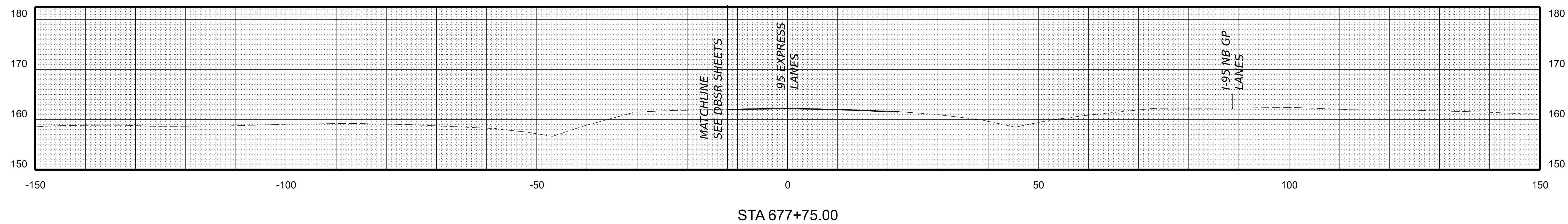
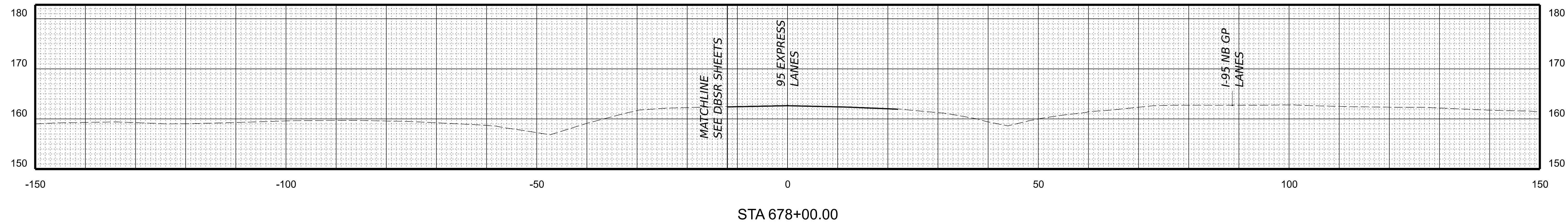
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INQA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	122

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PAC PLANS
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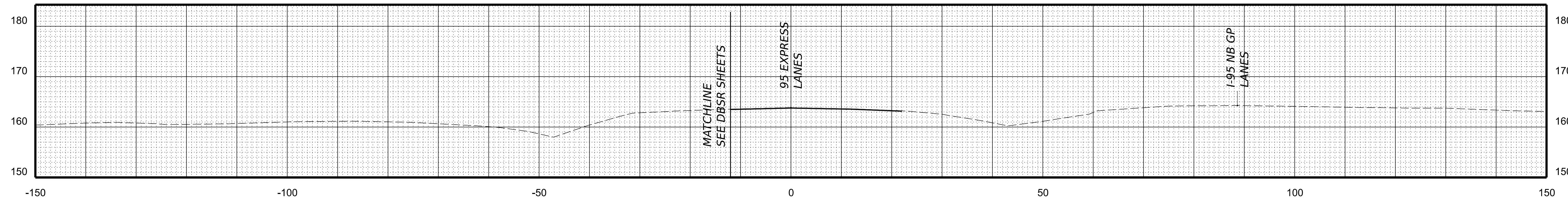
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

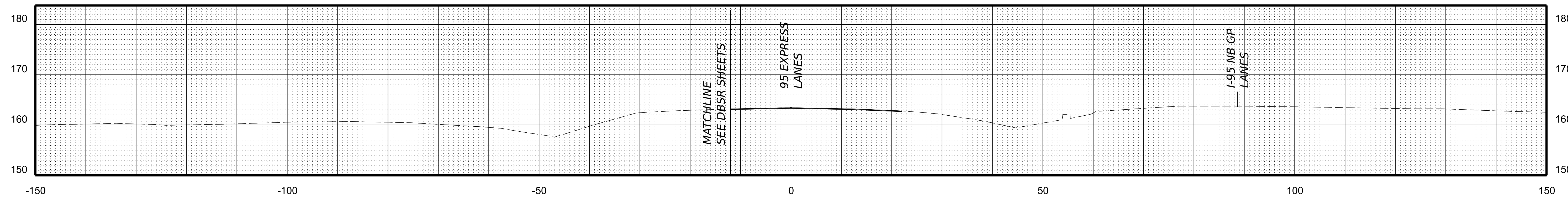
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	123

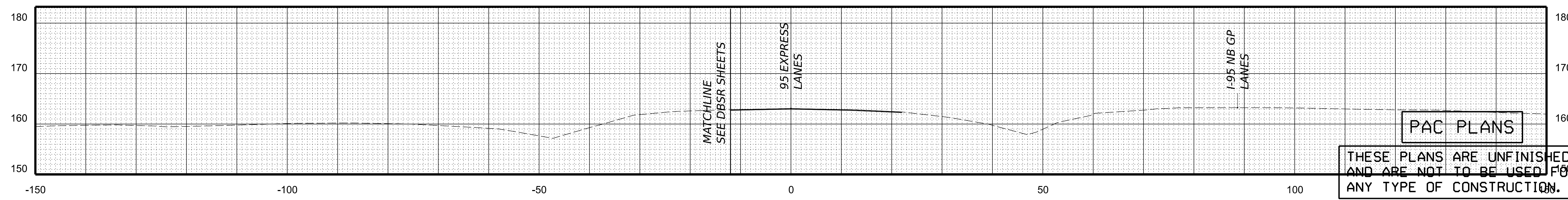
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 678+75.00



STA 678+50.00



STA 678+25.00

PAC PLANS

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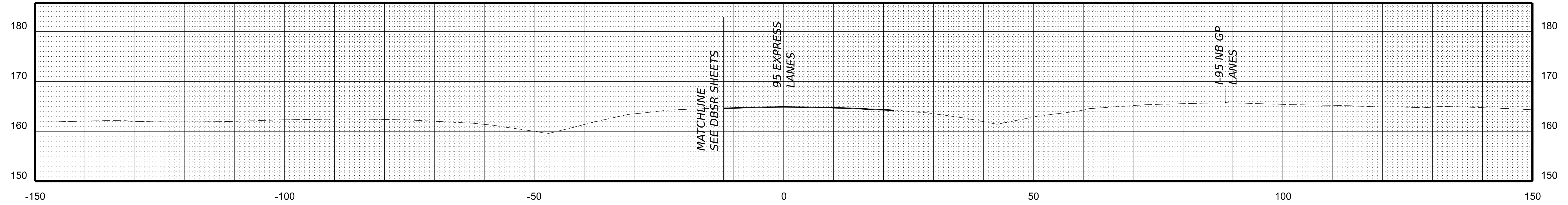
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

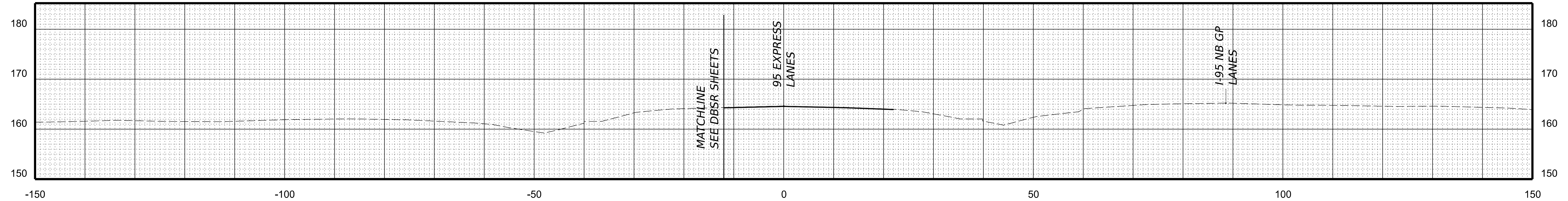
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	124

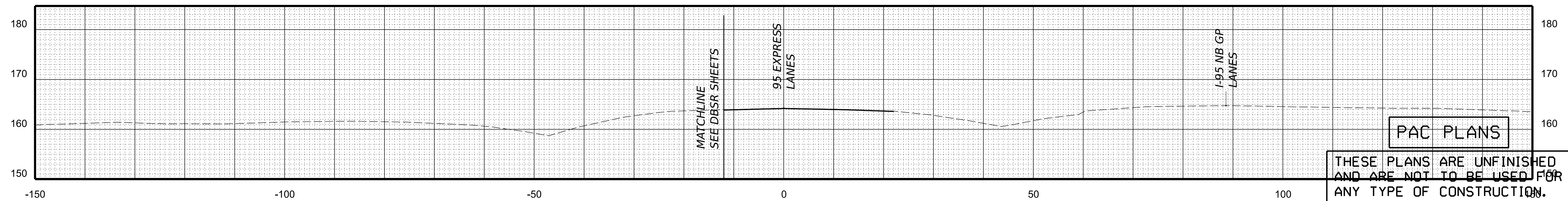
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 679+50.00



STA 679+25.00



STA 679+00.00

PAC PLANS

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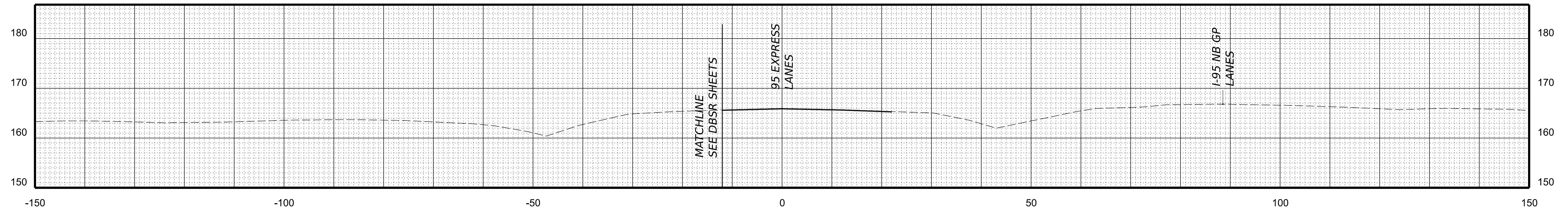
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

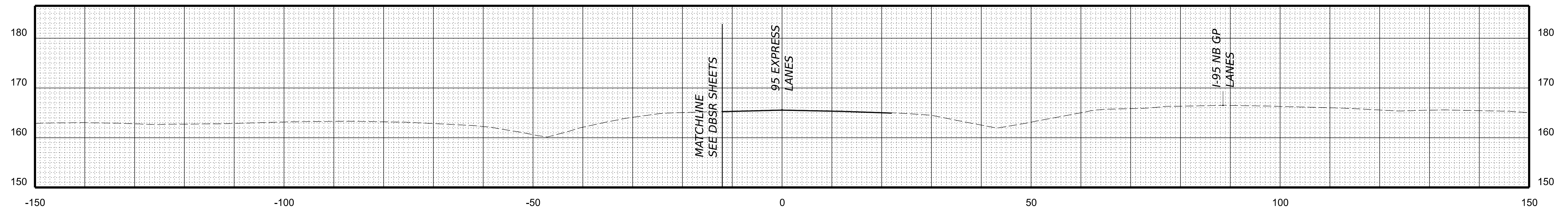
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	125

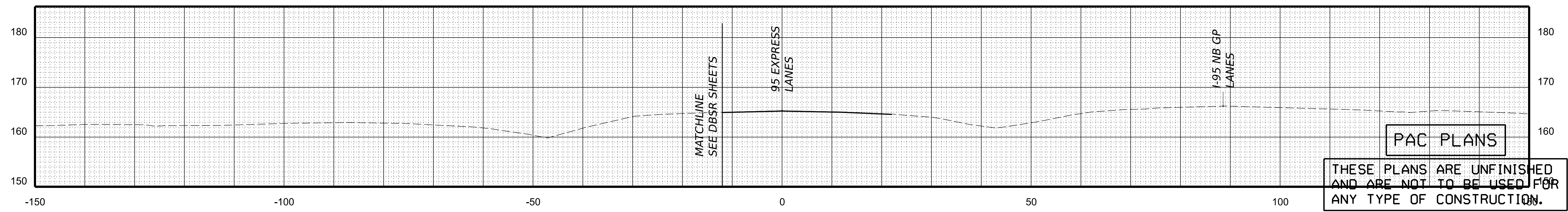
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 680+25.00



STA 680+00.00



STA 679+75.00

PAC PLANS

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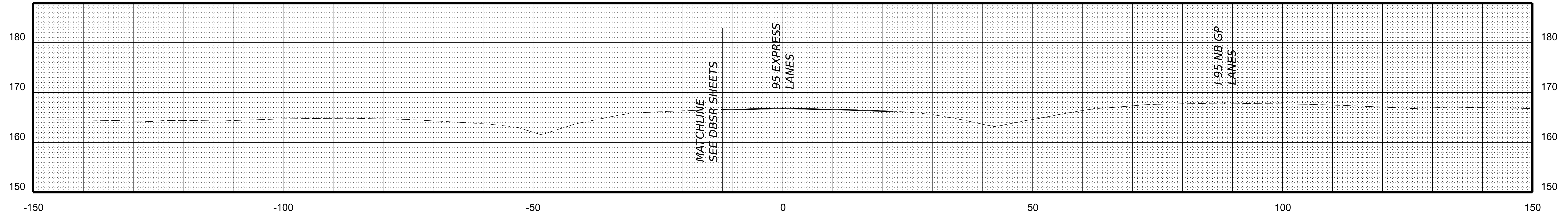
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

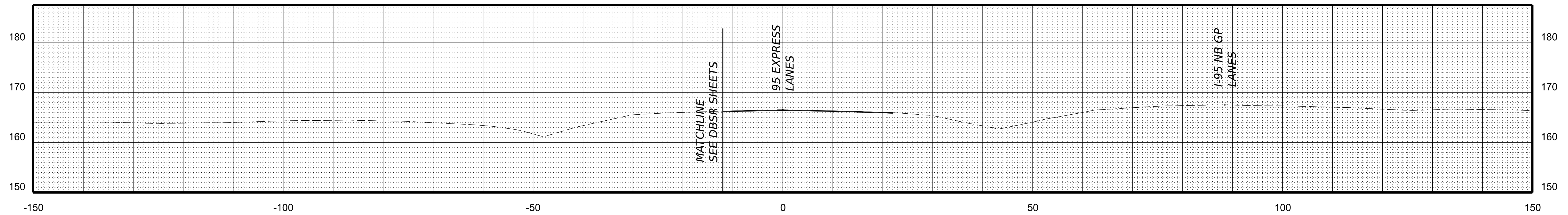
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	126

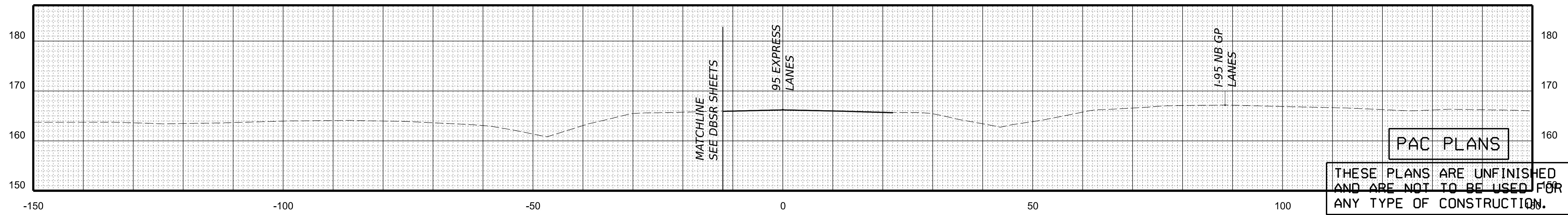
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 681+00.00



STA 680+75.00



STA 680+50.00

PAC PLANS

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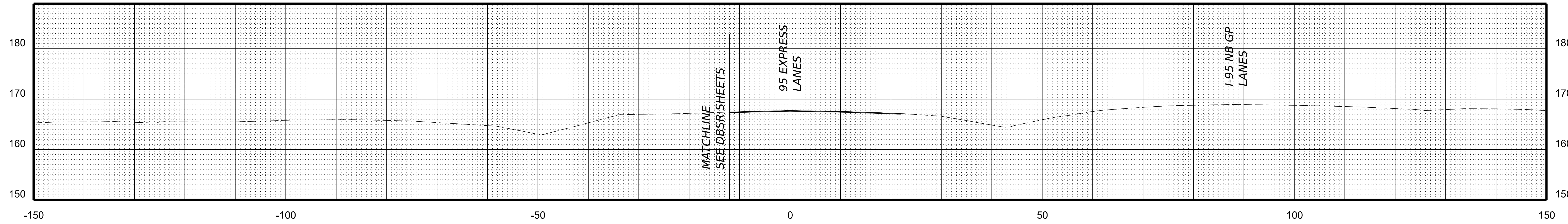
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

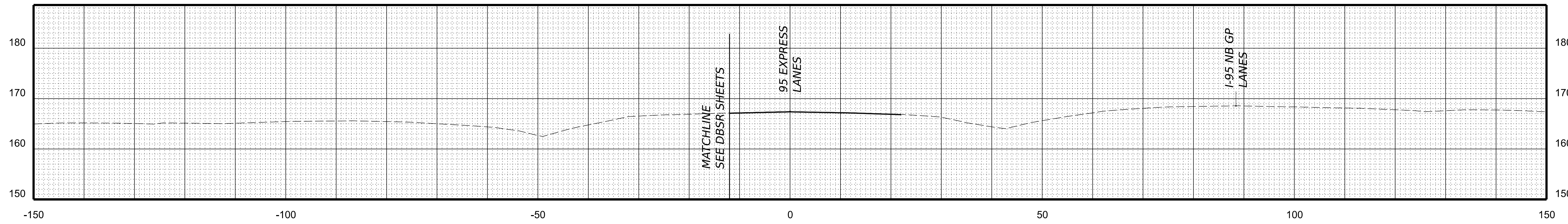
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	127

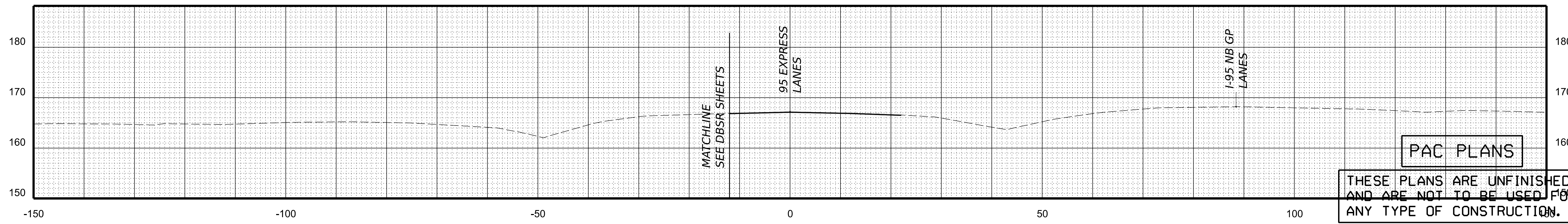
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 681+75.00



STA 681+50.00



STA 681+25.00

PAC PLANS

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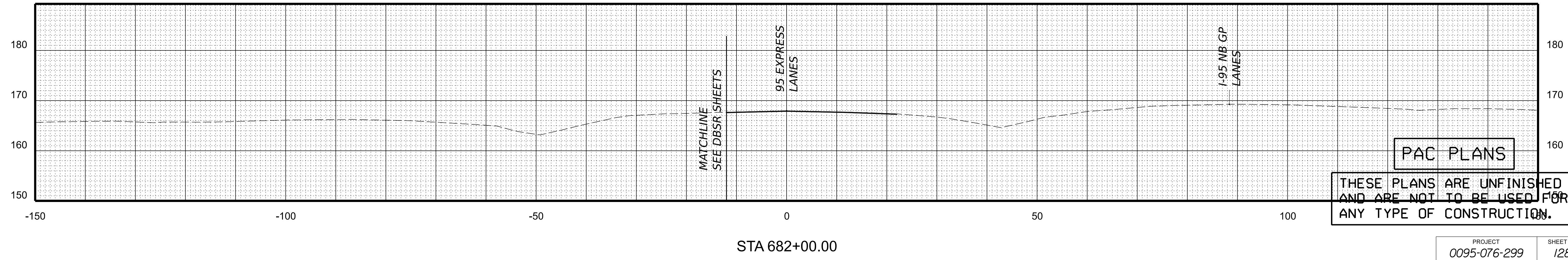
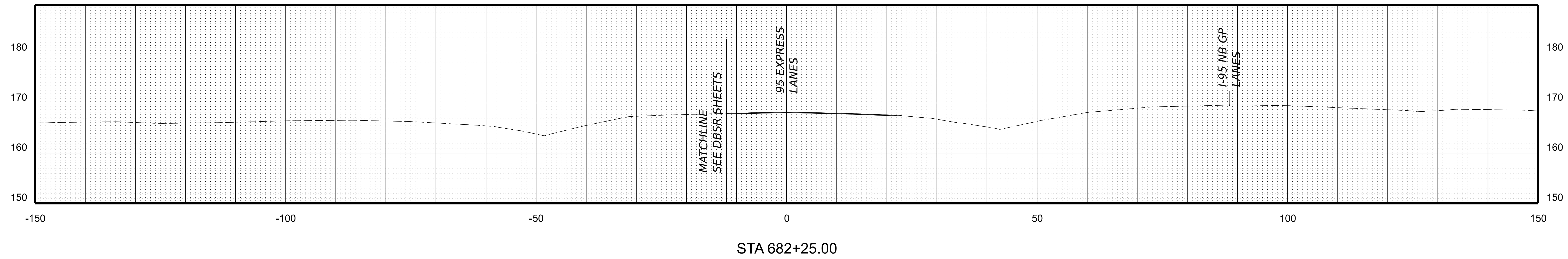
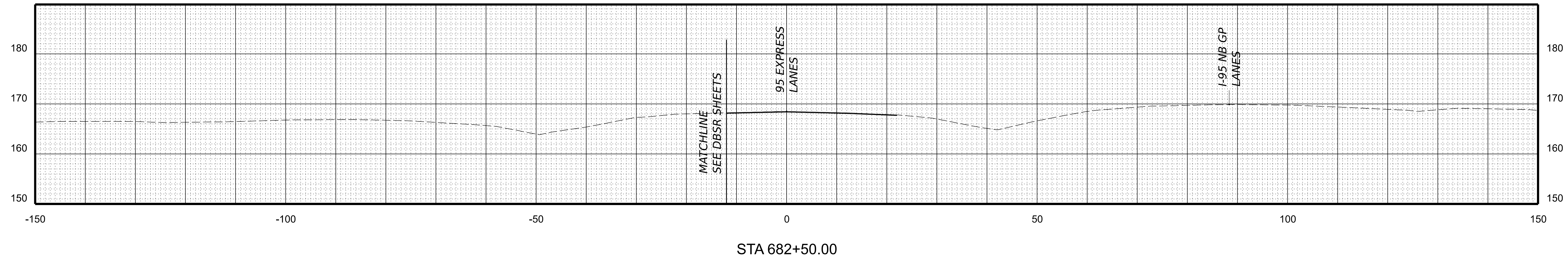
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	128

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PAC PLANS

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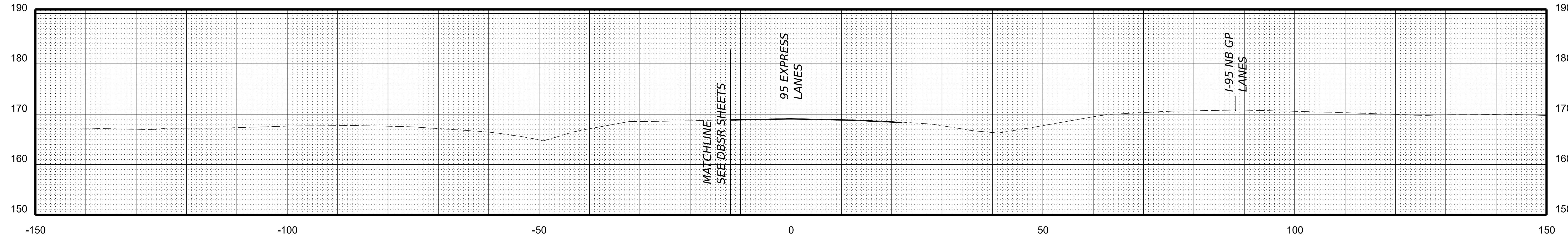
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

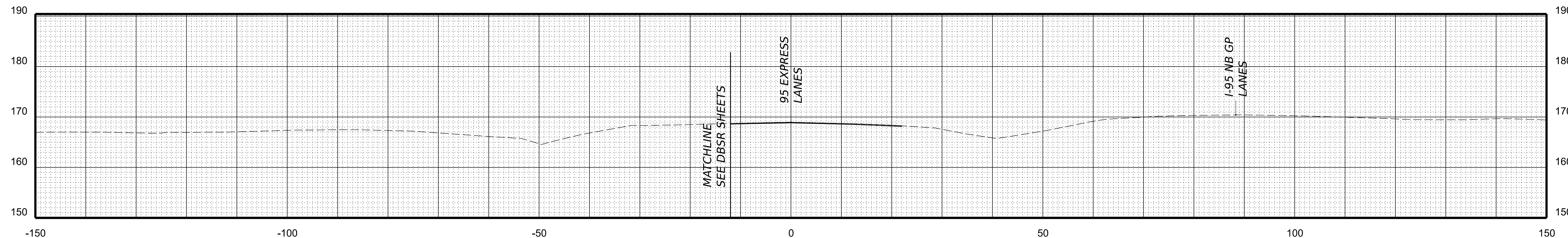
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	129

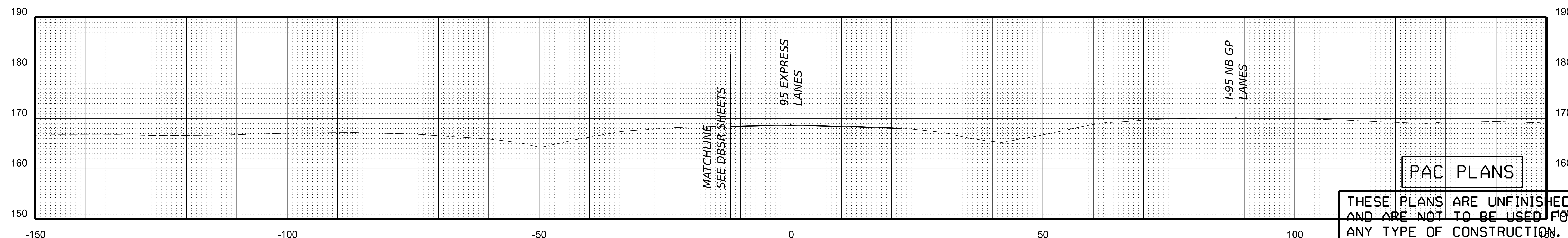
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 683+25.00



STA 683+00.00



STA 682+75.00

PAC PLANS

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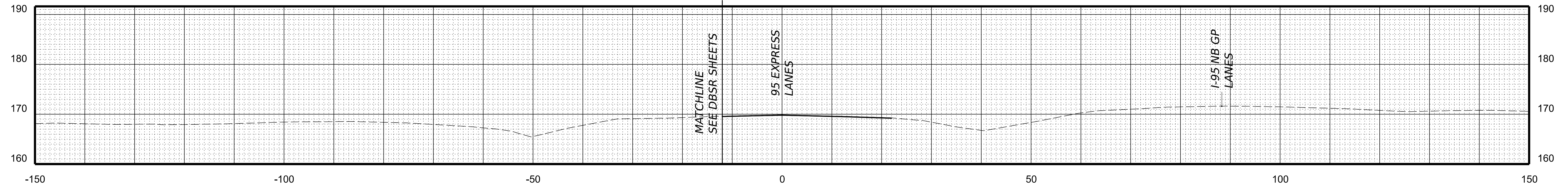
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

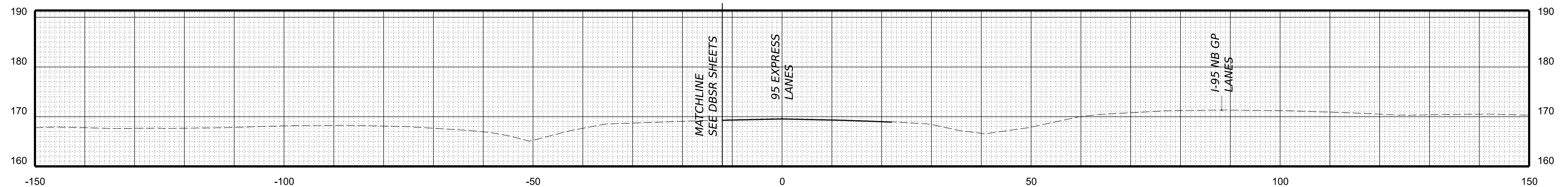
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	130

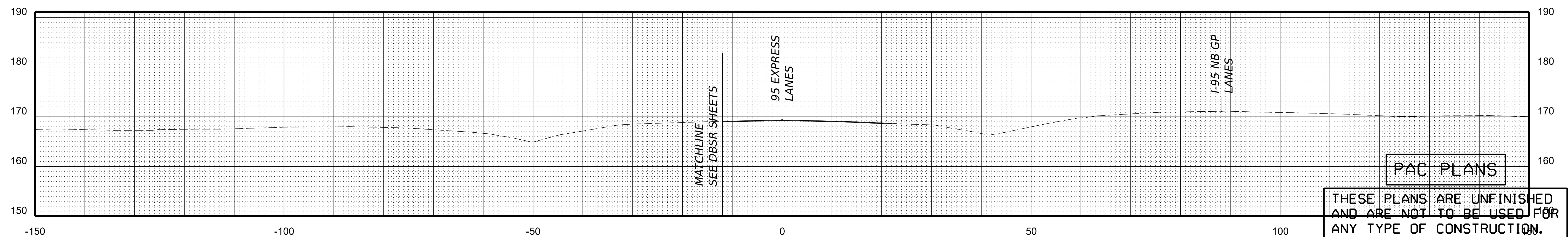
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 684+00.00



STA 683+75.00



STA 683+50.00

PAC PLANS

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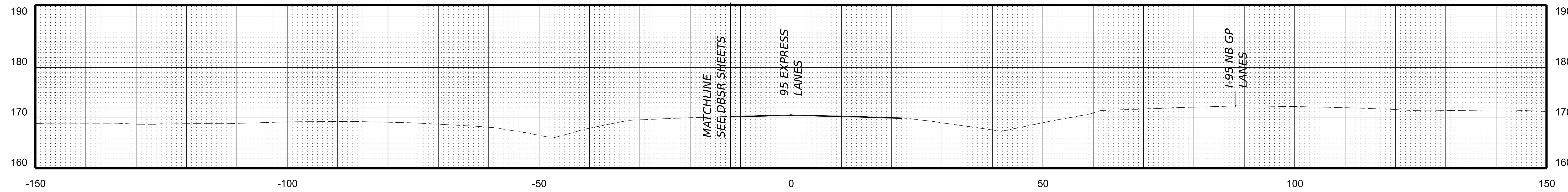
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

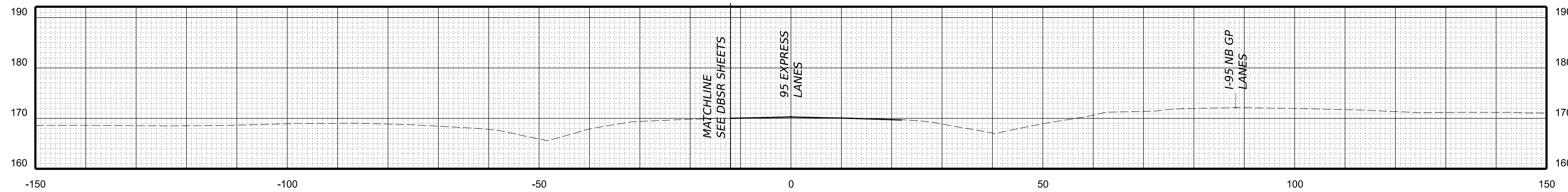
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	131

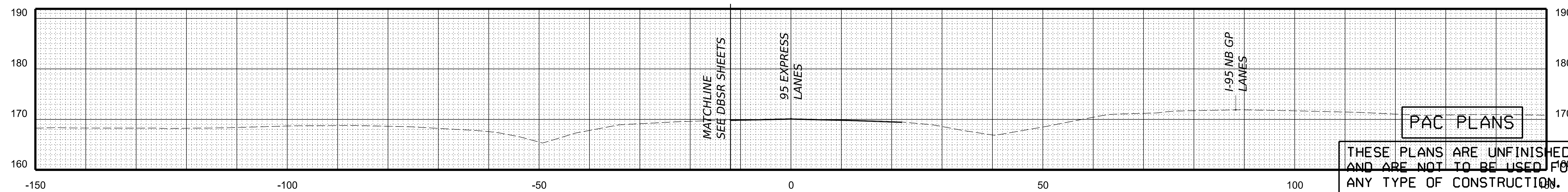
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 684+75.00



STA 684+50.00



STA 684+25.00

PAC PLANS

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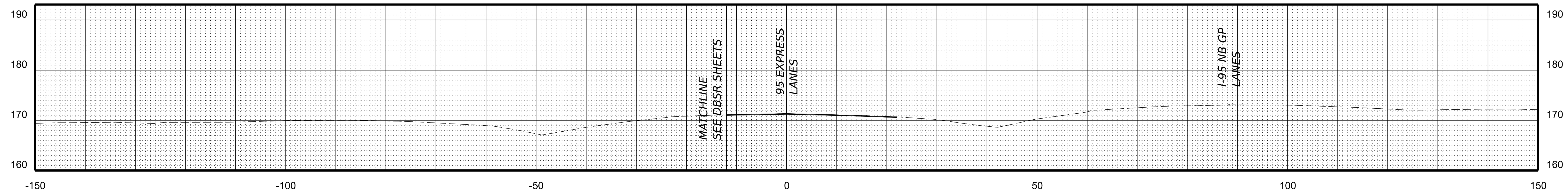
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INQA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

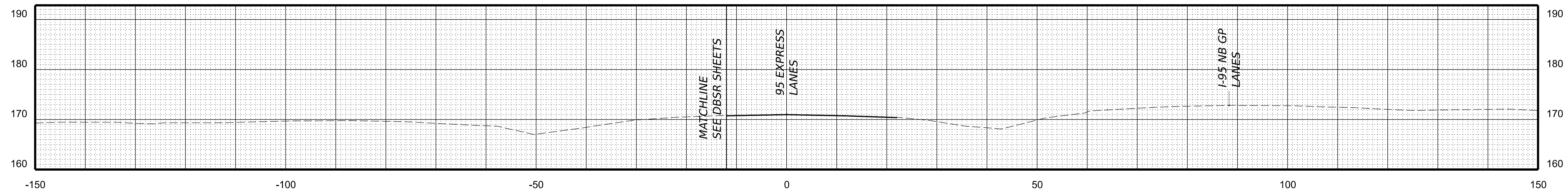
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	132

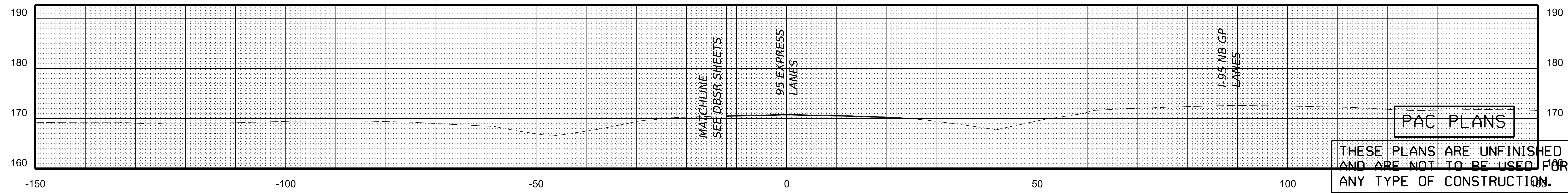
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 685+50.00



STA 685+25.00



STA 685+00.00

PAC PLANS

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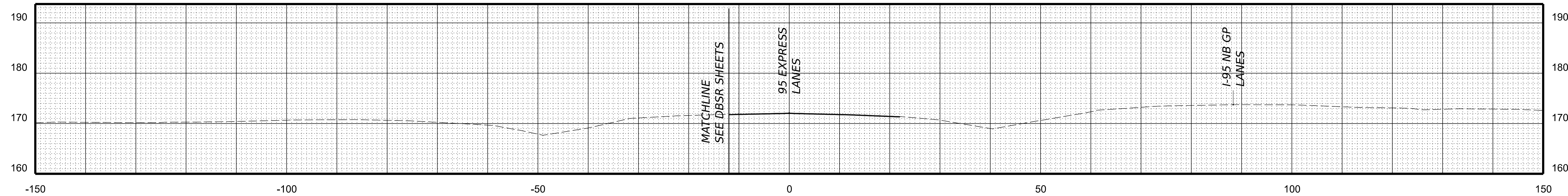
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

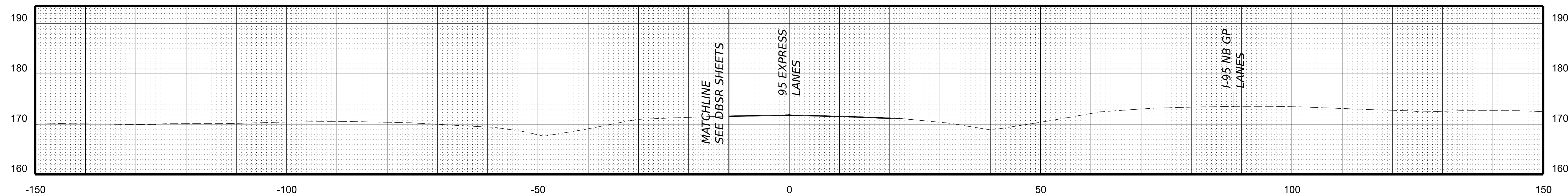
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	133

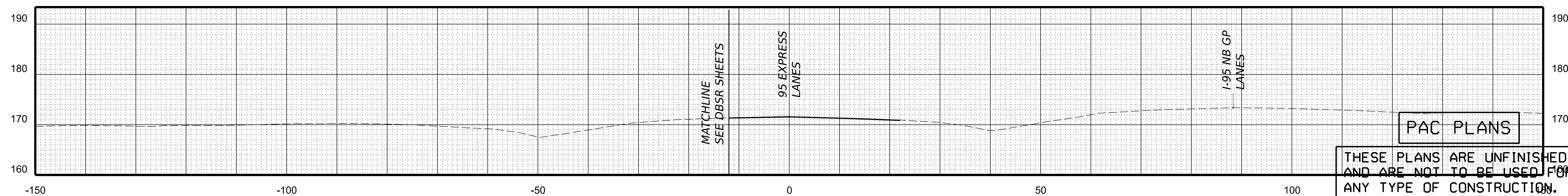
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 686+25.00



STA 686+00.00



STA 685+75.00

PAC PLANS

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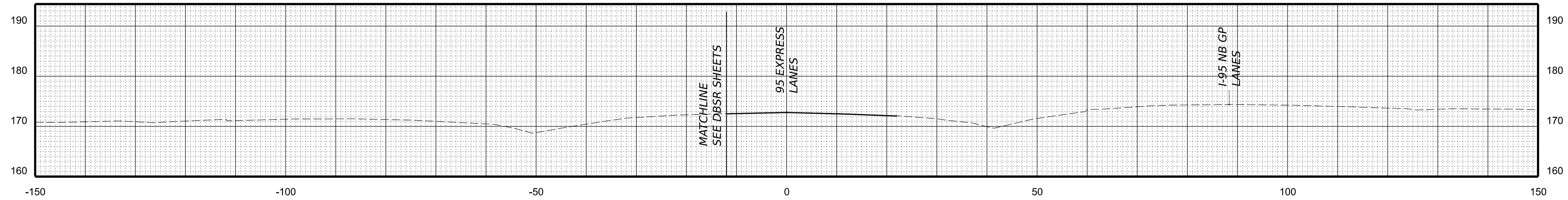
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

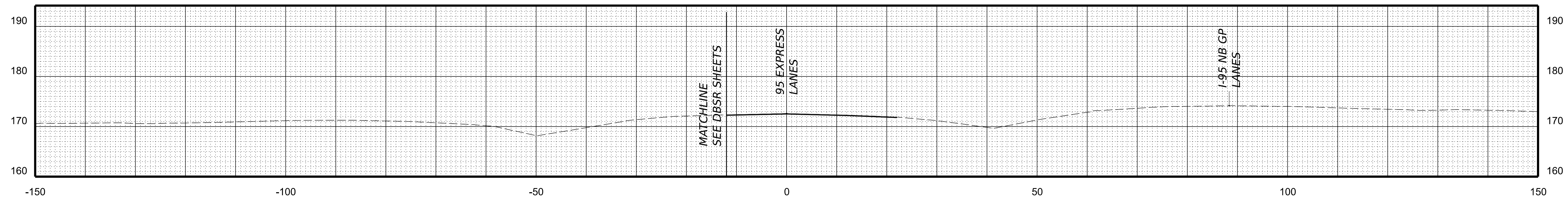
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	134

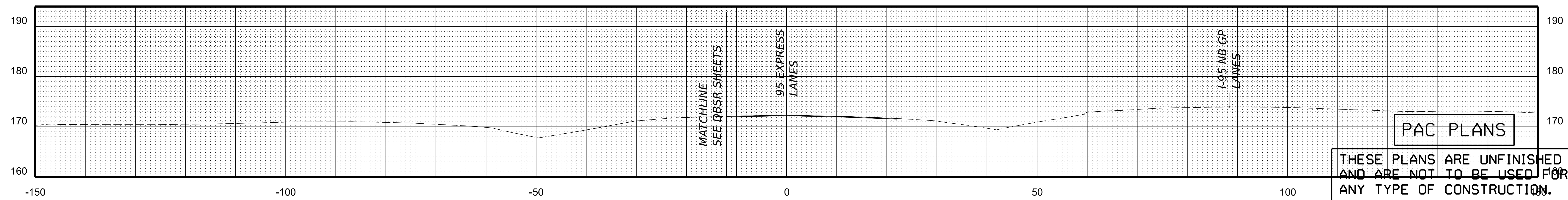
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 687+00.00



STA 686+75.00



STA 686+50.00

PAC PLANS

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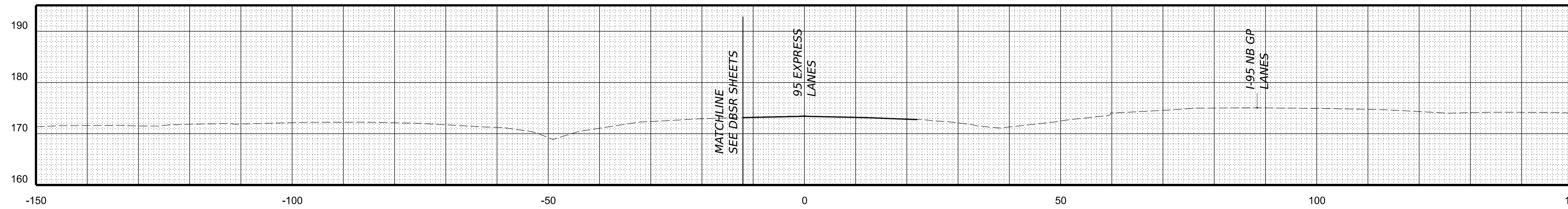
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
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SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

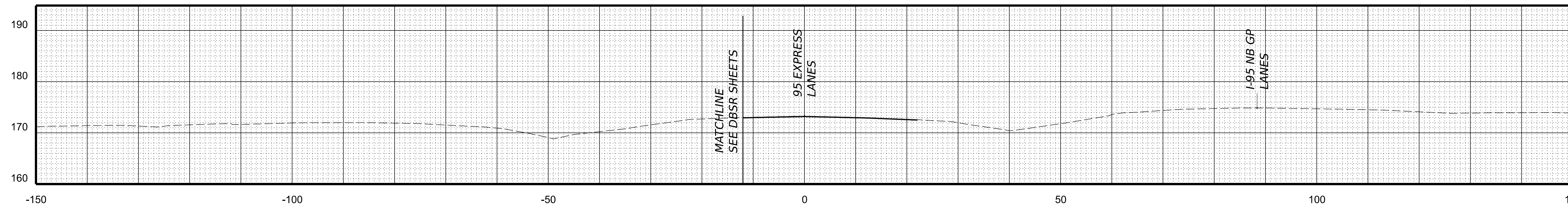
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	135

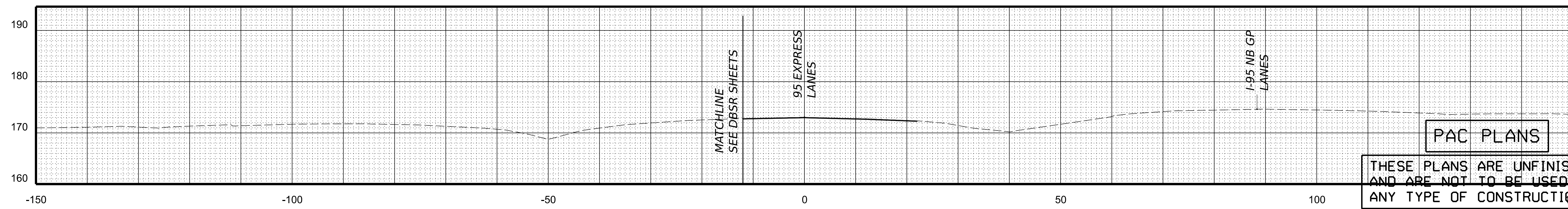
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 687+75.00



STA 687+50.00



STA 687+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

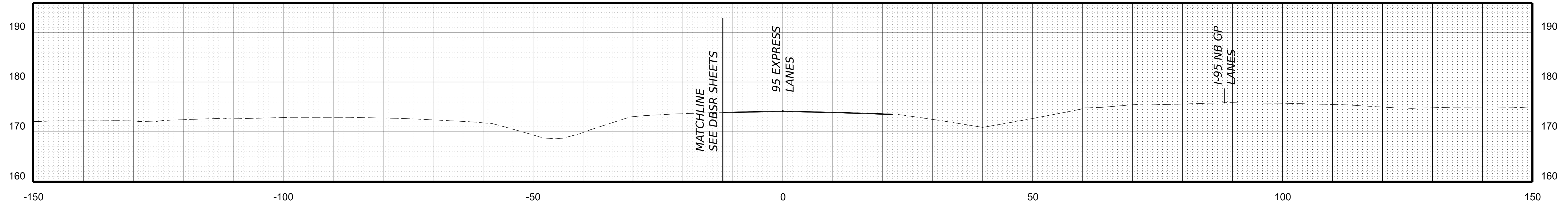
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

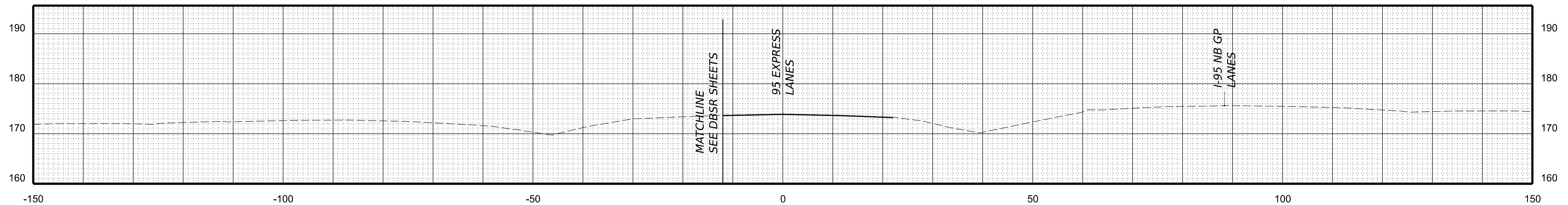
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	136

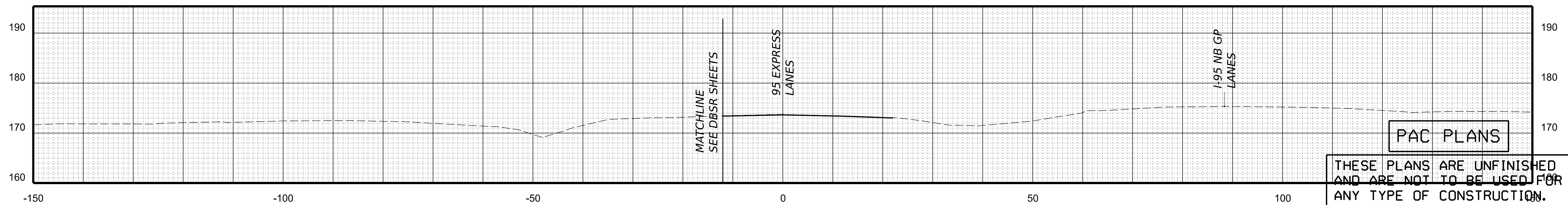
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 688+50.00



STA 688+25.00



STA 688+00.00

PAC PLANS
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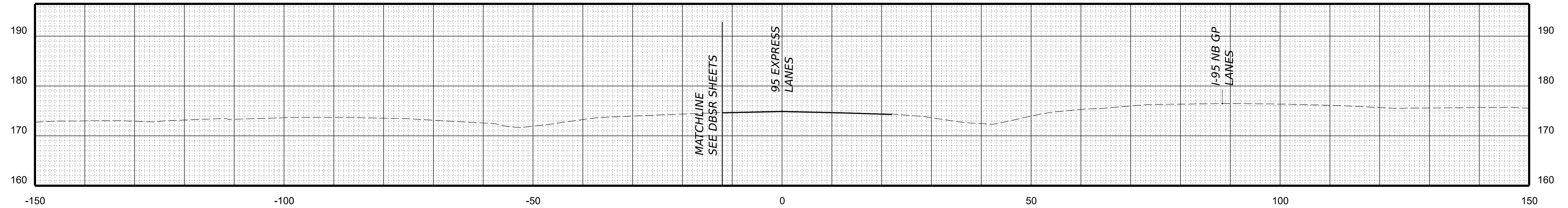
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

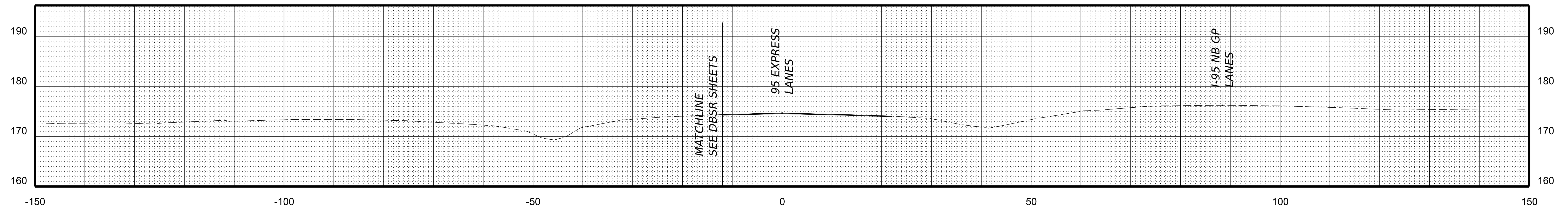
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	137

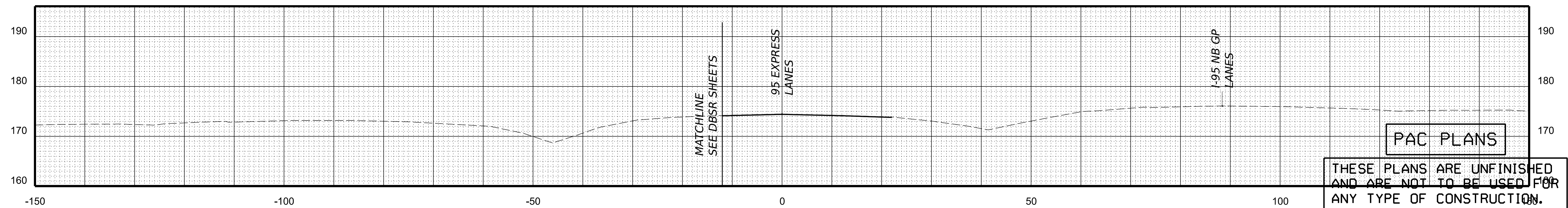
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 689+25.00



STA 689+00.00



STA 688+75.00

PAC PLANS

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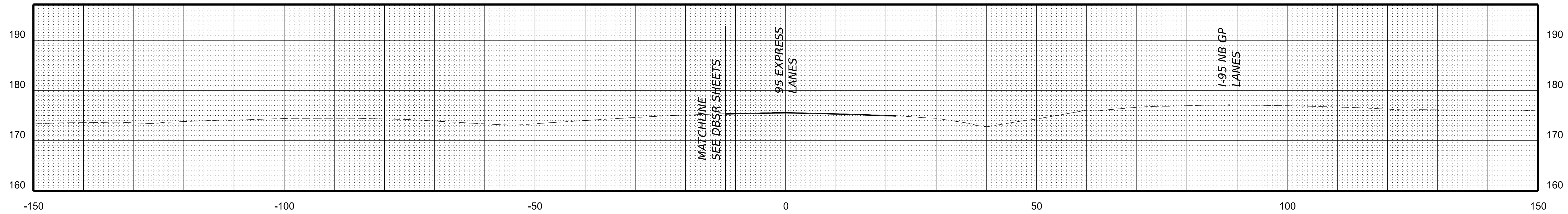
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

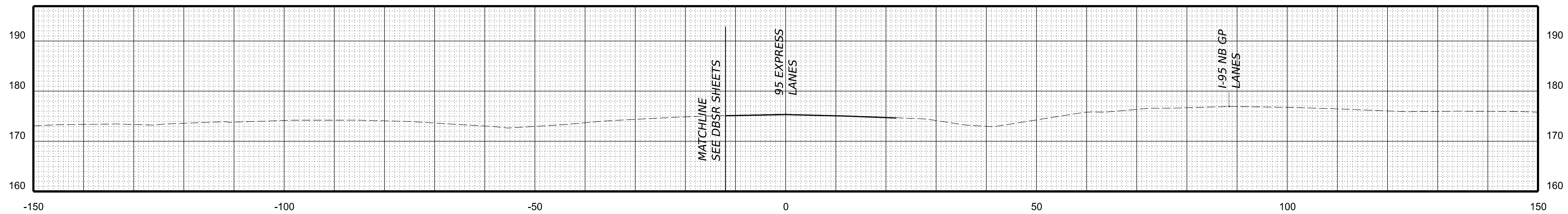
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	138

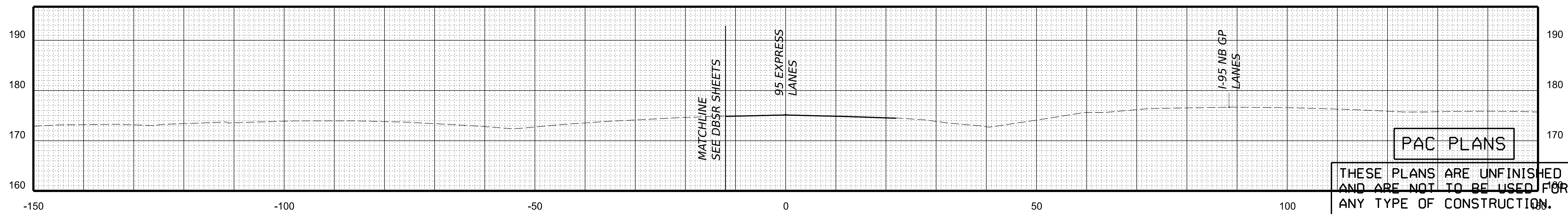
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 690+00.00



STA 689+75.00



STA 689+50.00

PAC PLANS

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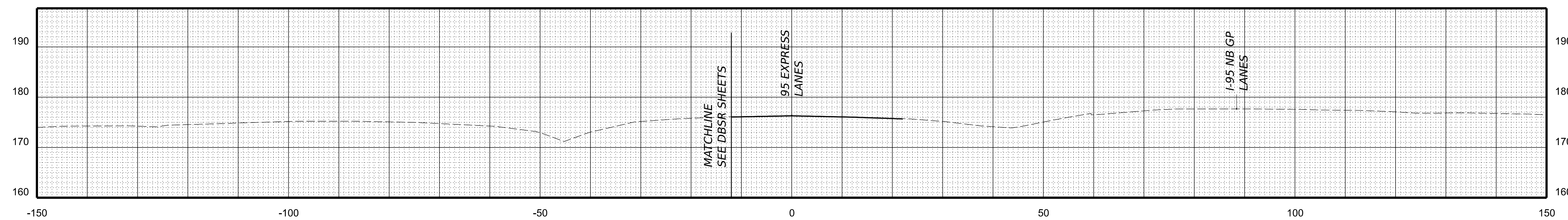
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

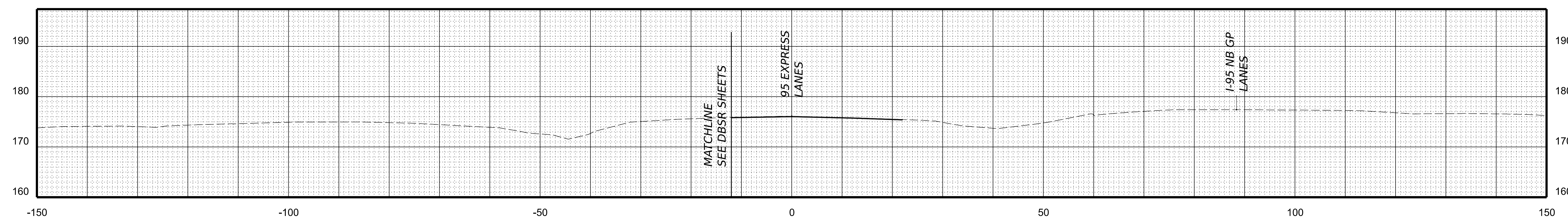
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	139

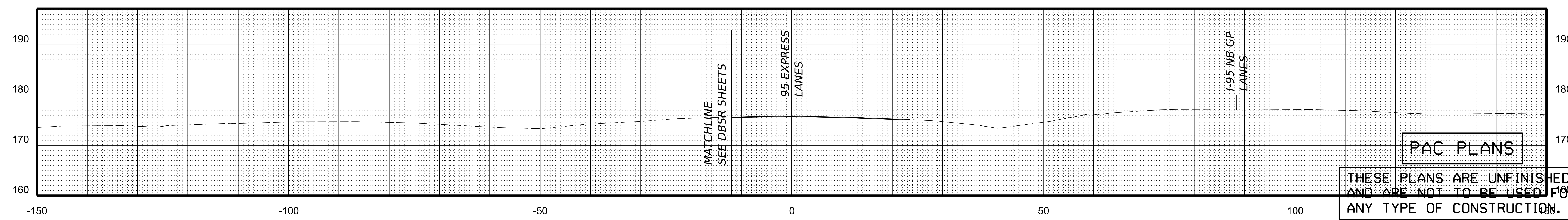
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 690+75.00



STA 690+50.00



STA 690+25.00

PAC PLANS
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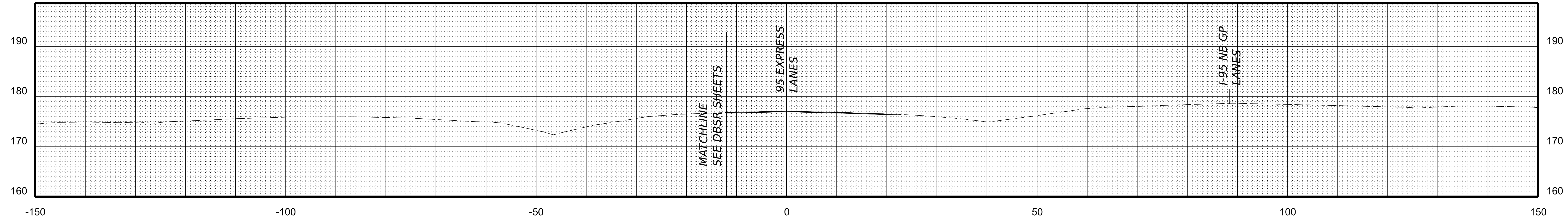
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

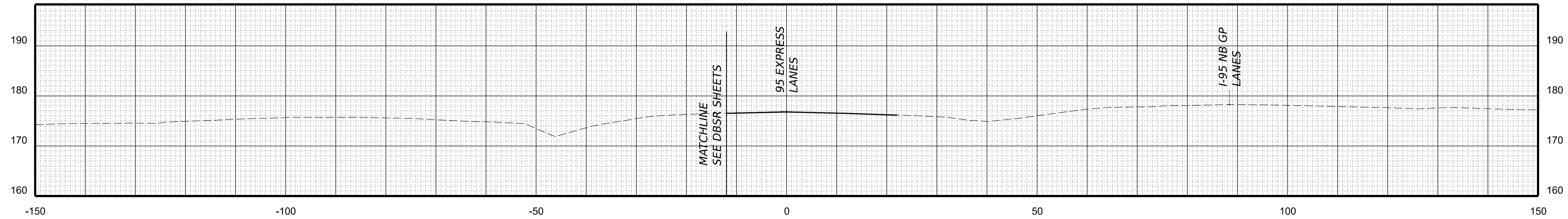
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	140

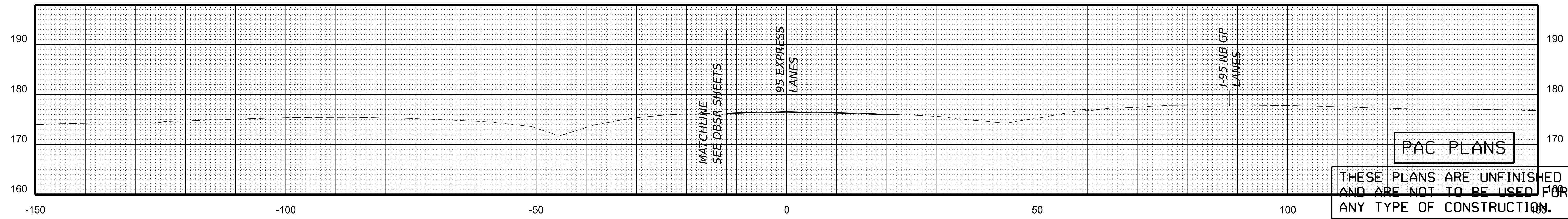
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 691+50.00



STA 691+25.00



STA 691+00.00

PAC PLANS

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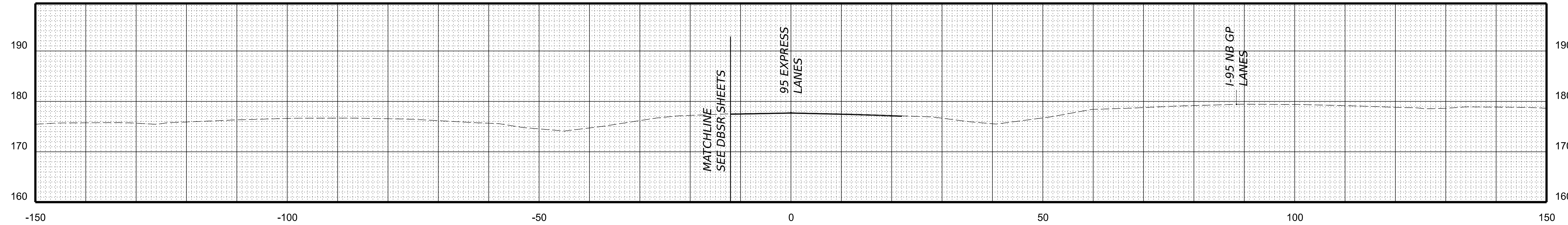
PROJECT MANAGER: *Bhupal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

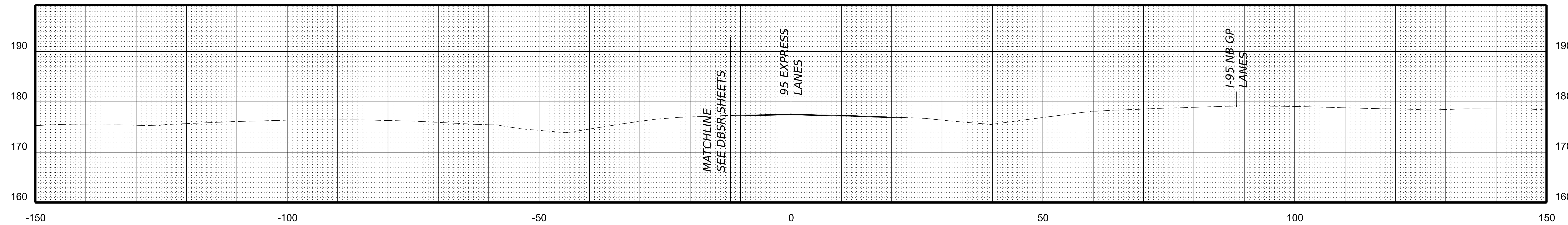
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	141

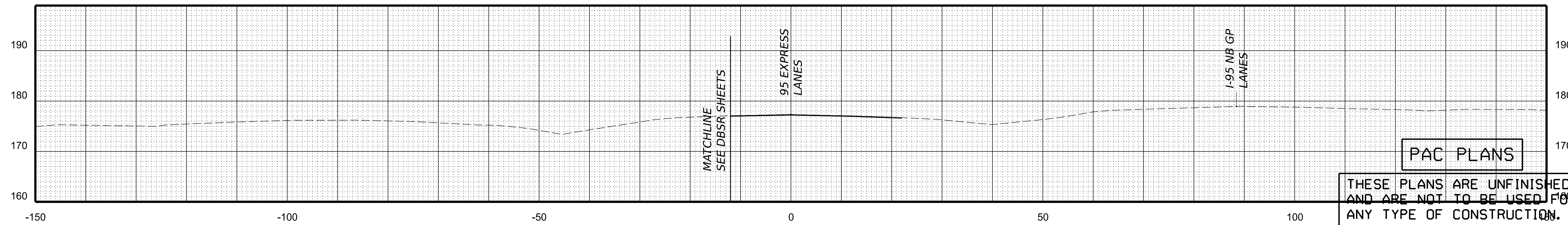
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 692+25.00



STA 692+00.00



STA 691+75.00

PAC PLANS

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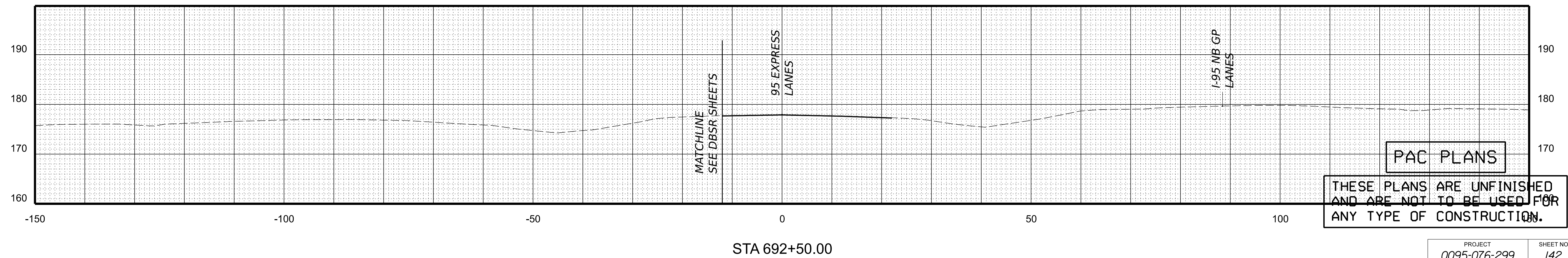
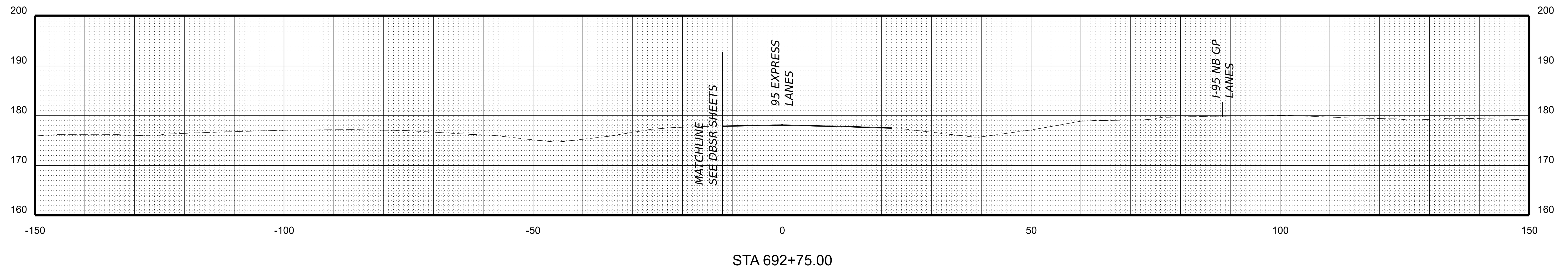
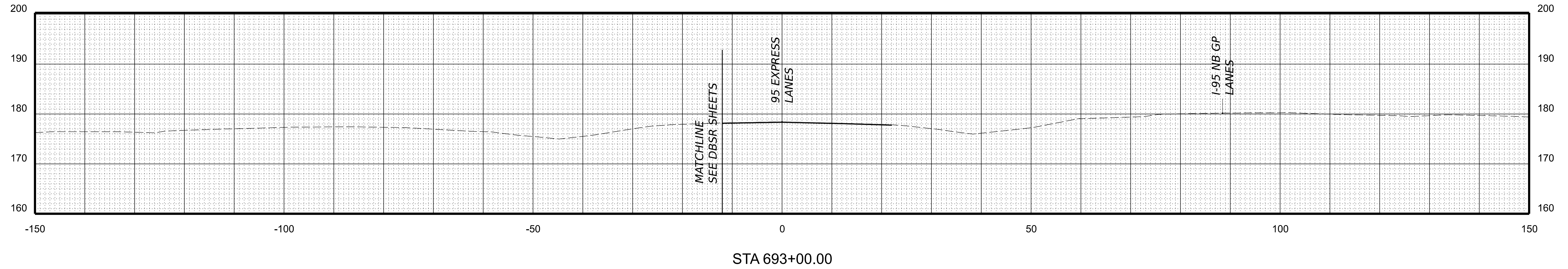
PROJECT MANAGER: *Bhupal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	142

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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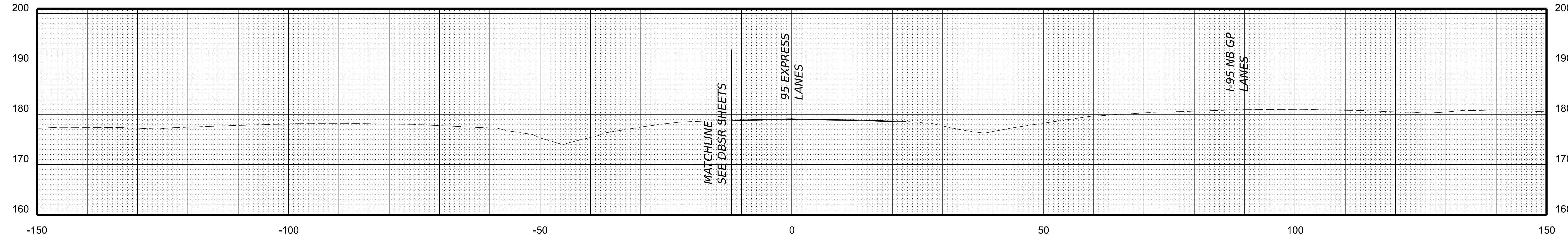
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

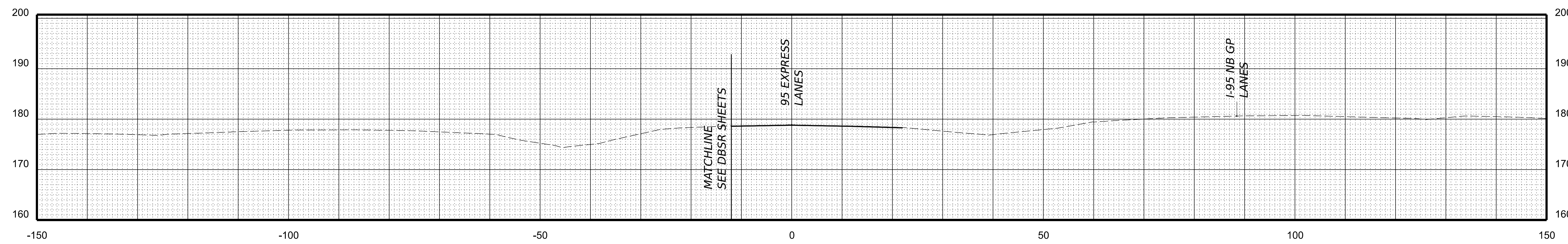
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	143

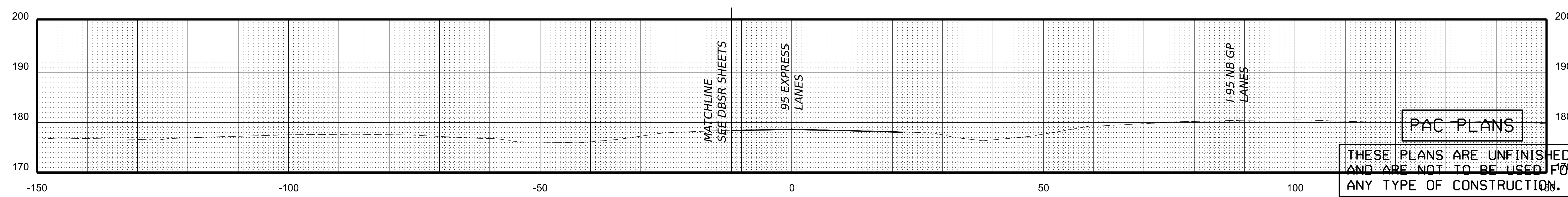
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 693+75.00



STA 693+50.00



STA 693+25.00

PAC PLANS
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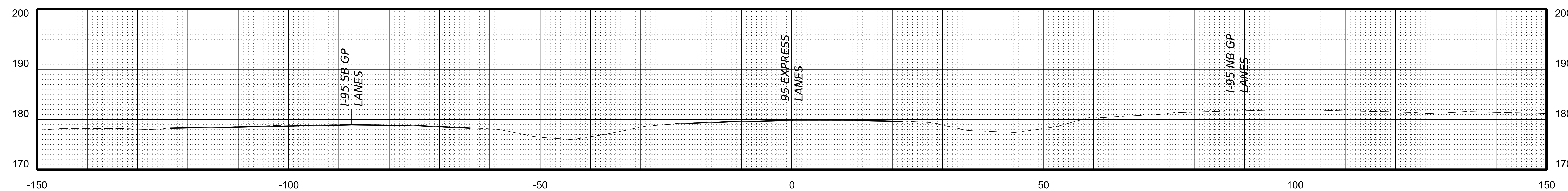
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

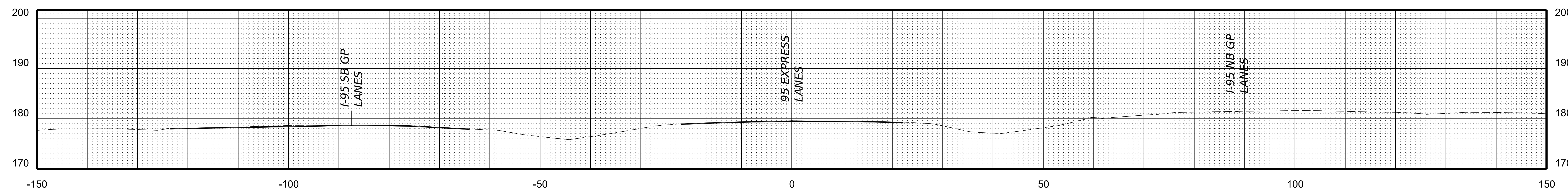
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	144

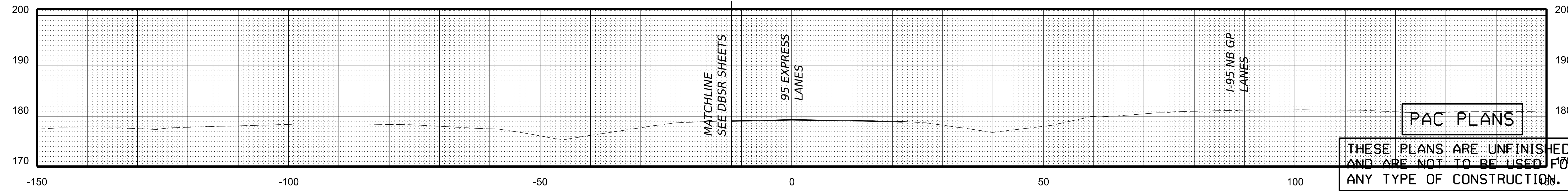
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 694+50.00



STA 694+25.00



STA 694+00.00

PAC PLANS
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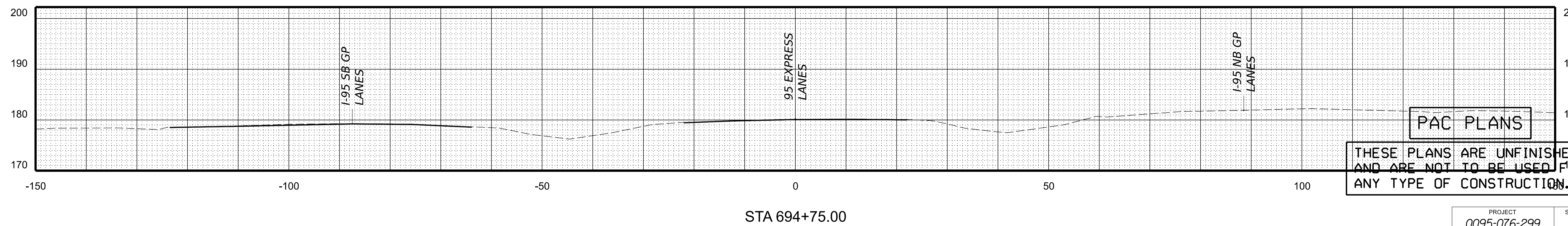
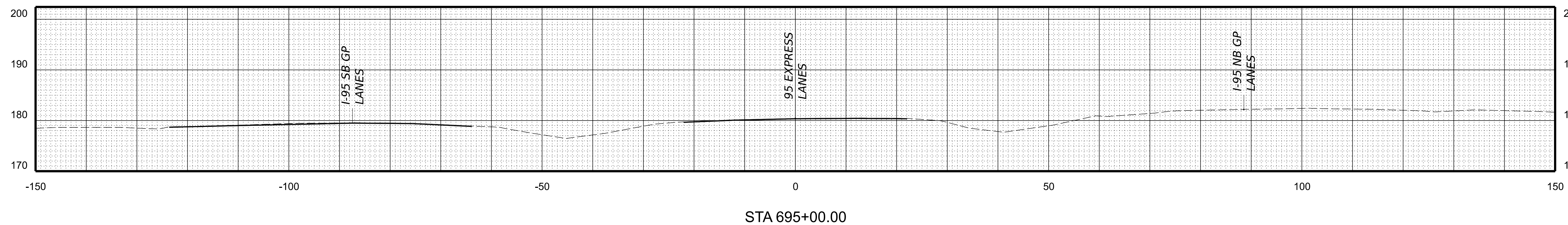
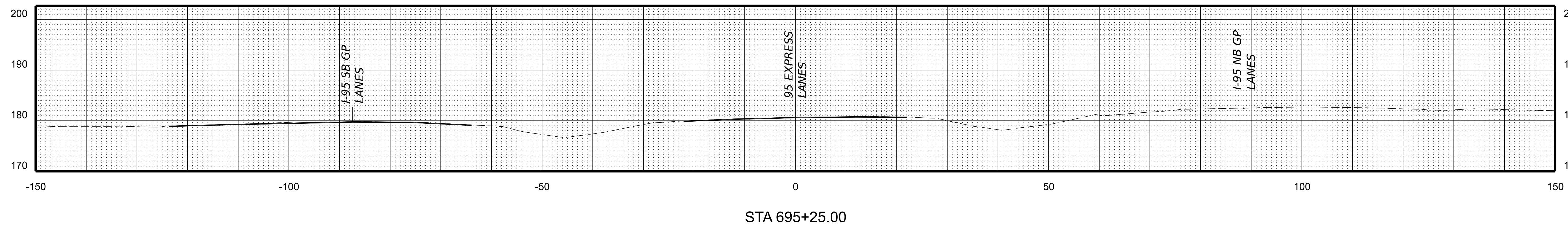
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	145

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS

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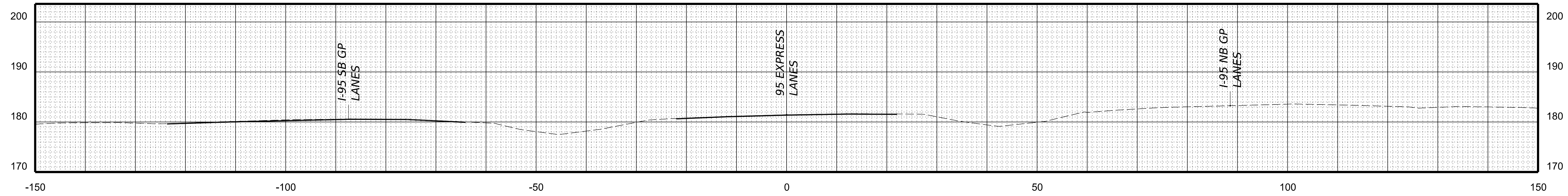
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8100*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

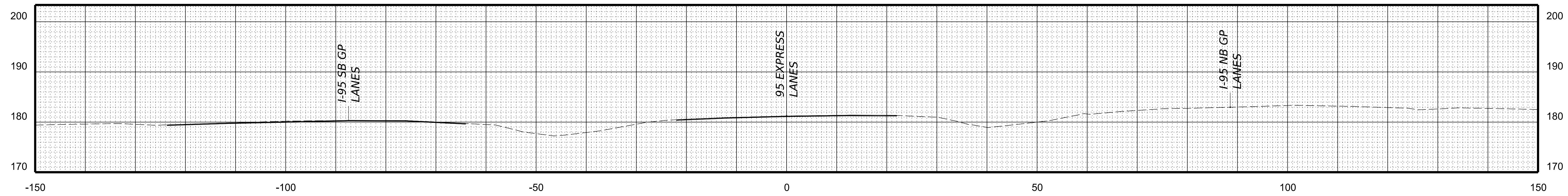
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	146

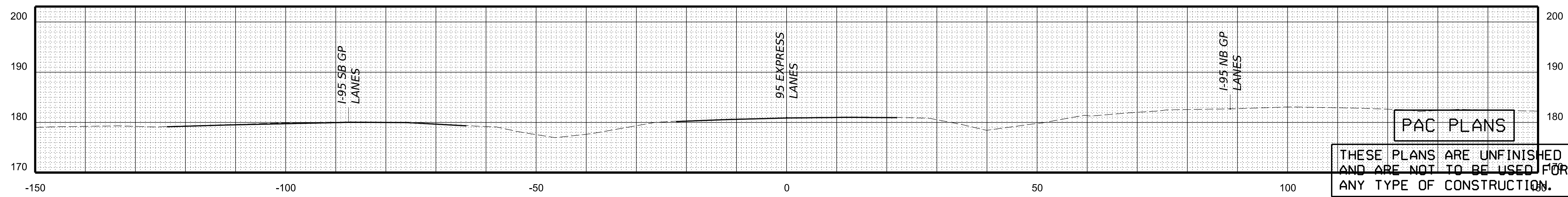
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 696+00.00



STA 695+75.00



STA 695+50.00

PAC PLANS

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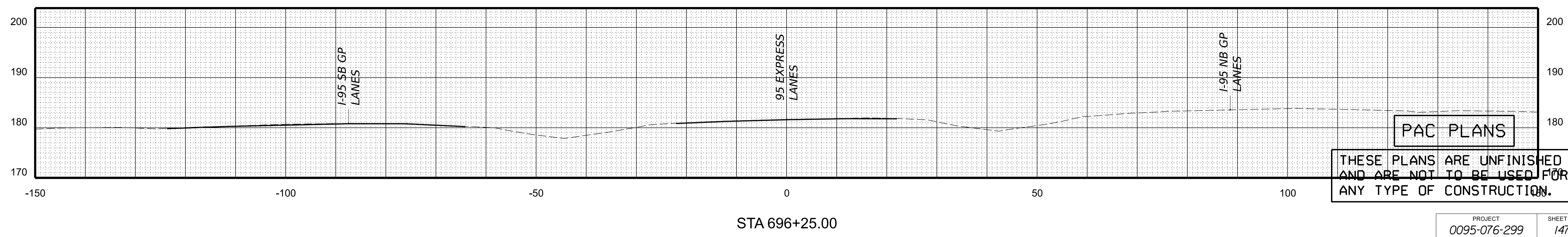
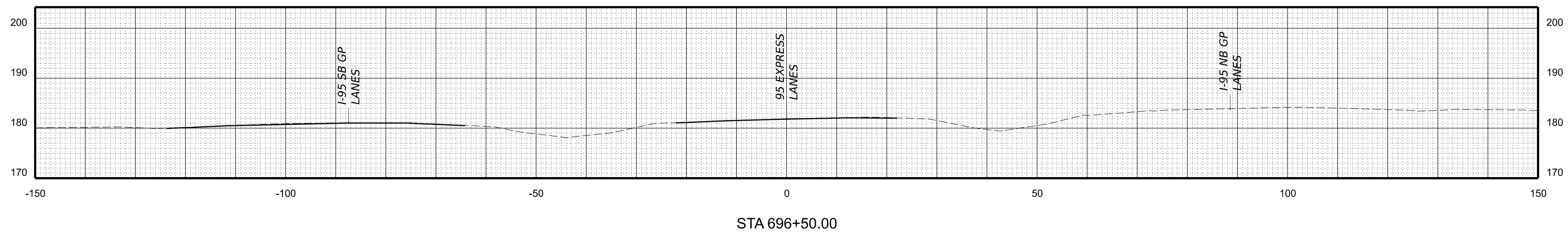
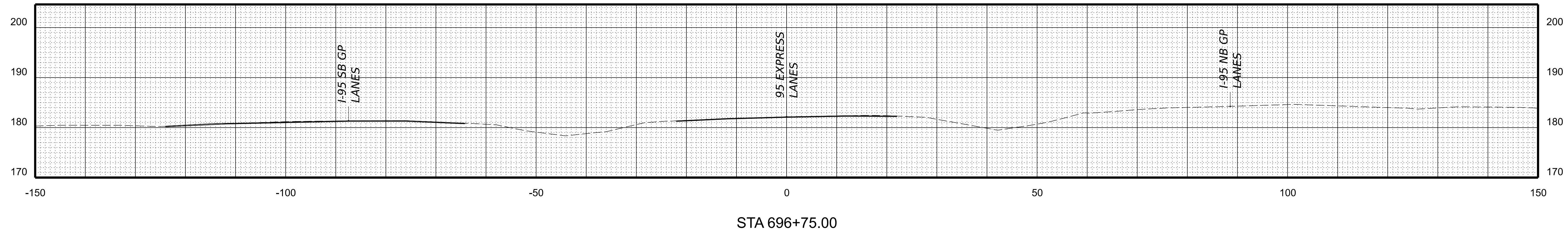
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	147

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



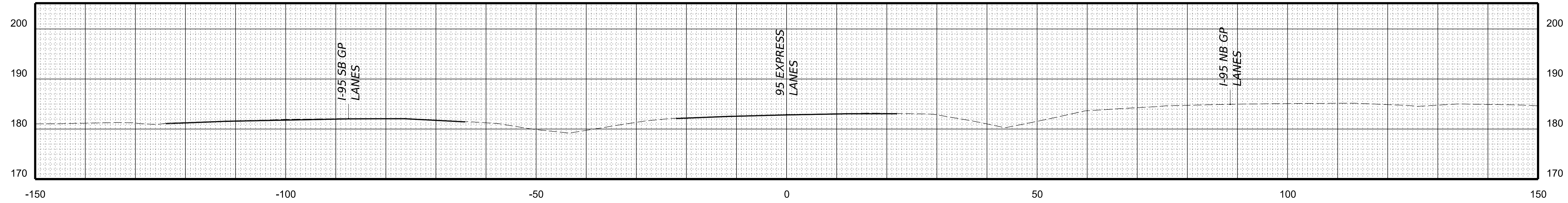
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

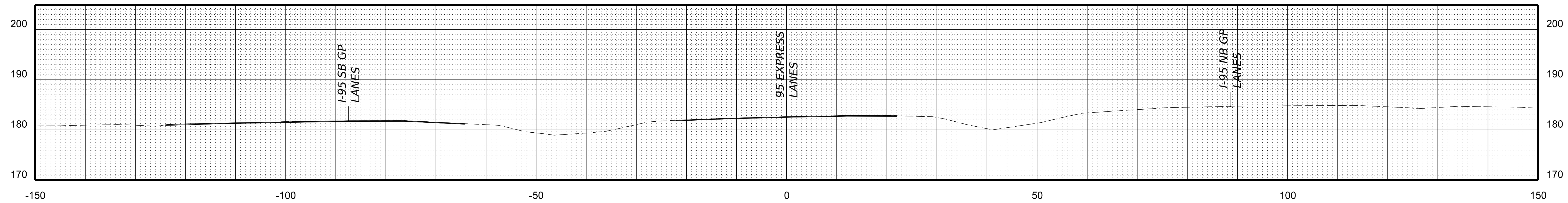
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	148

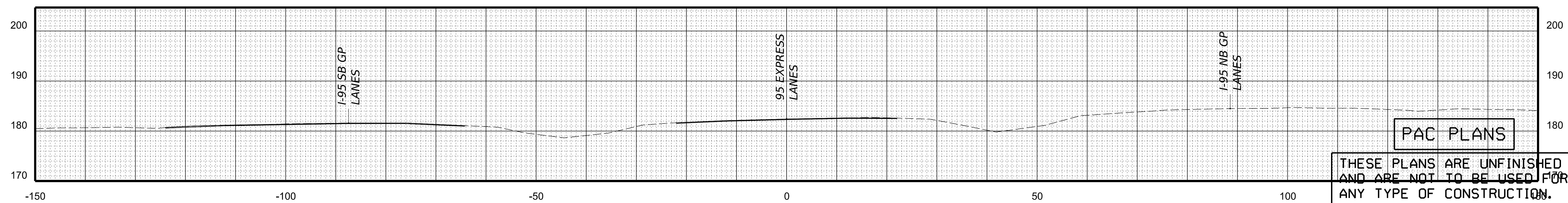
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 697+50.00



STA 697+25.00



STA 697+00.00

PAC PLANS

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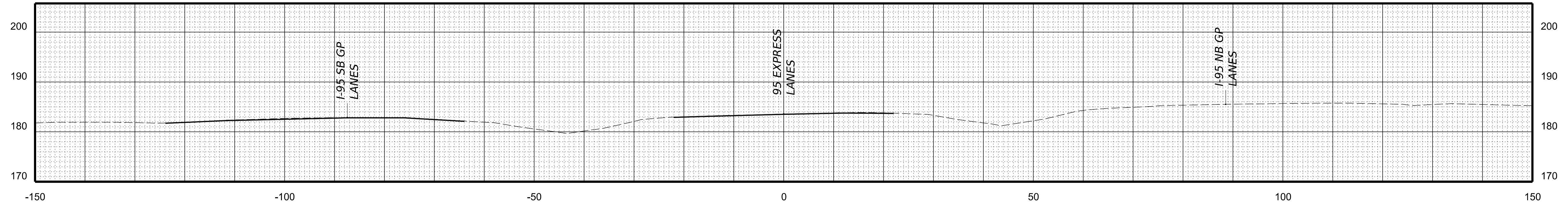
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

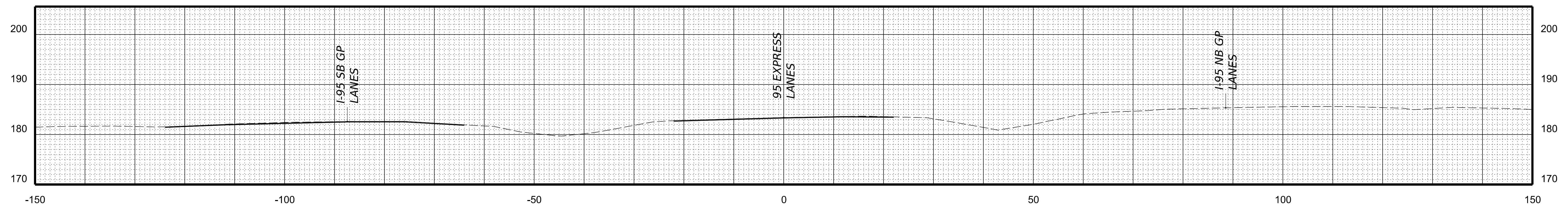
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	149

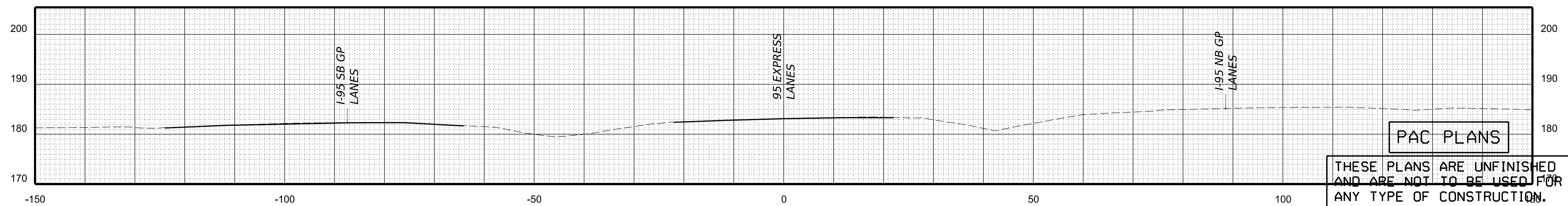
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 698+25.00



STA 698+00.00



STA 697+75.00

PAC PLANS

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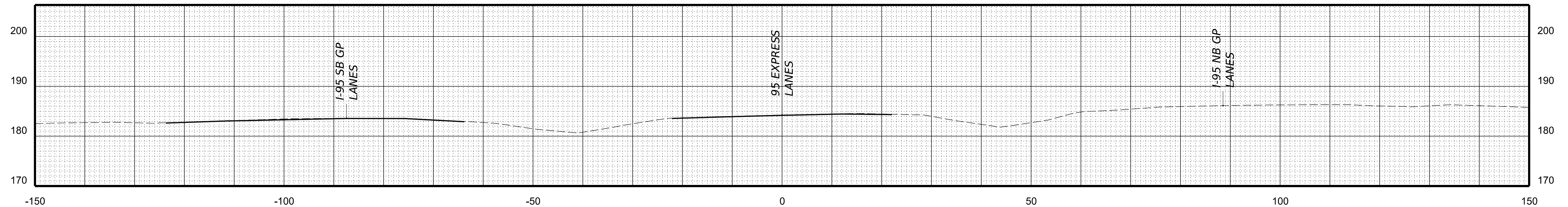
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

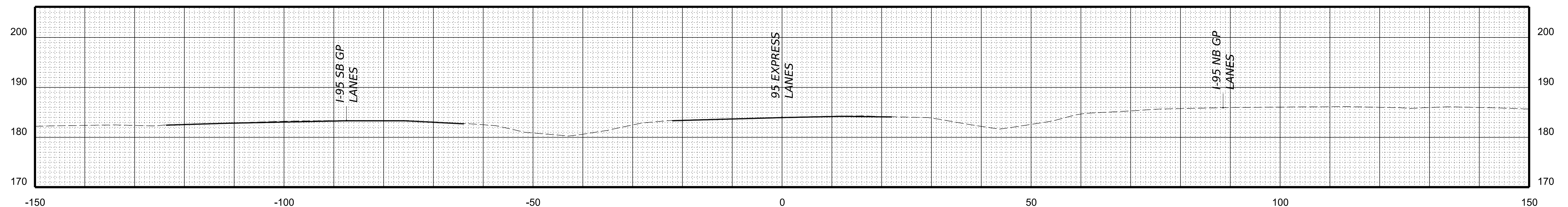
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	150

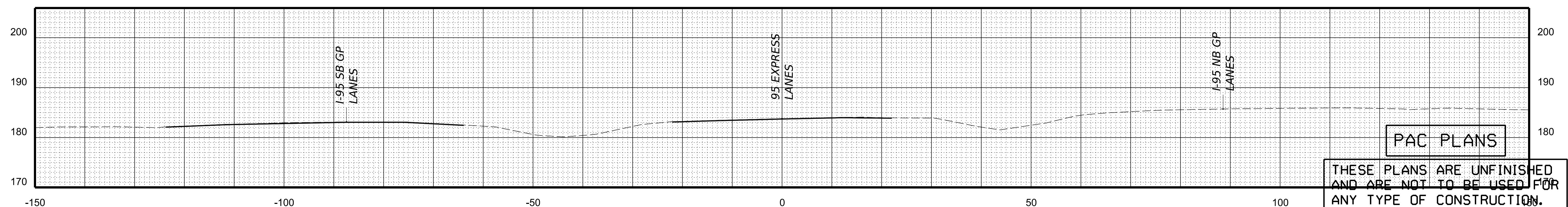
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 699+00.00



STA 698+75.00



STA 698+50.00

PAC PLANS

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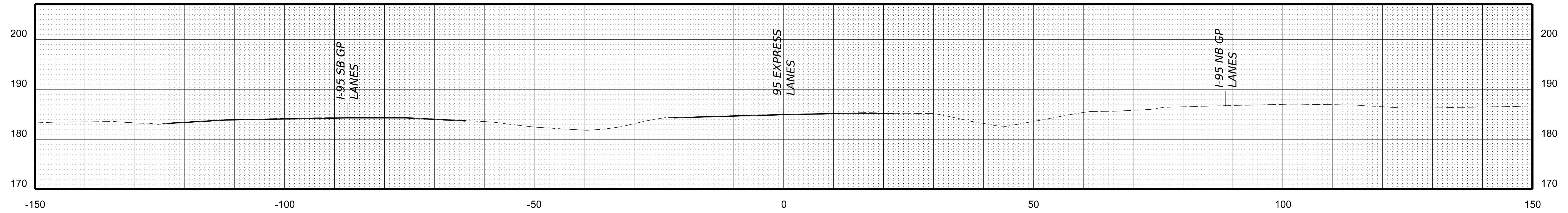
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

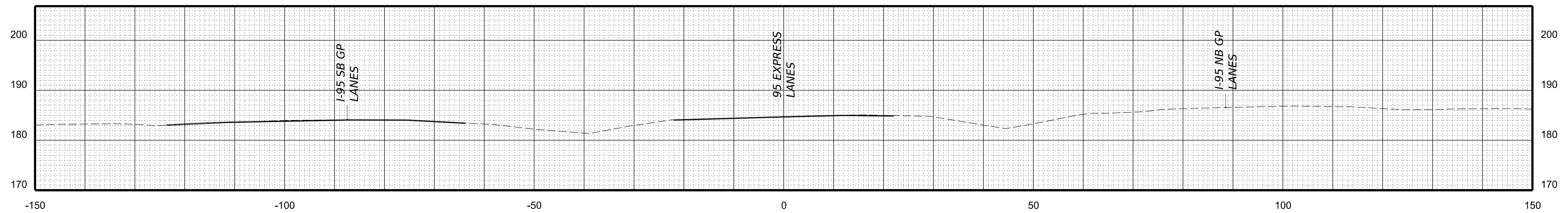
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	151

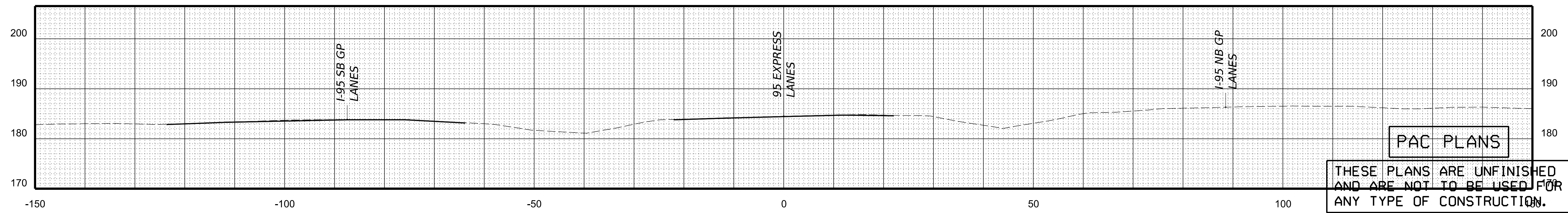
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 699+75.00



STA 699+50.00



STA 699+25.00

PAC PLANS

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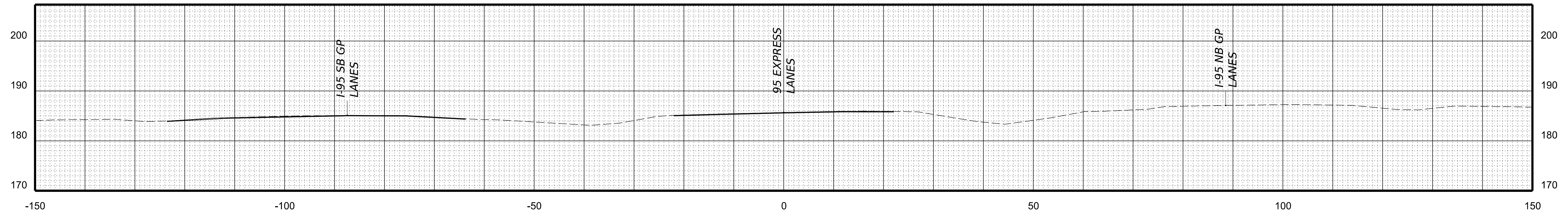
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

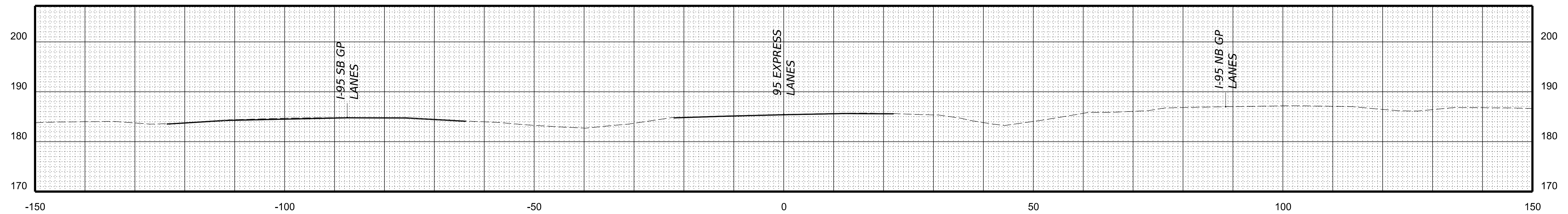
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	152

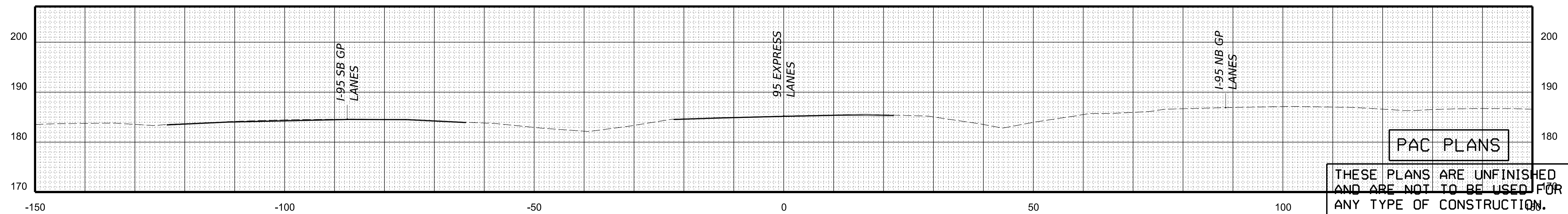
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 700+50.00



STA 700+25.00



STA 700+00.00

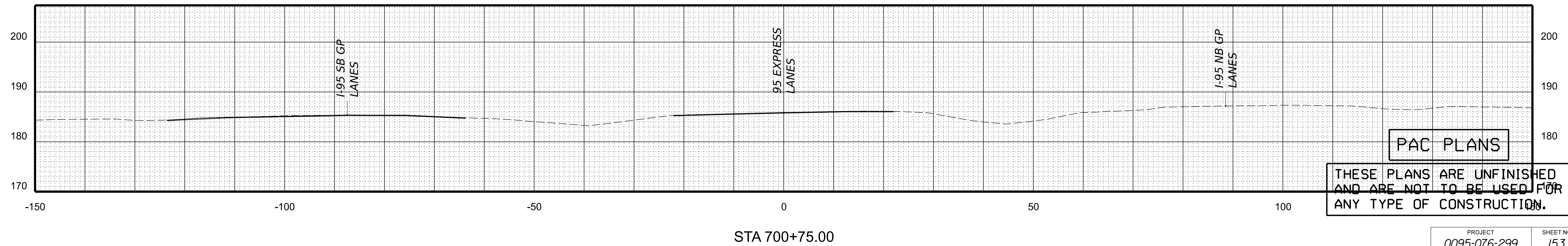
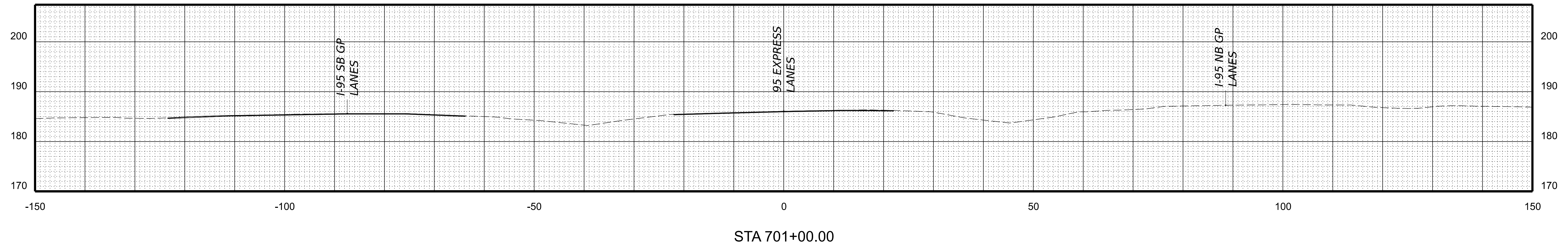
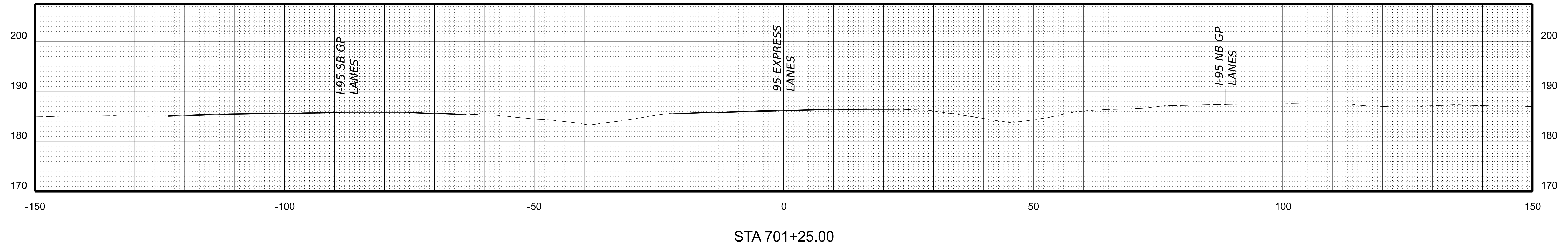
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	153

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



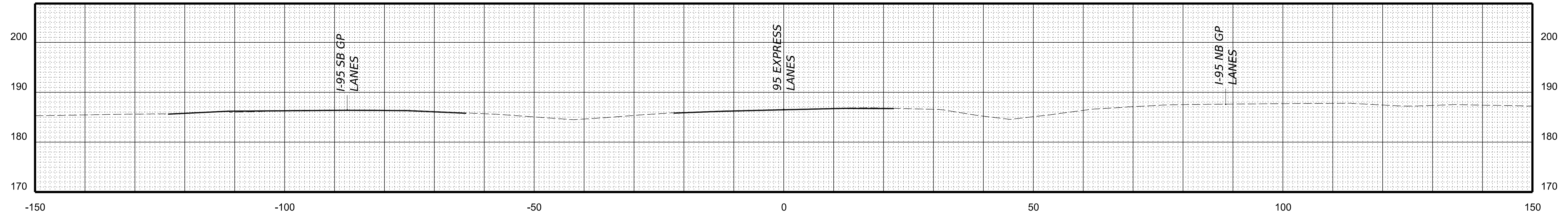
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

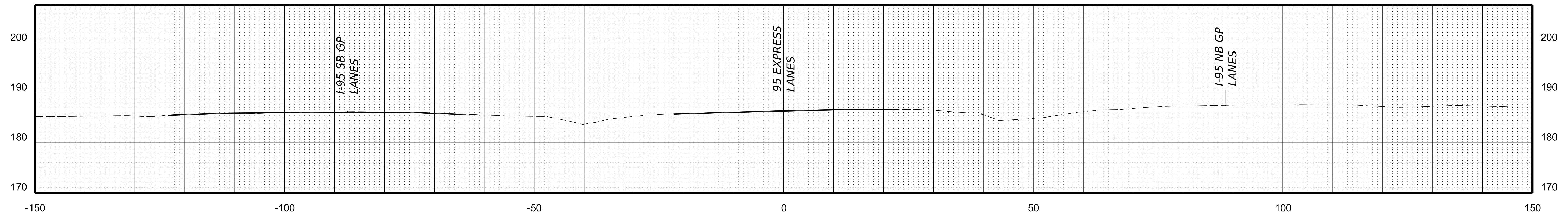
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	154

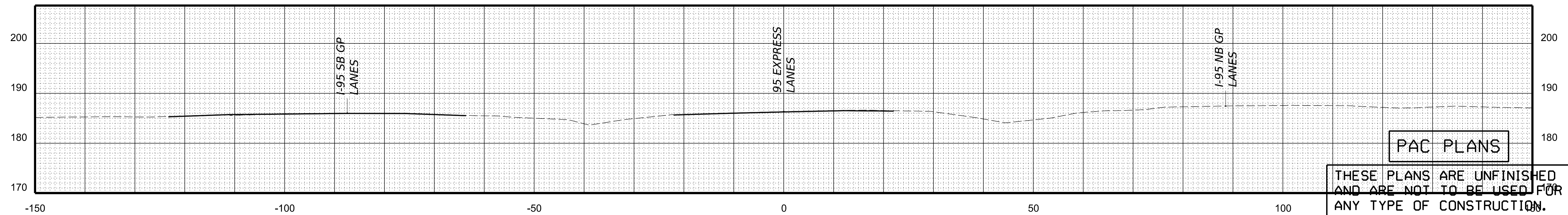
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 702+00.00



STA 701+75.00



STA 701+50.00

PAC PLANS
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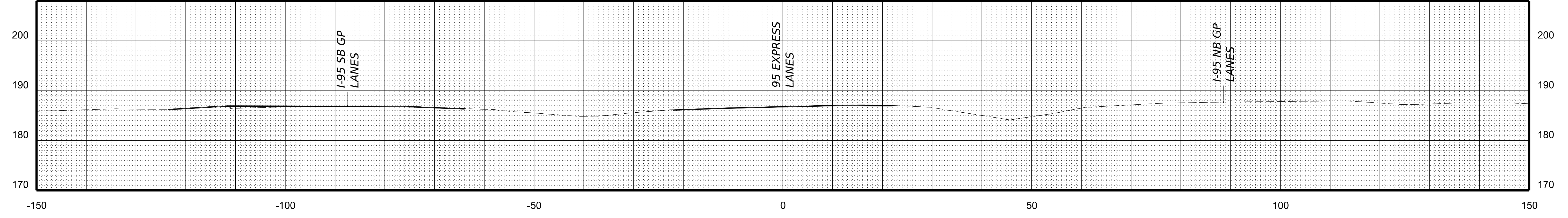
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

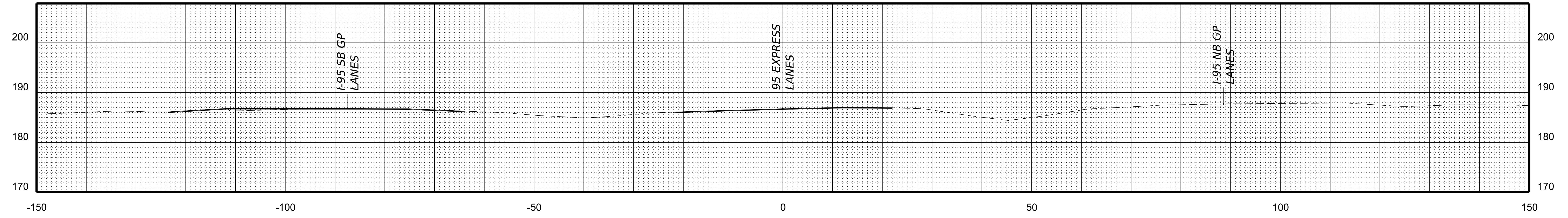
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	155

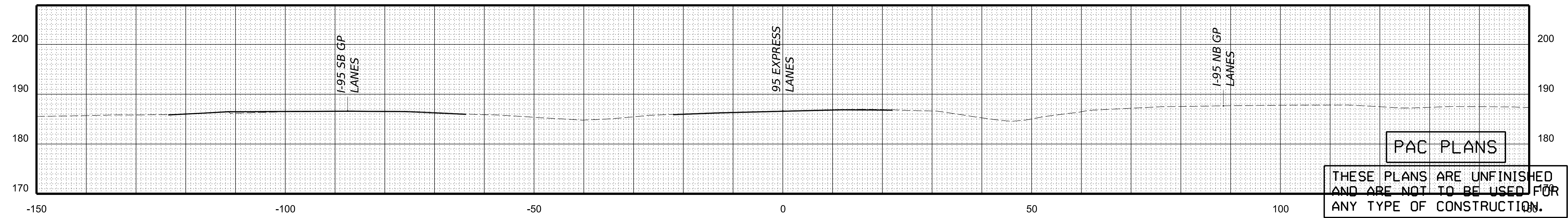
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 702+75.00



STA 702+50.00



STA 702+25.00

PAC PLANS

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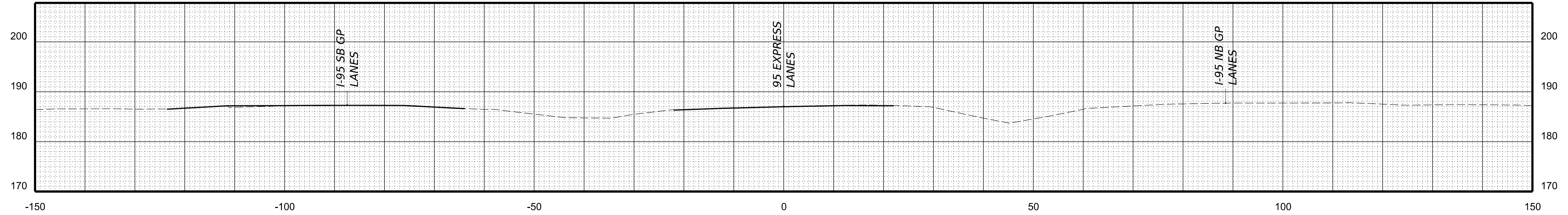
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

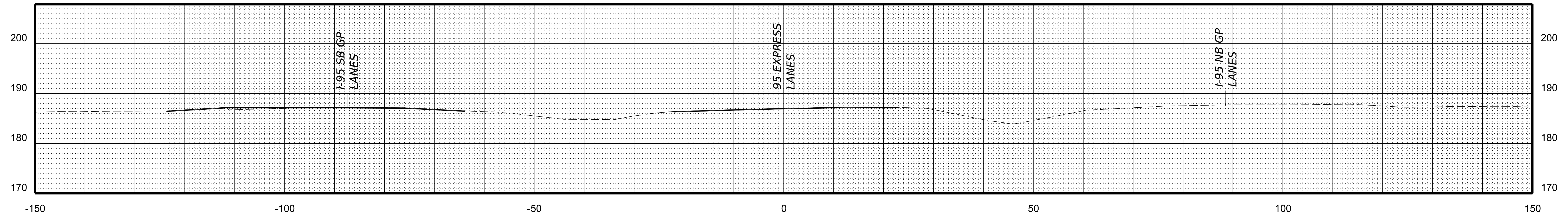
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	156

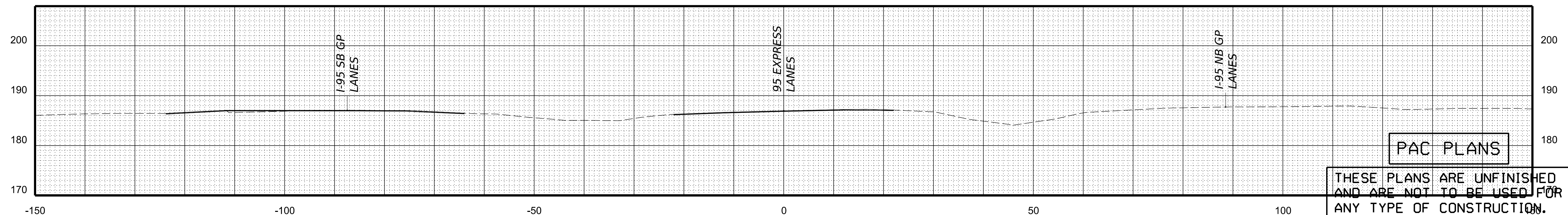
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 703+50.00



STA 703+25.00



STA 703+00.00

PAC PLANS

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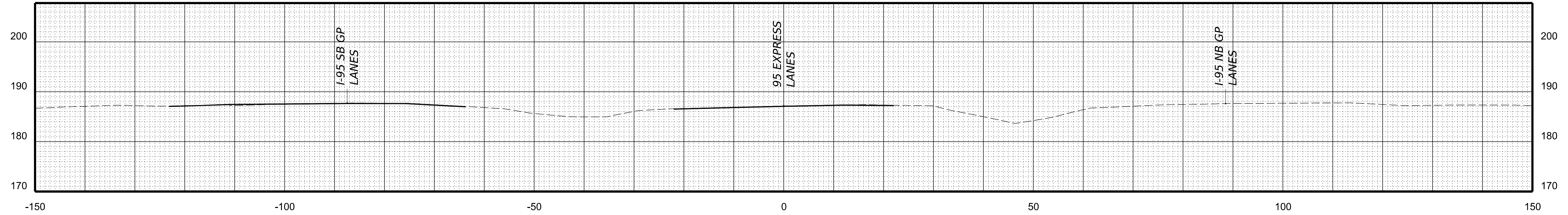
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

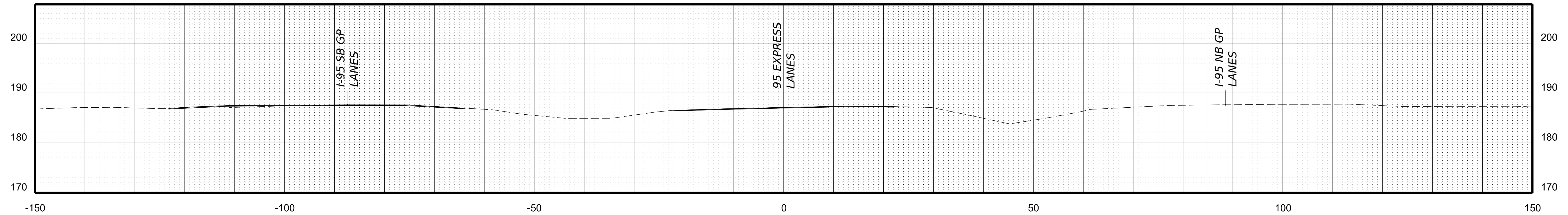
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	157

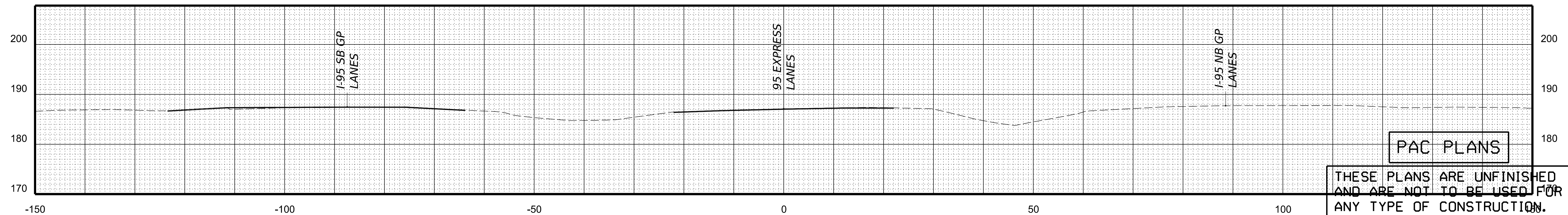
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 704+25.00



STA 704+00.00



STA 703+75.00

PAC PLANS

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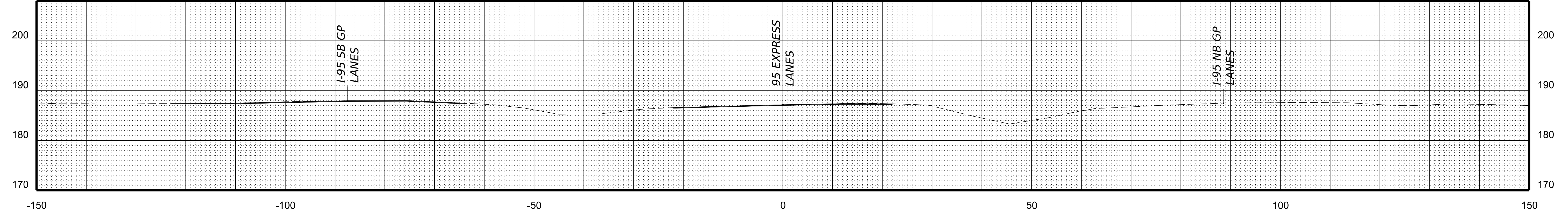
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

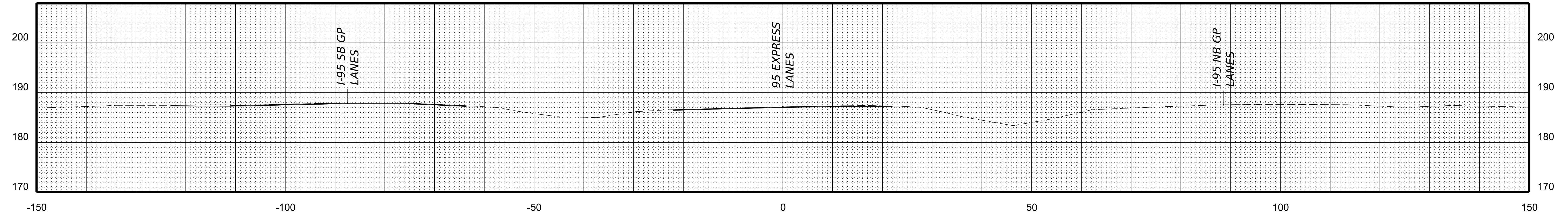
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	158

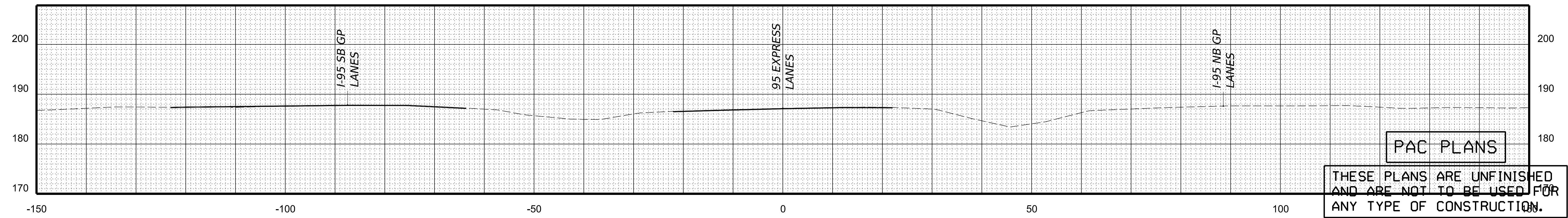
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 705+00.00



STA 704+75.00



STA 704+50.00

PAC PLANS

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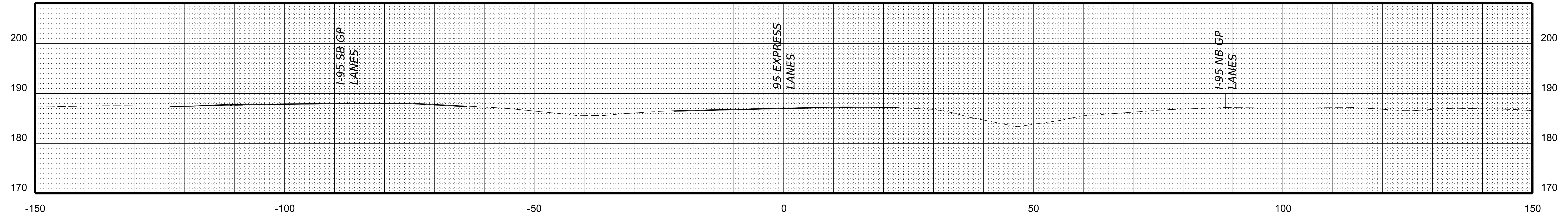
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

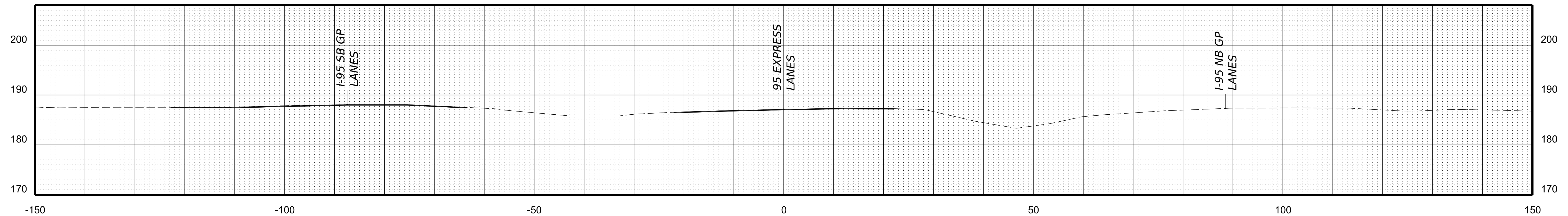
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	159

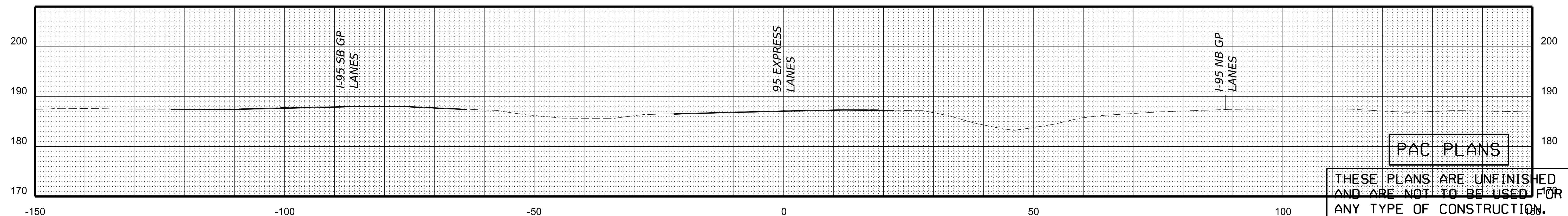
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STA 705+75.00



STA 705+50.00



STA 705+25.00

PAC PLANS

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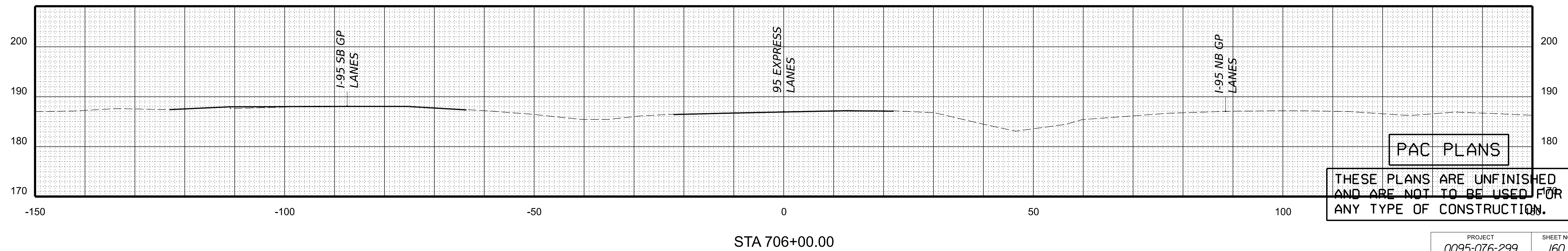
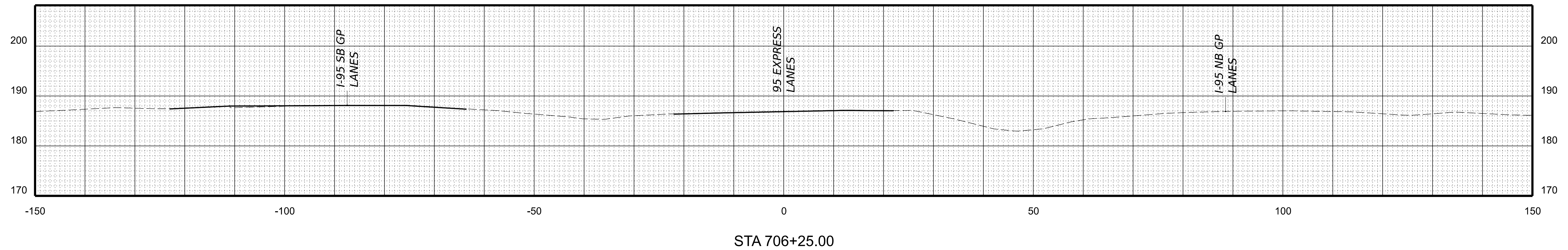
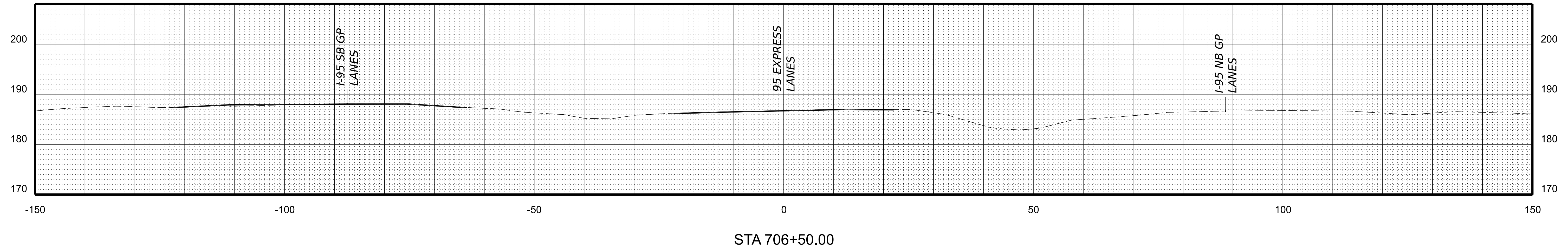
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
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SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	160

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



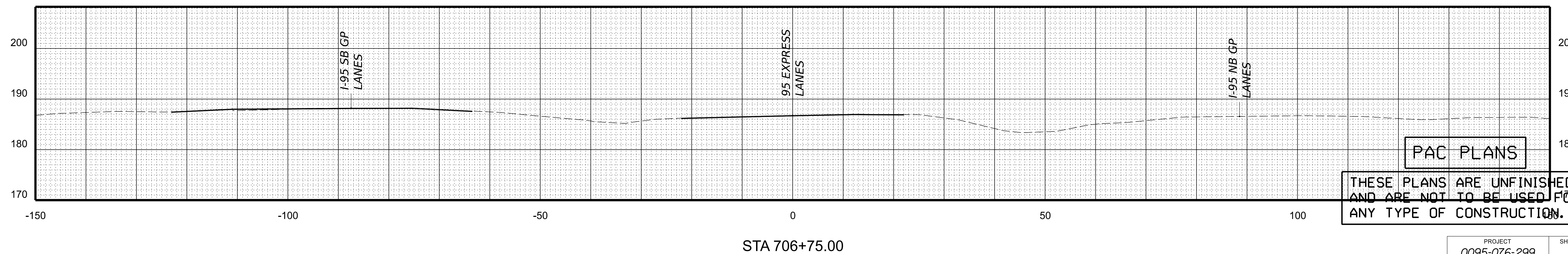
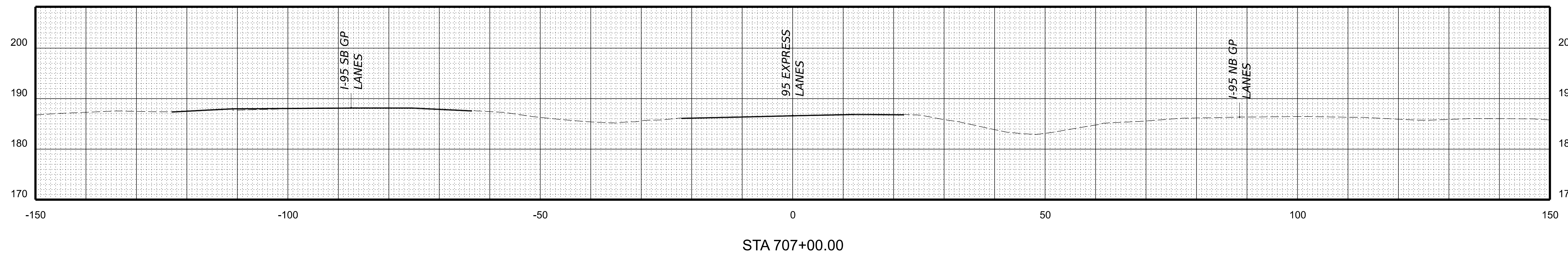
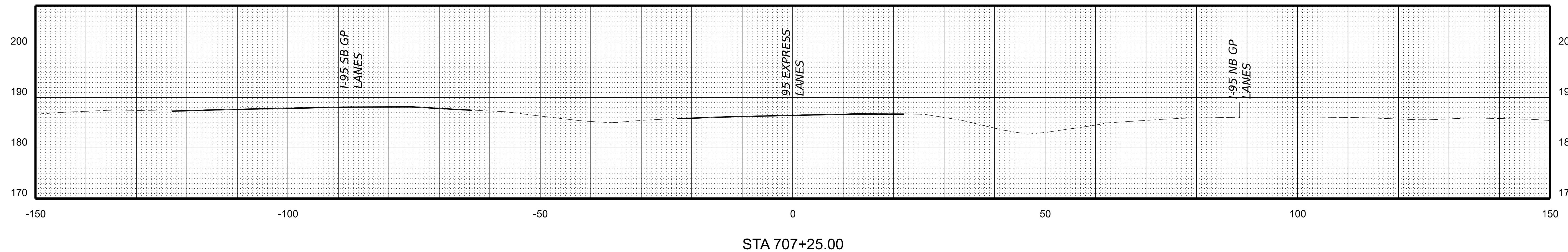
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SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	161

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PAC PLANS

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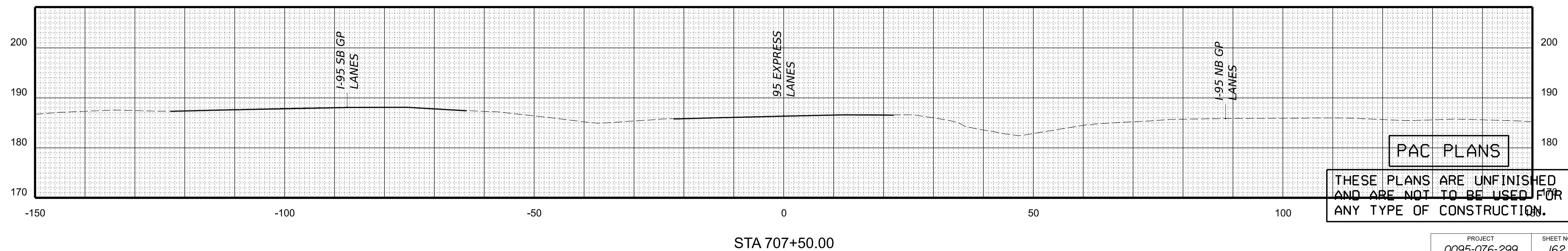
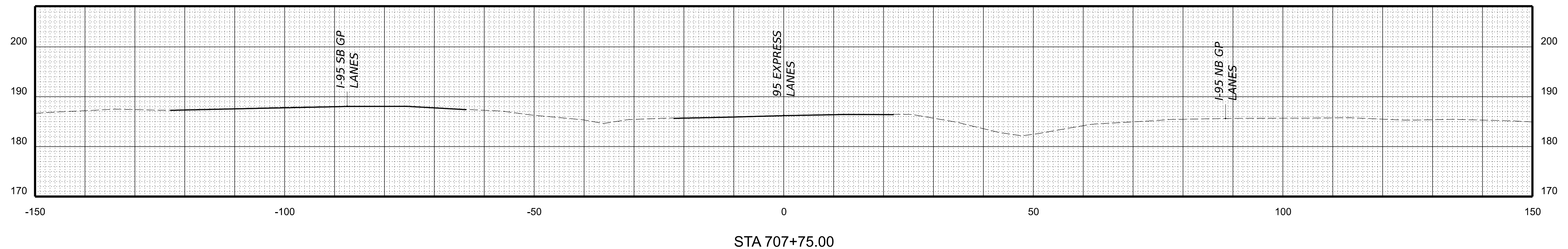
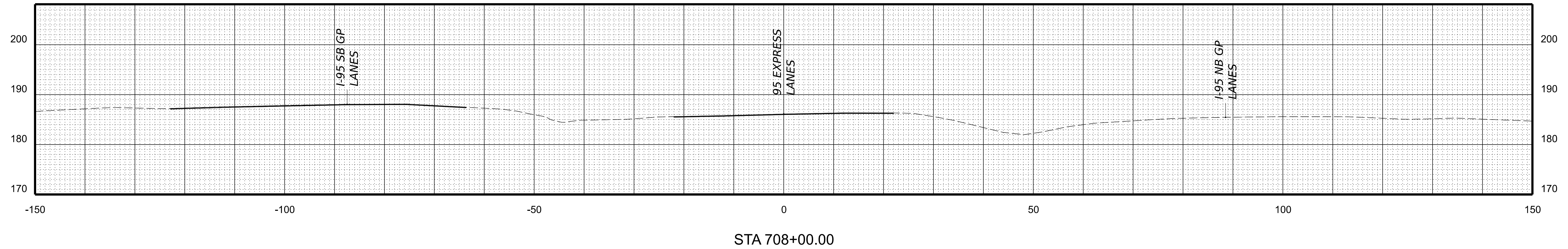
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
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CROSS SECTIONS

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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	162

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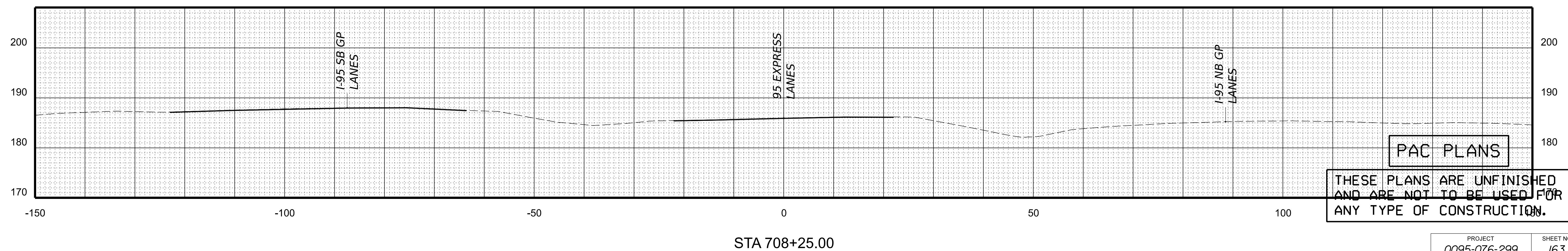
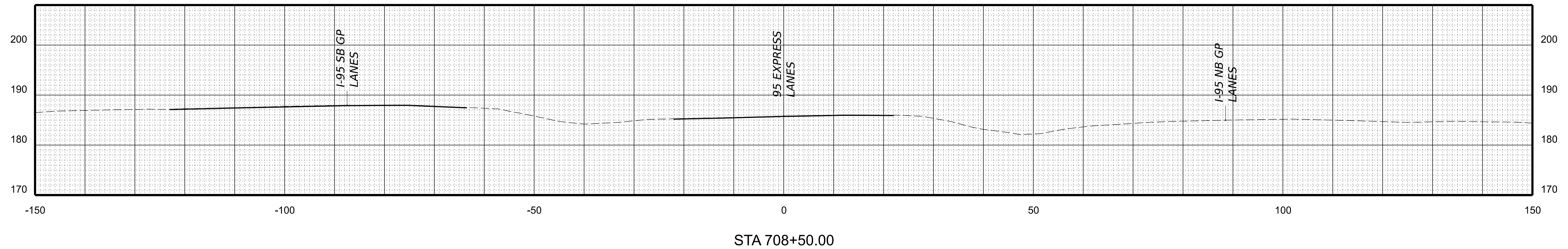
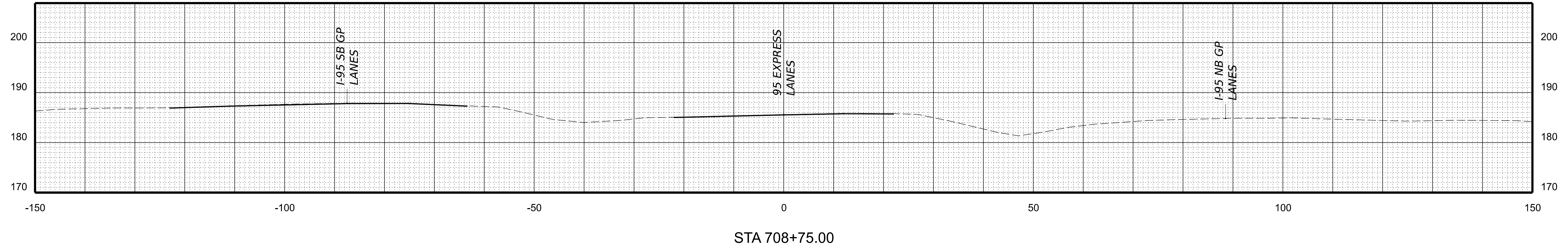
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	163

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PAC PLANS

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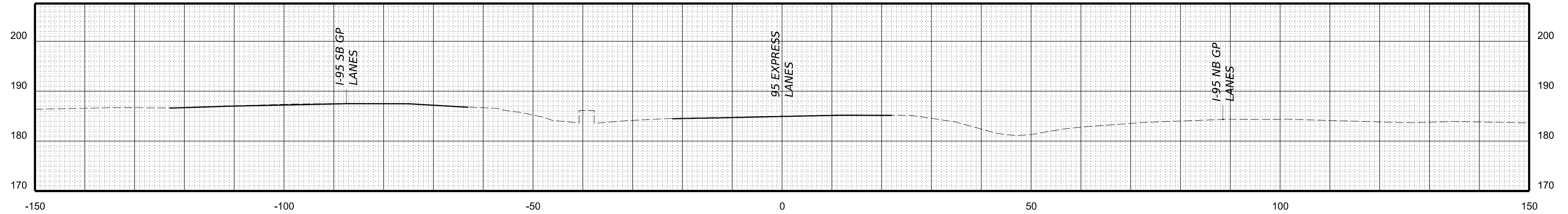
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CROSS SECTIONS

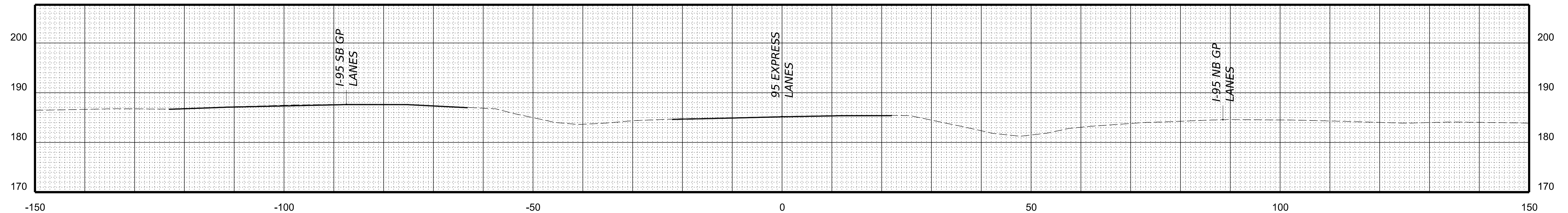
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	164

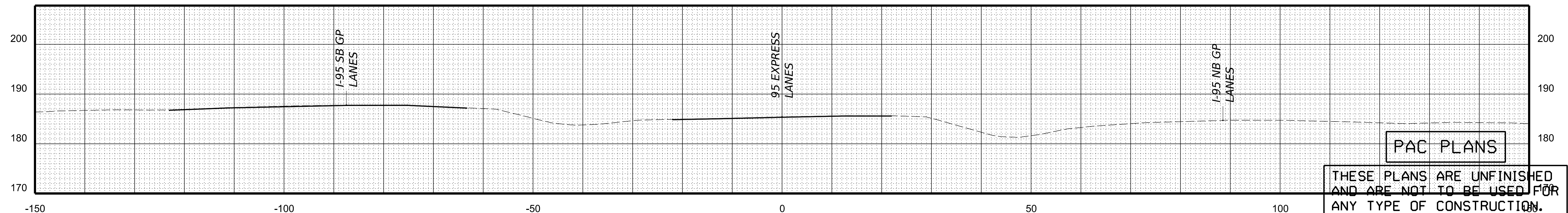
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 709+50.00



STA 709+25.00



STA 709+00.00

PAC PLANS

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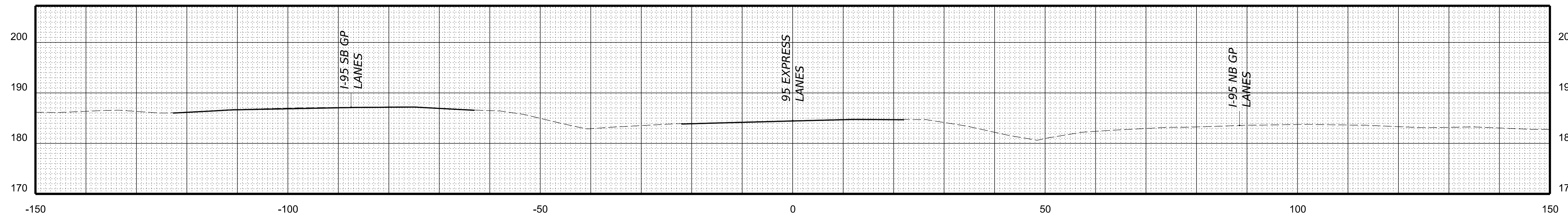
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CROSS SECTIONS

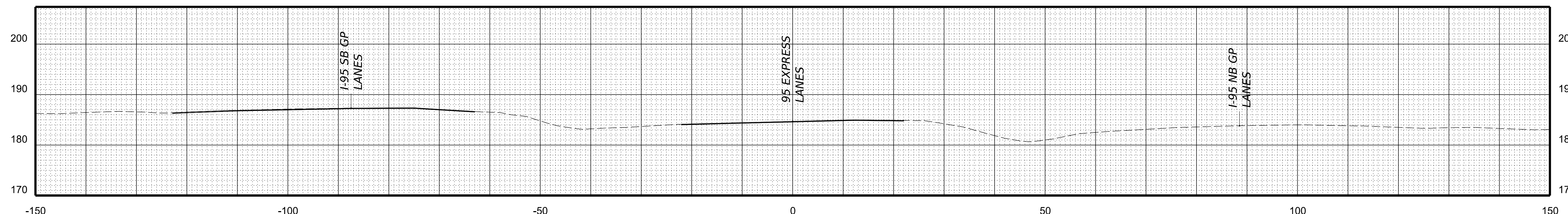
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	165

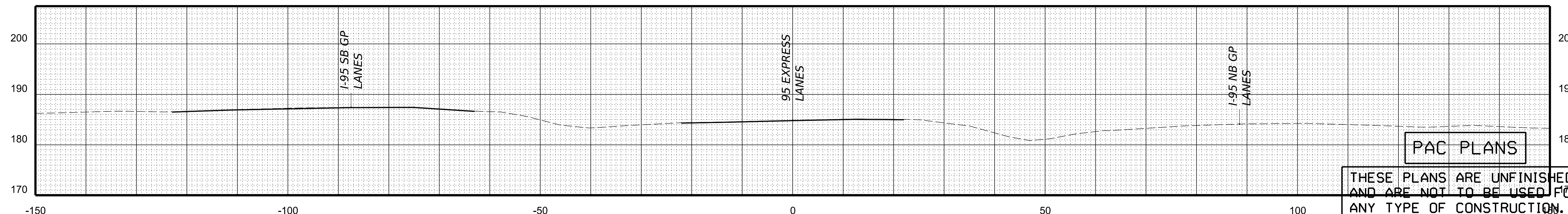
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 710+25.00



STA 710+00.00



STA 709+75.00

PAC PLANS

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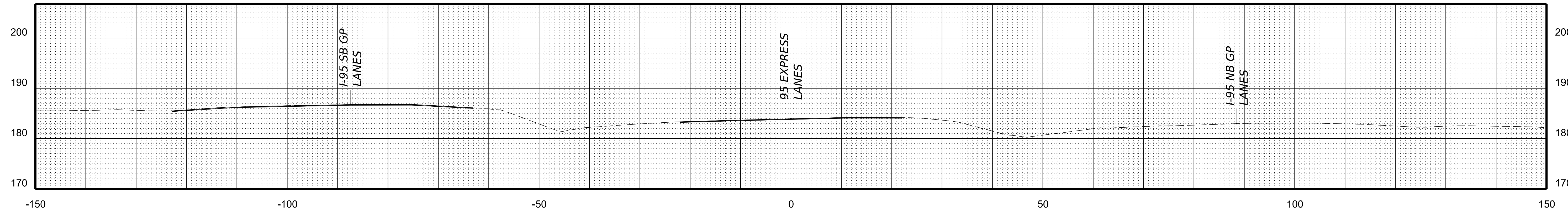
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

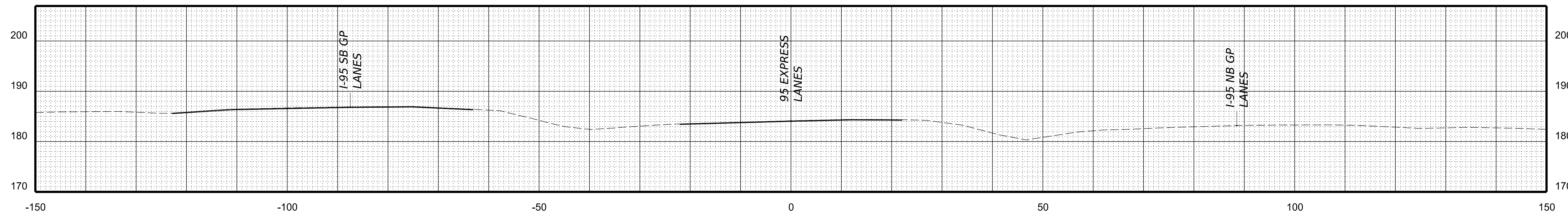
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	166

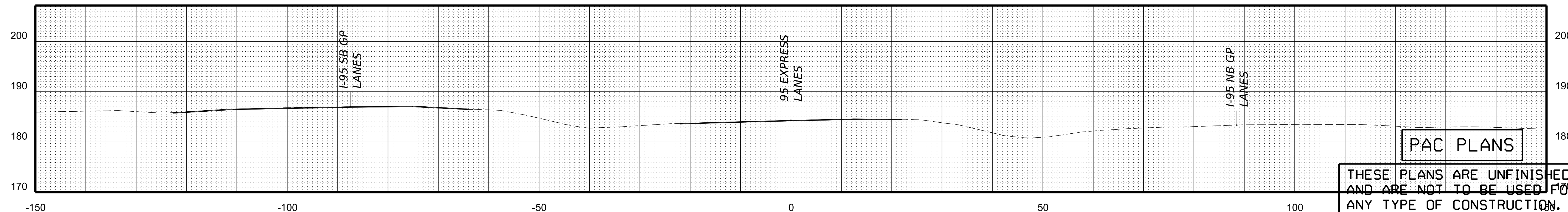
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 711+00.00



STA 710+75.00



STA 710+50.00

PAC PLANS

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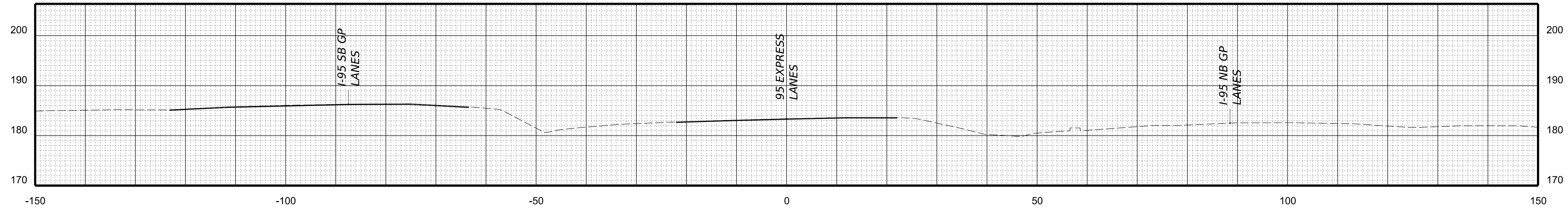
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

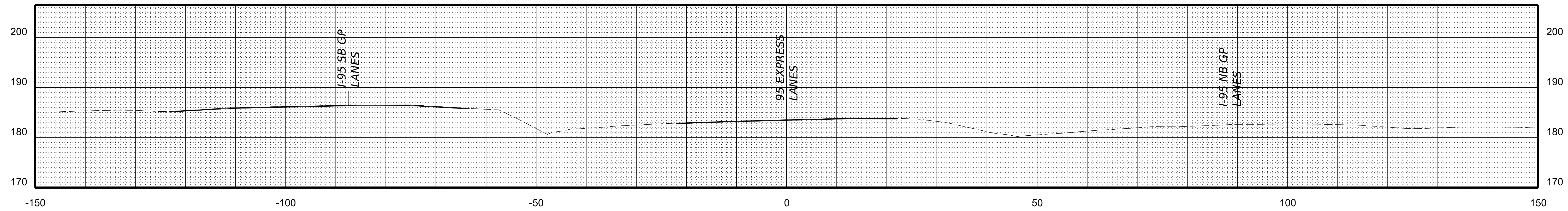
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	167

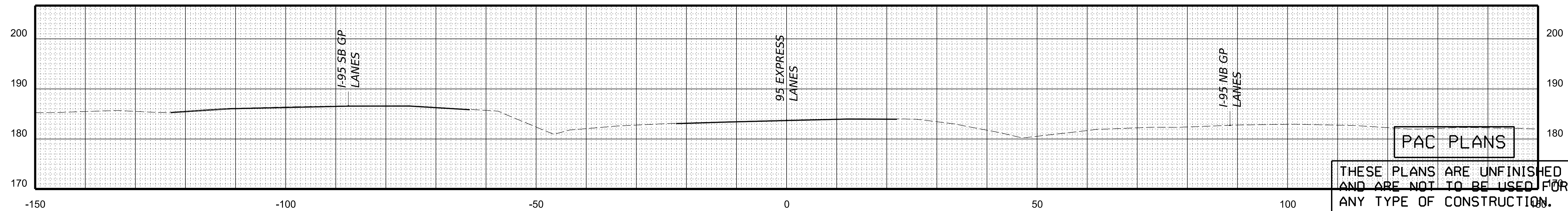
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 711+75.00



STA 711+50.00



STA 711+25.00

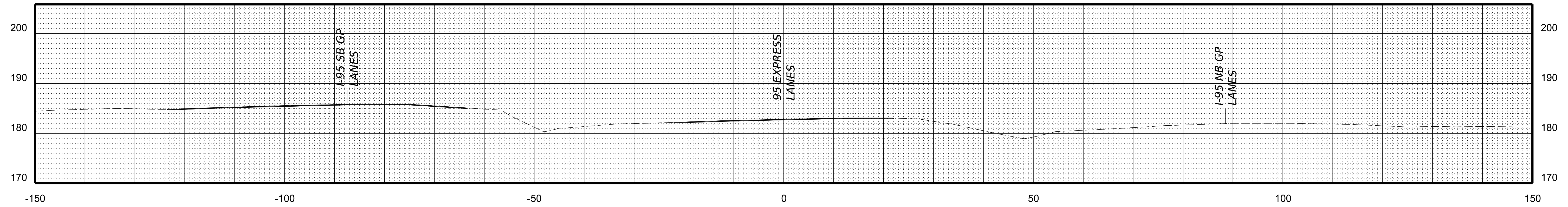
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

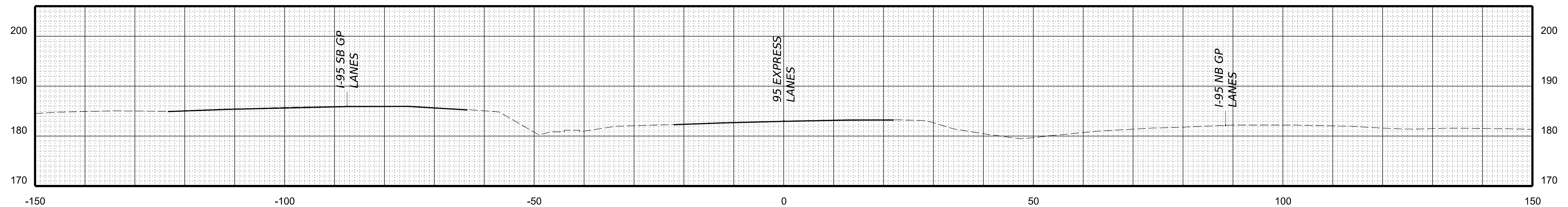
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	168

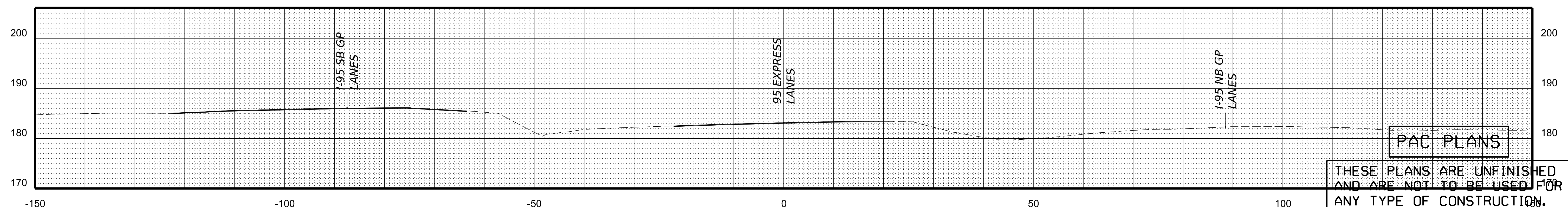
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 712+50.00



STA 712+25.00



STA 712+00.00

PAC PLANS

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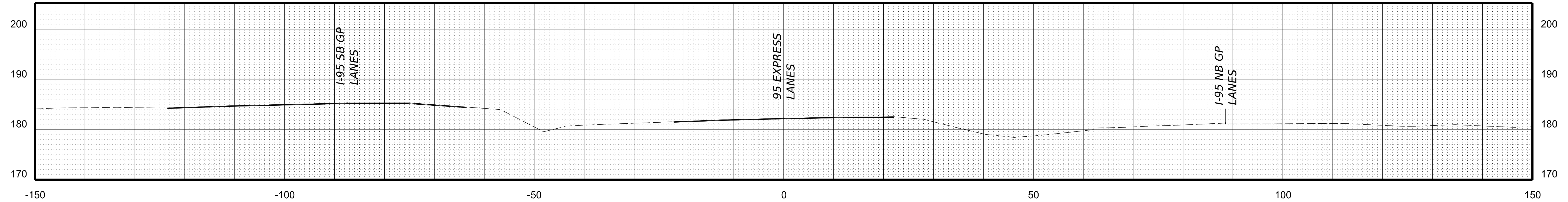
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

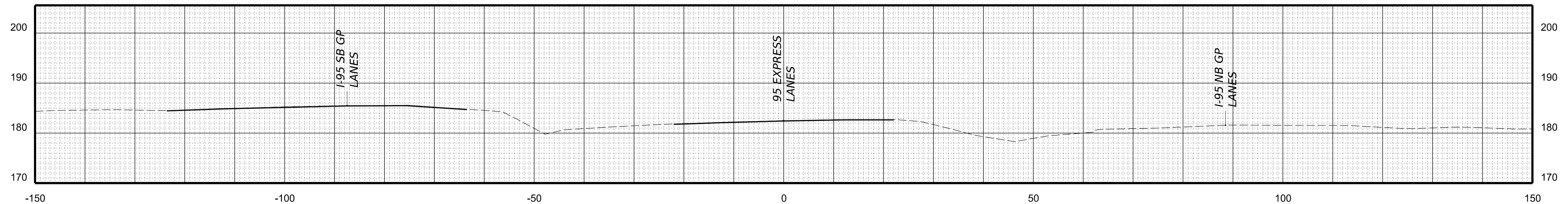
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	169

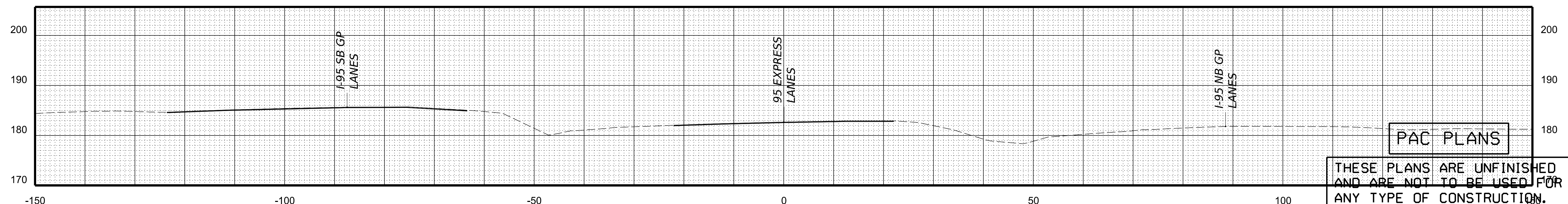
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 713+25.00



STA 713+00.00



STA 712+75.00

PAC PLANS

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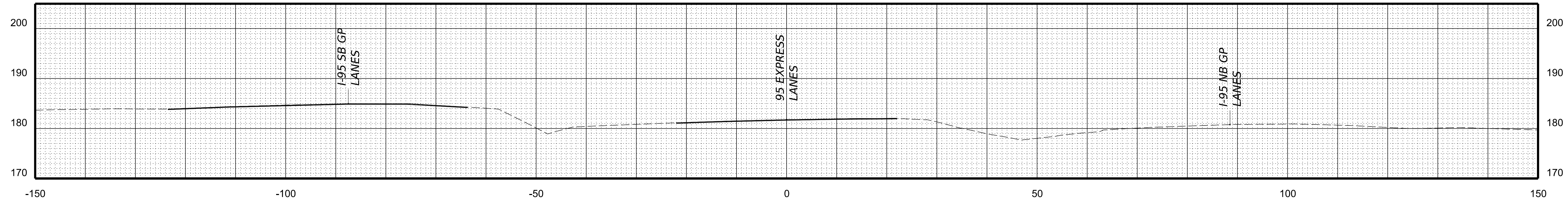
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

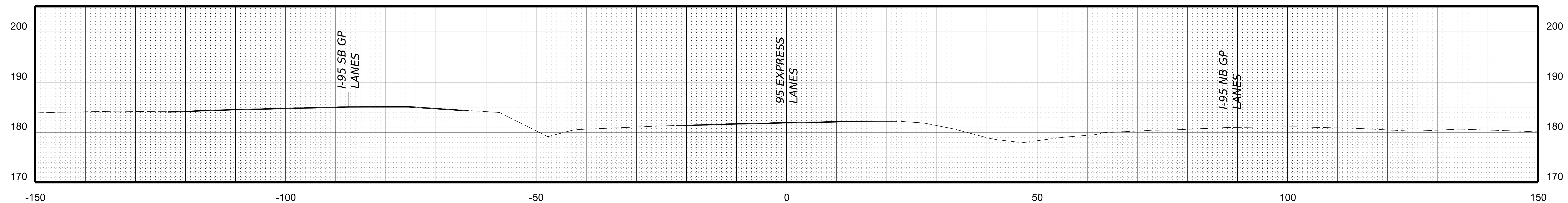
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	170

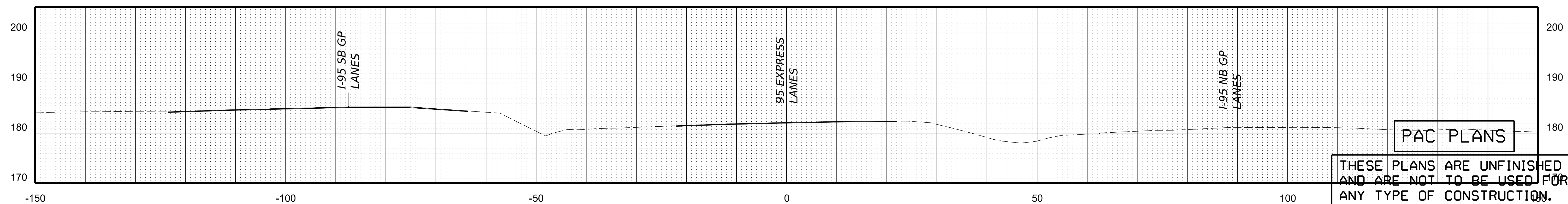
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 714+00.00



STA 713+75.00



STA 713+50.00

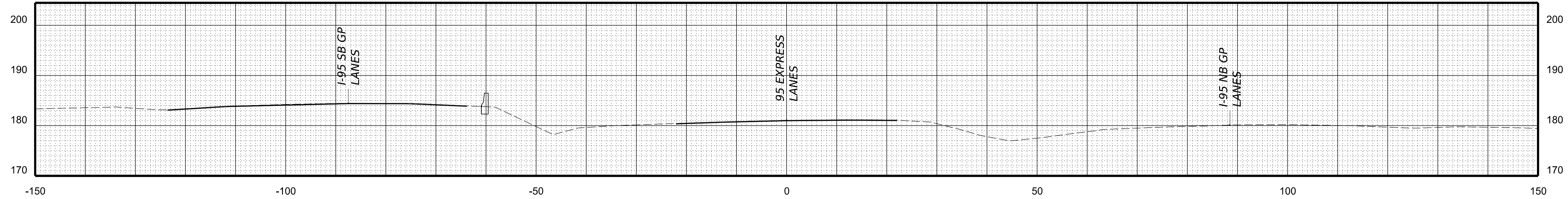
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

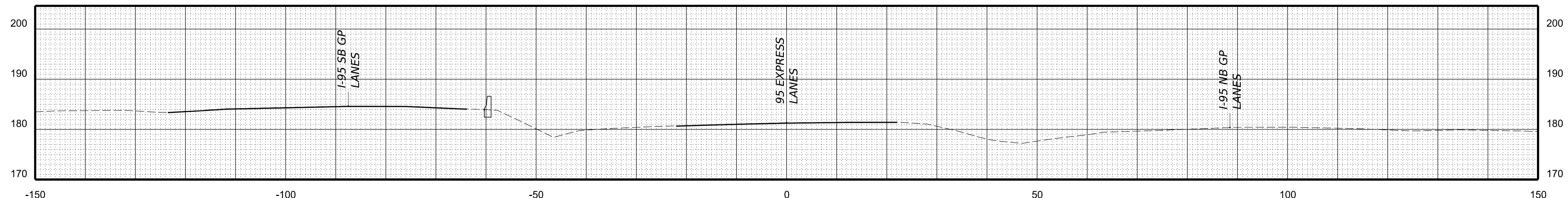
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	171

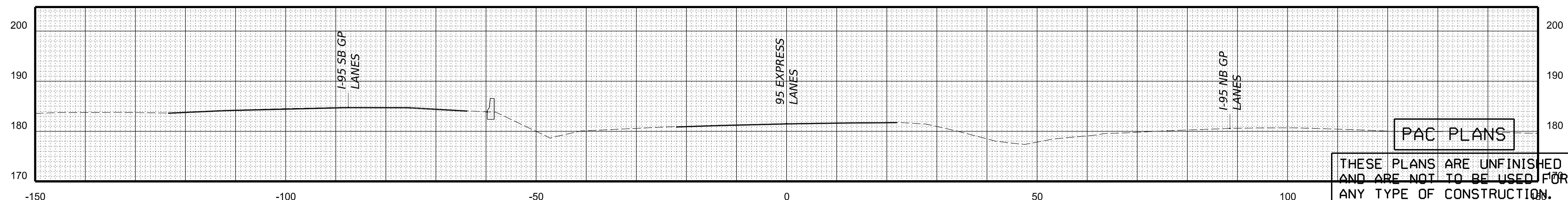
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 714+75.00



STA 714+50.00



STA 714+25.00

PAC PLANS

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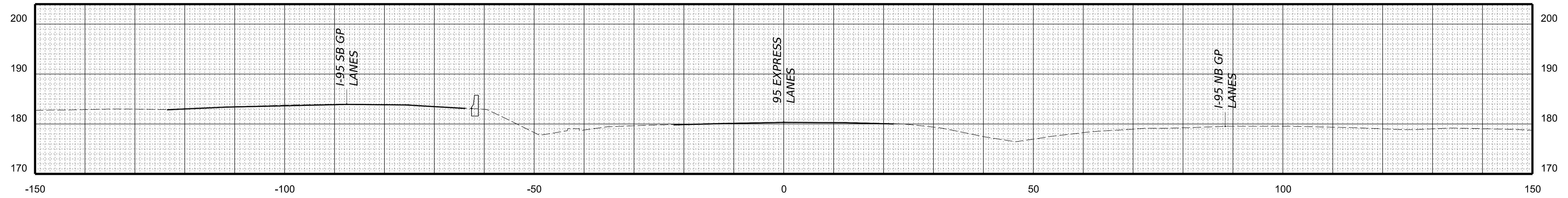
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

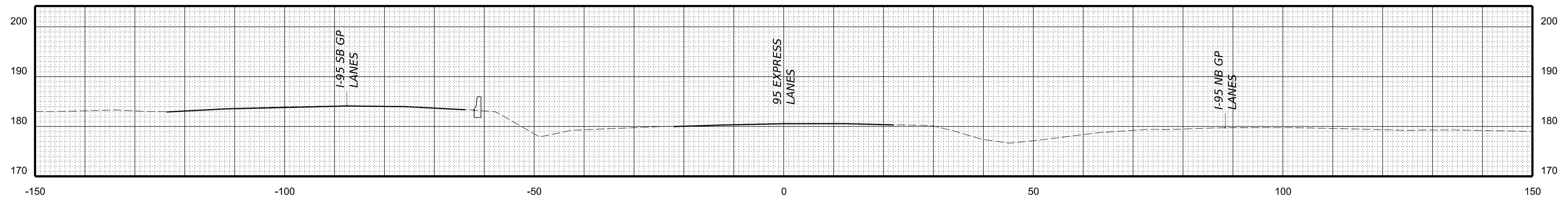
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	172

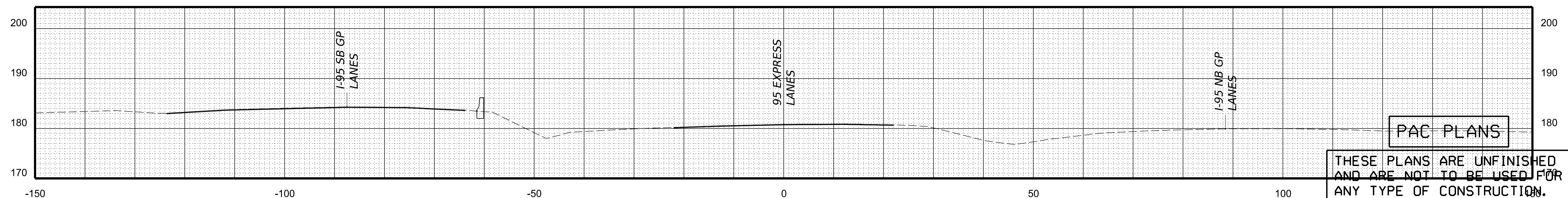
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 715+50.00



STA 715+25.00



STA 715+00.00

PAC PLANS

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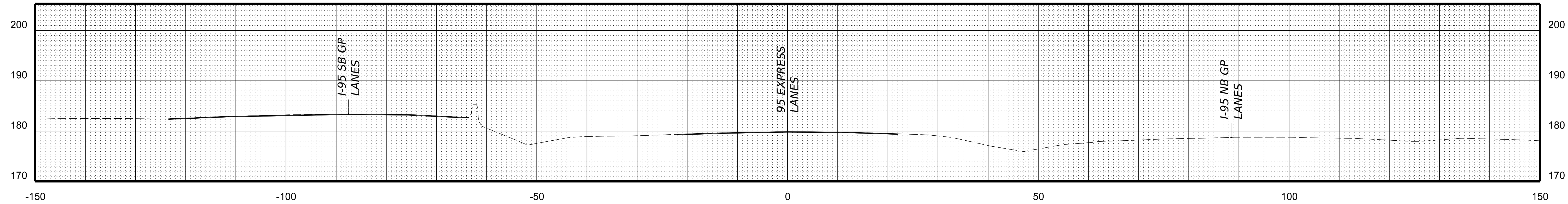
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

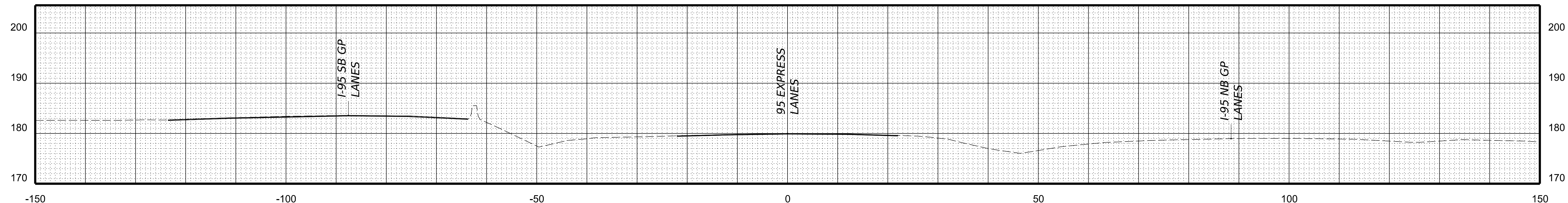
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	173

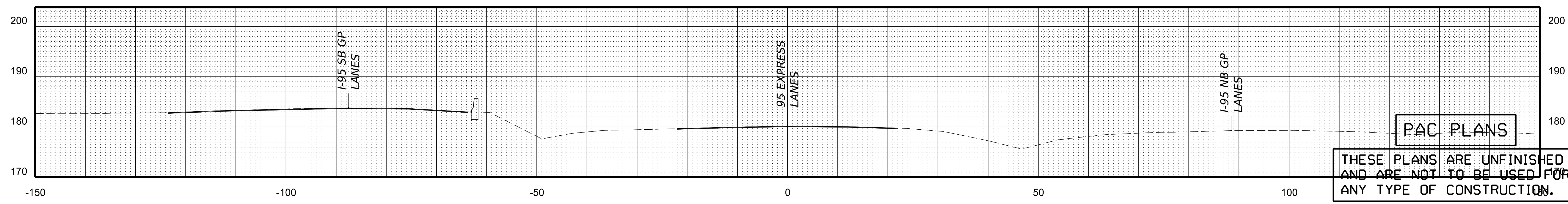
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 716+25.00



STA 716+00.00



STA 715+75.00

PAC PLANS

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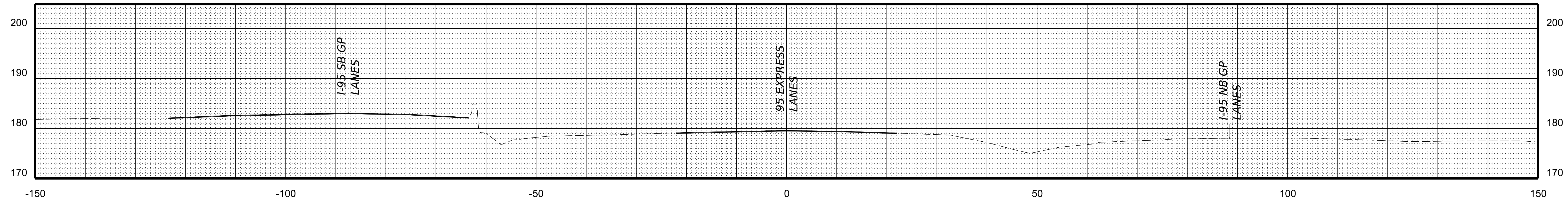
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

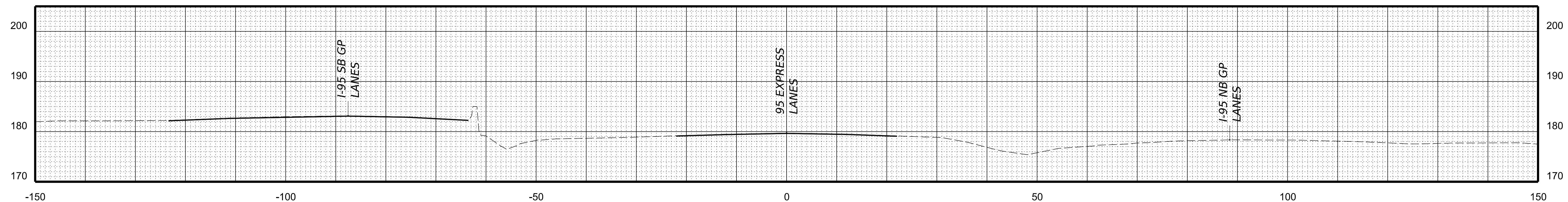
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	174

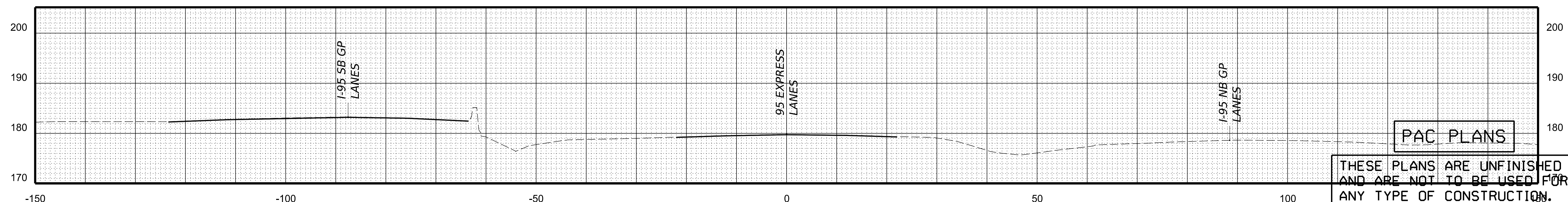
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 717+00.00



STA 716+75.00



STA 716+50.00

PAC PLANS

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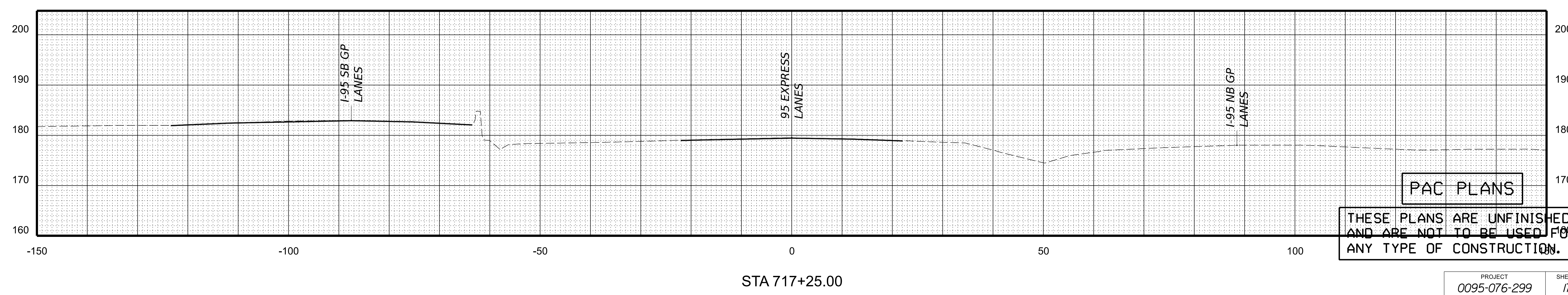
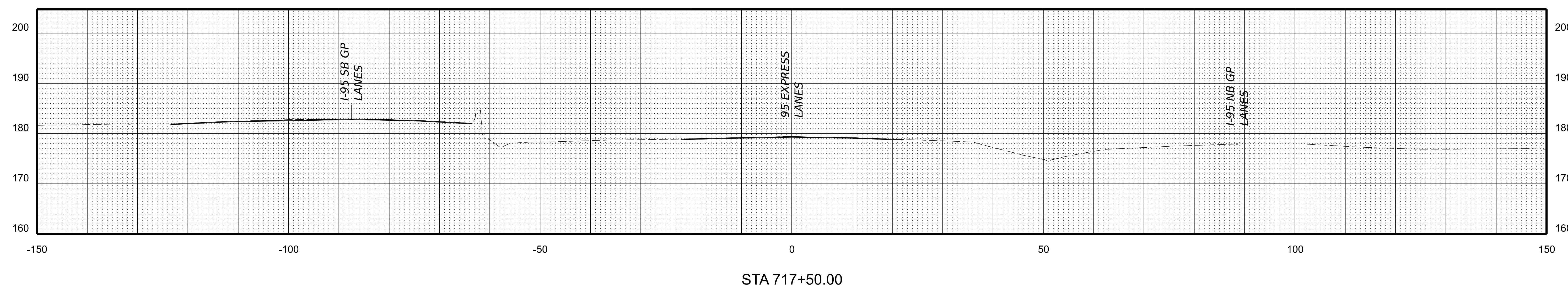
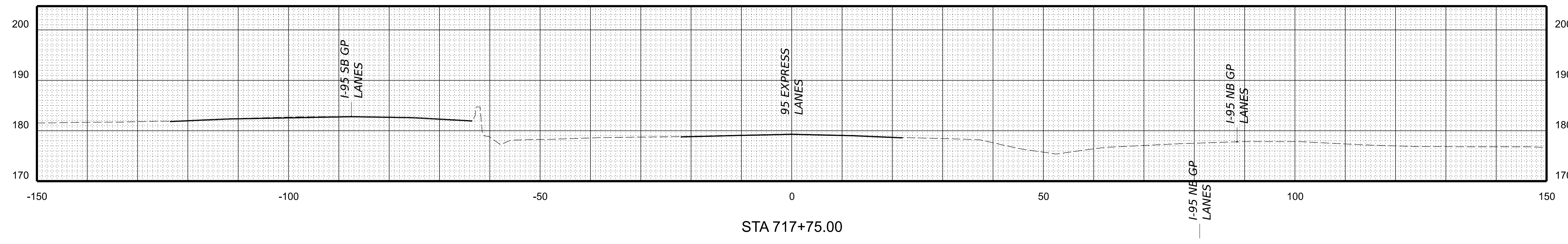
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	175

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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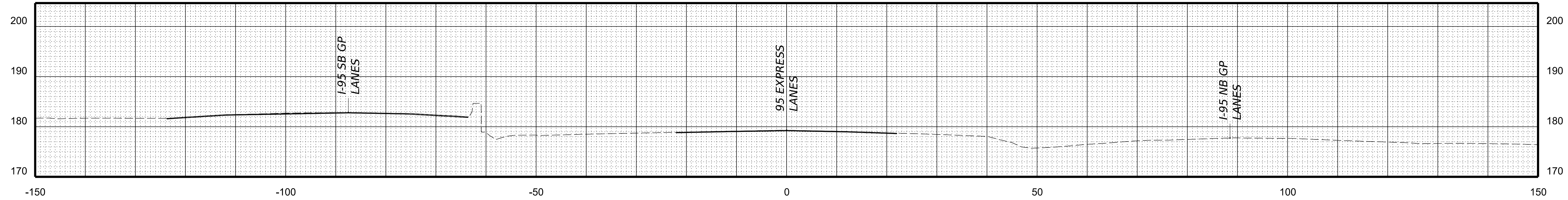
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

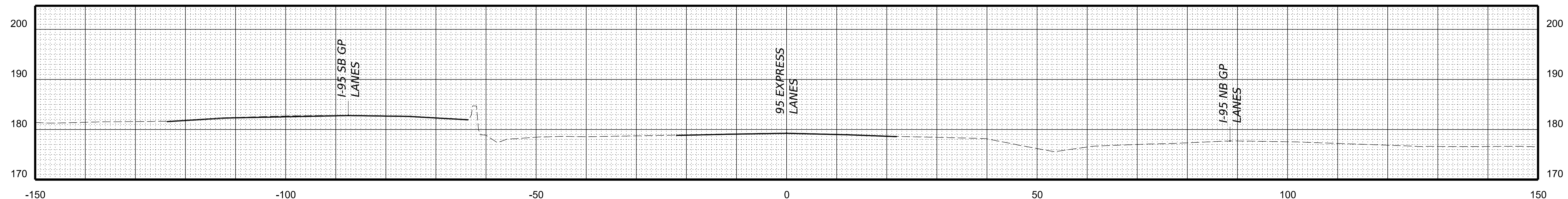
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	176

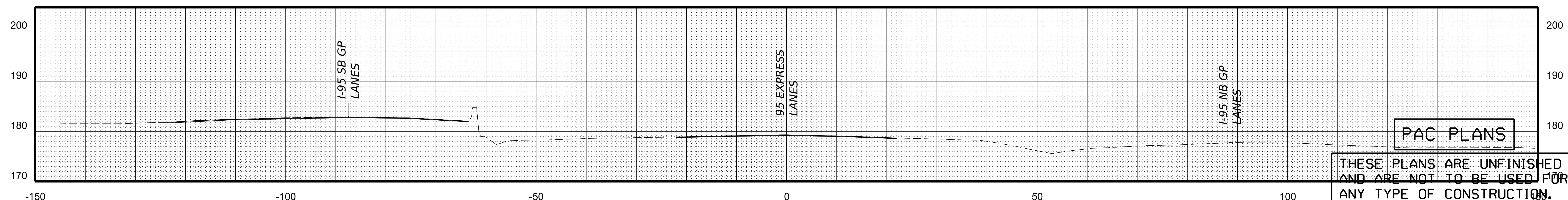
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 718+50.00



STA 718+25.00



STA 718+00.00

PAC PLANS

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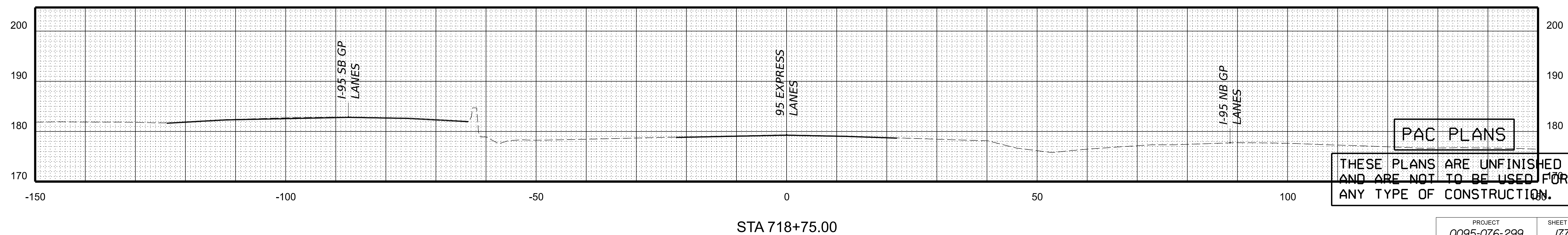
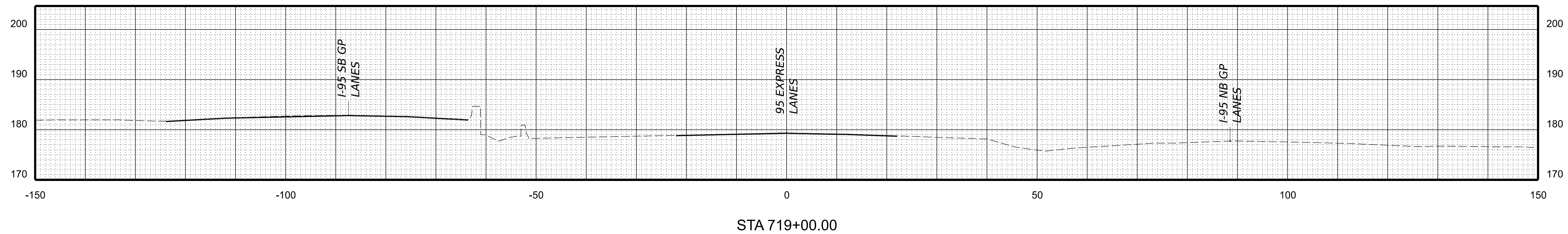
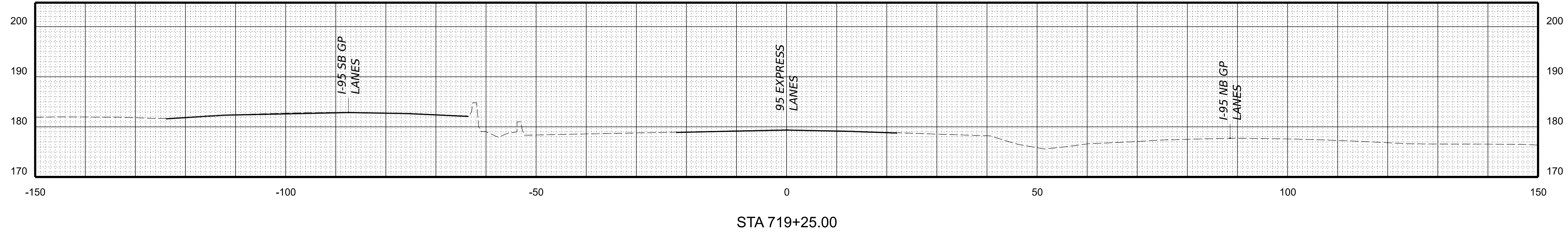
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	177

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



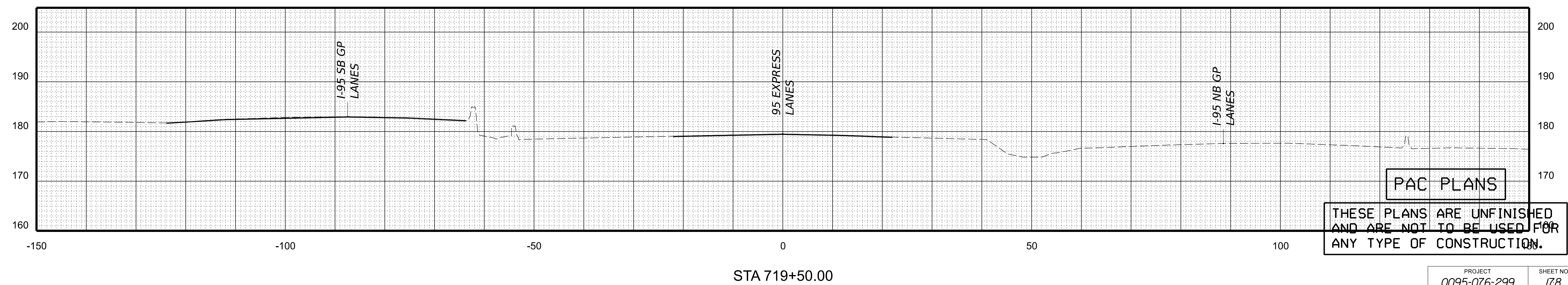
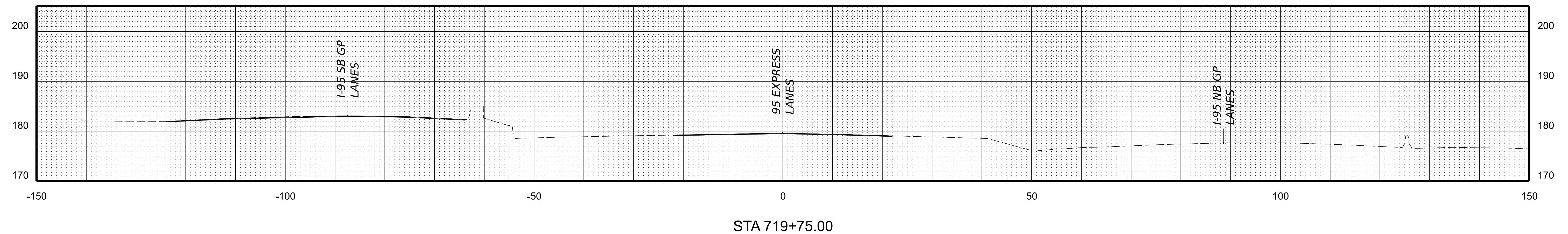
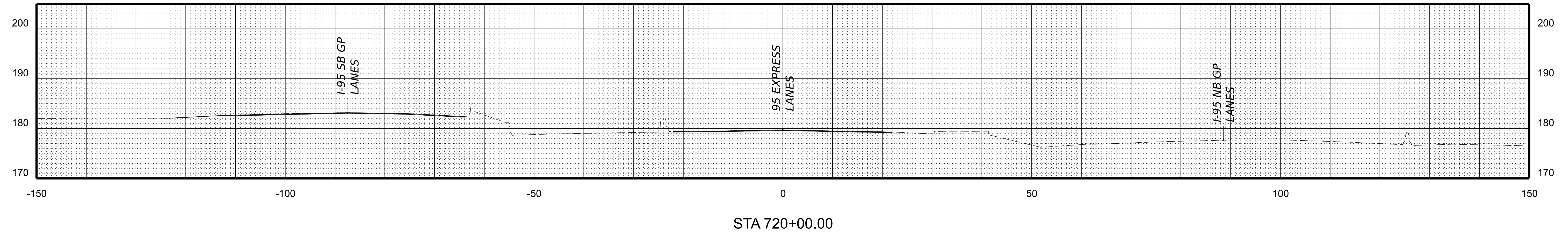
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	178

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PAC PLANS

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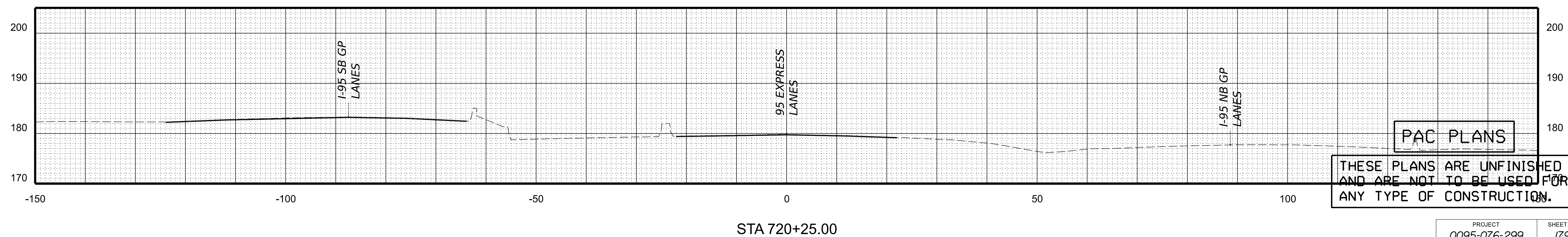
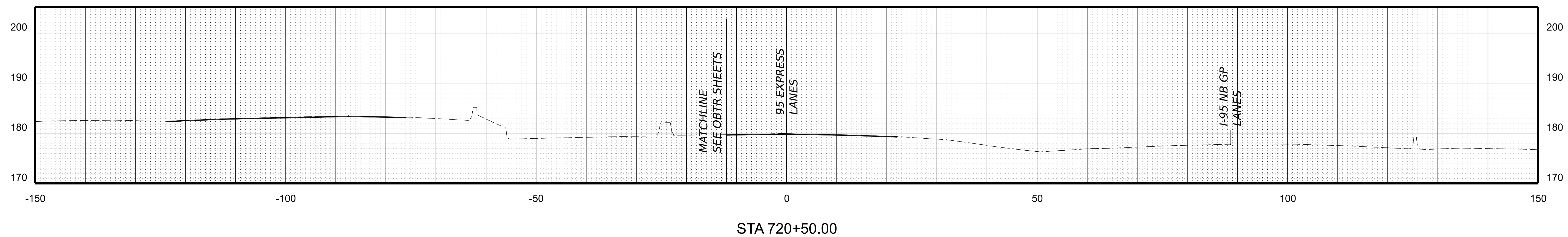
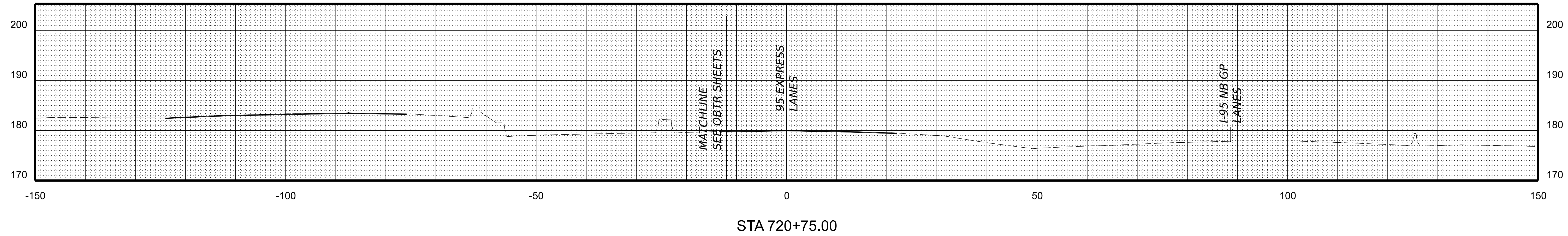
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
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CROSS SECTIONS

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1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	179

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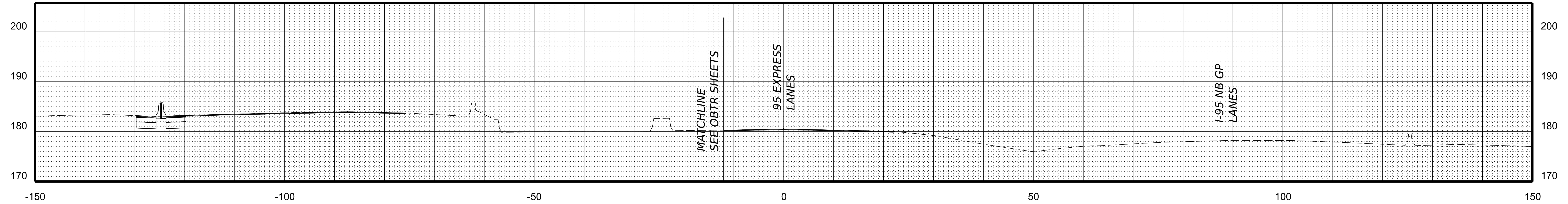
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

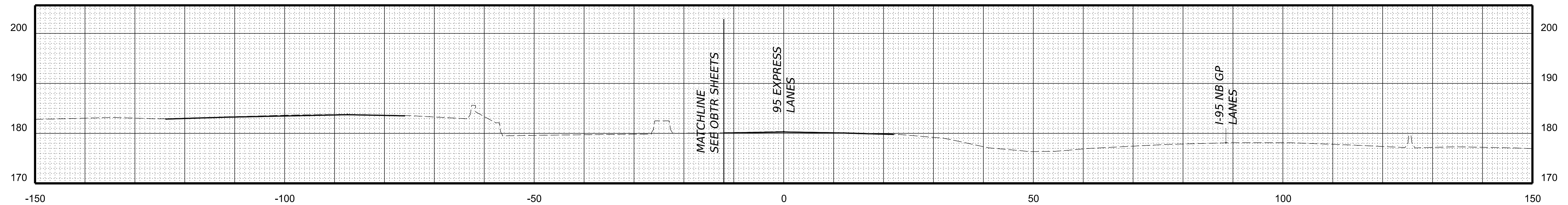
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	180

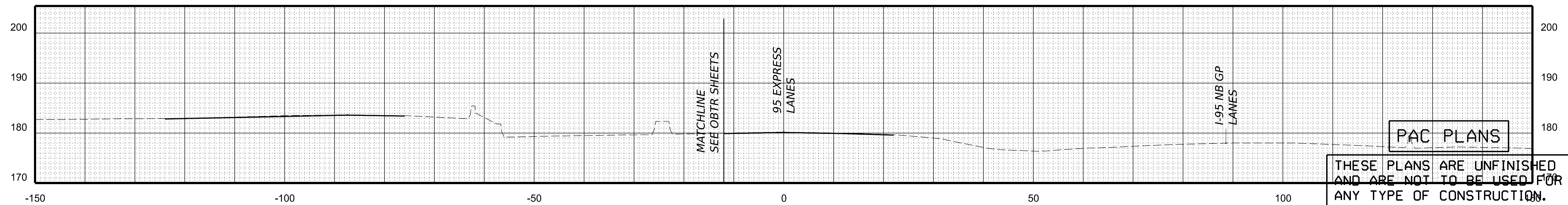
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 721+50.00



STA 721+25.00



STA 721+00.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

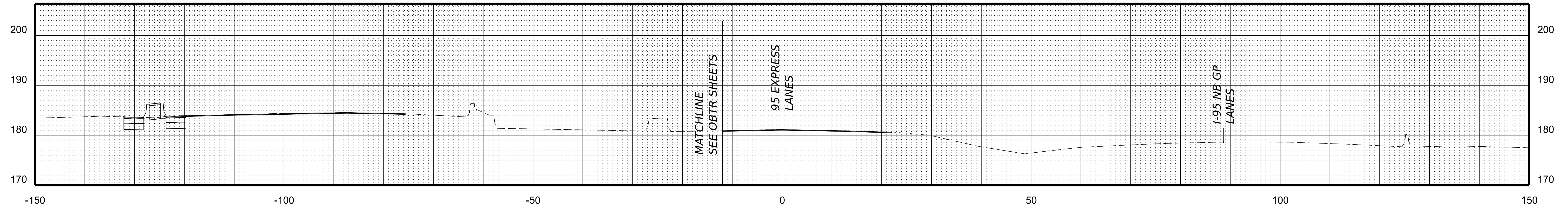
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

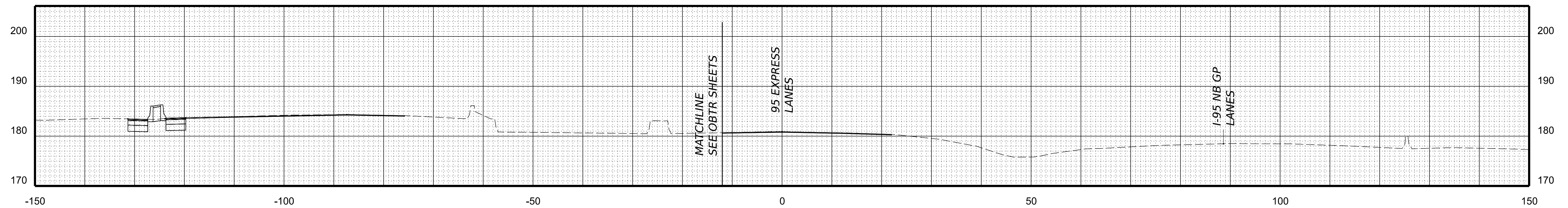
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	181

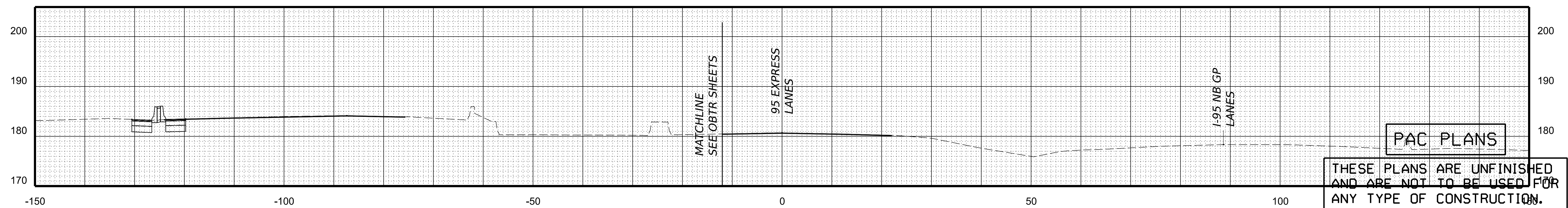
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 722+25.00



STA 722+00.00



STA 721+75.00

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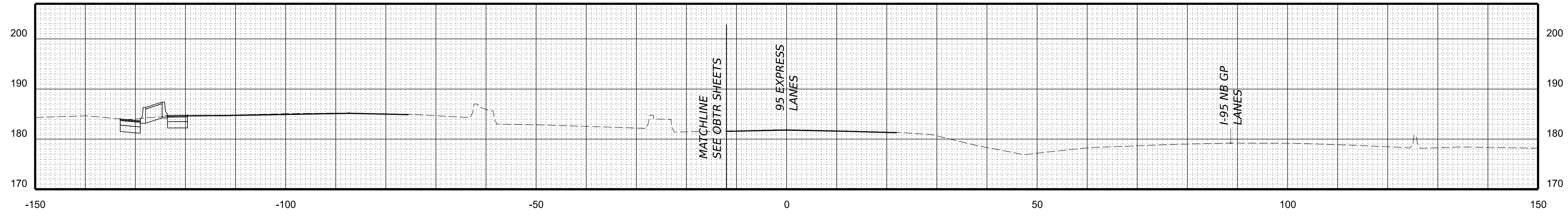
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

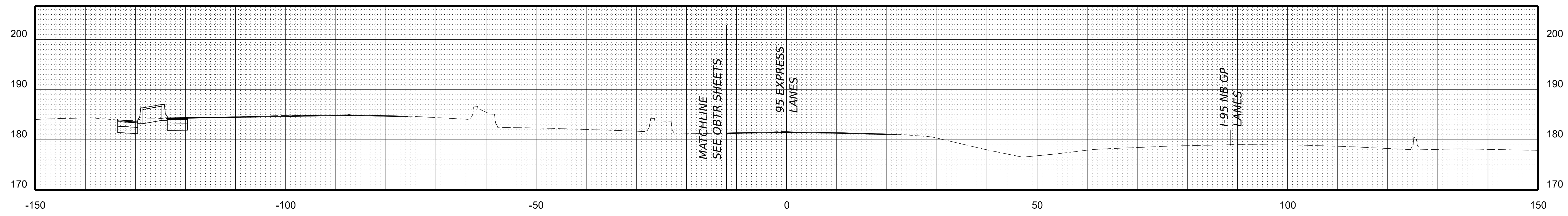
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	182

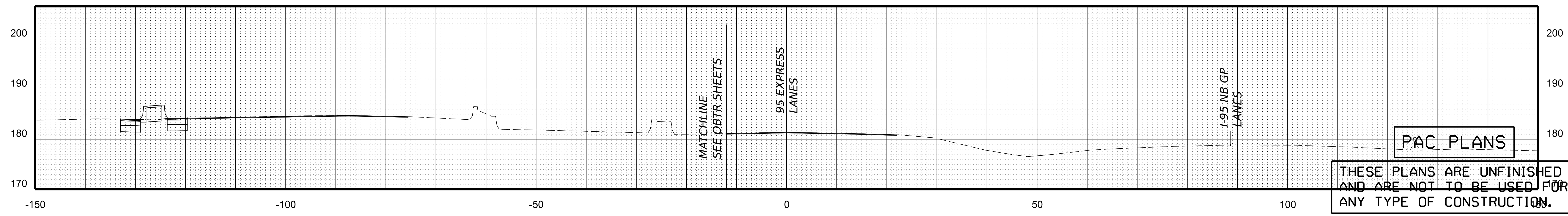
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 723+00.00



STA 722+75.00



STA 722+50.00

PAC PLANS

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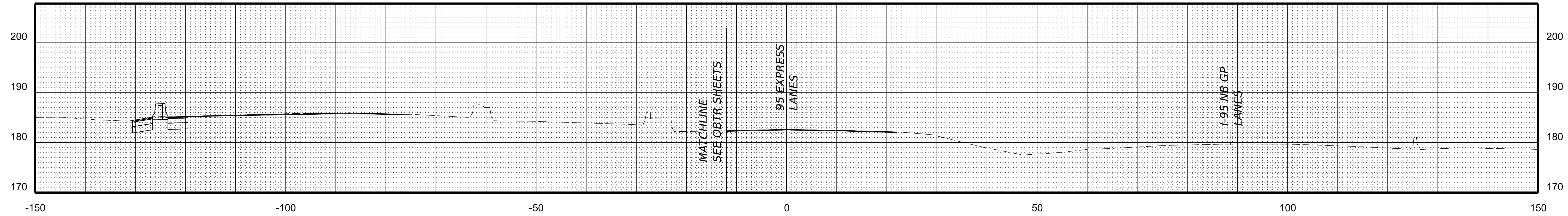
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

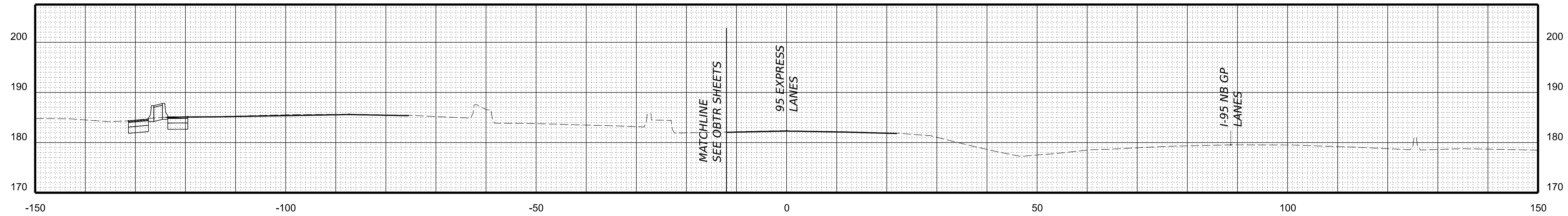
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	183

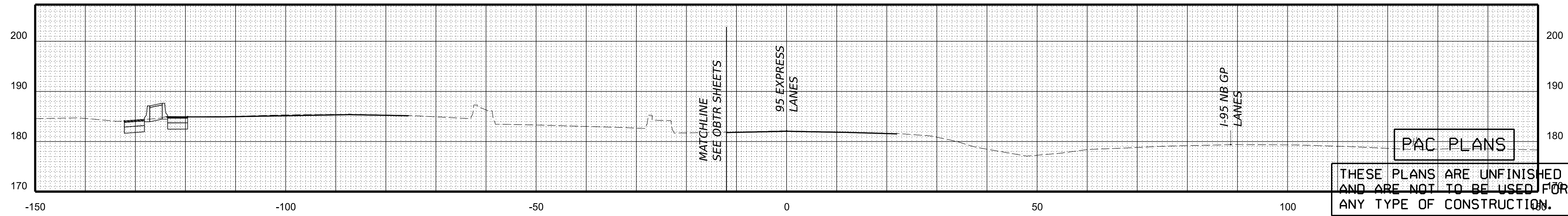
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 723+75.00



STA 723+50.00



STA 723+25.00

PAC PLANS

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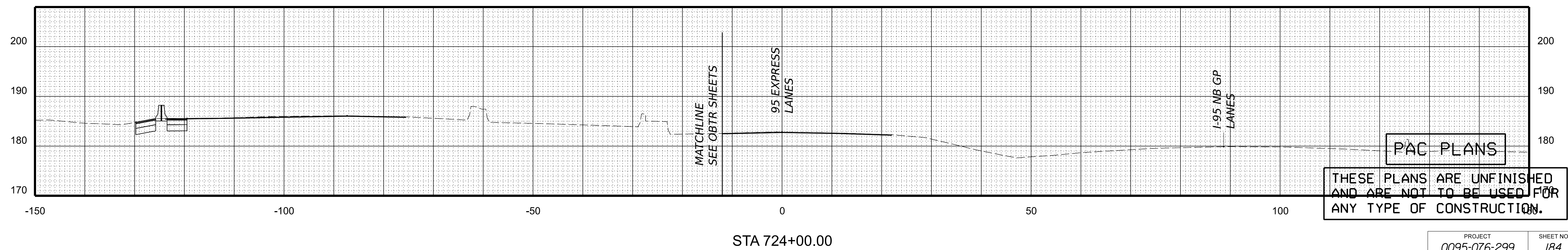
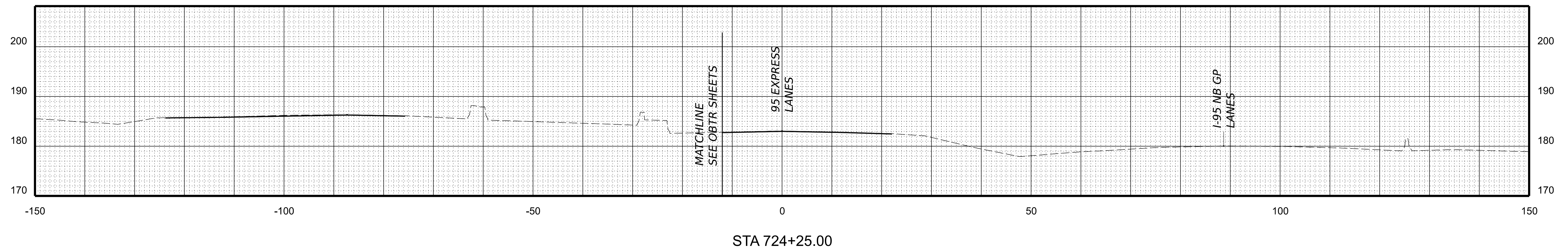
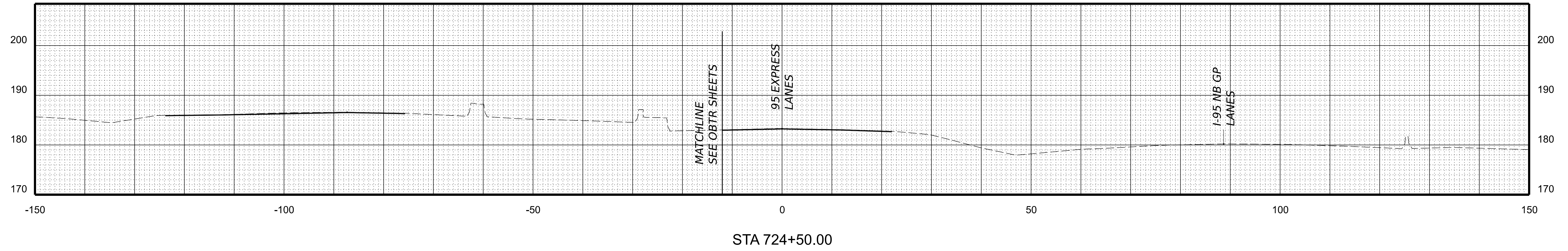
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	184

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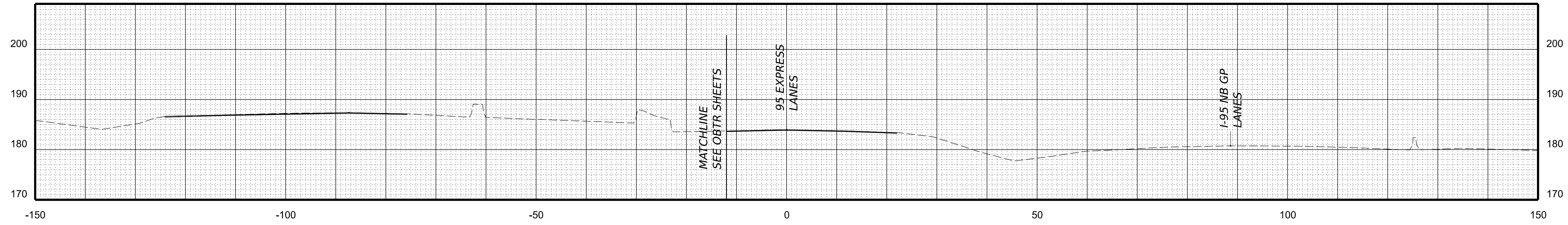
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

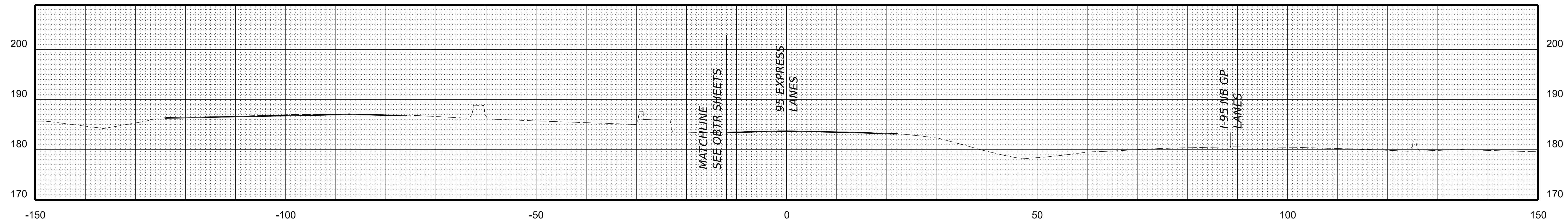
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	185

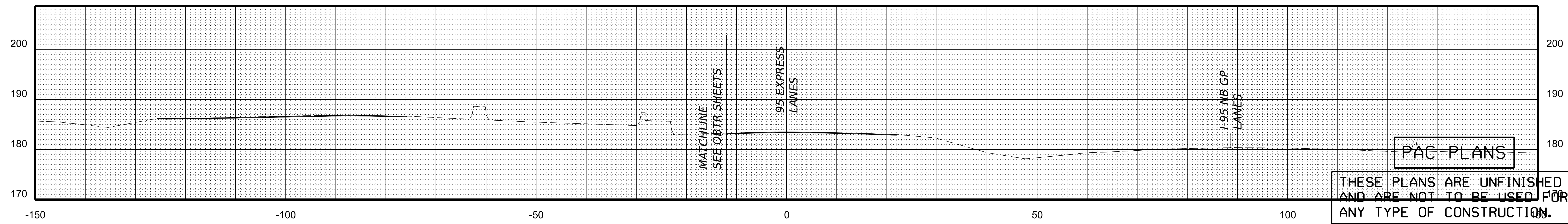
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 725+25.00



STA 725+00.00



STA 724+75.00

PAC PLANS

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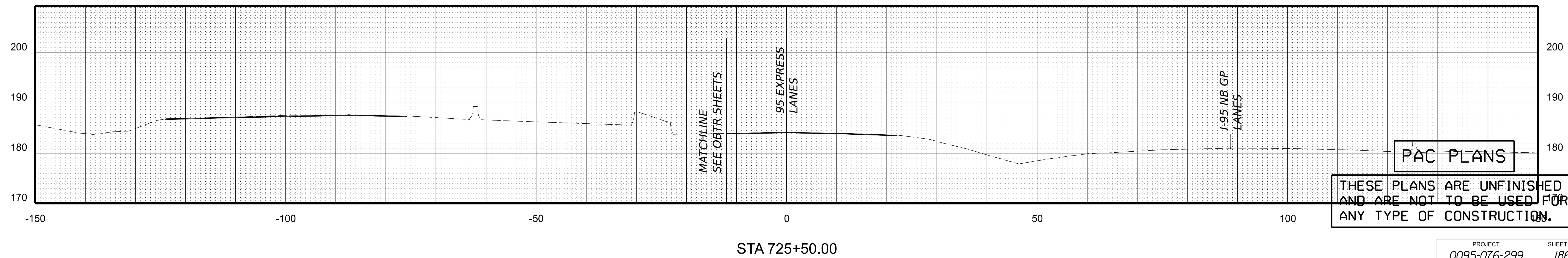
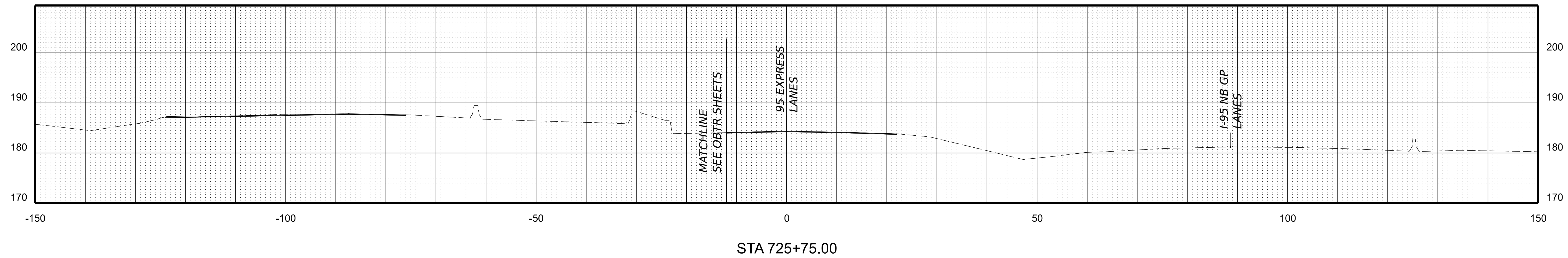
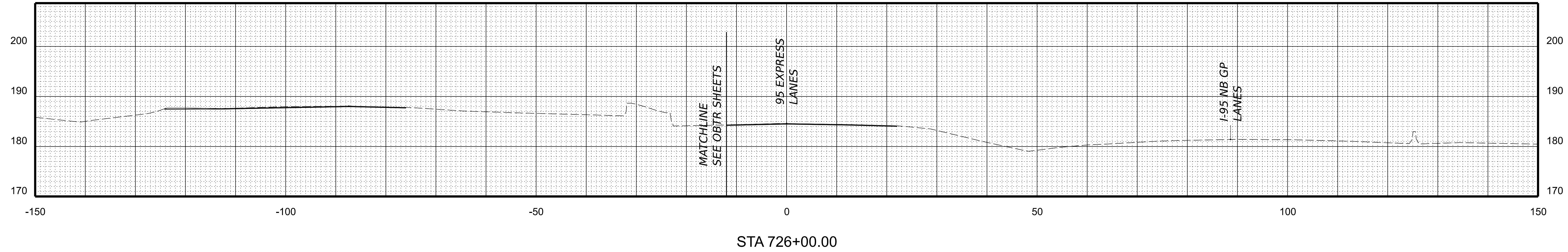
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	186

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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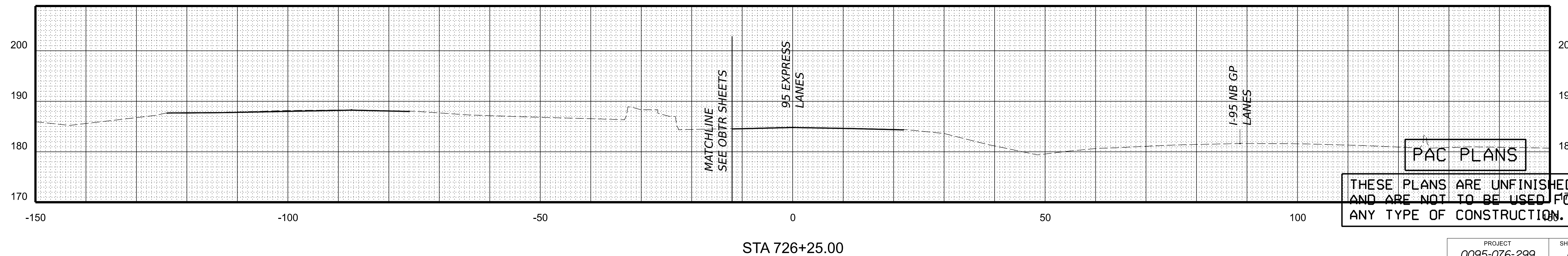
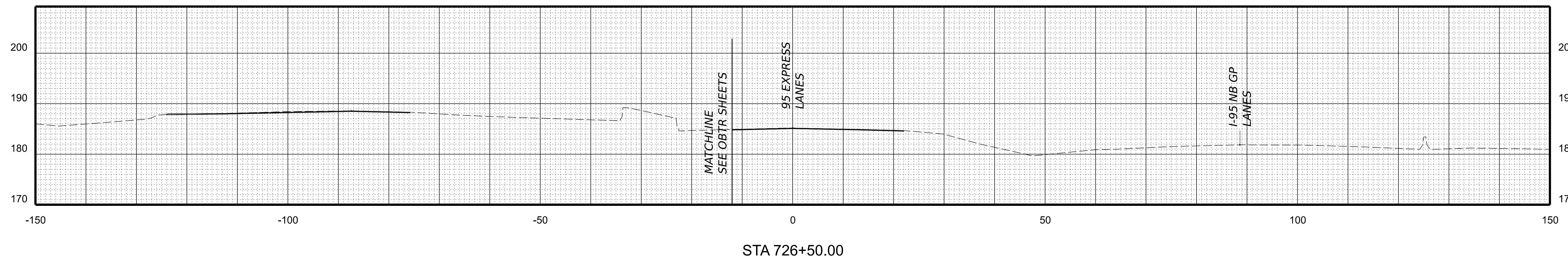
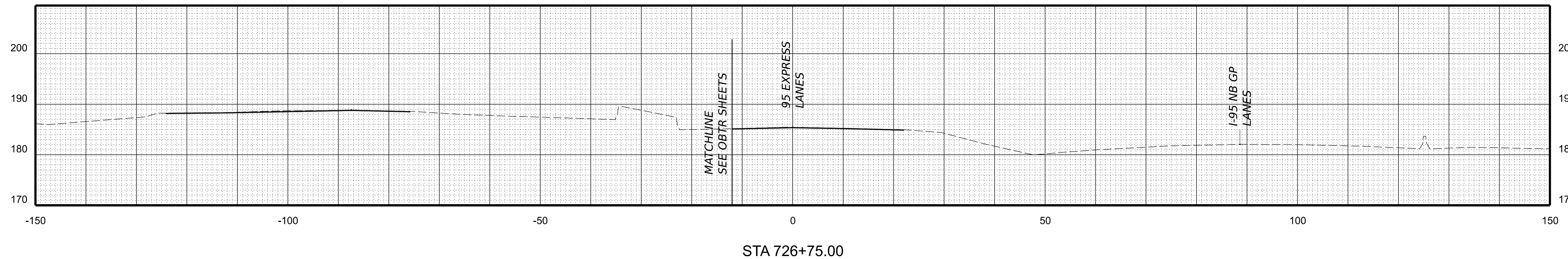
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	187

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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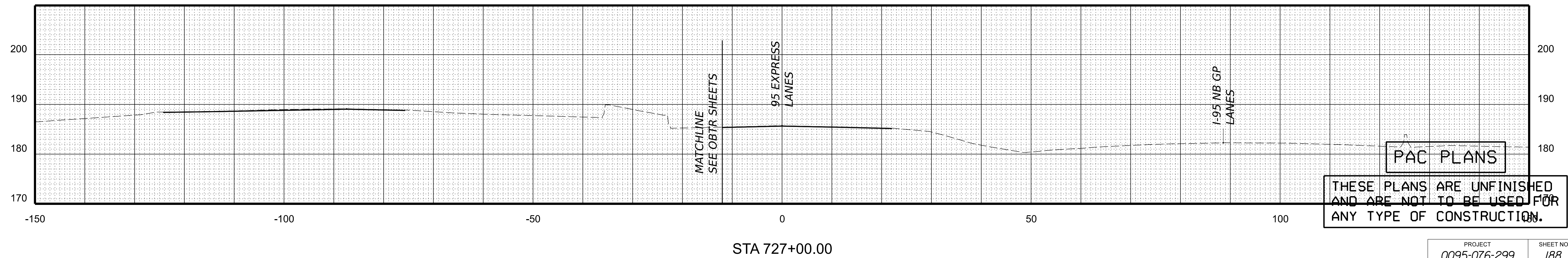
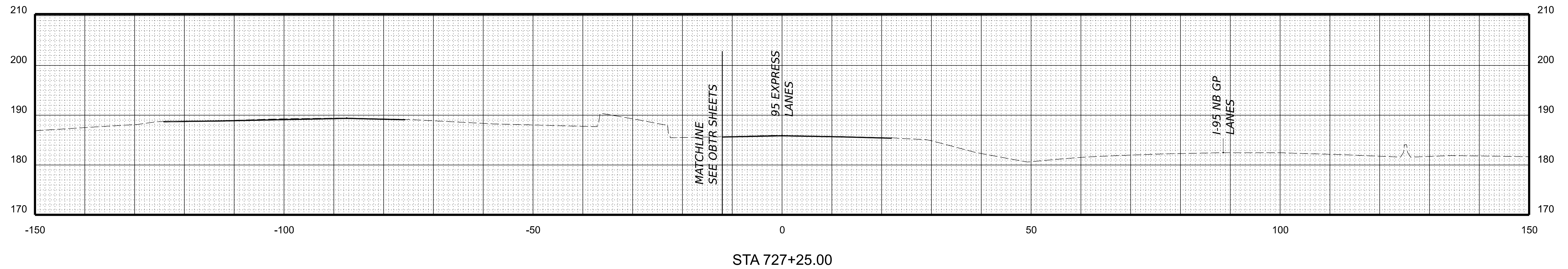
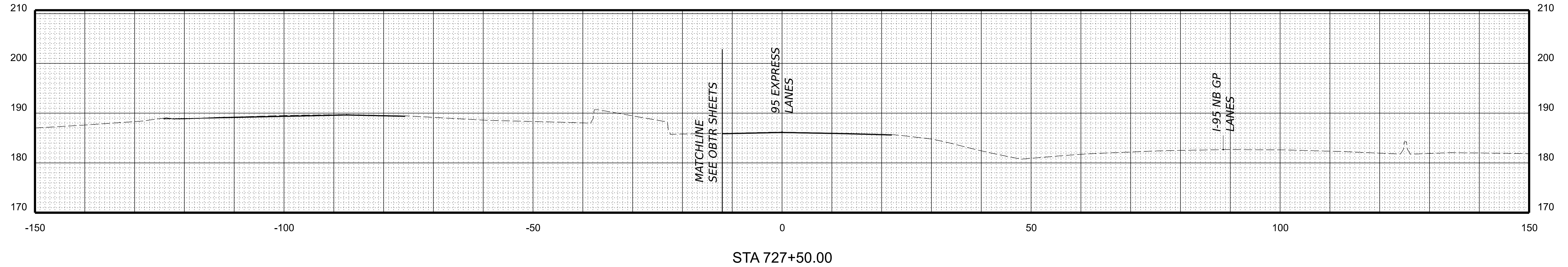
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	188

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



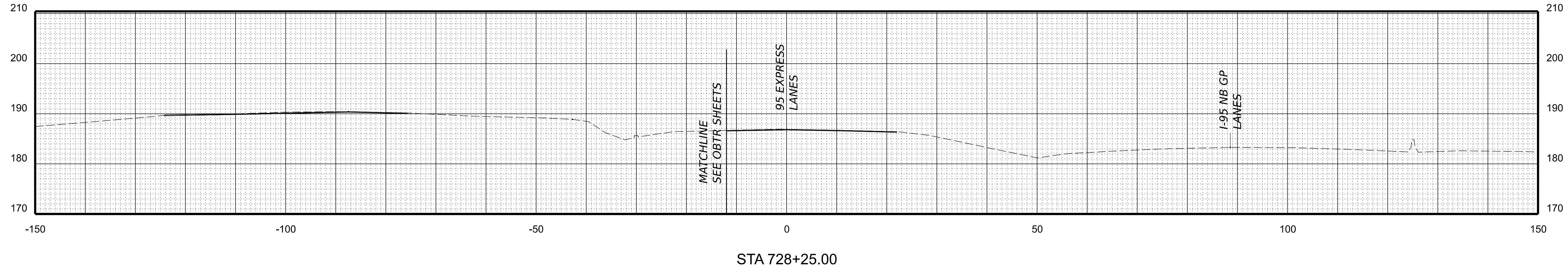
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

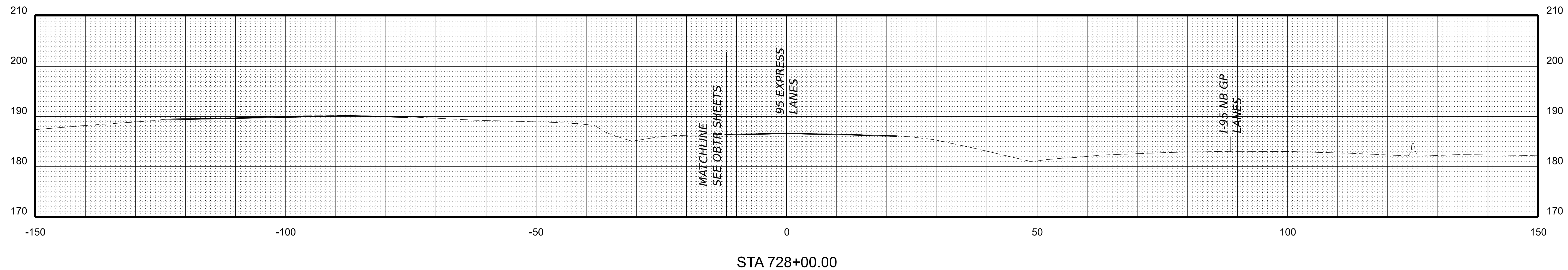
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	189

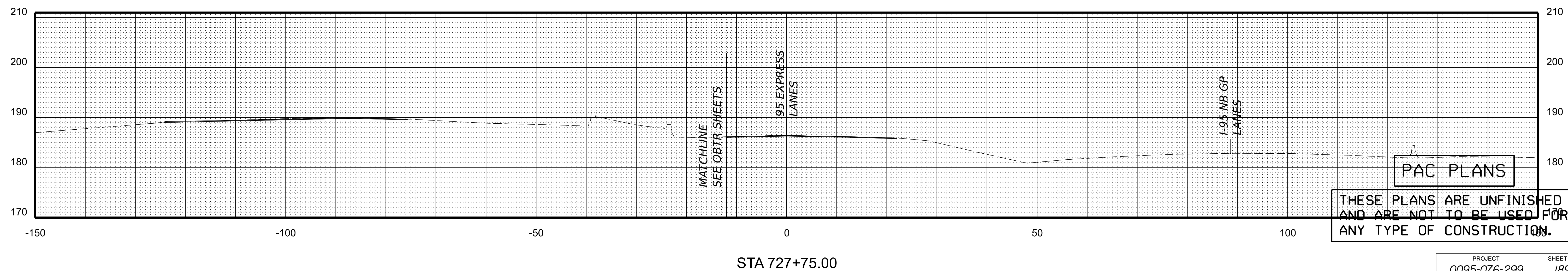
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 728+25.00



STA 728+00.00



STA 727+75.00

PAC PLANS
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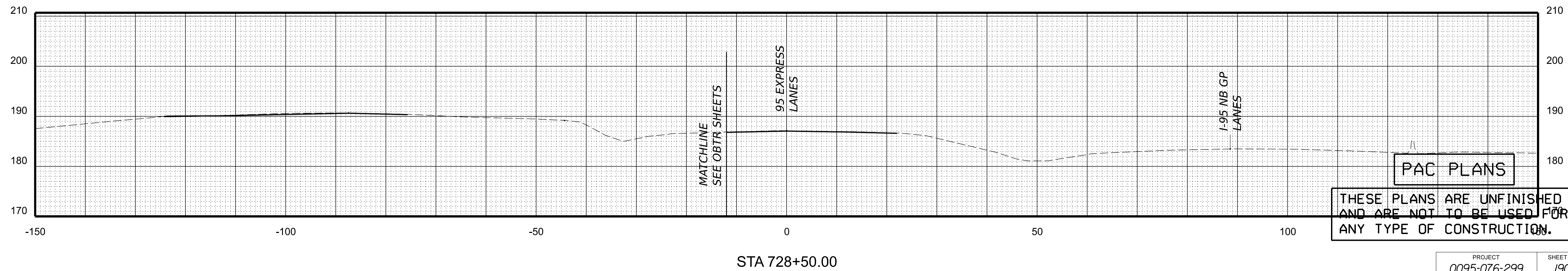
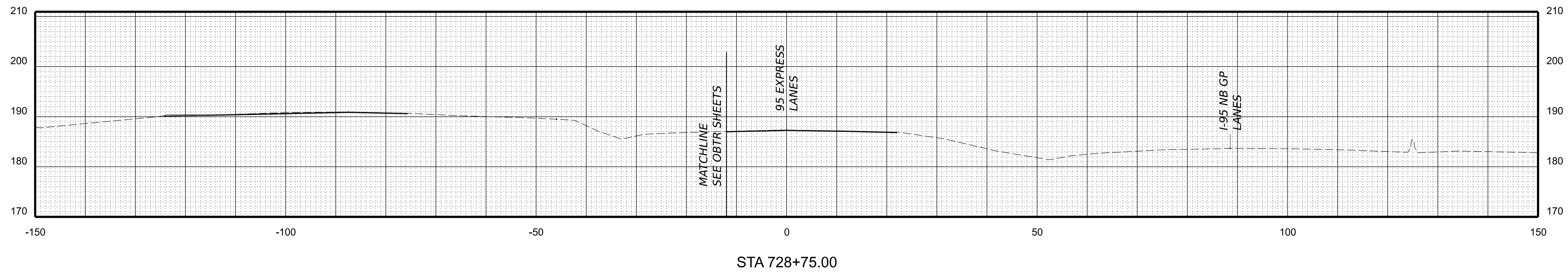
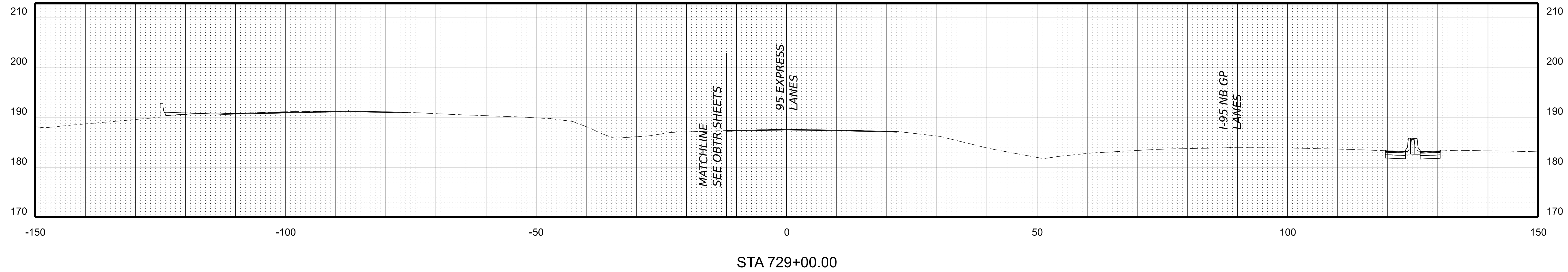
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	190

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



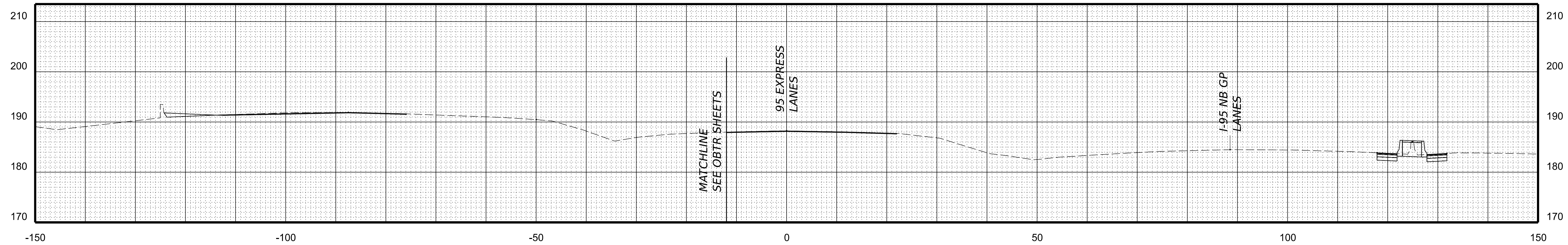
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

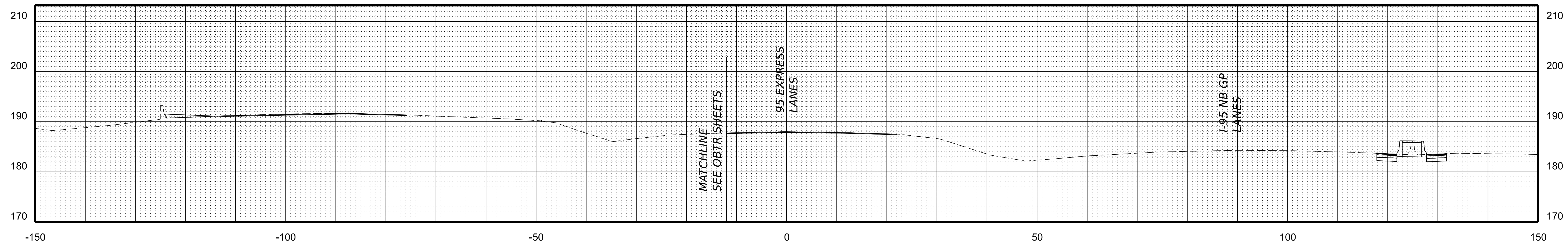
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	191

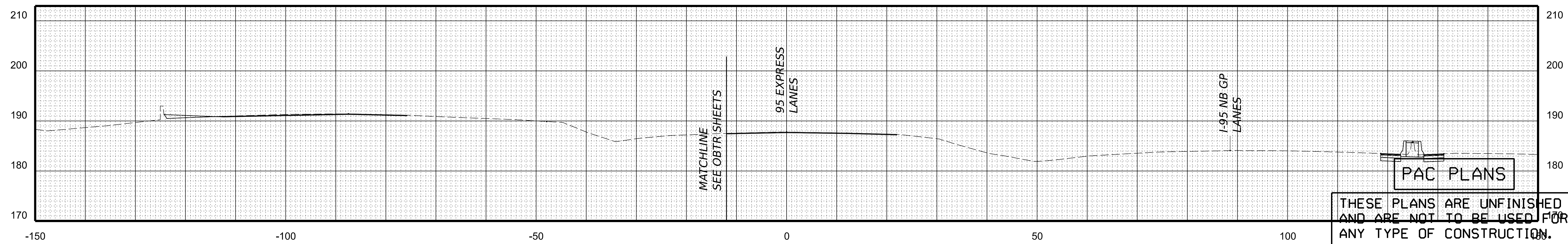
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 729+75.00



STA 729+50.00



STA 729+25.00

PAC PLANS

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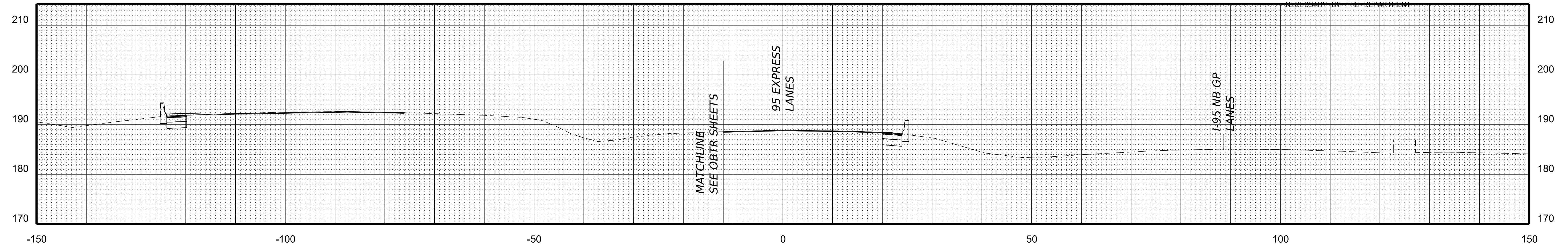
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

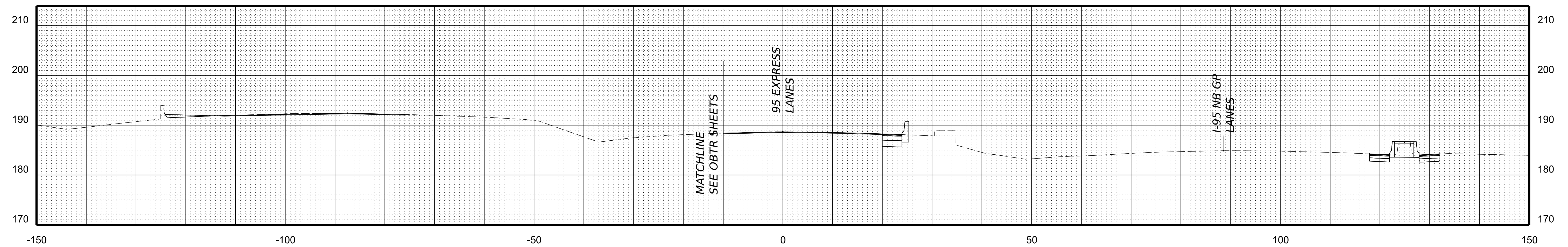
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	192

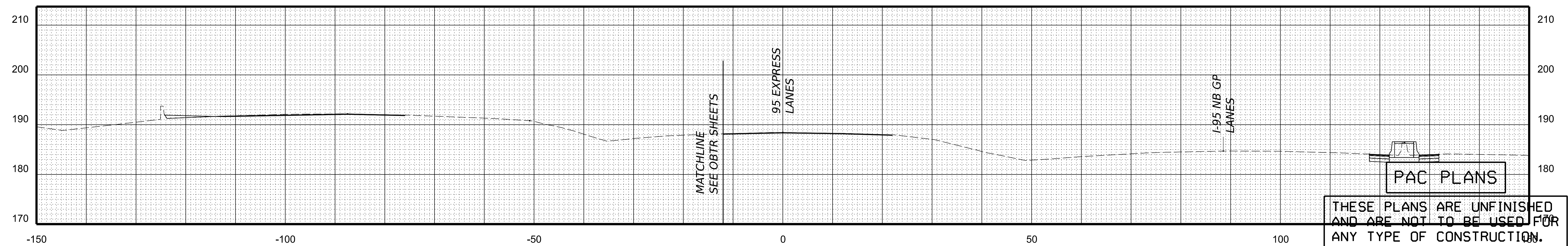
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 730+50.00



STA 730+25.00



STA 730+00.00

PAC PLANS

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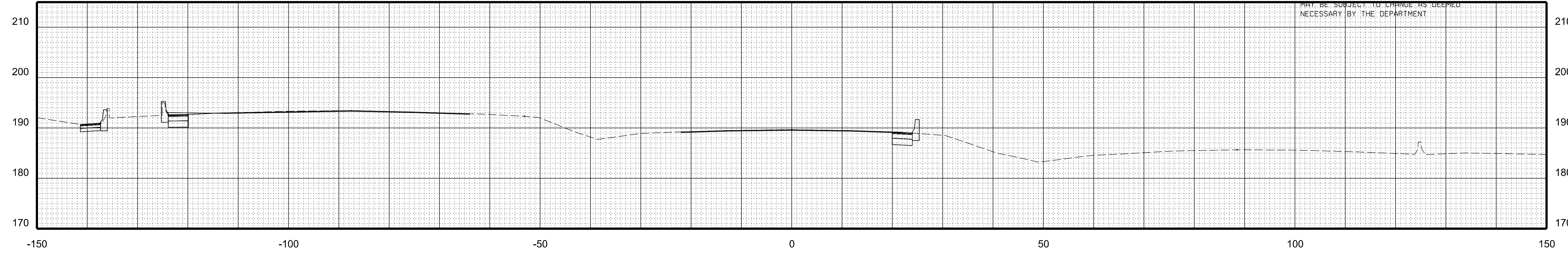
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
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CROSS SECTIONS

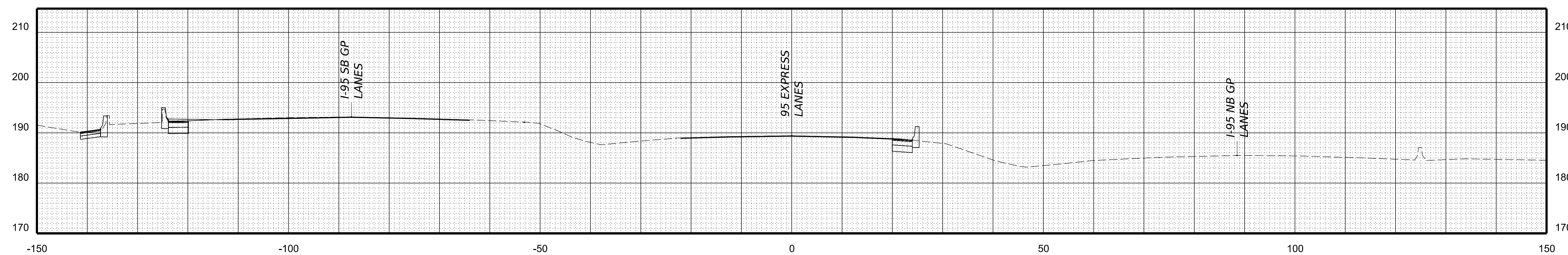
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	193

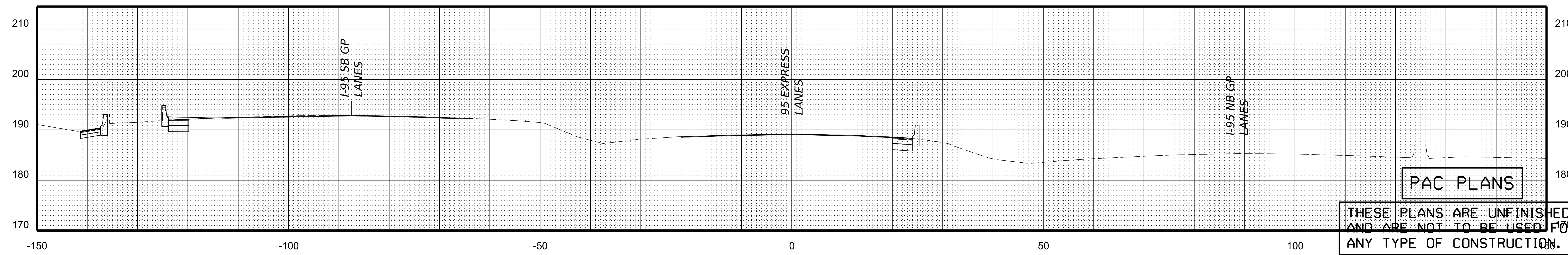
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 731+25.00
OPITZ BLVD STA. 67+75.73 =
XBL STA. 731+24.61



STA 731+00.00



STA 730+75.00

PAC PLANS
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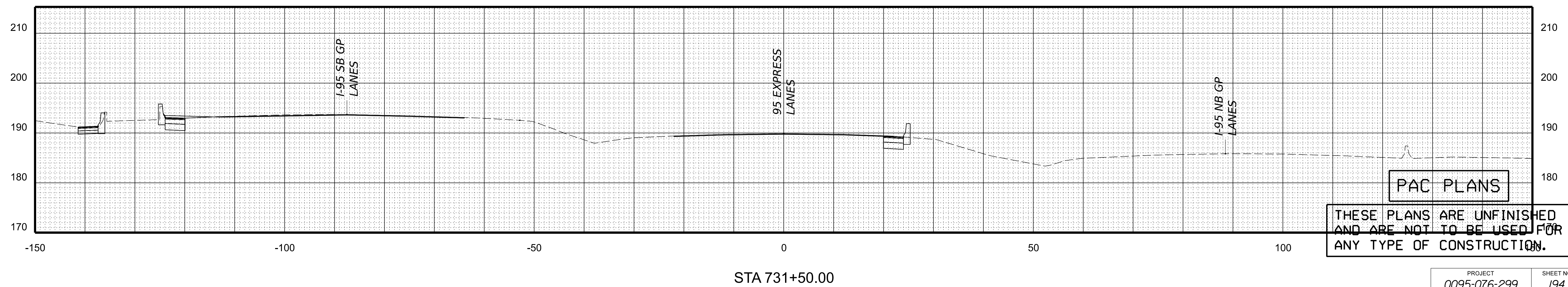
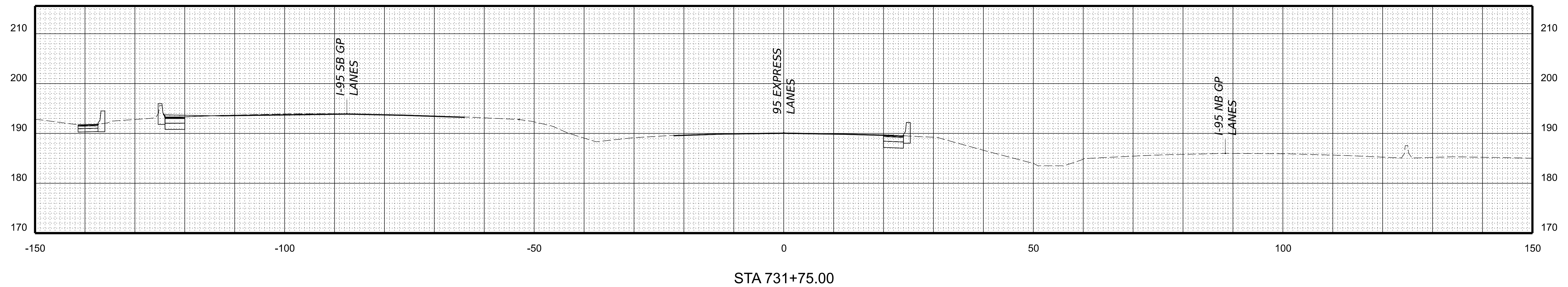
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	194

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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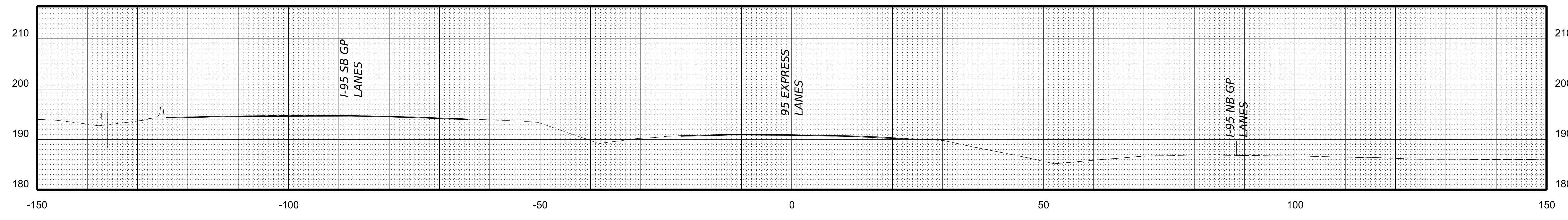
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

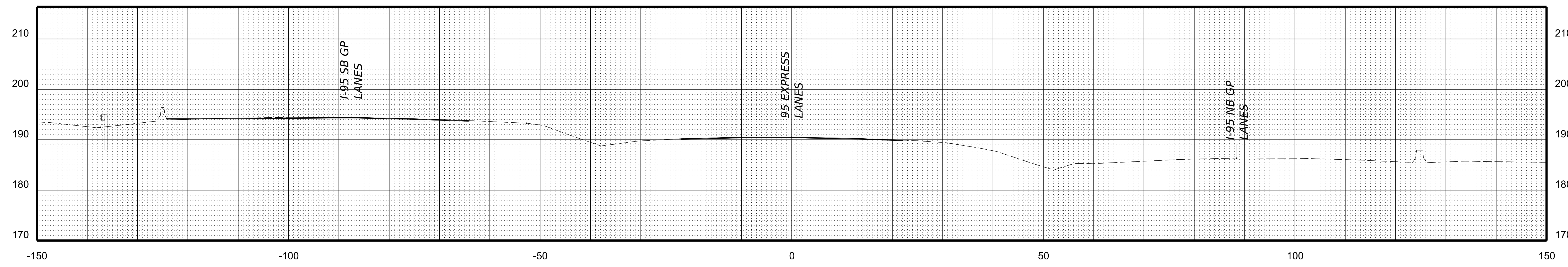
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	195

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 732+50.00



STA 732+25.00



STA 732+00.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

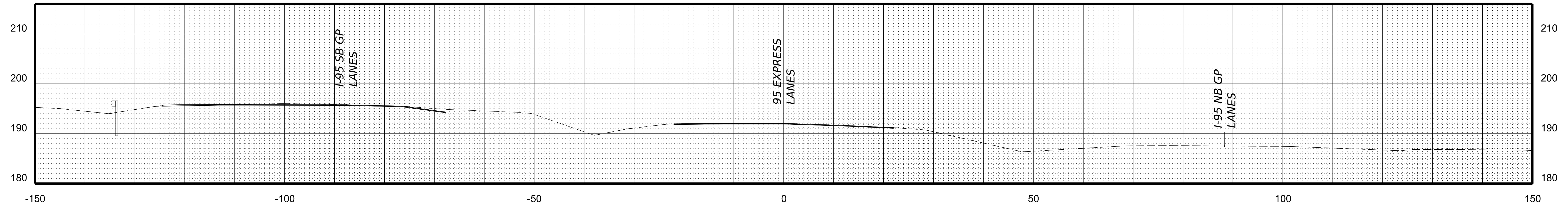
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

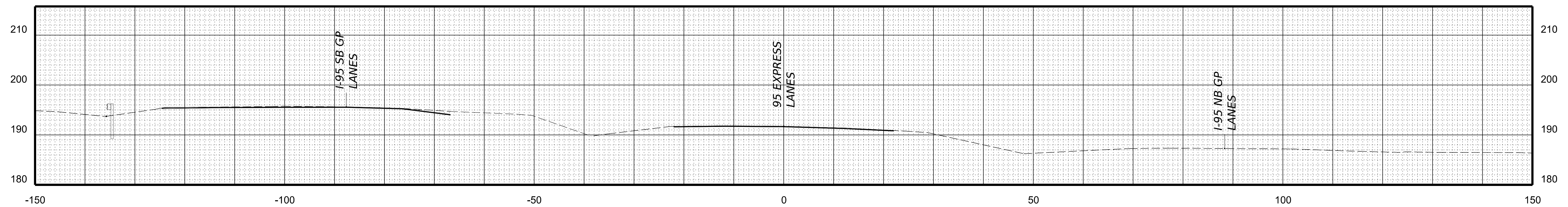
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	196

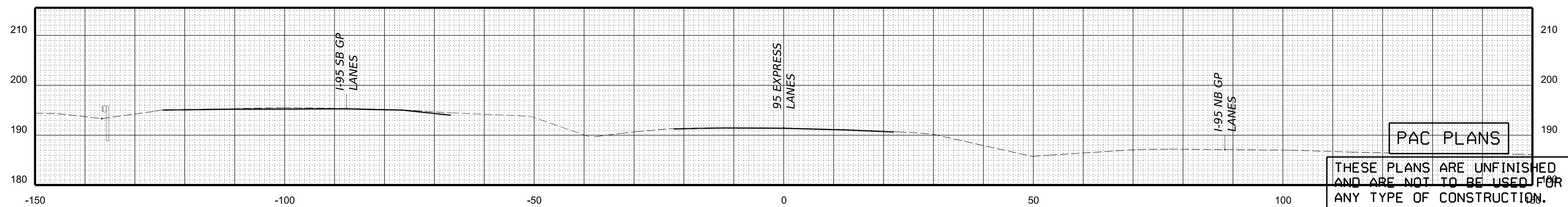
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 733+25.00



STA 733+00.00



STA 732+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

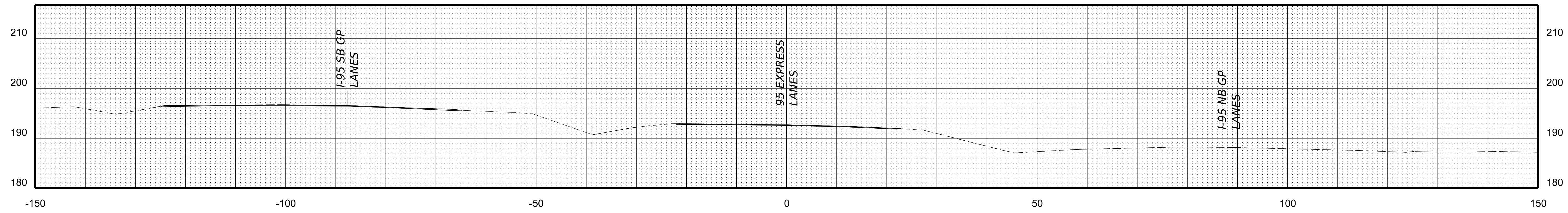
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

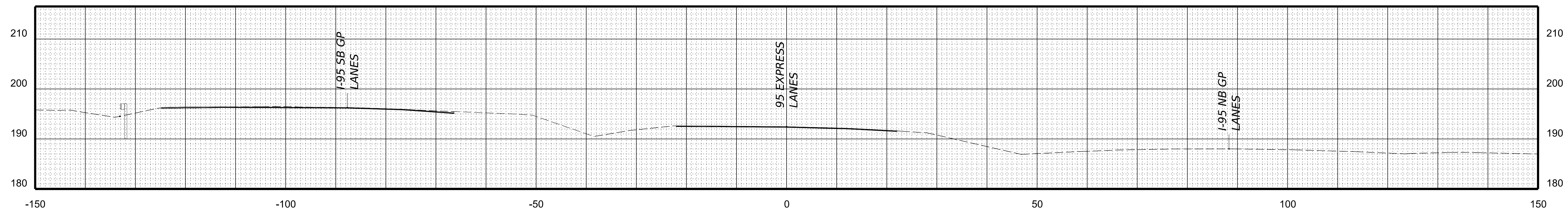
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	197

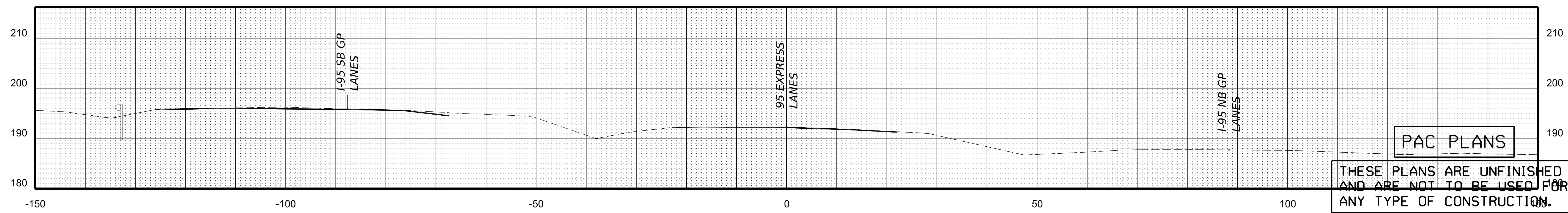
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 734+00.00



STA 733+75.00



STA 733+50.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

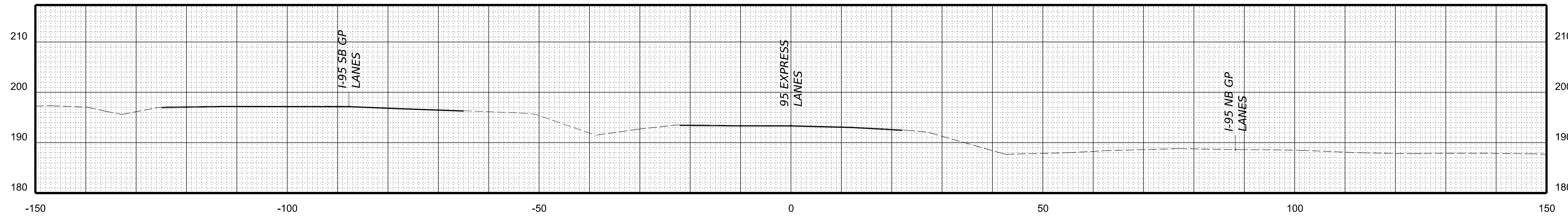
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

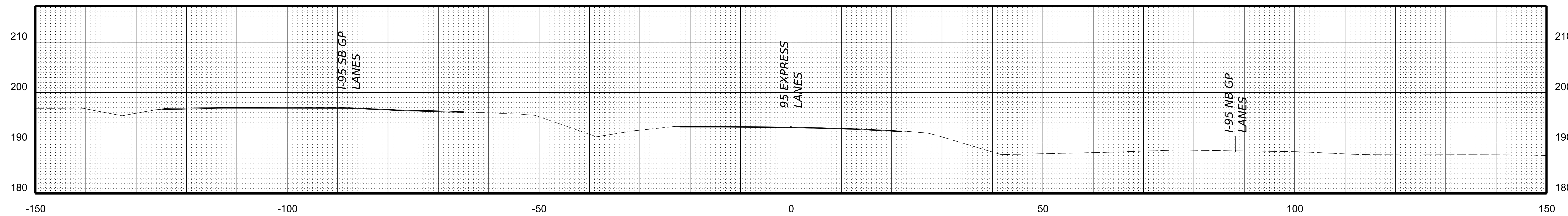
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	198

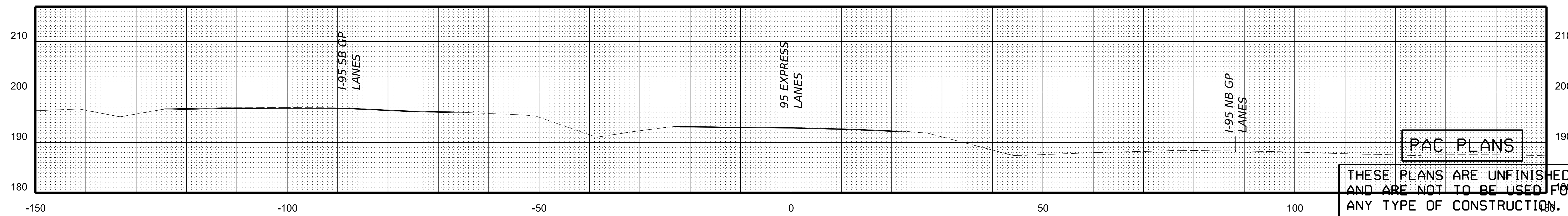
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 734+75.00



STA 734+50.00



STA 734+25.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

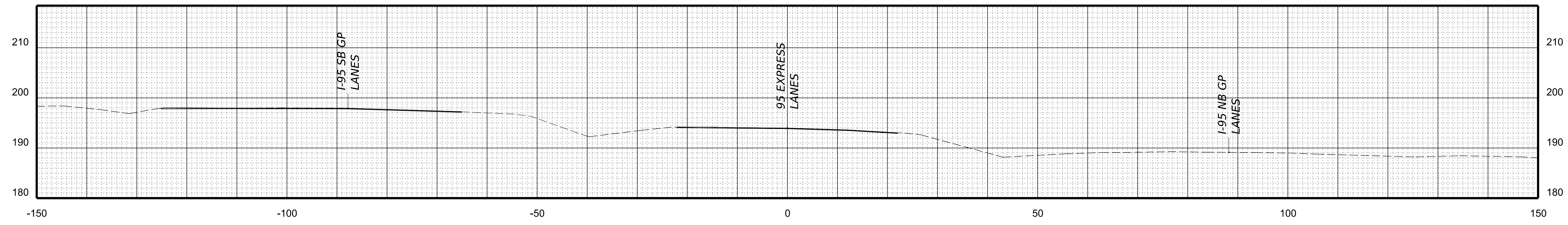
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	199

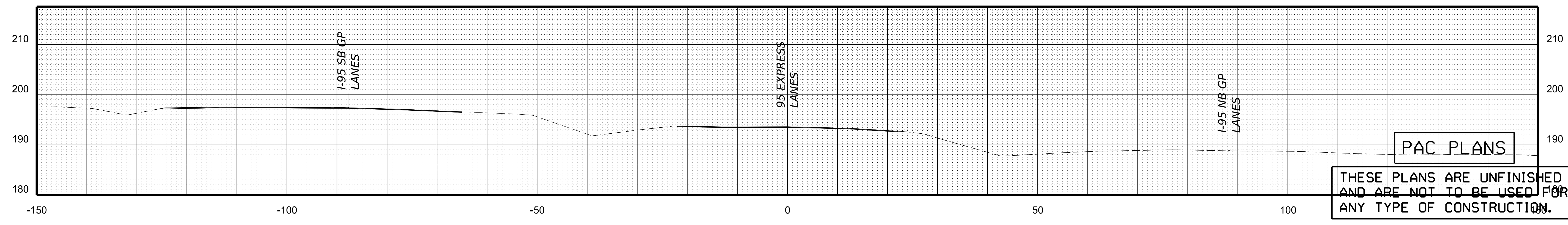
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 735+50.00



STA 735+25.00



STA 735+00.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

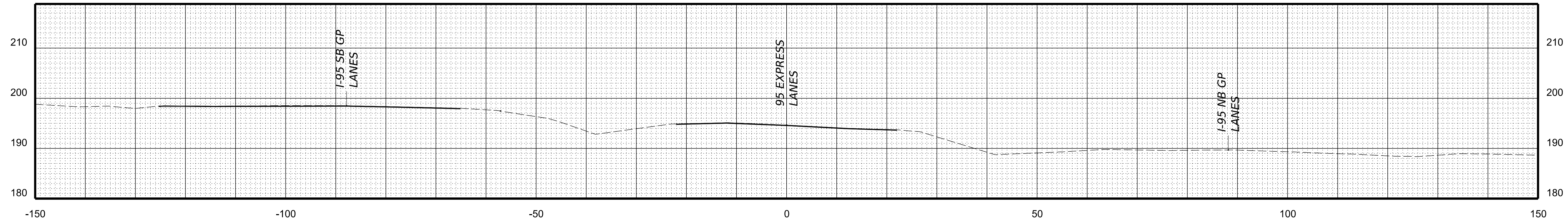
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

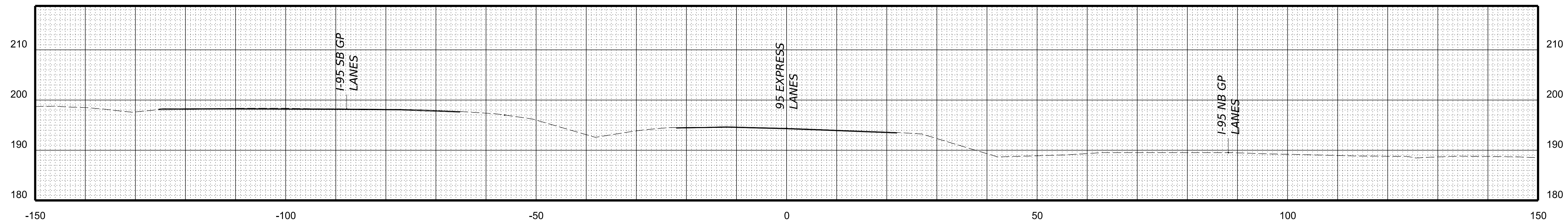
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	200

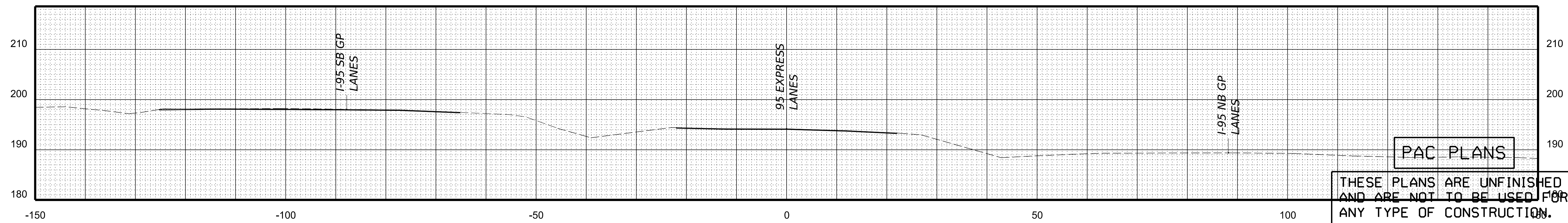
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 736+25.00



STA 736+00.00



STA 735+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

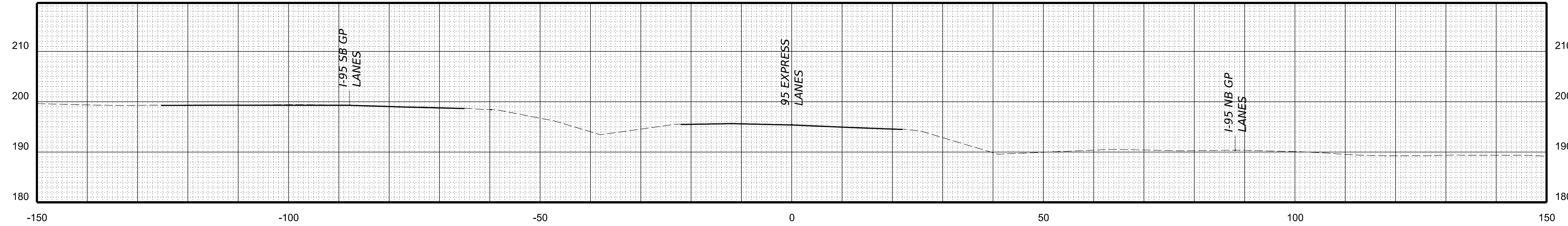
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

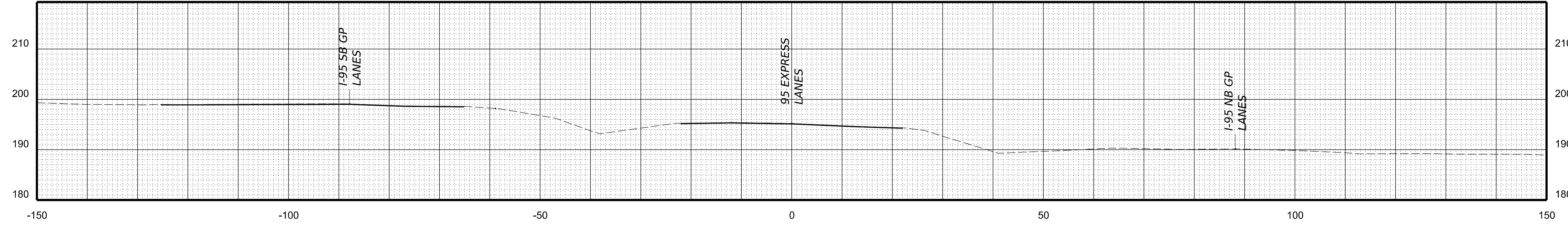
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	201

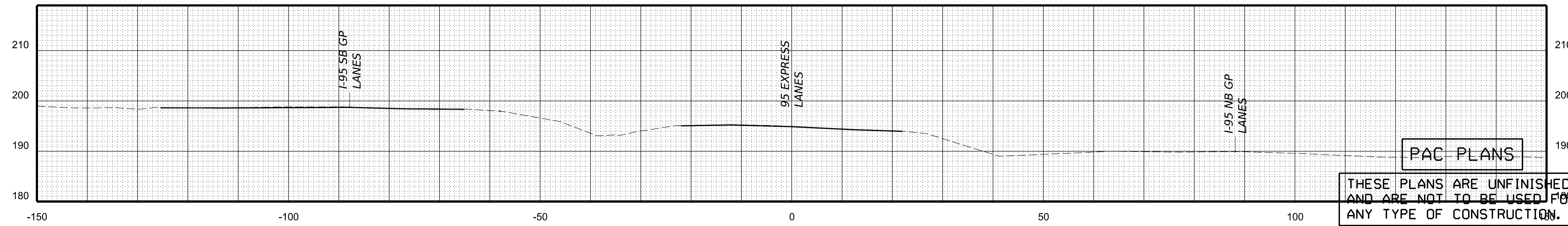
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 737+00.00



STA 736+75.00



STA 736+50.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

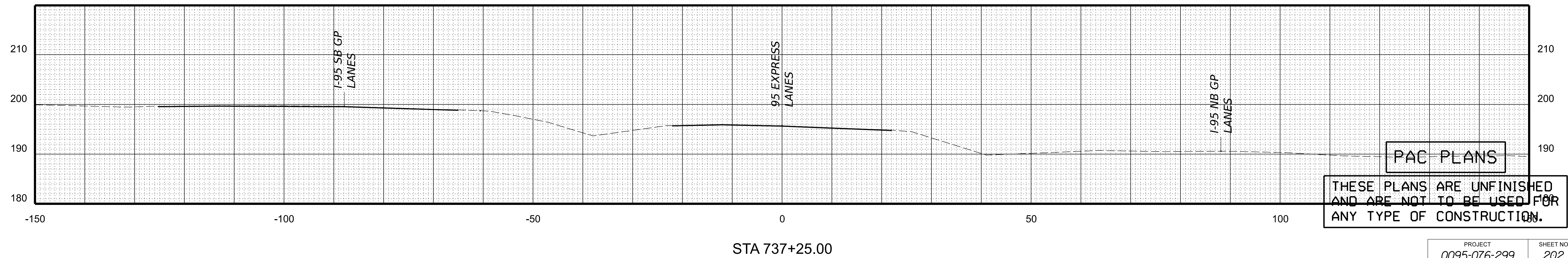
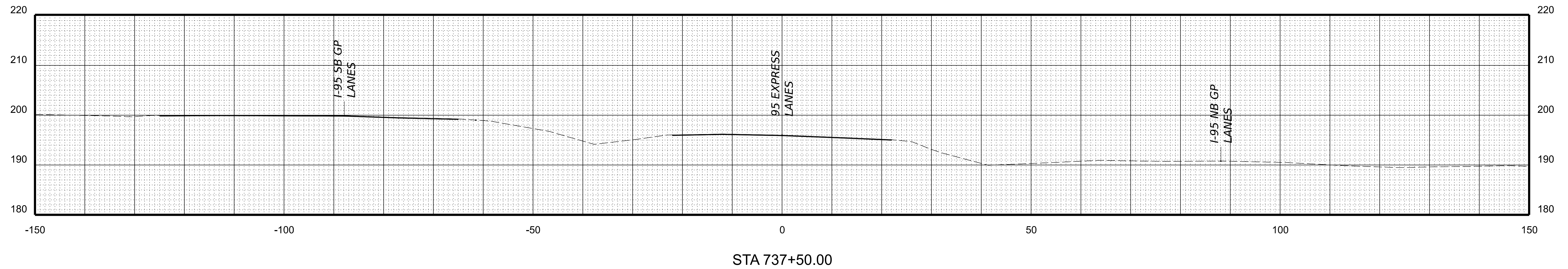
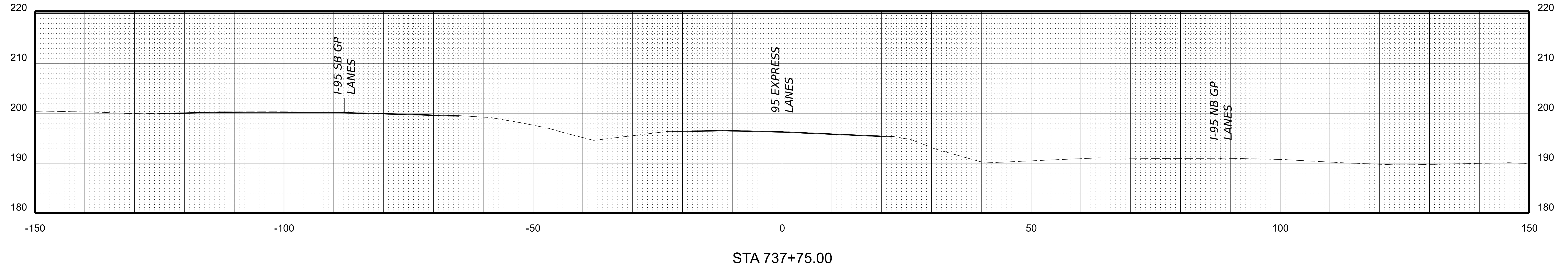
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Witman, Reardon, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	202

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



PAC PLANS
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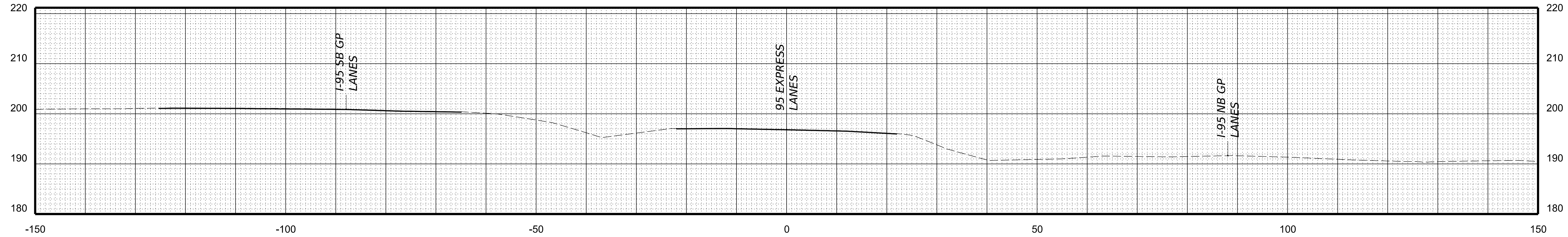
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

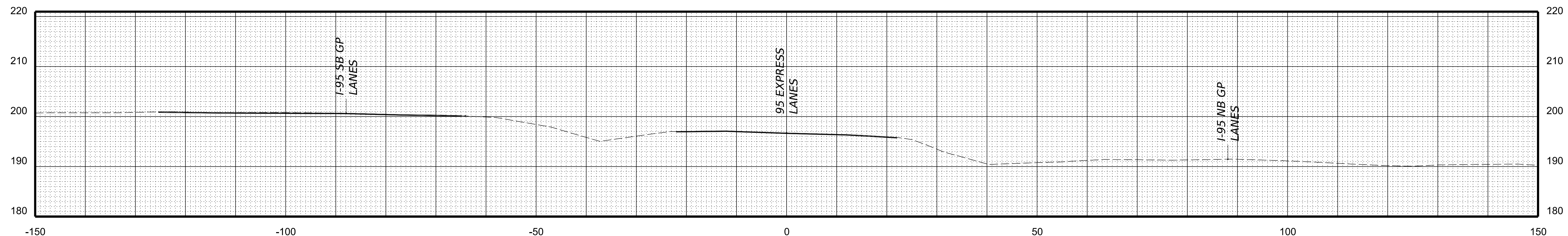
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	203

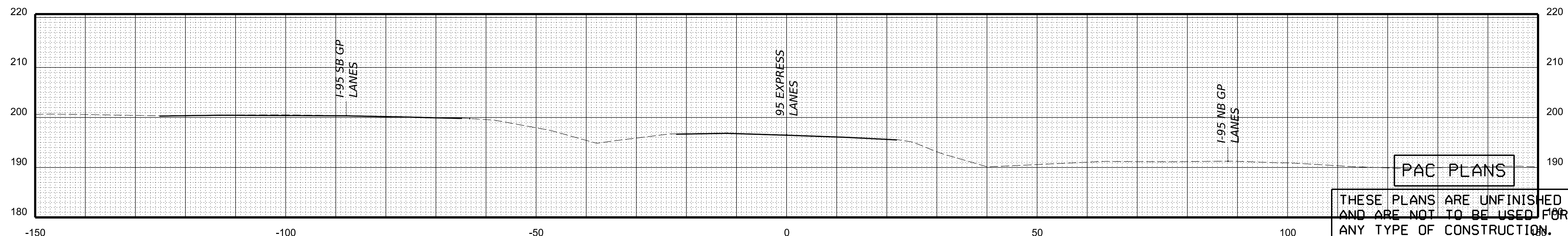
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 738+50.00



STA 738+25.00



STA 738+00.00

PAC PLANS

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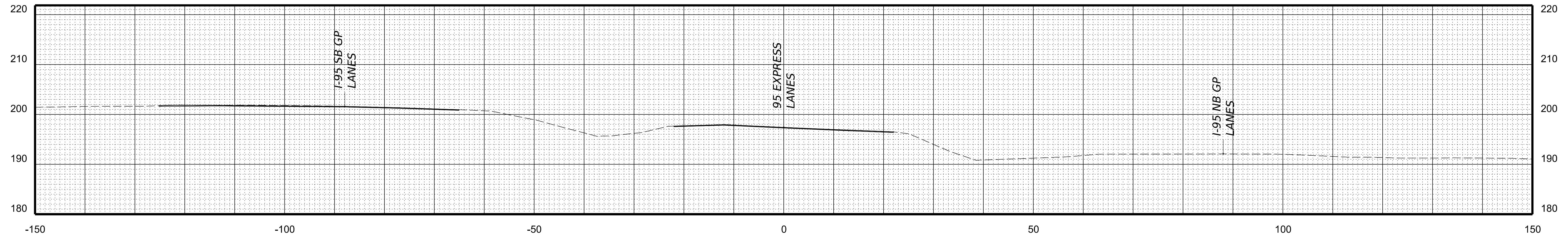
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

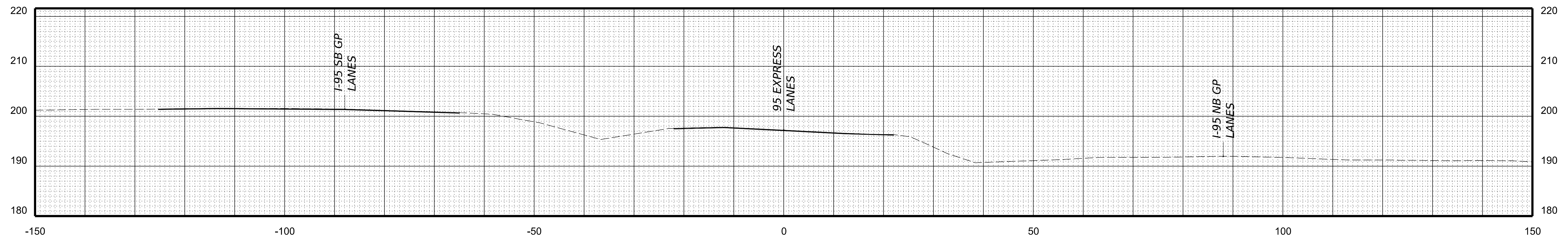
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	204

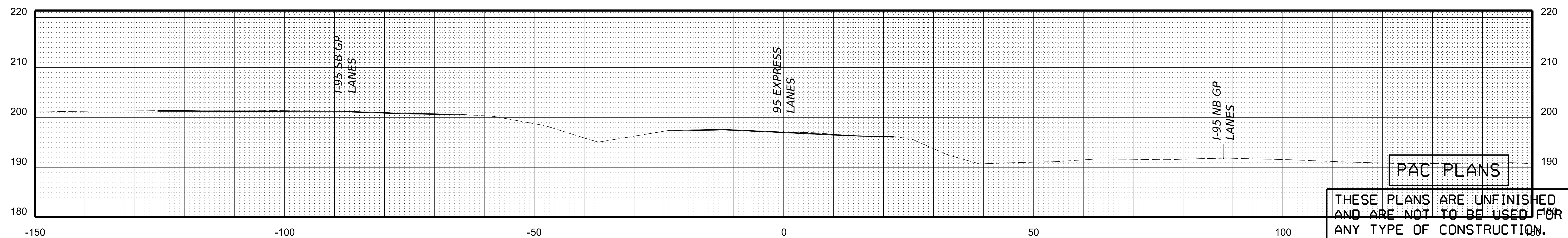
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 739+25.00



STA 739+00.00



STA 738+75.00

PAC PLANS

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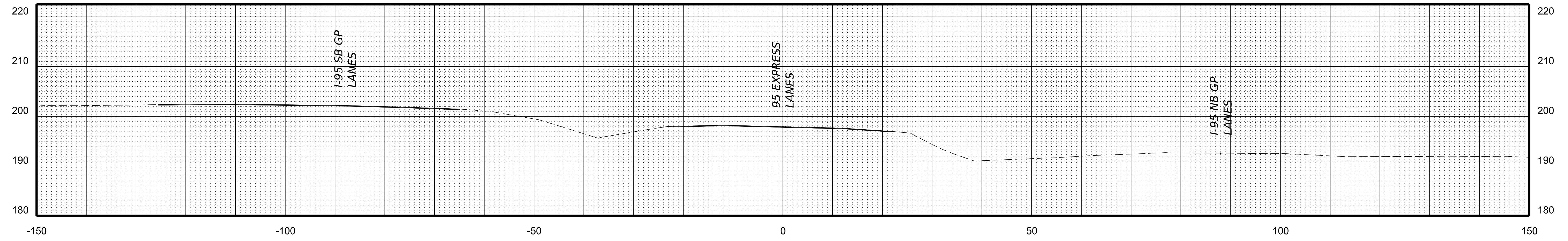
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

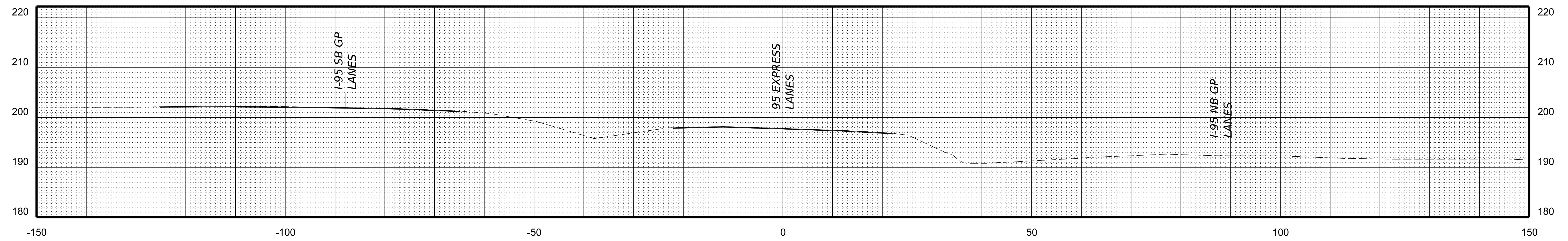
REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	205

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

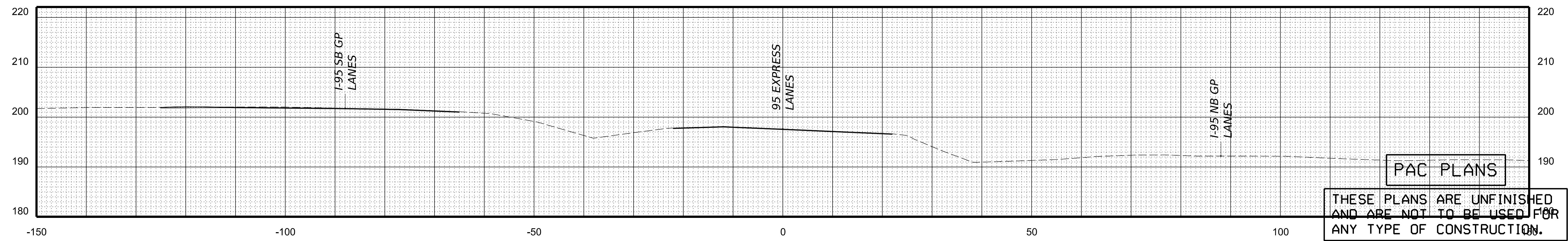


STA 740+00.00

END PROJECT 0095-076-299
C-501 STA. 739+02.45 95 XBL



STA 739+75.00



STA 739+50.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

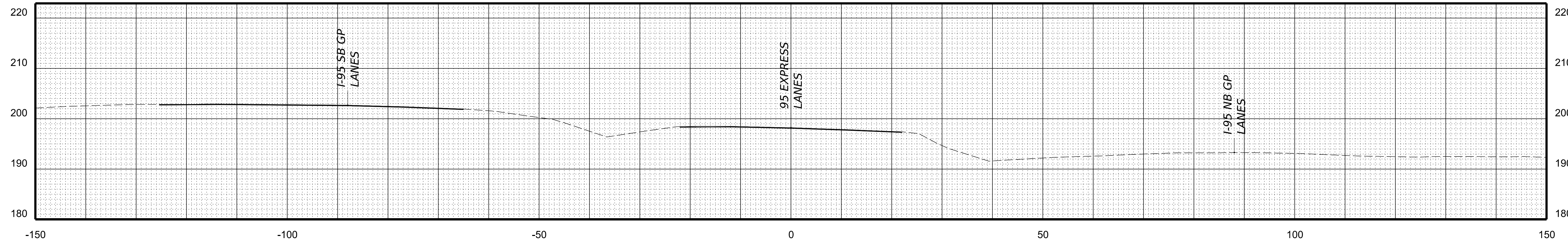
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: DATE *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: DATE *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

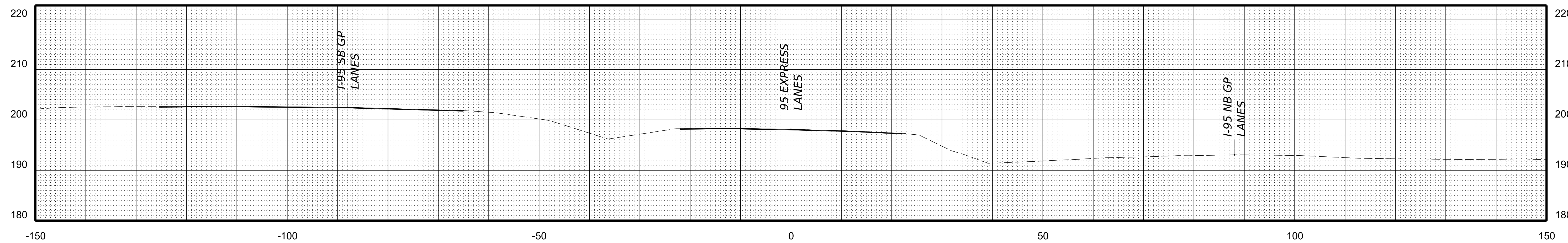
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	206

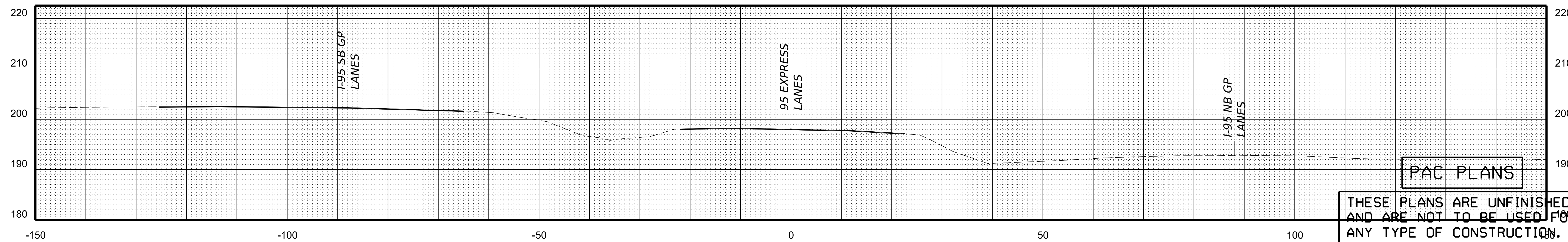
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 740+75.00



STA 740+50.00



STA 740+25.00

PAC PLANS

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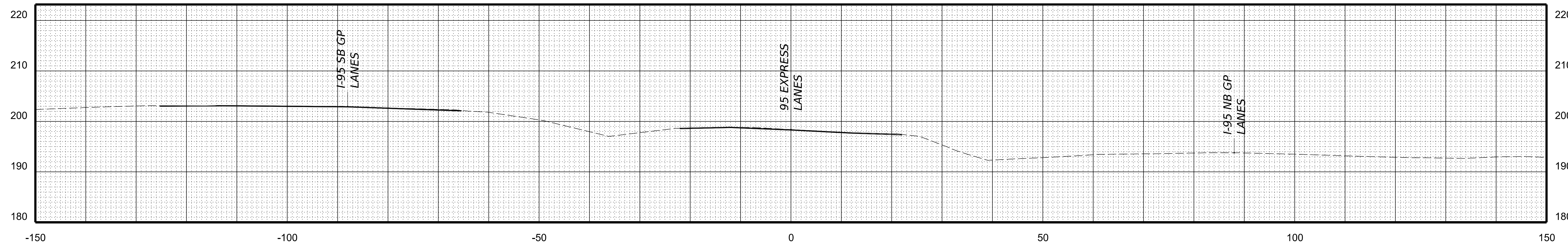
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

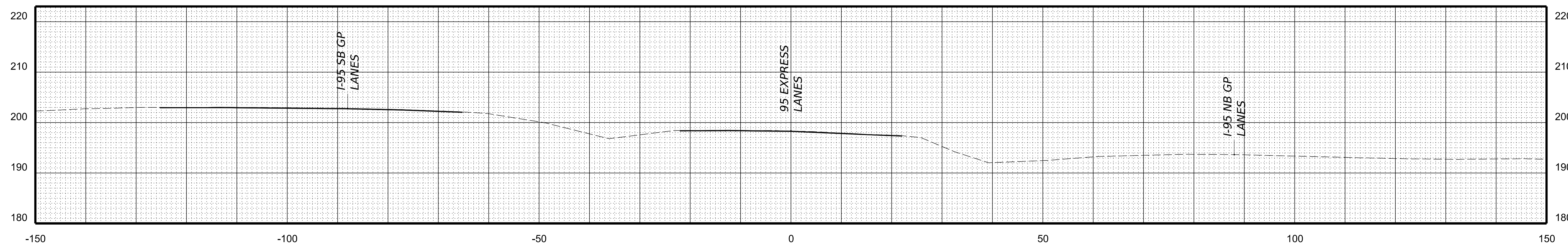
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	207

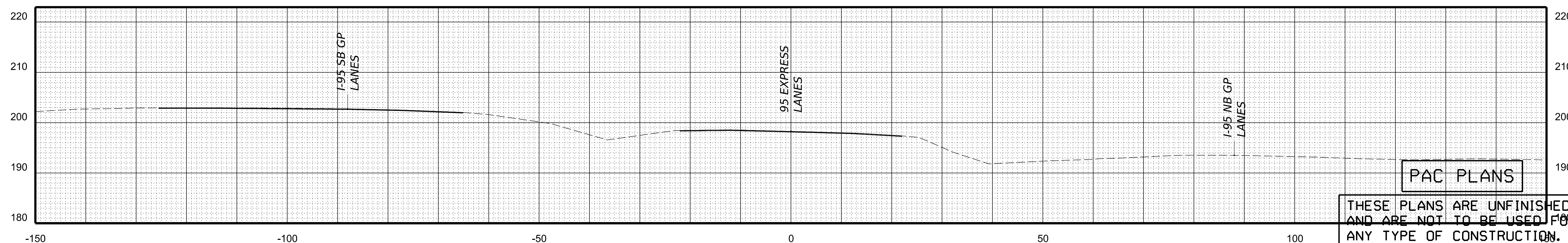
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 741+50.00



STA 741+25.00



STA 741+00.00

PAC PLANS

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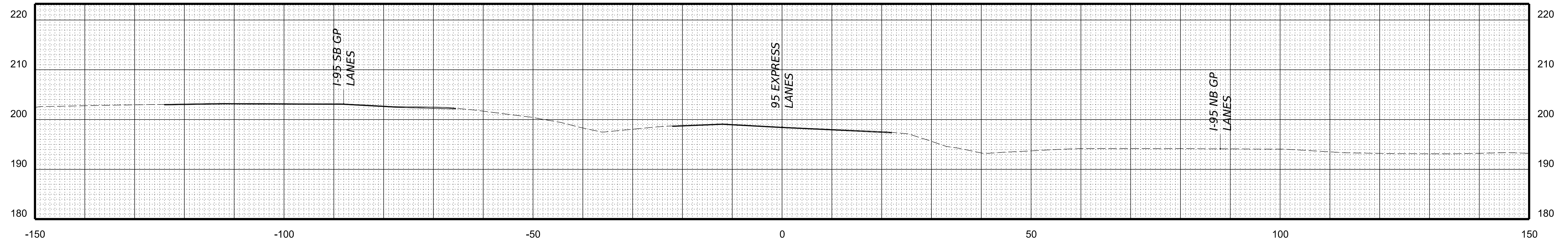
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

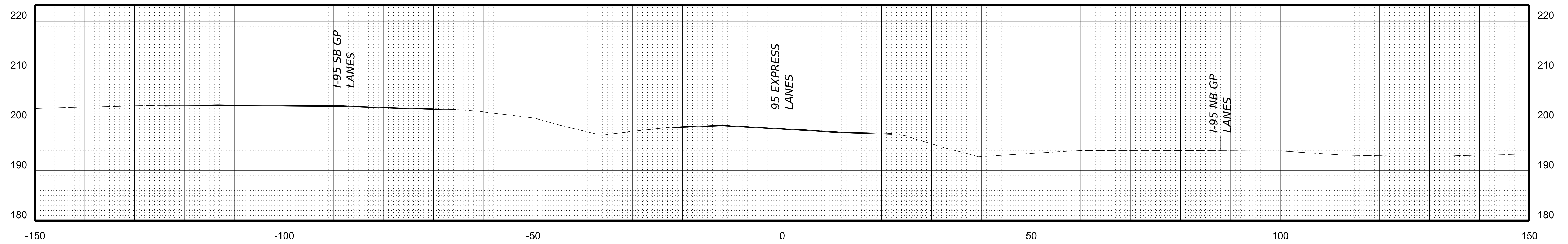
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	208

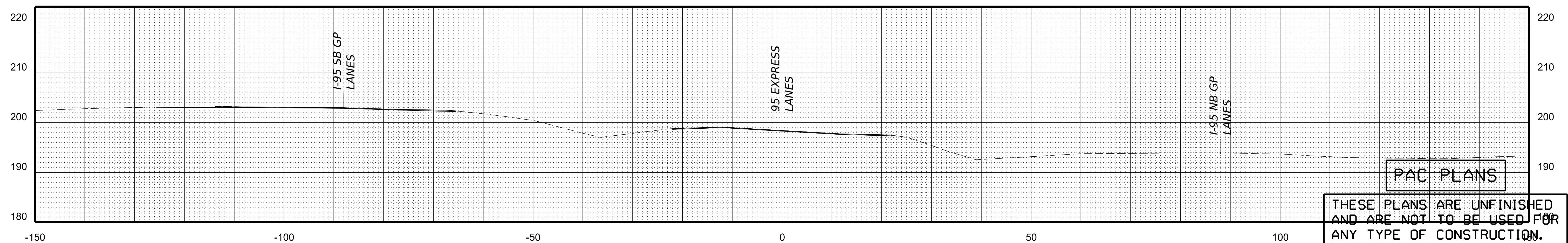
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 742+25.00



STA 742+00.00



STA 741+75.00

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

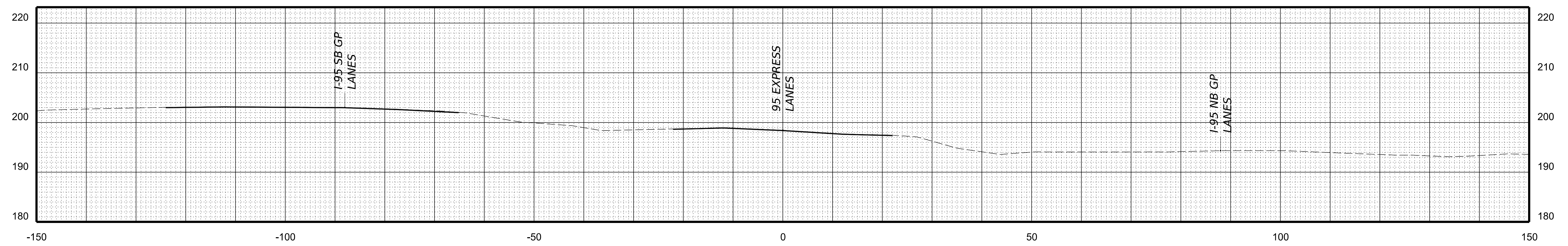
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

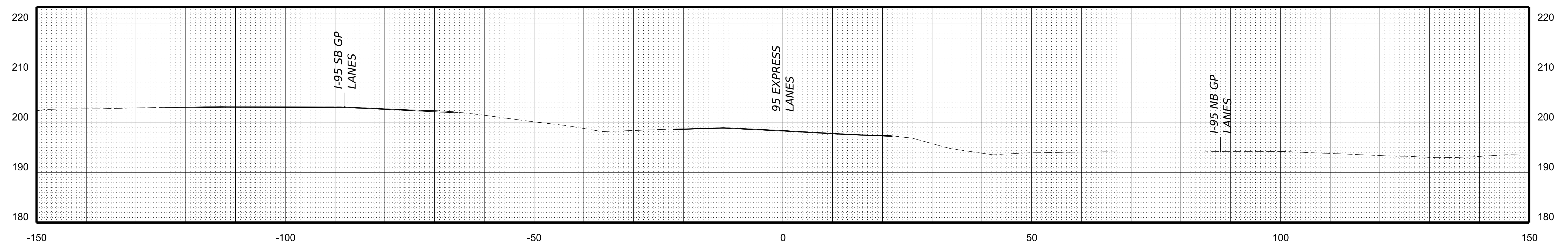
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	209

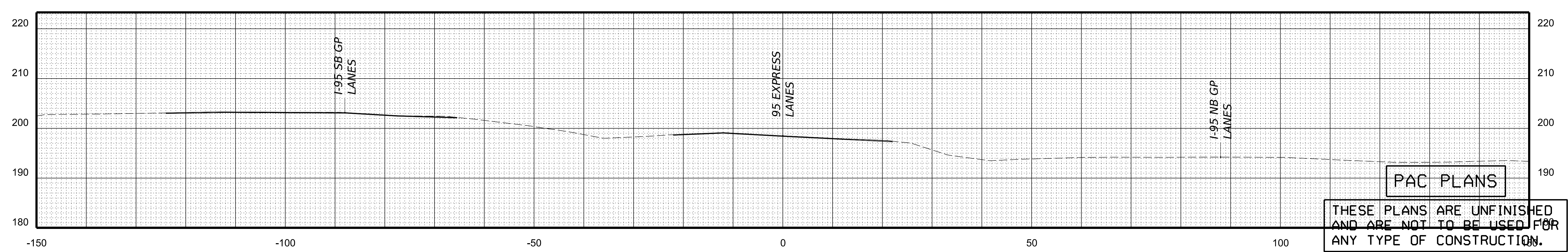
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 743+00.00



STA 742+75.00



STA 742+50.00

PAC PLANS
THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.

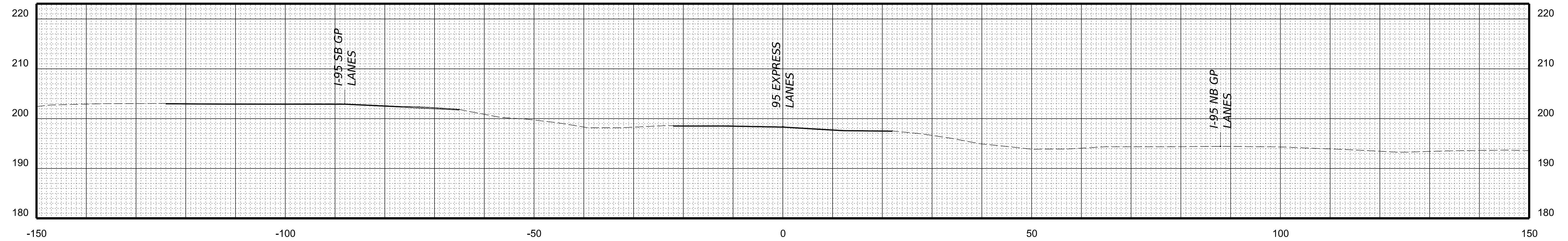
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	210

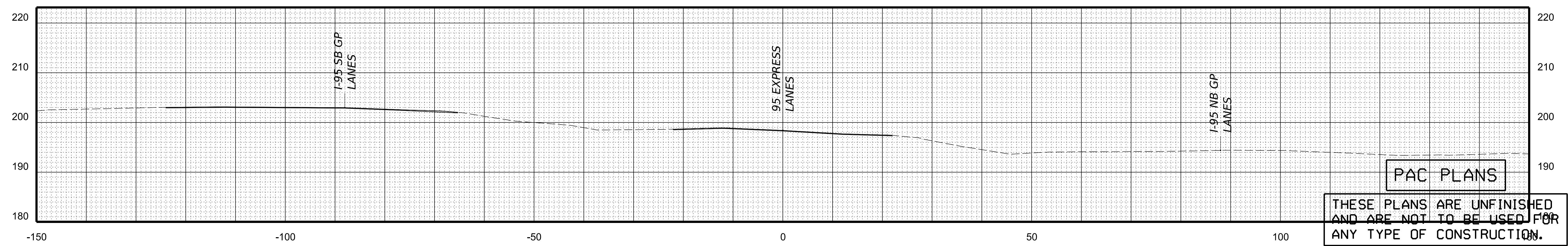
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 743+75.00



STA 743+50.00



STA 743+25.00

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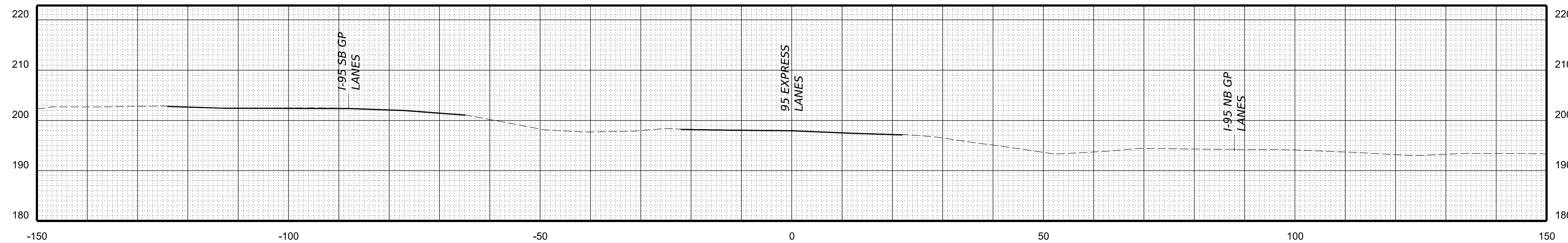
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

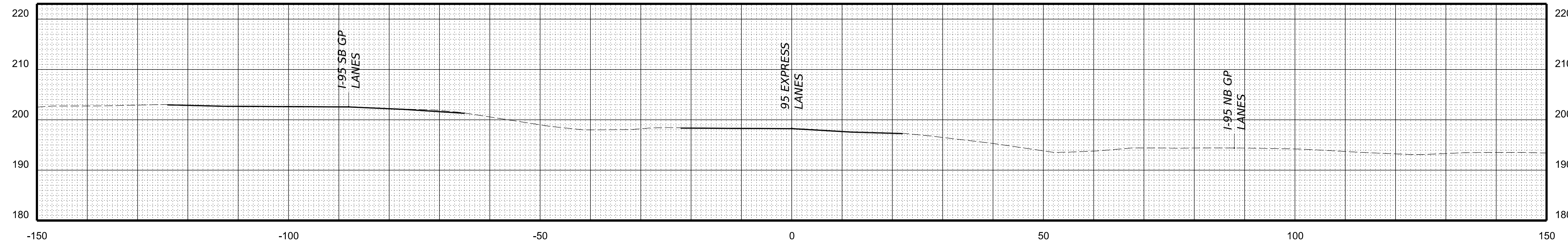
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	211

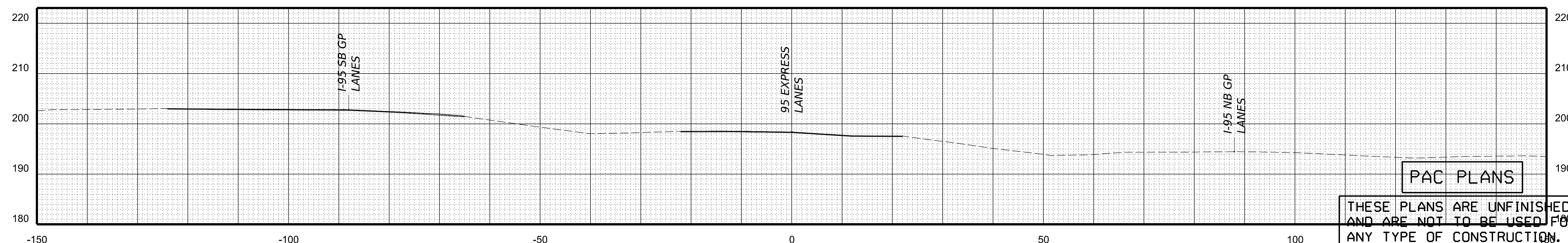
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STA 744+25.00



STA 744+00.00

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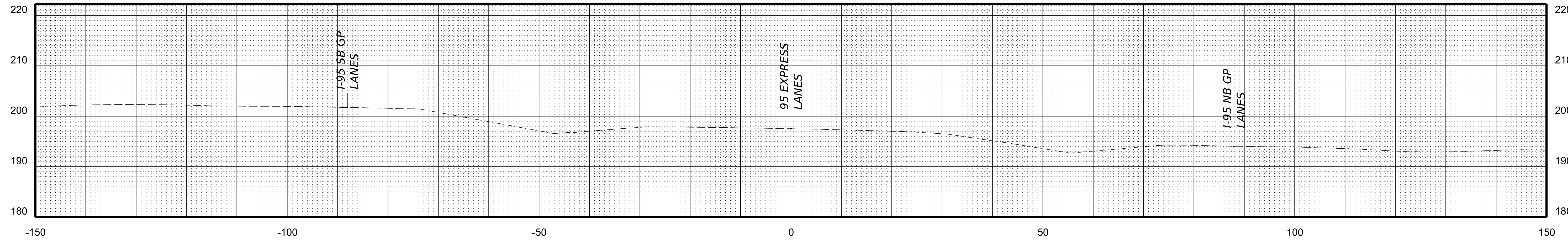
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

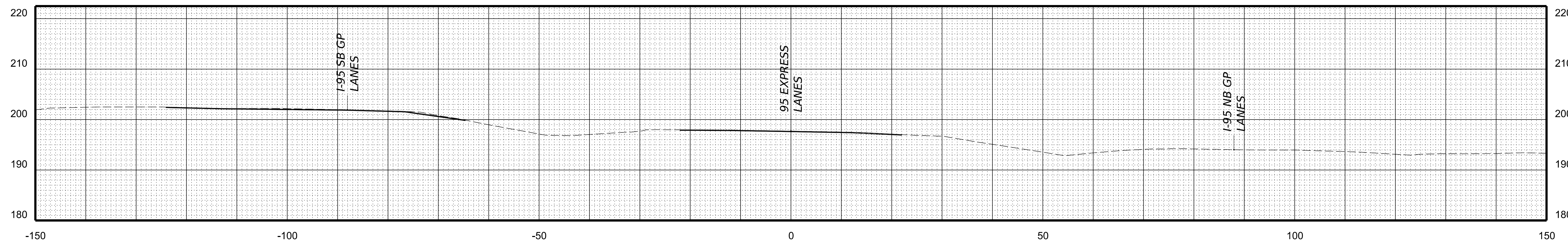
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REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	212

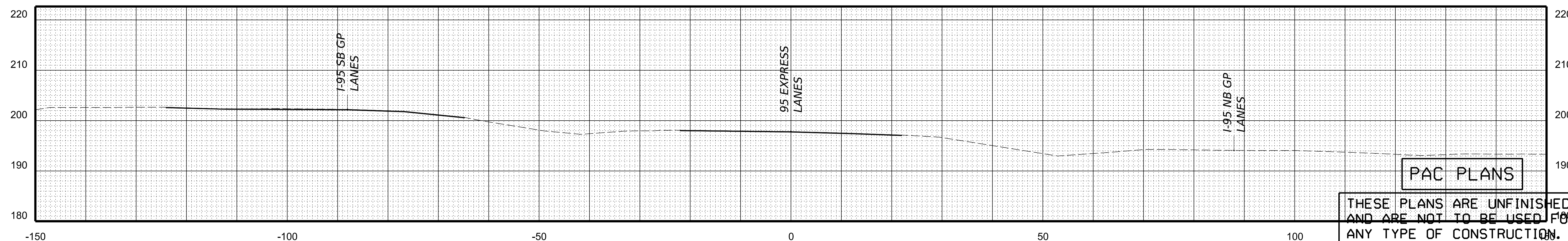
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STA 745+00.00



STA 744+75.00

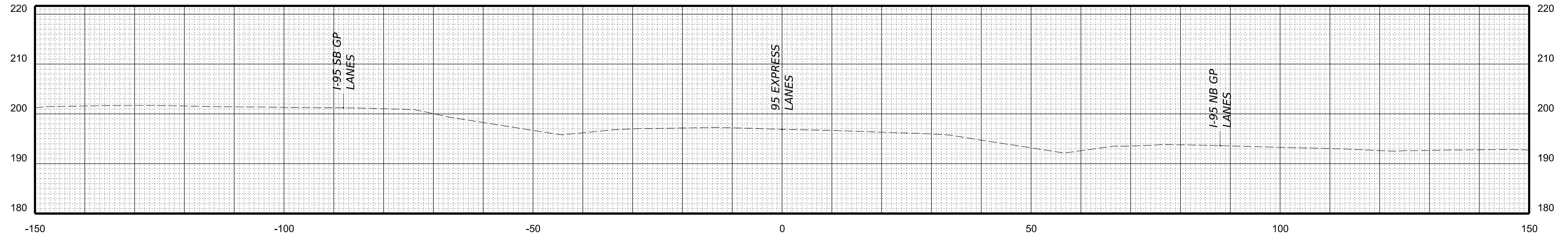
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DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

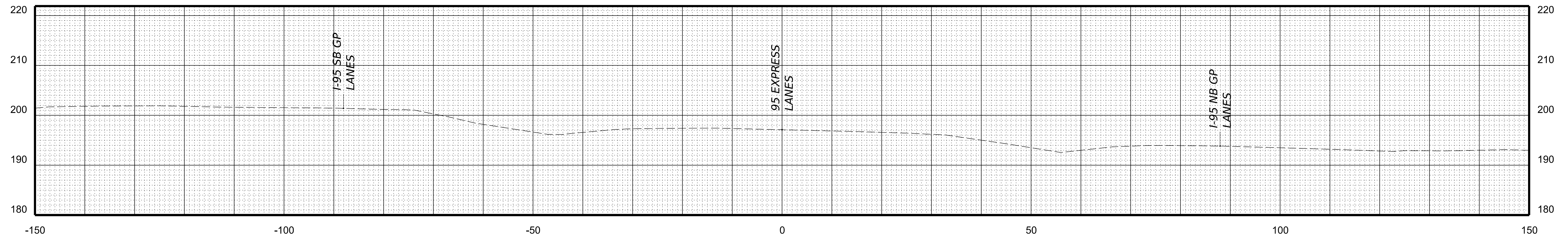
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1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	213

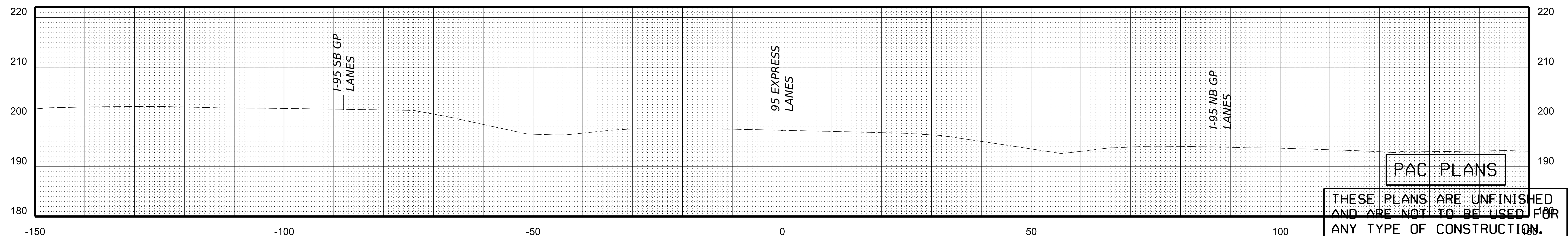
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STA 746+00.00



STA 745+75.00



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PAC PLANS

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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE	PROJECT
		95	0095-076-299, B688
Federal Structure No. 000000000014334		FHWA Construction and Scour Code:	X771-SN
Federal Stewardship and Oversight Code:		NFO	UPC No. 116663

DESIGN EXCEPTION(S):

None.

GENERAL NOTES:

The original approved sheet, including original signatures, is filed in the VDOT Central Office. Any misuse of electronic files, including scanned signatures is illegal. Violators will be prosecuted to the full extent of the applicable laws.

Width: Opitz Blvd. - 7'-0" sidewalk, 12" rail, 39'-0" WBL roadway, variable median, 51'-0" EBL roadway. Overall width 103'-0" face-to-face of rail/curb. Includes 9'-10" of widening on right of EBL traffic.

Ramp - Varies face-to-face of curbs

Span layout: Opitz Blvd. - 105'-2", 168'-0" - 167'-10 1/2" continuous, and one 25'-11 1/4" composite steel plate girder spans

Ramp - 38'-6 3/8" composite steel plate girder span

Capacity: HS20-44 loading and alternate military loading (original); HL-93 loading (new)

Specifications:

Construction: Virginia Department of Transportation Road and Bridge Specifications, 2020.

Design: AASHTO Standard Specifications for Highway Bridges, 16th Edition, 1996; 1997 and 1998 Interim Specifications; and VDOT Modifications (existing bridge elements).

AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017; and VDOT Modifications (New bridge elements).

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition with 2020 Interims.

Standards: Virginia Department of Transportation Road and Bridge Standards, 2016; including all current revisions.

These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.

Design loading includes 20 psf allowance for construction tolerances and construction methods for new deck, beams and substructure.

Design loading includes 15 psf allowance for future wearing surface for new deck, beams and substructure.

Stay-in-place forms to be supported by existing girders shall have their corrugations filled with foam inserts.

All structural steel, including bearings, shall be ASTM A709 Grade 50W and shall be painted.

Finish paint color shall be brown, AMS-STD-595-20059

Zone coating of beams for 9'-0" from end of beam including bearings and end crossframes and diaphragms, Girder A exterior fascia and interior fascia 5' on either side of traffic signal support and area of lateral bracing stiffener removal shall be in accordance with Section 411.05 (c5) of the Specifications.

General notes continued on sheet 2.



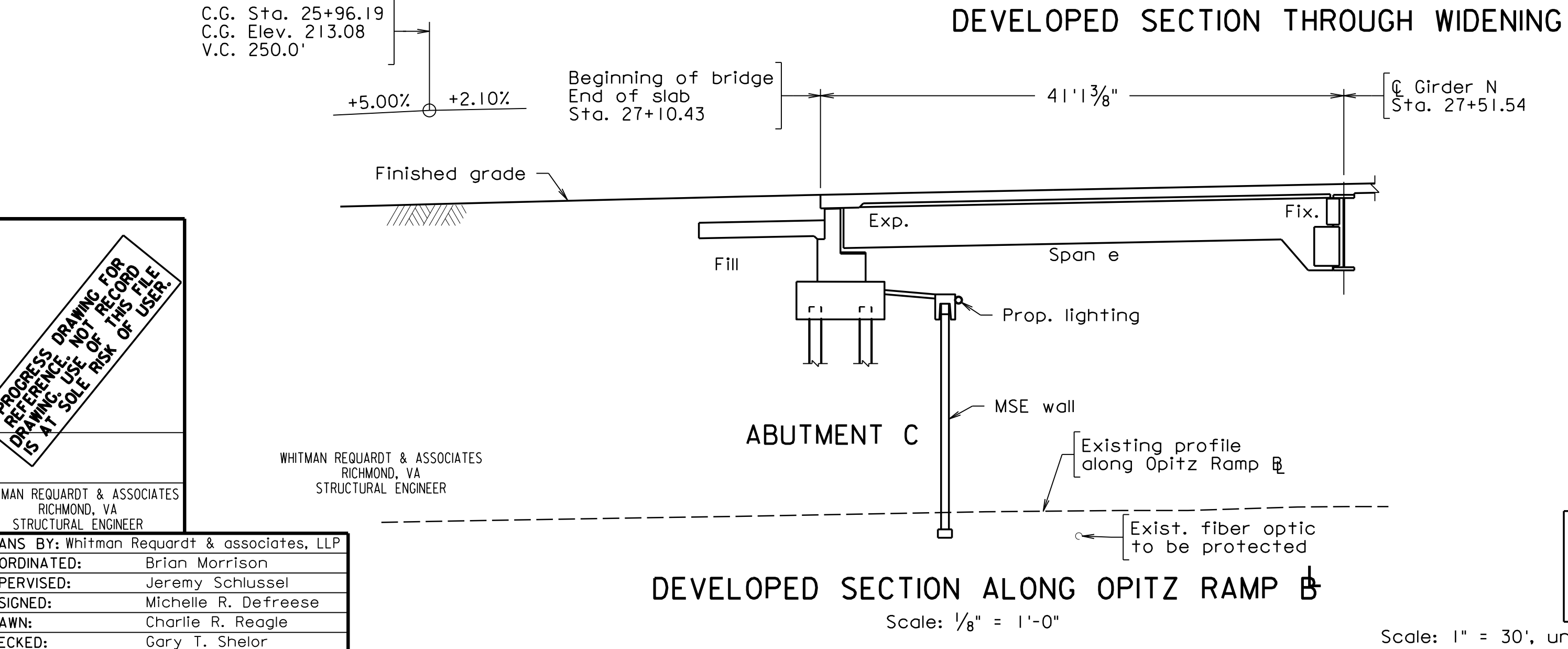
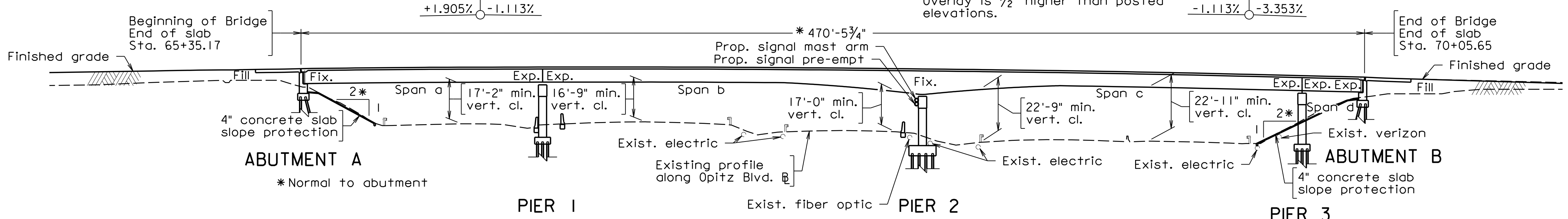
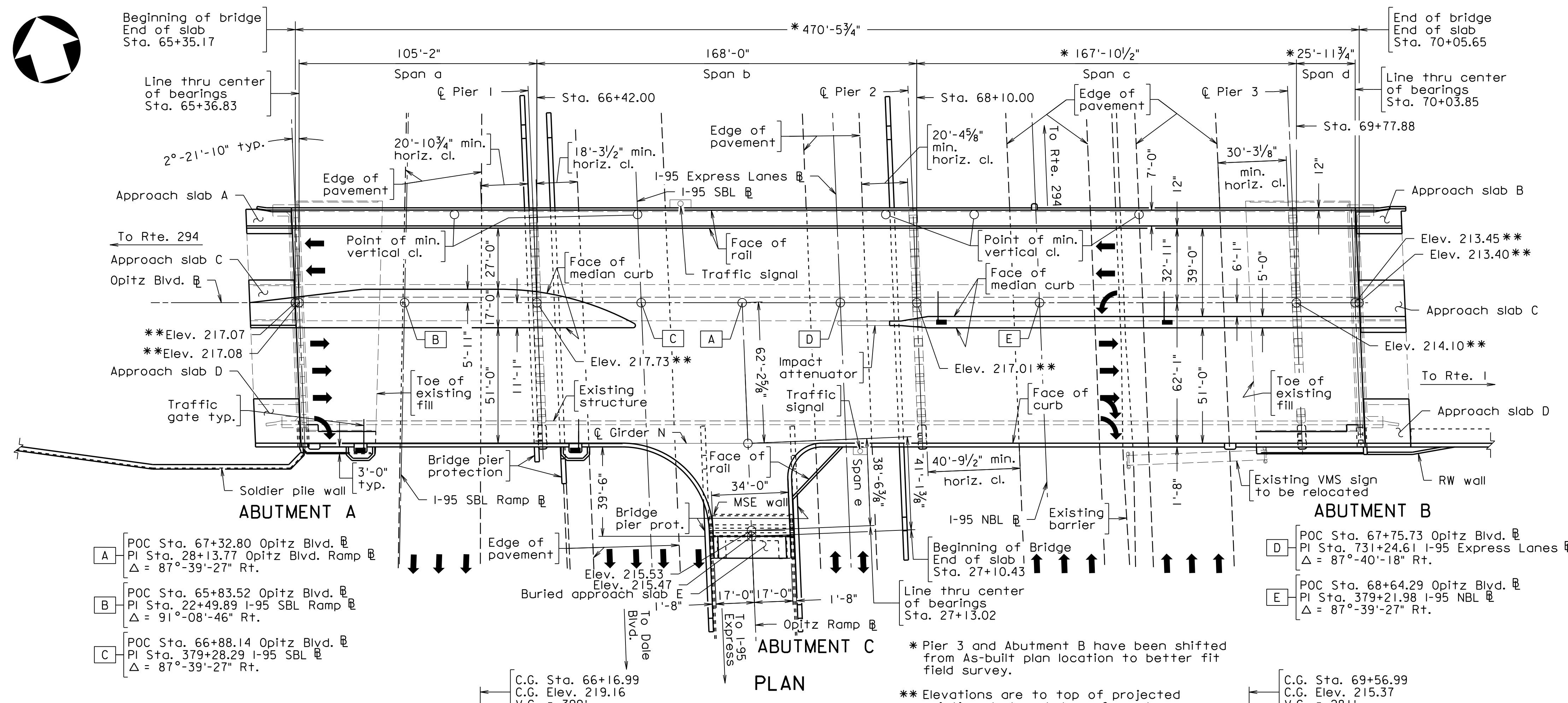
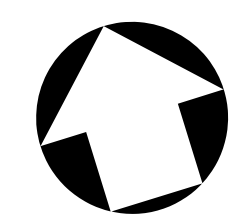
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
PROPOSED WIDENING ON
OPITZ BLVD OVER I-95, I-95 EXPRESS LANES
PRINCE WILLIAM CO.
PROJ. 0095-076-299, B688

VDOT to verify

Recommended for Approval: _____ Date _____
District Project Development Engineer

Approved: _____ Date _____
District Administrator

257-38A



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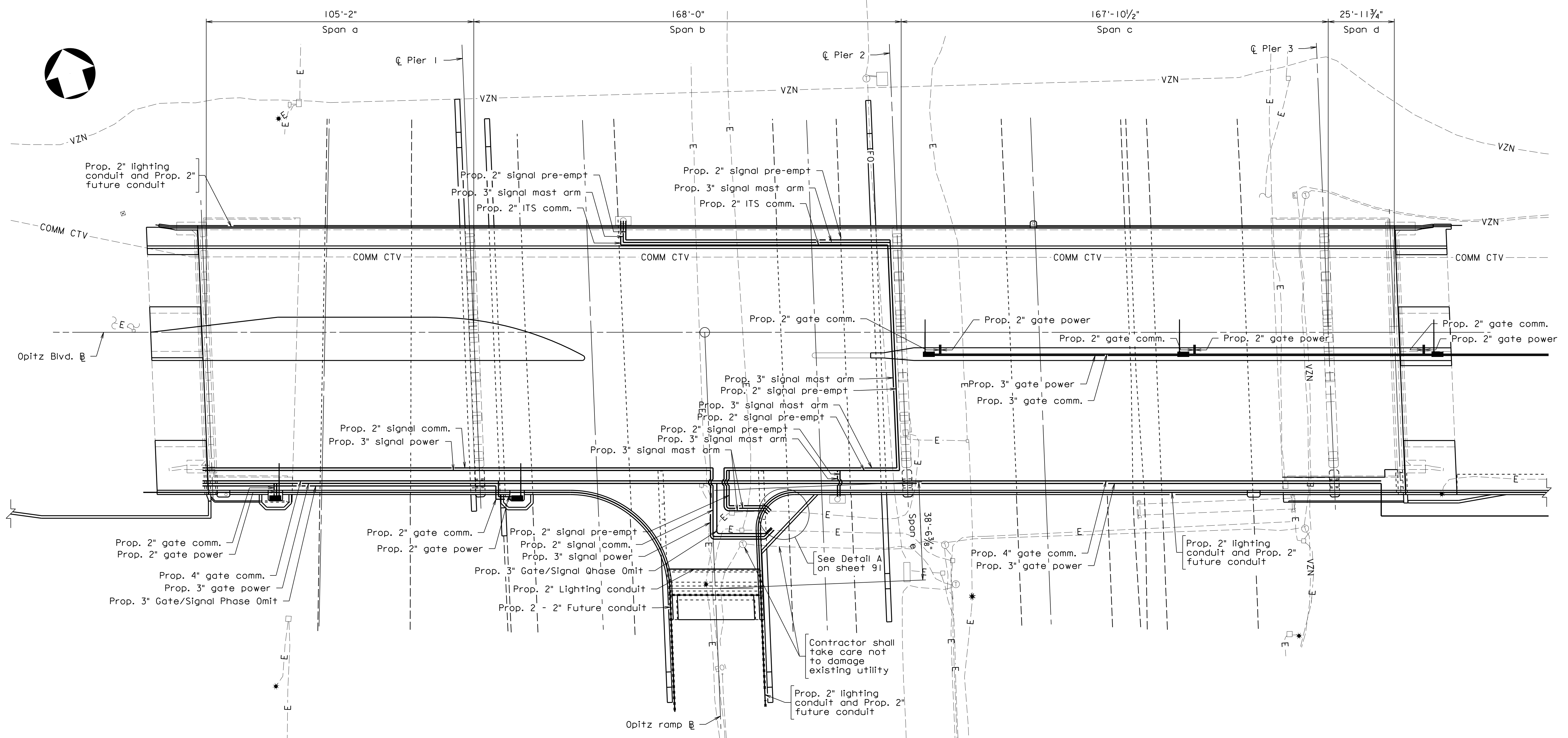
No.	Description	Date
REVISIONS		
For Table of Revisions, see Sheet 3.		

257-38A_001.dgn

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

PLANS BY: Whitman Requardt & Associates, LLP
COORDINATED: Brian Morrison
SUPERVISED: Jeremy Schiussel
DESIGNED: Michelle R. DeFreese
DRAWN: Charlie R. Reagle
CHECKED: Gary T. Shelor

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			1a



UTILITY PLAN

Not to scale

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
EXISTING AND PROPOSED UTILITY PLAN					
No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn: MRD.....	Apr. 2022	257-38A
			Checked: J.S.....		1a of 125
Revisions					

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257-38A_001a.dgn

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WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER

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VA.	—		95	0095-076-299, B688	2

GENERAL NOTES CONTINUED:

Concrete in superstructure including rails, parapets, terminal walls and medians shall be Low Shrinkage Class A4 Modified (Lightweight, 120 pcf) in accordance with Section 217.12(a); in substructure, Class A3.

Concrete surface color coating for proposed exposed pier columns and caps shall be light beige, similar to federal standard color AMS-STD-595-37769.

Concrete surface color coating for CPSR rail shall be multicolored natural stone colors (consisting of browns, greens, grays and tans). Median curb shall be stamped red brick pattern (brick paver type with a basket weave pattern). Work associated with architectural finishes, concrete form liners, stamped concrete patterns and color stain coating shall be in accordance with Prince William County Contract Special Provisions. Contractor shall submit proposed form liner patterns and color stain schemes for approval prior to construction.

All reinforcing steel shall be deformed and shall conform to ASTM A615, Grade 60 except for steels noted as Corrosion Resistant Reinforcing (CRR) which shall conform to Section 223 of the Specifications. All reinforcing bar dimensions on the detailed drawings are to centers of bars except where otherwise noted and are subject to fabrication and construction tolerances.

CRR steels shall conform to one or more of the three Classes listed in Section 223 of the Specifications. The Class(es) of CRR steels required on this project is/are noted on plan sheets and in the reinforcing steel schedule. CRR Steel, Class II or Class III may be substituted for Class I. CRR Steel, Class III, may be substituted for Class II.

HP piles shall be ASTM A709 Grade 50 steel. All piles shall be driven to the required nominal axial resistance or refusal. For axial resistance requirements for the abutments and piers, see Pile Data Tables. Nominal axial resistance shall be determined by Dynamic Pile Testing.

Virginia Structure No. of existing bridge is 6156. Plan No. is 257-38.

The Bridge Data Plate shall be installed in accordance with VDOT's Road and Bridge Standards and obtained from the District Structure and Bridge Office.

The existing structure is designated a Type B structure in accordance with Sec. 411.

B.M.: VDOT Disk #076-2058 set in concrete flush with the ground and Elev. 256.35.
VDOT Disk #076-2059 set in concrete flush with the ground and Elev. 242.16.

Contractor shall sheet/shore as necessary for structure excavation.

Datum shift for this location based on the average of differences between the existing plan elevations and the survey elevations of the top of deck is -0.83 feet. Span length for Spans c and d were adjusted by average difference between existing plan dimensions and the survey. Contractor shall verify existing bridge elevations and notify the Engineer prior to proceeding with work.

Contractor shall verify geometry prior to fabrication or execution of associated work. Any discrepancies between these plans and field conditions shall be brought to the attention of the Engineer prior to proceeding with work.

The Contractor shall take care not to damage the portion of the existing bridge structure to remain, and if damaged shall repair the damage as directed by the Engineer at no additional cost.

The Contractor shall submit a demolition plan for approval.

The Contractor shall take care not to damage the existing fiber optic junction box and conduit near the proposed MSE wall at Abutment C and bridge pier protection at Pier 2.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
INDEX OF SHEETS AND GENERAL NOTES CONTINUED					
No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn:MRD....	Apr. 2022	257-38A
			Checked: LRC.....		2 of 125
Revisions					

PROGRESS PRINT 4/1/2022

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

ESTIMATED QUANTITIES - SUBSTRUCTURE ONLY

		Concrete Class A3	Reinforcing Steel	Corrosion Resistant Reinf. Steel, Class I	Backwall Reconstruction	Backwall Reconstruction HES	NS Reconstruct Bridge Seat	Steel Piles 10"	Dynamic pile test	Driving Test for 10" Steel Pile	Concrete Substructure Surface Repair	Embedded Galvanic Anodes	Crack Repair Type B	Concrete Parapet 32" (Lightweight)	Pedestrian Rail, Lwt. BPF-6	Struct. Excav.	Select Backfill (Abutment Zone)	Concrete Slab Slope Protec. 4"	Geocomposite Wall Drain	Pipe Underdrain 6"	Pier Protection System 54"	Concrete Surface Color Coating
		CY	LB	LB	LF	LF	EA	LF	EA	LF	* SY	* EA	* LF	LF ⊗	LF ⊗	CY ⊗	TON	SY ⊗	SY	LF	LF	SY
Abutment A	Neat	7.7	—	1,810	51	42	5	—	—	—	6	48	82	—	16	4.0	157	41	9.00	42	—	—
	Footing	4.7	620	—	—	—	—	173	1	77	—	—	—	—	—	22.0	—	—	—	—	—	—
Pier 1	Neat	14.9	—	4,050	—	—	10	—	—	—	35	280	50	—	—	—	—	—	—	—	326	43
	Footing	9.8	2,020	—	—	—	—	209	1	62	—	—	—	—	—	46.0	—	—	—	—	—	—
Pier 2	Neat	19.0	—	3,820	—	—	5	—	—	—	3	24	18	—	—	—	—	—	—	—	205	43
	Footing	20.0	2,310	—	—	—	—	366	1	54	—	—	—	—	—	73.0	—	—	—	—	—	—
Pier 3	Neat	15.2	—	3,850	—	—	10	—	—	—	9	72	4	—	—	—	—	—	—	—	—	44
	Footing	9.8	2,020	—	—	—	—	183	1	57	—	—	—	—	—	72.0	—	—	—	—	—	—
Abutment B	Neat	8.9	—	1,720	55	42	5	—	—	—	8	64	107	—	16	4.0	157	61	9.00	15	—	—
	Footing	4.7	590	—	—	—	—	158	1	72	—	—	—	—	—	18.0	—	—	—	—	—	—
Abutment C	Neat	24.4	4,010	—	—	—	—	—	—	—	—	—	—	—	—	—	373	—	28.00	54	182	—
	Footing	36.0	4,610	—	—	—	—	1105	1	85	—	—	—	—	—	48.9	—	—	—	—	—	—
Total		175.1	16,180	15,250	106	84	35	2194	6	407	61	488	261	20	32	288	687	102	46	111	713	130

⊗ Denotes items to be paid for on the basis of plan quantities in accordance with current Road and Bridge Specifications.

Notes:

Architectural Treatment shall include the materials, equipment, labor and any incidentals necessary for architectural treatment and concrete surface color coating noted here-in.

Bridge Conduit System - B688 shall include the materials, equipment, labor and any incidentals necessary for installation of conduits, junction boxes and hangers for ITS, traffic signals and traffic gates and their foundations on the bridge.

Bridge Lighting System - B688 shall include the materials, equipment, labor and any incidentals necessary for installation of conduits and junction boxes for lighting and future lighting on the bridge and retaining walls.

Remove Portion of Existing Structure Number 6156 includes removal of portions of superstructure and portions of abutments and piers as denoted in these plans; including saw cutting and epoxy required for ends of cutoff reinforcing steel.

Quantity for Cover depth survey includes moment slab on RW wall and sidewalk.

Concrete in Backwall Reconstruction HES, Joint Reconstruction HES and Deck Slab Closure shall be a high early strength concrete Class A4 and in accordance with Section 412 of the Specifications.

Per VWAPM Section 6C.17, the Contractor shall take extreme care when working within the traveled way of a limited access highway. A shielding system shall be installed over travel way and shoulders to ensure the containment of all dislodged concrete and debris to protect the traveling public from debris under the bridge. The shielding system shall be used during demolition and throughout the whole construction process. It will be required on the full bridge width in addition to the SIP forms during new construction when pouring the deck, forming the parapet, installing the railing and fencing, milling operations, and any other construction activities being performed over active traffic. The secondary shielding system shall be incidental to other items.

Any temporary sheeting or shoring needed for construction of substructure foundations shall be included in the cost for Structure Excavation.

Rev. No.	Sheets Revised	Date

LUMP SUM BID ITEMS	
Mobilization	LS
Construction Surveying	LS
Remove Portion of Existing Structure 6156	LS
Material Disposal	LS
Environmental and Worker Protection	LS
Zone Coating	LS
Disposal of Material	LS
Environmental Protection and Health and Safety	LS
Bridge Lighting System - B688	LS
Bridge Conduit System - B688	LS
NBIS Access Under Bridge	LS
Architectural Treatment	LS
Temporary Shoring	LS

ESTIMATED QUANTITIES - SUPERSTRUCTURE ONLY		
Item	Units	Quantity
Adhesive Based Joint Sealer Class I	LF	196
Bridge Deck Grooving	SY	5193
Concrete Class A4 Approach Slab	CY	115
Concrete Low Shrinkage Class A4 Modified Lightweight	CY	748
Corrosion Resistant Reinforcing Steel, Class I Approach Slab	LB	2400
Corrosion Resistant Reinforcing Steel, Class II Approach Slab U	LB	18580
Corrosion Resistant Reinforcing Steel, Class II U	LB	143510
Cover Depth Survey	SY	2900
Elastomeric Expansion Dam	LF	124
Epoxy Resin Type (Waterproofing)	SY	66
Jacking and Blocking Beams	EA	49
NS Br. Superstr. Wid./Repair Beam End Modifications	EA	10
NS Br. Superstr. Wid./Repair Deck Slab Closure HES	SY	109
NS Bridge Median Barrier	LF	17
NS Furnish VES Latex Modified Concrete (1 1/4" - 2")	CY	323
NS Parapet Concrete parapet, 32" (Lightweight)	LF	941
NS Parapet Concrete parapet, 42" (Lightweight)	LF	20
NS Pedestrian Fence (Lightweight) - BPF-6	LF	502
NS Pedestrian Fence (Lightweight) - BPR-1	LF	76
NS Rolling Railing, CPSR (Lightweight)	LF	518
Place VES Latex Modified Concrete	SY	5266
Reconstruct Expansion Joint HES	LF	59
Remove Asphalt Concrete Overlay	SY	231
Replace Anchor Bolt	EA	108
Replace Bearing	EA	49
Structural Steel Plate Girders ASTM A709 50W **	LB	566100
Type A Hydrodemolition, 1/2"	SY	3105
Type A Milling (1 1/4")	SY	4855

ESTIMATED QUANTITIES - RETAINING WALLS ONLY		
Item	Units	Quantity
Concrete Class A4	CY	35.2
Corrosion Resistant Reinforcing Steel, Class II	LB	6,920
Retaining Wall RW-3	CY	144
Retaining Wall Excavation	CY	502
Concrete Parapet, 32"	LF	118
Concrete Parapet, 42"	LF	1,298
NS Retaining Structure Soldier Pile Wall	SF	2,647
Pedestrian Fence, 6'	LF	228
NS Retaining Structure MSE	SF	23,018
NS Lighting	LS	1

Beam End Modifications shall include the equipment, labor and any incidentals necessary to remove beam ends at Pier 3 that impact pier cap wall. Contractor shall provide measurements of beam end clearance to concrete pier cap for each beam end at Span c to the Engineer.

Reconstruct Beam Seats shall include the materials, equipment, labor and any incidentals necessary for removal and reconstruction of existing beam seats as noted here-in.

Retaining Structure Soldier Pile Wall shall include the materials, equipment, labor including piles, concrete, reinforcing steel, timber lagging, coping and any incidentals necessary for installation of soldier pile noted herein.

Retaining Structure MSE Wall shall include the design, materials, equipment, labor including MSE panels, moment slab, coping, MSE backfill, and any incidentals necessary for installation of conduits, junction boxes and hangers for ITS, traffic signals and traffic gates on the bridge

Any Type B Patching of existing deck to remain shall be incidental to other items.

* Quantity is subject to change. Contractor shall verify quantity in the field and notify the Engineer of any discrepancies.

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STRUCTURE AND BRIDGE DIVISION				
ESTIMATED QUANTITIES				
No.	Description	Date	Designed: RDS.....	Sheet No.
			Date	
			Plan No.	
			Apr. 2022	257-38A
			Checked: MRD.....	3 of 125
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** Lump Sum - Weight includes 7,750 lbs. of bearing steel

⊗ Denotes items to be paid for on the basis of plan quantities in accordance with current Road and Bridge Specifications.

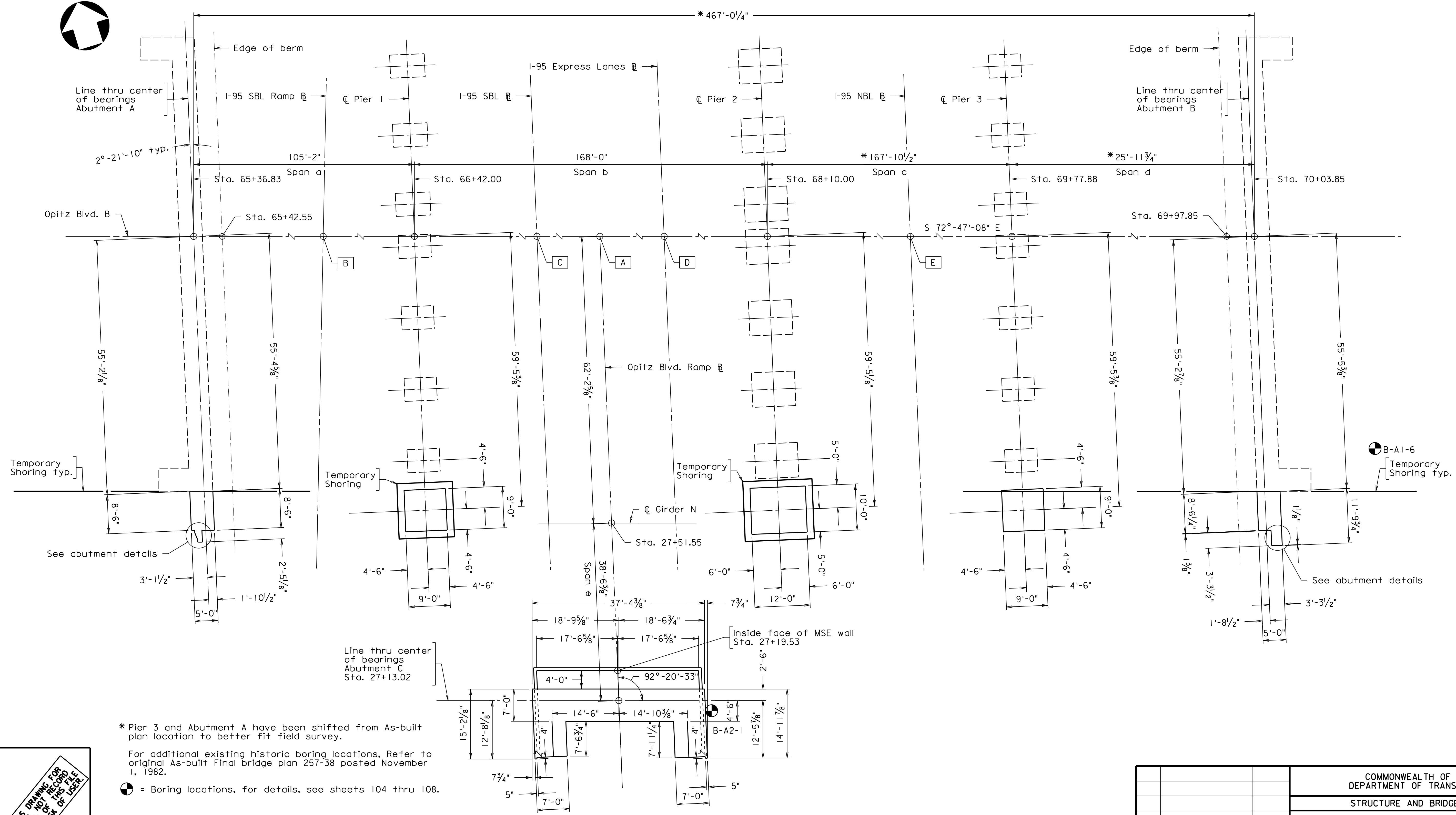
Bid Items Bridge Deck Grooving, Furnish VES Latex Modified Concrete and Place VES Latex Modified Concrete includes the quantity for approach slabs.

Bid Item Concrete Parapet, 32" (Lightweight) and CPSR include the quantity on approach slabs.

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- A POC Sta. 67+32.80 Opitz Blvd. $\Delta = 87^{\circ}-39'-27''$ Rt.
- B POC Sta. 65+83.52 Opitz Blvd. $\Delta = 91^{\circ}-08'-46''$ Rt.
- C POC Sta. 66+88.14 Opitz Blvd. $\Delta = 87^{\circ}-39'-27''$ Rt.
- D POC Sta. 67+76.21 Opitz Blvd. $\Delta = 87^{\circ}-39'-27''$ Rt.
- E POC Sta. 68+64.29 Opitz Blvd. $\Delta = 87^{\circ}-39'-27''$ Rt.

Notes:
 This layout is to be used only for the purpose of locating fill slopes and footings. For details not shown see abutment and pier details.
 For details of MSE walls, see sheets 121 thru 125.



* Pier 3 and Abutment A have been shifted from As-built plan location to better fit field survey.
 For additional existing historic boring locations, Refer to original As-built Final bridge plan 257-38 posted November 1, 1982.
 B = Boring locations, for details, see sheets 104 thru 108.

SUBSTRUCTURE LAYOUT

Scale: 3/32" = 1'-0" unless otherwise noted.

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SUBSTRUCTURE LAYOUT					
No.	Description	Date	Designed: AC	Date	Plan No.
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VA.	PROJECT	ROUTE PROJECT	5
		95 0095-076-299, B688	

SUGGESTED SEQUENCE OF CONSTRUCTION:

Stage 1:

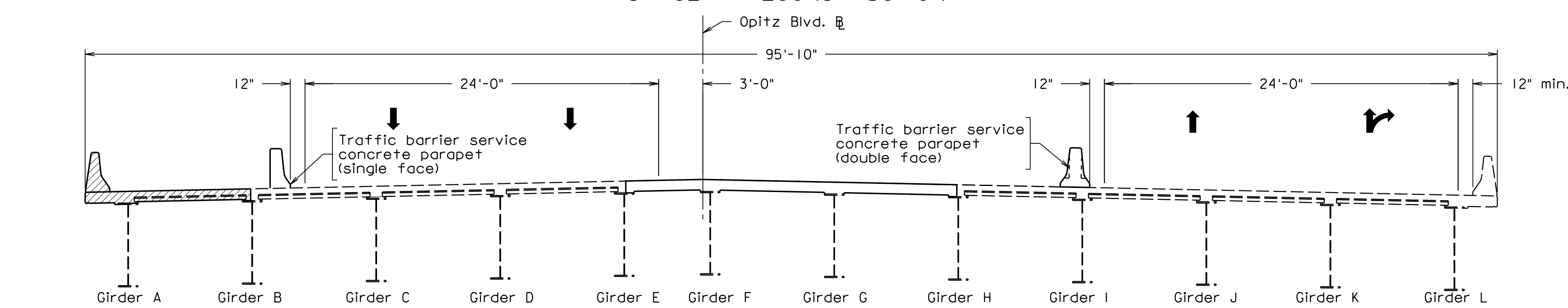
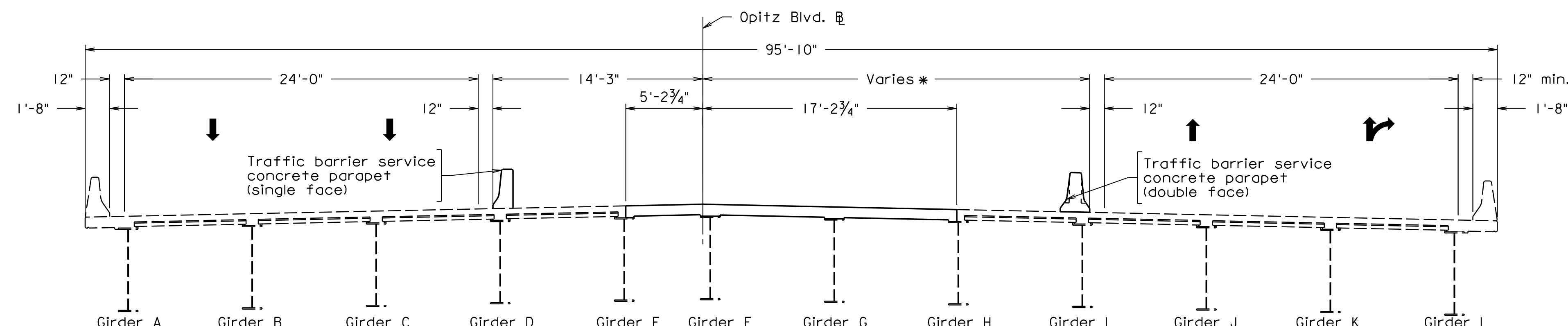
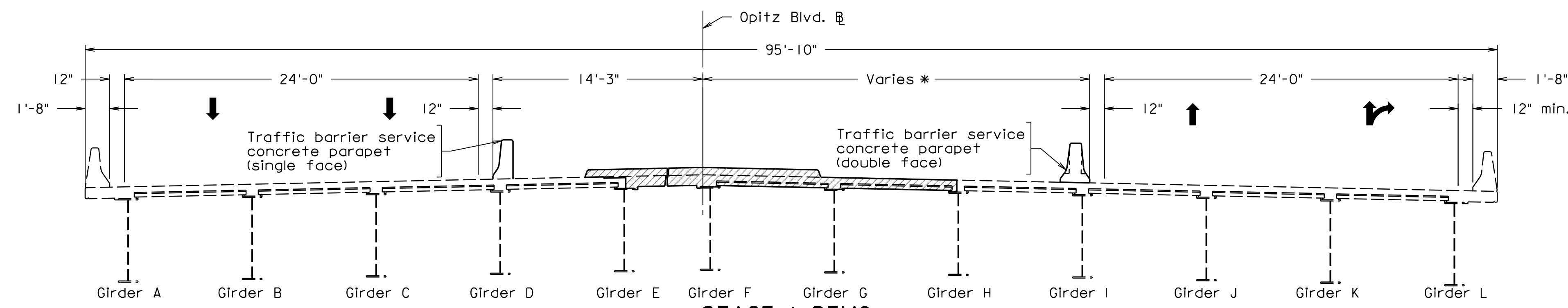
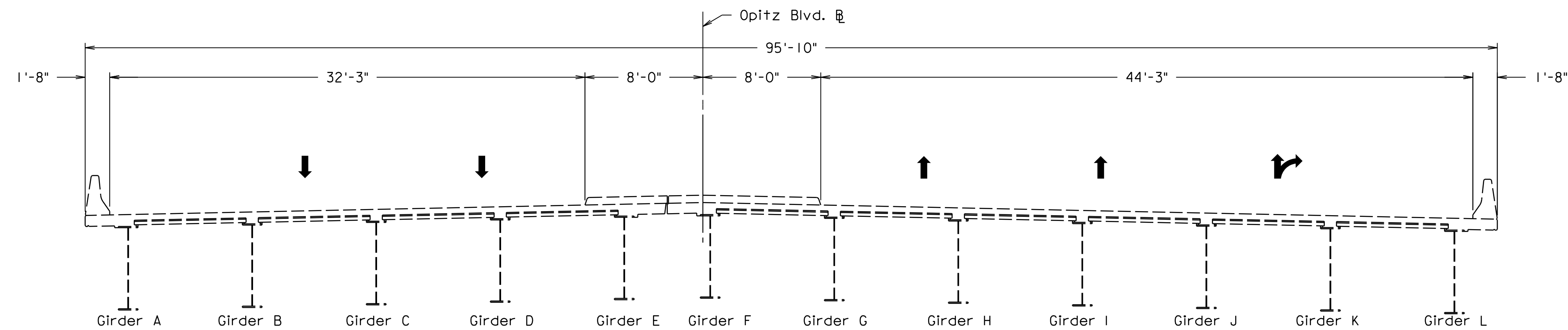
- Perform substructure surface repairs at any appropriate time in this stage.
- Place maintenance of traffic components to include Traffic Barrier Service Concrete Parapet (single and double face).
- Remove existing superstructure to limits shown for Stage 1.
- Modify existing Abutments A and B.
- Jack and block beams in Stage 1 and replace bearings designated to be replaced.
- Perform joint reconstruction and deck slab closure.
- Install cross frames between Girders E and F.
- Cast concrete deck to limits shown for Stage 1.
- Cast concrete approach slab to limits shown for Stage 1.
- Cast concrete median barrier.
- Install traffic gates.
- Complete backfill of approaches.
- Complete deck grooving.
- Place Stage 2 Traffic Barrier Service Concrete Parapet (single face)

Stage 2:

- Adjust all maintenance of traffic components accordingly.
- Remove existing superstructure to limits shown for Stage 2.
- Modify existing Abutments A and B.
- Jack and block beams in Stage 2 and replace bearings.
- Remove existing lateral bracing.
- Perform expansion joint reconstruction and deck slab closure.
- Cast concrete deck to limits shown for Stage 2.
- Cast concrete approach slab to limits shown for Stage 2.
- Cast pedestrian rail and CPSR rail to limits shown for Stage 2.
- Install pedestrian fence and lighting.
- Complete backfill of approaches.
- Complete deck grooving.
- Place Stage 3 Traffic Barrier Service Concrete Parapet (single face)

Stage 3:

- Adjust all maintenance of traffic components accordingly.
- Survey top of existing deck at centerline of Girder L.
- Remove existing overhang to limits shown for Stage 3.
- Install temporary shoring.
- Widen Abutments A and B.
- Construct piers.
- Construct ramp MSE walls and Abutment C.
- Backfill approaches.
- Remove existing lateral bracing.
- Set girders.
- Sequence of Construction Stage 3 continued on sheet 6.



Notes:

Contractor shall feather top of proposed deck to match existing deck at construction joints.

*Dimension is 26'-3" except where varies between Sta. 65+35.14 to Sta. 66+64.56 from 22'-5" to 26'-3".

Mill and overlay, joint reconstruction HES, joint deck slab closure HES removal, abutment backwall reconstruction HES modifications, and median curb shall be completed in Stage 4.

Contractor shall use steel plates as necessary to facilitate construction in Stage 4. Steel plates shall be incidental to other items.

For temporary traffic barrier connection to deck details and notes, see sheet 6.

Indicates Limits of Removal.

Scale: 3/16" = 1'-0"

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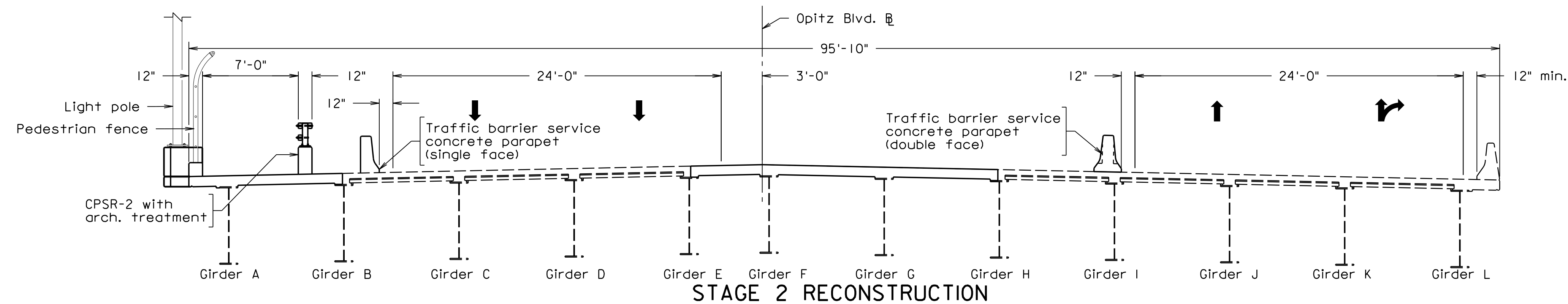
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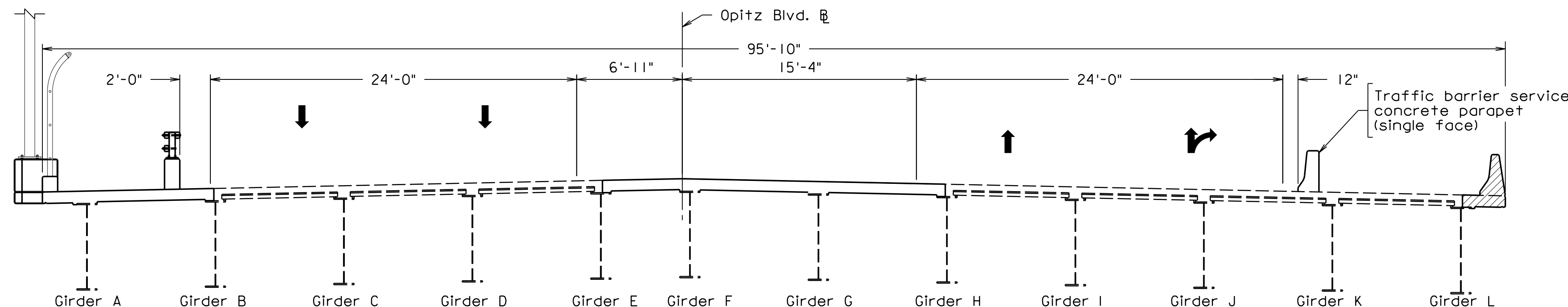
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SEQUENCE OF CONSTRUCTION 1 OF 2					
No.	Description	Date	Designed: MRD	Date	Plan No.
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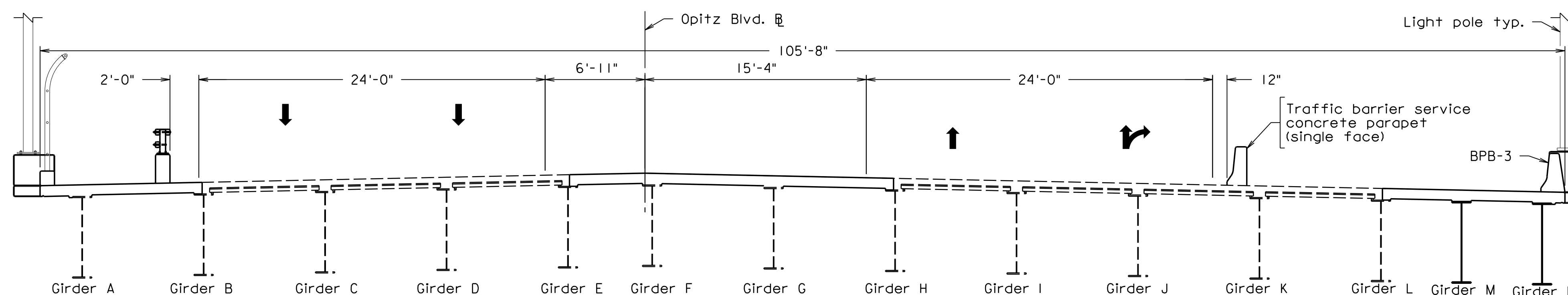
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
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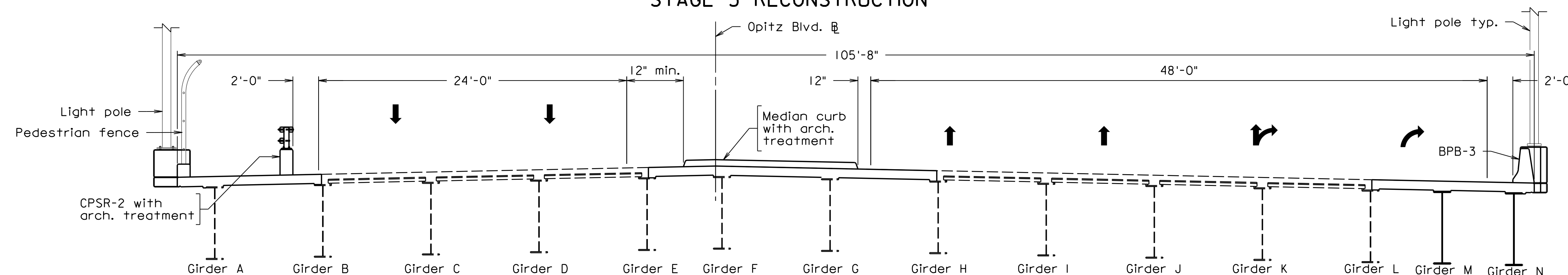
STAGE 2 RECONSTRUCTION



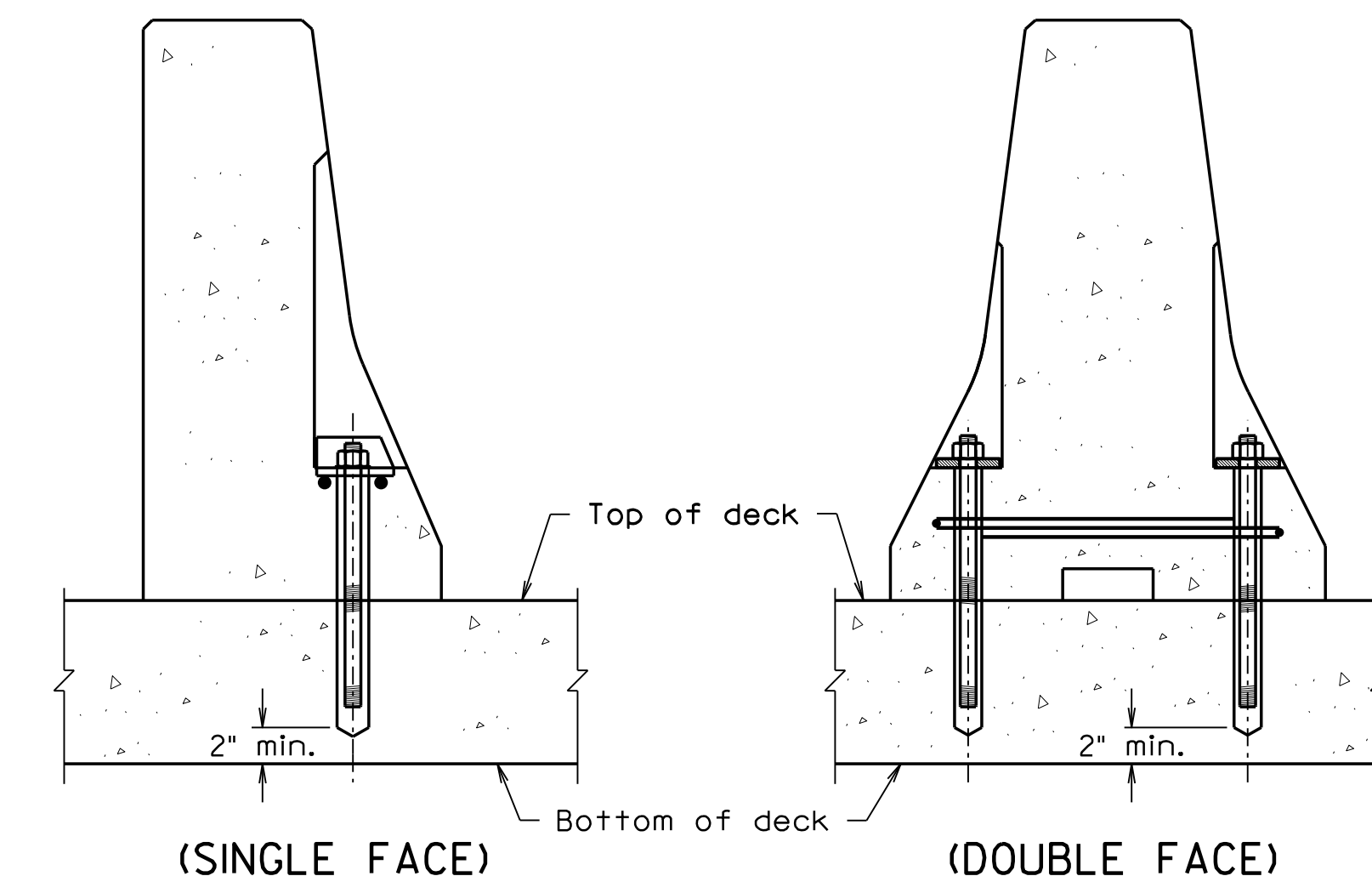
STAGE 3 DEMO



STAGE 3 RECONSTRUCTION



FINAL



NOTES:

Bolt down side adjacent to traffic.

For details not shown, see VDOT Road and Bridge Standards MB-10A for Single face barrier and MB-11A for Double face barrier.

After removing Temporary barrier, cut 7/8" Ø bolt or threaded rod as low as practical below roadway surface and fill recess with epoxy bonding compound EP-4.

Anchor system shall be tested to provide a minimum pullout of 32,000 lbs. and installed according to manufacturer's recommendations. Testing shall be performed in the existing bridge deck in accordance with ASTM E488 at locations approved by the Engineer prior to installation of temporary traffic barrier service.

Contractor shall take care not to damage existing precast deck panels.

TRAFFIC BARRIER SERVICE CONCRETE PARAPET
Not to scale

SUGGESTED SEQUENCE OF CONSTRUCTION CONTINUED:

Stage 3 continued:

- Jack and block beams in Stage 2 and replace bearings.
- Cast concrete deck to limits shown for Stage 3.
- Perform joint reconstruction and deck slab closure.
- Install approach slabs to limits shown for Stage 3.
- Install bridge parapet to limits shown for Stage 3.
- Install moment slab, parapet and pier protection at MSE wall.
- Install guardrail and end terminals.
- Complete deck grooving.
- Install bridge pier protection
- Upon completion of Stage 3 construction, remove all Traffic Barrier Service Concrete Parapet (single face) and repair anchor locations.

Stage 4:

- Adjust all maintenance of traffic components accordingly.
- Modify existing Abutments A and B.
- Perform joint reconstruction and deck slab closure.
- Construct remaining median curb.
- Perform milling, hydrodemolition and overlay deck operations.

Notes:

Mill and overlay, joint reconstruction, joint removal, abutment modifications, and install remainder of median curb shall be completed in Stage 4.

For additional notes, see sheet 5.

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SEQUENCE OF CONSTRUCTION 2 OF 2					
No.	Description	Date	Designed: MRD	Date	Plan No.
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Notes:

Slope Protection shall be in accordance with Section 415 of the Specifications.

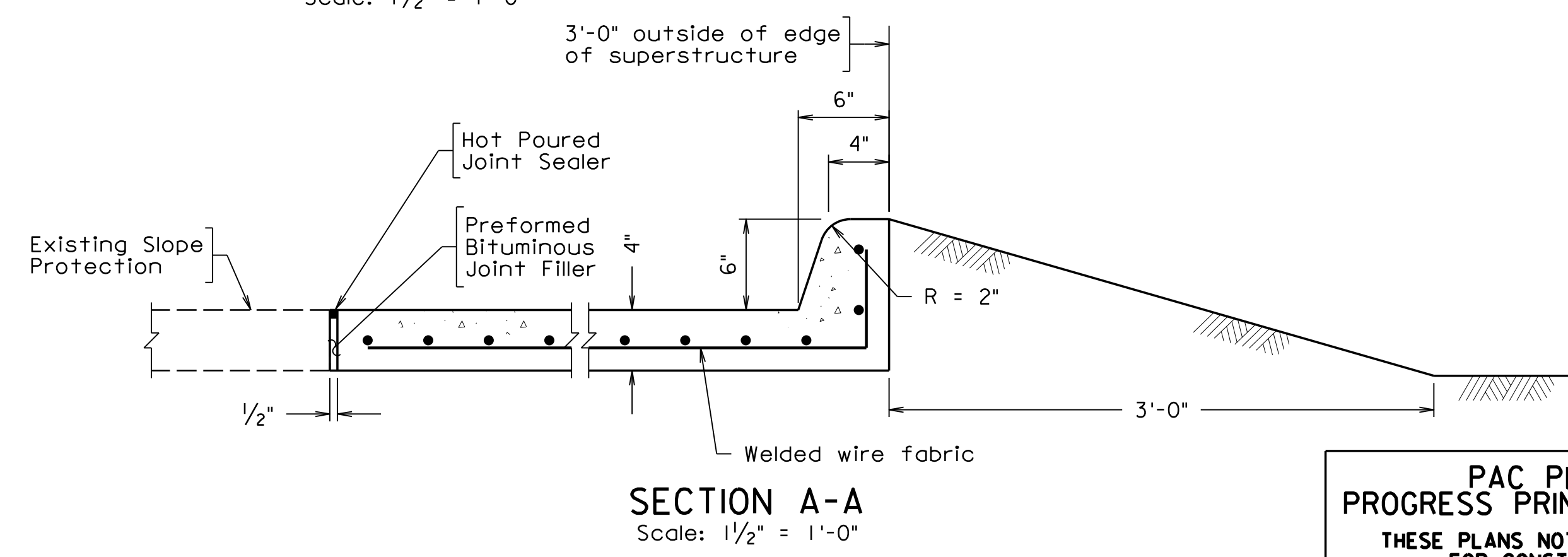
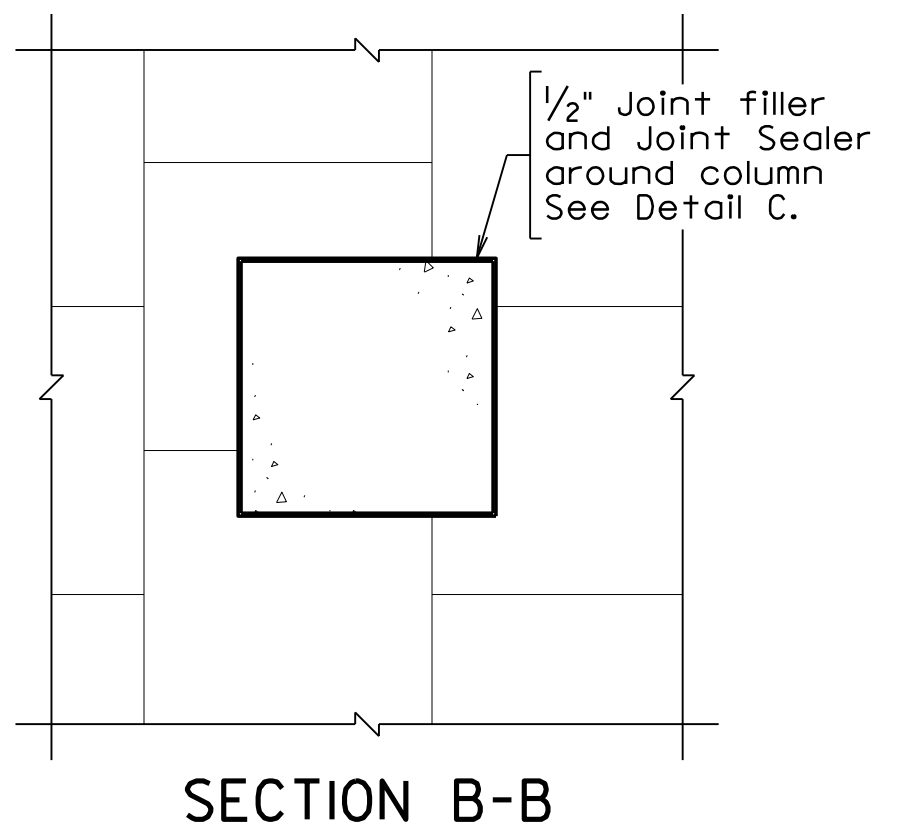
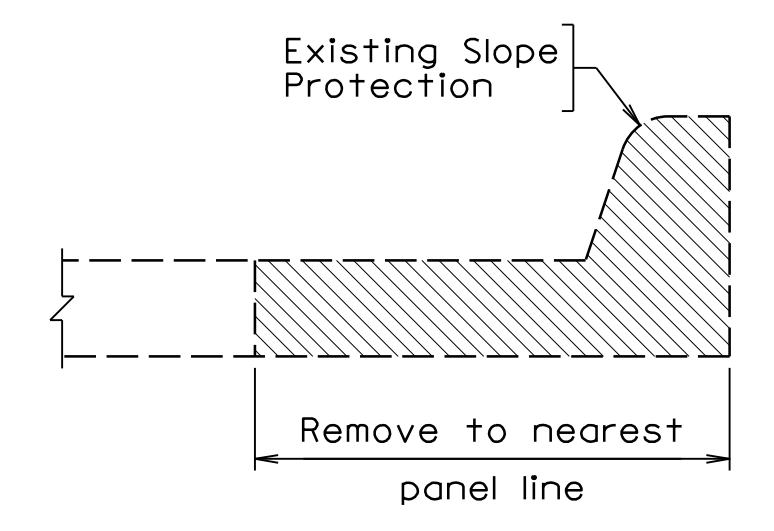
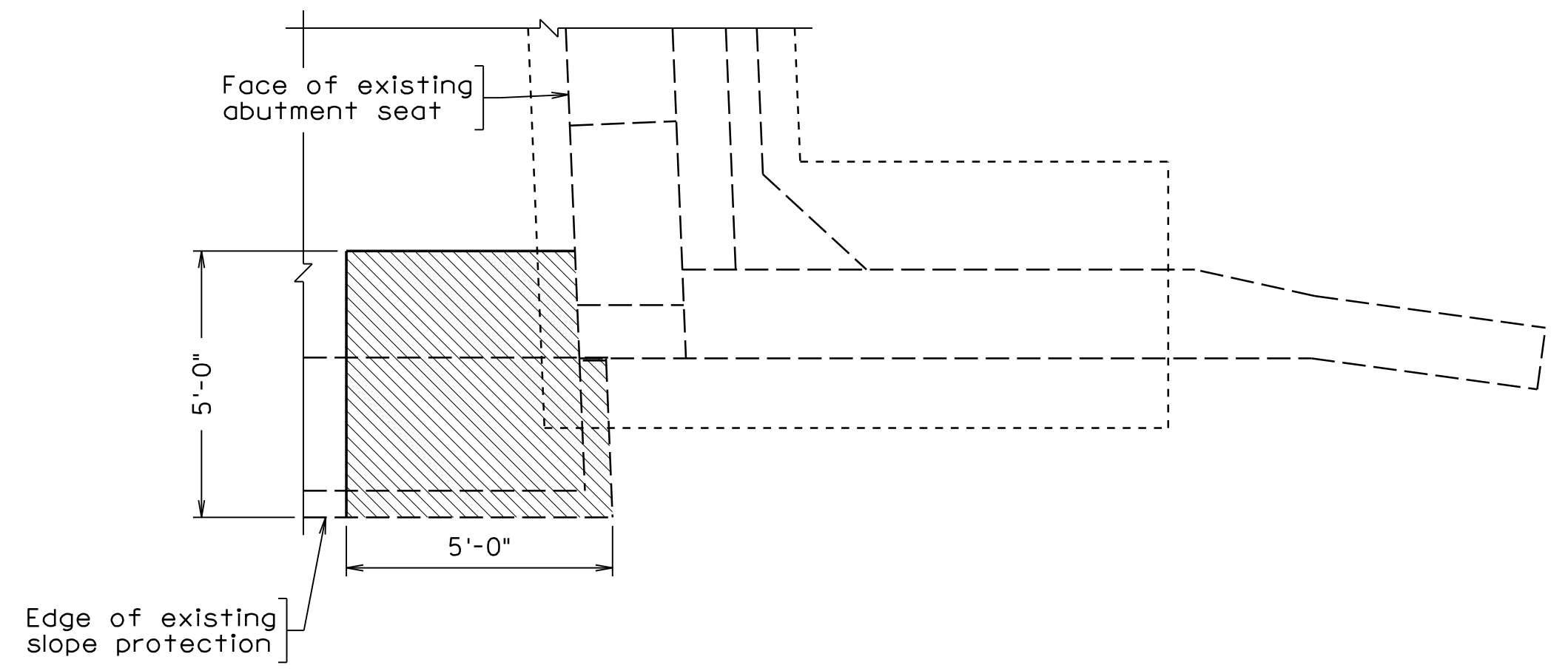
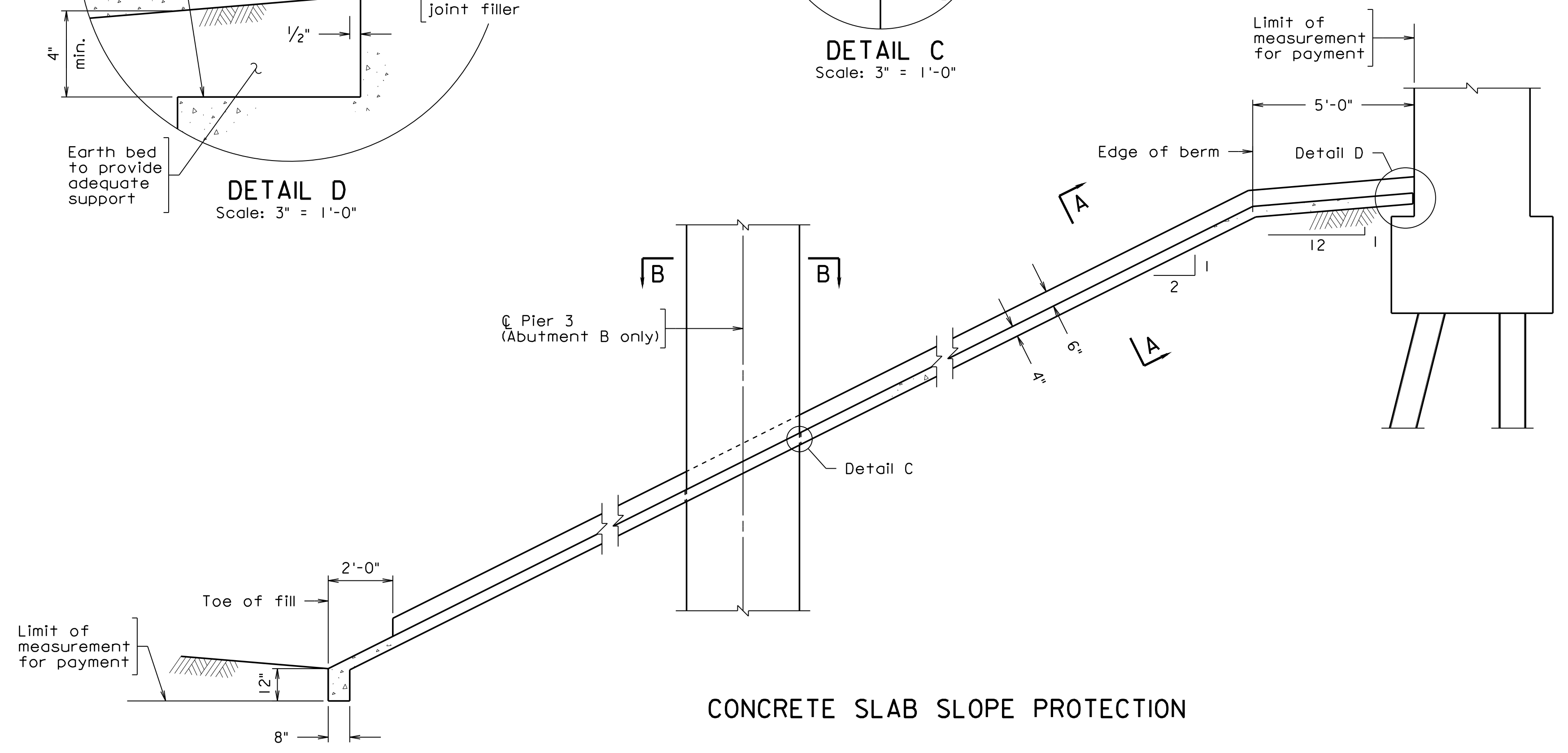
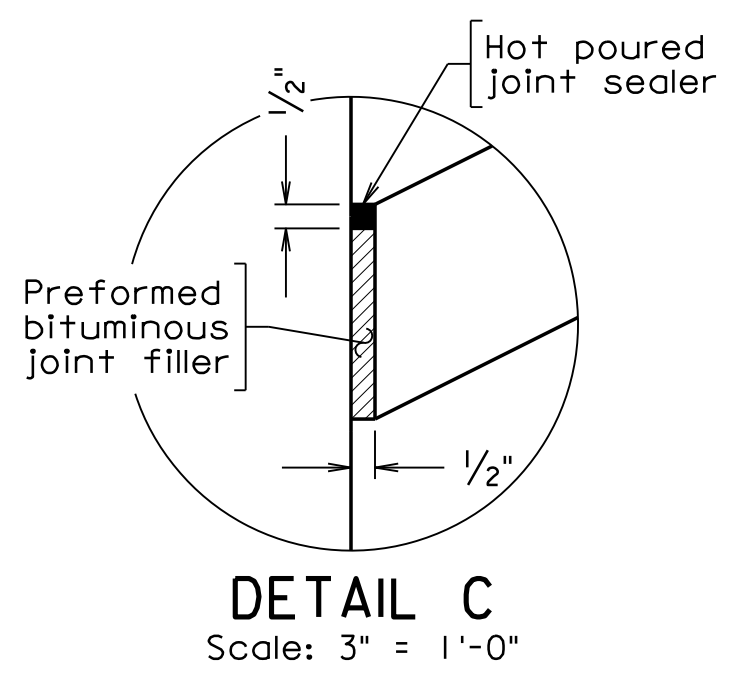
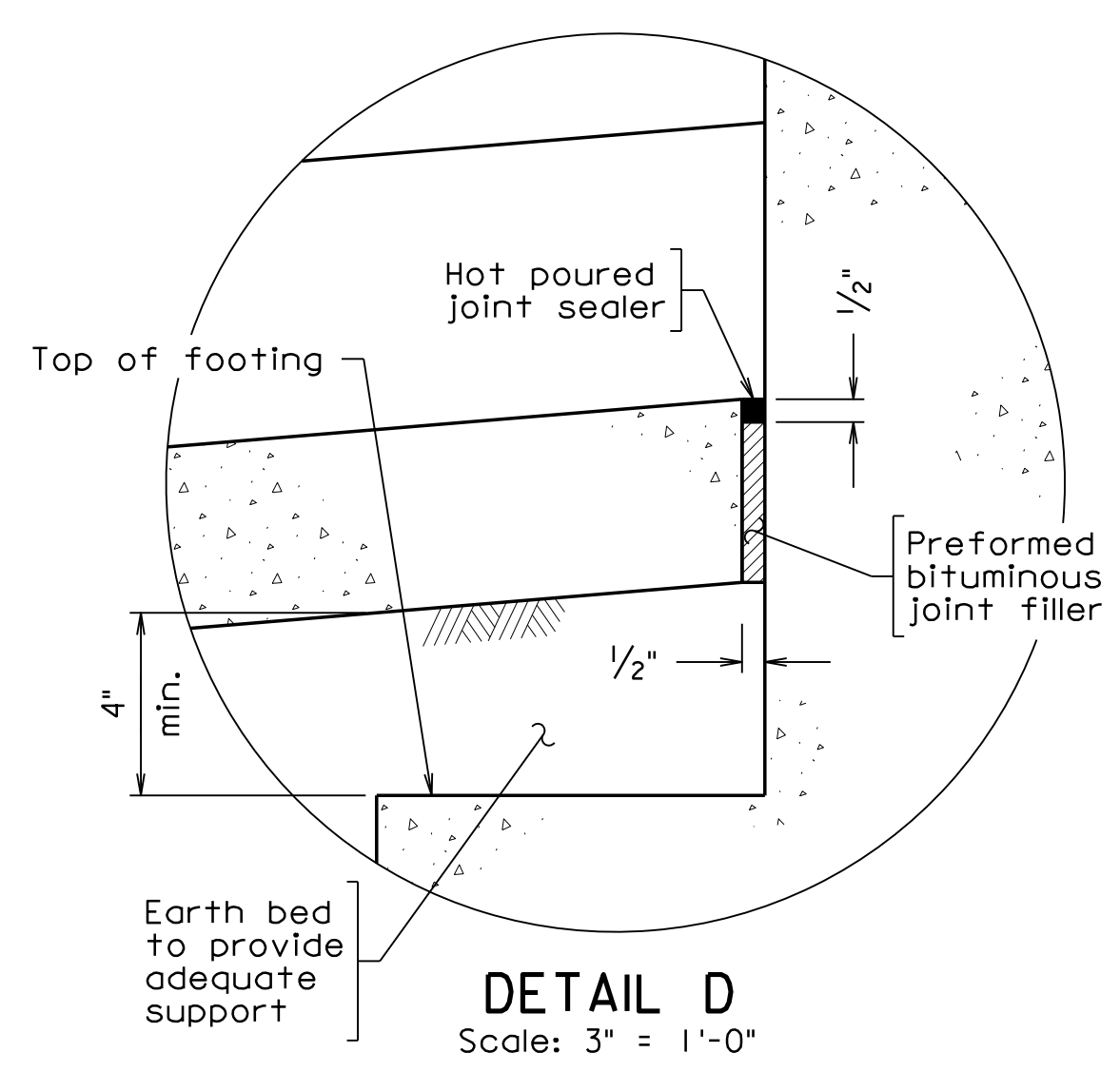
Contractor shall grade slope, filling any voids prior to installation of proposed slope protection.

The cost for grading, filling of voids, and seeding shall be included in the unit bid price for Concrete Slab Slope Protection 4.

Contractor shall extend new concrete slab slope protection to bottom of existing slope or as directed by the Engineer.

Contractor shall provide a minimum 1/2 inch joint between any column face with preformed joint filler and hot poured joint sealer.

 Indicates Limits of removal



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SLOPE PROTECTION DETAILS					
No.	Description	Date	Designed: MRD	Date	Plan No.
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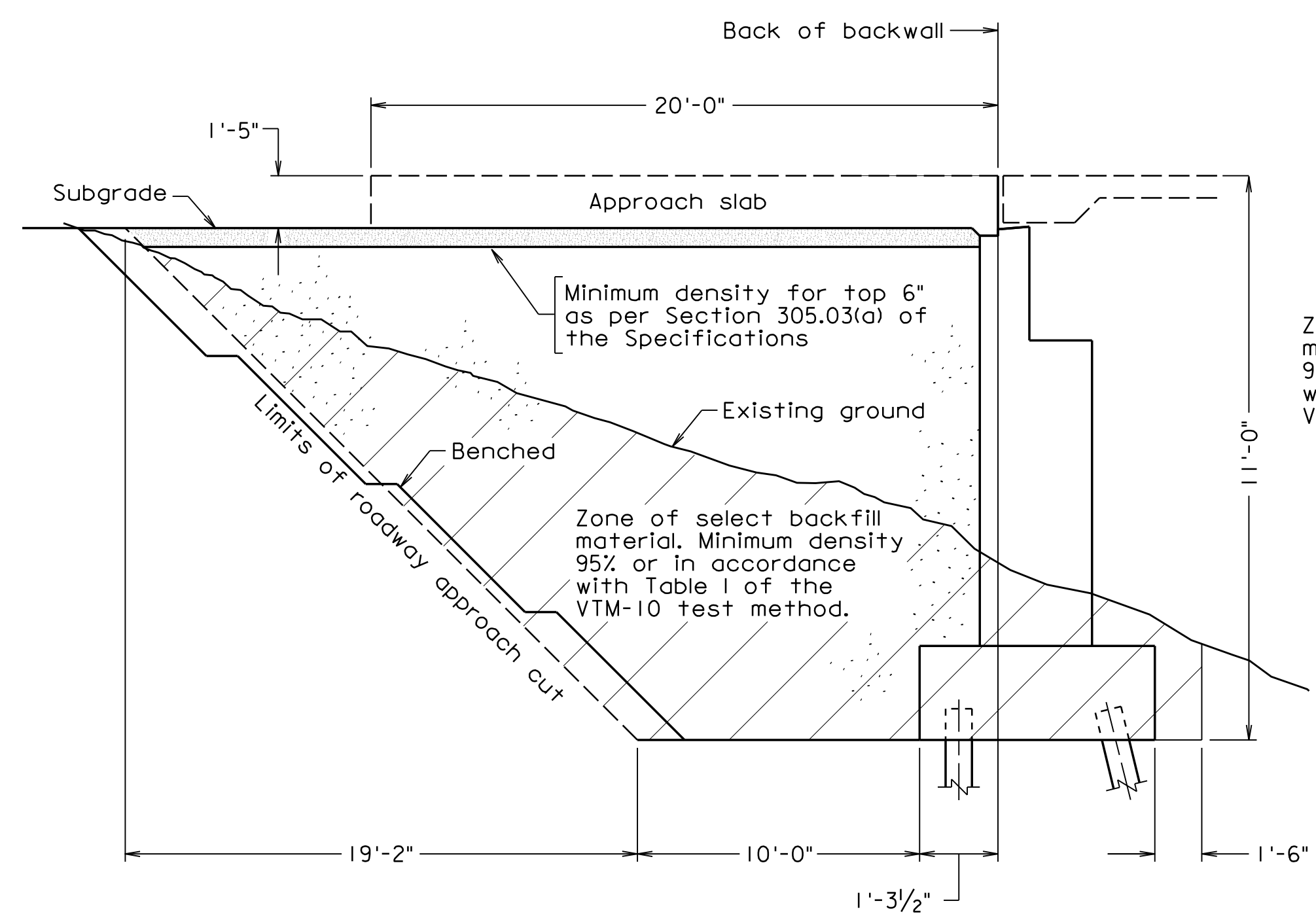
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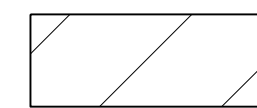
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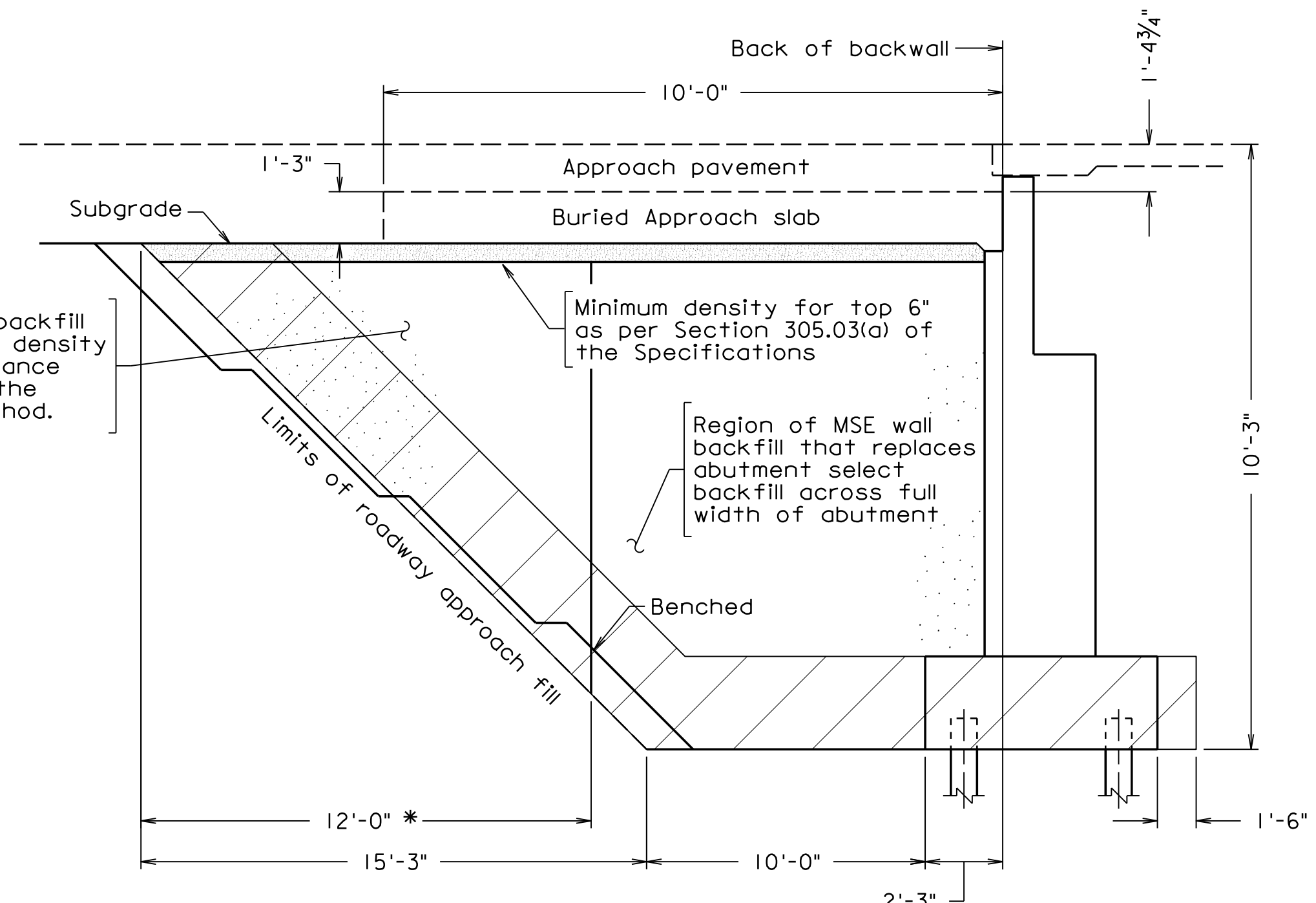
STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			95	0095-076-299, B688	8



Zone of select backfill material. Minimum density 95% or in accordance with Table I of the VTM-10 test method.

 To be paid for as structure excavation

SECTION THROUGH ABUTMENTS A and B - CUT SECTION
Abutment drainage not shown



* Estimated limit of quantity for structure excavation and min. CBR 30 select fill

SECTION THROUGH ABUTMENT C - FILL SECTION
Abutment drainage not shown

Notes:

Material in the abutment select backfill zone shall be Select Material Type 1, minimum CBR 30, and shall be compacted in accordance with Sections 303 and 305 of the VDOT Road and Bridge Specifications. 21A or 21B may be substituted for Select Material Type 1, minimum CBR 30, at no additional cost to the Department.

In cut situations, material with strength characteristics greater than the select backfill may be left in place.

The final depth A of the embankment side slopes shall be regular embankment material placed and finished as required.

The estimated quantity given for the abutment select backfill zone has been reduced by the estimated quantity of MSE wall backfill in the zone. ((Note to be used when MSE walls compose all or part of the abutment.)) ((Delete note if MSE walls are not utilized.))

At the Contractor's option and at no additional cost to the Department, the MSE wall backfill may be used for the entire abutment select backfill zone in lieu of Select Material Type 1, minimum CBR 30 excluding #10 screenings, which may not be used in the abutment select backfill zone. If the MSE wall backfill is #8 or coarser, a separator fabric shall be used between the MSE wall backfill and roadway subgrade, and between the select backfill and the approach roadway cut or fill. The separator fabric shall be needle-punched, non-woven geotextile in accordance with Section 245.03 (d)2 of the Specifications or in accordance with the Special Provision located in VDOT's Manual of the Structure and Division, Part 2, File No. 17.13-8 at no additional cost when utilizing this option. ((Note to be used when MSE walls compose all or part of the abutment.)) ((Delete note if MSE walls are not utilized.))

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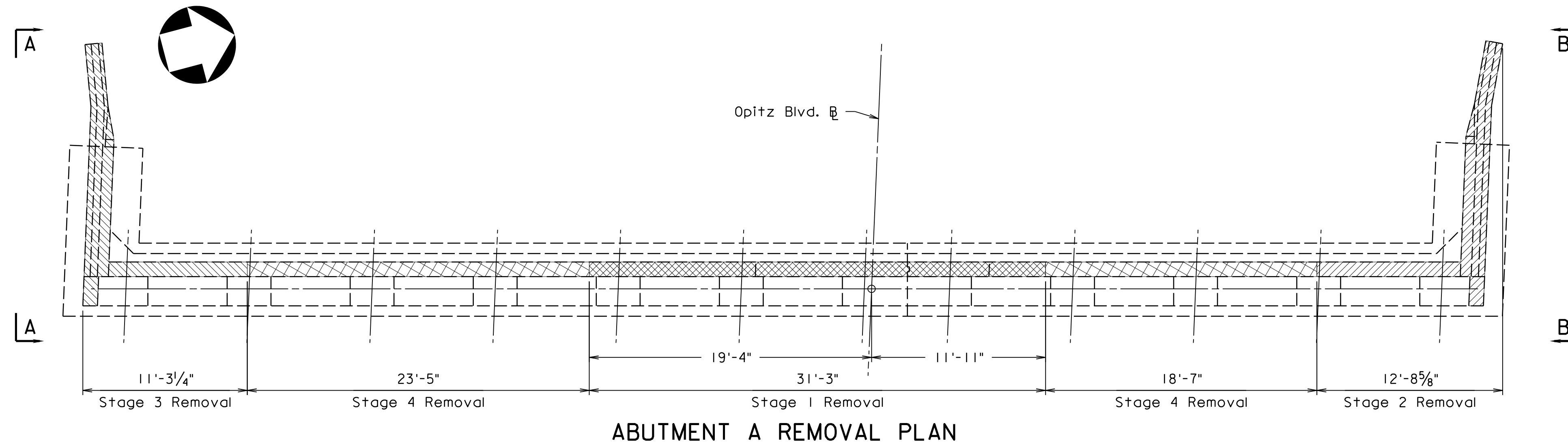
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ABUTMENT BACKFILL DETAILS					
No.	Description	Date	Designed: MRD..... Drawn: CBR..... Checked: J.S.....	Date Apr. 2022	Plan No. 257-38A
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ABUTMENT A REMOVAL PLAN

Notes:

Contractor shall take care not to damage portion of existing structure to remain in service.

Contractor shall provide a clean edge of demolition with a 1 inch deep saw cut.

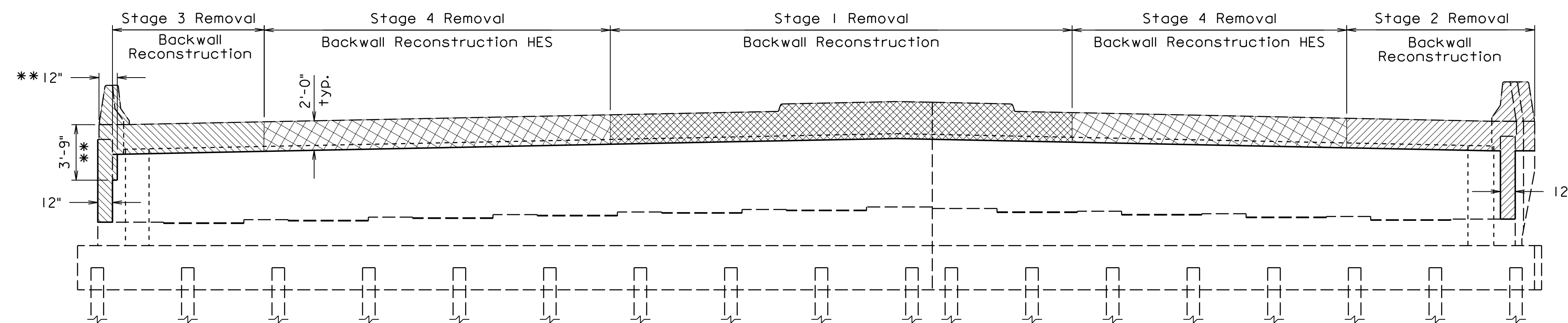
*Wingwall removal may occur after abutment modifications to allow for temporary shoring. Wingwall shall be removed to a minimum of 3 feet below proposed top of ground and shall provide clearance for conduit.

**Dimension may be adjusted to allow for installation of conduit.

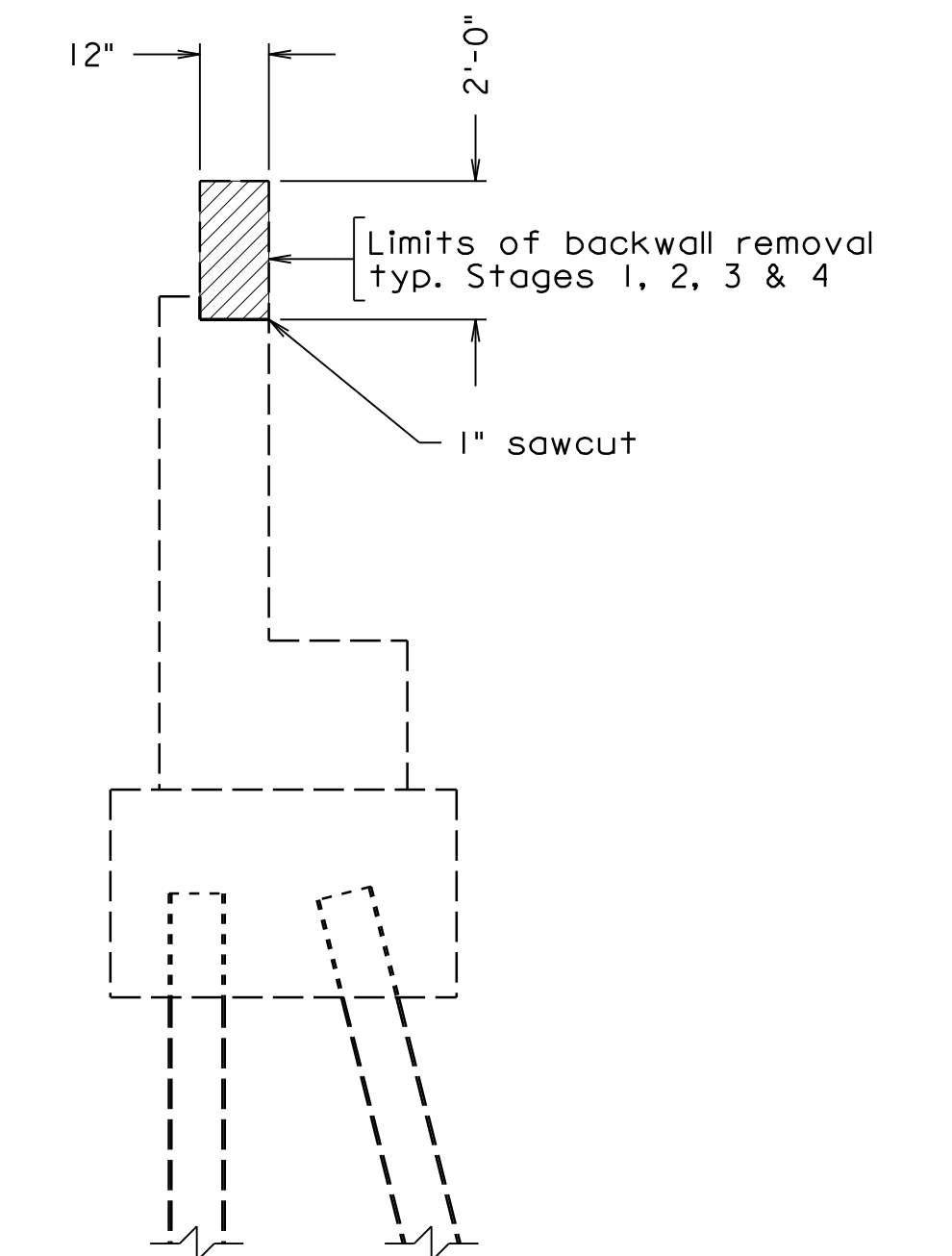
For abutment modification details, see sheets 10, 11, 12, 13, and 14.

Legend:

- Denotes portion of existing structure to be removed during Stage 1
- Denotes portion of existing structure to be removed during Stage 2
- Denotes portion of existing structure to be removed during Stage 3
- Denotes portion of existing structure to be removed during Stage 4

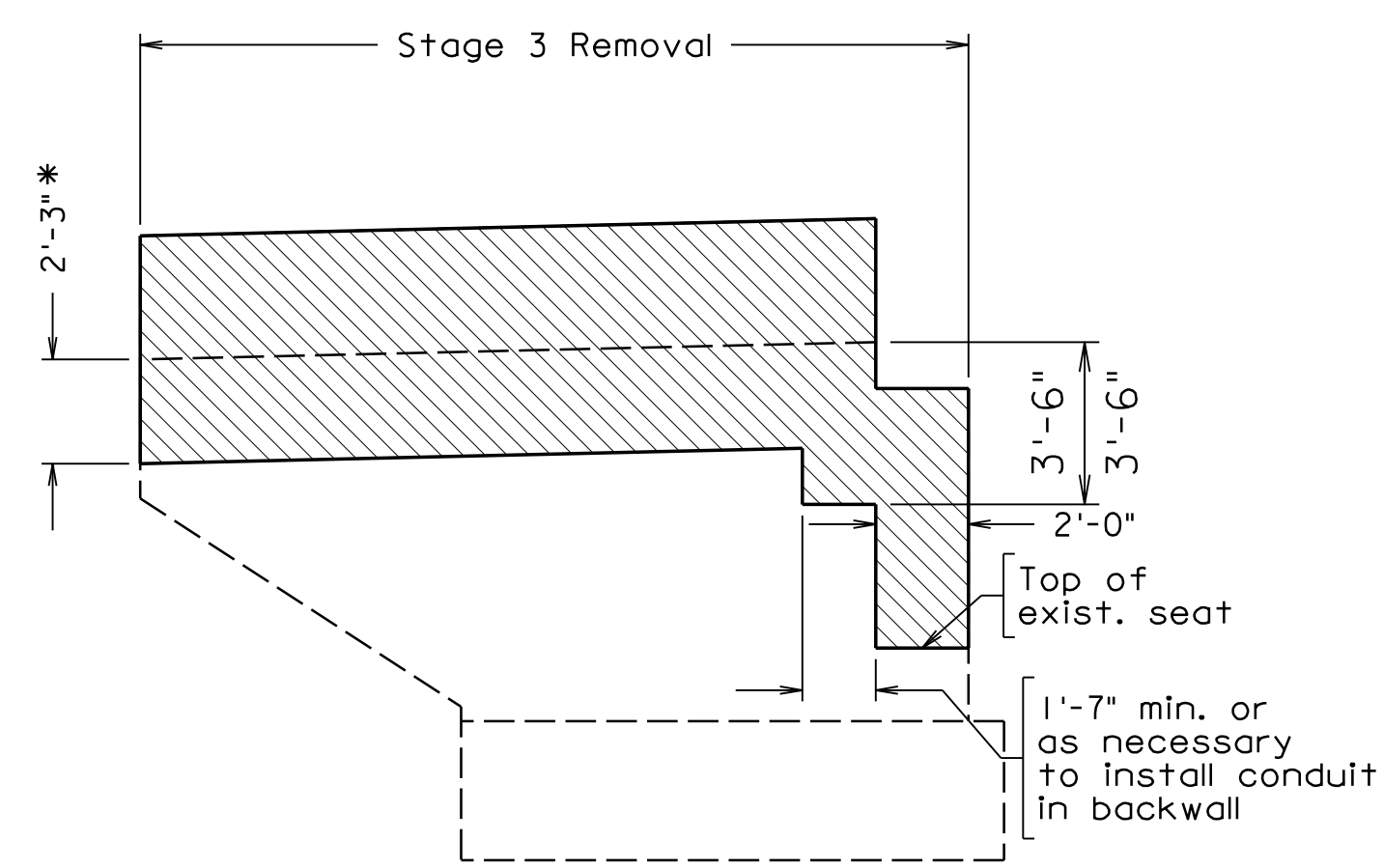


ABUTMENT A REMOVAL ELEVATION



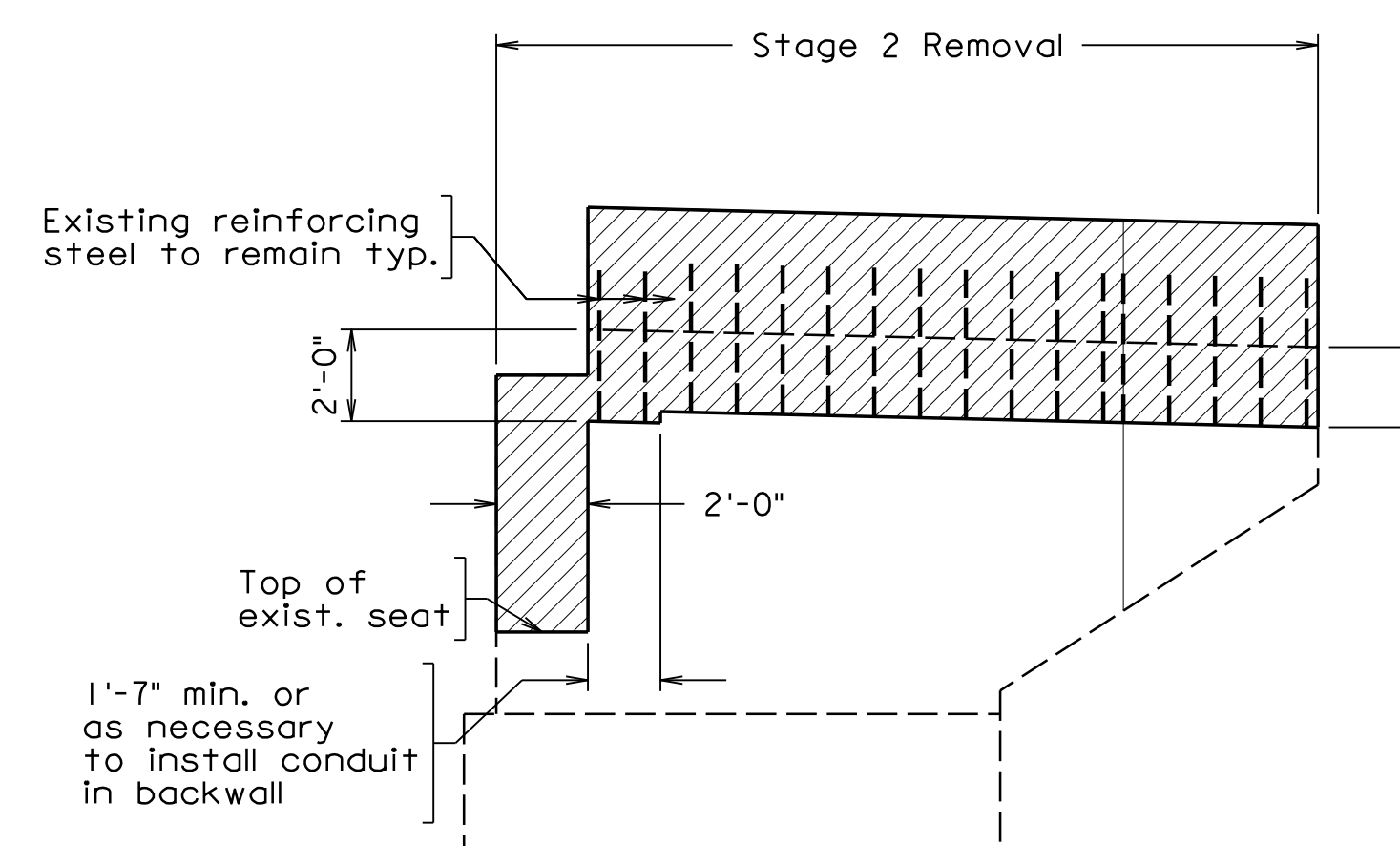
EXISTING ABUTMENT A SECTION

Scale: 3/8" = 1'-0"



VIEW A-A

Scale: 1/4" = 1'-0"



VIEW B-B

Scale: 1/4" = 1'-0"

Scale: 3/8" = 1'-0" unless otherwise noted.

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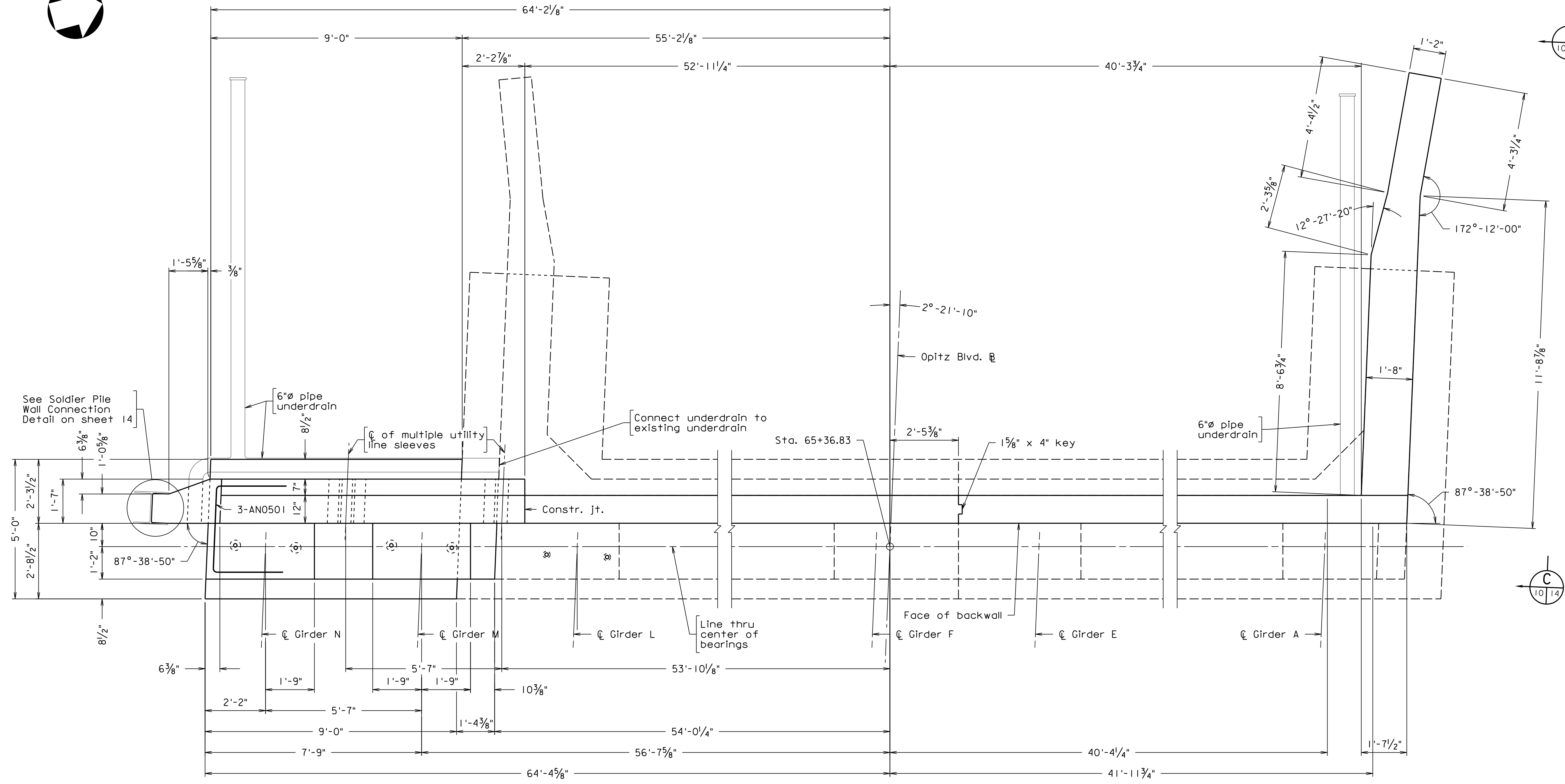
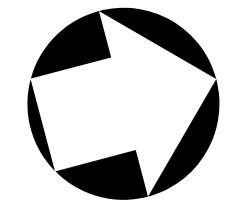
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ABUTMENT A REMOVAL				
No.	Description	Date	Designed: RDS..... Date: Apr. 2022 Drawn: MWL..... Checked: SKL.....	Plan No. 257-38A Sheet No. 9 of 125
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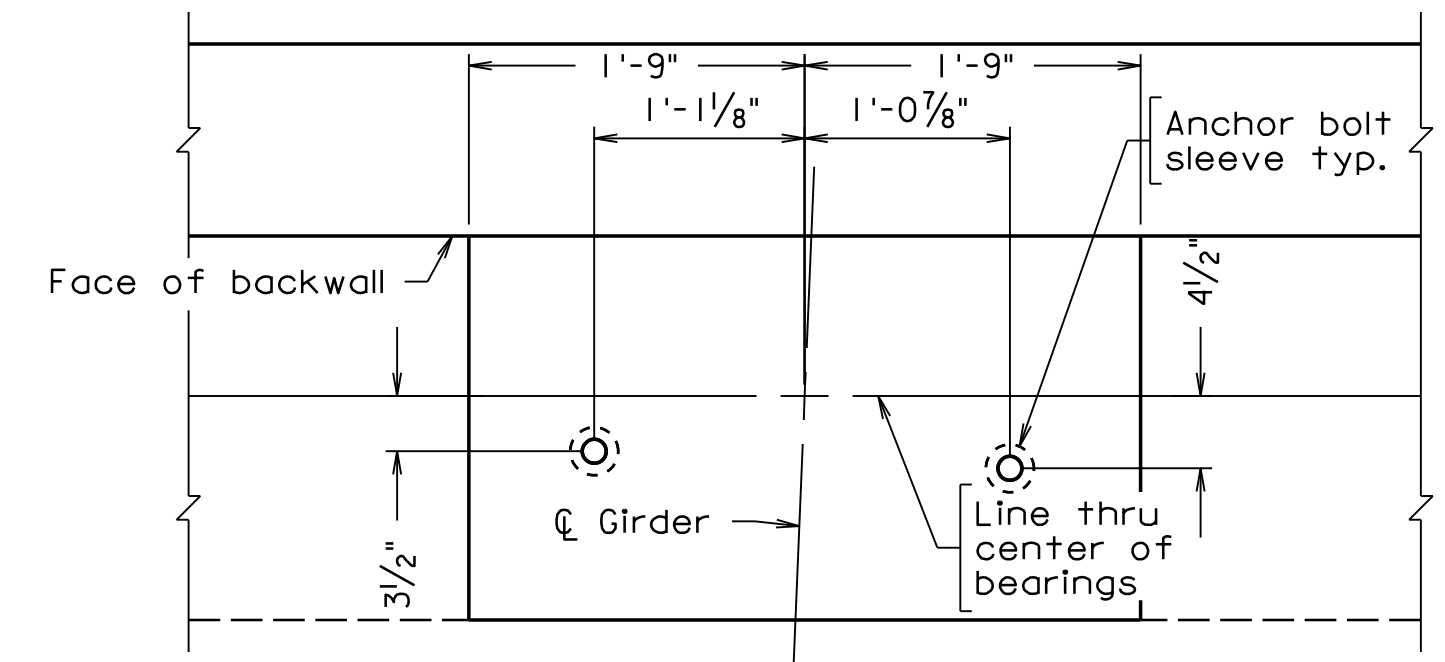
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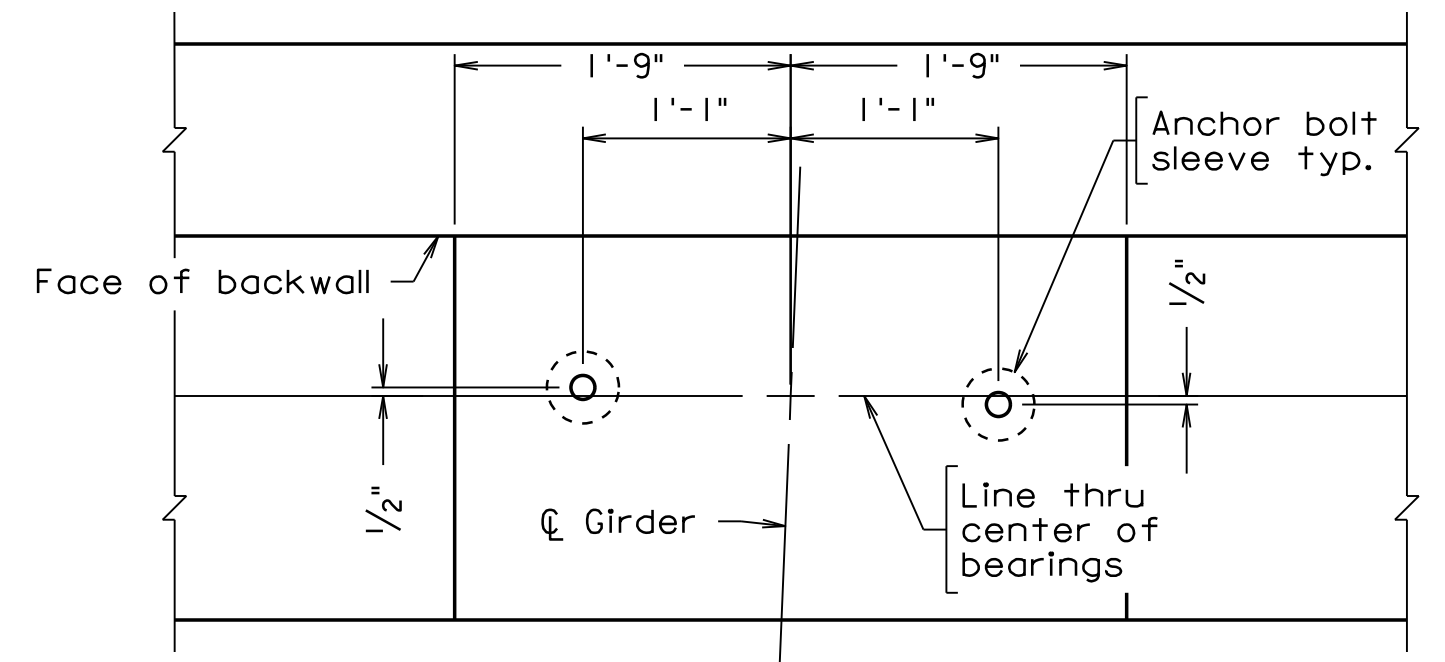
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PLAN



ANCHOR BOLT LAYOUT
GIRDERS A-C AND K-L
Scale: 1" = 1'-0"



ANCHOR BOLT LAYOUT
GIRDERS M AND N
Scale: 1/2" = 1'-0" unless otherwise noted.

Notes:
 For elevation view, Backwall construction joint locations and elevations, see sheet 11.
 For pile layout and footing plan, see sheet 12.
 For typical section, see sheet 13.
 For wingwall details, see sheet 14.
 For anchor bolt sleeve details, see sheet 34.

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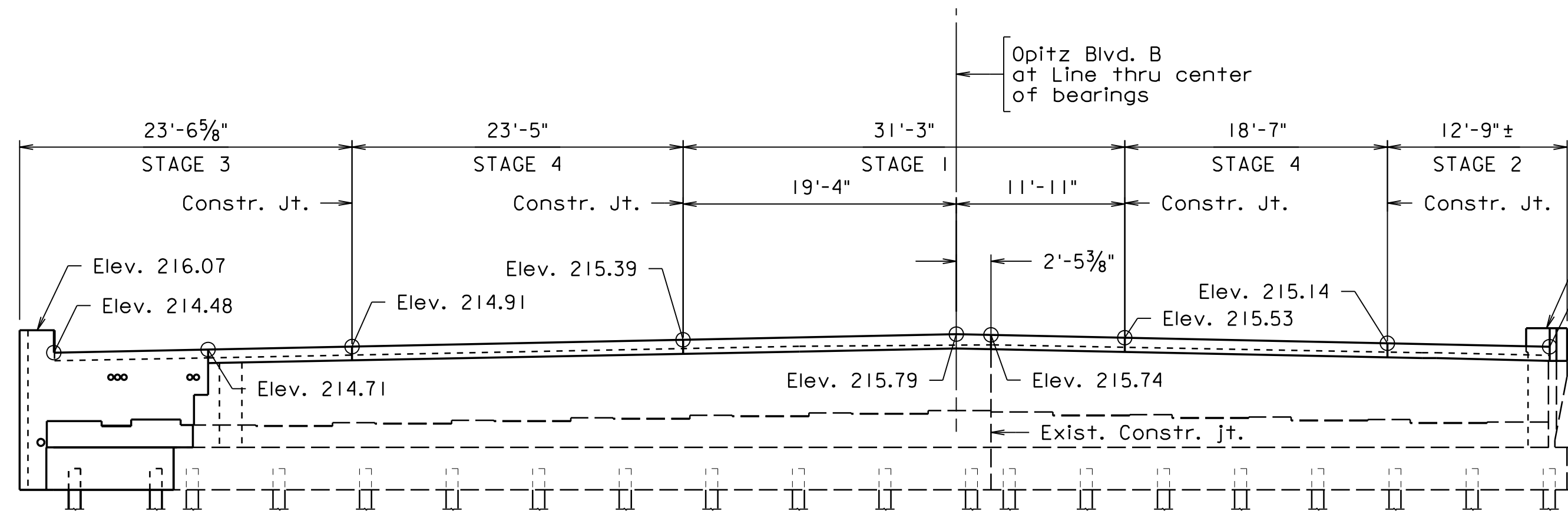
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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT A PLAN					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
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Revisions					

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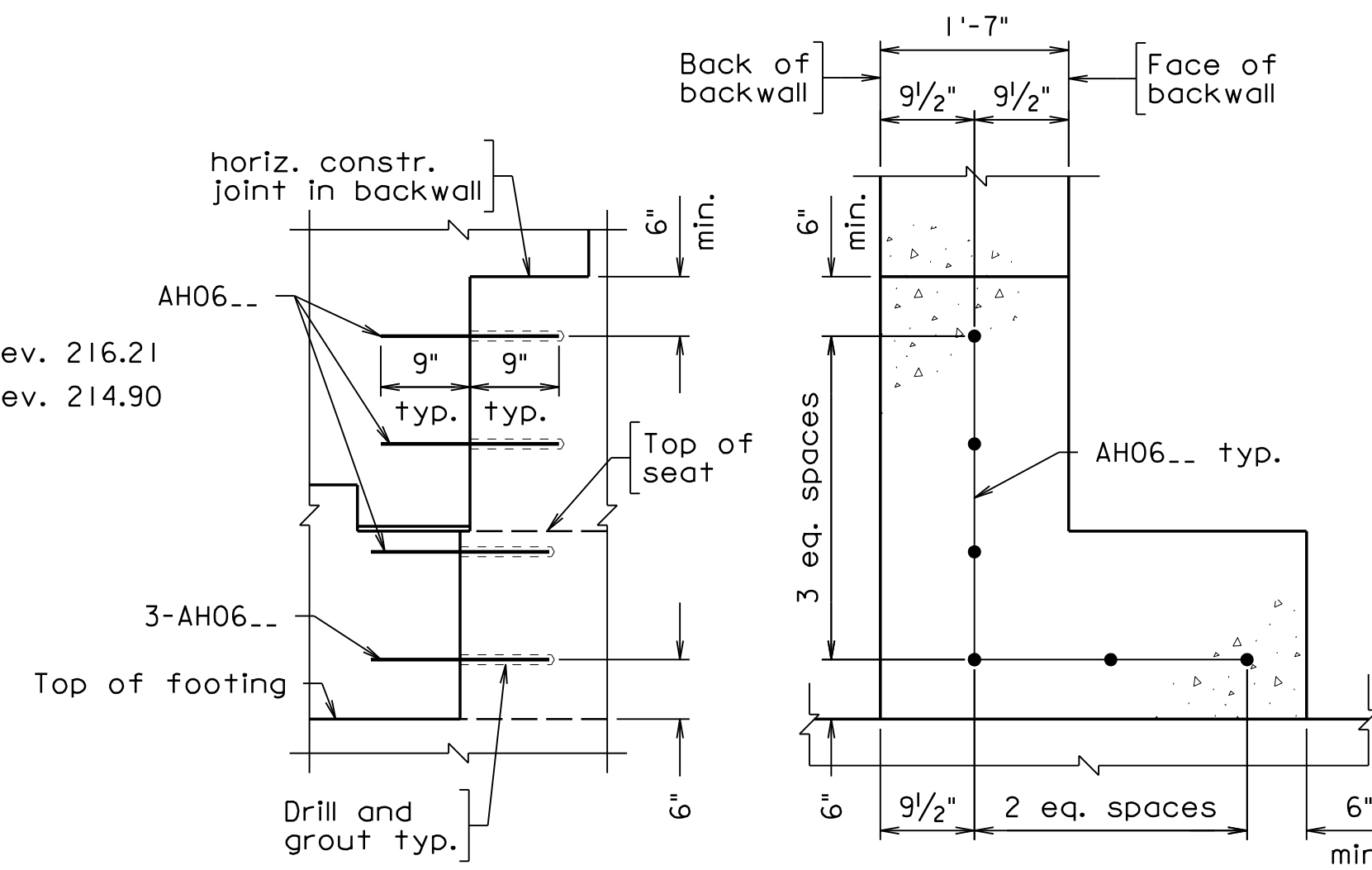
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VA.		95	0095-076-299, B688
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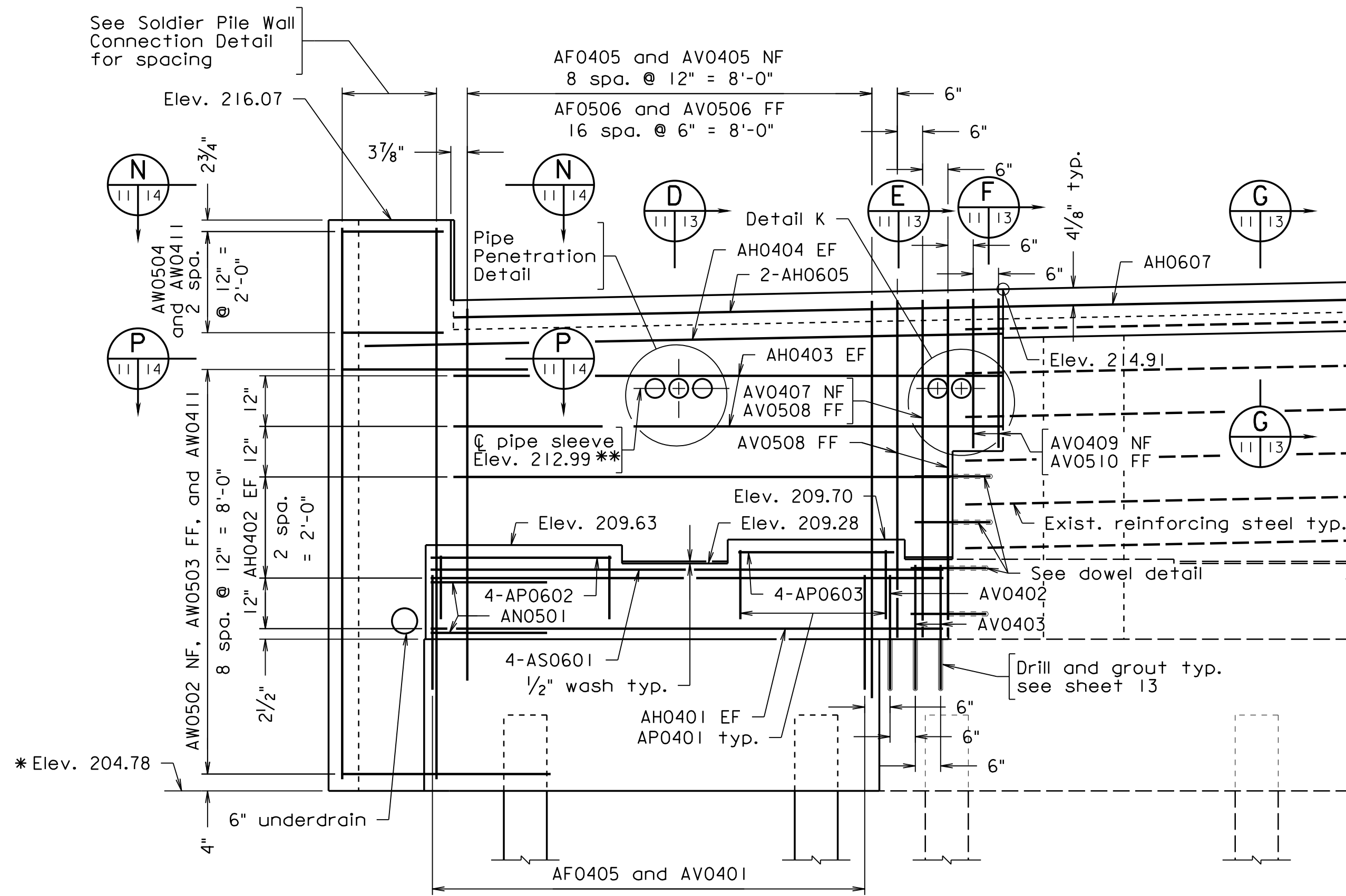
ABUTMENT BACKWALL CONSTRUCTION JOINT LOCATIONS AND ELEVATIONS
Scale: 1/8" = 1'-0"



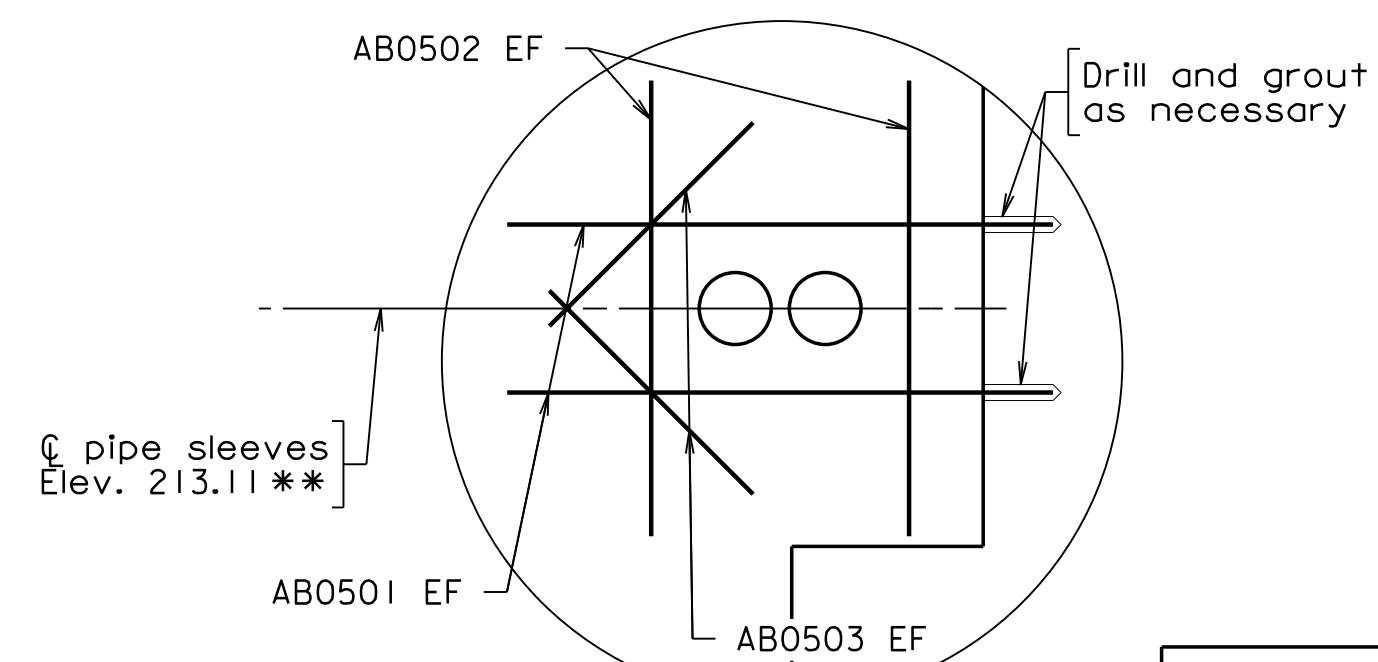
PART ELEVATION BACKWALL DOWEL DETAIL
Scale: 3/4" = 1'-0"

Notes:

- *Proposed bottom of footing shall match existing bottom of footing.
- **Conduit shall be located to clear cross frames.
- Backwall construction joints shall be perpendicular to face of backwall.
- The joining of new and existing concrete abutment footing shall be in accordance with Section 412 of the VDOT Standard Specifications. Grout for drilled in dowels shall conform to Section 218 of the VDOT Standard Specifications.
- Contractor shall install couplers or AH0608 coupler bars for AH0607 bars at any construction joint necessary for their means and methods to perform backwall reconstruction except at existing construction joint.
- The number of AH0608 coupler bars shall be determined by Contractor and is not included in reinforcing steel schedule.
- AH0607 bars shall be cut to length determined by Contractor's construction joint location.
- For plan view, see sheet 10.
- For pile layout, footing plan, and Bearing pad details see sheet 12.
- For typical section, see sheet 13.
- For wingwall details and Slider Pile Wall Connection Detail, see sheet 14.
- For Pipe Penetration Detail, see sheet 92.

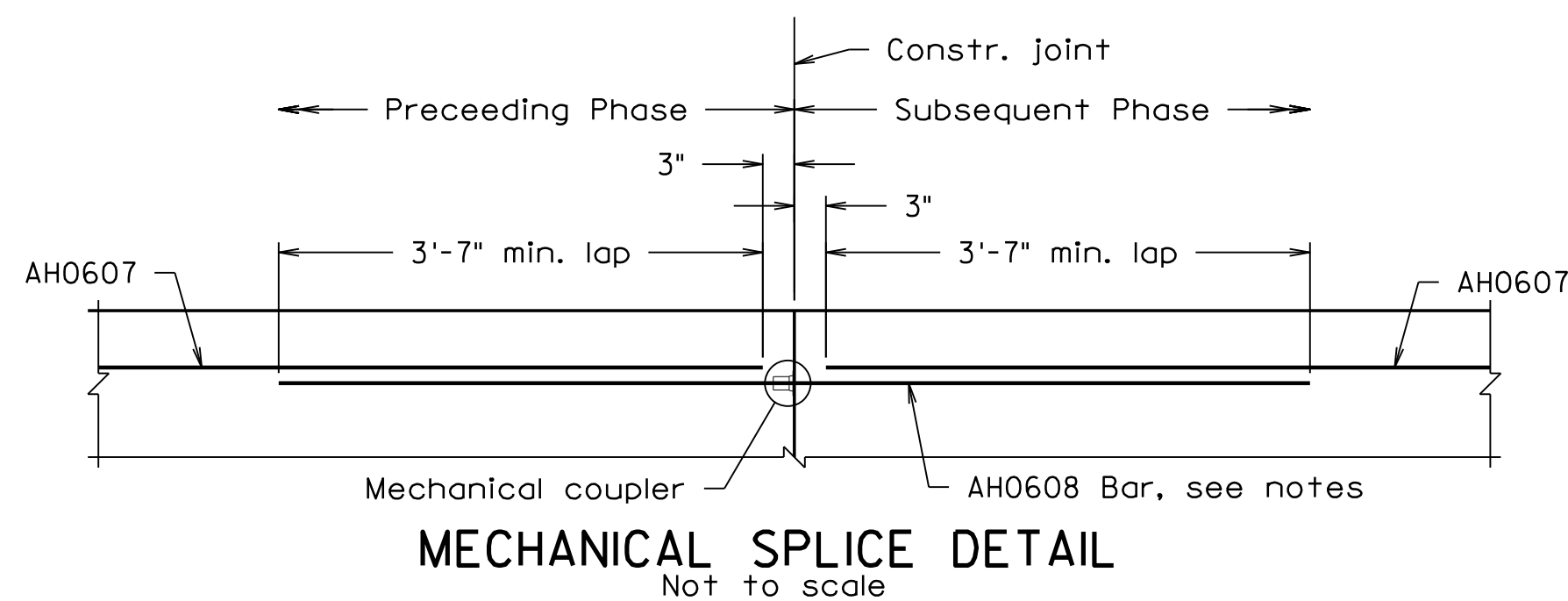


ELEVATION



DETAIL K
Scale: 1" = 1'-0"

Scale: 1/2" = 1'-0" unless otherwise noted.



MECHANICAL SPLICE DETAIL
Not to scale

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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT A ELEVATION					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: J.S.K.....		11 of 125
Revisions					

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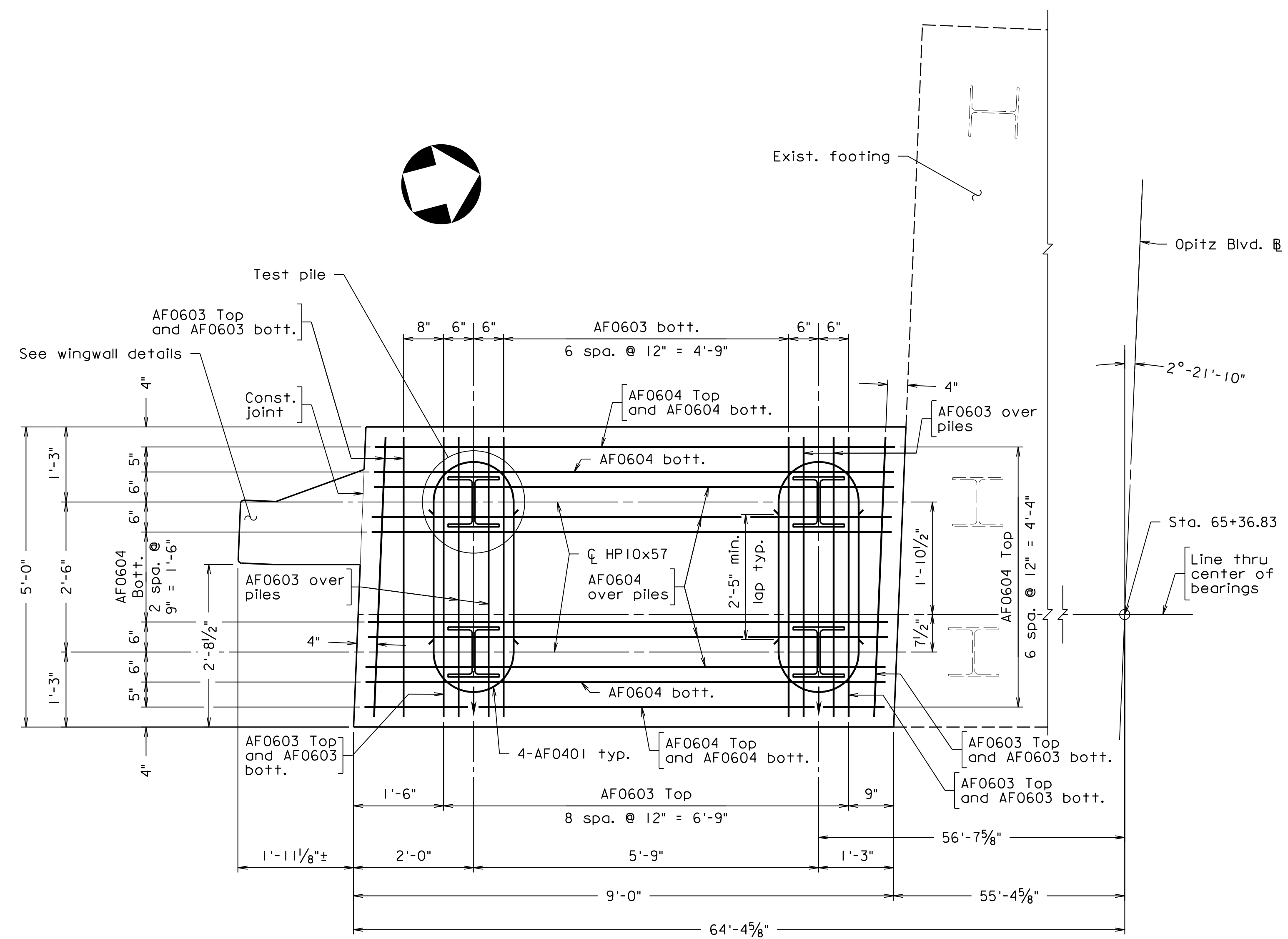
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			12

PILE DATA TABLE			
Nominal Axial Resistance Measured During Driving (Tons/pile)	Factored Axial Resistance (Tons/pile)	Estimated Tip Elevation	Minimum Tip Elevation
192	125	150	175

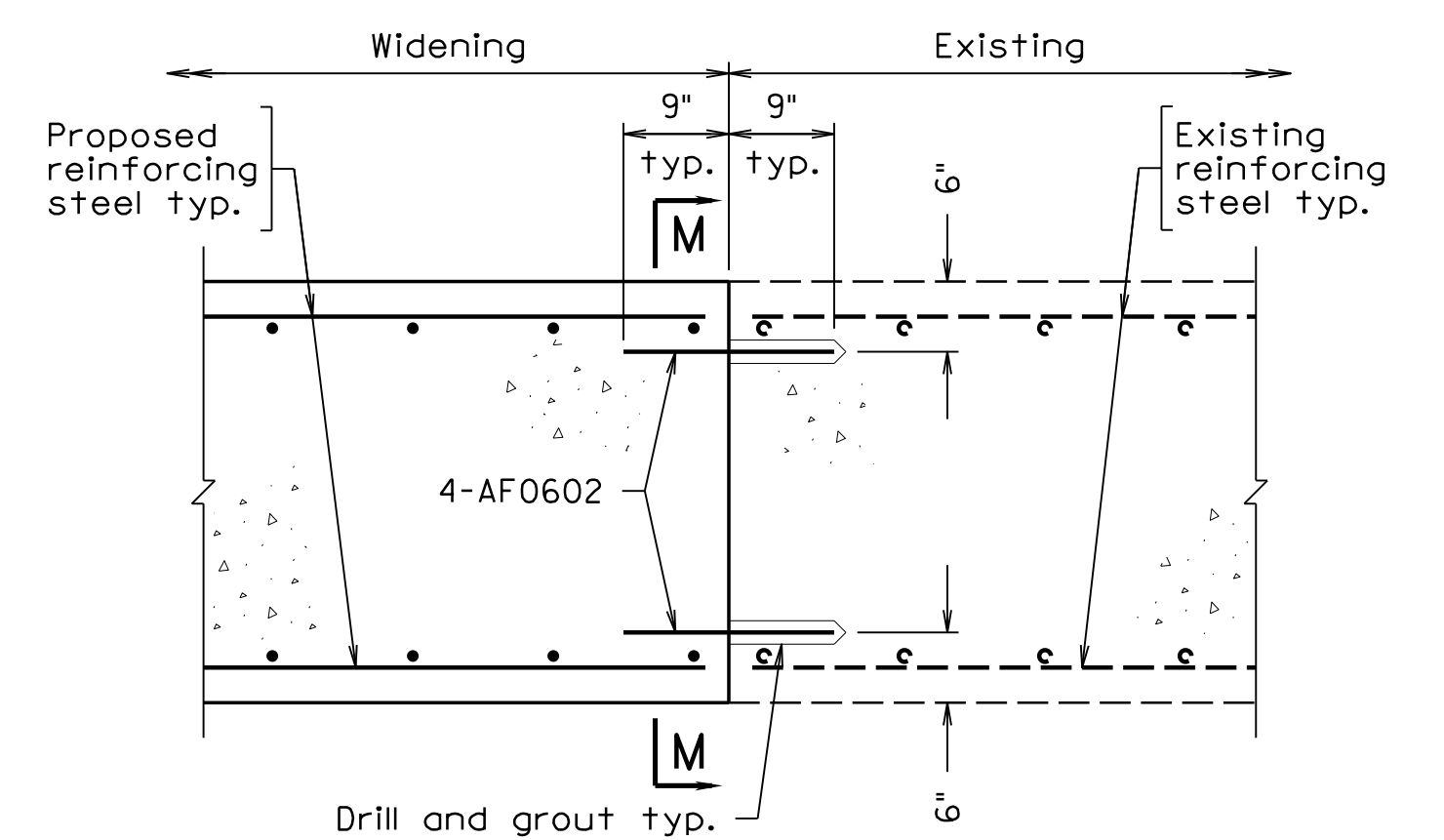
The Strength Limit State controls the pile design.

Notes:
 For Abutment A typical sections, see sheet 13.
 The joining of new and existing concrete abutment footing shall be in accordance with Section 412 of the VDOT Standard Specifications. Grout for drilled in dowels shall conform to Section 218 of the VDOT Standard Specifications.
 The one required test pile and dynamic pile test are required to be done prior to driving any other permanent piling within the same substructure unit.

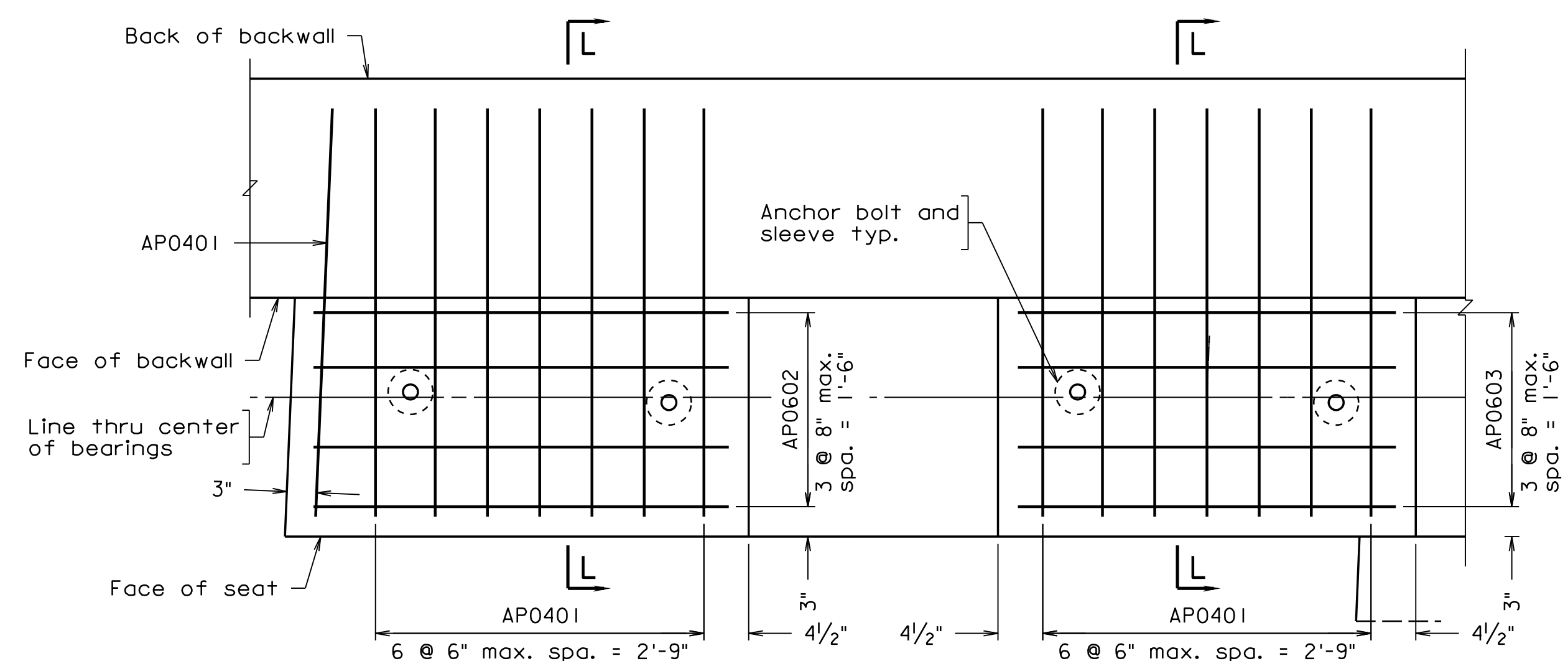
Legend:
 ↓ Denotes direction of 3:12 batter.



FOOTING PLAN

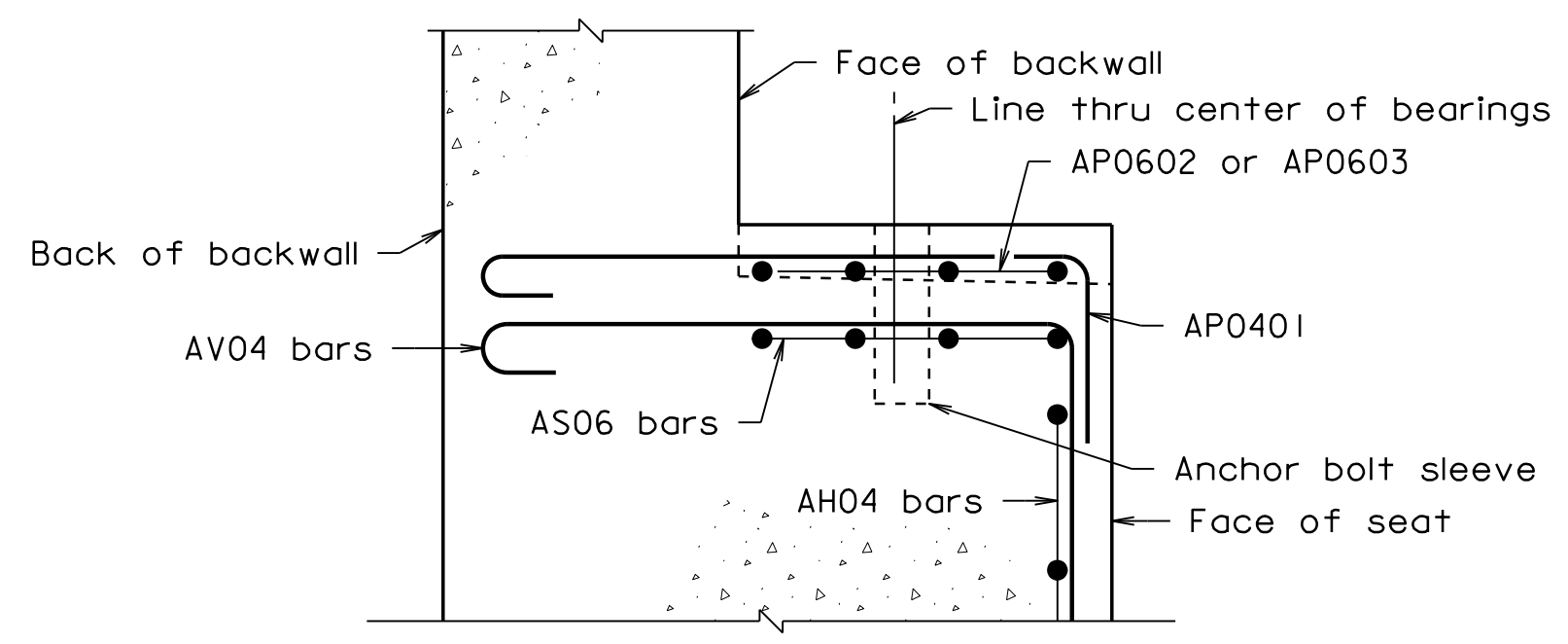


DOWEL BAR DETAIL



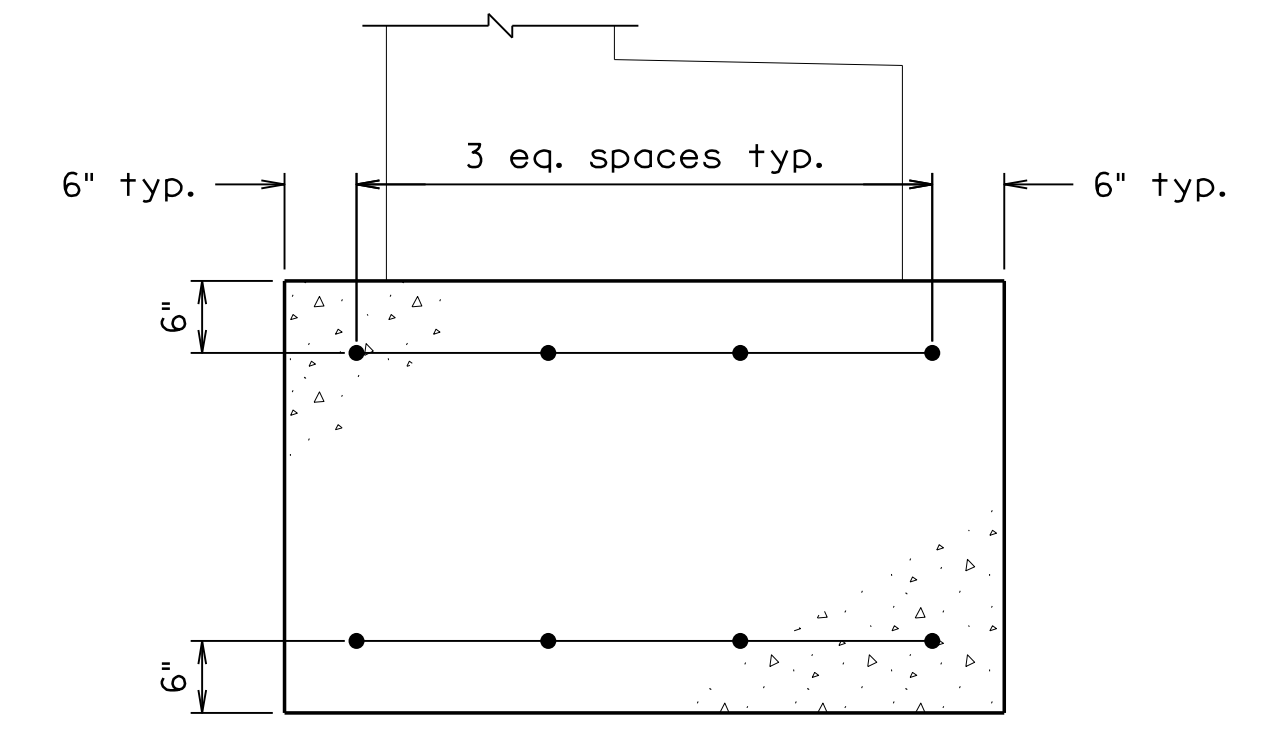
BEARING PAD PLAN

Scale: 1" = 1'-0"
 AP0401 and AP0602 bar spacing may be adjusted where required to clear anchor bolt sleeves.



SECTION L-L

Not to scale
 Backwall reinforcing steel not shown for clarity.



SECTION M-M

Scale: 3/4" = 1'-0"
 Footing reinforcing steel not shown for clarity.

257-38A_012.dgn

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Scale: 3/4" = 1'-0" unless otherwise noted.

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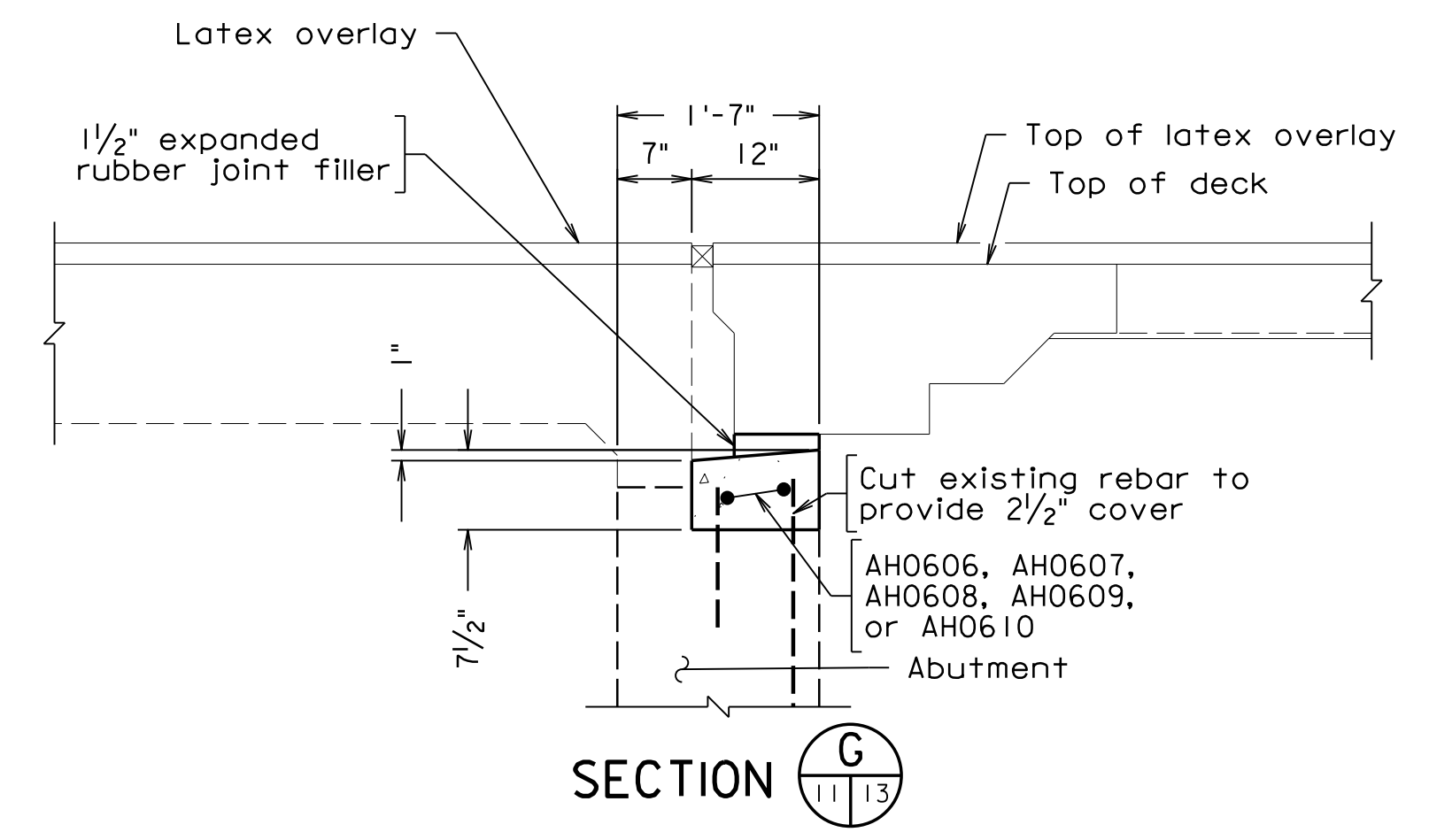
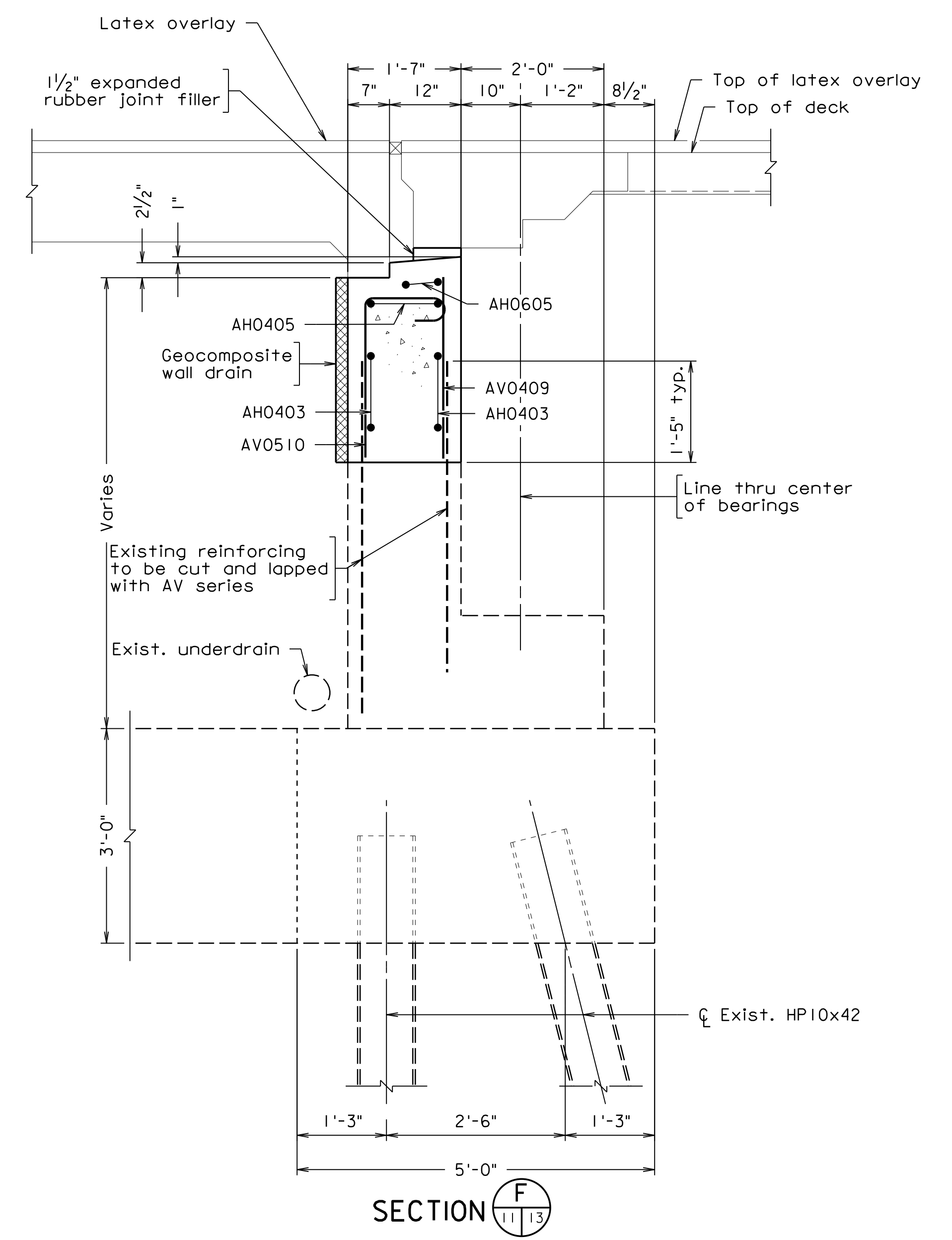
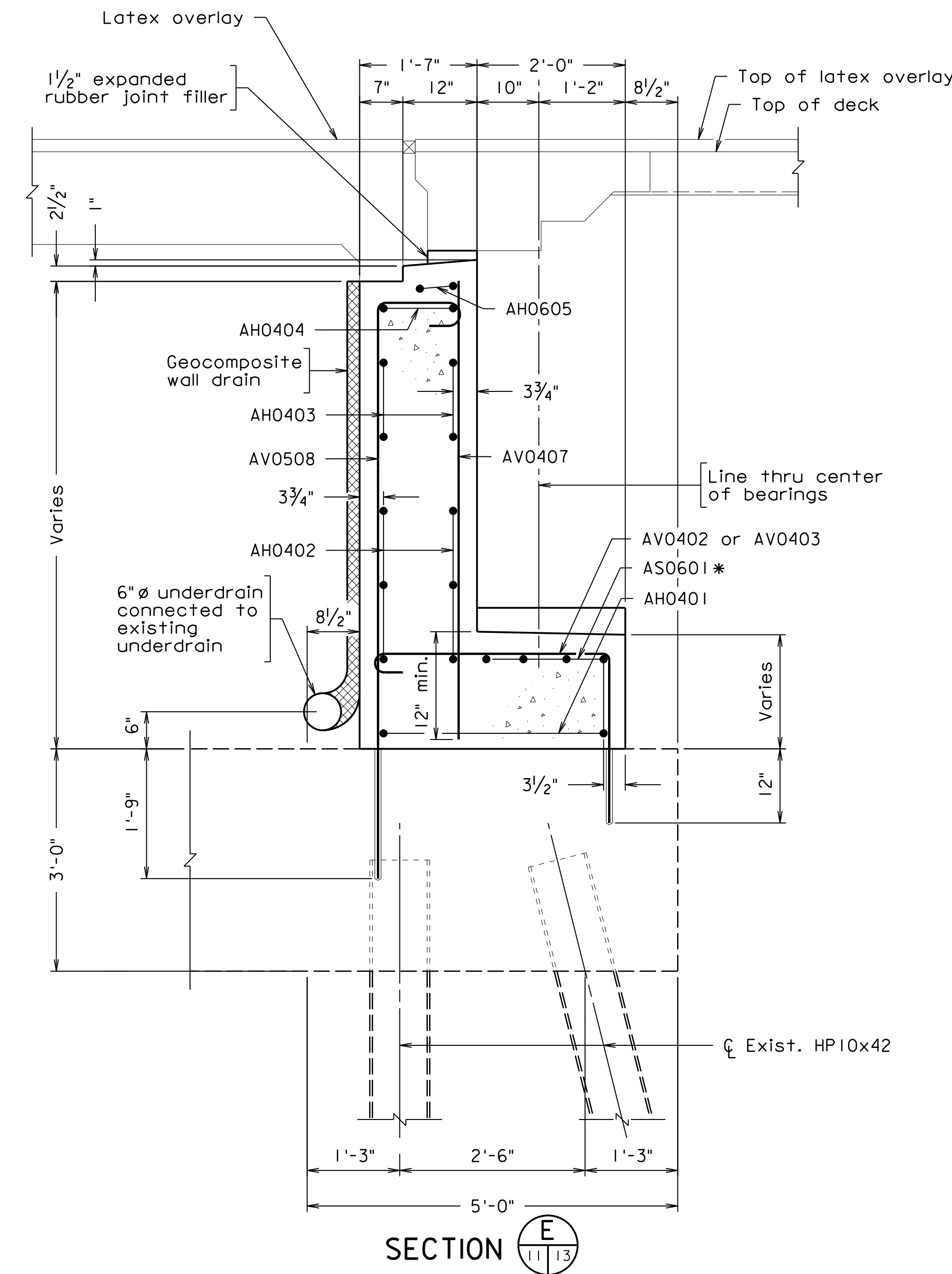
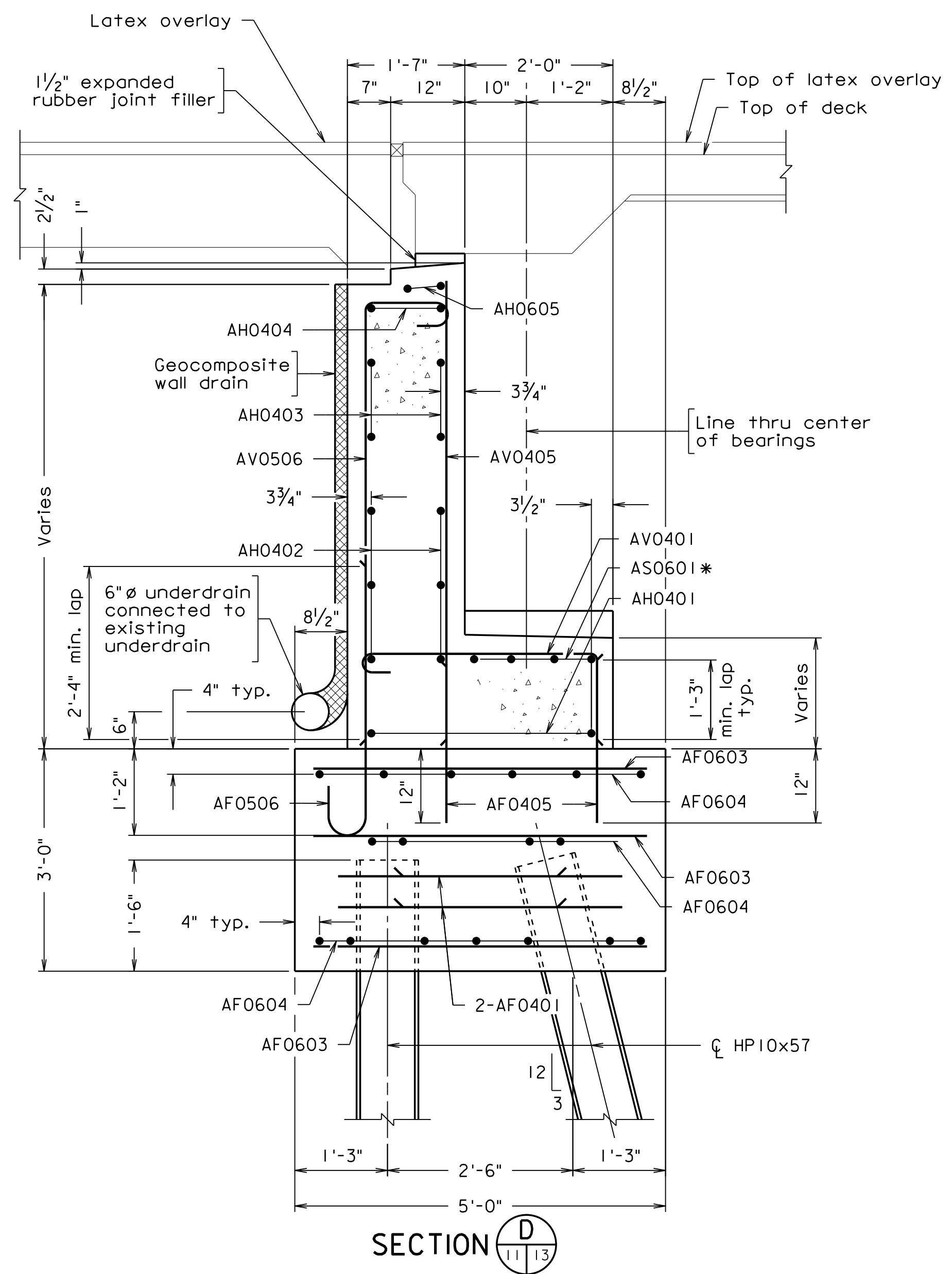
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
ABUTMENT A FOOTING PLAN AND PILE LAYOUT					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn:MWL.....	Apr. 2022	257-38A
			Checked: .SKT.....		12 of 125
Revisions					

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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			13

Notes:

- * AS0601 bar spacing may be adjusted where required to clear anchor bolt sleeves.
- The 1/2" expanded rubber joint filler shall extend the full length of the deck slab extension.
- Geocomposite wall drain shall extend from approach slab notch or 3'-0" below finished grade down to underdrain.
- 6" diameter underdrain shall connect to existing underdrain and run along back of backwall at bottom of wall drain with 1% slope.
- For Virginia Micro Abutment Detail, see sheet 66.
- For demolition limits of backwall, see sheet 9.



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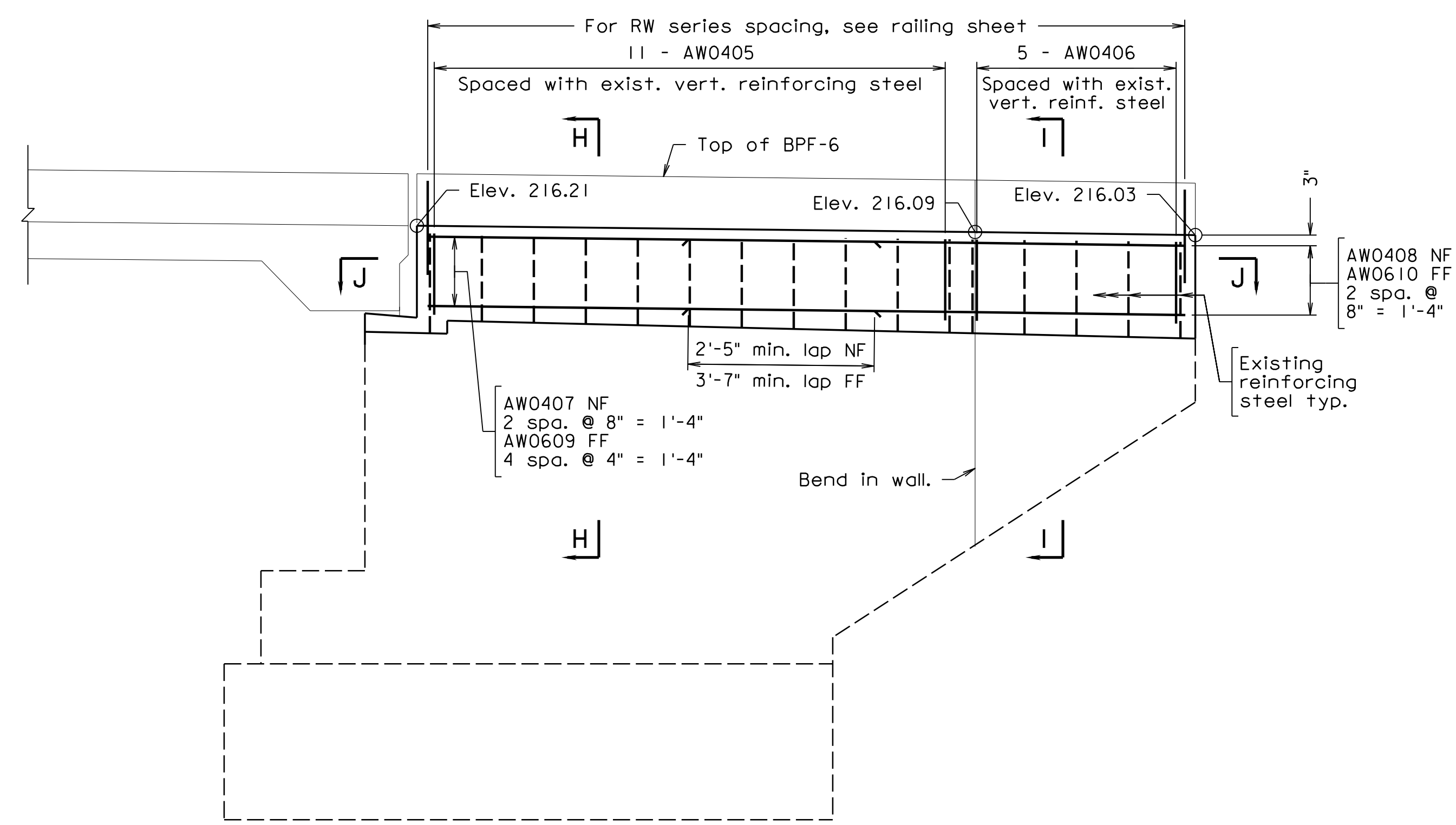
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
ABUTMENT A TYPICAL SECTIONS					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: SKT.....		13 of 125
Revisions					

Scale: 3/4" = 1'-0" unless otherwise noted.

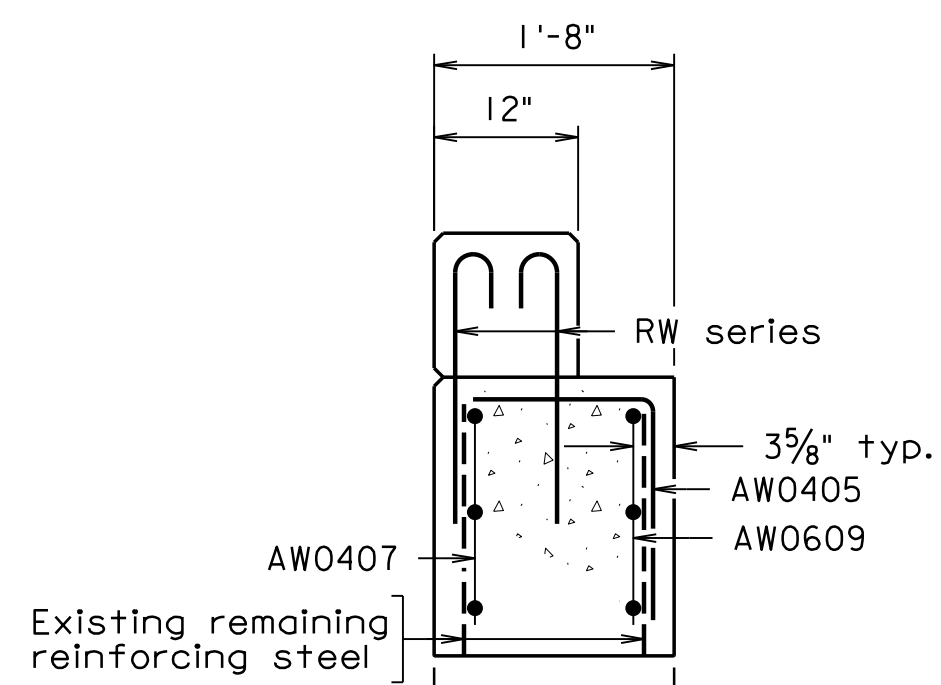
PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			14

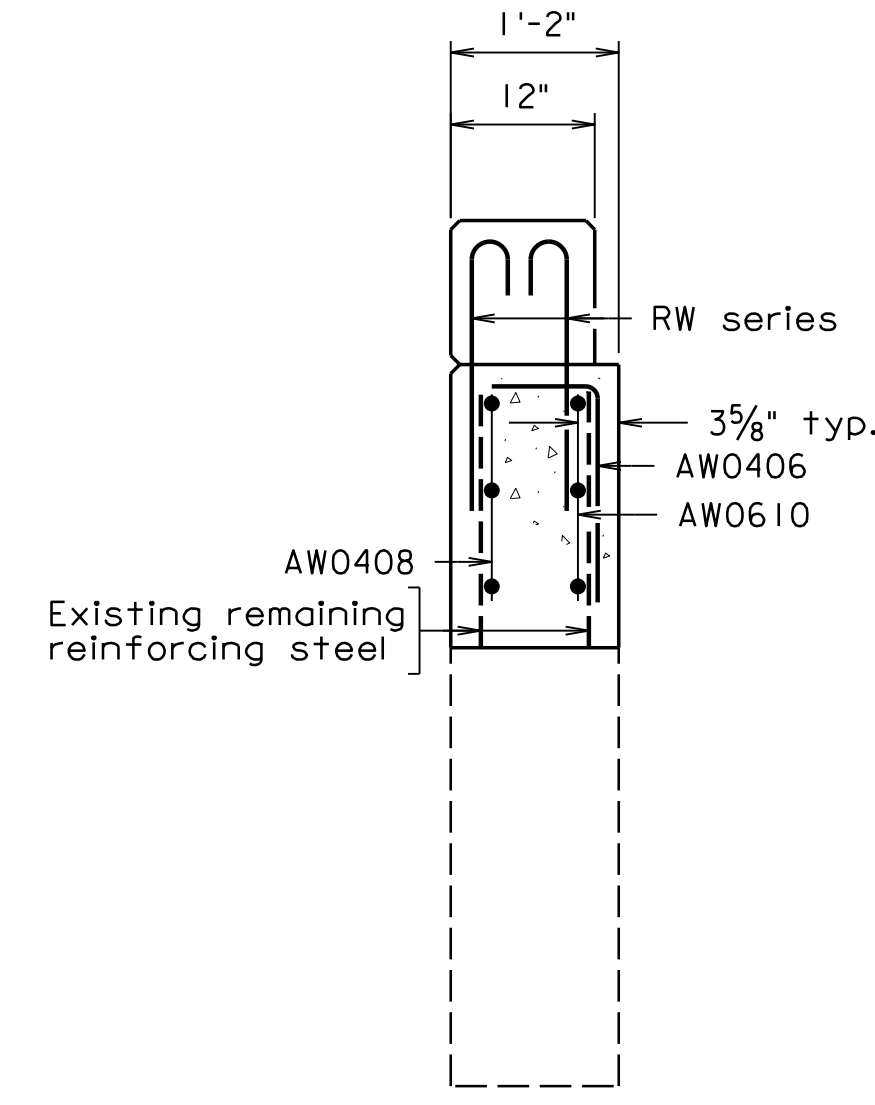
Notes:
 For details of pedestrian fence, pedestal and handrail, see sheet 76.
 For demolition limits of wingwall, see sheet 9.



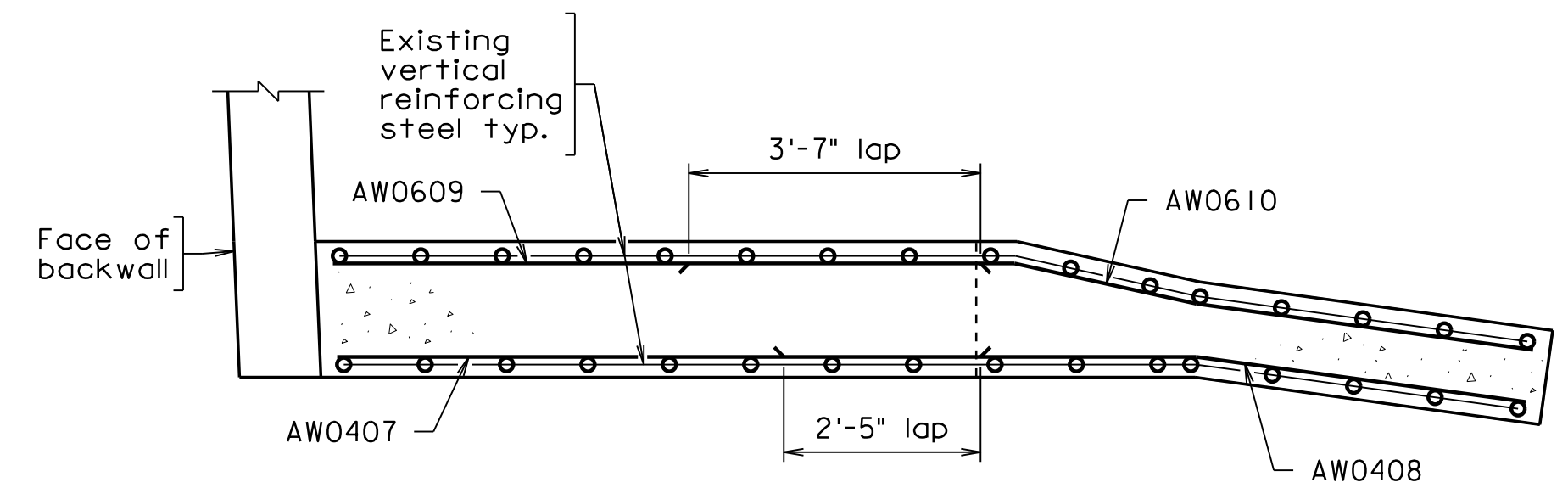
VIEW C



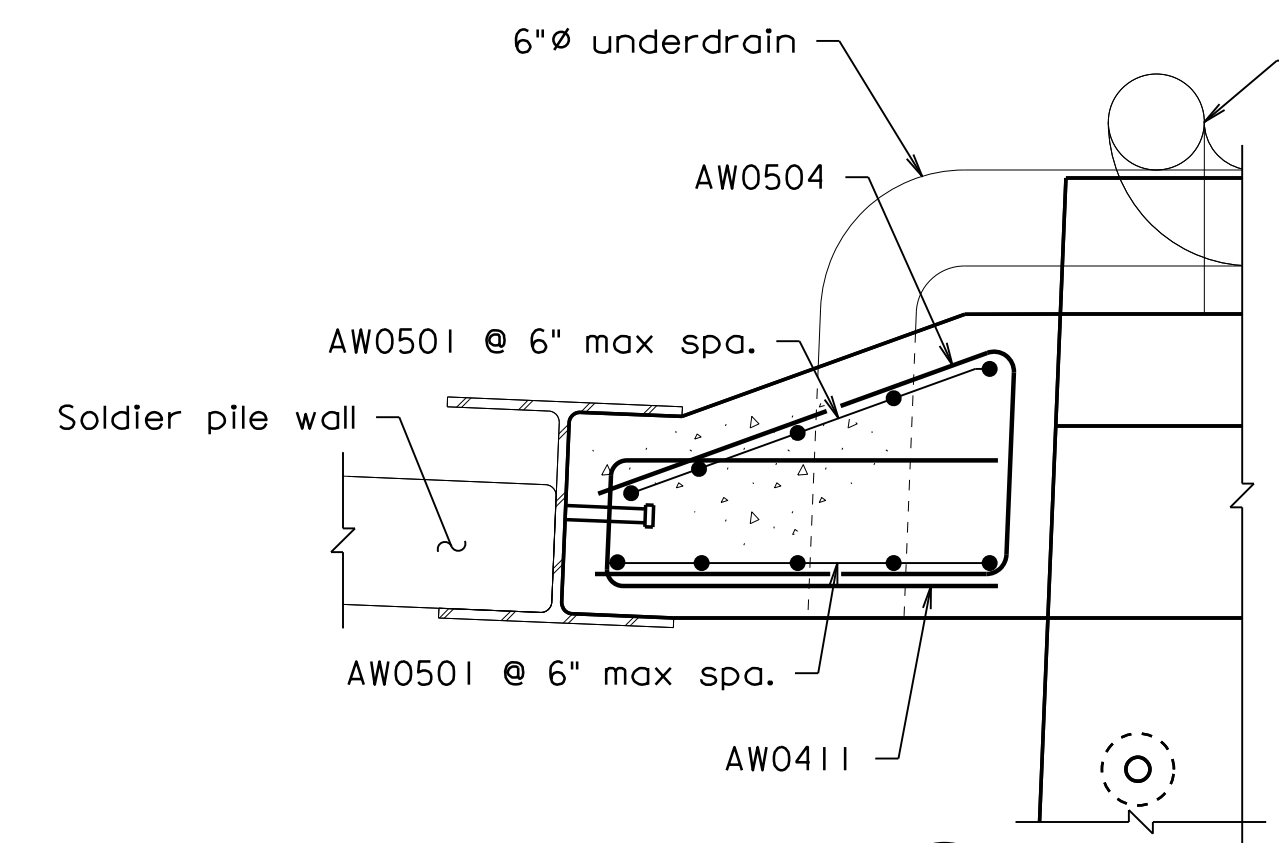
SECTION H-H
 Scale: 3/4" = 1'-0"



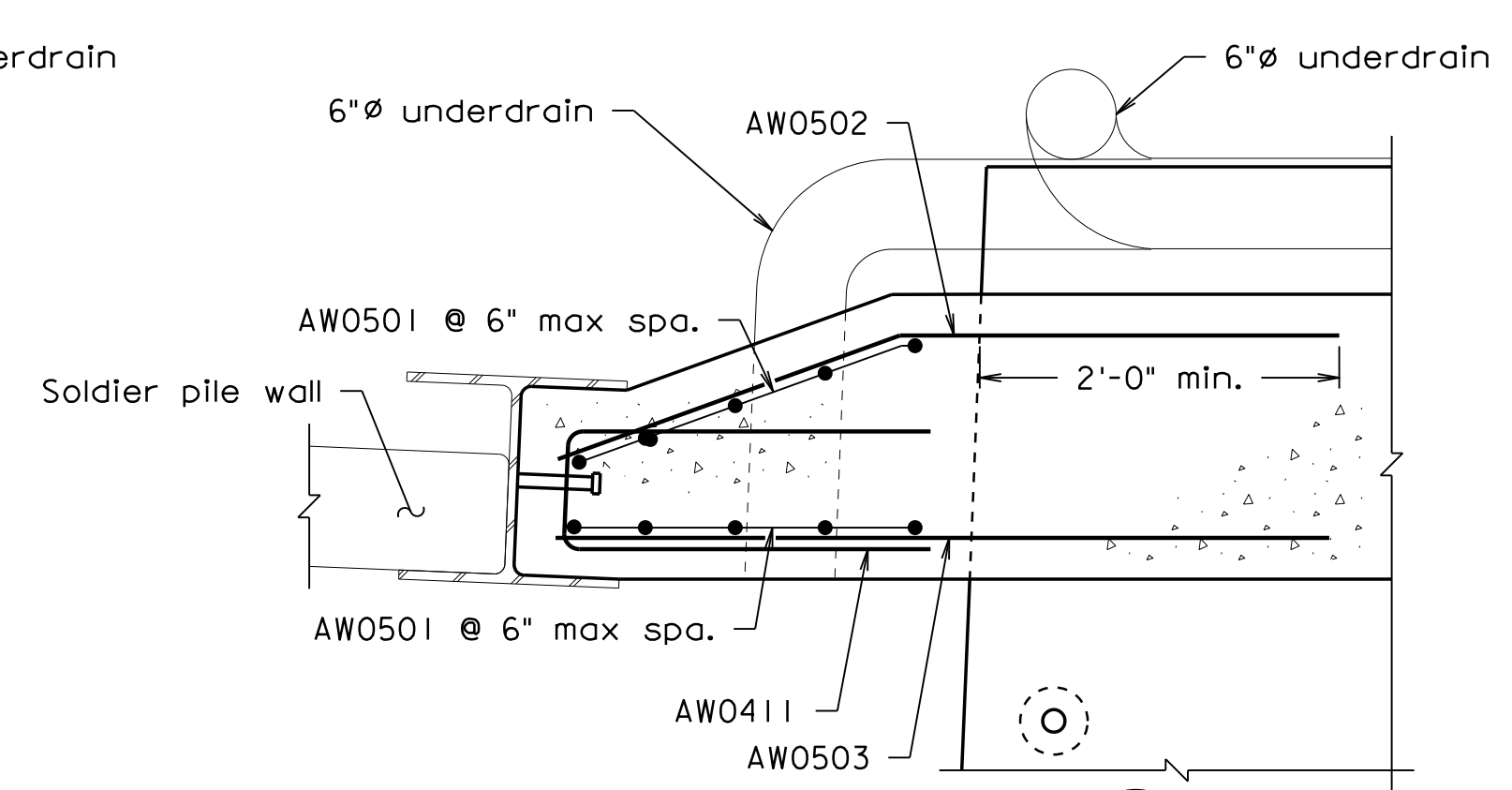
SECTION I-I
 Scale: 3/4" = 1'-0"



SECTION J-J



VIEW N



SECTION P

SOLDIER PILE WALL CONNECTION DETAIL
 Scale: 1" = 1'-0"

Scale: 1/2" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT A WINGWALLS					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: SKL.....		14 of 125
Revisions					

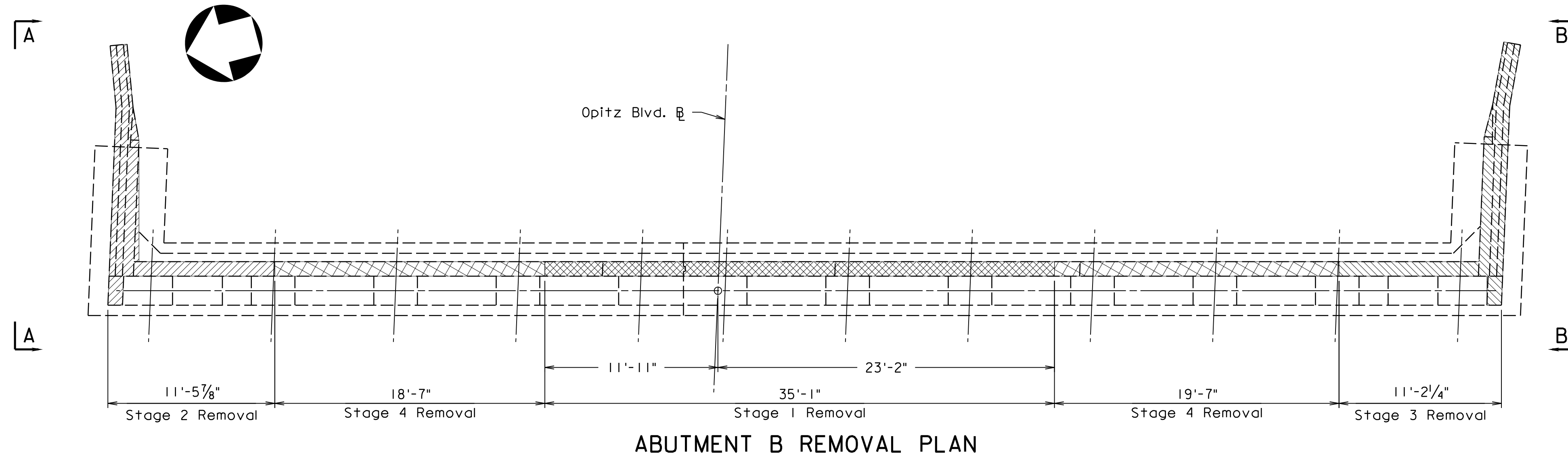
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STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				15



Notes:

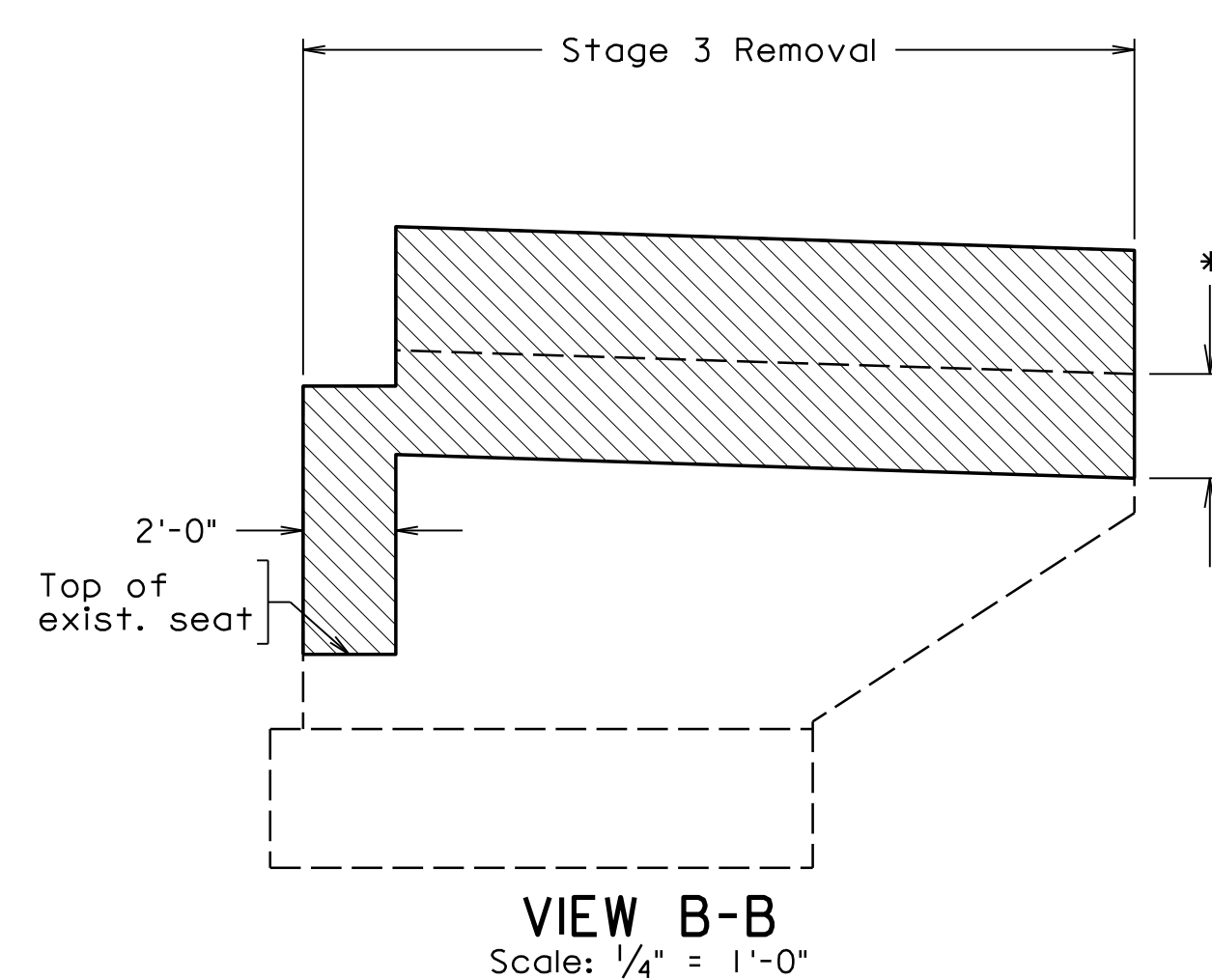
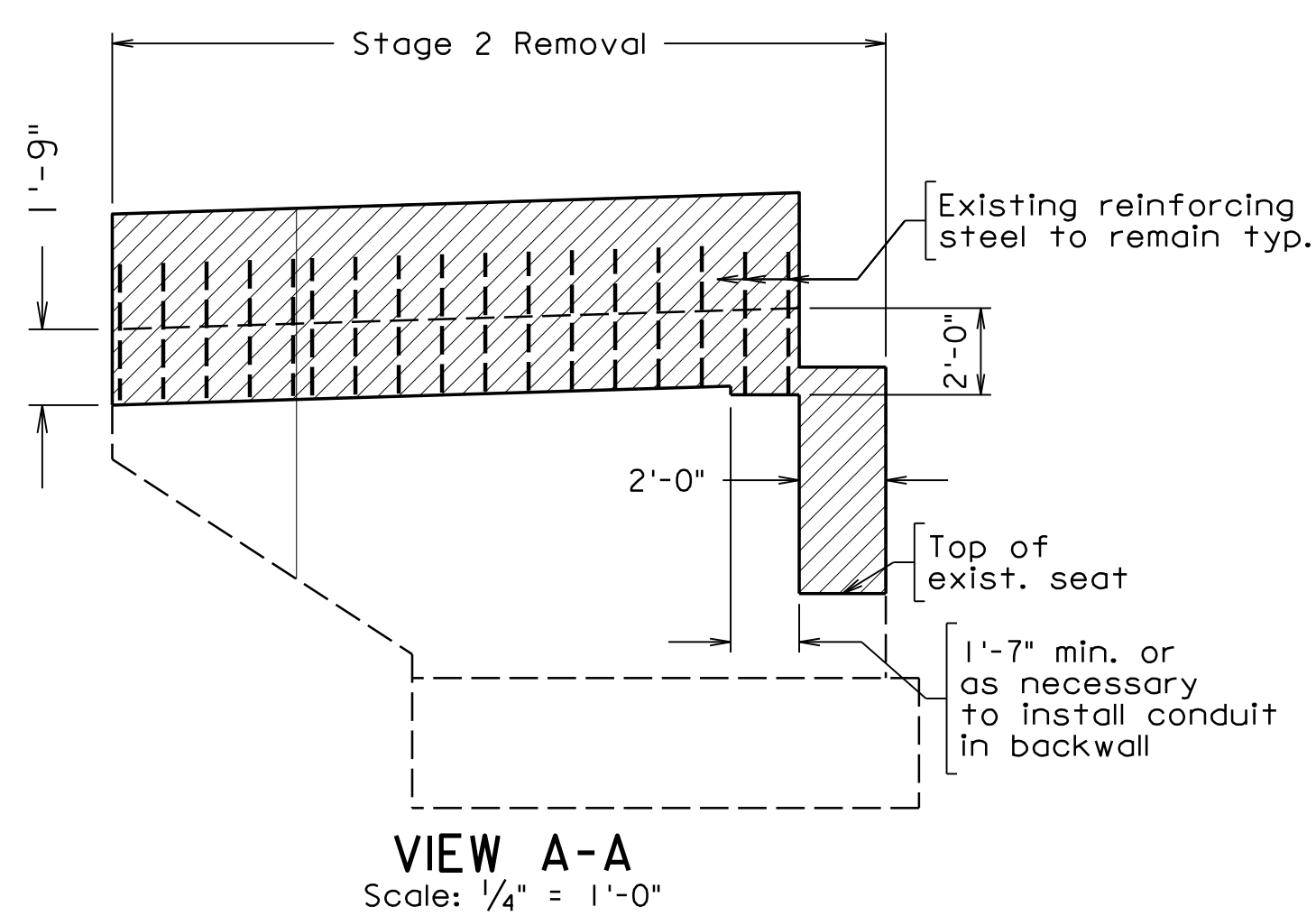
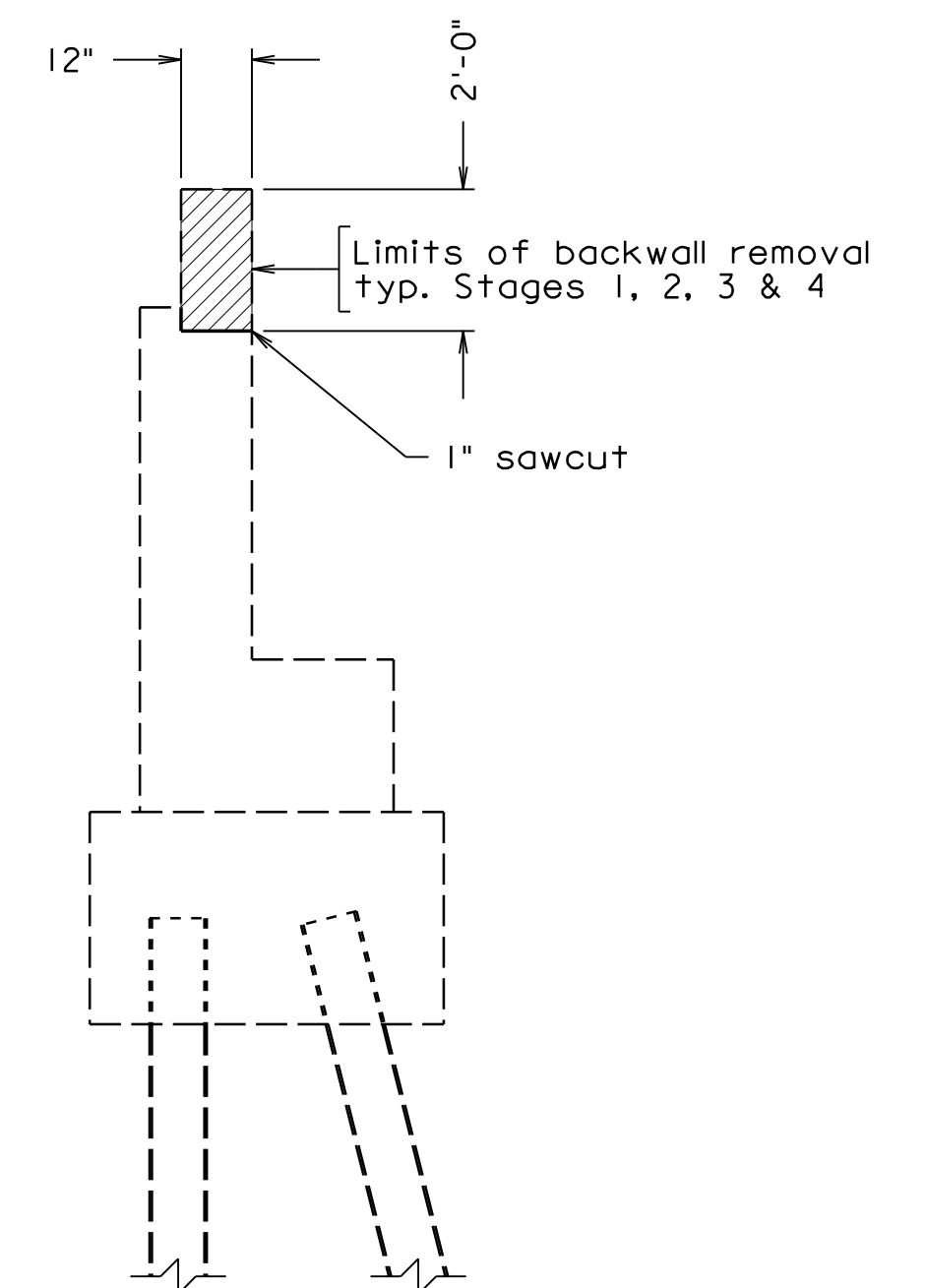
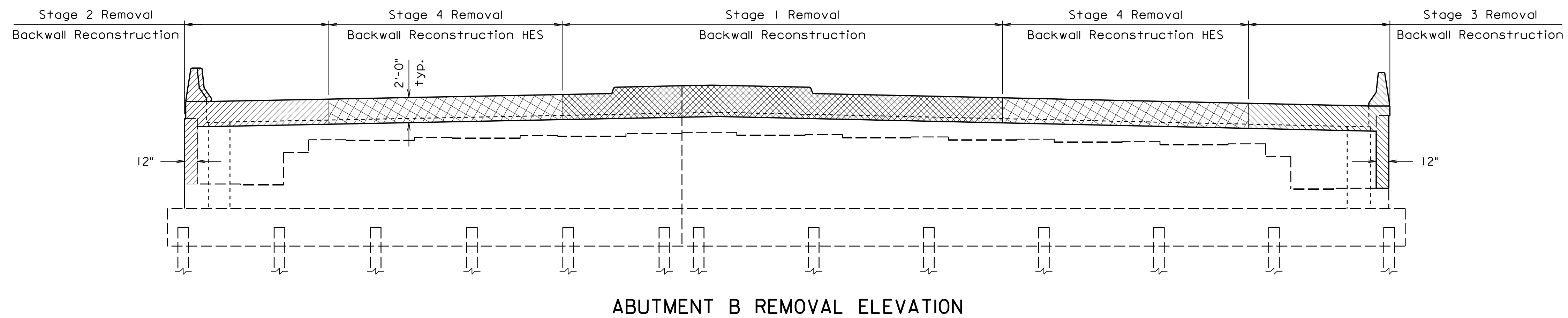
Contractor shall take care not to damage portion of existing structure to remain in service.

Contractor shall provide a clean edge of demolition with a 1 inch deep saw cut.

* Wingwall removal may occur after abutment modifications to allow for temporary shoring. Wingwall shall be removed to a minimum of 3 feet below proposed top of ground.

For abutment modification details, see sheets 16, 17, 18, 19, and 20.

- Legend:
- Denotes portion of existing structure to be removed during Stage 1
 - Denotes portion of existing structure to be removed during Stage 2
 - Denotes portion of existing structure to be removed during Stage 3
 - Denotes portion of existing structure to be removed during Stage 4



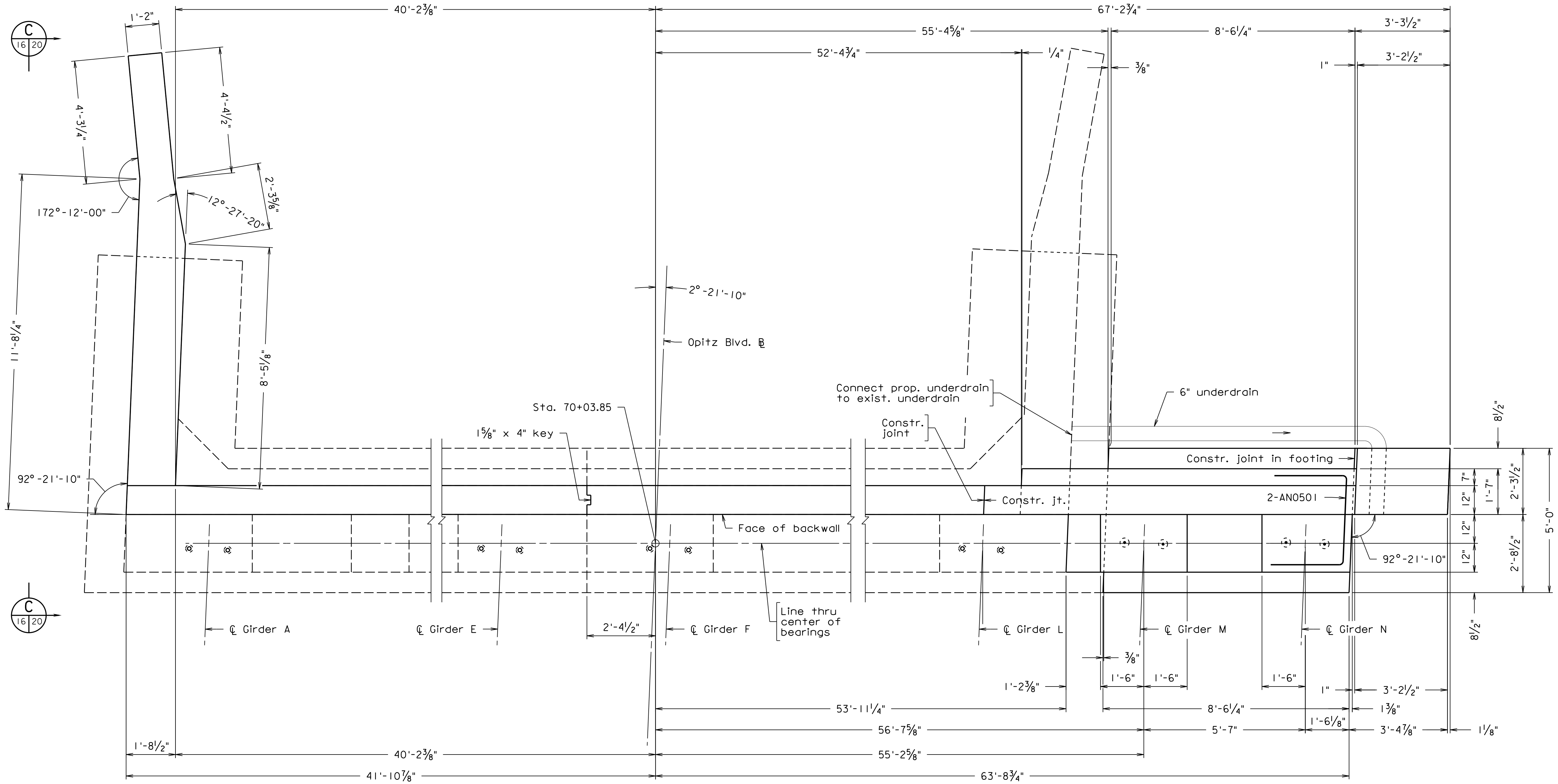
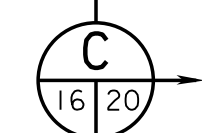
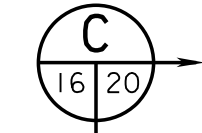
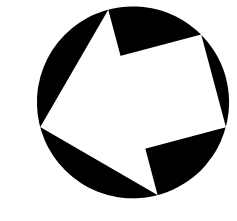
Scale: 3/8" = 1'-0" unless otherwise noted.

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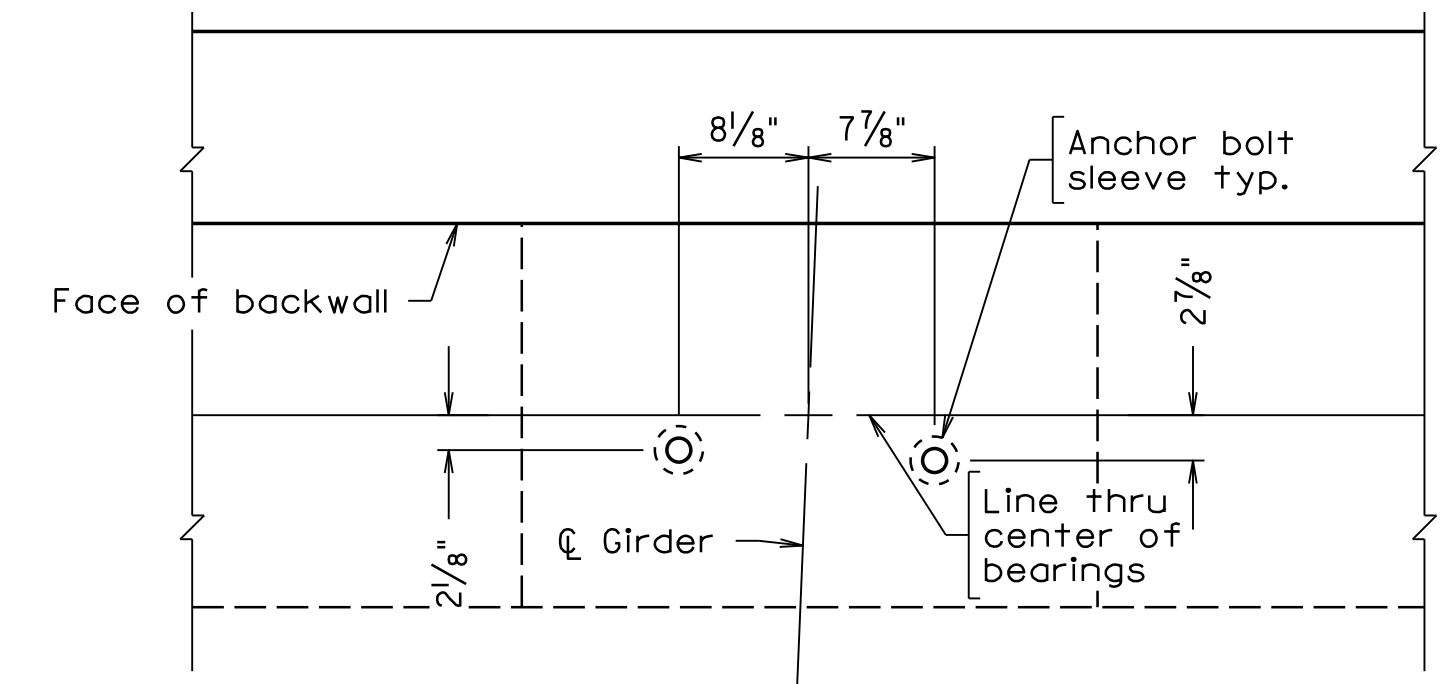
COMMONWEALTH OF VIRGINIA					
DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
ABUTMENT B REMOVAL					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MVL.....	Apr. 2022	257-38A
			Checked: SKL.....		15 of 125
Revisions					

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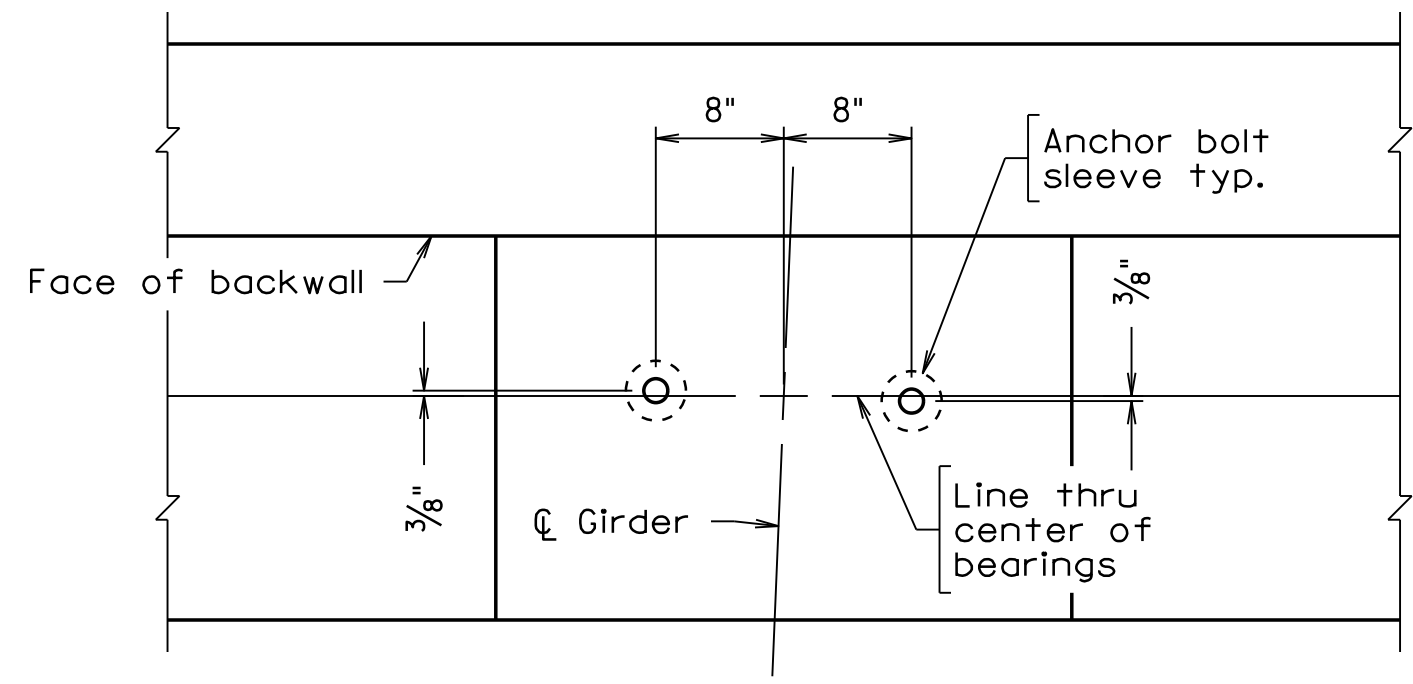


PLAN

Notes:
 For elevation view, see sheet 17.
 For pile layout and footing plan, see sheet 18.
 For typical section, see sheet 19.
 For wingwall details, see sheet 20.
 For anchor bolt sleeve details see bearing details on sheet 35.



ANCHOR BOLT LAYOUT
GIRDERS A-L
Scale: 1" = 1'-0"



ANCHOR BOLT LAYOUT
GIRDERS M AND N
Scale: 1/2" = 1'-0" unless otherwise noted.

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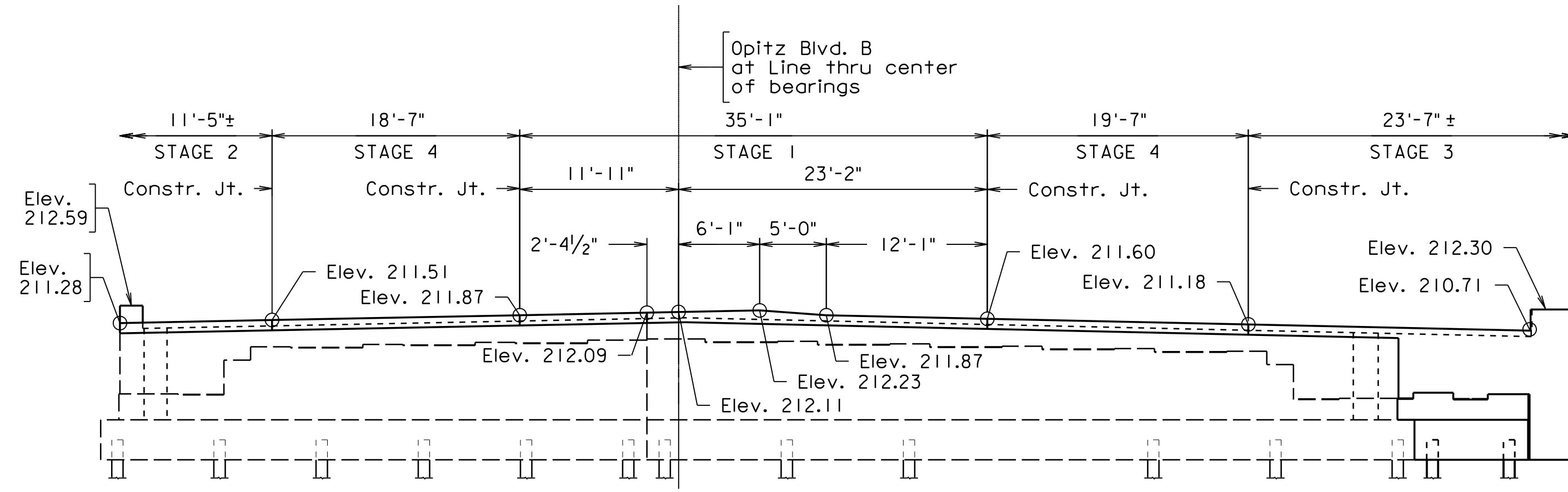
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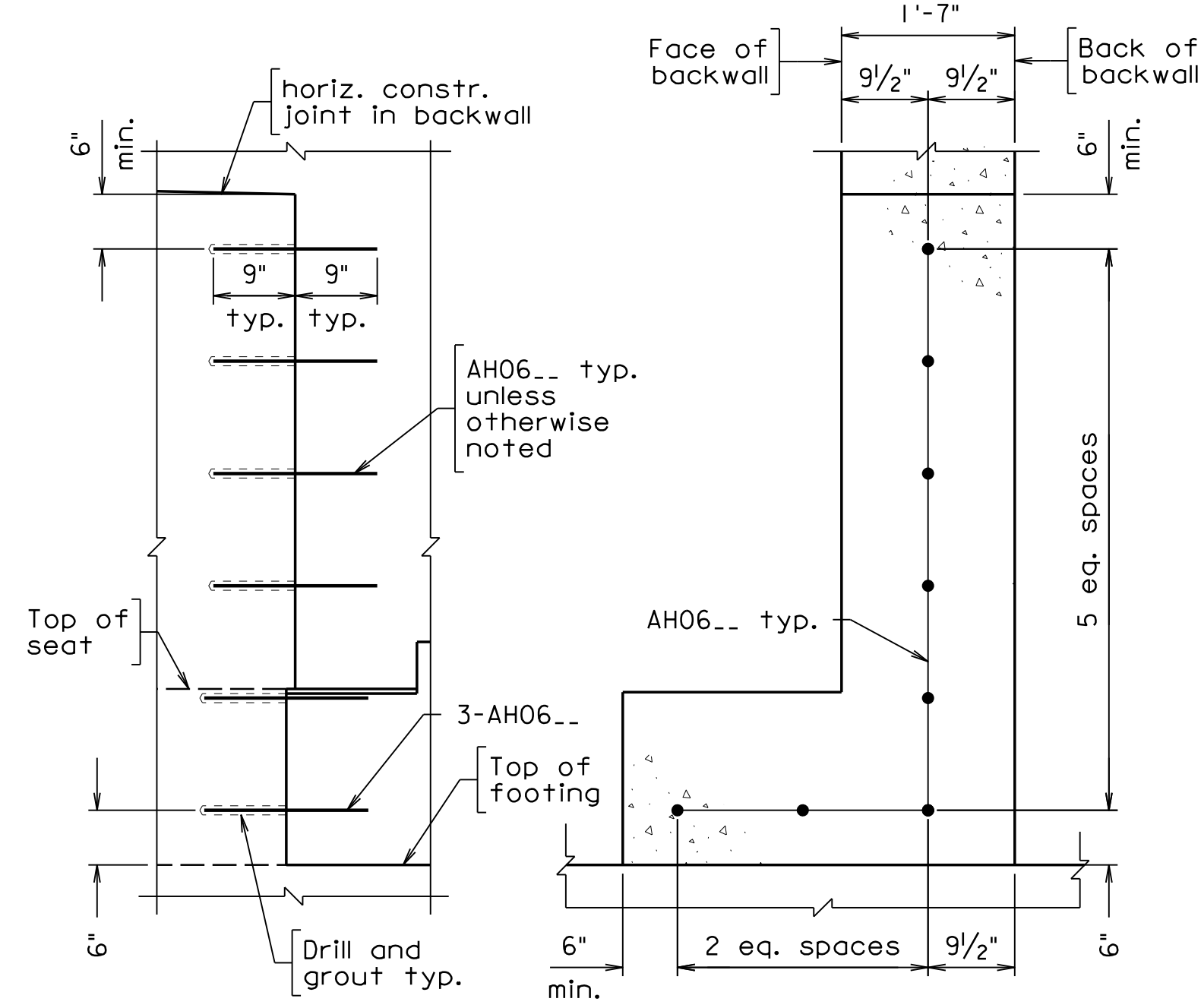
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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT B PLAN					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: SKH.....		16 of 125
Revisions					

STATE	FEDERAL AID	STATE	SHEET
VA.	PROJECT	ROUTE 95	NO. 17
		PROJECT 0095-076-299, B688	



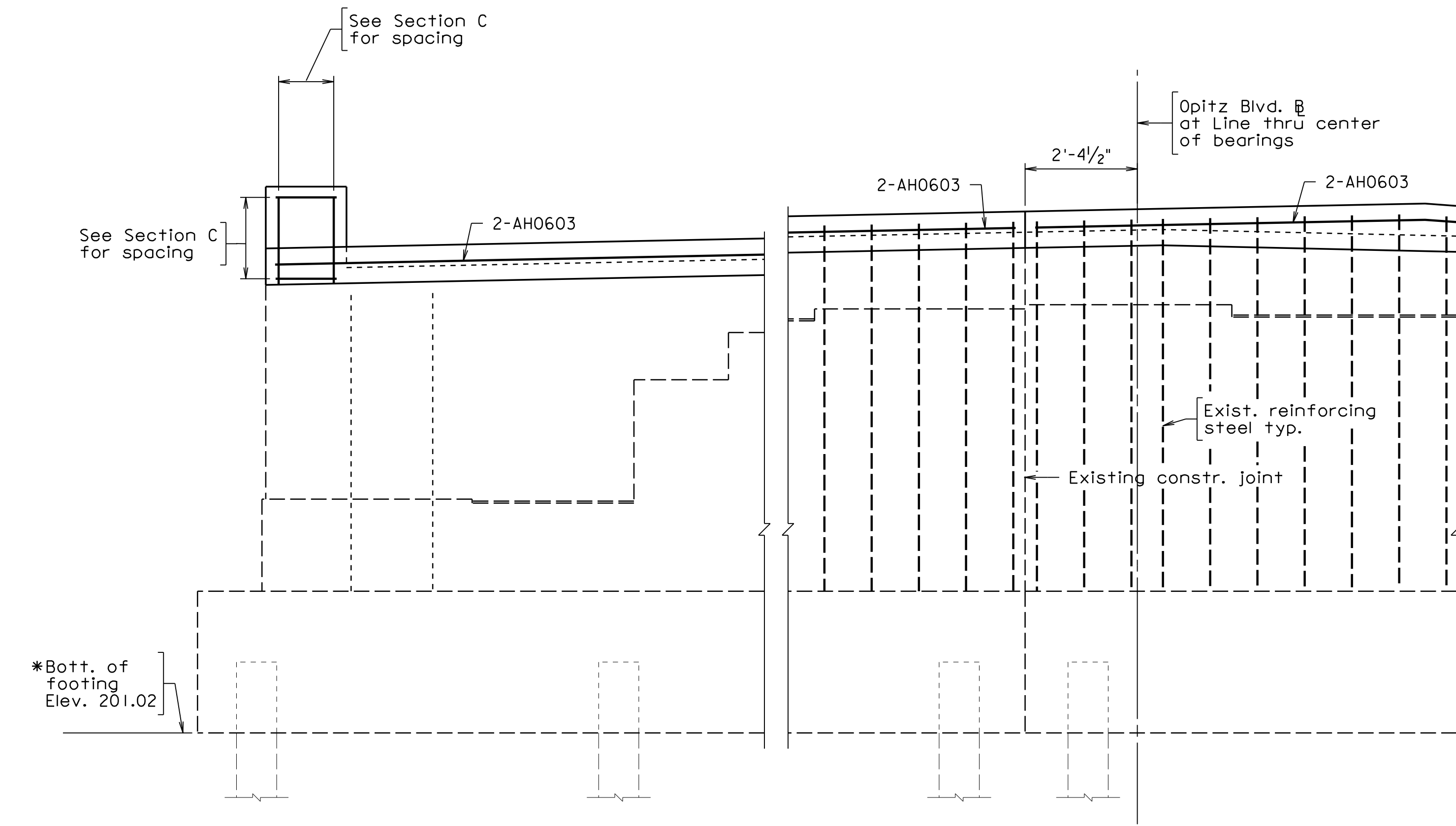
ABUTMENT BACKWALL CONSTRUCTION JOINT LOCATIONS AND ELEVATIONS
Scale: 1/8" = 1'-0"



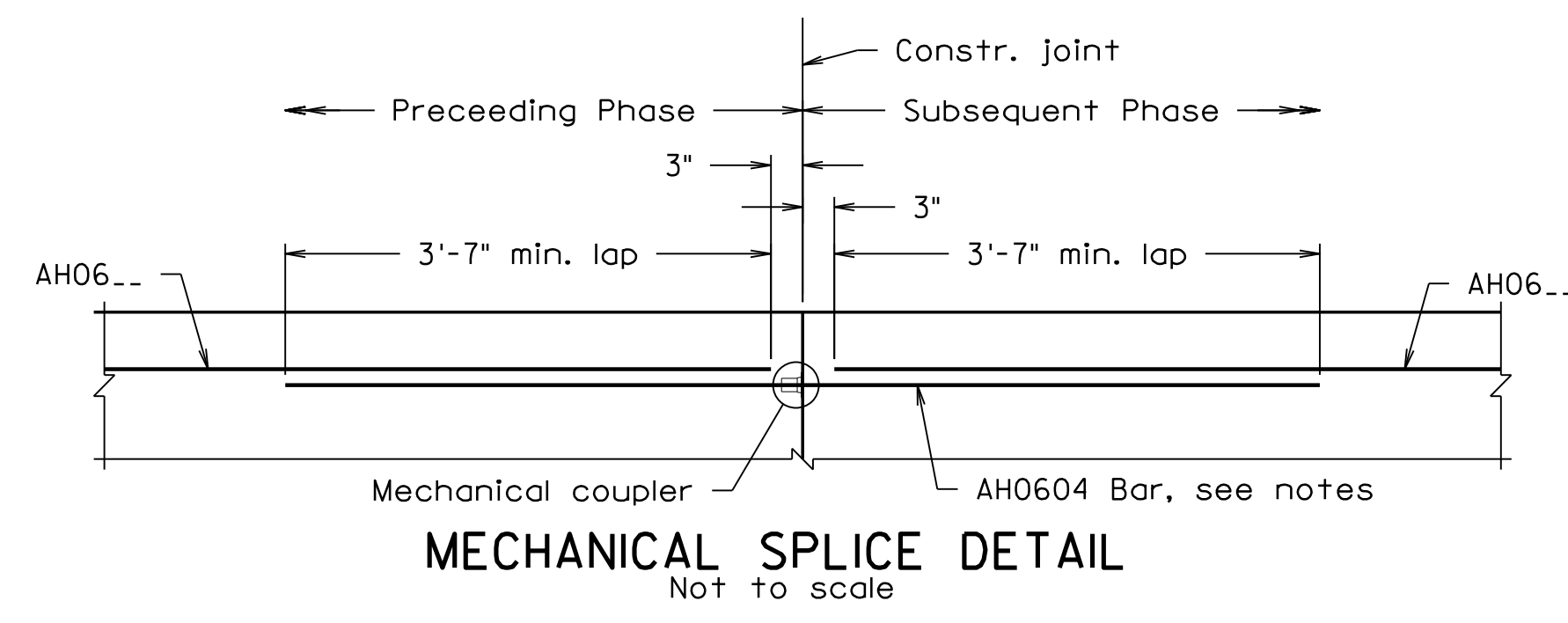
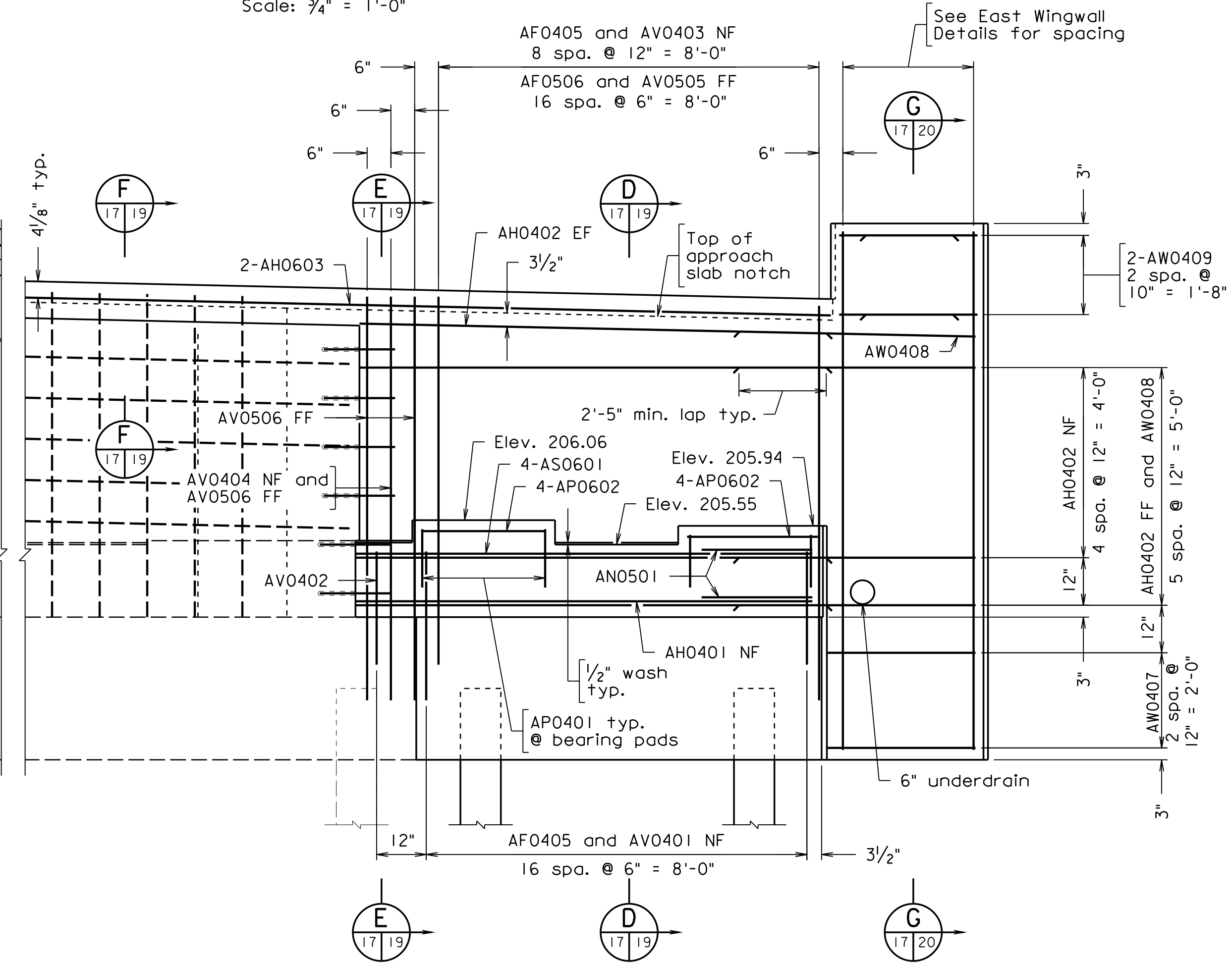
PART ELEVATION BACKWALL DOWEL DETAIL
Scale: 3/4" = 1'-0"

Notes:

- *Proposed bottom of footing shall match existing bottom of footing.
- Backwall construction joints shall be perpendicular to face of backwall.
- Contractor shall install couplers or AH0604 coupler bars for AH0603 bars at any construction joint necessary for their means and methods to perform backwall reconstruction except at existing construction joint.
- The number of AH0604 coupler bars shall be determined by Contractor and is not included in reinforcing steel schedule.
- AH0603 bars shall be cut to length determined by Contractor's construction joint location.
- For plan view, see sheet 16.
- For pile layout and footing plan, see sheet 18.
- For typical section, see sheet 19.
- For Section C and wingwall details, see sheet 20.



ELEVATION



MECHANICAL SPLICE DETAIL
Not to scale

Scale: 1/2" = 1'-0" unless otherwise noted.

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ABUTMENT B ELEVATION					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: SKL.....		17 of 125
Revisions					

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STATE	FEDERAL AID	STATE	SHEET NO.
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			18

PILE DATA TABLE			
Nominal Axial Resistance Measured During Driving (Tons/pile)	Factored Axial Resistance (Tons/pile)	Estimated Tip Elevation	Minimum Tip Elevation
192	125	151	160

The Strength Limit State controls the pile design.

Notes:

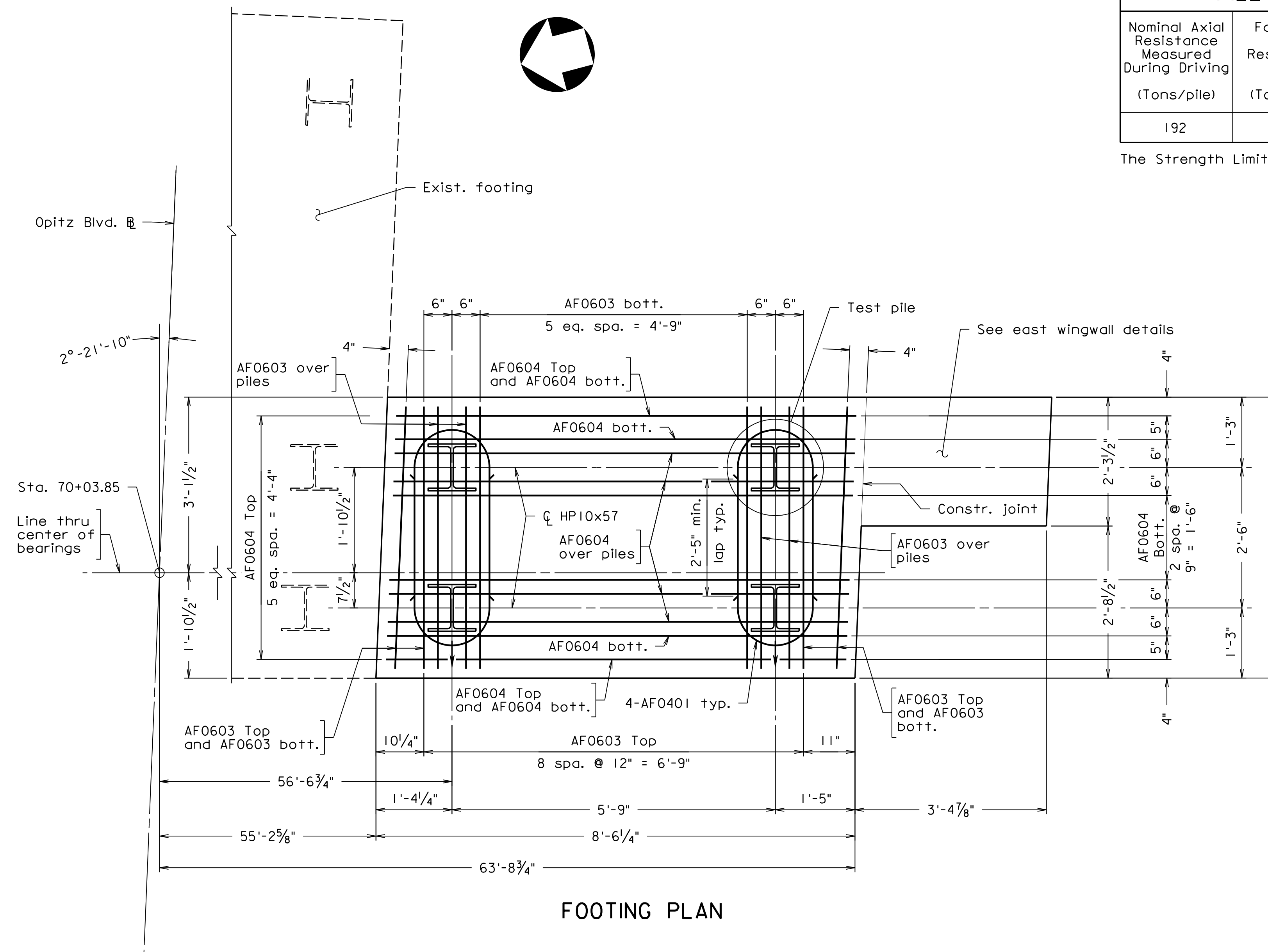
For Abutment B typical sections, see sheet 19.

The joining of new and existing concrete abutment footing shall be in accordance with Section 412 of the VDOT Standard Specifications. Grout for drilled in dowels shall conform to Section 218 of the VDOT Standard Specifications.

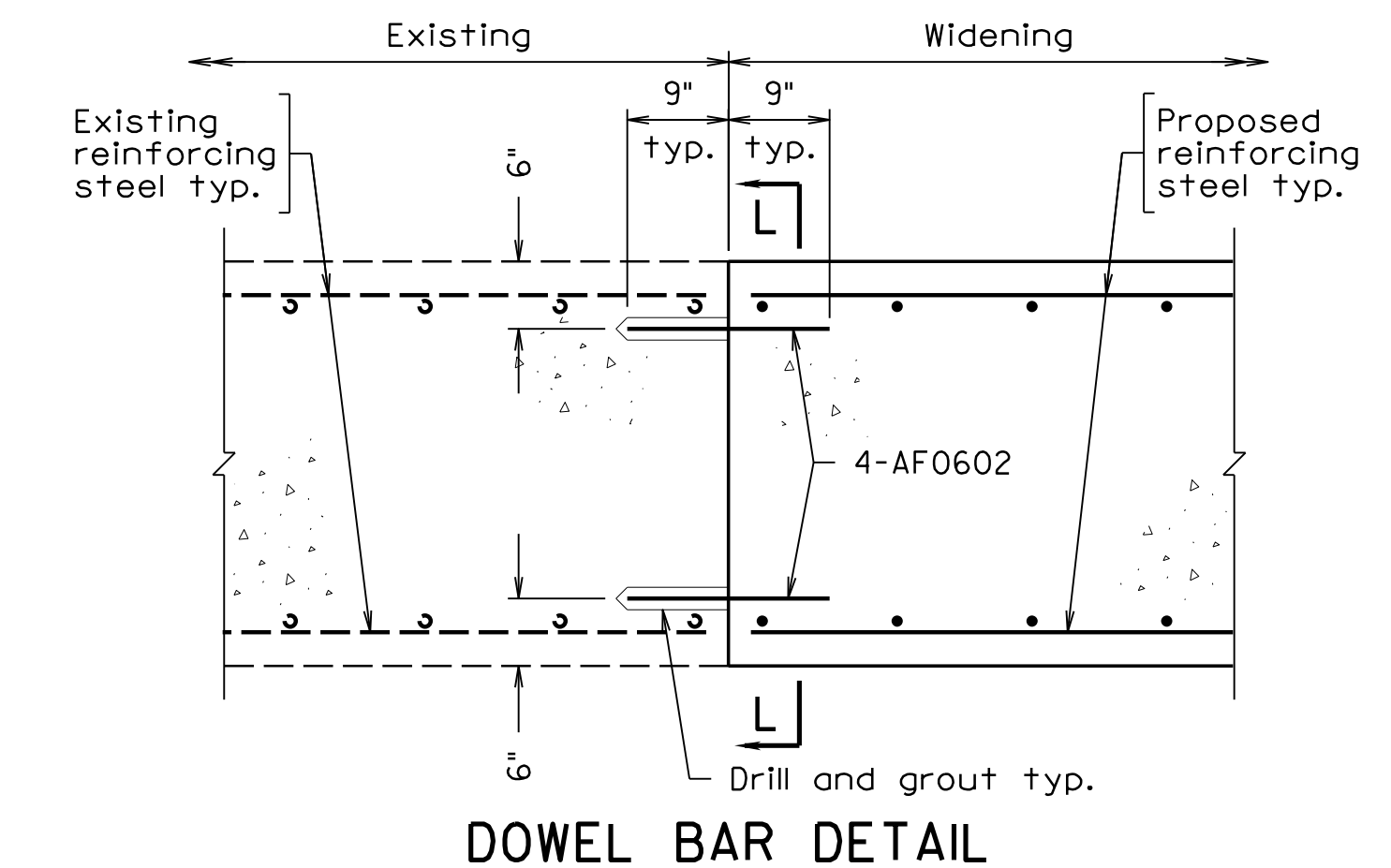
The one required test pile and dynamic pile test are required to be done prior to driving any other permanent piling within the same substructure unit.

Legend:

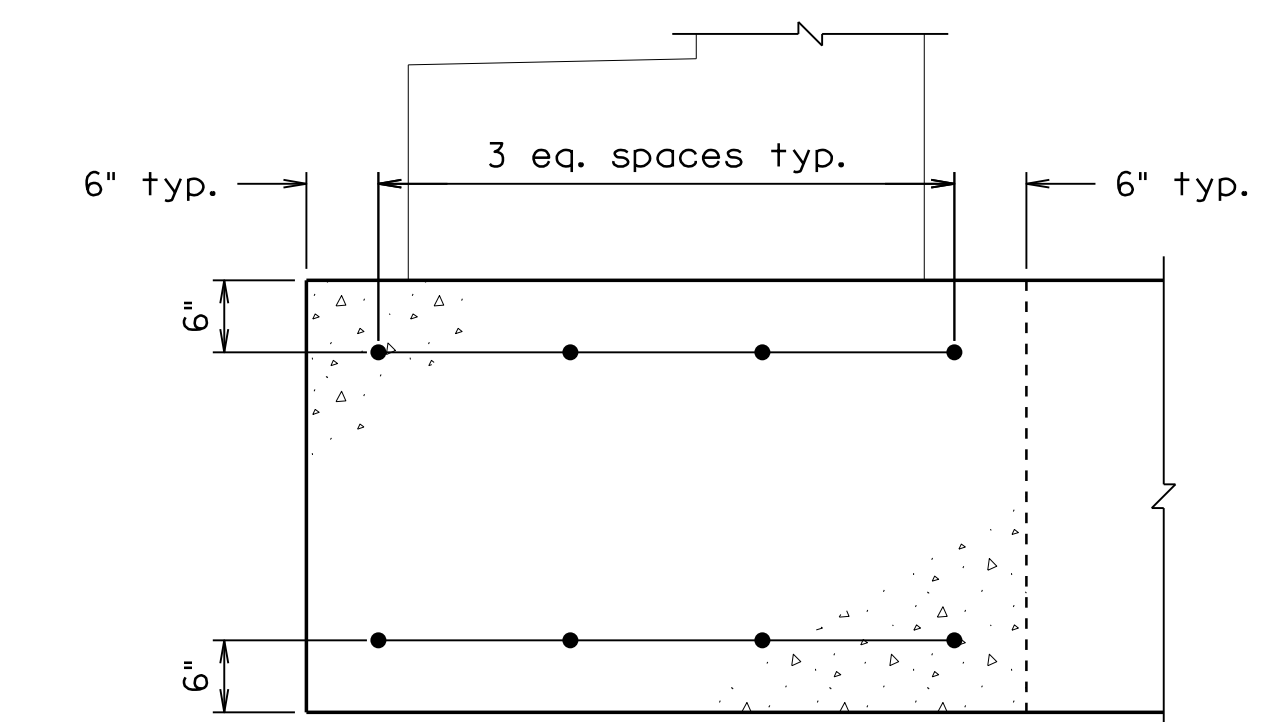
↓ Denotes direction of 3:12 batter.



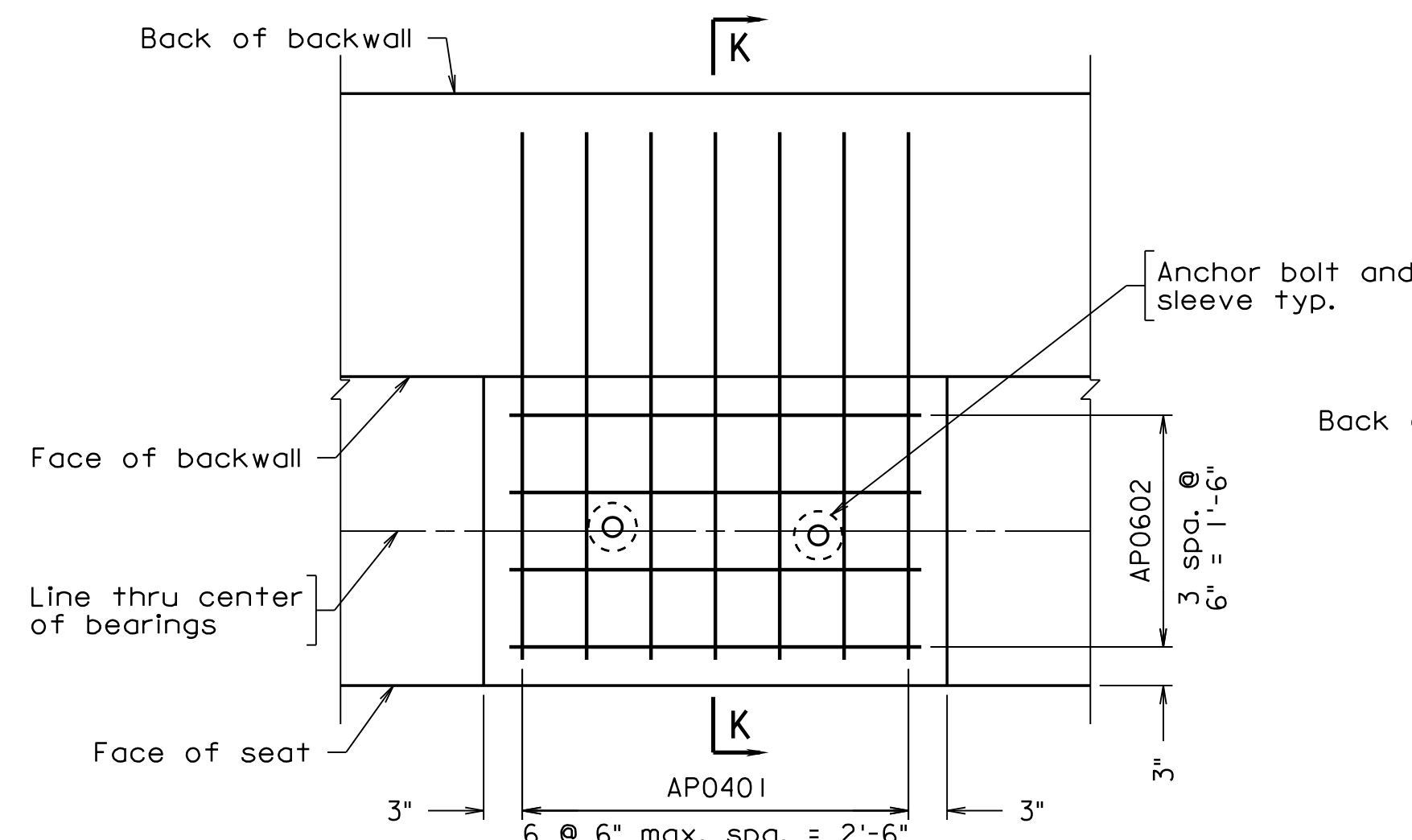
FOOTING PLAN



DOWEL BAR DETAIL



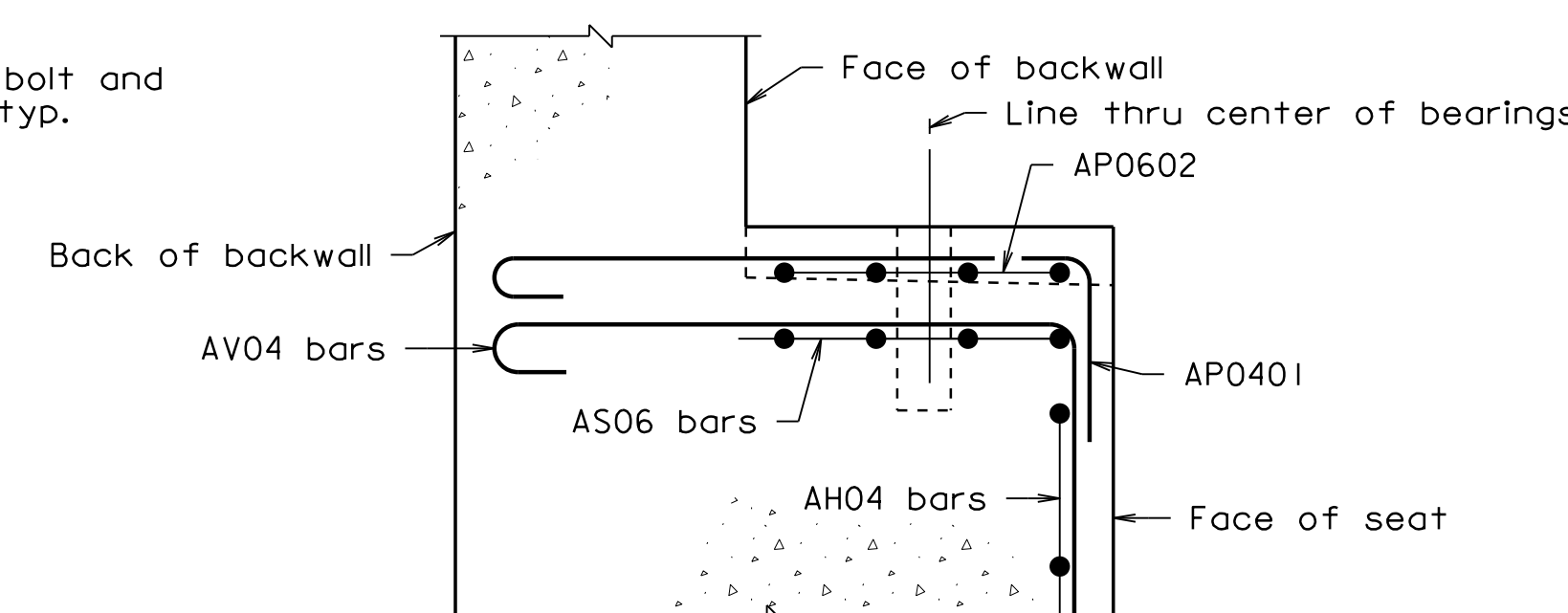
SECTION L-L
Scale: 3/4" = 1'-0"
Footing reinforcing steel not shown for clarity.



TYPICAL BEARING PAD PLAN

Scale: 1" = 1'-0"

AP0401 and AP0602 bar spacing may be adjusted where required to clear anchor bolt sleeves.



SECTION K-K

Not to scale

Backwall reinforcing steel not shown for clarity.

Scale: 3/4" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION			
ABUTMENT B FOOTING PLAN AND PILE LAYOUT			
No.	Description	Date	Designed: RDS..... Date Drawn: MWL..... Checked: JSL.....
	Revisions	Apr. 2022	Plan No. 257-38A Sheet No. 18 of 125

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STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				19

Notes:

* AS0601 bar spacing may be adjusted where required to clear anchor bolt sleeves.

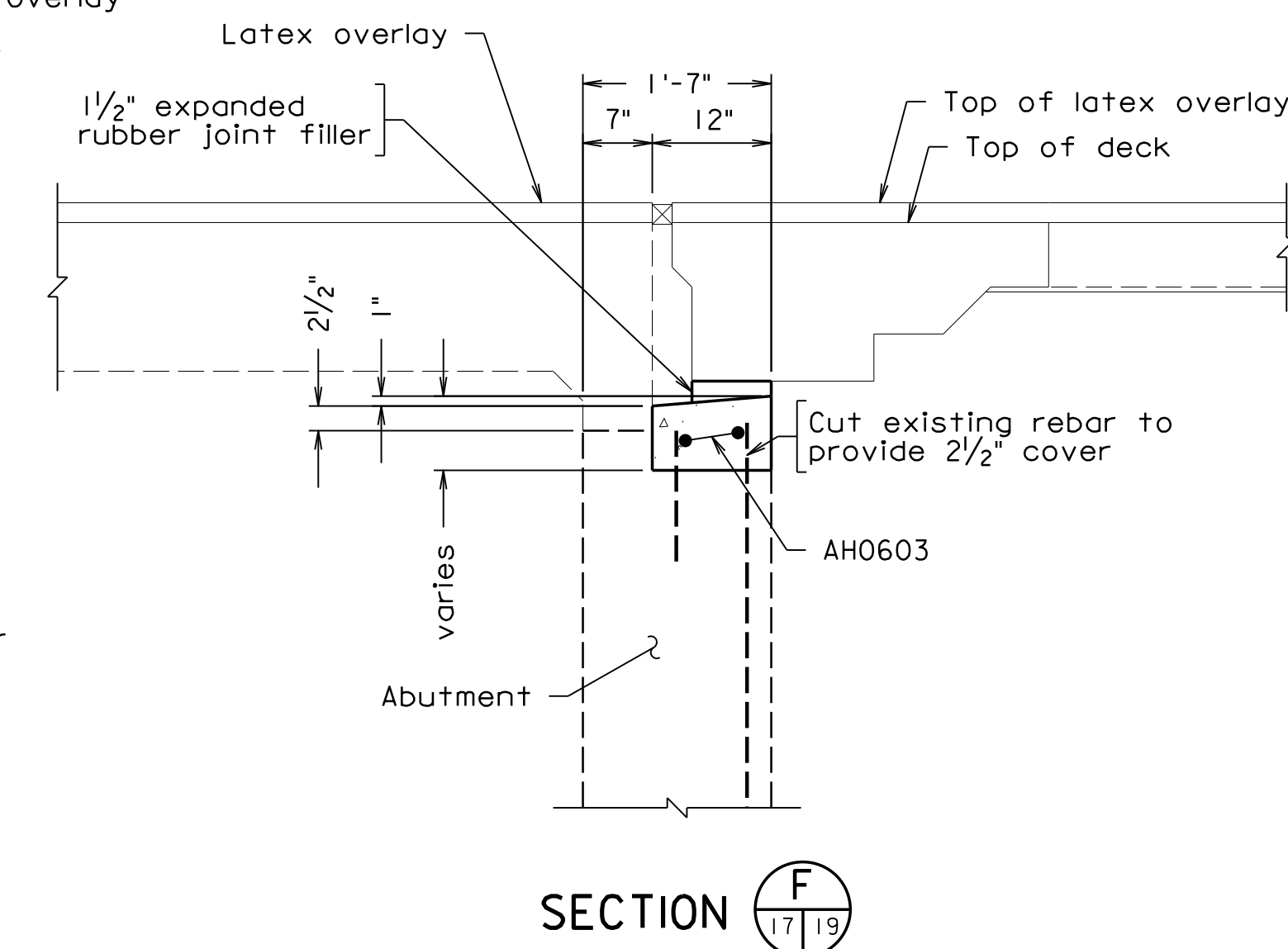
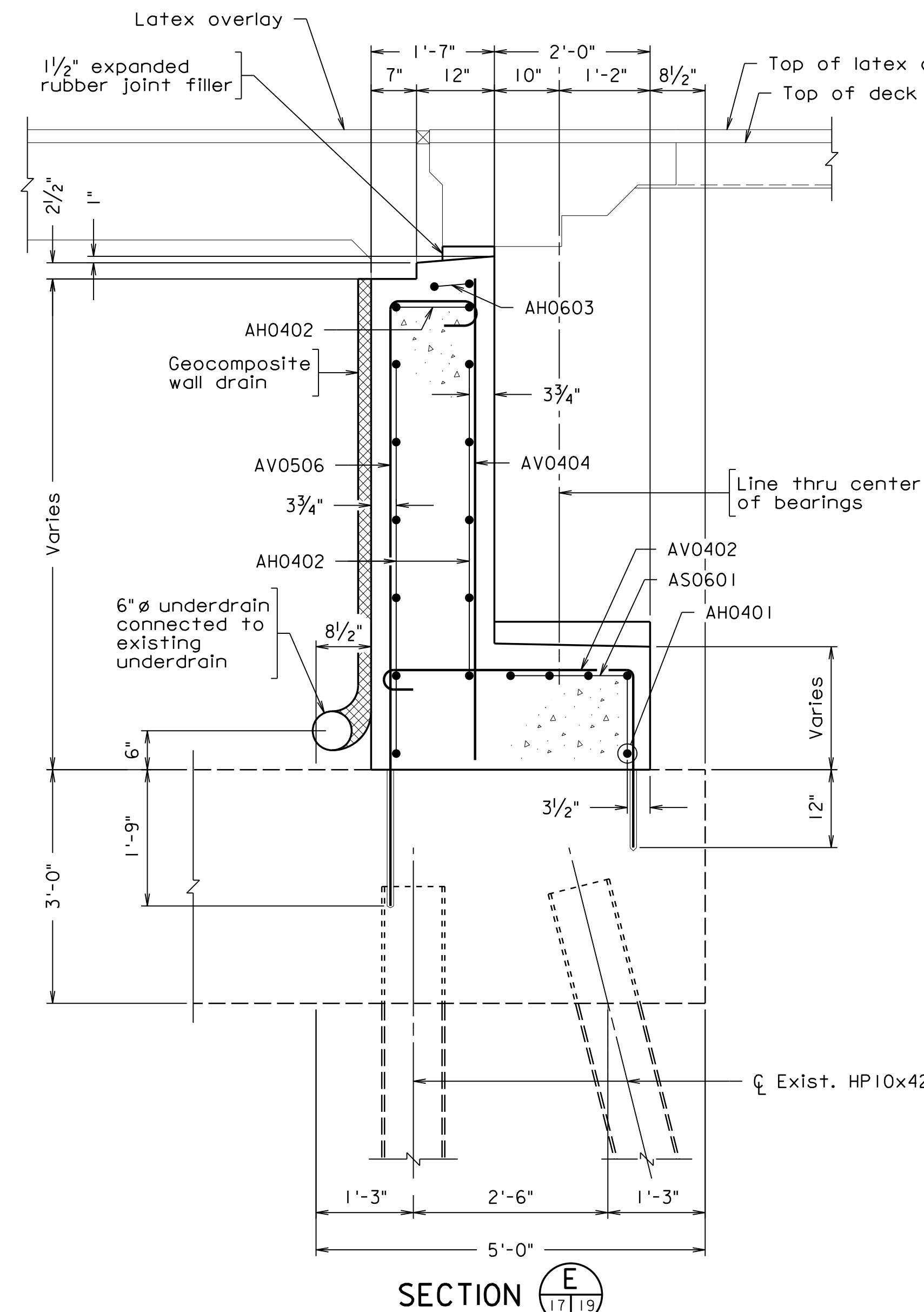
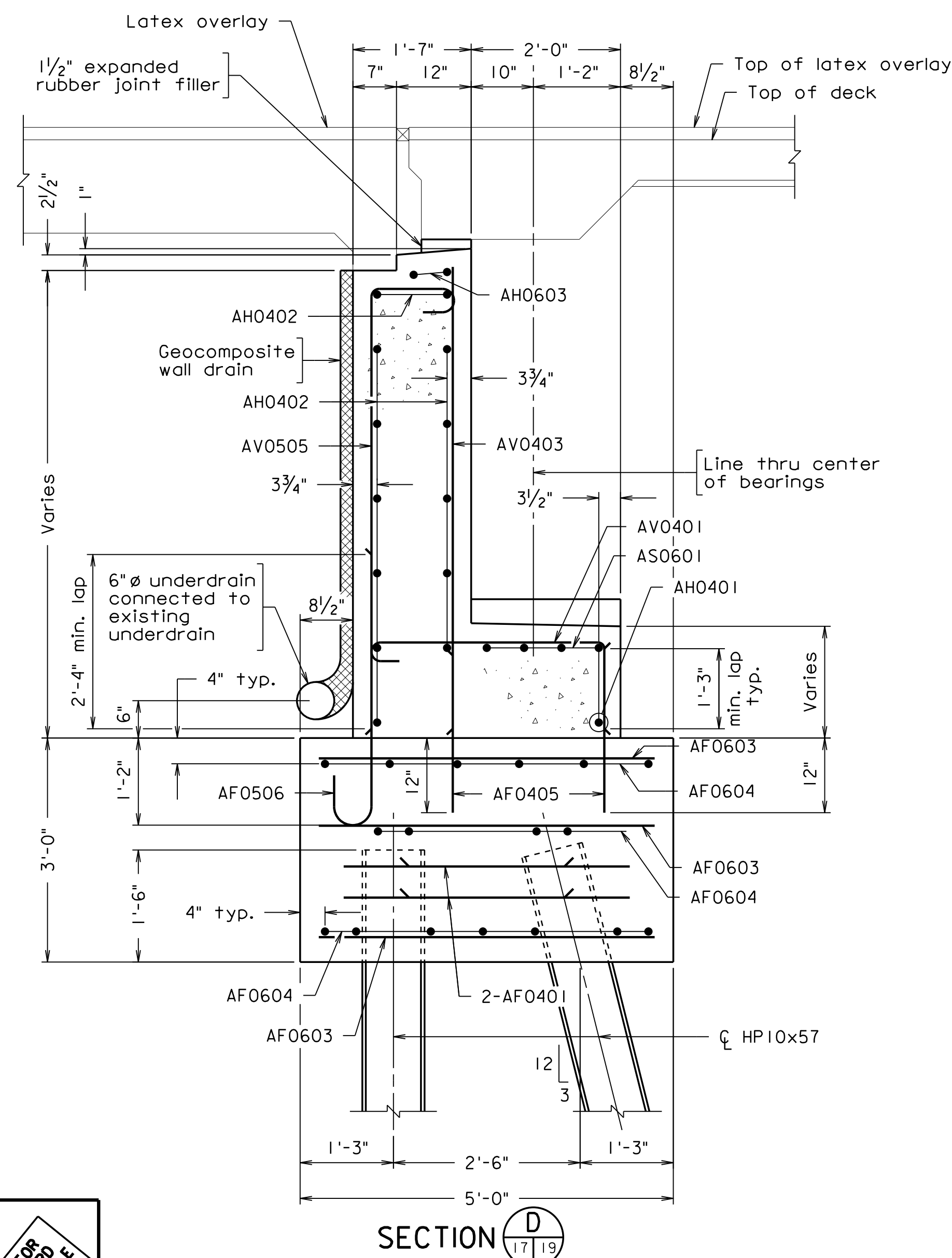
The 1/2" expanded rubber joint filler shall extend the full length of the deck slab extension.

Geocomposite wall drain shall extend from approach slab notch or 3'-0" below finished grade down to underdrain.

6" diameter underdrain shall connect to existing underdrain and run along back of backwall at bottom of wall drain with 1% slope.

For demolition limits of backwall, see sheet 15.

For Virginia Micro Abutment Detail, see sheet 66.



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Scale: 3/4" = 1'-0" unless otherwise noted.

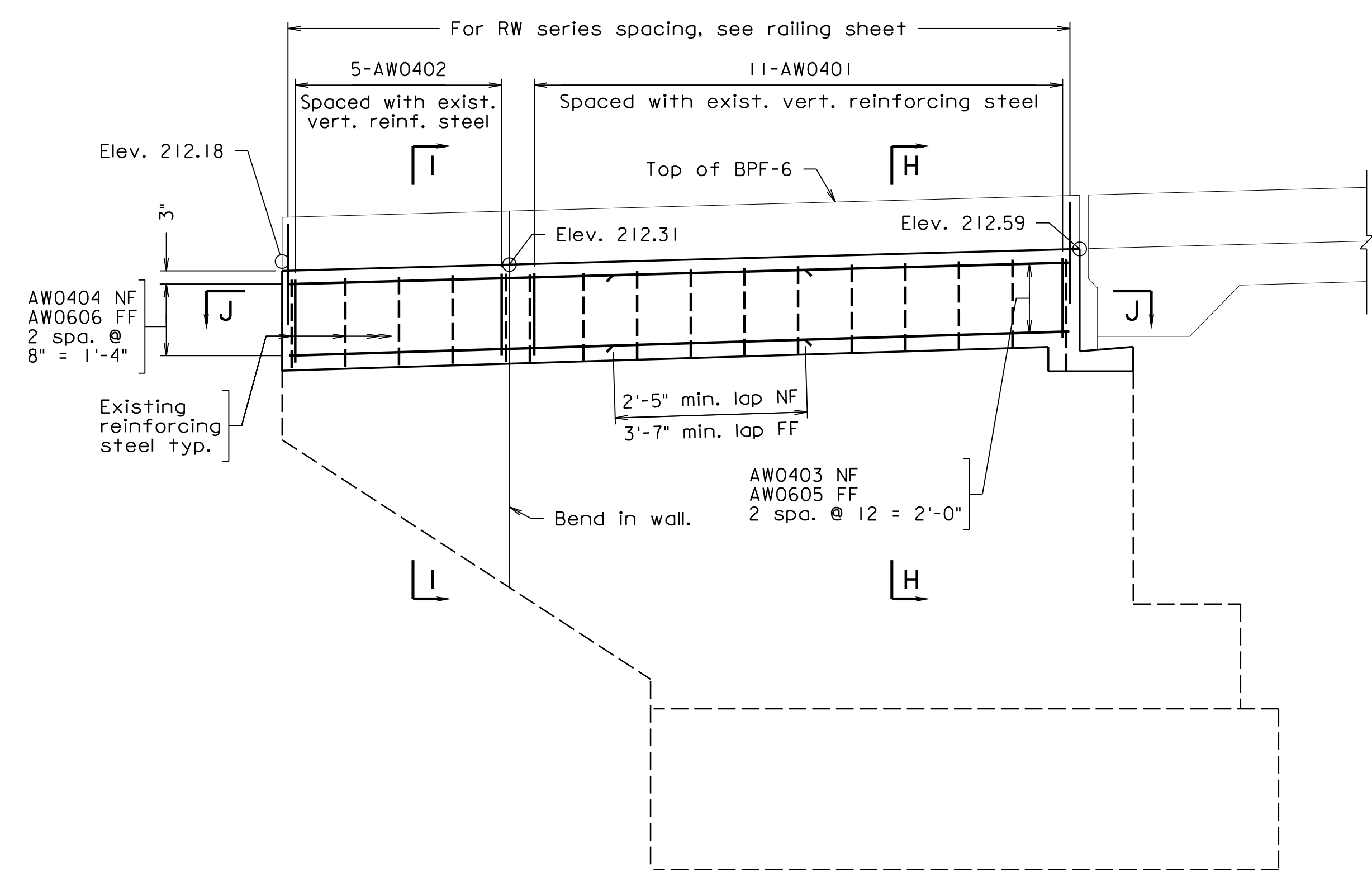
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STRUCTURE AND BRIDGE DIVISION				
ABUTMENT B TYPICAL SECTIONS				
No.	Description	Date	Designed: RDS..... Drawn: MWL..... Checked: skt.....	Date Apr. 2022
Revisions			Plan No. 257-38A	Sheet No. 19 of 125

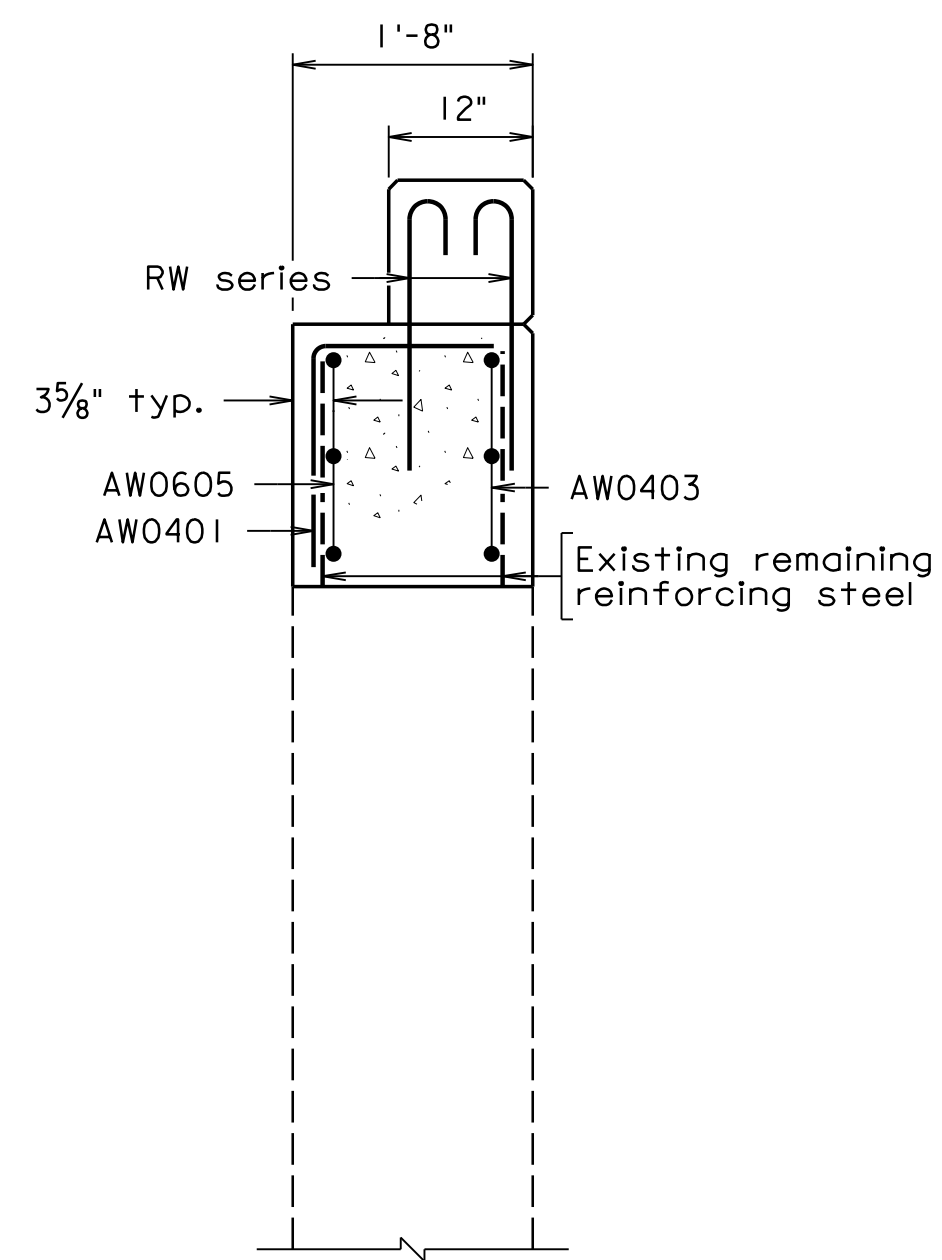
PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			20

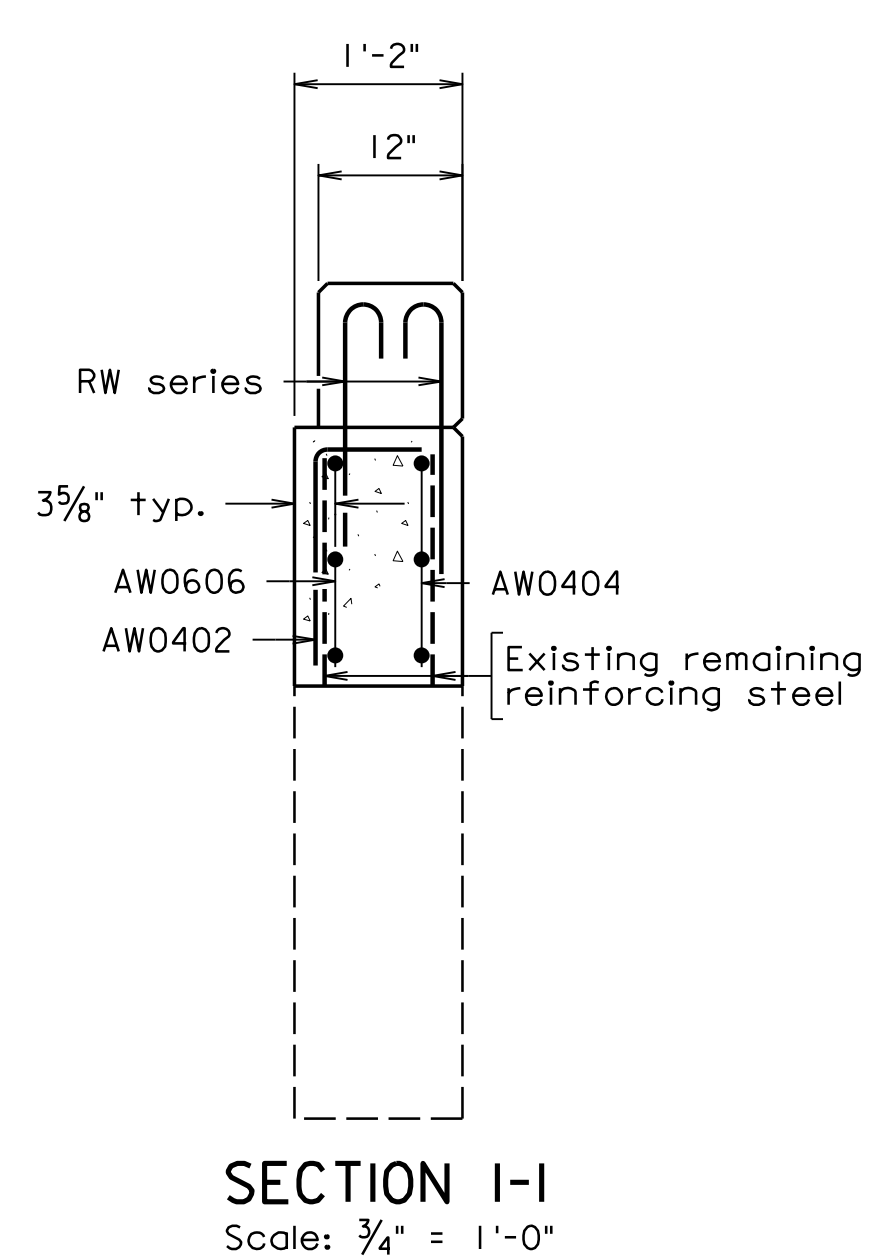
Notes:
 For details of pedestrian fence, pedestal and handrail, see sheet 76.
 For demolition limits of wingwall, see sheet 15.



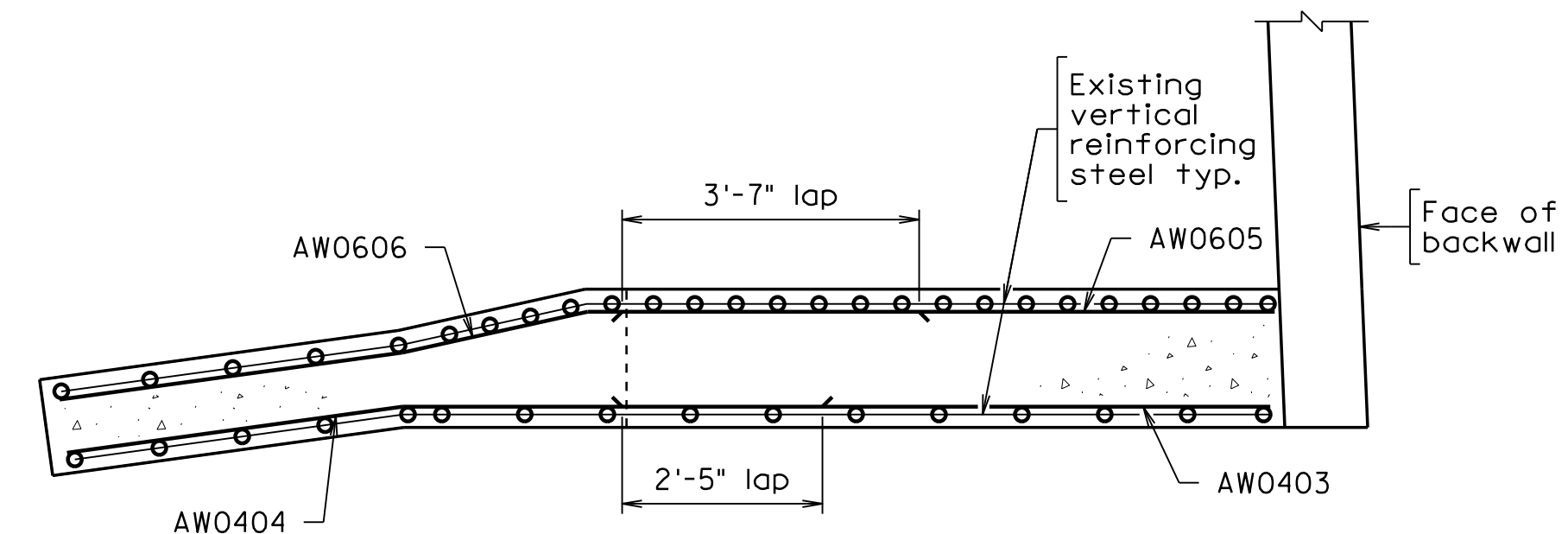
VIEW C



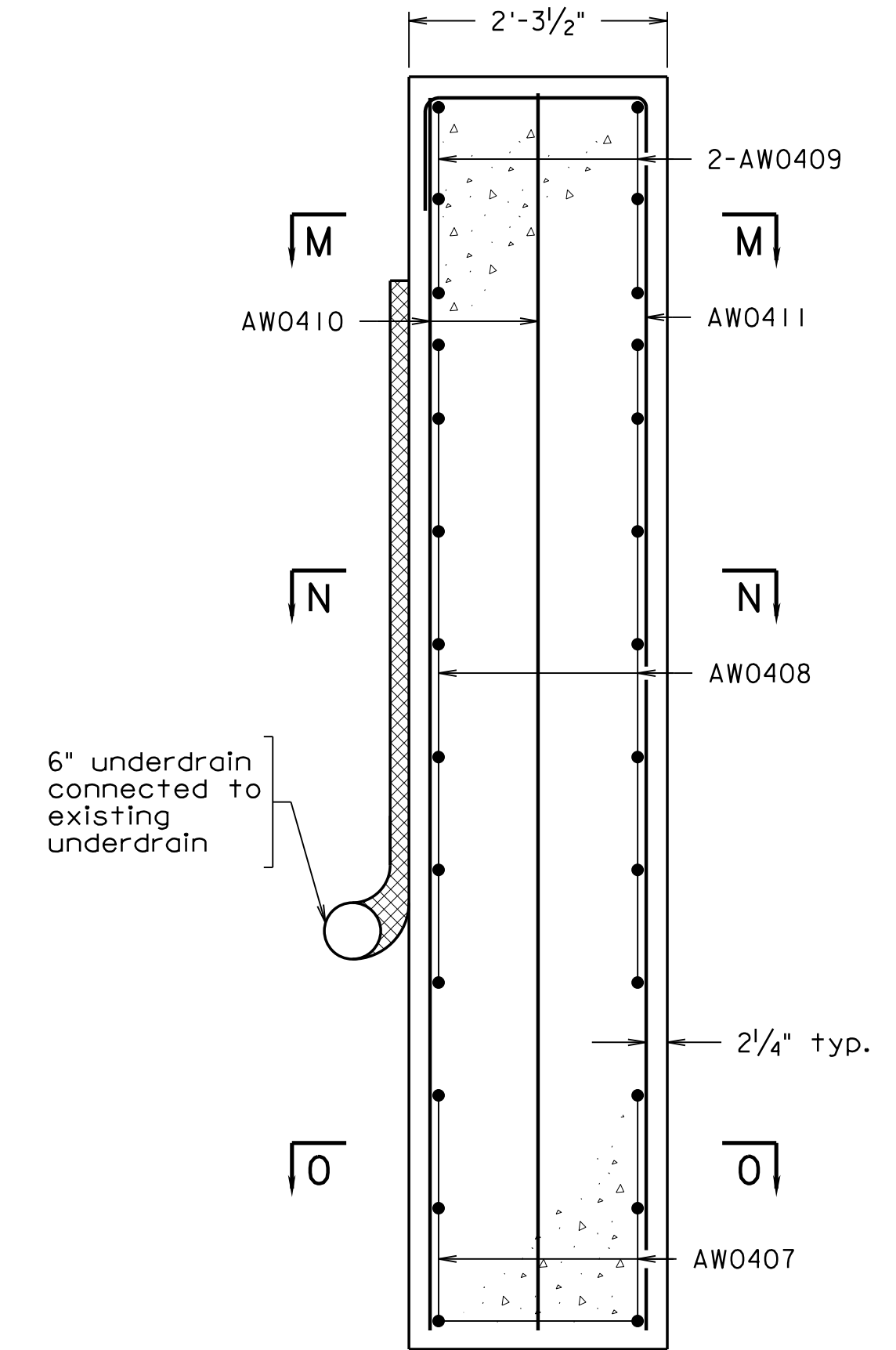
SECTION H-H
Scale: 3/4" = 1'-0"



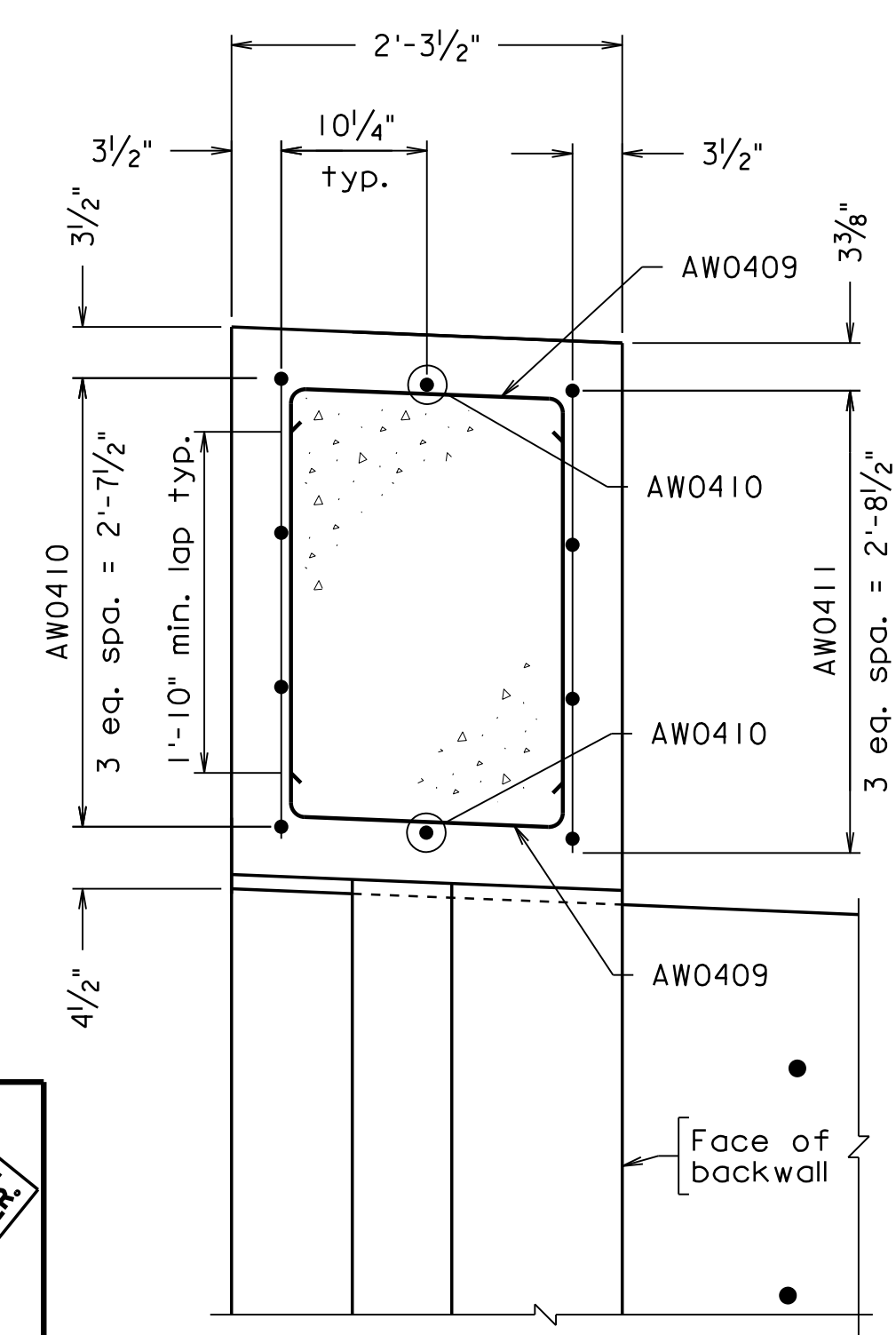
SECTION I-I
Scale: 3/4" = 1'-0"



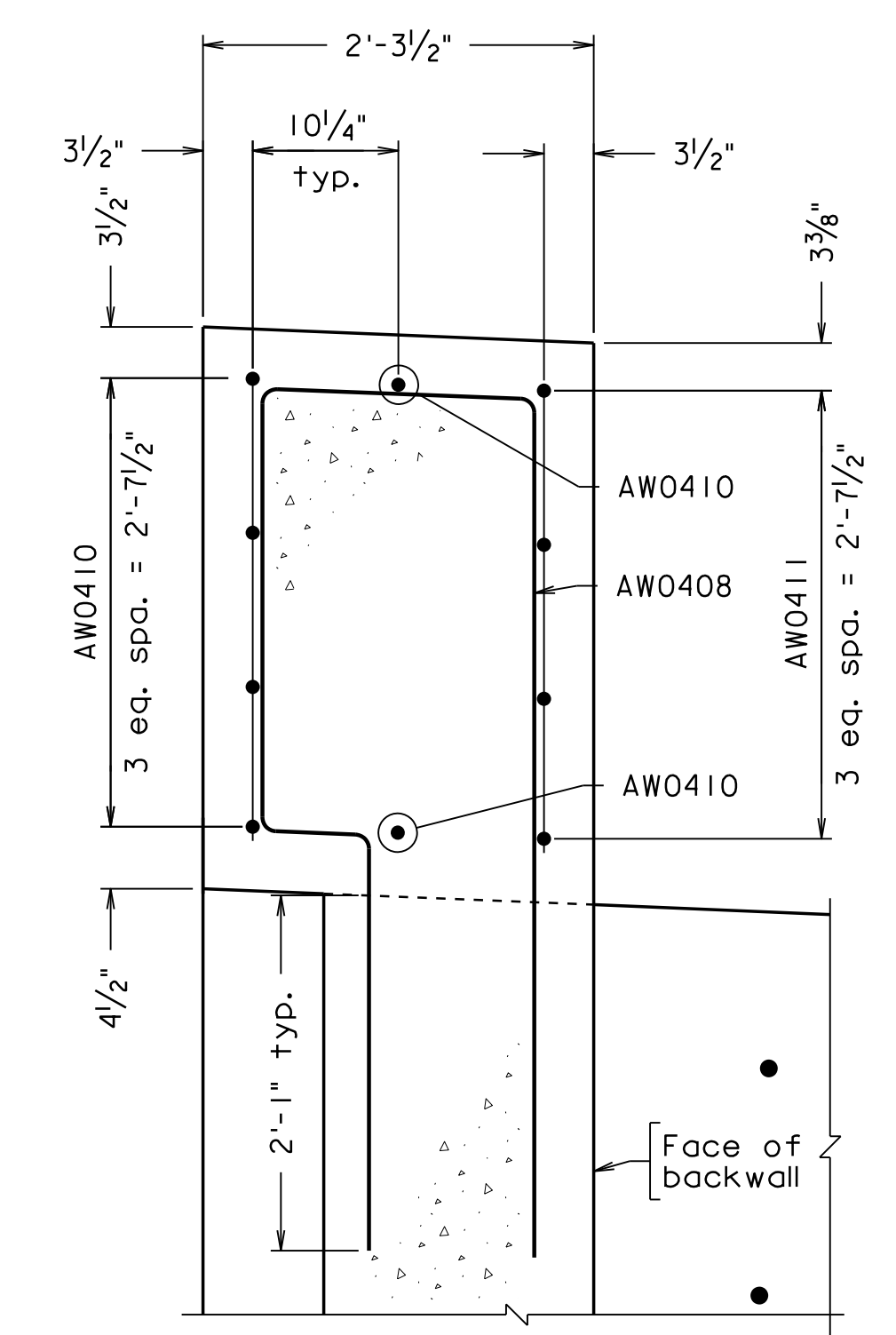
SECTION J-J



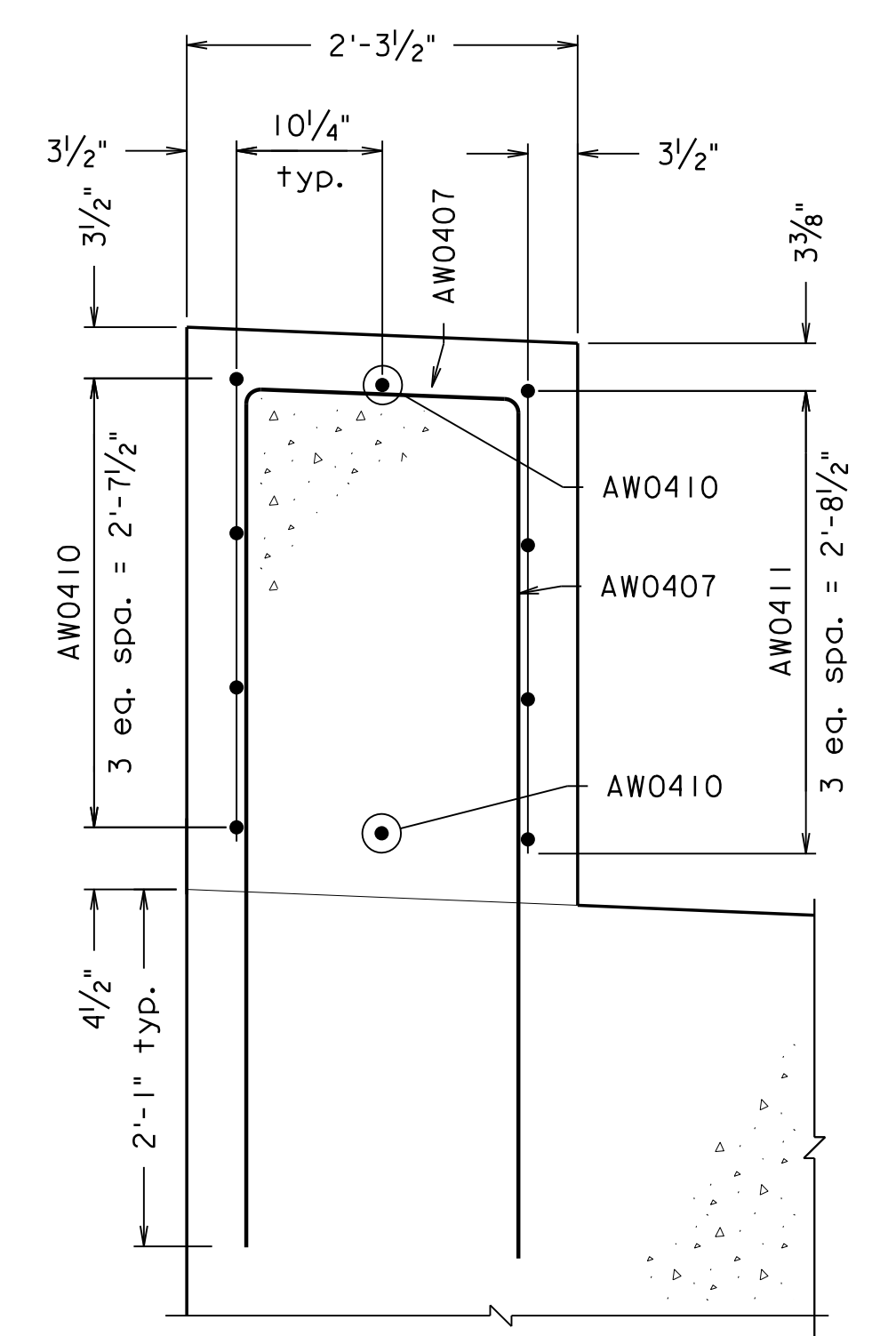
SECTION G
Scale: 3/4" = 1'-0"



SECTION M-M
SOUTH WINGWALL
Scale: 1" = 1'-0"



SECTION N-N
SOUTH WINGWALL
Scale: 1" = 1'-0"
Abutment backwall reinforcing steel not shown for clarity.



SECTION O-O
SOUTH WINGWALL
Scale: 1" = 1'-0"
Abutment footing reinforcing steel not shown for clarity.
Scale: 1/2" = 1'-0" unless otherwise noted.

PAC PLANS
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ABUTMENT B WINGWALLS					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn:MWL.....	Apr. 2022	257-38A
			Checked: .SLT.....		20 of 125
Revisions					

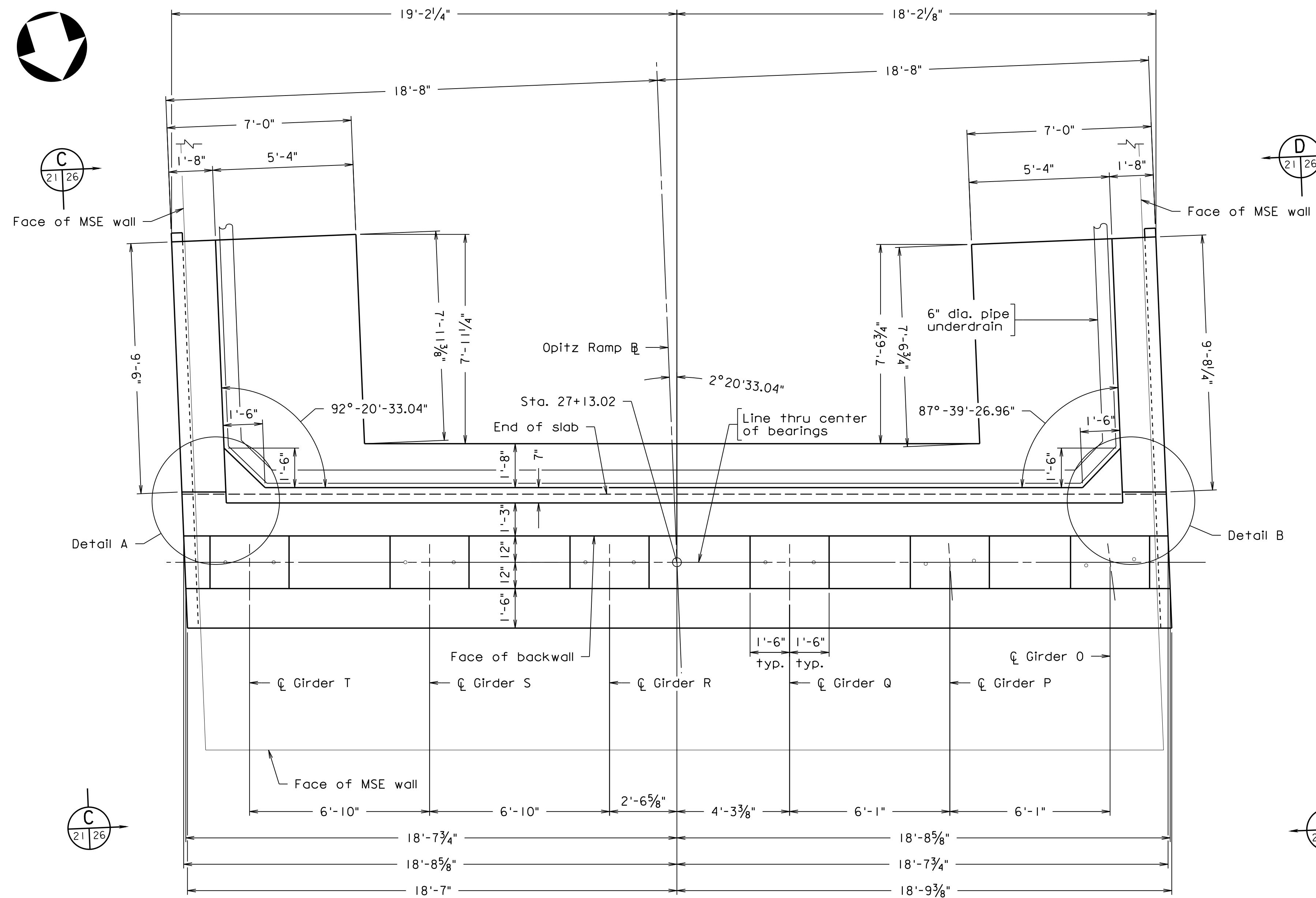
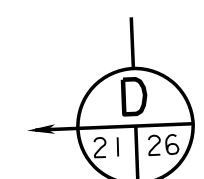
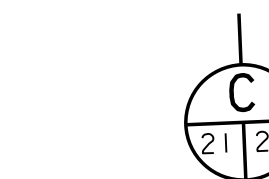
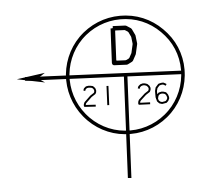
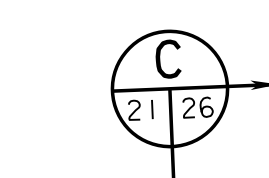
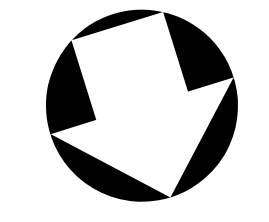
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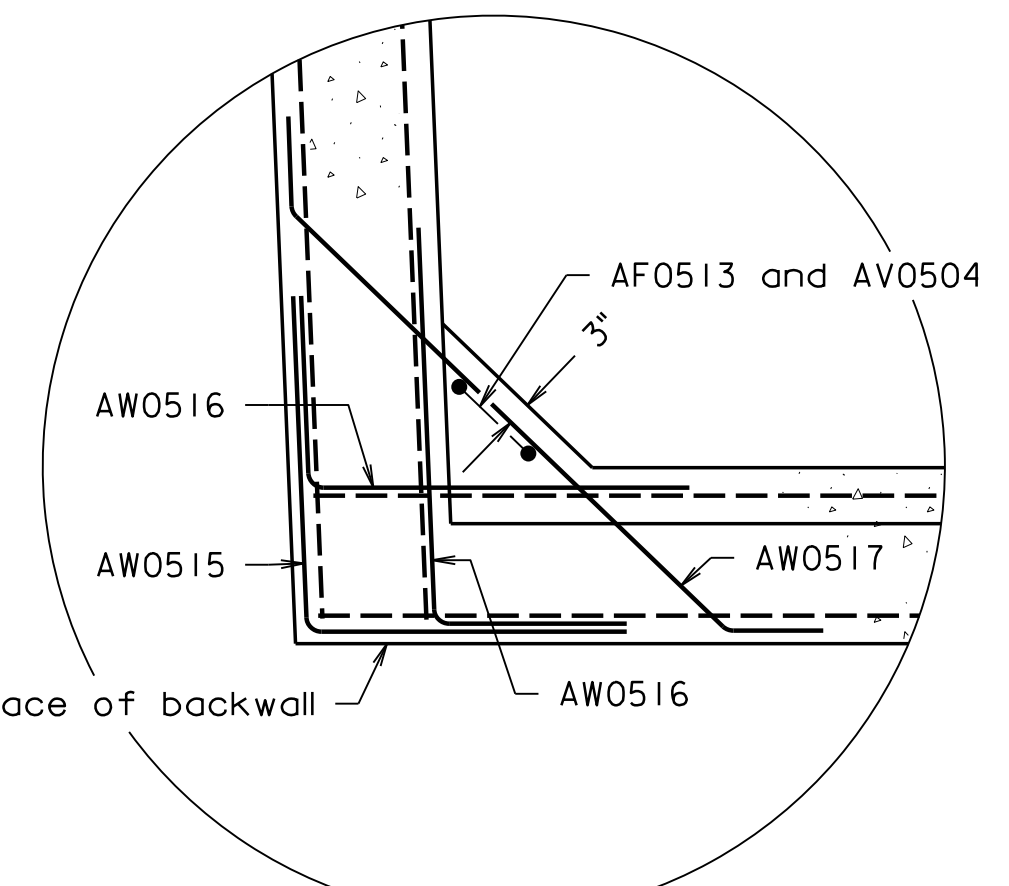
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			21

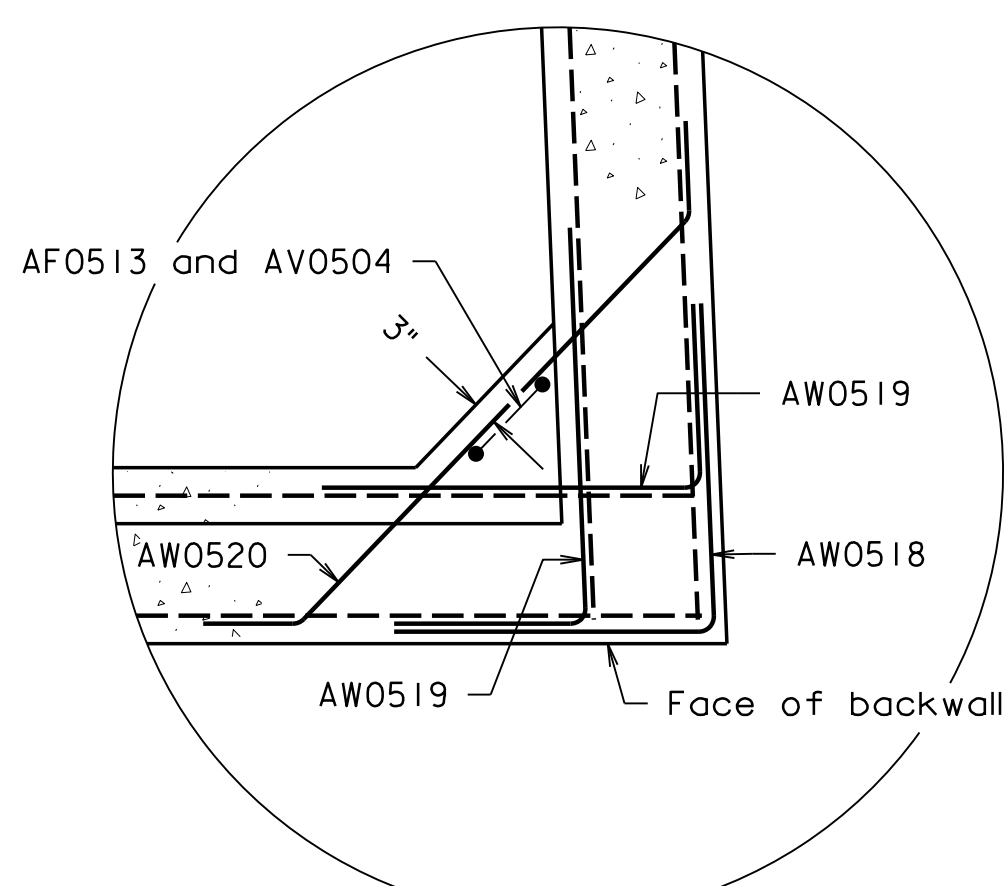


PLAN



DETAIL A
Scale: 1/2" = 1'-0"

Additional backwall and wingwall reinforcing steel not shown for clarity.



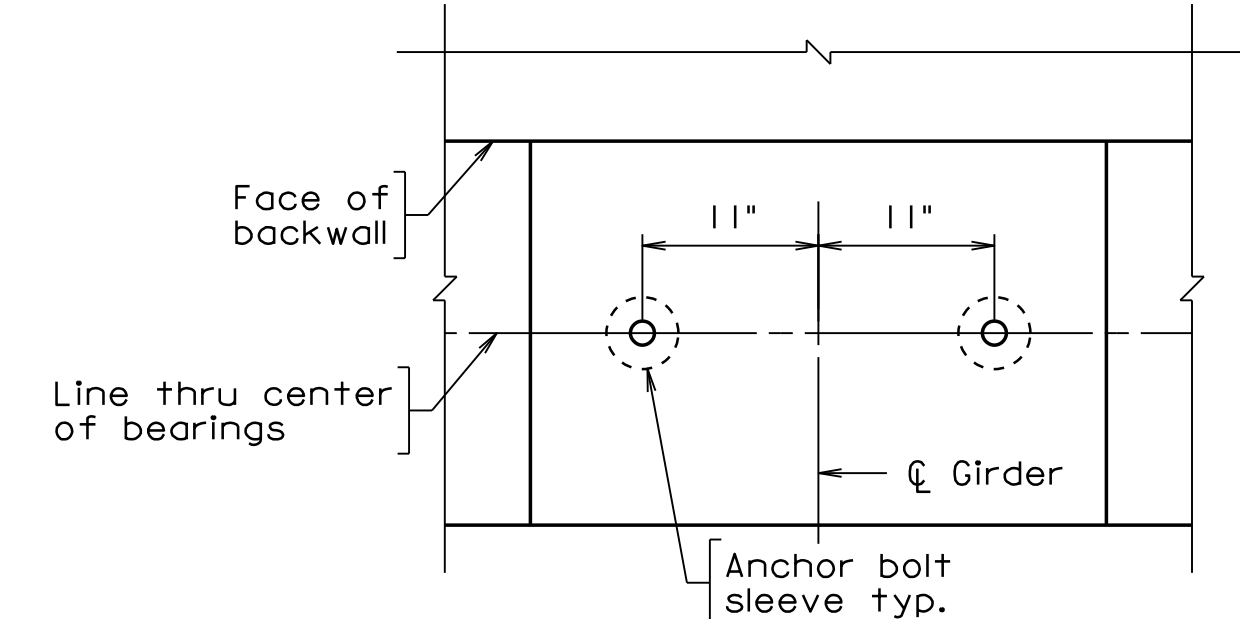
DETAIL B
Scale: 1/2" = 1'-0"

Additional backwall and wingwall reinforcing steel not shown for clarity.

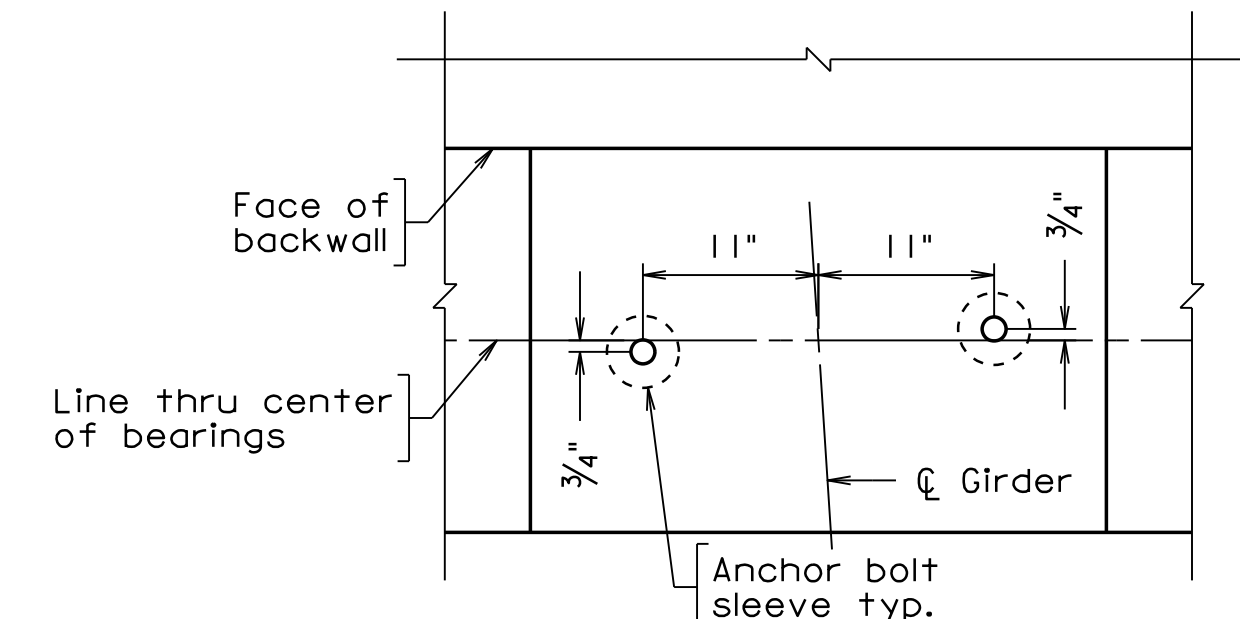
Scale: 3/8" = 1'-0" unless otherwise noted.

Notes:

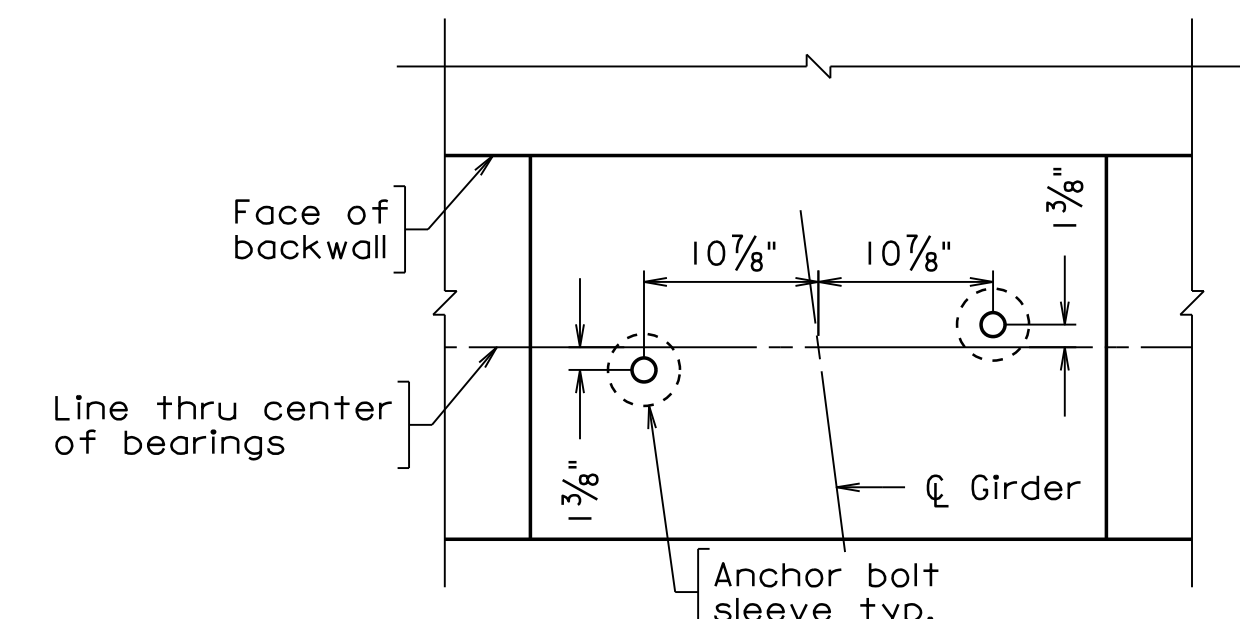
- For elevation view and typical seat reinforcement, see sheet 22.
- For pile layout, see sheet 23.
- For Footing Plan, see sheet 24.
- For typical section, see sheet 25.
- For anchor bolt sleeve details, see bearing details on sheet 33.
- For details of deck slab extension, see sheet 67.
- For details of MSE wall, see sheets 121 thru 125.



ANCHOR BOLT LAYOUT
GIRDERS Q, R, S, AND T
Scale: 1" = 1'-0"



ANCHOR BOLT LAYOUT
GIRDER P
Scale: 1" = 1'-0"



ANCHOR BOLT LAYOUT
GIRDER O
Scale: 1" = 1'-0"

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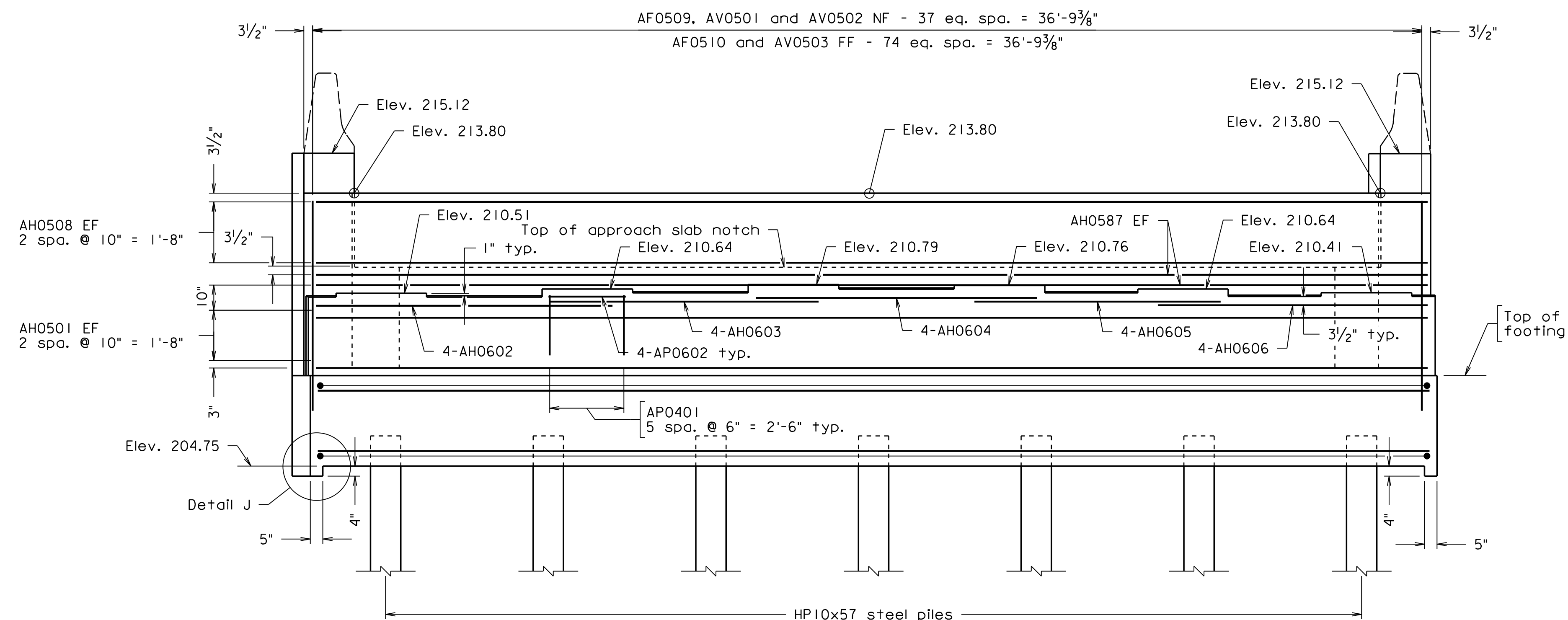
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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT C PLAN					
No.	Description	Date	Designed: RDS.....	Date	Plan No.
			Drawn: CRR.....	Apr. 2022	257-38A
			Checked: SKL.....		21 of 125
Revisions					

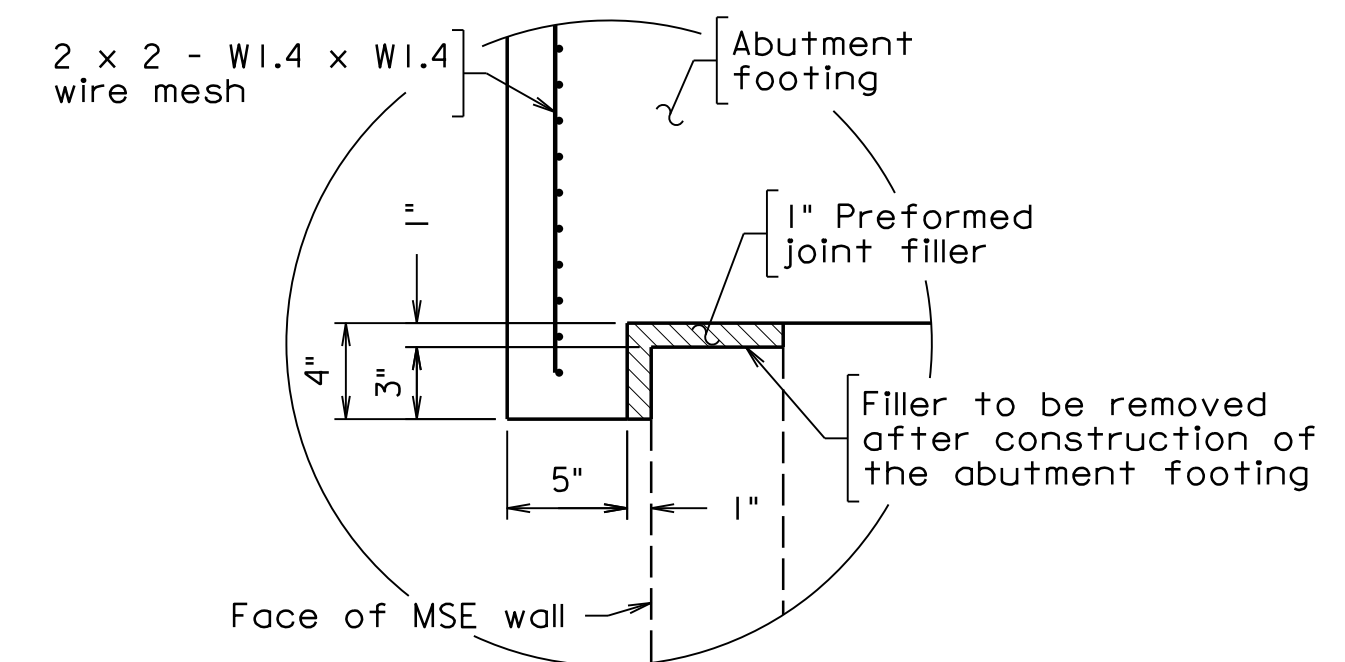
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			22

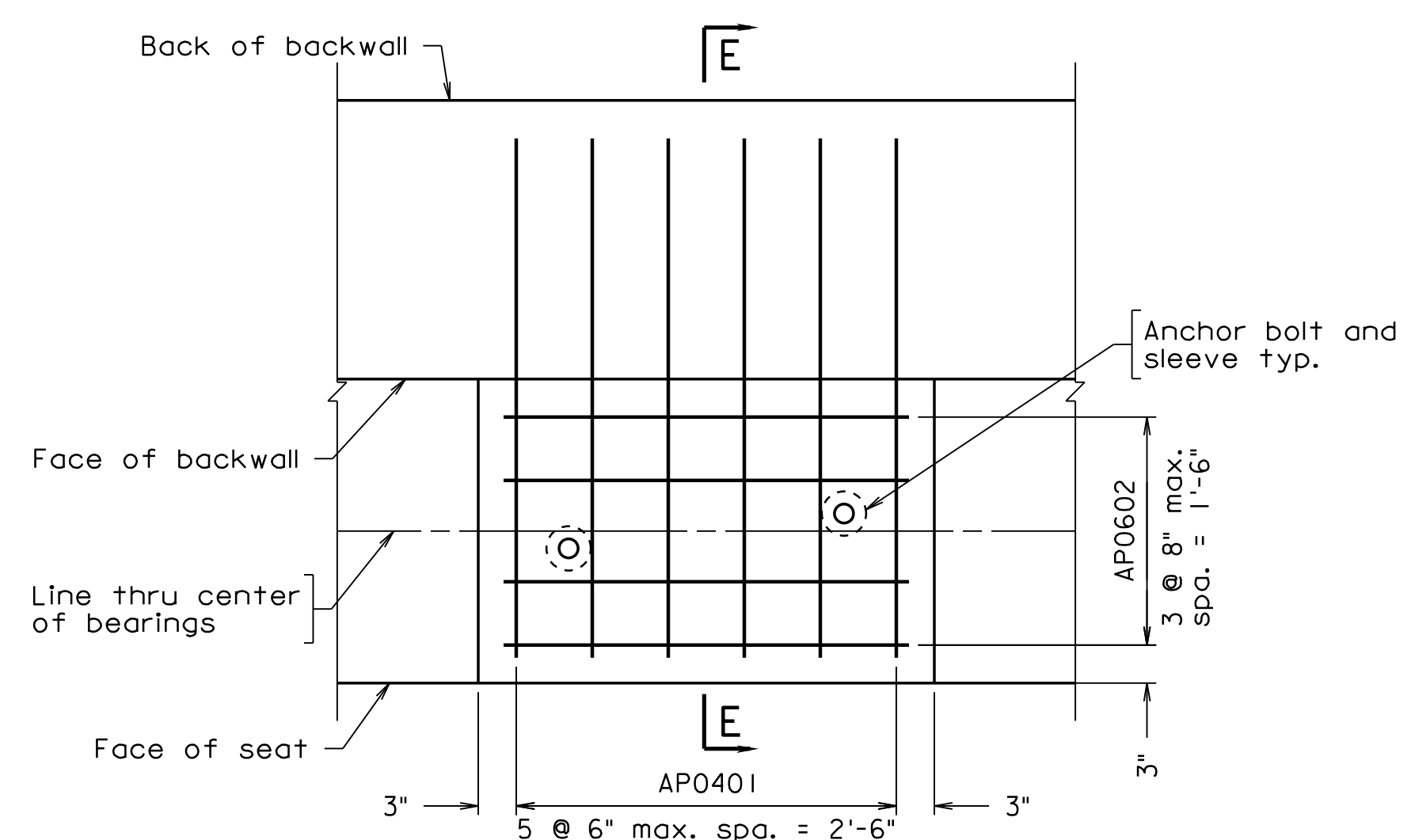
Notes:
 For plan view, see sheet 21.
 For pile layout and footing plan, see sheet 23.
 For footing plan, see sheet 24.
 For typical section, see sheet 25.
 For wingwall details, see sheet 26.



ELEVATION

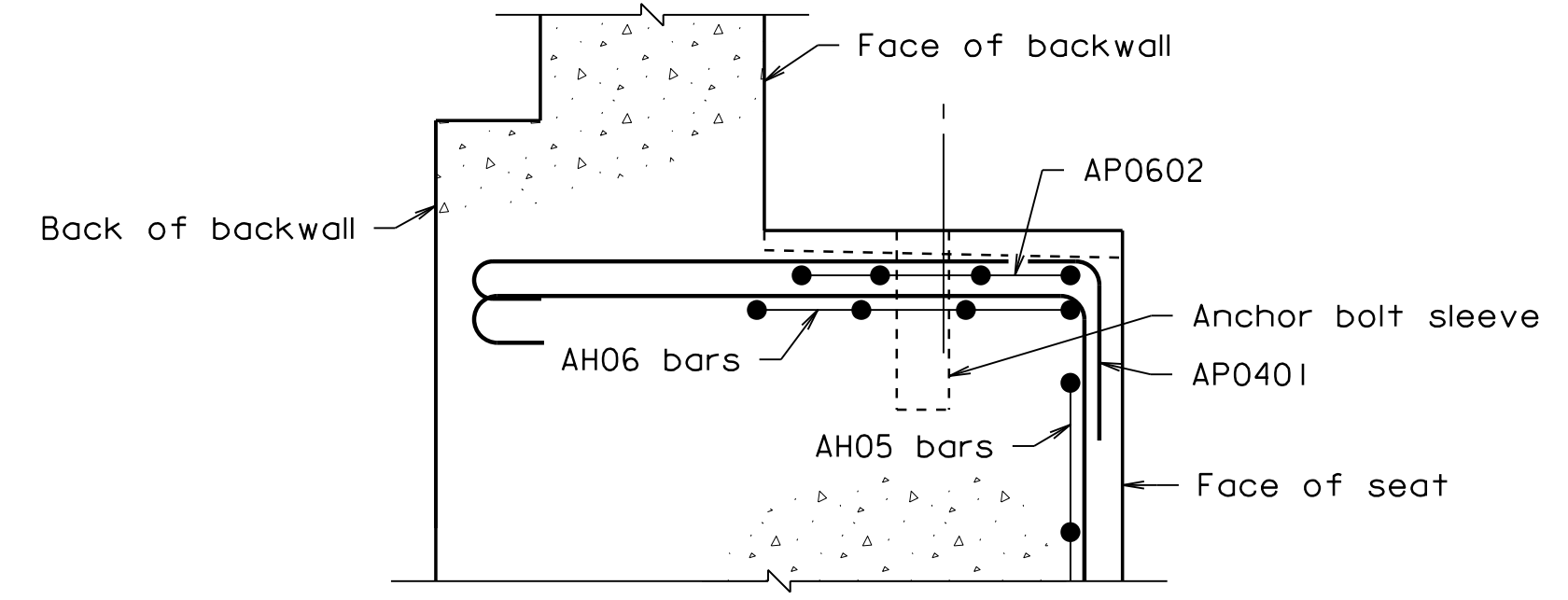


DETAIL J
 Scale: 1/2" = 1'-0"



TYPICAL BEARING PAD PLAN

Scale: 1" = 1'-0"
 AP0401 and AP0602 bar spacing may be adjusted where required to clear anchor bolt sleeves.



SECTION E-E

Not to scale
 Backwall reinforcing steel not shown for clarity.

Scale: 3/8" = 1'-0" unless otherwise noted.

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ABUTMENT C ELEVATION			
No.	Description	Date	Revisions
Designed: RDS	Date	Plan No.	Sheet No.
Drawn: CRR	Apr. 2022	257-38A	22 of 125
Checked: SKH			

PROGRESS PRINT 4/1/2022

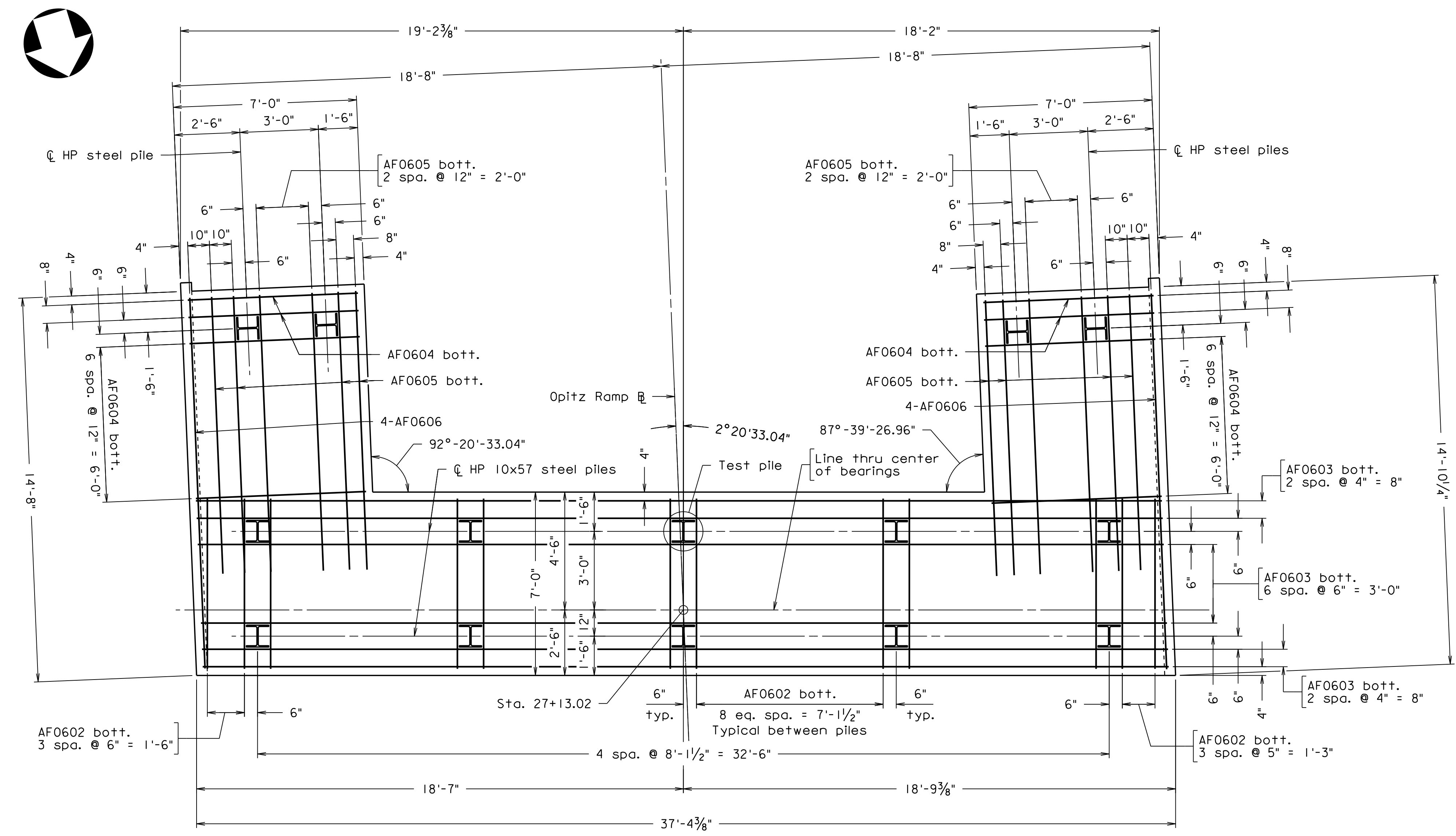
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Notes:

The one required test pile and dynamic pile test are required to be done prior to driving any other permanent piling within the same substructure unit.
 For Footing Plan showing the top mat of rebar, see sheet 24.



PILE LAYOUT
 Showing pile layout and bottom mat of reinforcing steel only.

PILE DATA TABLE			
Nominal Axial Resistance Measured During Driving (Tons/pile)	Factored Axial Resistance (Tons/pile)	Estimated Tip Elevation	Minimum Tip Elevation
192	125	141	157

The Strength Limit State controls the pile design.

257-38A_023.dgn

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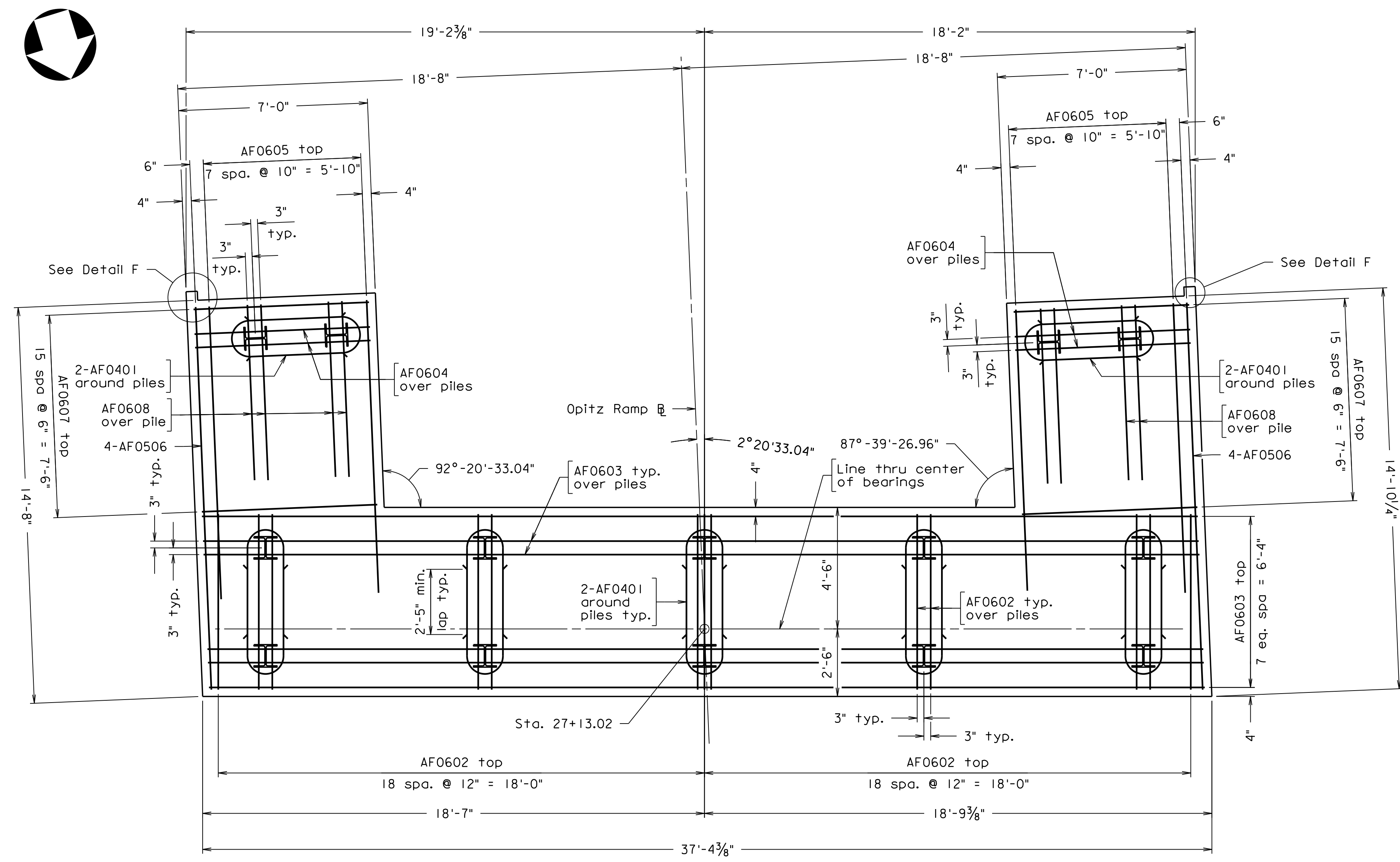
Scale: 3/8" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION					
ABUTMENT C FOOTING PLAN AND PILE LAYOUT					
No.	Description	Date	Designed: RDS	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: SKH		23 of 125
Revisions					

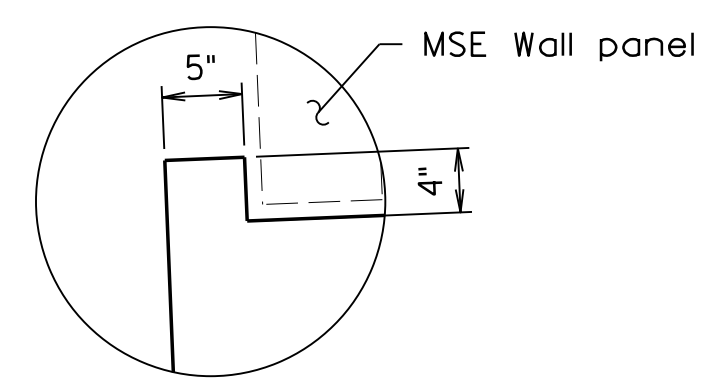
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			24

Notes:
 For Pile Layout showing the bottom mat of rebar, see sheet 23.
 For Abutment C typical section, see sheet 25.



FOOTING PLAN

Showing reinforcing steel at piles and top mat of reinforcing steel only.



DETAIL F
 Scale: 1" = 1'-0"

257-38A_024.dgn

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ABUTMENT C FOOTING PLAN					
No.	Description	Date	Designed: RDS..... Drawn: CRR..... Checked: SKH.....	Date	Plan No. / Sheet No.
	Revisions			Apr. 2022	257-38A / 24 of 125

Scale: 3/8" = 1'-0" unless otherwise noted.

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
NO.		NO.	
VA.		95	0095-076-299, B688
			25

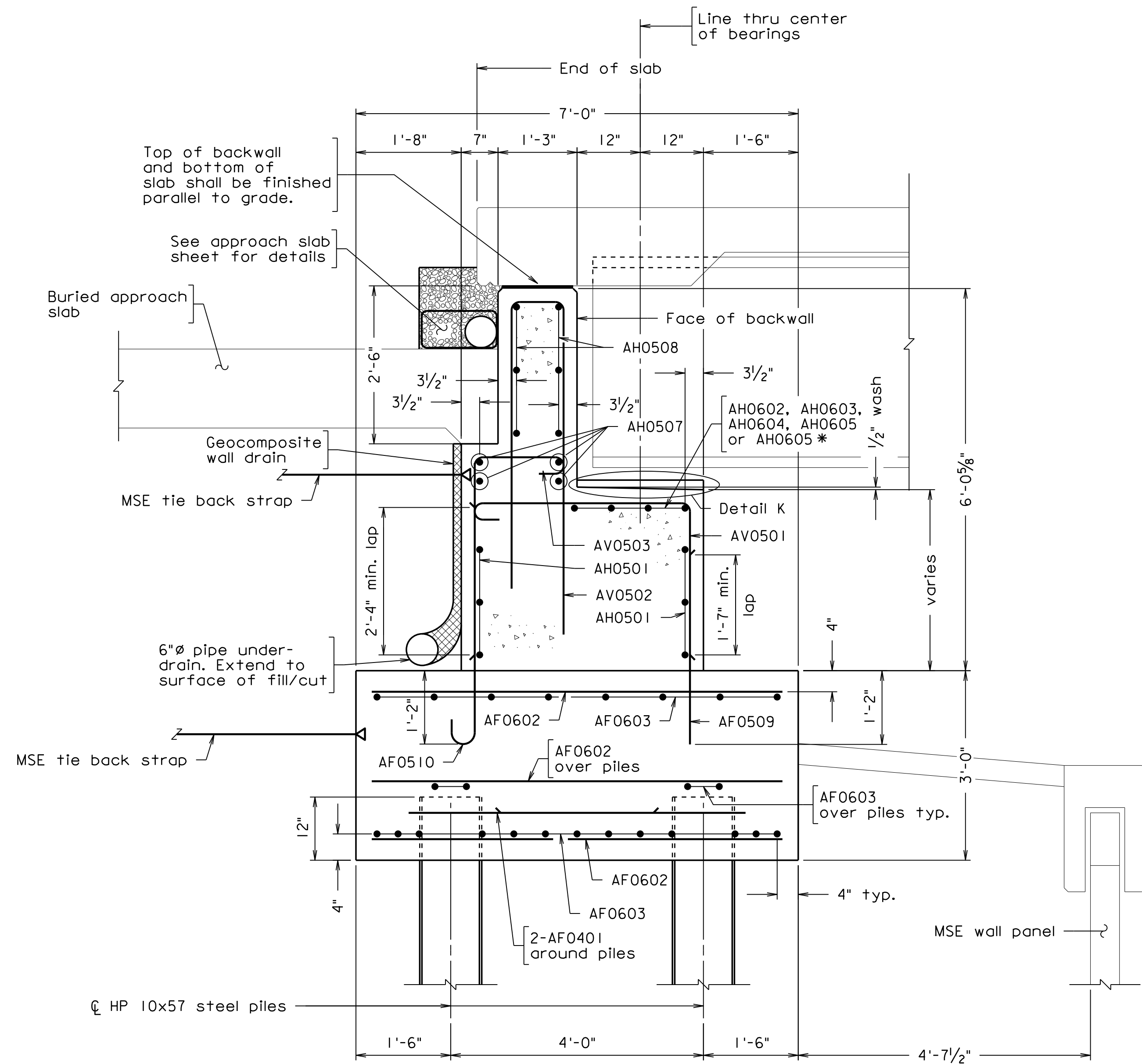
Notes:

* AH06 bar spacing may be adjusted where required to clear anchor bolt sleeves.

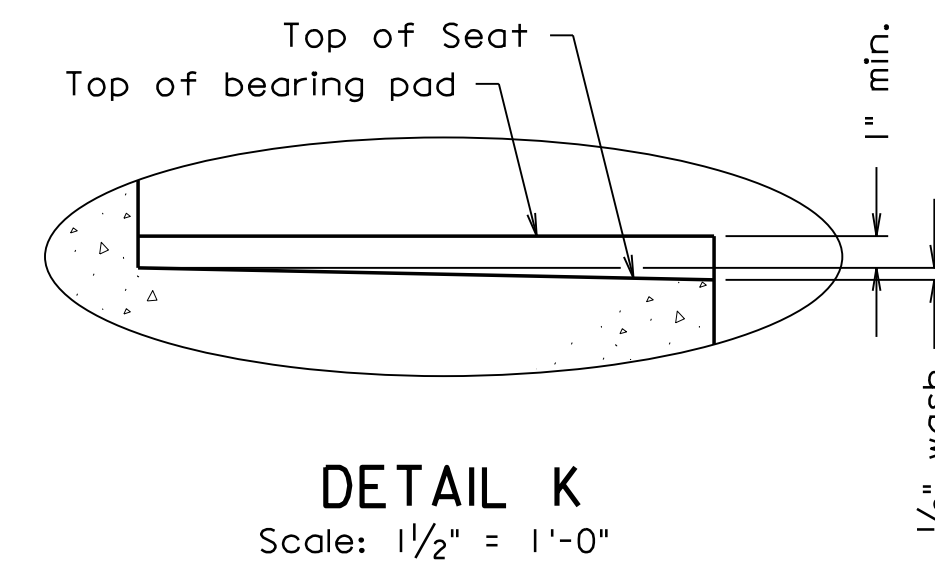
For details of deck slab extension, see sheet 67.

Abutment MSE straps shall be designed for the following factored loads:

1.04 kips/ft of soil pressure and 3.00 kips/ft of additional longitudinal loads along the length of the abutment wall.



TYPICAL SECTION



DETAIL K
Scale: 1 1/2" = 1'-0"

257-38A_025.dgn

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Scale: 3/4" = 1'-0" unless otherwise noted.

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ABUTMENT C SECTIONS AND DETAILS					
No.	Description	Date	Designed: RDS..... Drawn: CRR..... Checked: SKH.....	Date Apr. 2022	Plan No. 257-38A
Revisions					Sheet No. 25 of 125

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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			26

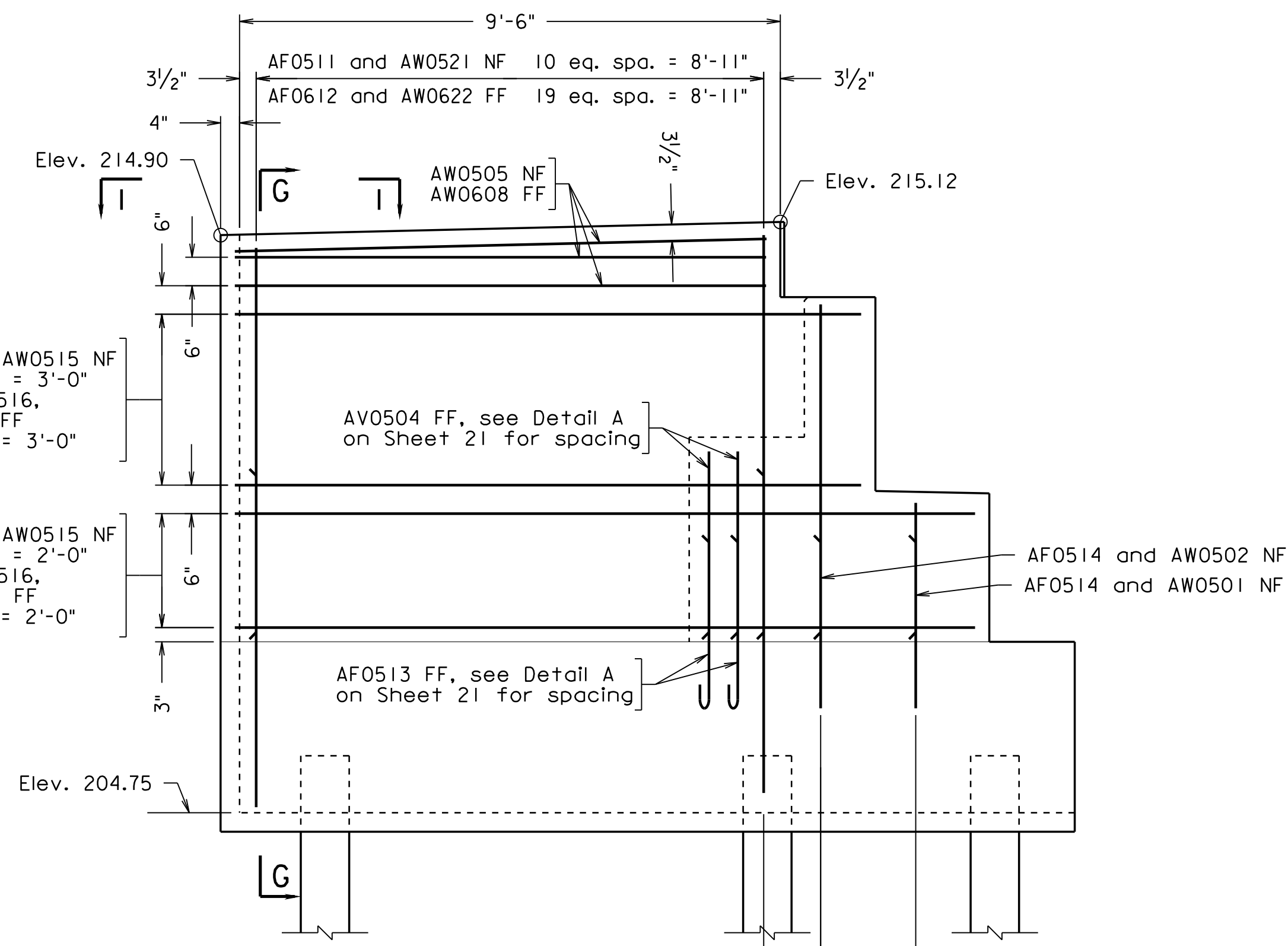
Notes:

For details of footing, see sheets 23 and 24.

For parapet details, see sheet 82.

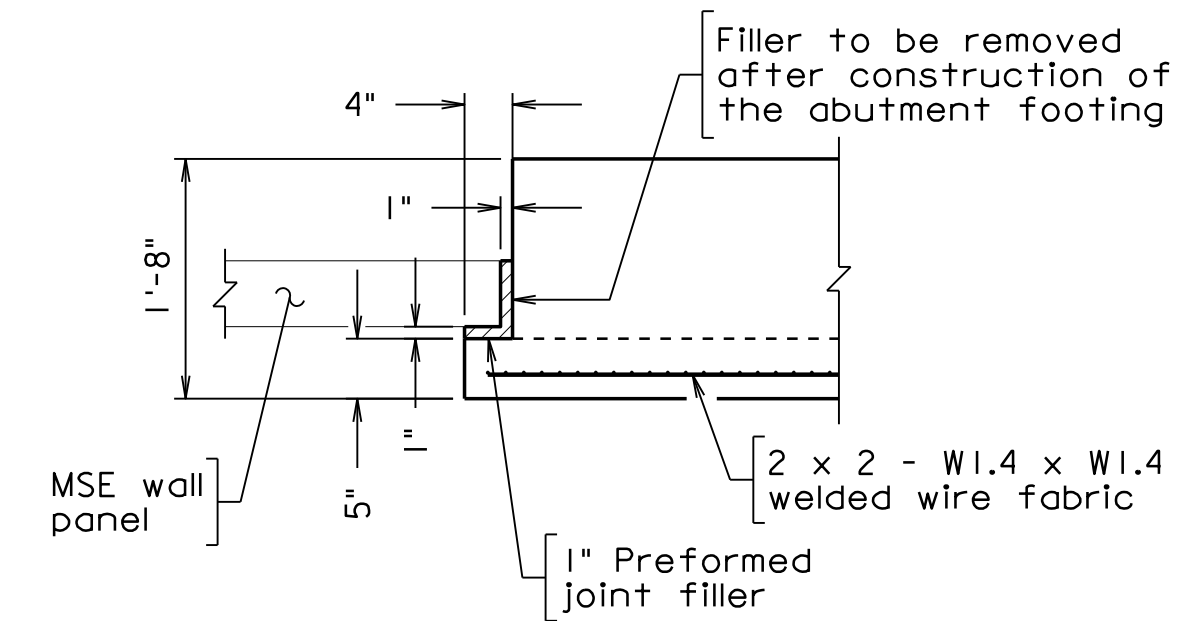
Wingwall MSE straps shall be designed for the following factored loads:

2.64 kips/ft of soil pressure and 1.73 kips/ft of additional longitudinal loads along the length of the wingwall.

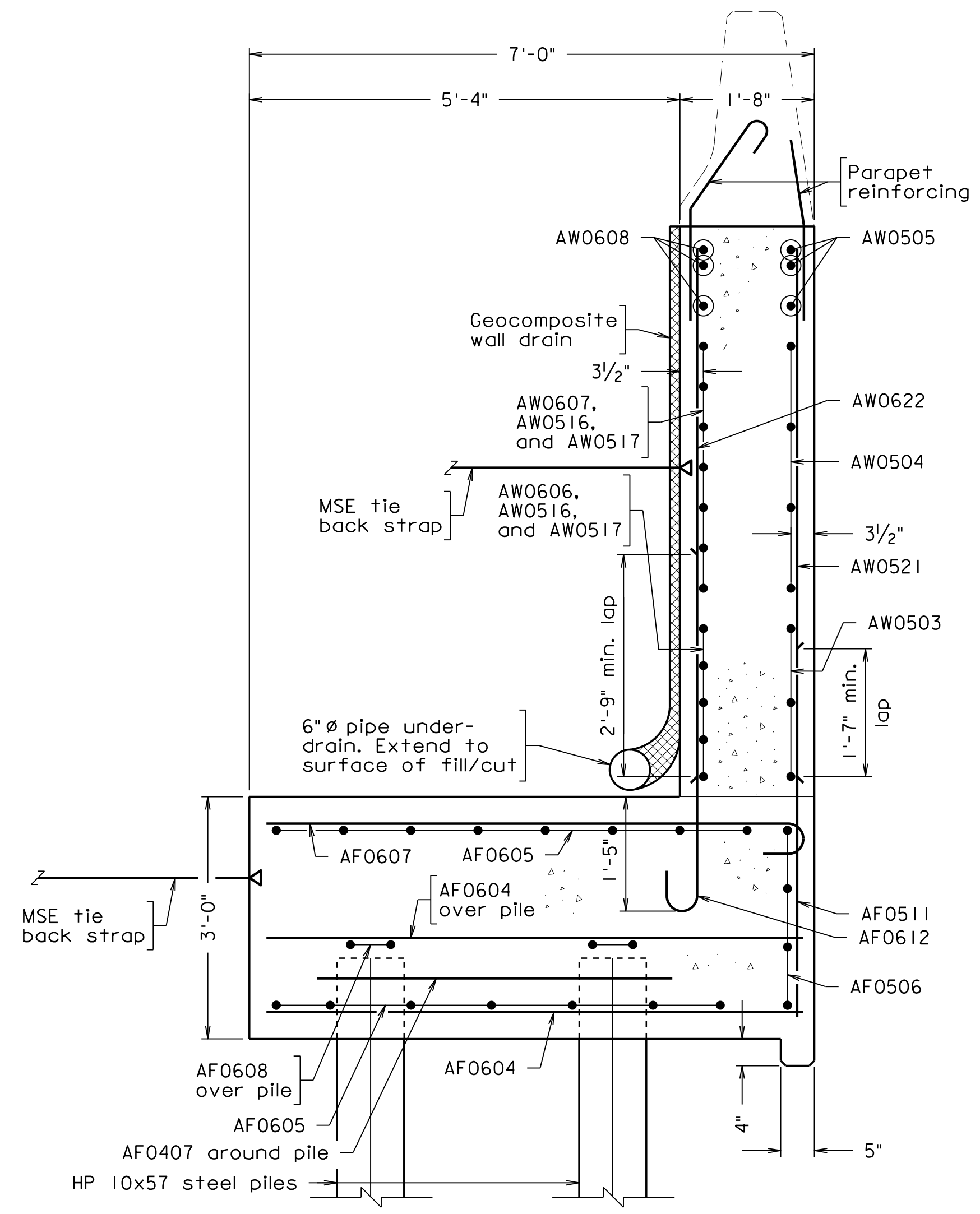


VIEW C
21 | 26

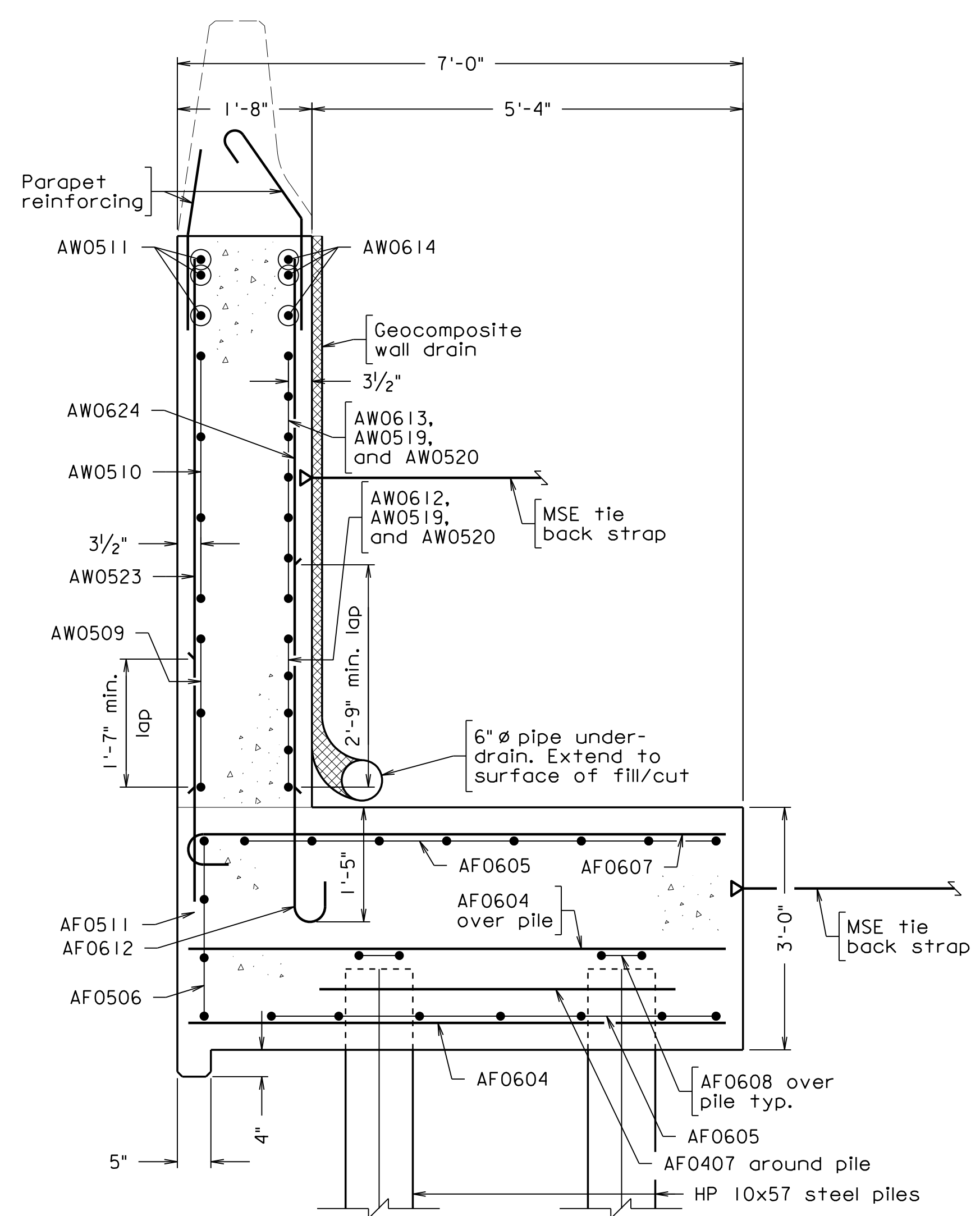
Footing reinforcing not shown



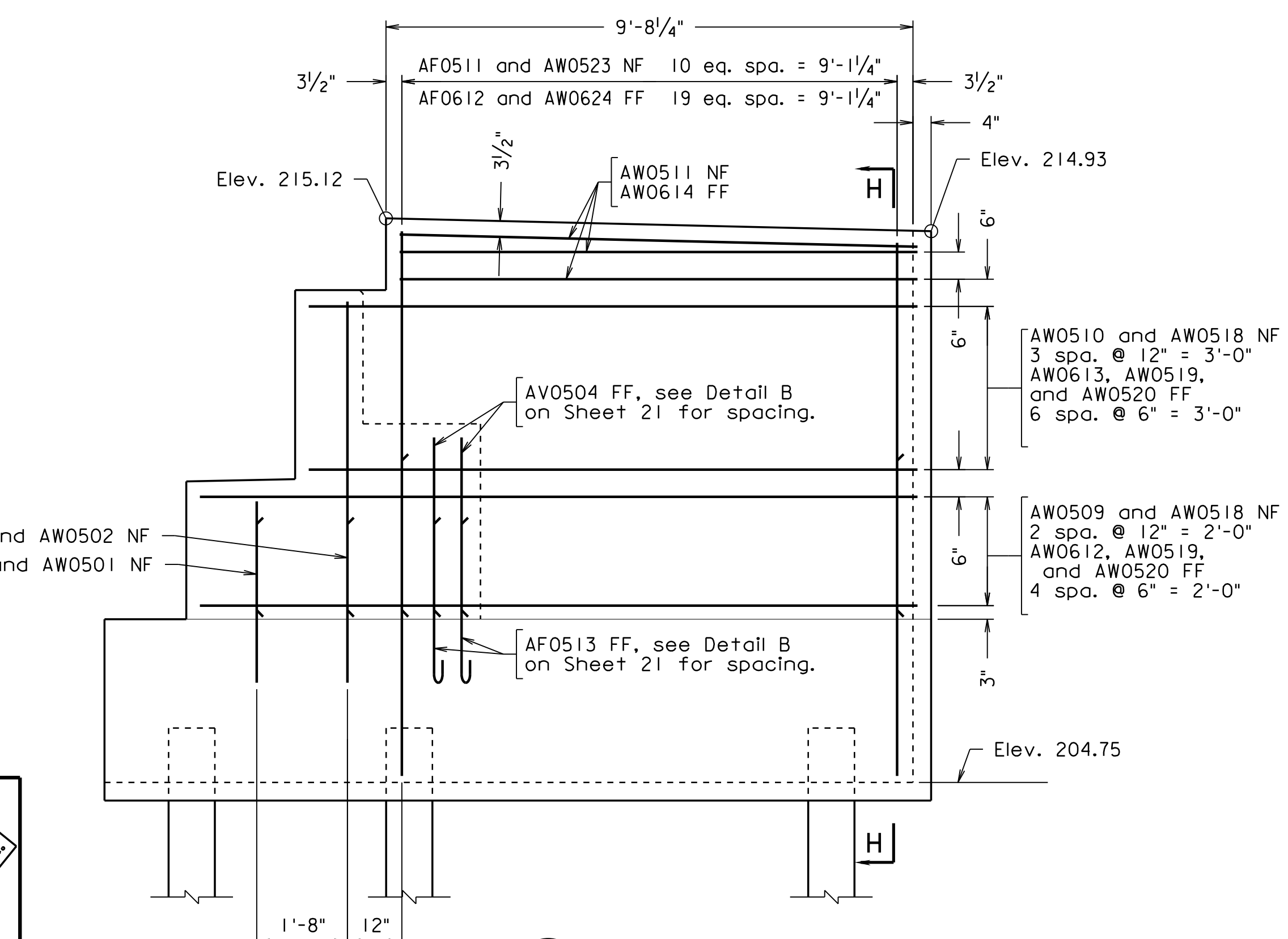
VIEW I-I
Scale: 3/4" = 1'-0"



SECTION G-G
Scale: 3/4" = 1'-0"



SECTION H-H
Scale: 3/4" = 1'-0"



VIEW D
21 | 26

Footing reinforcing not shown

257-38A_026.dgn

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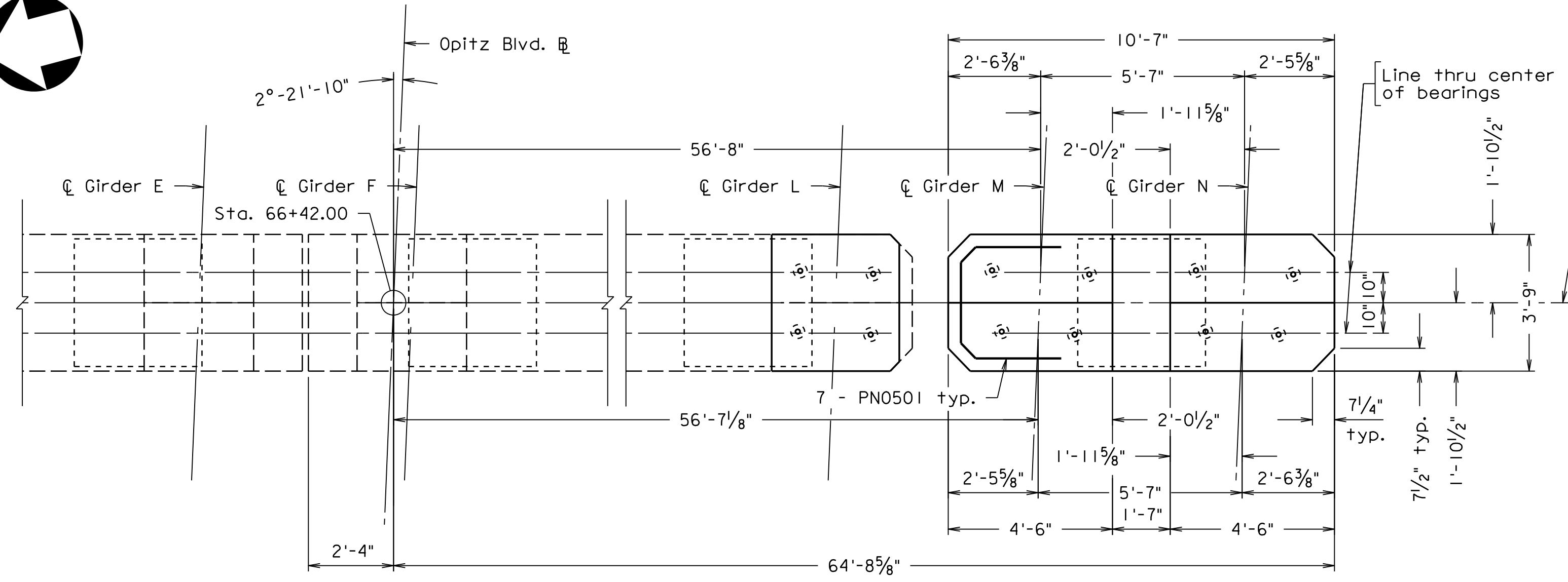
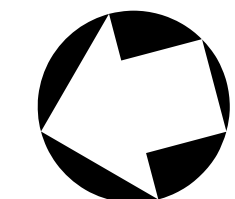
Scale: 1/2" = 1'-0" unless otherwise noted.

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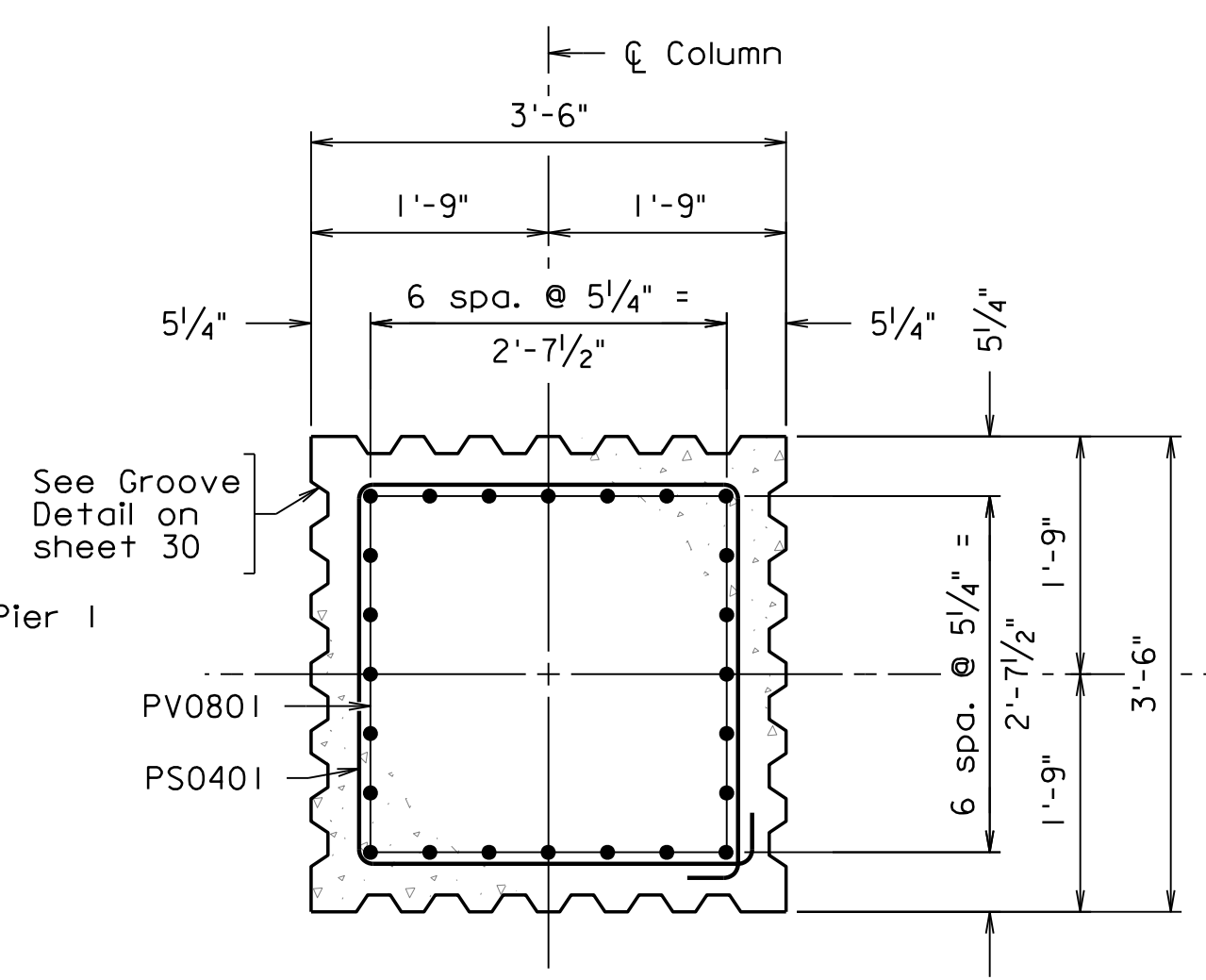
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION	
STRUCTURE AND BRIDGE DIVISION	
ABUTMENT C WINGWALLS	
No.	Description
Revisions	
Designed: RDS	Date
Drawn: CRR	Apr. 2022
Checked: SKH	
Plan No.	Sheet No.
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			27

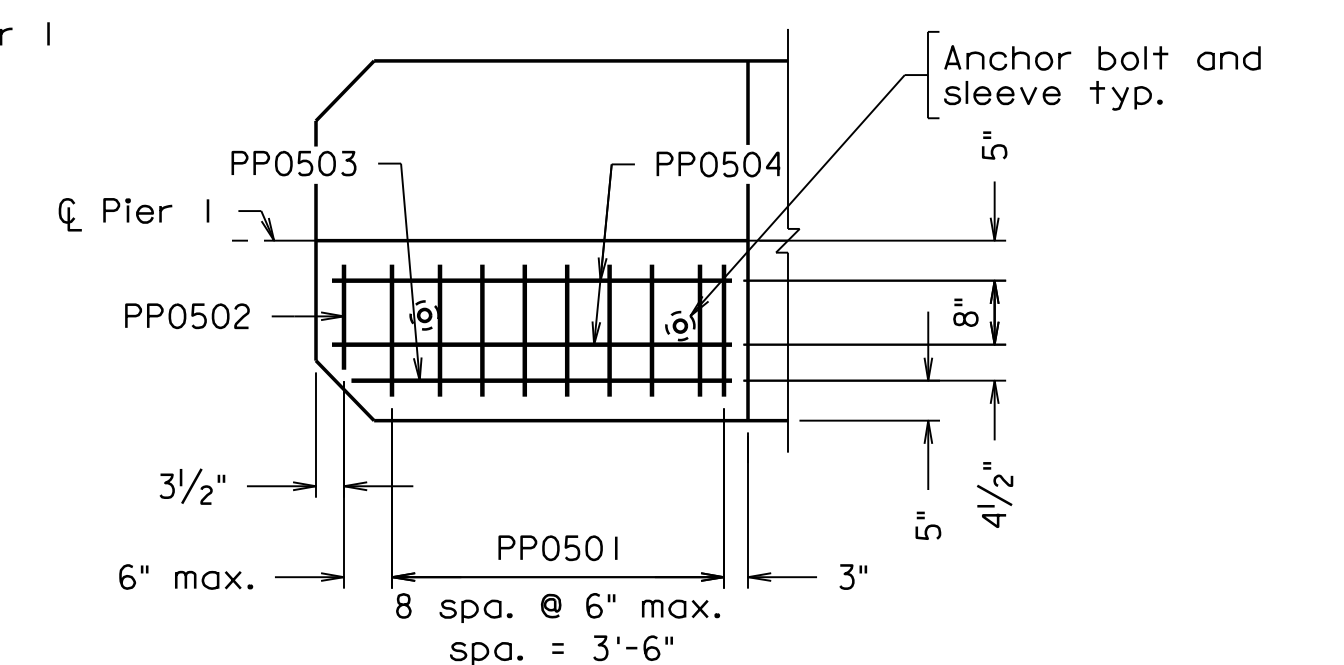


PLAN

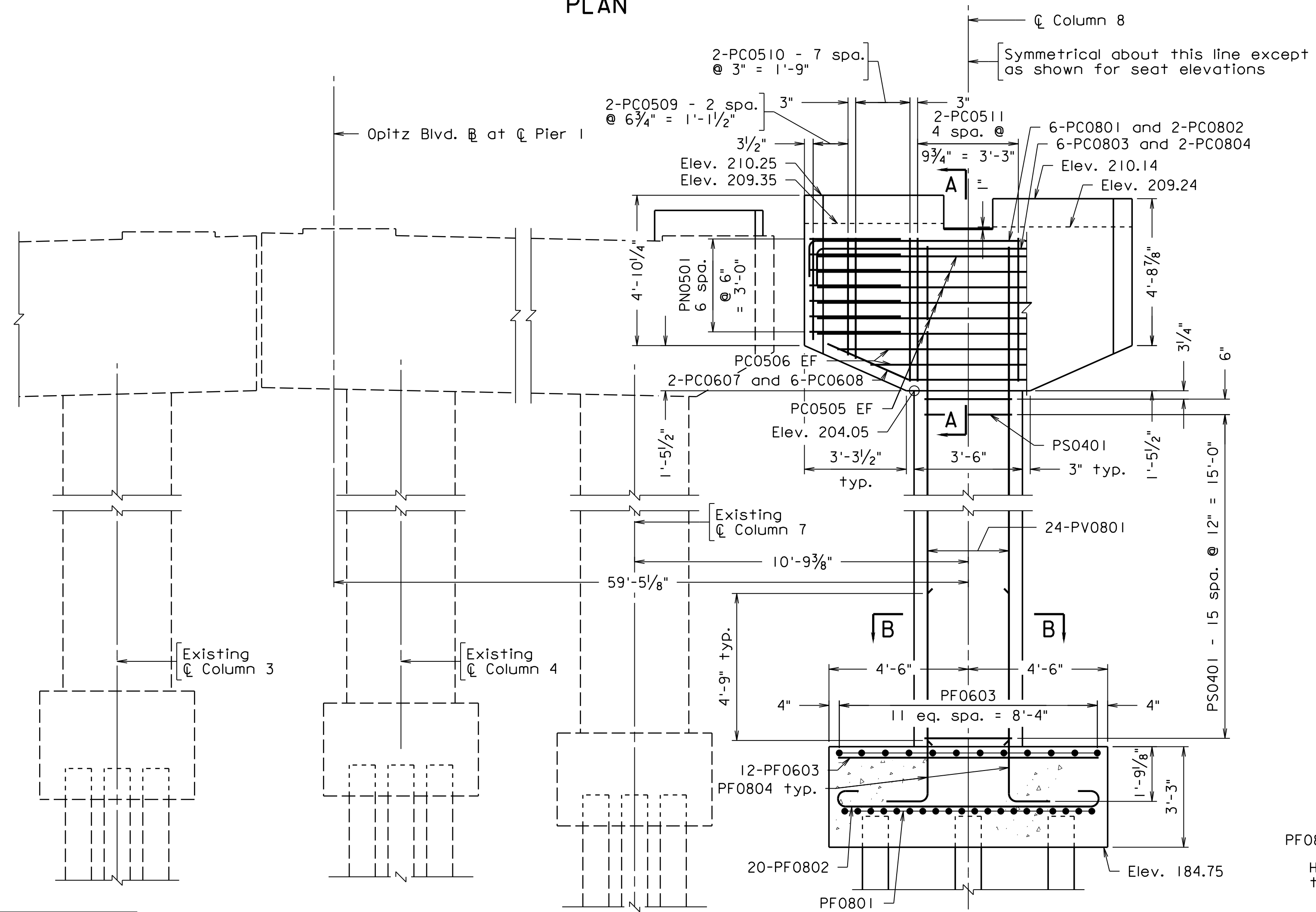


SECTION B-B
Scale: 3/4" = 1'-0"

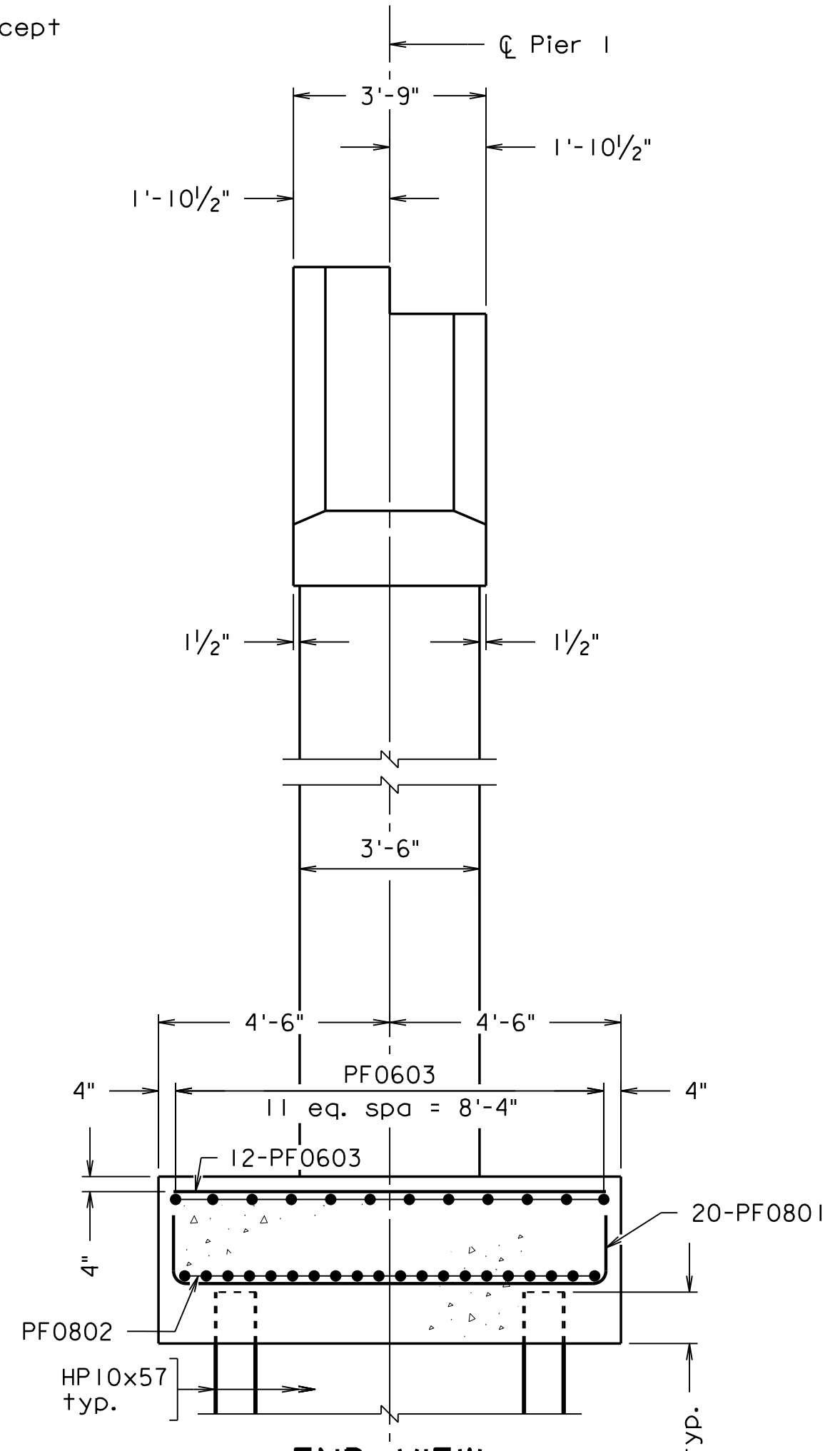
Notes:
 For spacing of PF08 series bars, see footing plan on sheet 30.
 For anchor bolt layout, see sheet 30.
 For Beam seat modification details, see sheet 31.



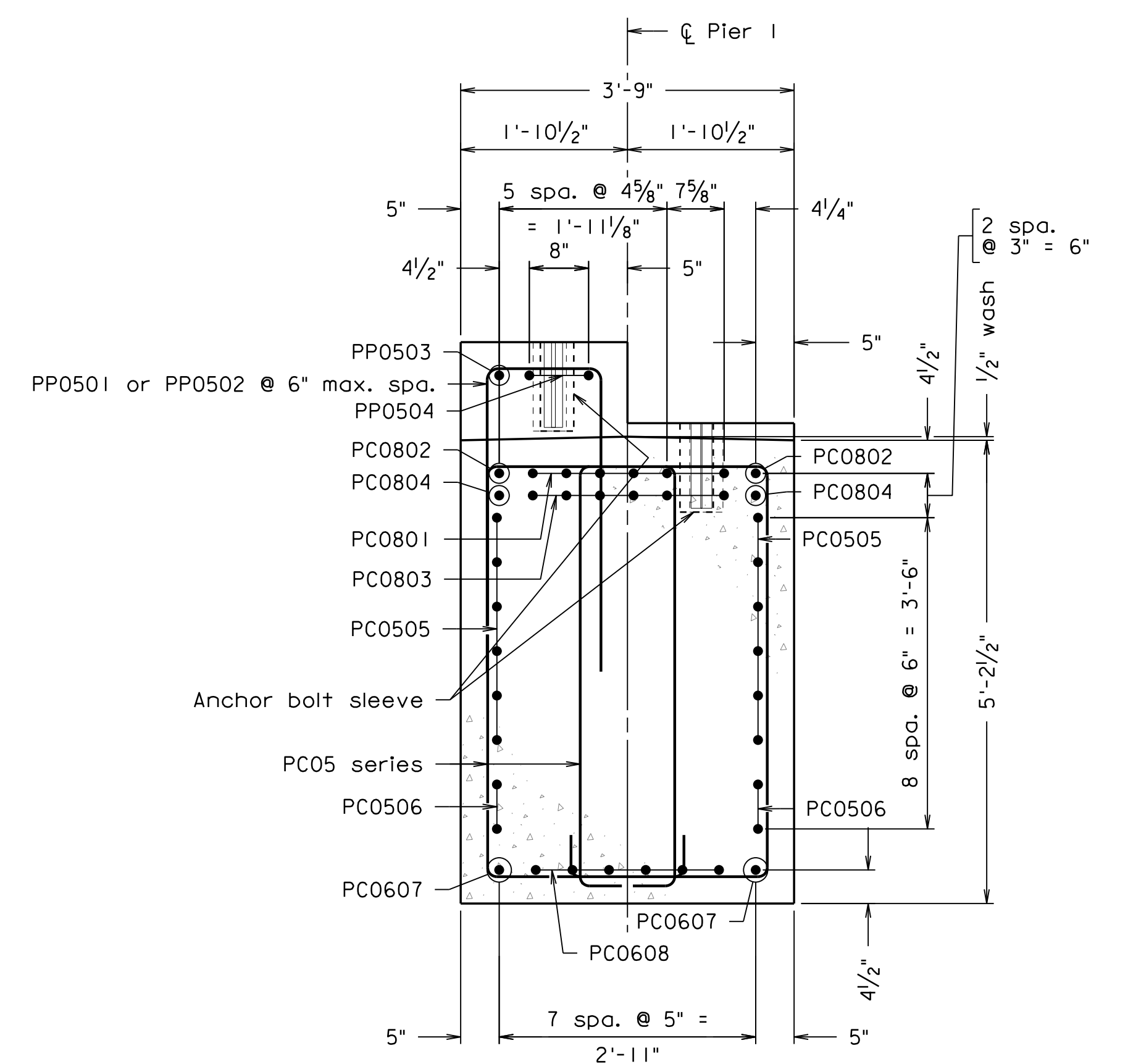
TYPICAL SEAT REINFORCING STEEL PLAN
 Seat for Girder M shown, Seat for Girder N similar opposite hand.
 Scale: 1/2" = 1'-0"
 PP05 bar spacing may be adjusted where required to clear anchor bolt sleeves.



ELEVATION



END VIEW



SECTION A-A
Scale: 3/4" = 1'-0"

Scale: 3/8" = 1'-0" unless otherwise noted.

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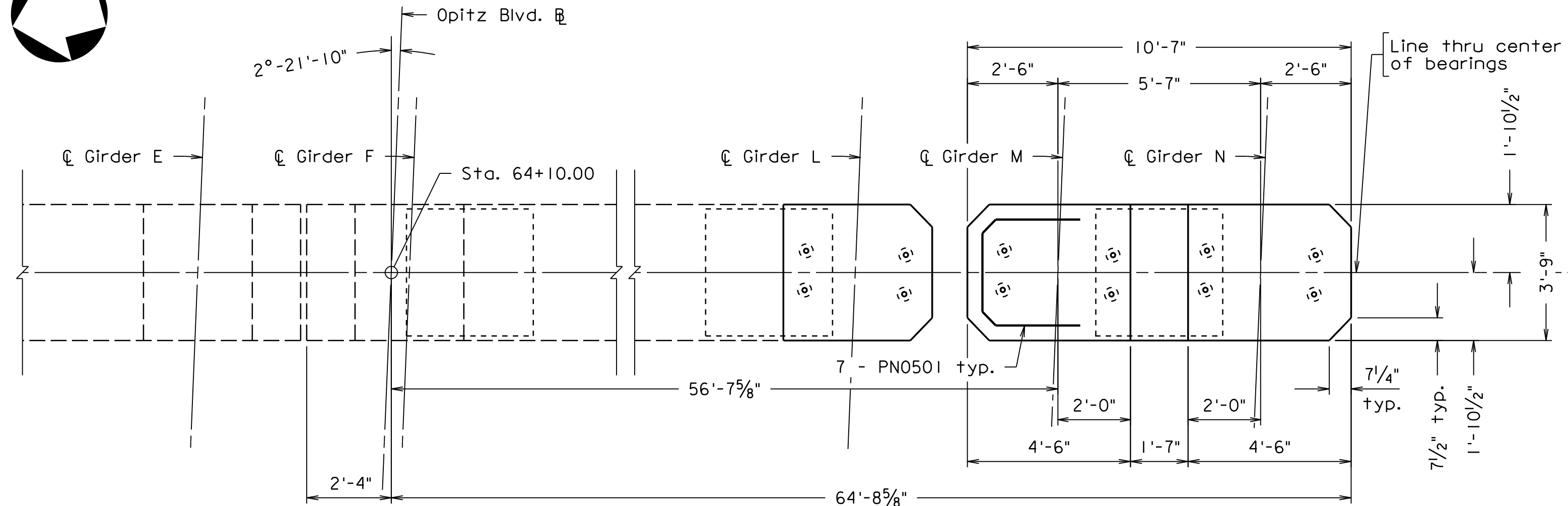
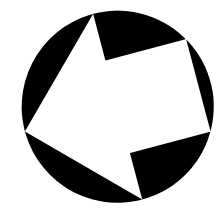
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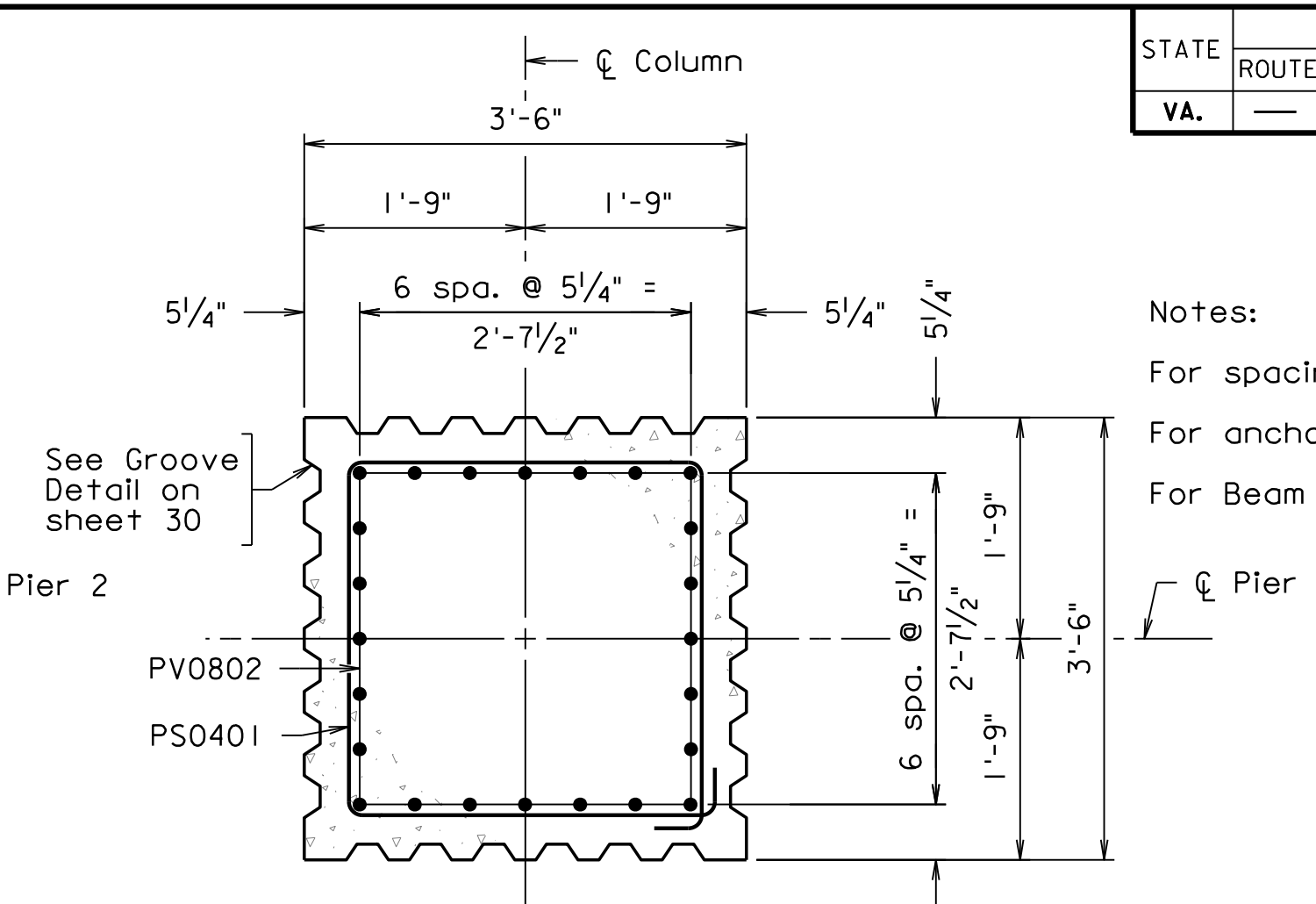
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
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PIER I WIDENING DETAILS					
No.	Description	Date	Designed: AC.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: KML.....		27 of 125
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ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			28

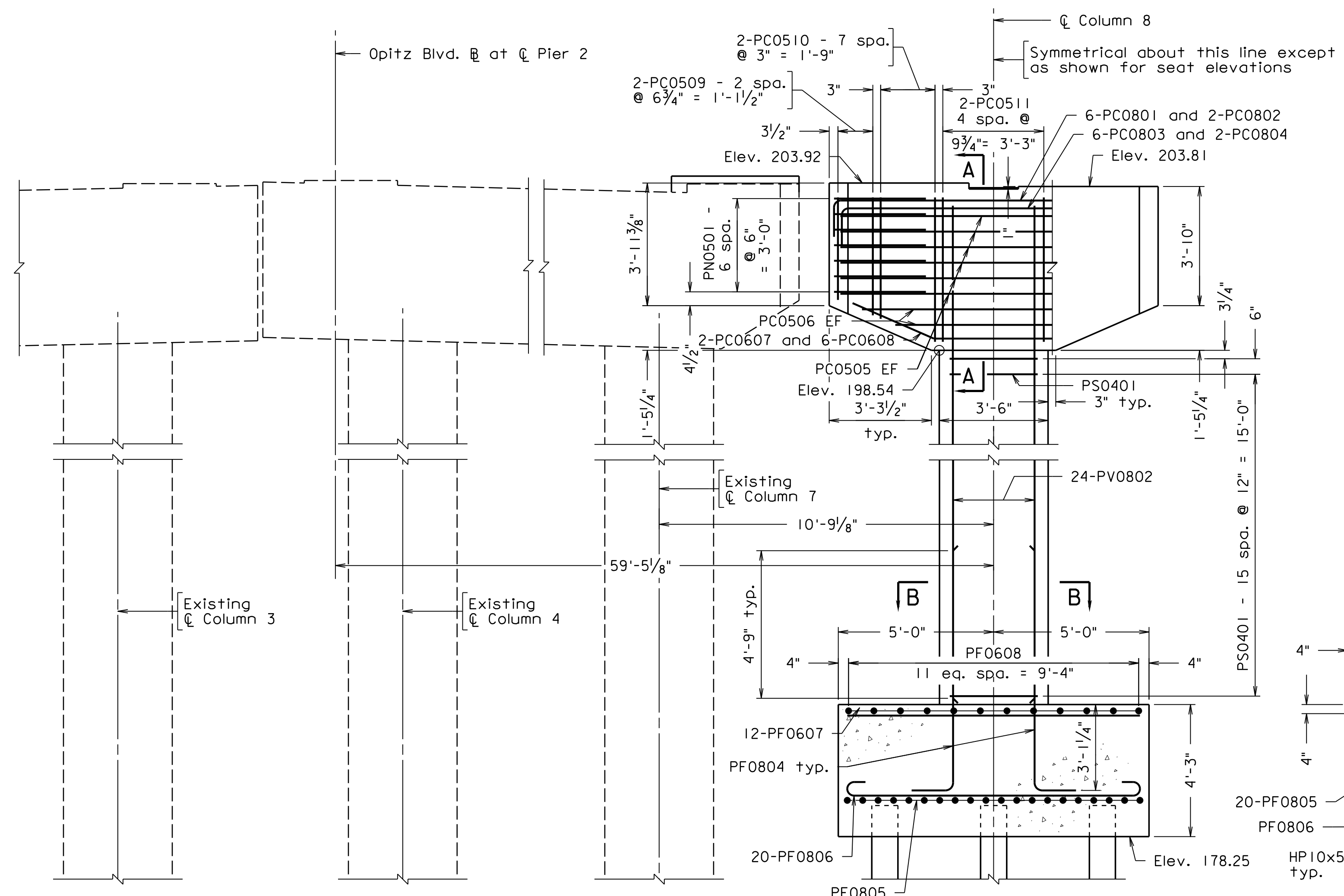


PLAN

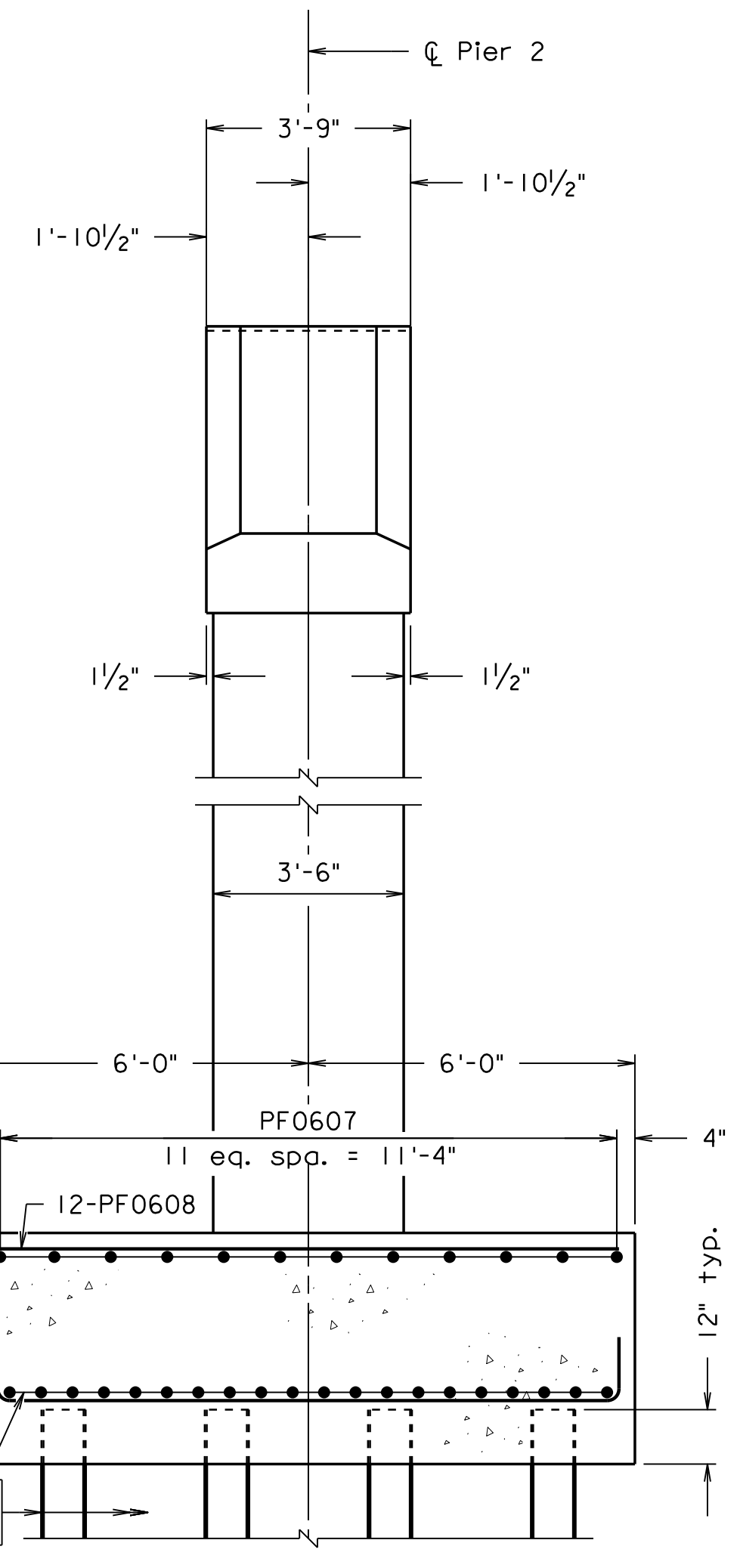


SECTION B-B
Scale: 3/4" = 1'-0"

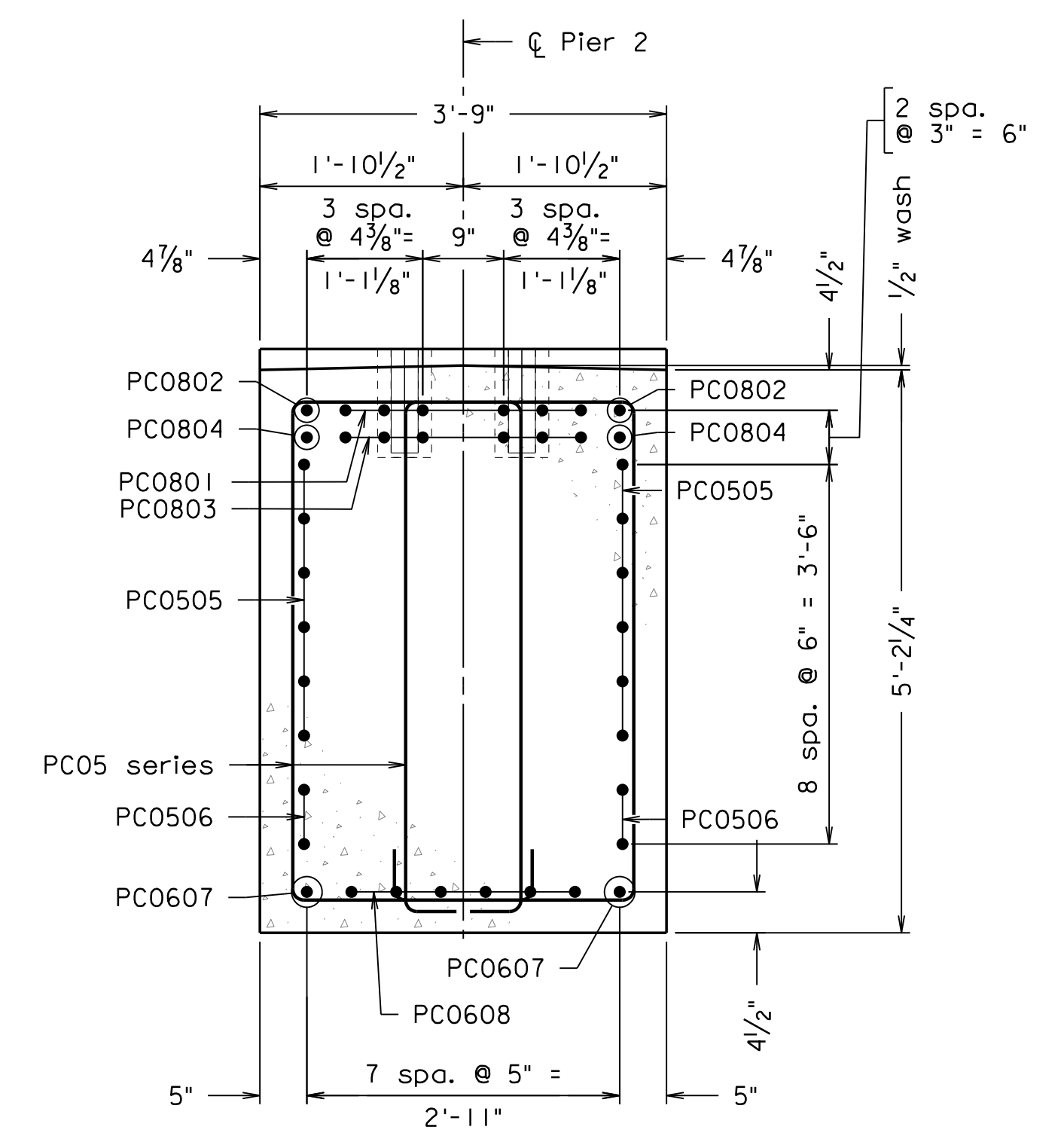
Notes:
 For spacing of PF08 series bars, see footing plan on sheet 30.
 For anchor bolt layout, see sheet 30.
 For Beam seat modification details, see sheet 31.



ELEVATION



END VIEW



SECTION A-A
Scale: 3/4" = 1'-0"

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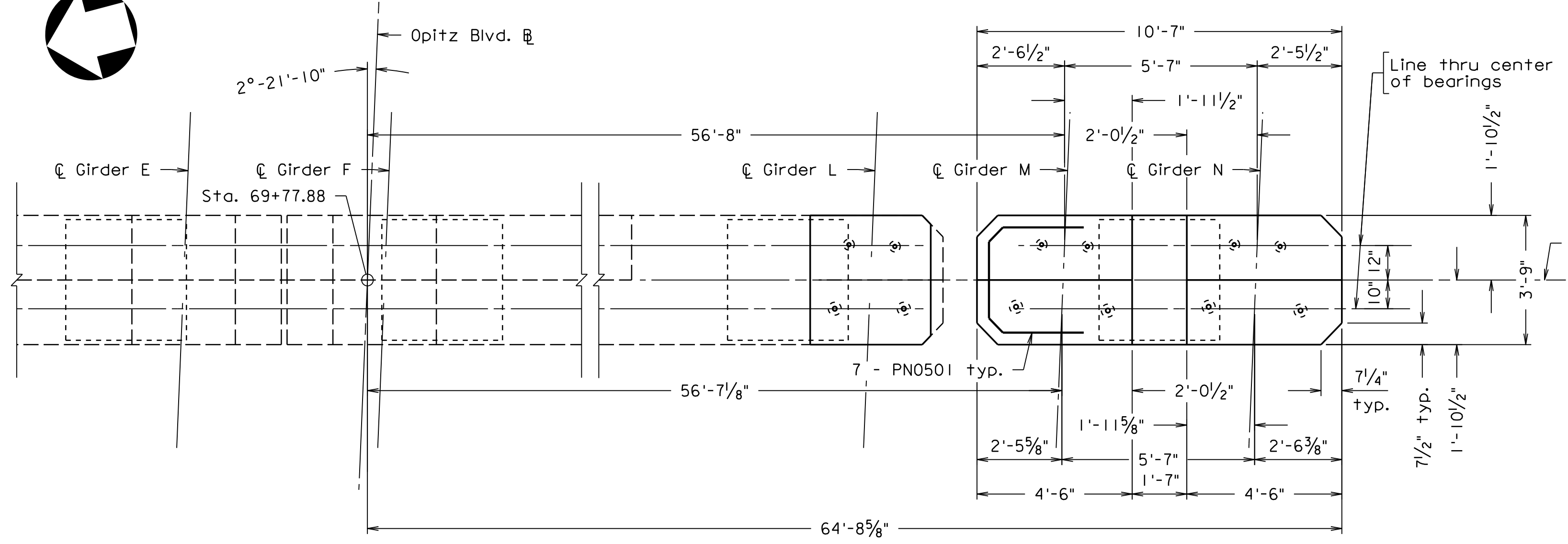
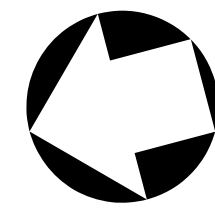
Scale: 3/8" = 1'-0", unless otherwise noted.

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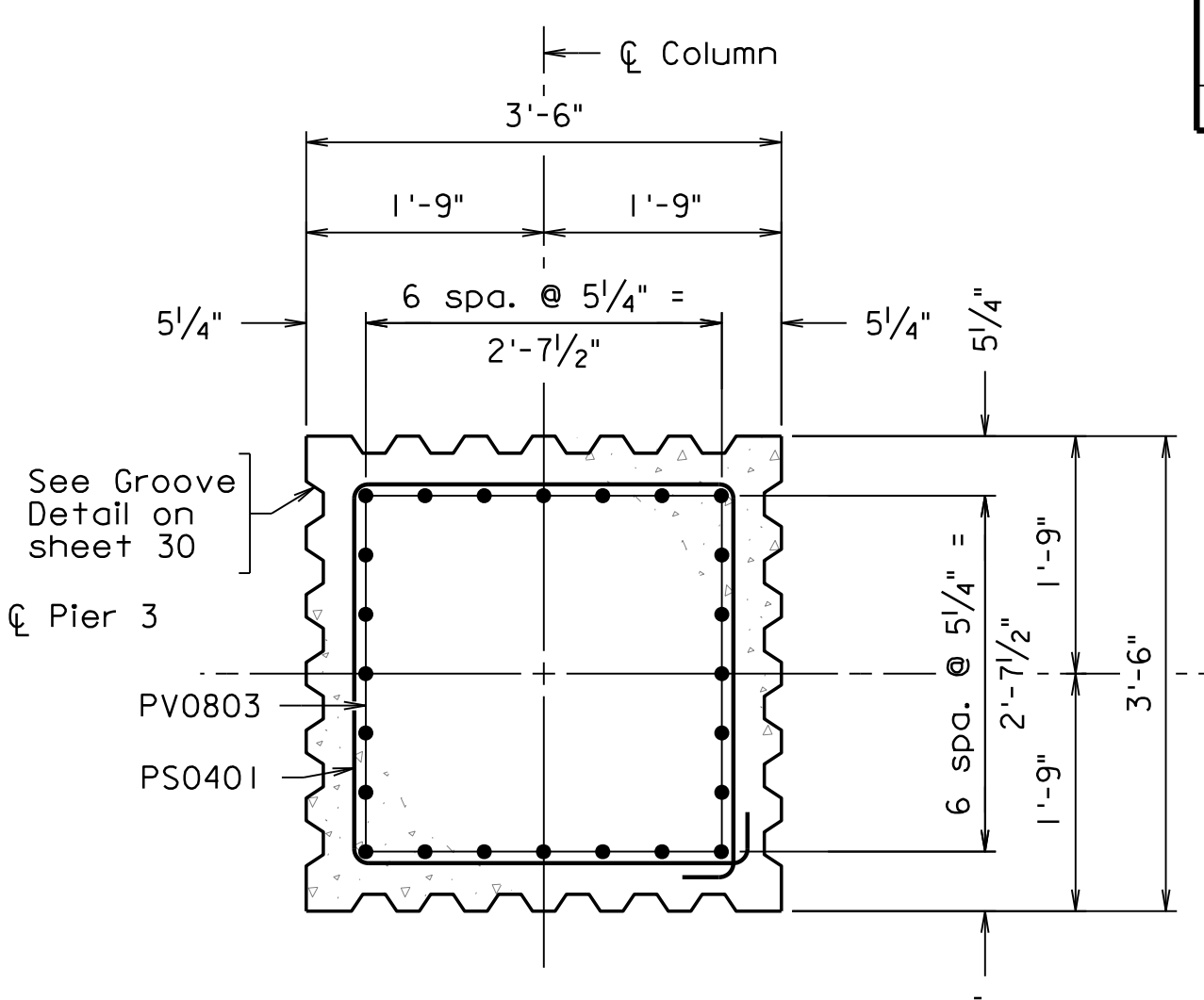
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PIER 2 WIDENING DETAILS					
No.	Description	Date	Designed: AC.....	Date	Plan No.
			Drawn: MWL.....	Apr. 2022	257-38A
			Checked: KML.....		28 of 125
Revisions					

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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			29

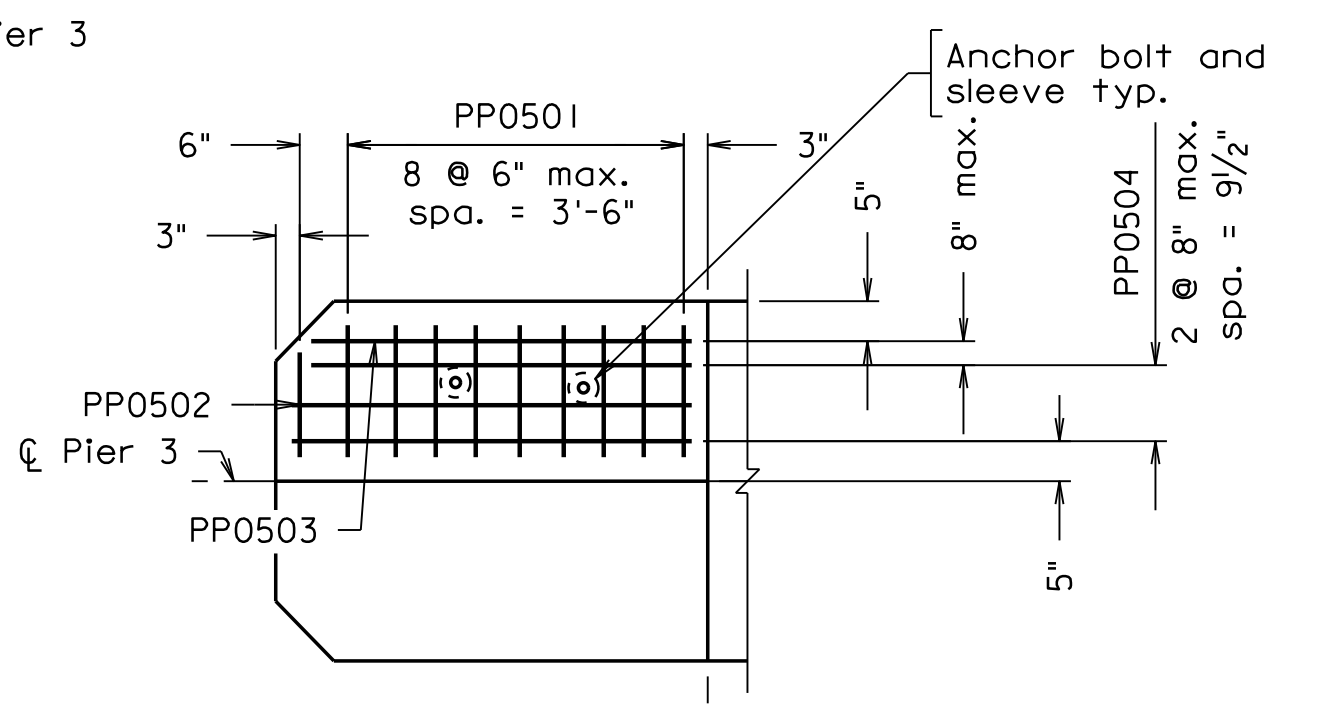


PLAN



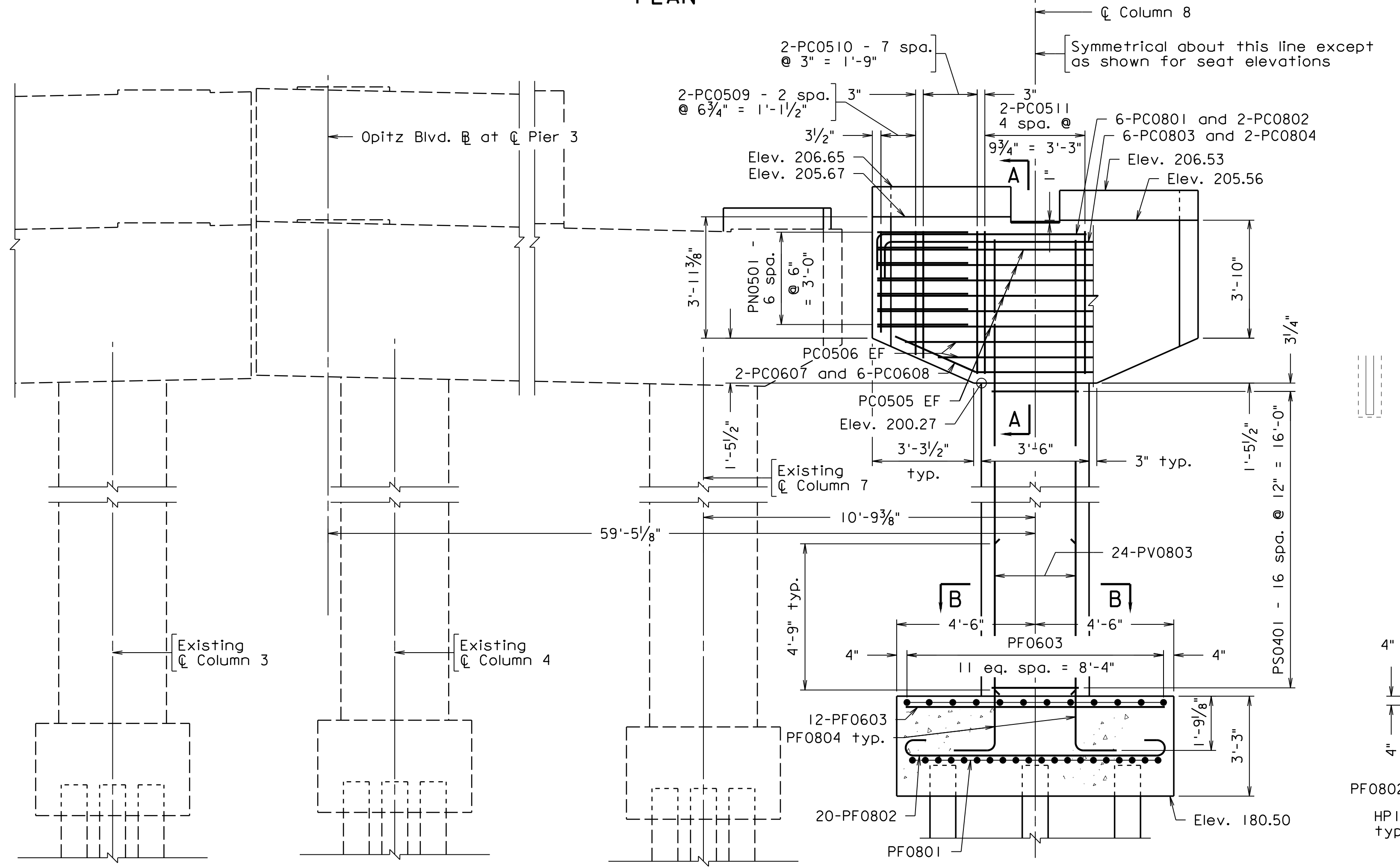
SECTION B-B
Scale: 3/4" = 1'-0"

Notes:
 For spacing of PF08 series bars, see footing plan on sheet 30.
 For anchor bolt layout, see sheet 30.
 For Beam seat modification details on exist. structure, see sheet 31.

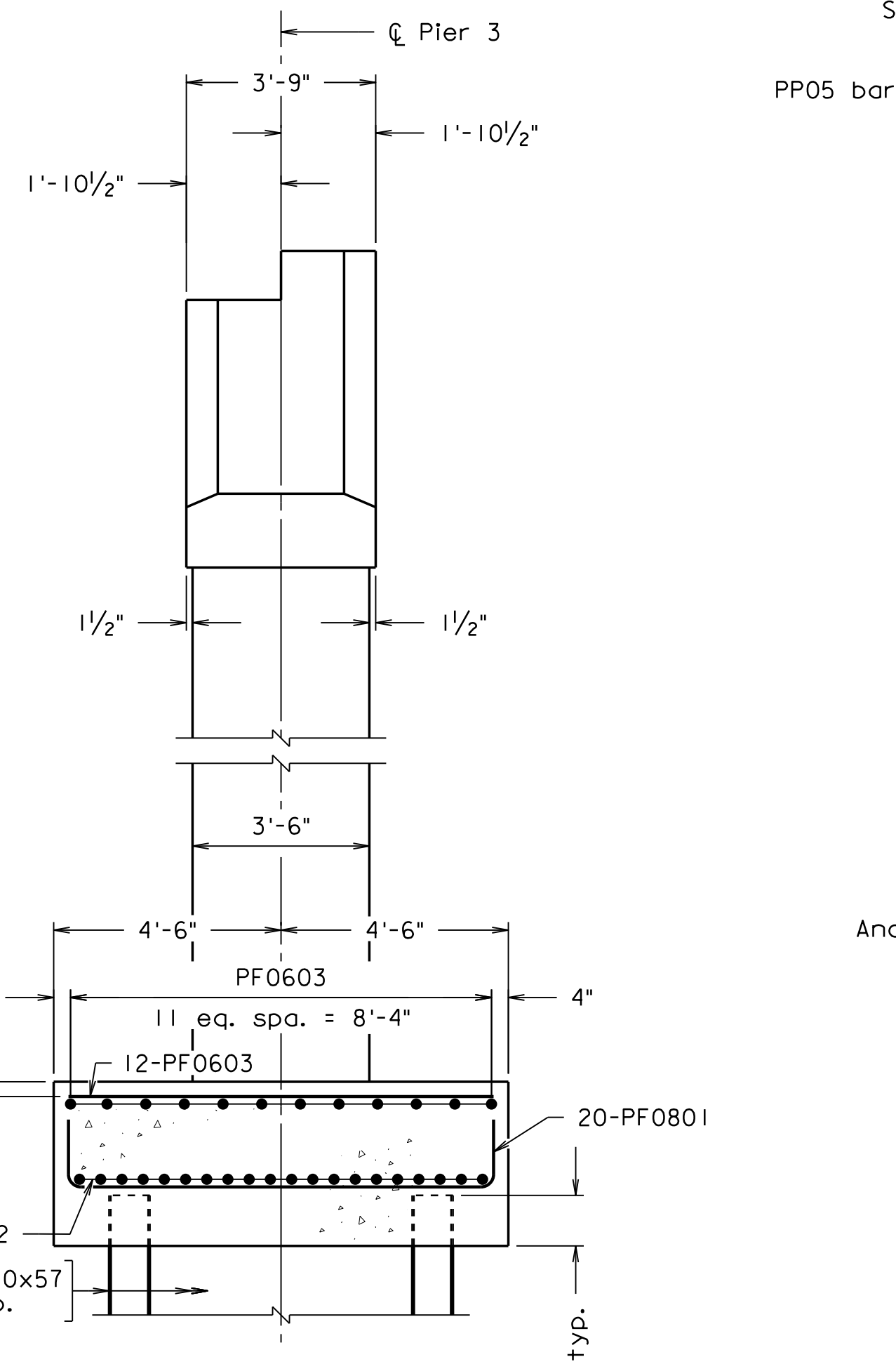


TYPICAL SEAT REINFORCING STEEL PLAN
 Seat for Girder M shown, Seat for Girder N similar opposite hand.
 Scale: 1/2" = 1'-0"

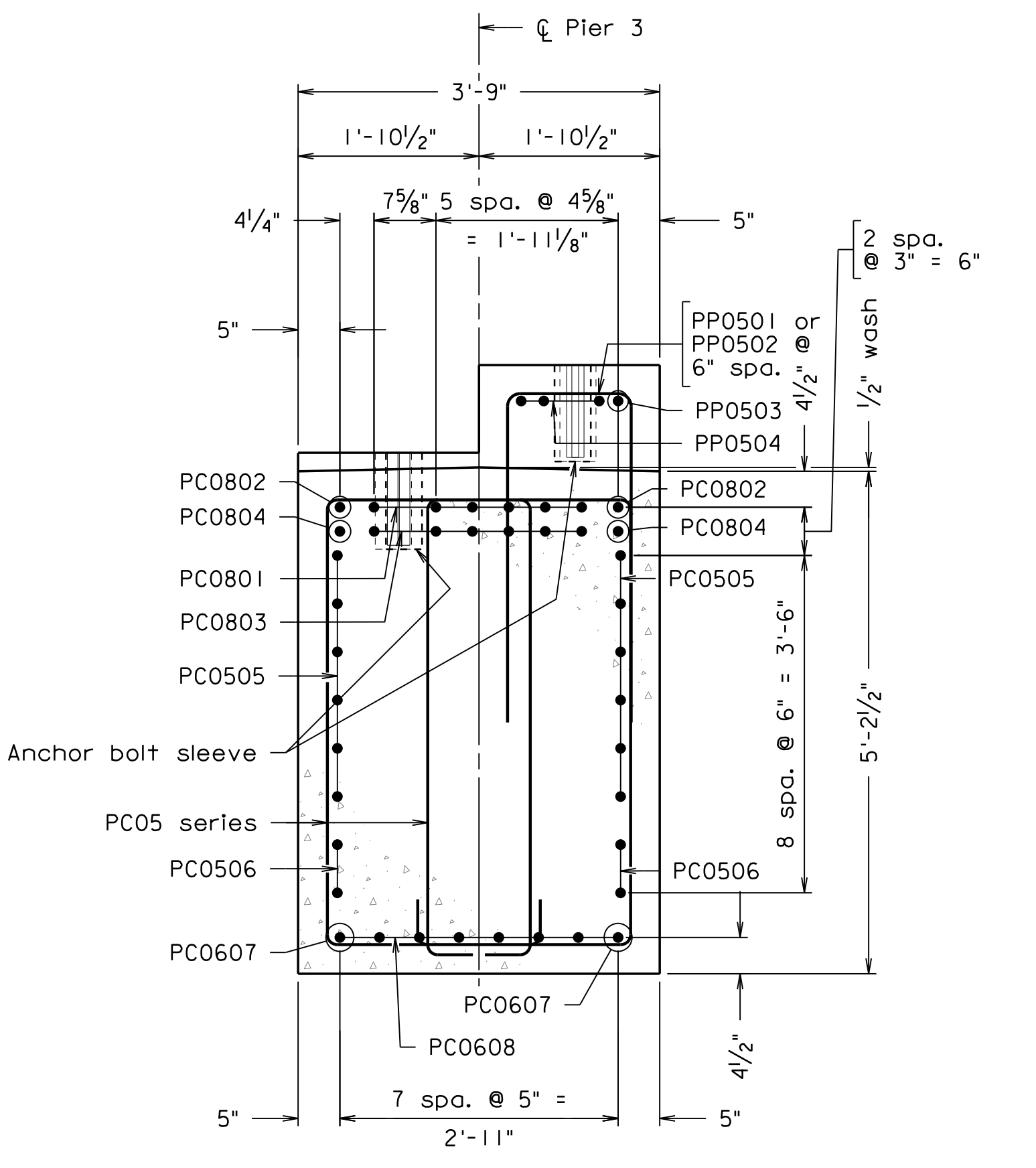
PP05 bar spacing may be adjusted where required to clear anchor bolt sleeves.



ELEVATION



END VIEW



SECTION A-A
Scale: 3/4" = 1'-0"

257-38A_029.dgn

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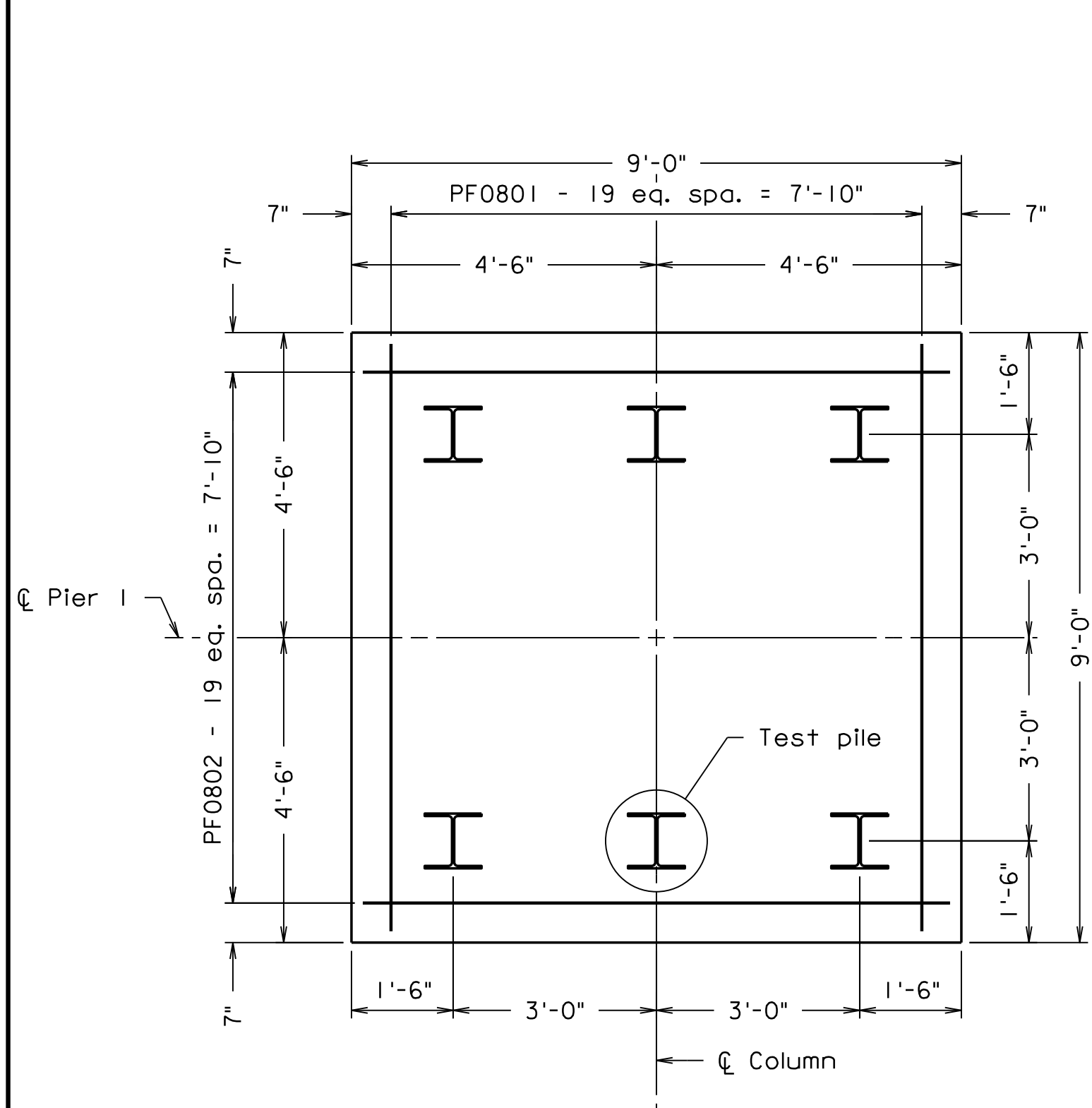
Scale: 3/8" = 1'-0" unless otherwise noted.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
PIER 3 WIDENING DETAILS					
No.	Description	Date	Designed: AC.....	Date	Plan No.
			Drawn:M.W.L.....	Apr. 2022	257-38A
			Checked: K.M.L.....		29 of 125
Revisions					

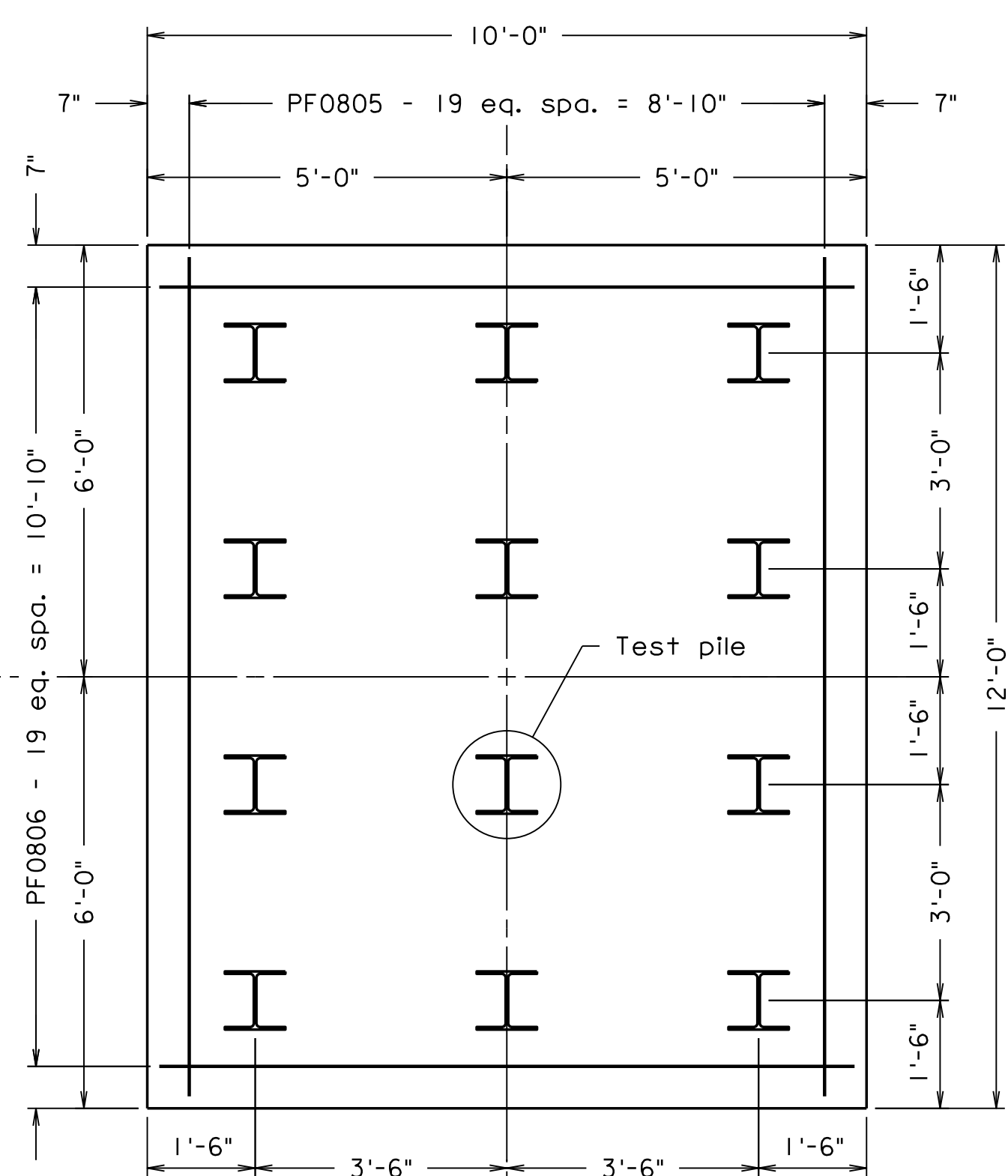
PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				30



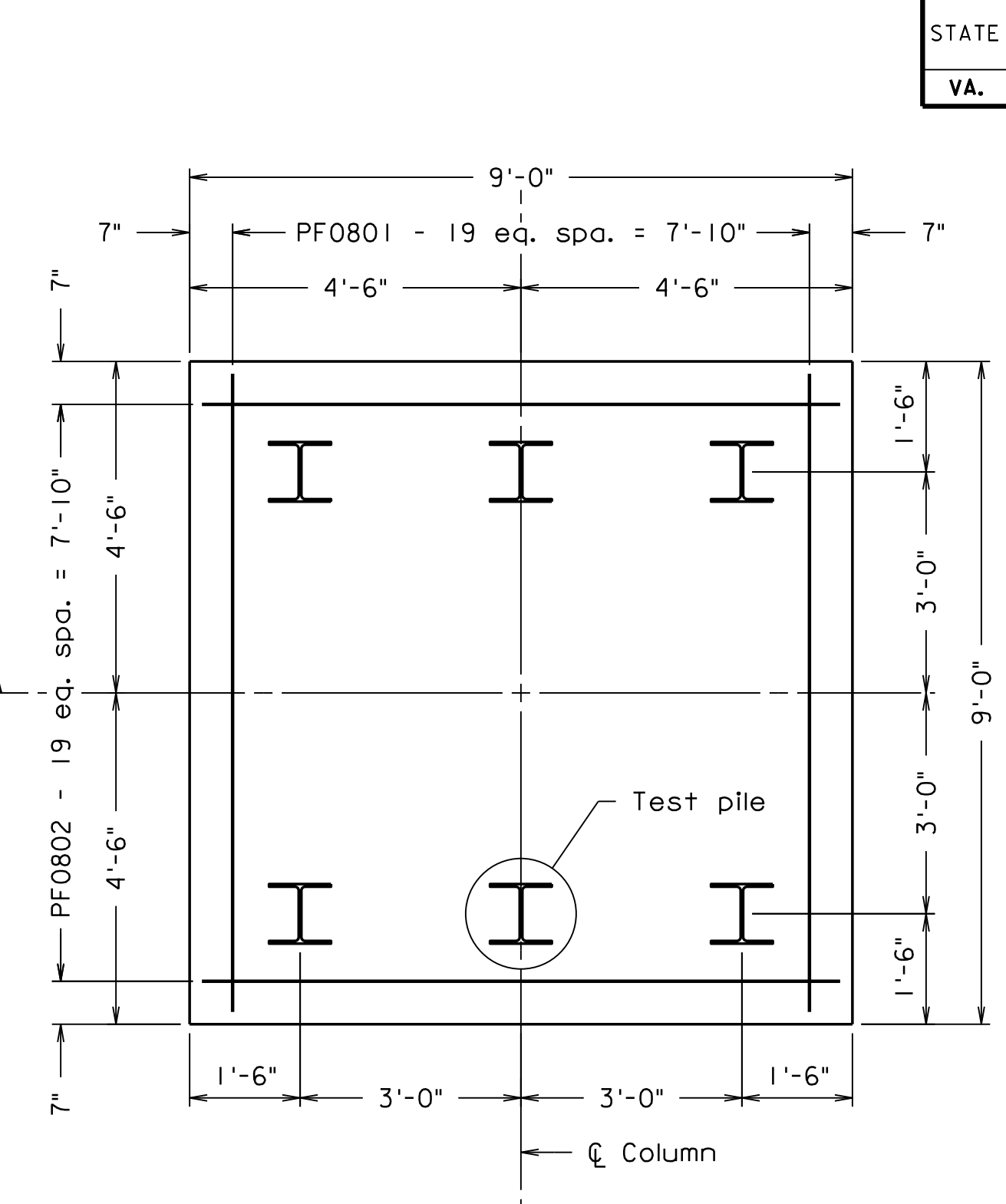
PIER 1 FOOTING PLAN

PF0603 and PF0604 are not shown for clarity. For spacing of PF0603 and PF0604, see sheet 27.



PIER 2 FOOTING PLAN

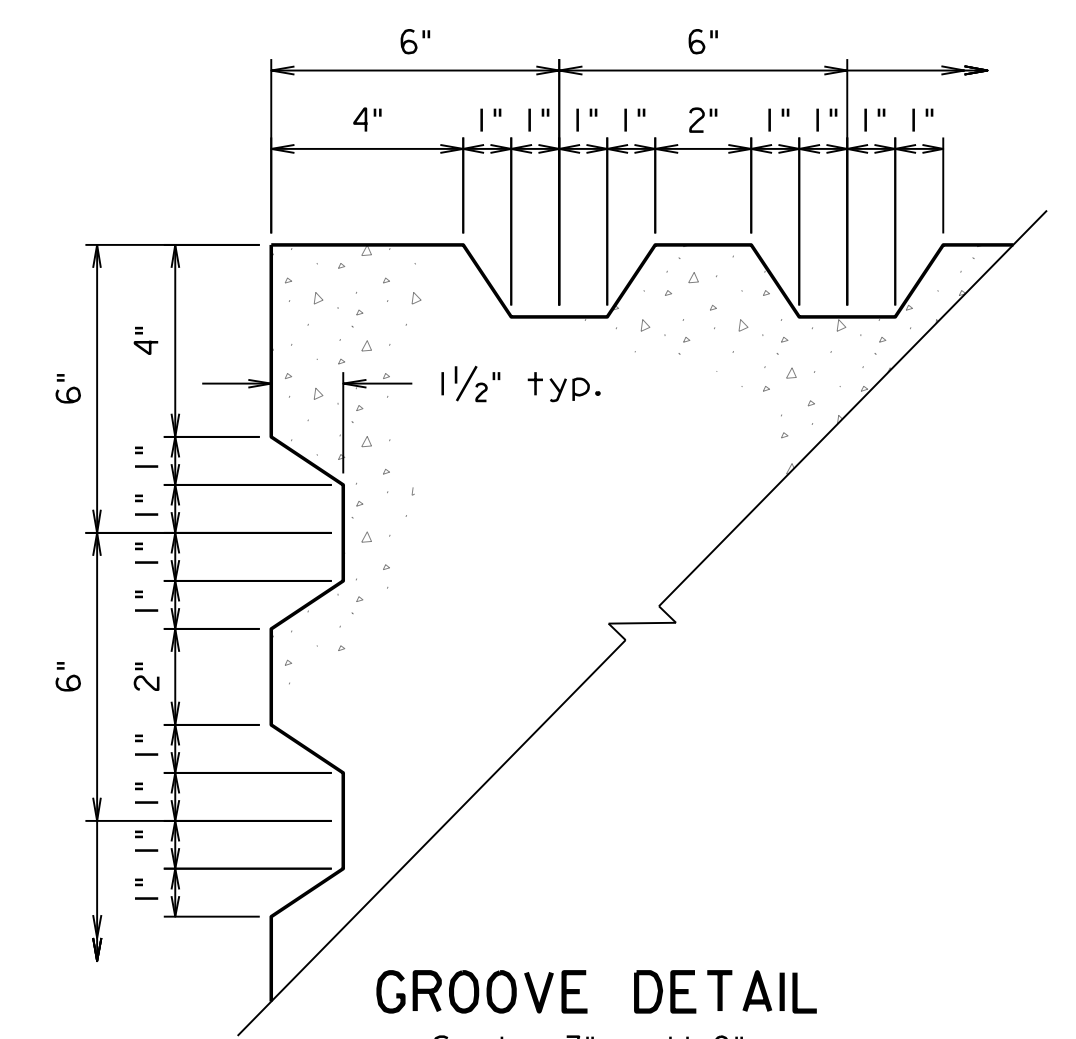
PF0607 and PF0608 are not shown for clarity. For spacing of PF0607 and PF0608, see sheet 28.



PIER 3 FOOTING PLAN

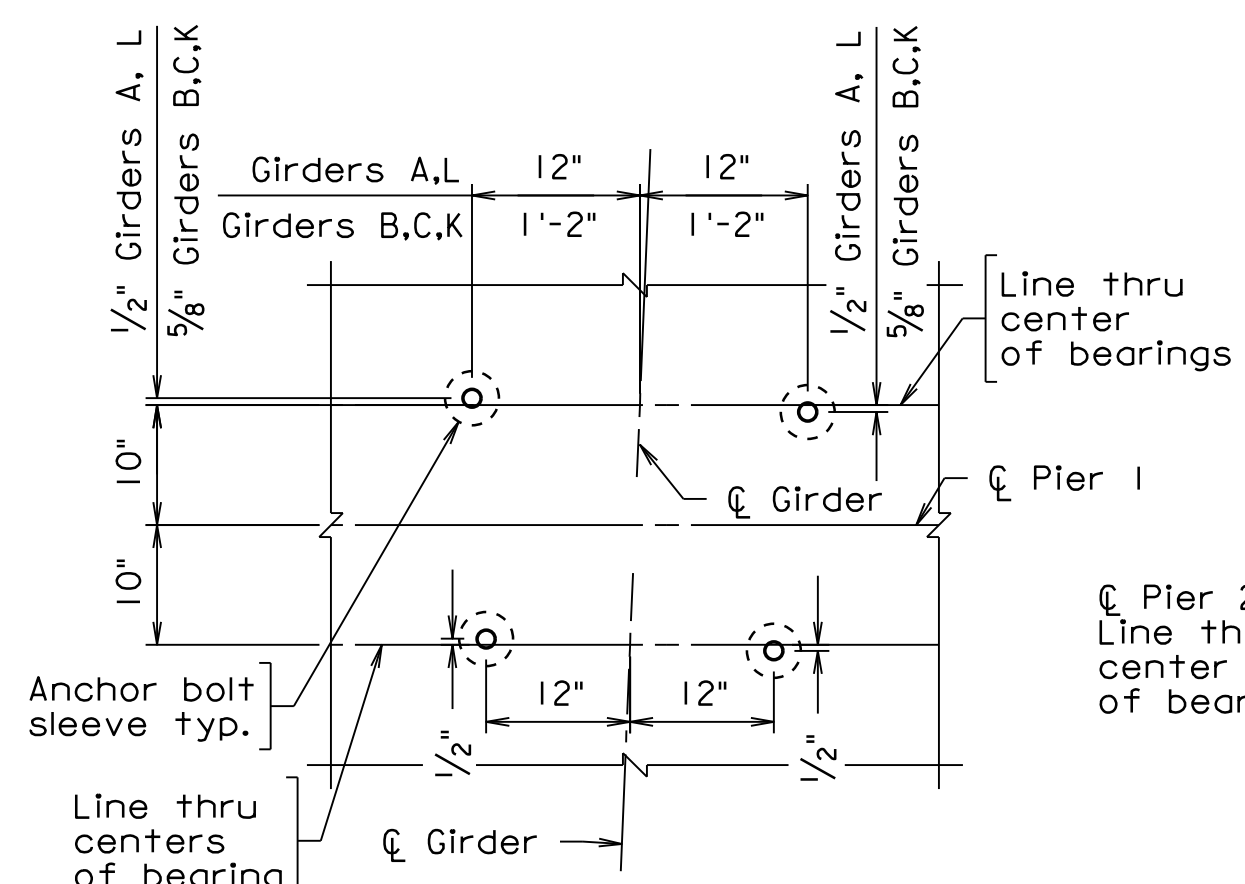
PF0603 and PF0604 are not shown for clarity. For spacing of PF0603 and PF0604, see sheet 29.

Notes:
 The one required test pile and dynamic pile test are required to be done prior to driving any other permanent piling within the same substructure unit.
 For details of anchor bolt sleeve, see bearing sheets 33, 34 and 35.



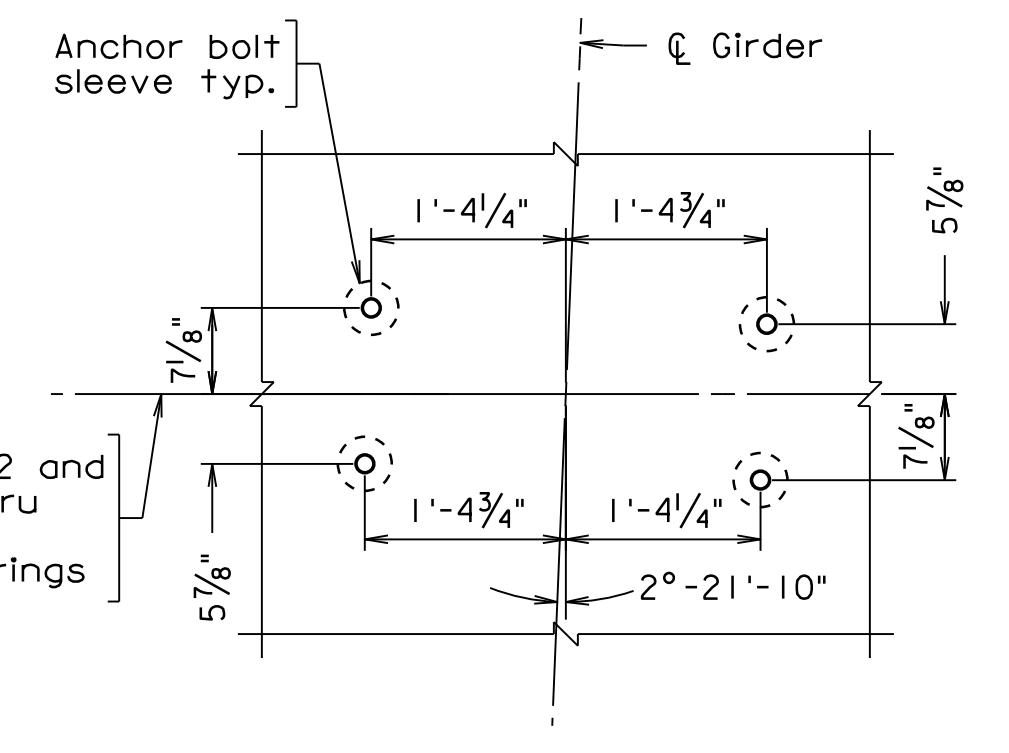
GROOVE DETAIL

Scale: 3" = 1'-0"
 Grooves to be cast full height of column.



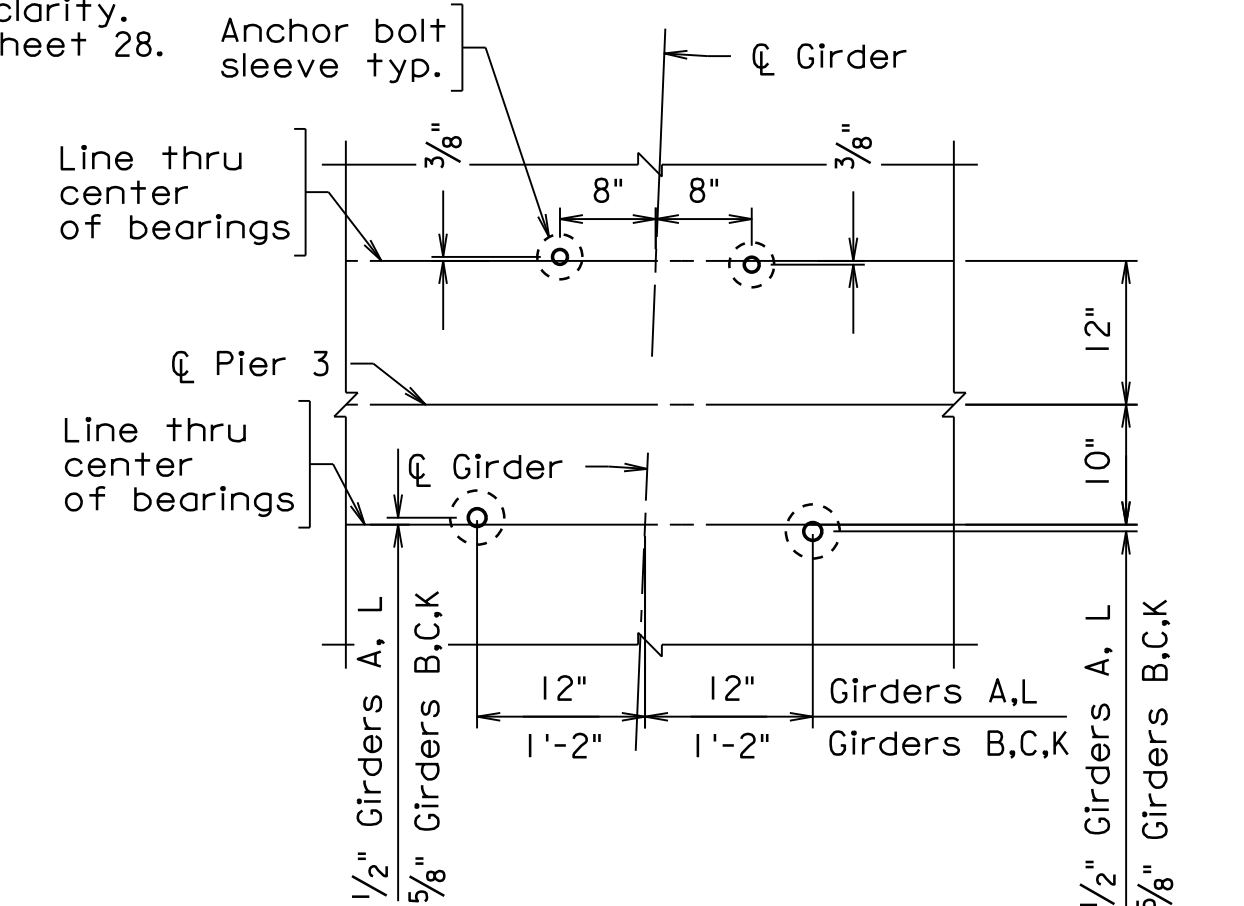
PIER 1 ANCHOR BOLT LAYOUT GIRDERS A-C AND K-L

Scale: 3/4" = 1'-0"



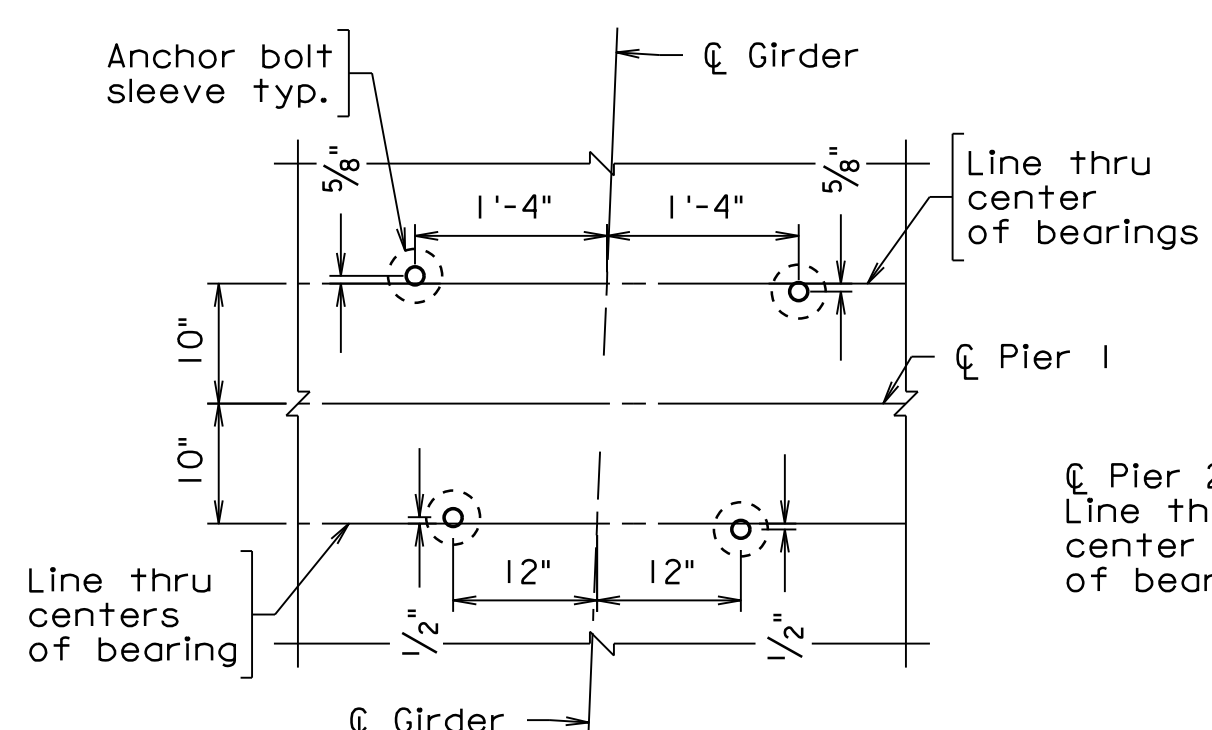
PIER 2 ANCHOR BOLT LAYOUT GIRDERS A-C AND K-L

Scale: 3/4" = 1'-0"



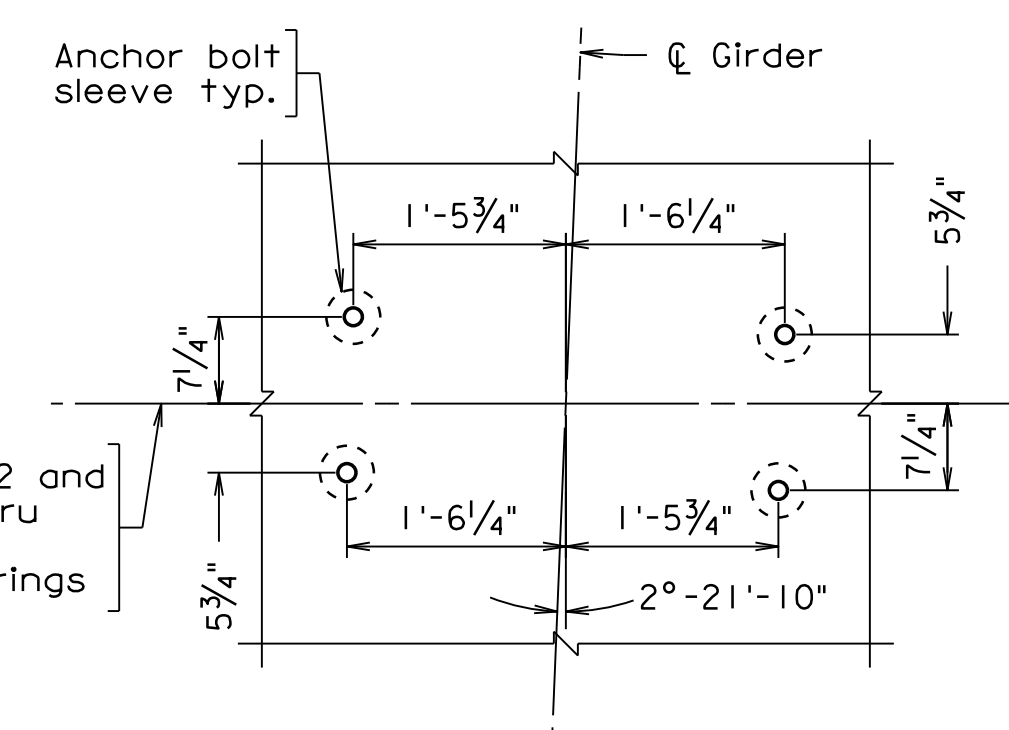
PIER 3 ANCHOR BOLT LAYOUT GIRDERS A-C AND K-L

Scale: 3/4" = 1'-0"



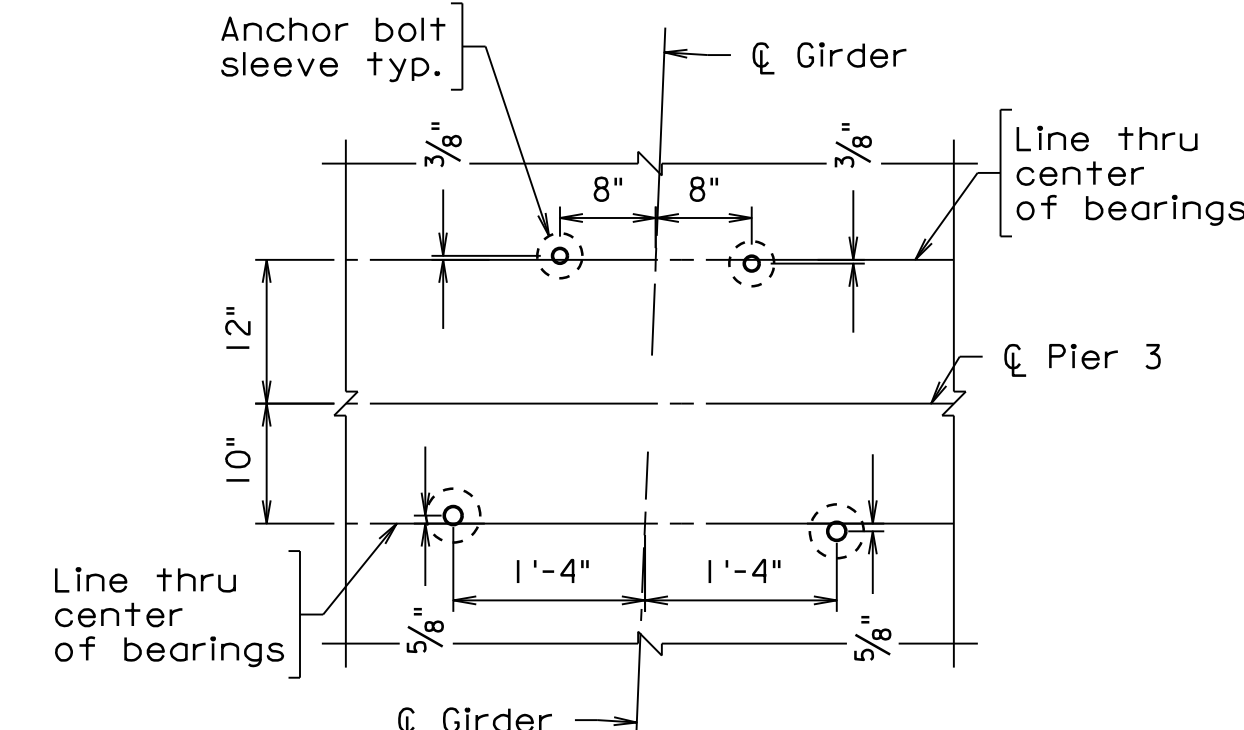
PIER 1 ANCHOR BOLT LAYOUT GIRDERS M AND N

Scale: 3/4" = 1'-0"



PIER 2 ANCHOR BOLT LAYOUT GIRDERS M AND N

Scale: 3/4" = 1'-0"



PIER 3 ANCHOR BOLT LAYOUT GIRDERS M AND N

Scale: 3/4" = 1'-0"

Scale: 1/2" = 1'-0" unless otherwise noted.

PILE DATA TABLE				
Substructure Unit	Nominal Axial Resistance Measured During Driving (Tons/pile)	Factored Axial Resistance (Tons/pile)	Estimated Tip Elevation	Minimum Tip Elevation
Pier 1	192	125	144	173
Pier 2	192	125	146	156
Pier 3	192	125	145	155

The Strength Limit State controls the pile design.

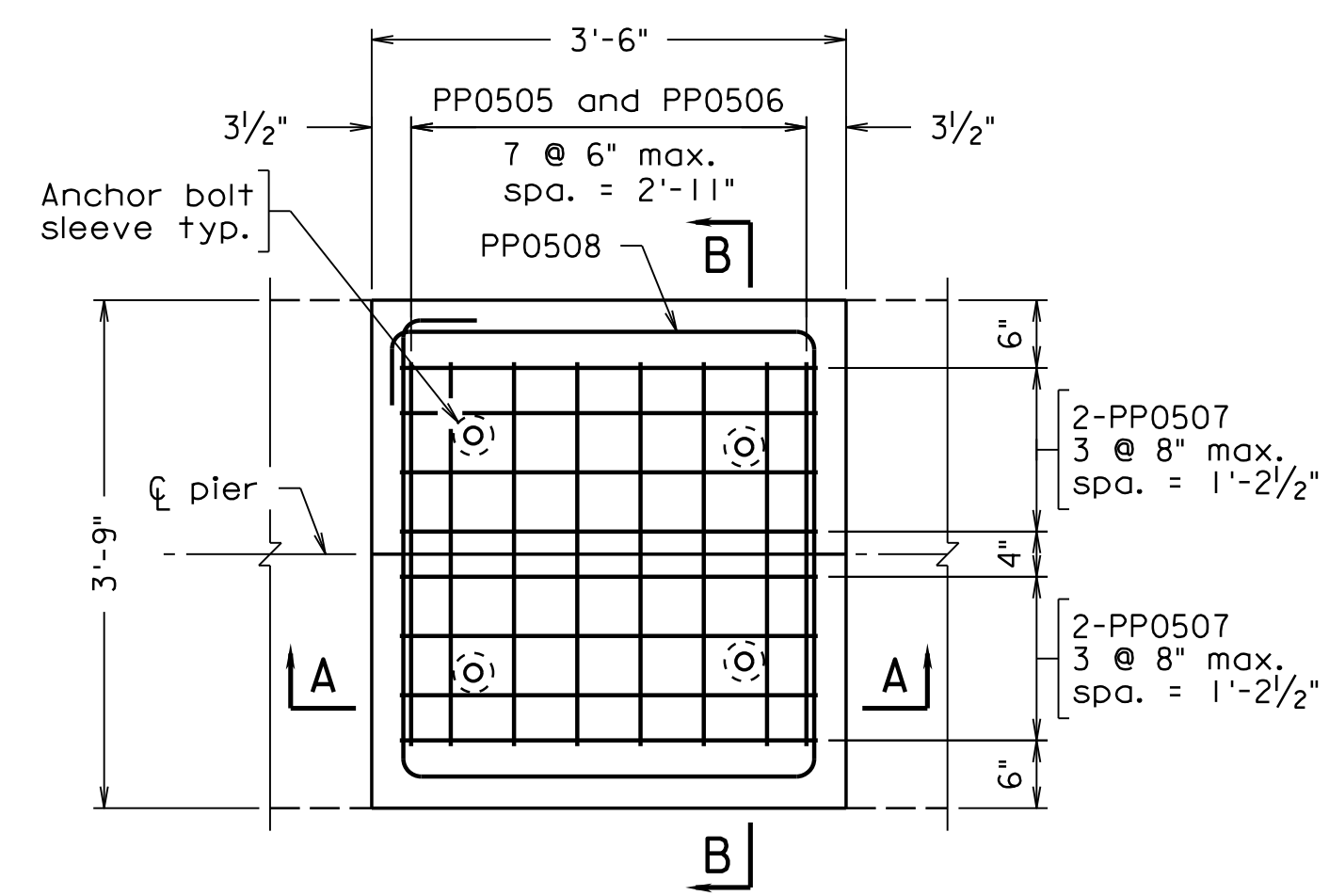
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PROGRESS PRINTS PAC PLANS
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MISCELLANEOUS PIER DETAILS					
No.	Description	Date	Designed: AC.....	Date	Plan No.
			Drawn:MWL.....	Apr. 2022	257-38A
			Checked: KML.....		30 of 125
Revisions					

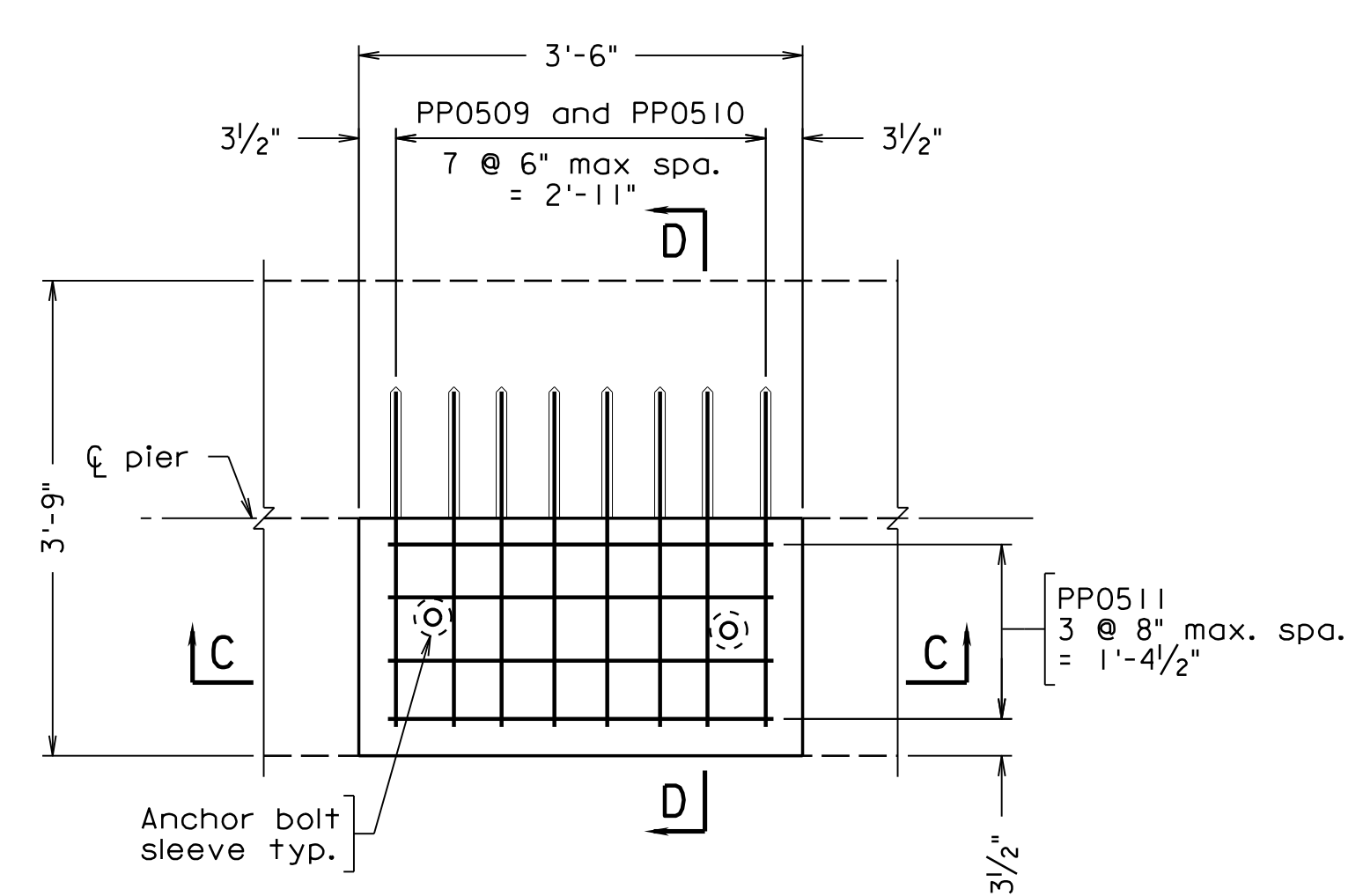


SEAT RECONSTRUCTION TYPE 1

Exterior beam seats shall match existing chamfer of pier cap.

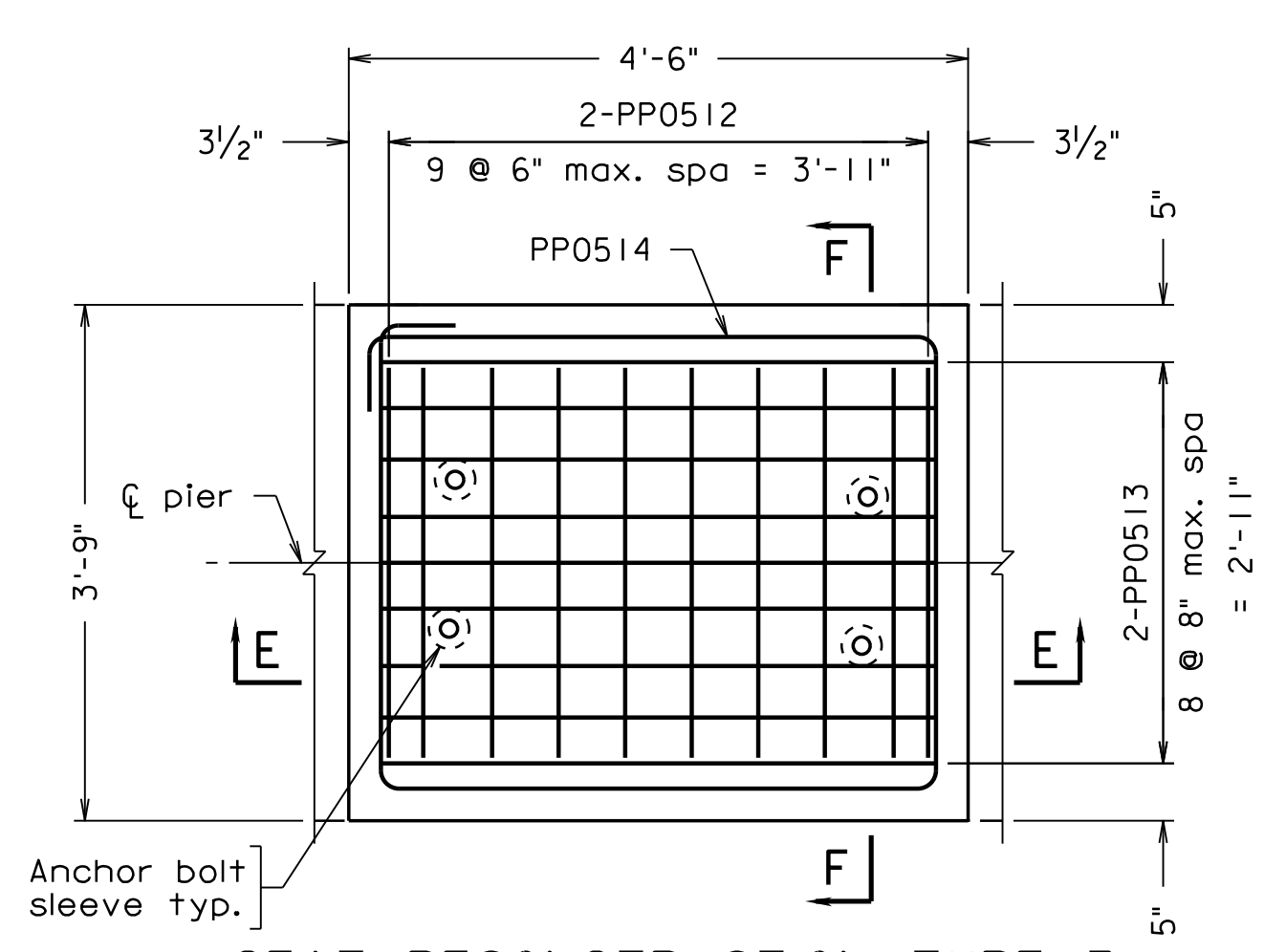
The vertical leg of the PP0505 and PP0506 bars may be field cut and not be drilled and grouted where located directly under the girder.

Vertical leg of PP0505, PP0506, and PP0507 bars may be field cut to achieve minimum concrete cover and minimum drill and grout depth.



SEAT RECONSTRUCTION TYPE 2

Vertical leg of PP0510 bar may be field cut to achieve minimum concrete cover and minimum drill and grout depth.



SEAT RECONSTRUCTION TYPE 3

Vertical leg of PP0512 and PP0513 bars may be field cut to achieve minimum concrete cover and minimum drill and grout depth.

Beam Seat Reconstruction Notes:

Beam seat reconstruction shall be in accordance with Section 412 of the Specifications.

Existing surface shall be roughened in accordance with Section 404.03(h) of the Specifications.

Existing reinforcing steel shown for reference only. Existing reinforcing bars shall be field located prior to drilling.

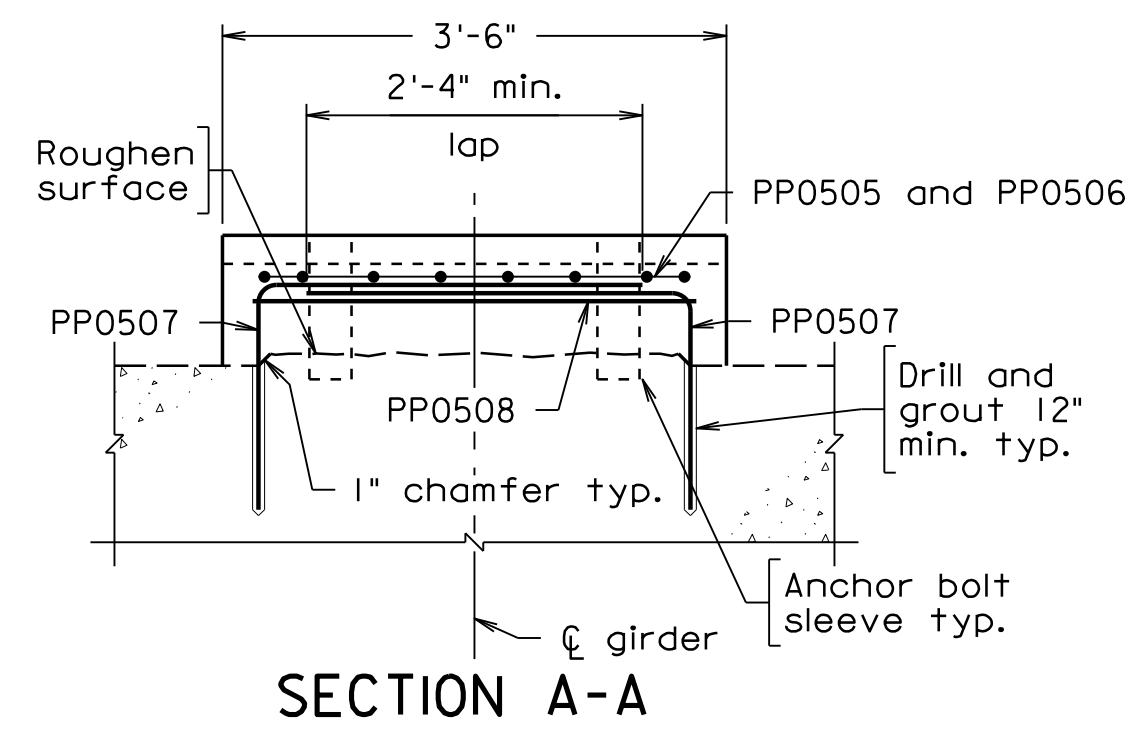
Proposed beam seat reconstruction reinforcing bars may be adjusted where required to clear anchor bolt sleeves and existing reinforcing steel and shall not exceed maximum spacing as noted.

A combination of variable length drill bits may be required to drill below existing girder.

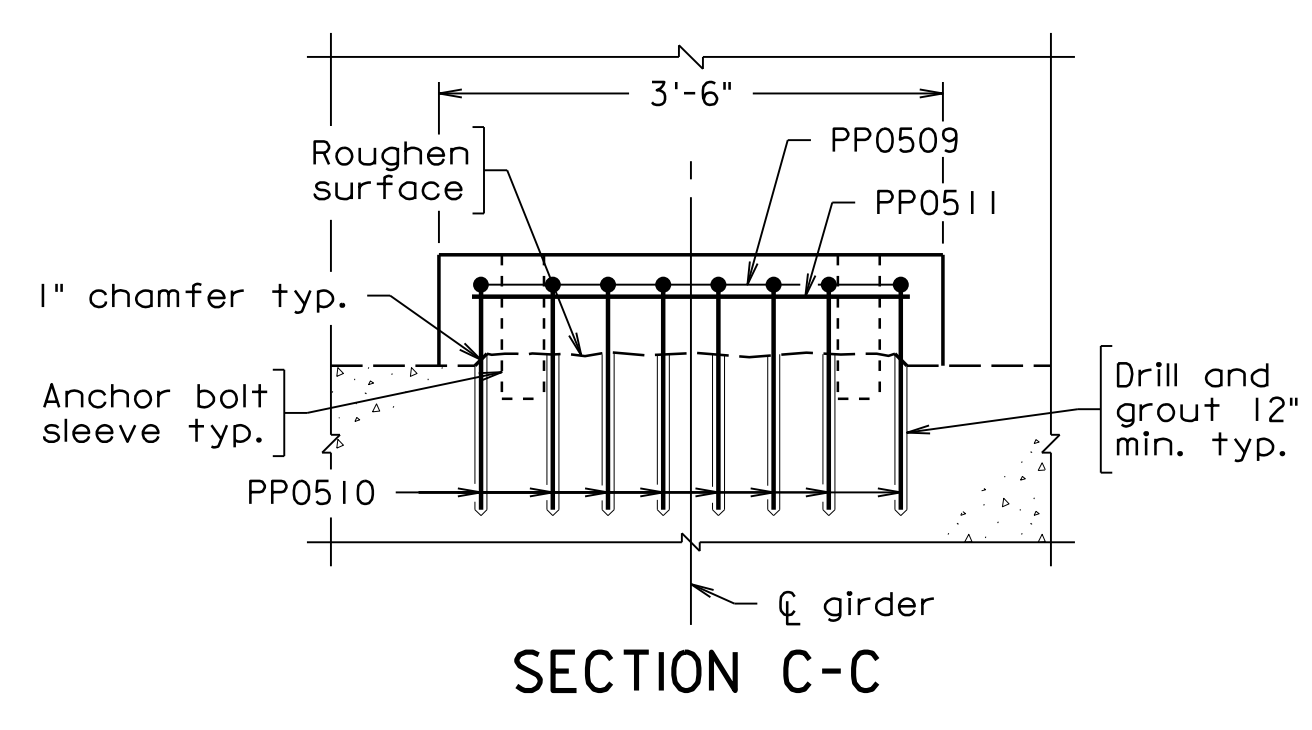
Concrete for beam buildup shall be self consolidating concrete in accordance with Section 217.11 of the Specifications.

Grout for drilled in dowels shall conform to Section 218 of the VDOT Standard Specifications.

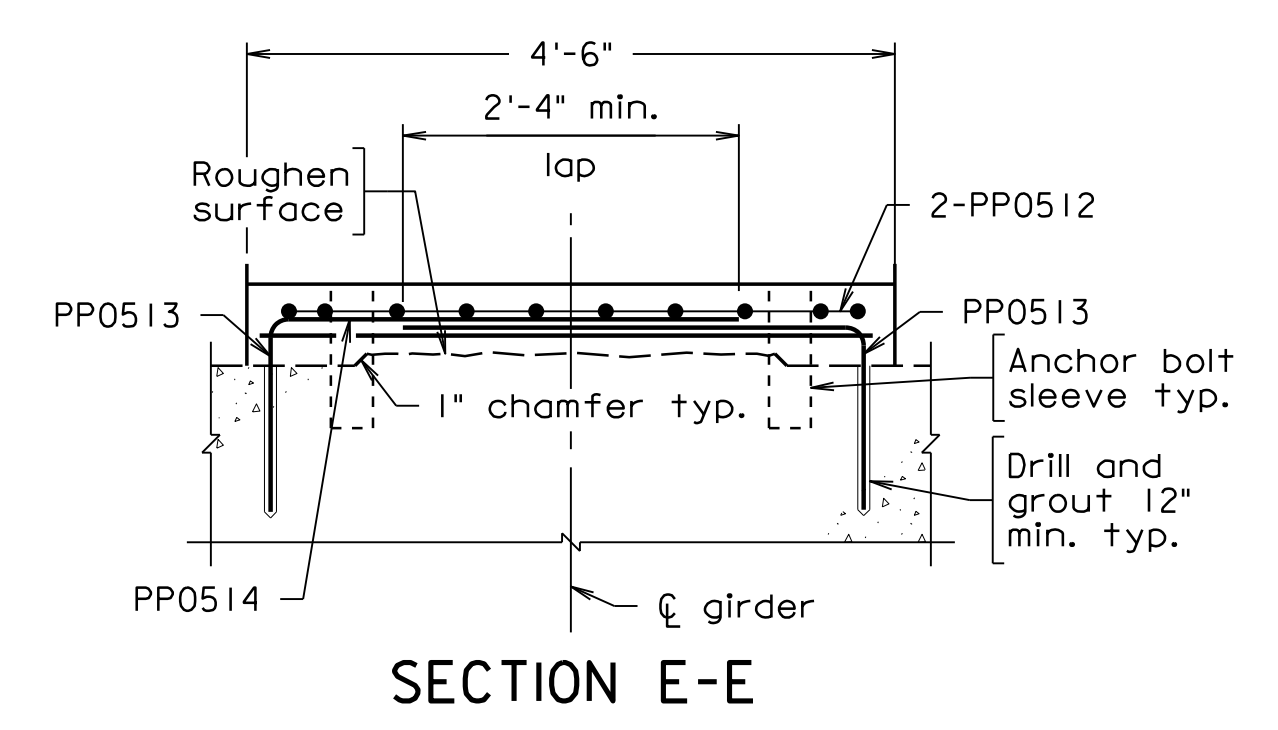
For reinforcing steel schedule see sheets 101 thru 102.



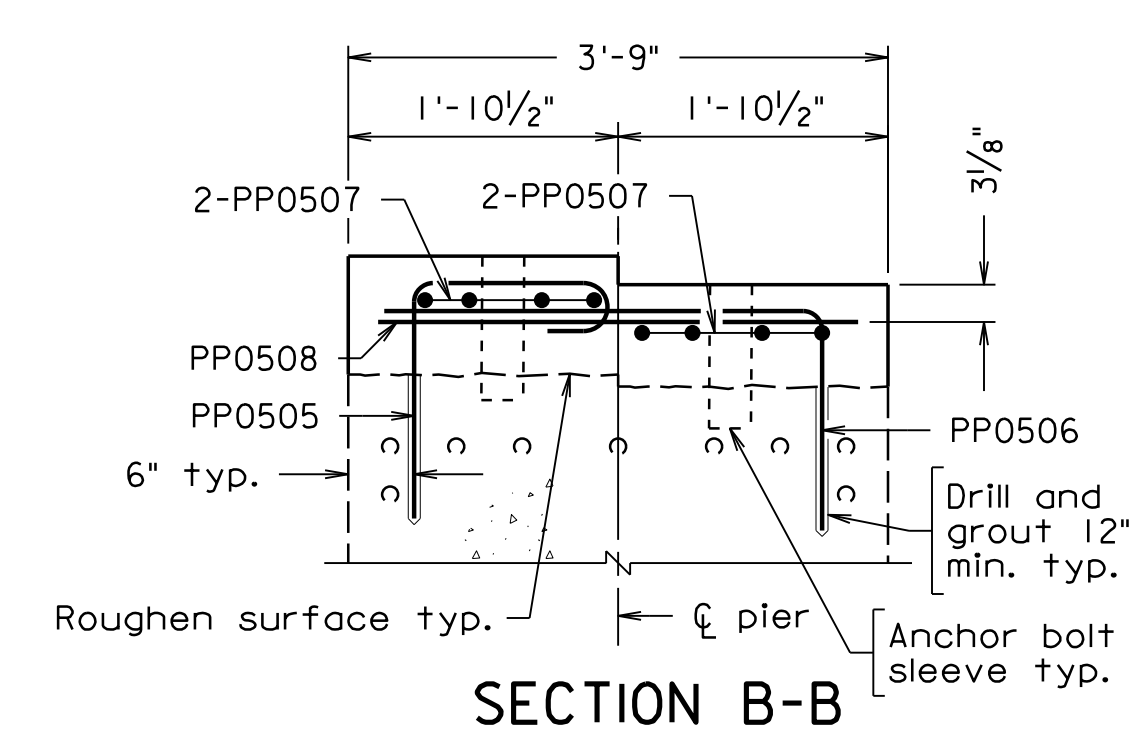
SECTION A-A



SECTION C-C

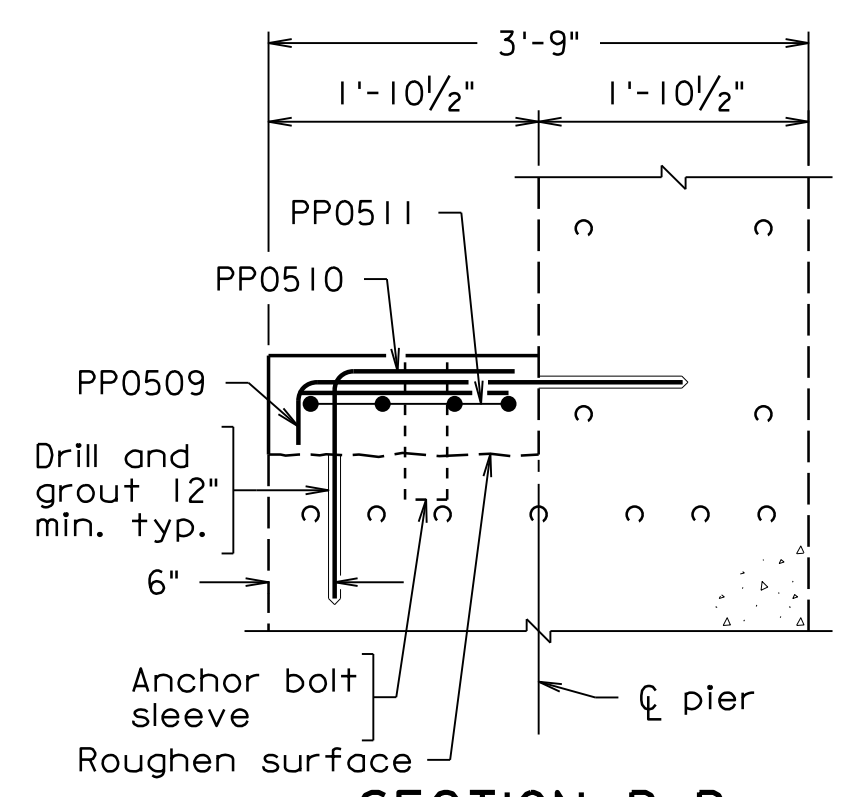


SECTION E-E

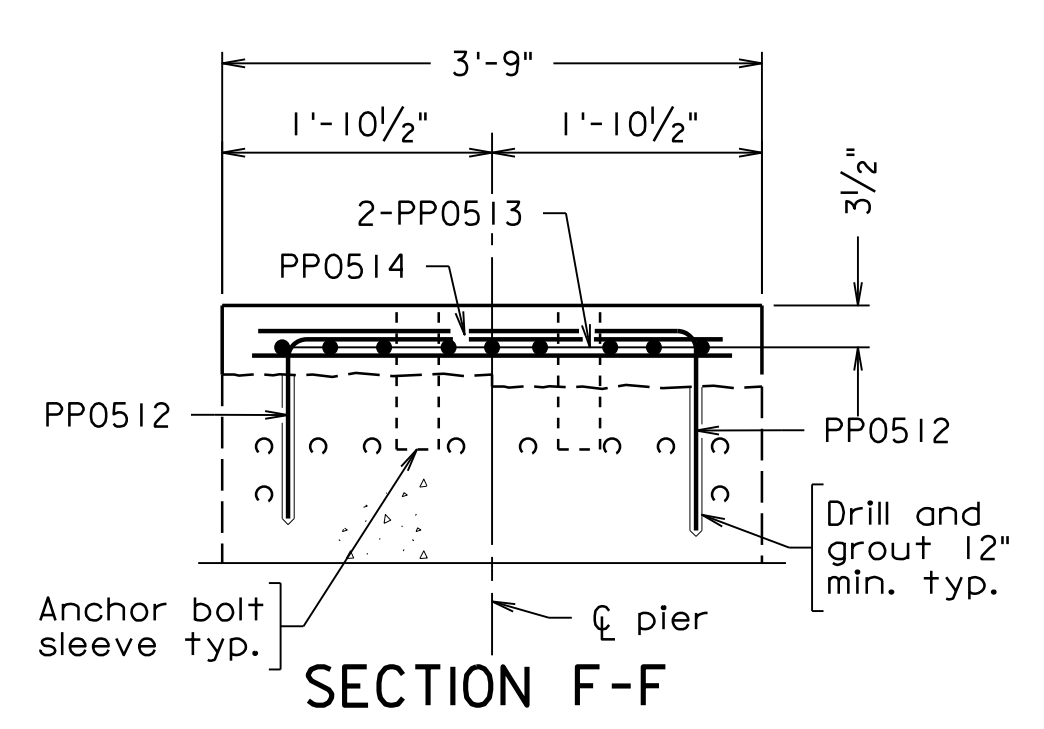


SECTION B-B

Pier 1 shown, Pier 3 similar opposite hand.



SECTION D-D



SECTION F-F

APPROXIMATE PIER SEAT BUILDUP TABLE				
Pier	Girder	Type	Downstation Span	Upstation Span
1	Girder A	1	9 7/8"	8 1/2"
	Girder B	1	9 7/8"	8 1/2"
	Girder C	1	9 7/8"	8 1/2"
	Girder K	1	9 7/8"	8 1/2"
2	Girder A	3	3"	3"
	Girder B	3	3"	3"
	Girder C	3	3"	3"
	Girder L	3	3"	3"
3	Girder A	1	8 1/4"	8 5/8"
	Girder B	2	8 1/4"	---
	Girder C	2	8 1/4"	---
	Girder L	1	8 1/4"	8 5/8"

Table is for reference only.

Contractor shall determine seat elevation as existing bottom of girder elevation at centerline of bearing (prior to jacking) minus proposed bearing height.

257-38A_031.dgn

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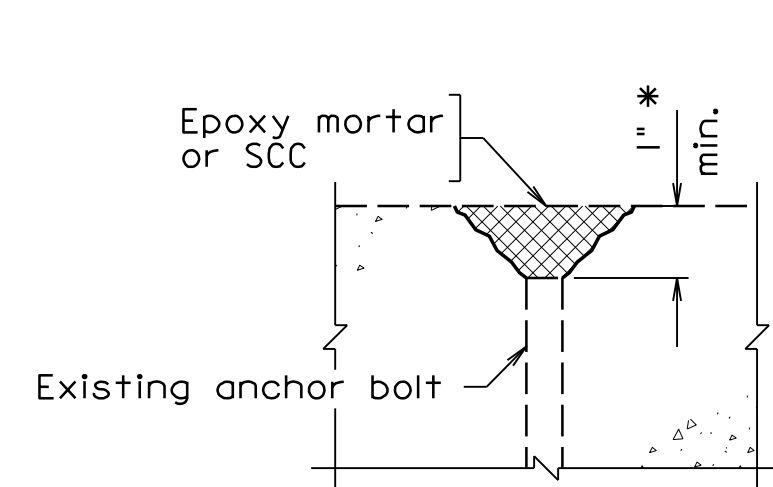
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
BEAM SEAT MODIFICATION DETAILS					
No.	Description	Date	Designed: MRO	Date	Plan No.
			Drawn: MRO	Apr. 2022	257-38A
			Checked: J.S.		31 of 125

Not to scale

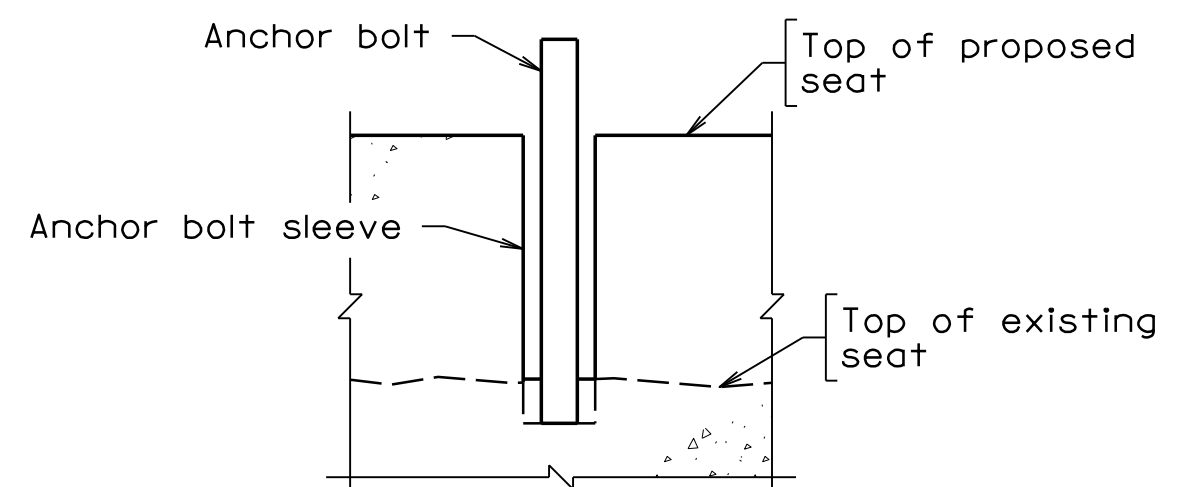
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STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			95	0095-076-299, B688	32



* Removal depth shall be increased as necessary to provide clearance for installation of proposed anchor bolt.

ANCHOR BOLT CUT OFF DETAIL



ANCHOR BOLT REPLACEMENT AT SEAT RECONSTRUCTION

Anchor Bolt Removal and Replacement Notes:

All anchor bolts at bearing replacements shall be replaced. All anchor bolts to be replaced shall be replaced in accordance with anchor bolt removal detail and anchor bolt replacement detail.

Anchor bolts at abutments are shifted from centerline of bearing to facilitate installation while existing crossframe or diaphragm is in place. If anchor bolt is to be installed with crossframe or diaphragm removed, Contractor shall contact the Engineer prior to fabrication of sole plates.

Existing anchor bolts shall be removed a minimum of 1 inch below concrete surface. Surface shall be repaired with epoxy mortar except at Reconstruct Bridge Seat locations.

For additional information on anchor bolts, anchor bolt sleeves, and bearings, see sheets 33-35.

Jacking and Blocking Notes:

The Contractor shall submit to the Engineer for approval, in addition to Section 412.03(e) of the VDOT Specifications, working drawings and design computations for temporary support, jacking and blocking, which shall bear the seal of a Professional Engineer licensed in the Commonwealth of Virginia. The Contractor shall not proceed with jacking and blocking until the working drawings have been approved.

If Contractor elects to utilize existing cross frame, design computations shall verify if the existing cross frames and connections are acceptable for jacking and blocking dead and live loads. If they are determined to not be acceptable, the design, removal and modifications necessary for installation of jacking and blocking shall be included in the pay item Jacking and Blocking Beams.

Temporary support, jacking and blocking shall be designed to support the dead load and live loads of the superstructure (see load table this sheet).

The Contractor's bearing assembly for the jacking and blocking shall evenly distribute the loads. If an area of delaminated or spalled concrete is within the limits of the proposed jacking and blocking location, this area shall be repaired prior to the installation of the jacking and blocking elements.

During the jacking operation, no traffic will be allowed above beams being jacked. Beams shall be blocked prior to application of traffic loads.

Jacking shall be performed until there is a transfer of load and not to exceed 1/8" unless directed by the Engineer.

At no time shall both ends of any span be supported on temporary support, jacking, or blocking at the same time.

Jacks shall be of sufficient size to jack 150 percent of anticipated load.

Jacking Load Table is for Contractor's reference.

Substructure	Span	Girder	Dead Load	Live Load Reactions
Abutment A, Pier 1	a	A-E, H-L	80	--
Abutment A, Pier 1	a	F, G	90	--
Pier 1, Pier 3	b, c	A-C, F	95	--
Pier 1, Pier 3	b, c	D-E, H-L	80	--
Pier 1, Pier 3	b, c	G	120	--
Pier 2	b, c	A-D, F-L	435	--
Pier 2	b, c	E	310	--
Pier 3, Abutment A	d	A-L	20	--

Table is for reference only.

Contractor shall determine seat elevation as existing bottom of girder elevation at centerline of bearing (prior to jacking) minus proposed bearing height.

No allowance has been included for dynamic or temporary construction loads.

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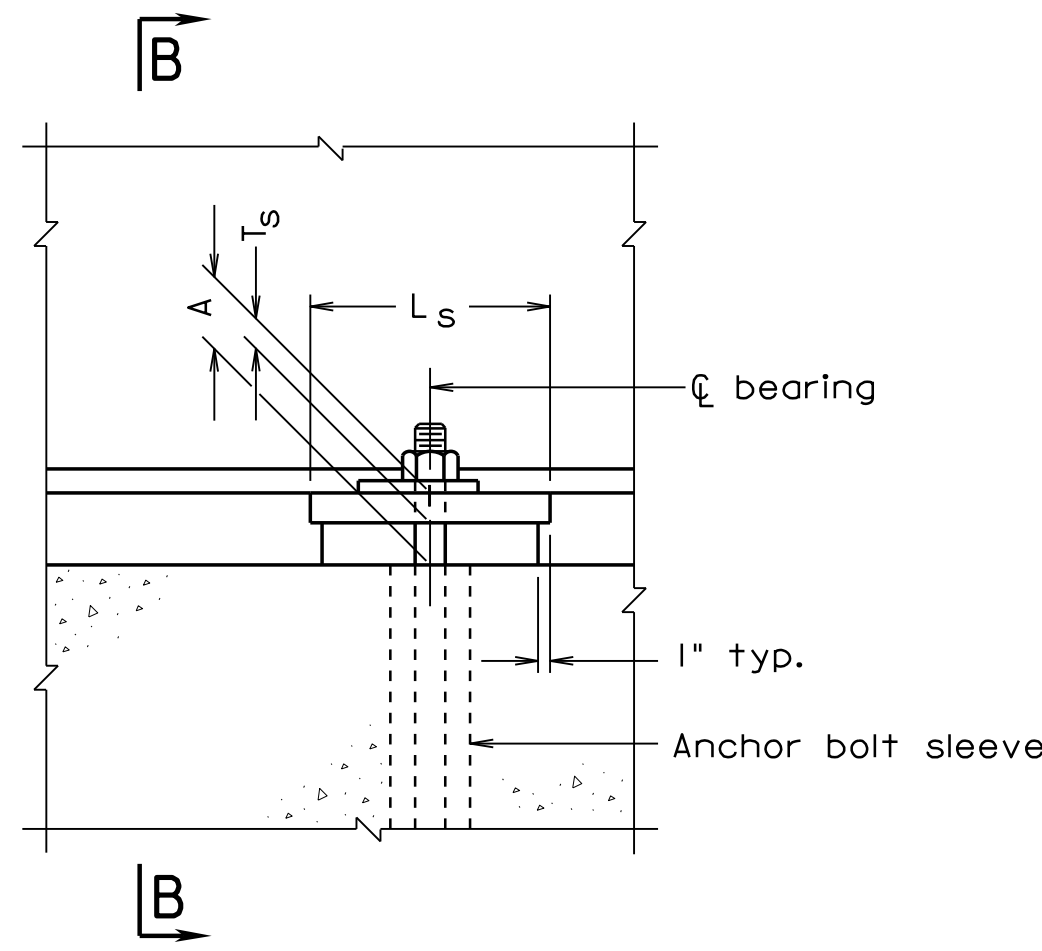
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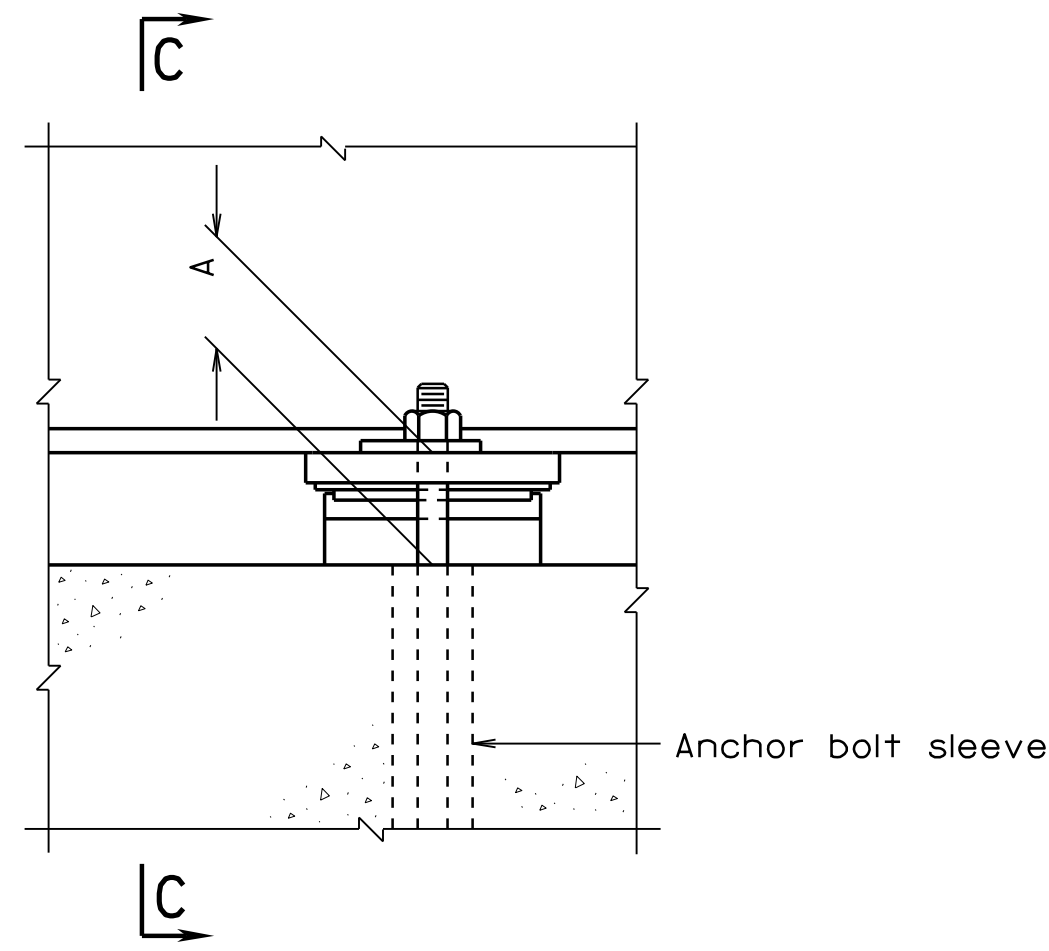
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
ANCHOR BOLT REPLACEMENT AND JACKING AND BLOCKING DETAILS					
No.	Description	Date	Designed: MRD..... Date	Plan No.	Sheet No.
	Revisions		Drawn:MRD..... Checked:S.I.S.....	Apr. 2022	257-38A 32 of 125

PROGRESS PRINT 4/1/2022



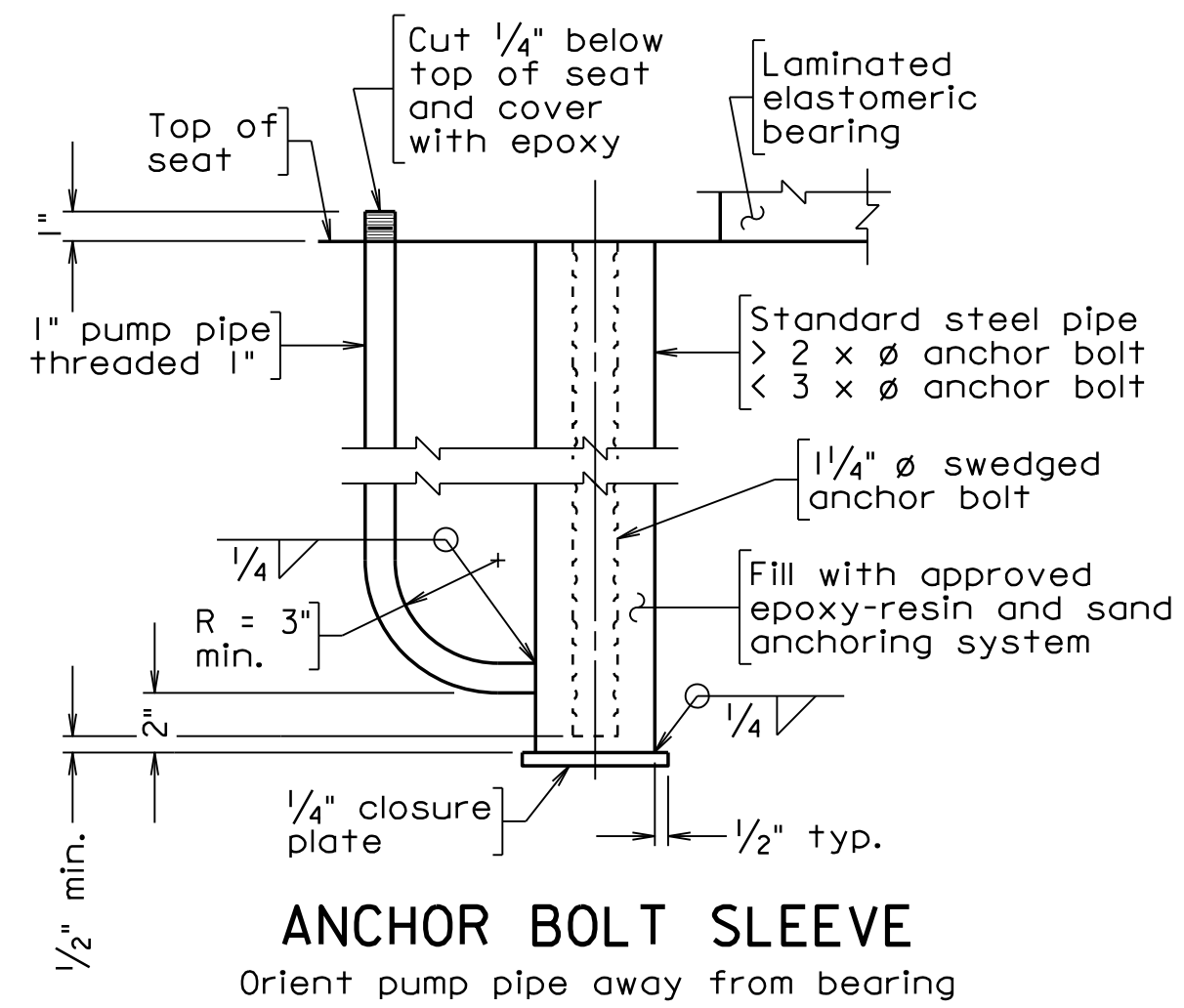
ELEVATION EXPANSION ASSEMBLY

Bearing stiffener(s) not shown for clarity



ELEVATION SLIDING EXPANSION ASSEMBLY

Bearing stiffener(s) not shown for clarity



ANCHOR BOLT SLEEVE

Orient pump pipe away from bearing

This detail is applicable on new substructure only.

Notes:

Material: Elastomer - 50 durometer hardness.
Shim - ASTM A36 or A1011 mild steel.
Anchor Bolt - AASHTO M314, Grade 55
Standard steel pipe - ASTM A53 Grade B.

The Contractor may elect not to provide anchor bolt sleeves at any locations and cast the anchor bolts directly into concrete at their own risk and expense.

Bevel sole plates to grade shown. Plates shall not be painted on the surface in contact with the elastomeric bearing.

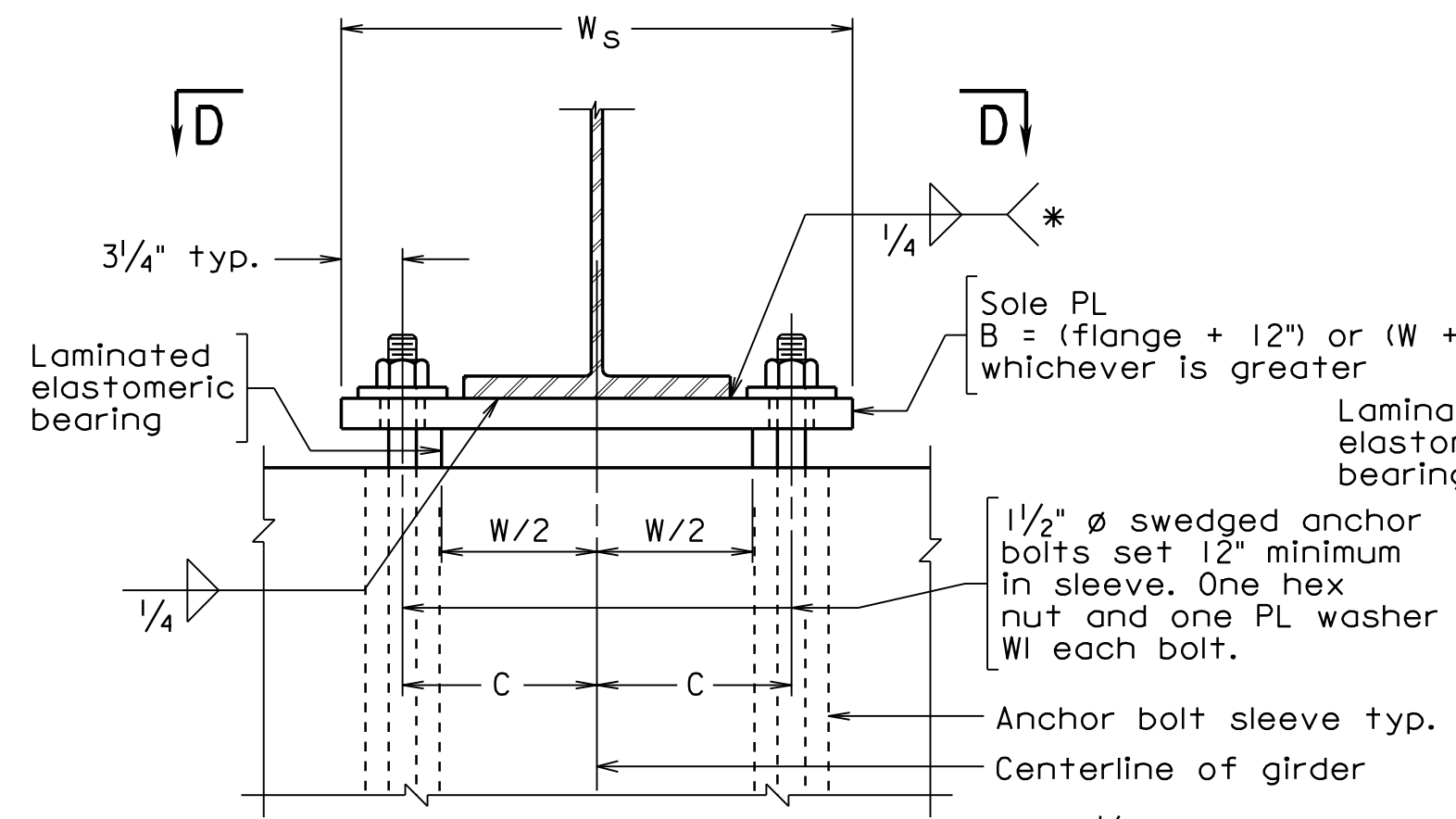
Elastomeric bearings shall be molded as a single unit.

Max. horizontal movement is the maximum horizontal superstructure displacement. If the maximum shear deformation of the elastomeric pads exceeds 75% of Max. horizontal movement during construction of the bridge, the Contractor shall reset the bearings at no additional cost to the Department.

* Weld shall terminate 1/4" from edge of sole plate.

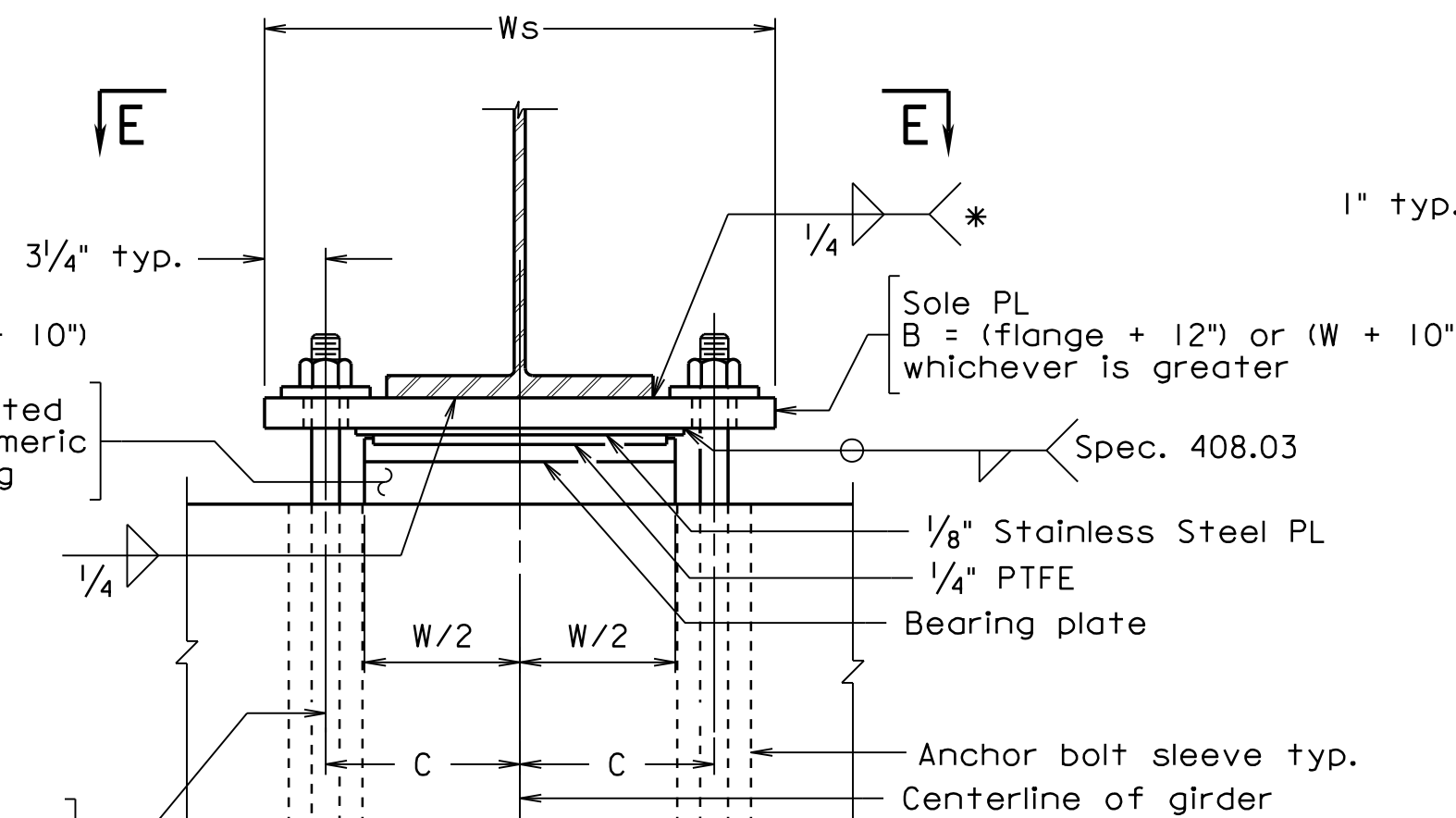
** Centerline of girder (including center line and text) shall be marked on the top, bottom and side surfaces of the laminated elastomeric bearing prior to shipping. The markings shall be done with an indelible ink or flexible paint of contrasting color.

PTFE and stainless steel sliding plates shall conform to Section 408.03 of the specifications.



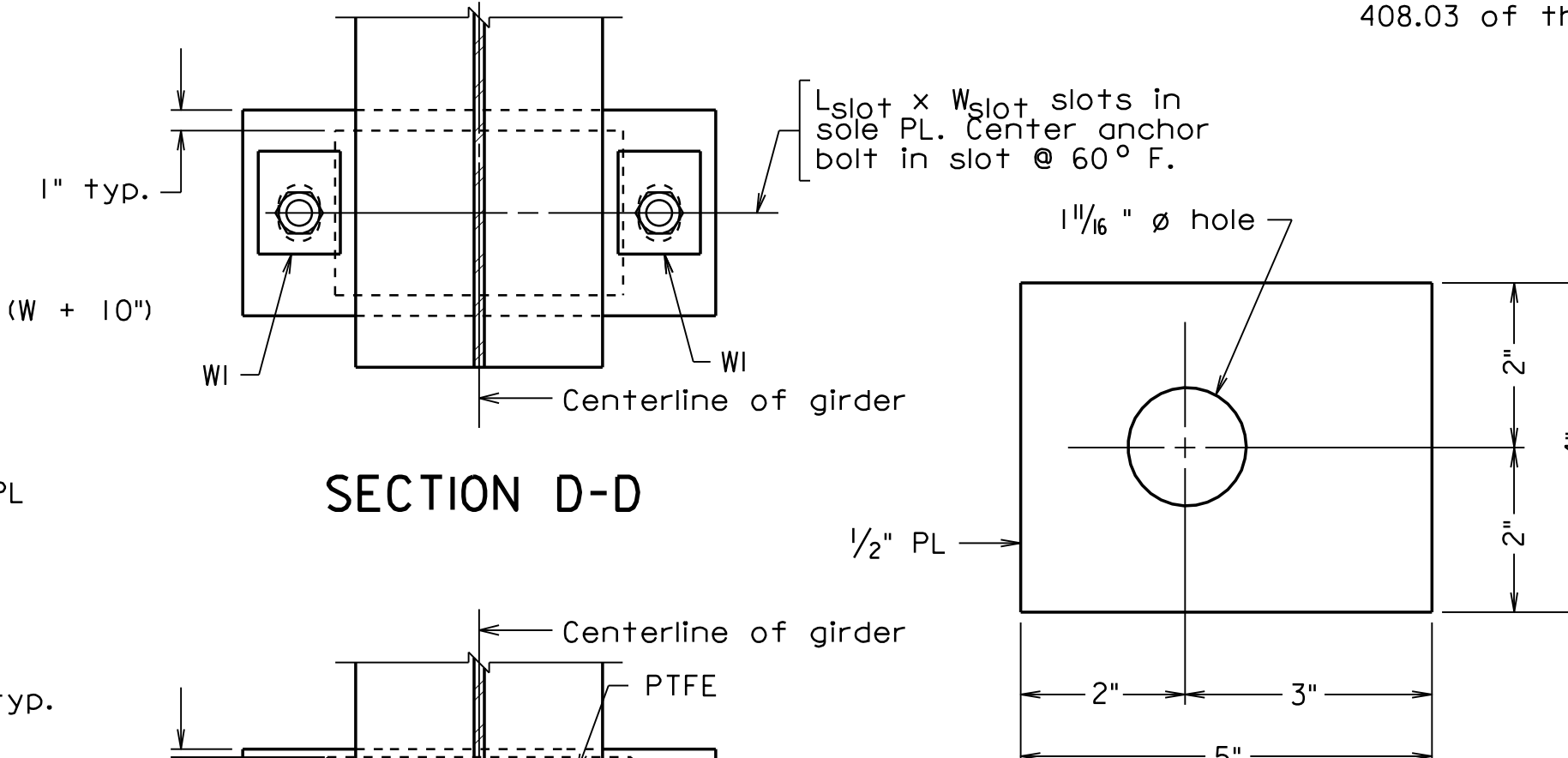
SECTION B-B

1/2" diameter swaged anchor bolts set 12" minimum in sleeve. One hex nut and one PL washer WI each bolt.



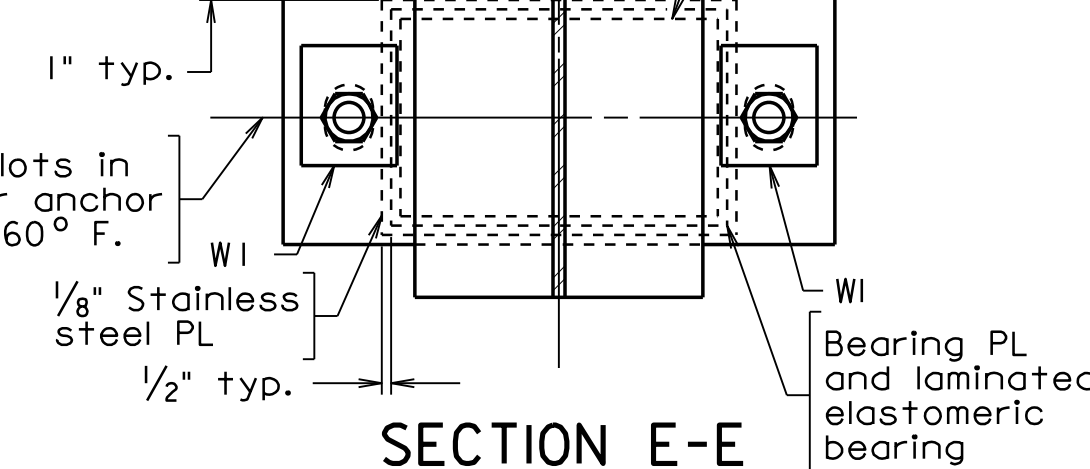
SECTION C-C

1/8" stainless steel PL
1/4" PTFE bearing plate

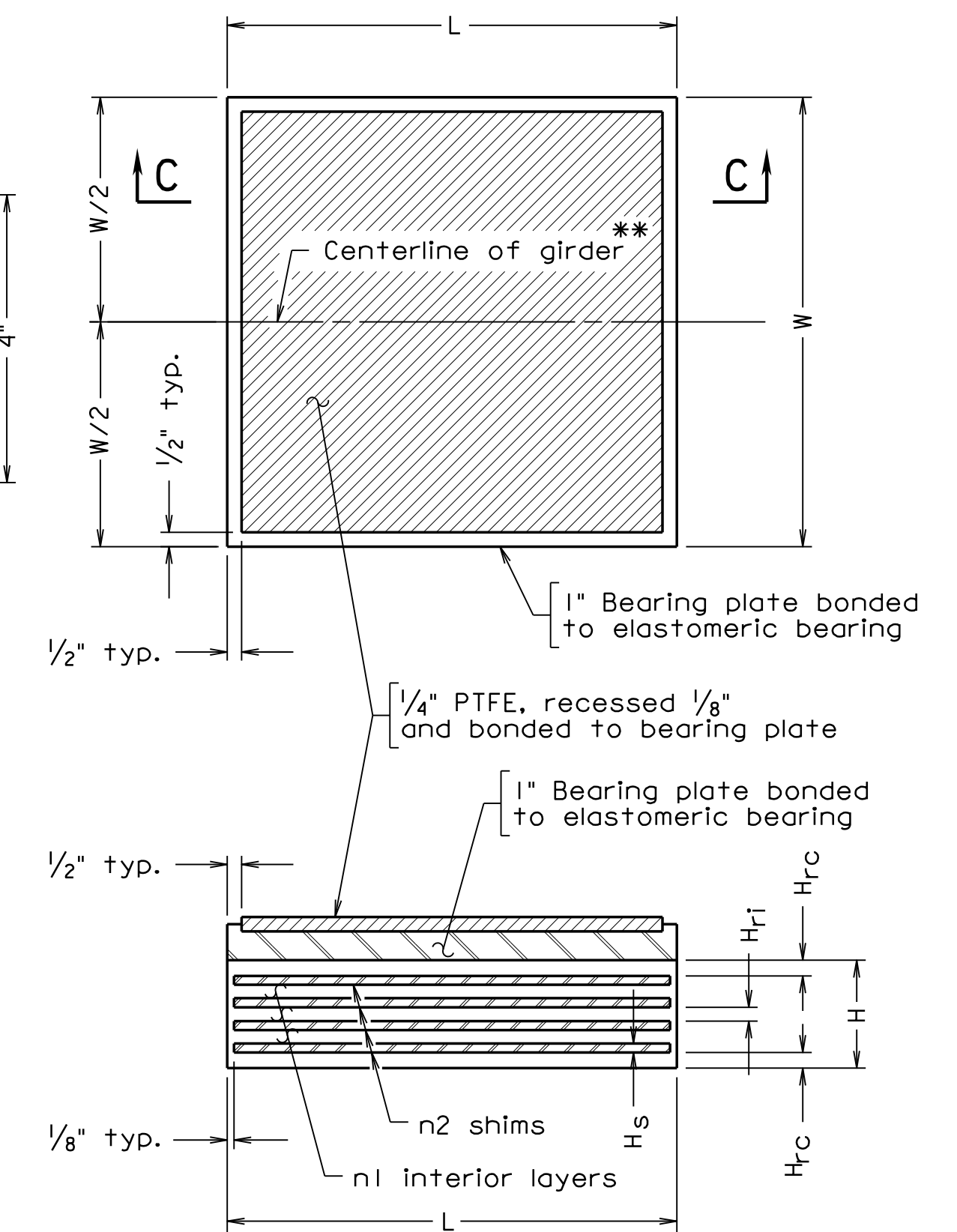


SECTION D-D

WASHER WI



SECTION E-E



SECTION C-C

LAMINATED ELASTOMERIC BEARING WITH BONDED BEARING PLATE AND PTFE

For laminated elastomeric bearing without sliding, see detail on sheet 34.

Span	Abut.	Pier	Girder	Bearing type	A	C	Laminated Elastomeric Bearing						Sole Plate			Grade %	Max. Horizontal Movement inches	Vertical Load Service kips	Lslot	Wslot
							W	L	H	H _{rc}	n1 @ H _{ri}	n2 @ H _s	W _s	L _s	T _s					
a		I	A,B,C,L,K	Exp	4.619	12	20	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	30.5	14	1.516	0.00	1.52	161	4	2.4375
a		I	M,N	Exp	4.619	12	20	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	30.5	14	1.516	0.00	1.52	161	4	2.4375
b		I	A,L	Sliding	5.055	12	20	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	30.5	14	1.514	0.00	2.75	165	4	2.4375
b		I	B,C,K	Sliding	5.055	14	24	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	34.5	14	1.514	0.00	2.75	203	4	2.4375
b		I	M,N	Sliding	5.055	16	28	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	38.5	14	1.514	0.00	2.75	242	4	2.4375
c		3	A,L	Sliding	5.207	12	20	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	30.5	14	1.666	-2.38	2.13	165	4	2.4375
c		3	B,C,K	Sliding	5.207	14	24	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	34.5	14	1.666	-2.38	2.13	203	4	2.4375
c		3	M,N	Sliding	5.207	16	28	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	38.5	14	1.666	-2.38	2.13	242	4	2.4375
e		C	O	Exp	4.819	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.715	3.08	0.57	123	4	2.25
e		C	P	Exp	4.792	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.689	2.70	0.57	123	4	2.25
e		C	Q	Exp	4.769	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.666	2.36	0.57	123	4	2.25
e		C	R	Exp	4.754	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.650	2.15	0.57	123	4	2.25
e		C	S	Exp	4.769	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.666	2.36	0.57	123	4	2.25
e		C	T	Exp	4.792	11	18	12	3.103	0.375	3 @ 0.625	4 @ 0.1196	28	14	1.689	2.70	0.57	123	4	2.25

All dimensions in table are in inches.

**PAC PLANS
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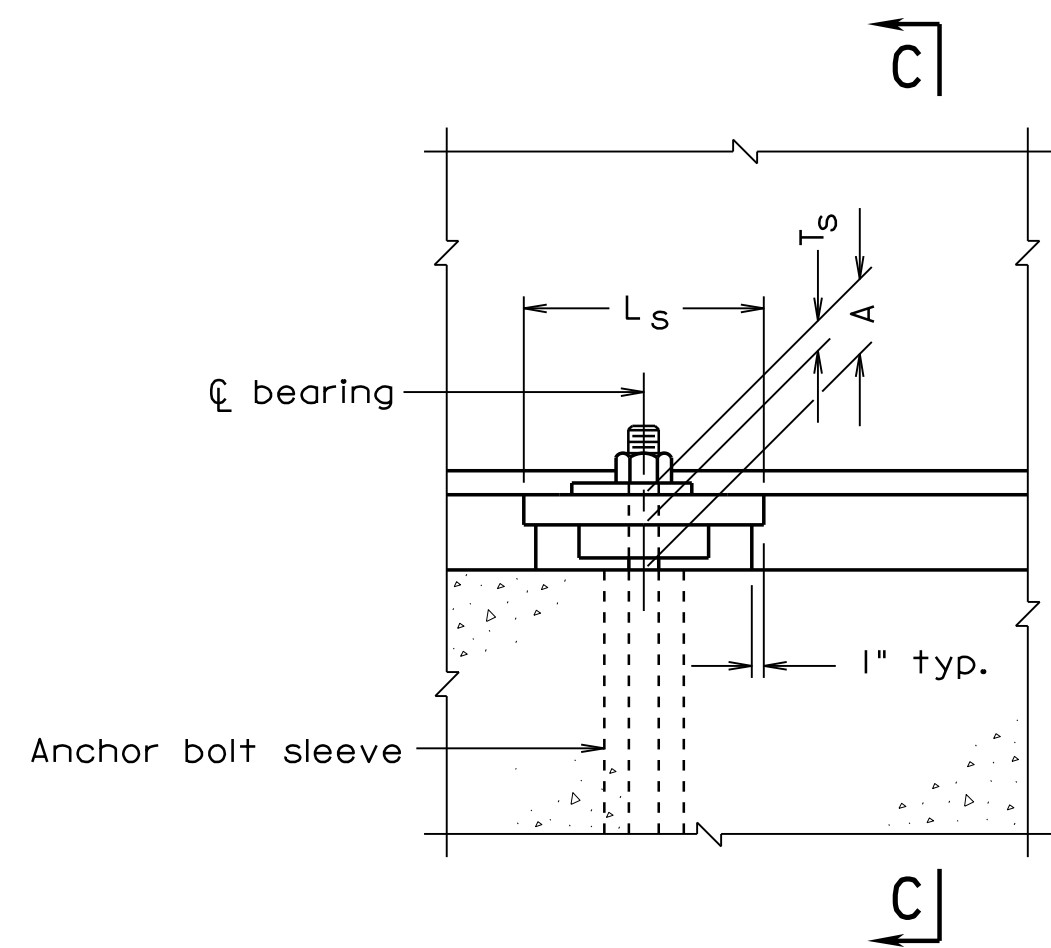
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
BEARING DETAILS 1 OF 3					
No.	Description	Date	Designed: KML..... Date: Drawn: Checked: MRD.....	Plan No. 257-38A	Sheet No. 33 of 125
Revisions					

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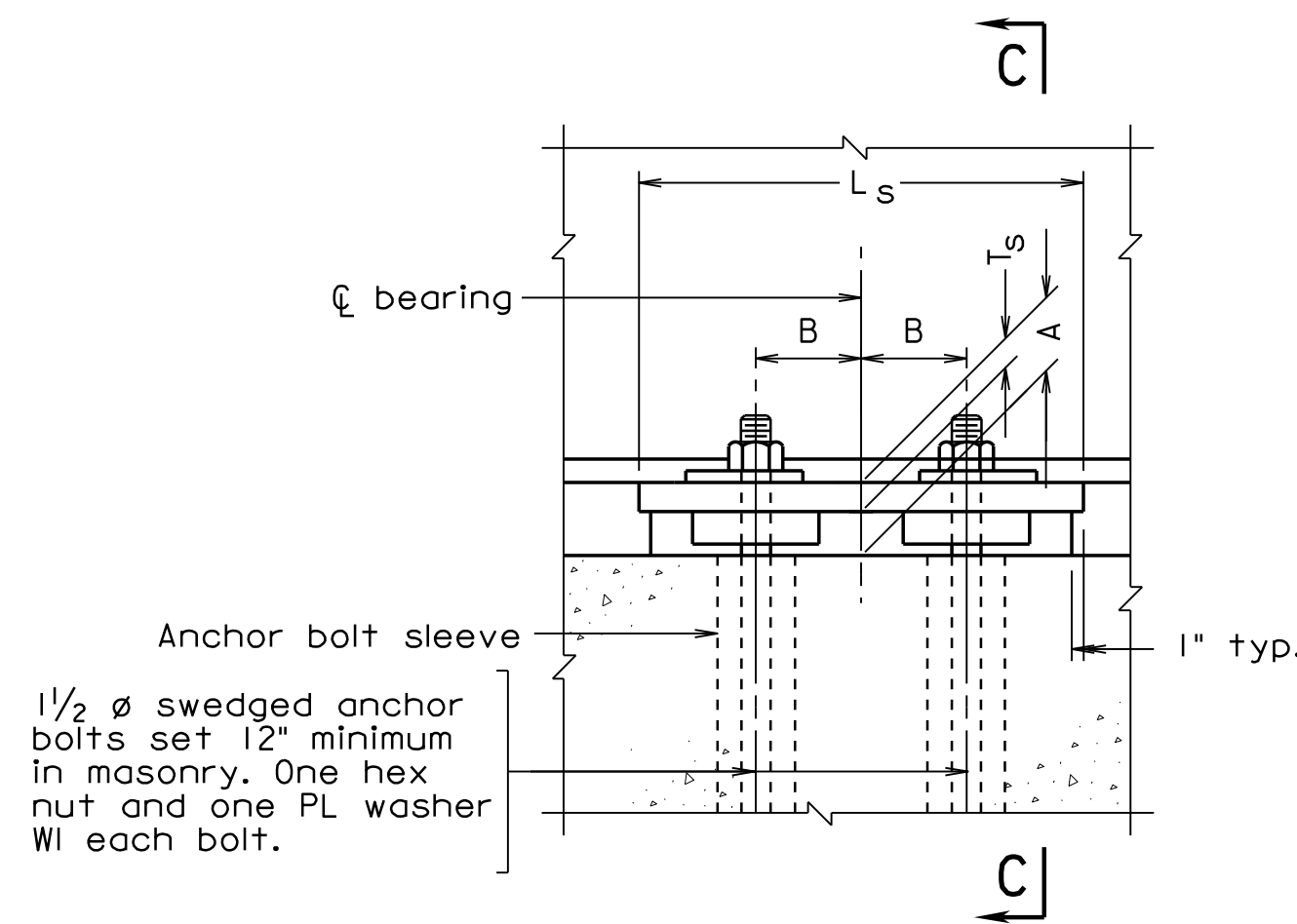
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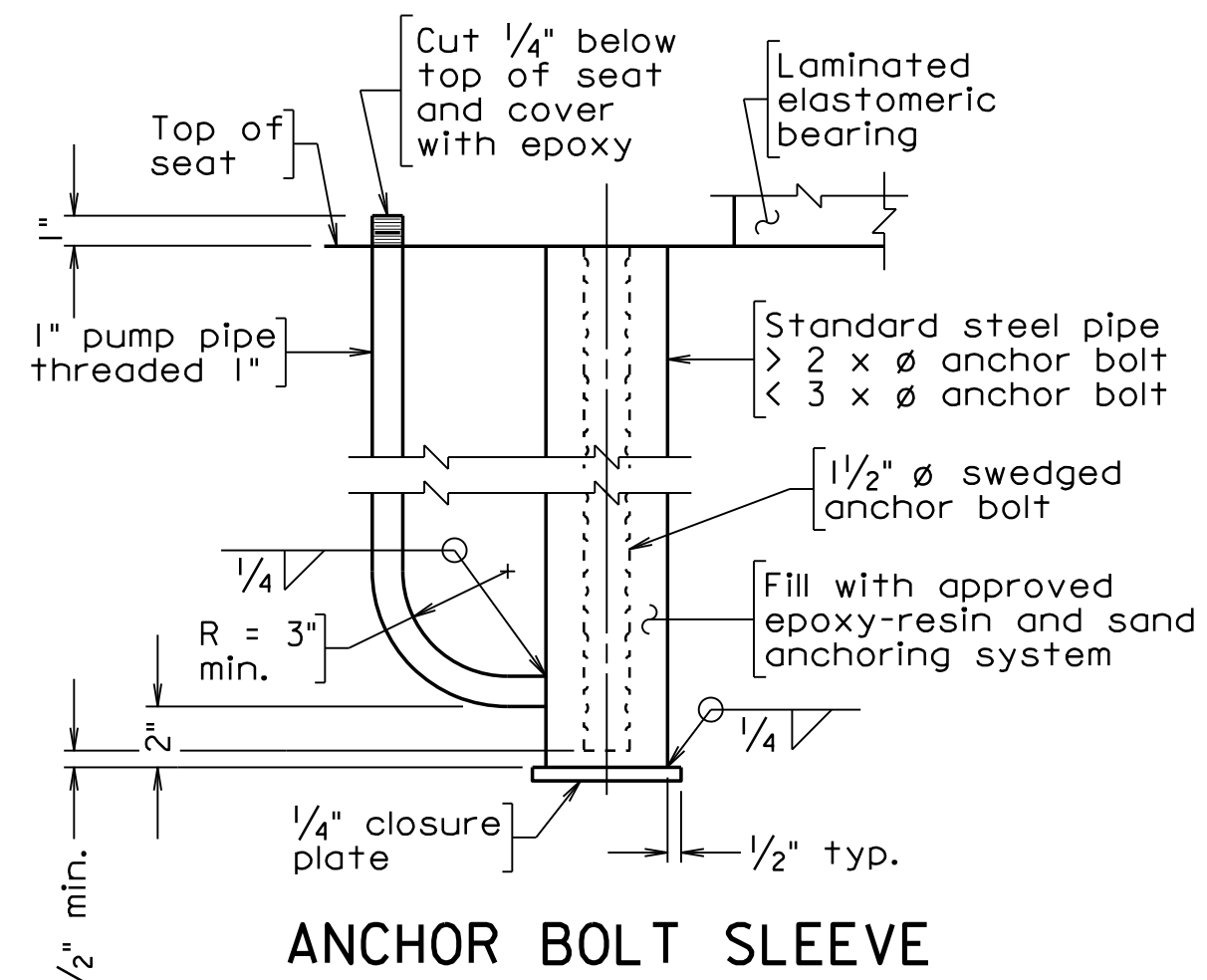
**ELEVATION
FIXED ASSEMBLY
ABUTMENT A**

Bearing stiffener(s) not shown for clarity



**ELEVATION
FIXED ASSEMBLY
PIER 2**

Bearing stiffener(s) not shown for clarity



ANCHOR BOLT SLEEVE

Orient pump pipe away from bearing
This detail is applicable on new substructure only.

Notes:

Material: Elastomer - 50 durometer hardness.
Shim - ASTM A36 or A1011 mild steel.
Anchor Bolt - AASHTO M314, Grade 55.
Standard steel pipe - ASTM A53 Grade B.

The Contractor may elect not to provide anchor bolt sleeves at any locations and cast the anchor bolts directly into concrete at their own risk and expense.

Bevel sole plates to grade shown. Plates shall not be painted on the surface in contact with the elastomeric bearing.

Elastomeric bearings shall be molded as a single unit.

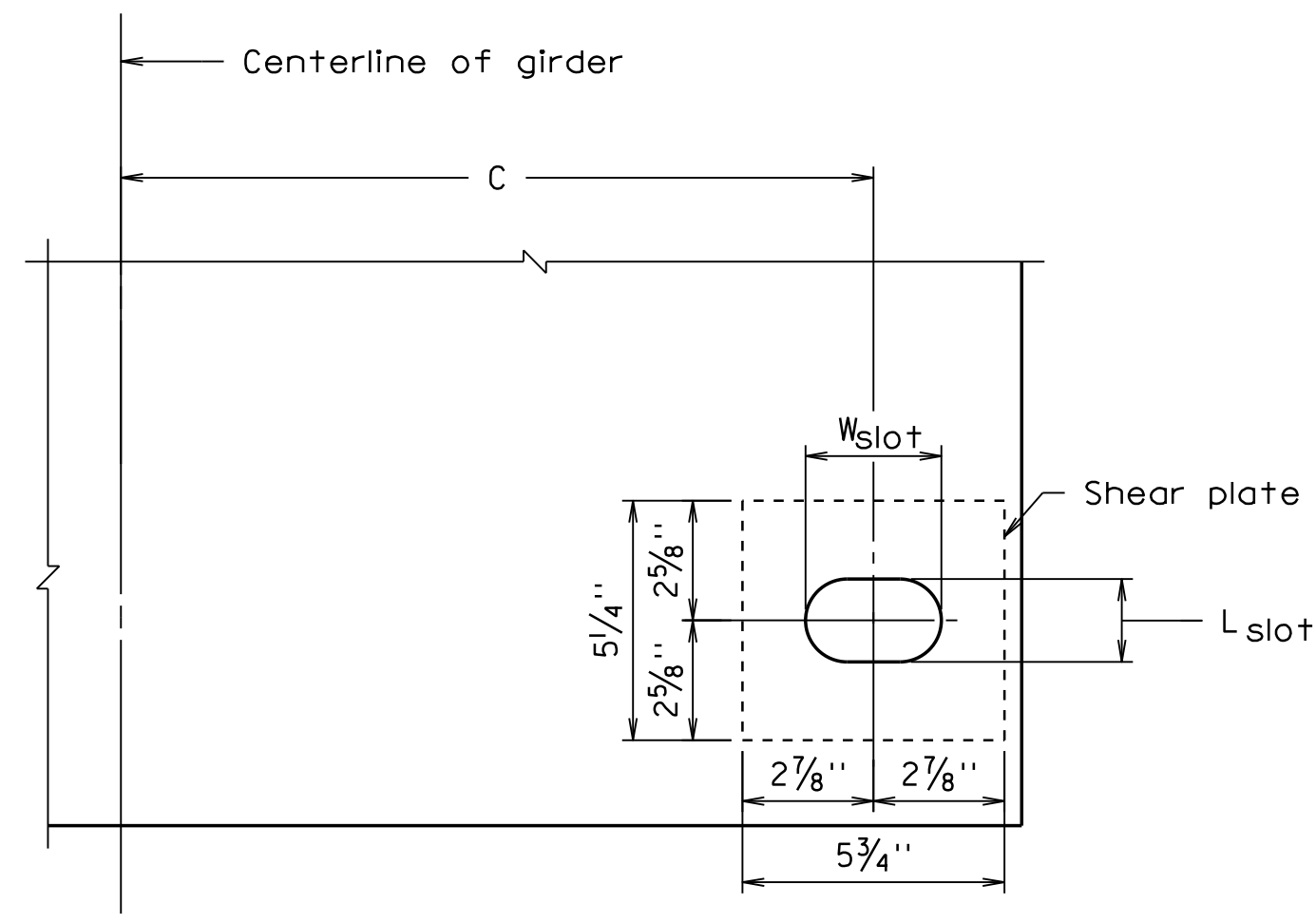
Max. horizontal movement is the maximum horizontal superstructure displacement. If the maximum shear deformation of the elastomeric pads exceeds 75% of Max. horizontal movement during construction of the bridge, the Contractor shall reset the bearings at no additional cost to the Department.

Anchor bolts shall be set in the center of the slot.

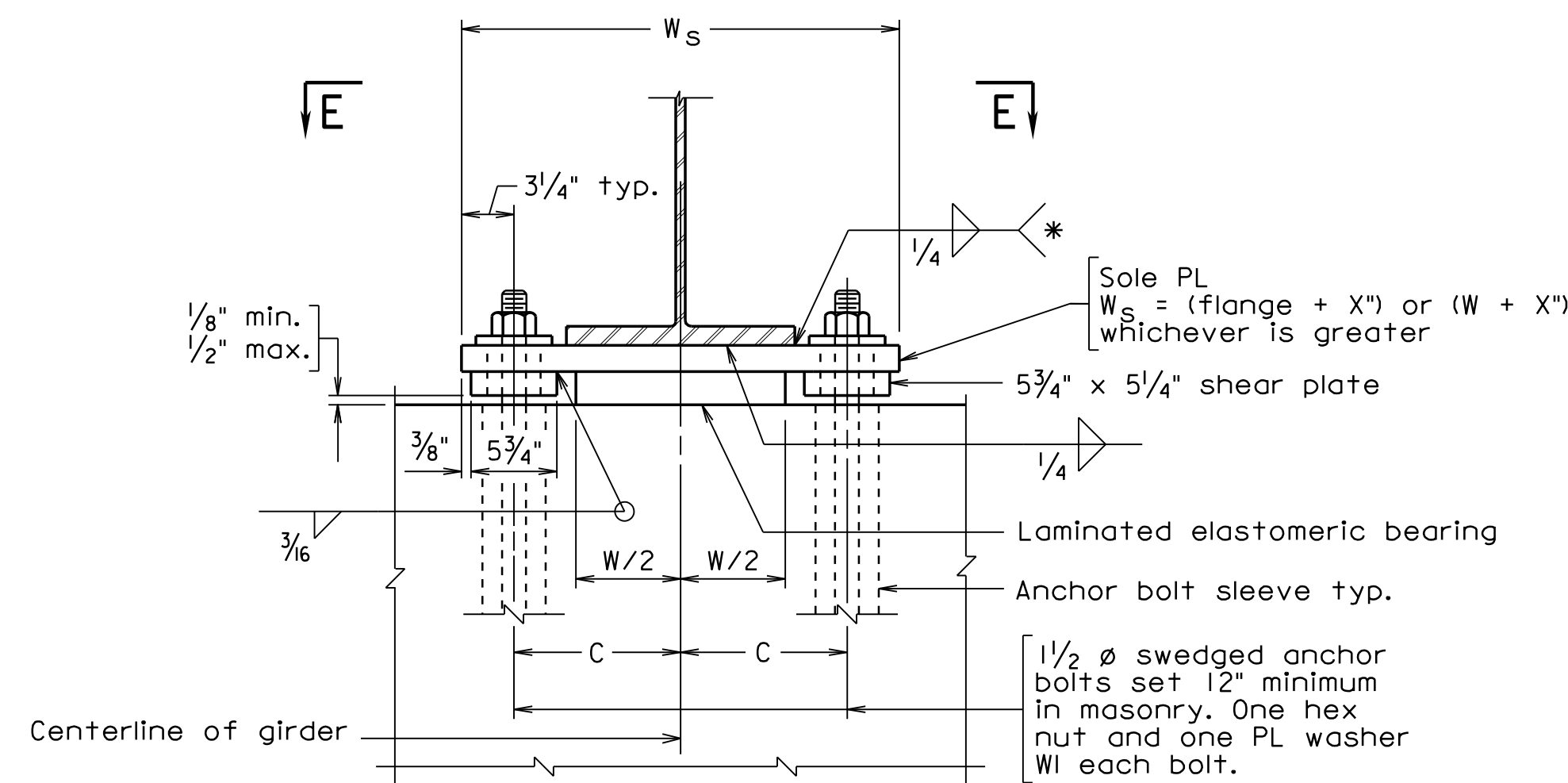
* Weld shall terminate 1/4" from edge of sole plate.

** Centerline of girder (including center line and text) shall be marked on the top, bottom and side surfaces of the laminated elastomeric bearing prior to shipping. The markings shall be done with an indelible ink or flexible paint of contrasting color.

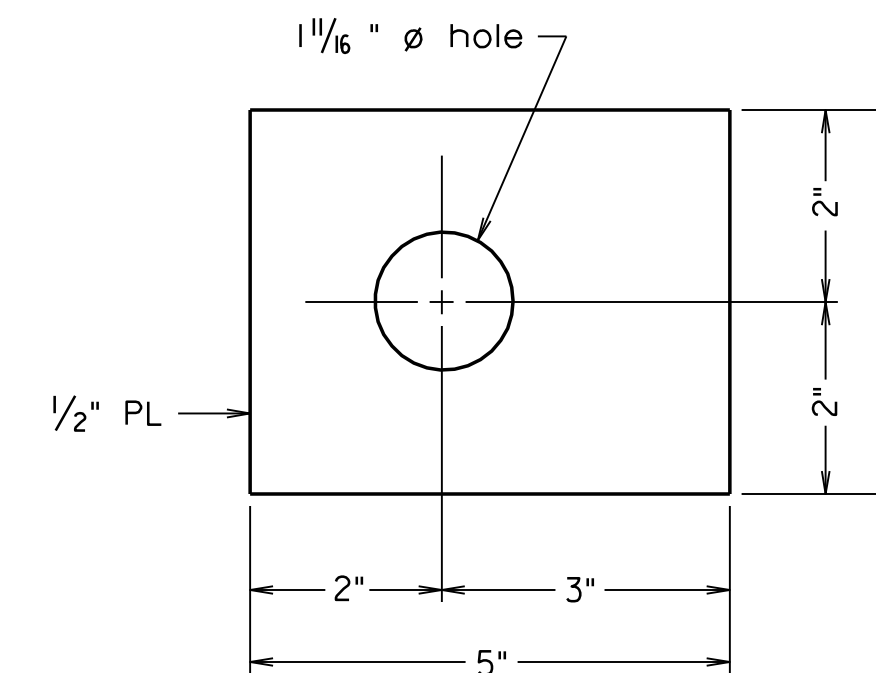
*** Horizontal movement for fixed bearings is for transverse slot.



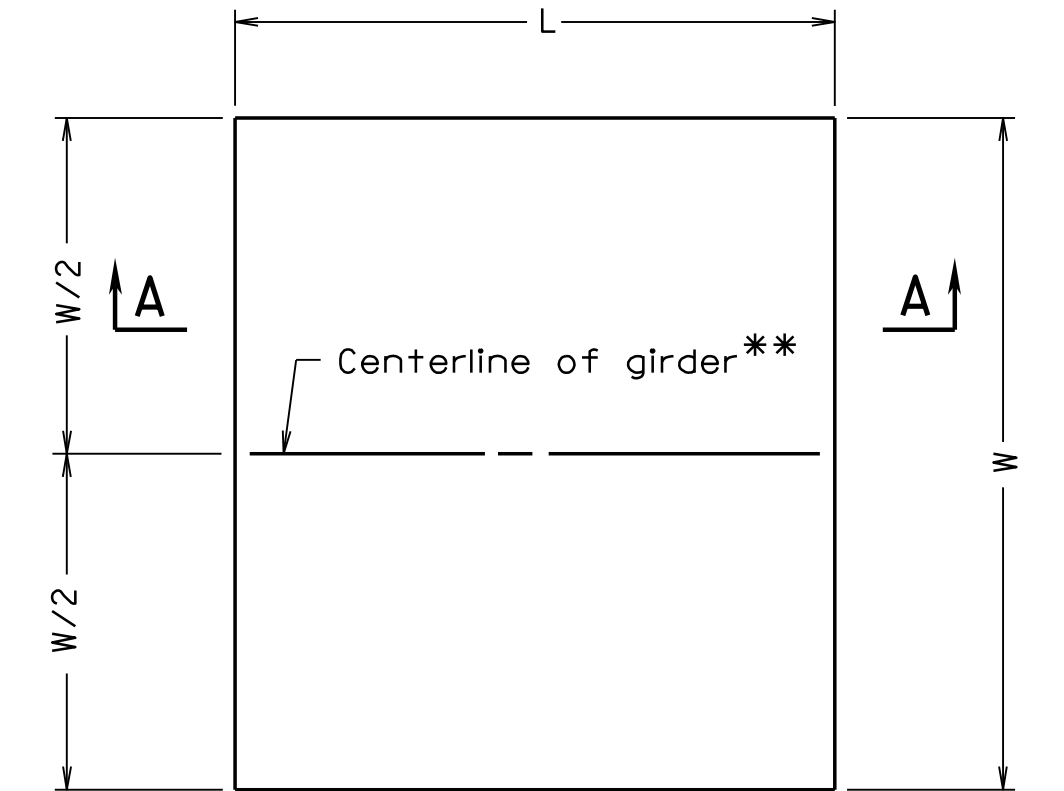
**TYPICAL SOLE PLATE
AND SHEAR PLATE SLOT DETAIL**



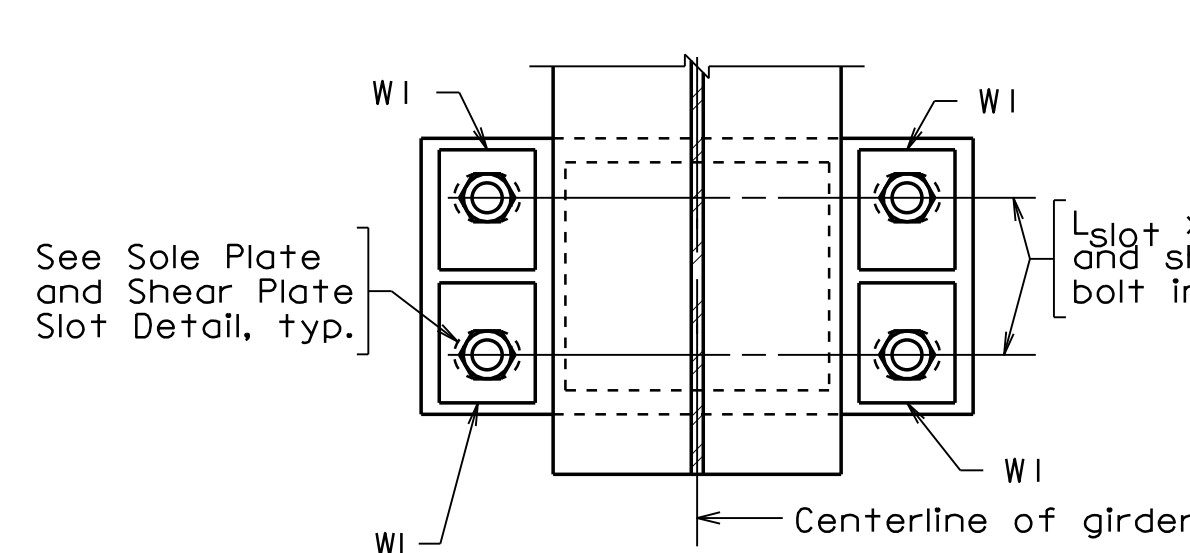
SECTION C-C



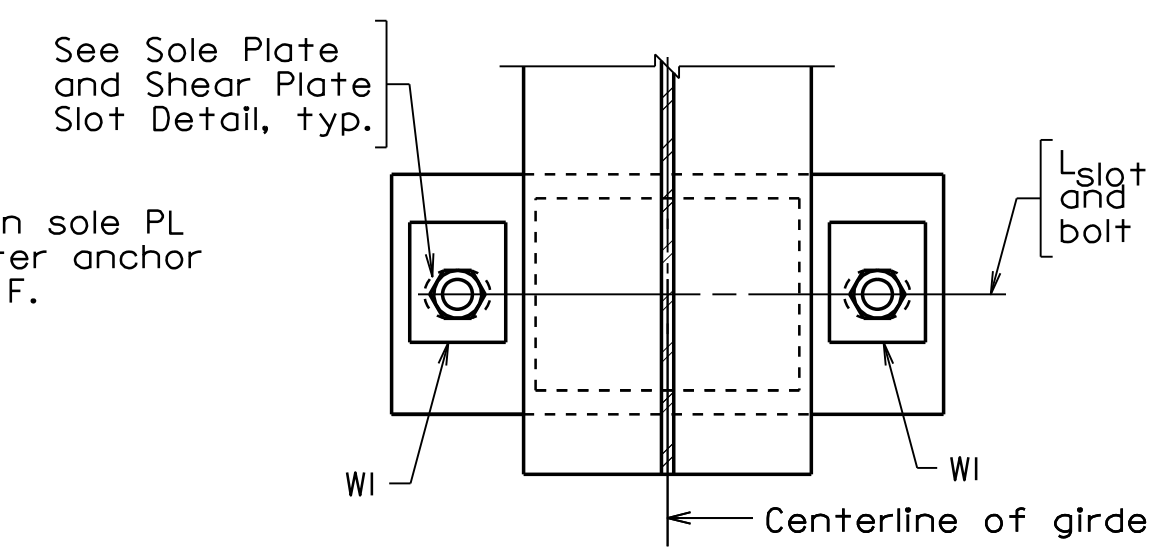
WASHER W1



**SECTION A-A
LAMINATED ELASTOMERIC BEARING**



**SECTION E-E
At Pier 2**



**SECTION E-E
At Abutment A**

Span	Abut.	Pier	Girder	Bearing type	A	B	C	Laminated Elastomeric Bearing					Sole Plate			Grade %	Max. Horizontal Movement inches ***	Vertical Load Service 1 kips	Lslot	Wslot	
								W	L	H	H _{rc}	n1 @ H _{rj}	n2 @ H _s	W _s	L _s						T _s
a	A		A,B,C,L,K	Fix	3.297	-	13	18	12	2.478	0.25	3 @ 0.5	4 @ 0.1196	32.5	14	0.819	0.00	0.74	160	1.6875	2.4375
a	A		M,N	Fix	3.297	-	13	18	12	2.478	0.25	3 @ 0.5	4 @ 0.1196	32.5	14	0.819	0.00	0.74	160	1.6875	2.4375
b,c		2	A	Fix	6.957	3.75	16.5	25	20	5.337	0.375	6 @ 0.625	7 @ 0.1196	39.5	22	1.619	-1.08	0.74	564	1.6875	2.4375
b,c		2	B,C	Fix	6.957	3.75	18	28	20	5.337	0.375	6 @ 0.625	7 @ 0.1196	42.5	22	1.619	-1.08	0.74	678	1.6875	2.4375
b,c		2	M,N	Fix	6.957	6.5	18	28	20	5.337	0.375	6 @ 0.625	7 @ 0.1196	42.5	22	1.619	-1.08	0.74	661	1.6875	2.4375
b,c		2	L	Fix	6.957	6.5	16.5	25	20	5.337	0.375	6 @ 0.625	7 @ 0.1196	39.5	22	1.619	-1.08	0.74	564	1.6875	2.4375
b,c		2	K	Fix	6.957	6.5	18	28	20	5.337	0.375	6 @ 0.625	7 @ 0.1196	42.5	22	1.619	-1.08	0.74	678	1.6875	2.4375

All dimensions in table are in inches.

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Revisions					

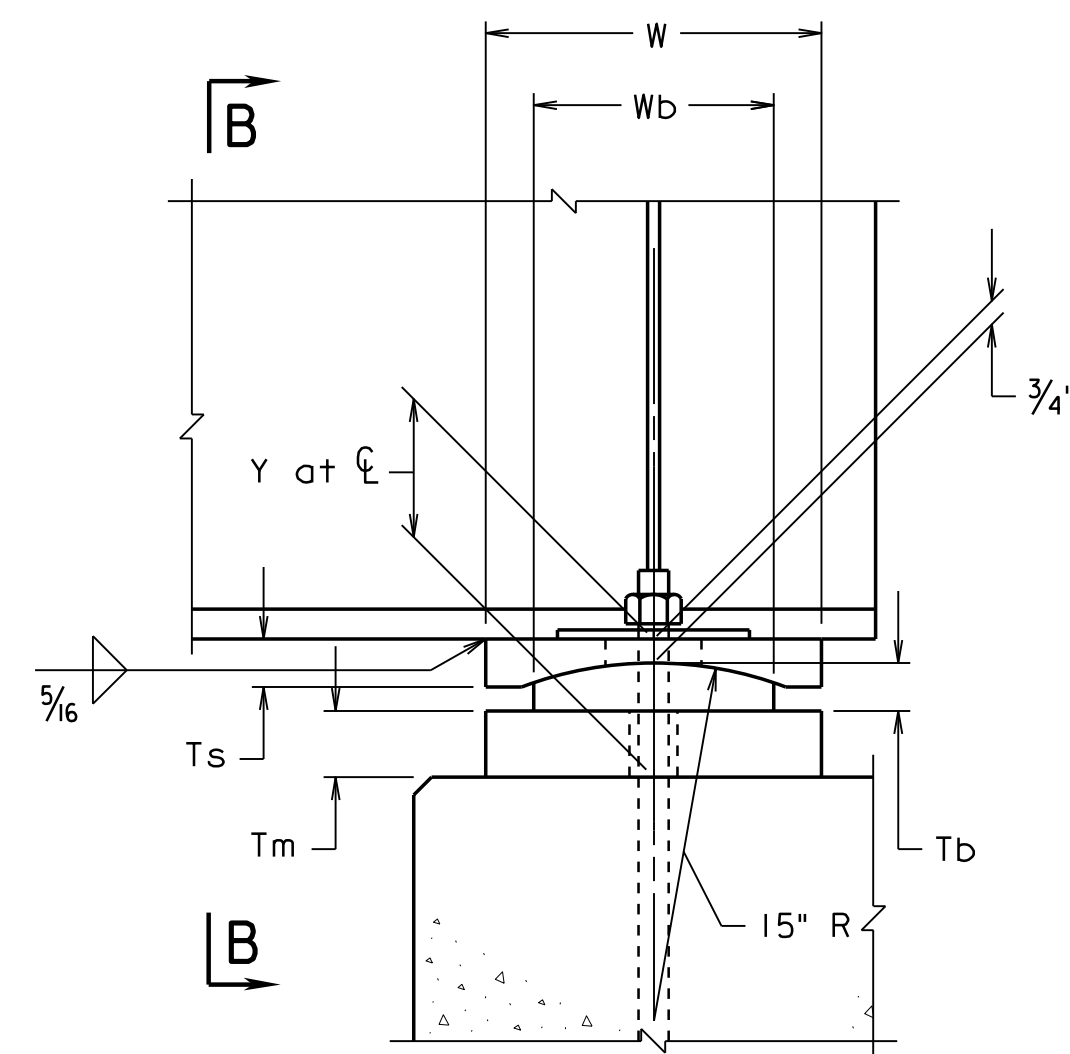
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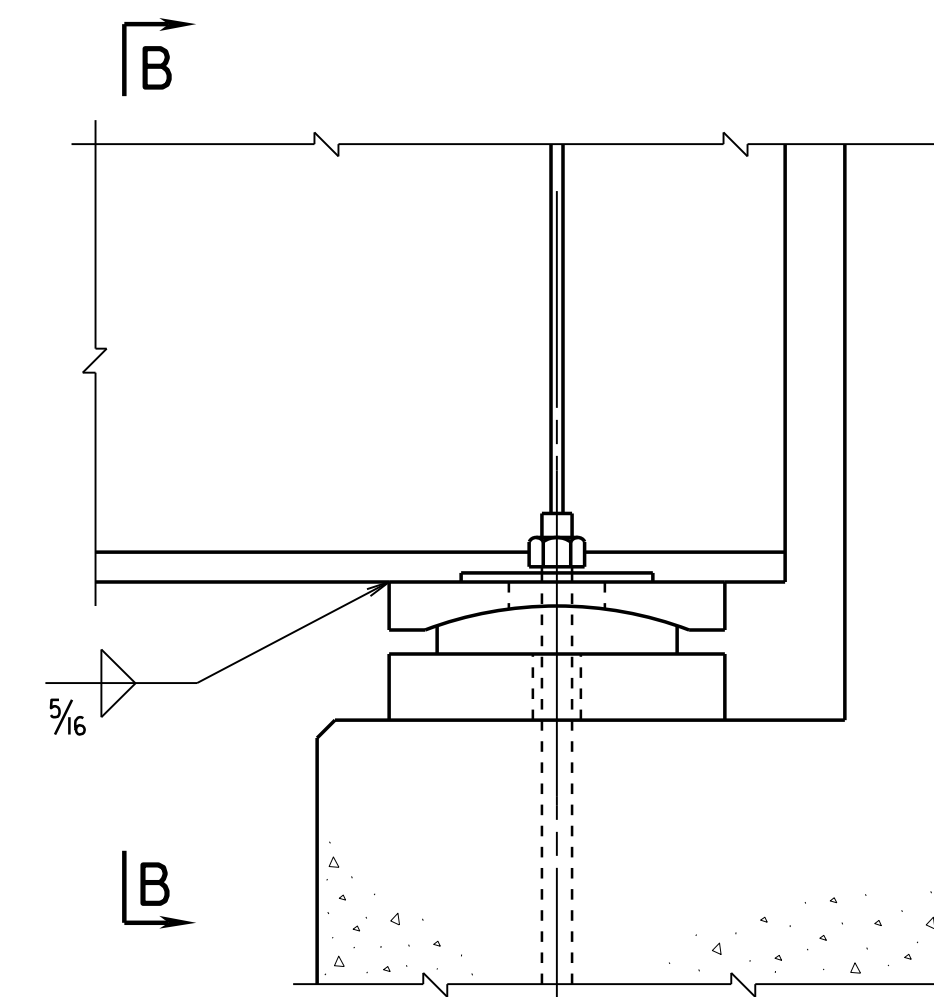
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VA.		95	0095-076-299, B688
			35



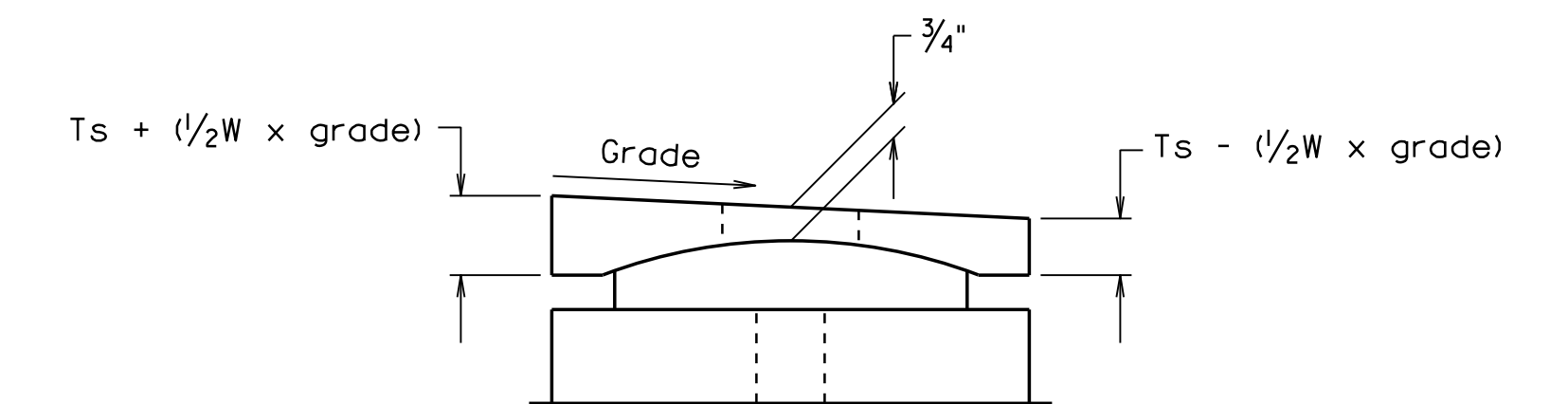
EXPANSION BEARING
PIER ELEVATION



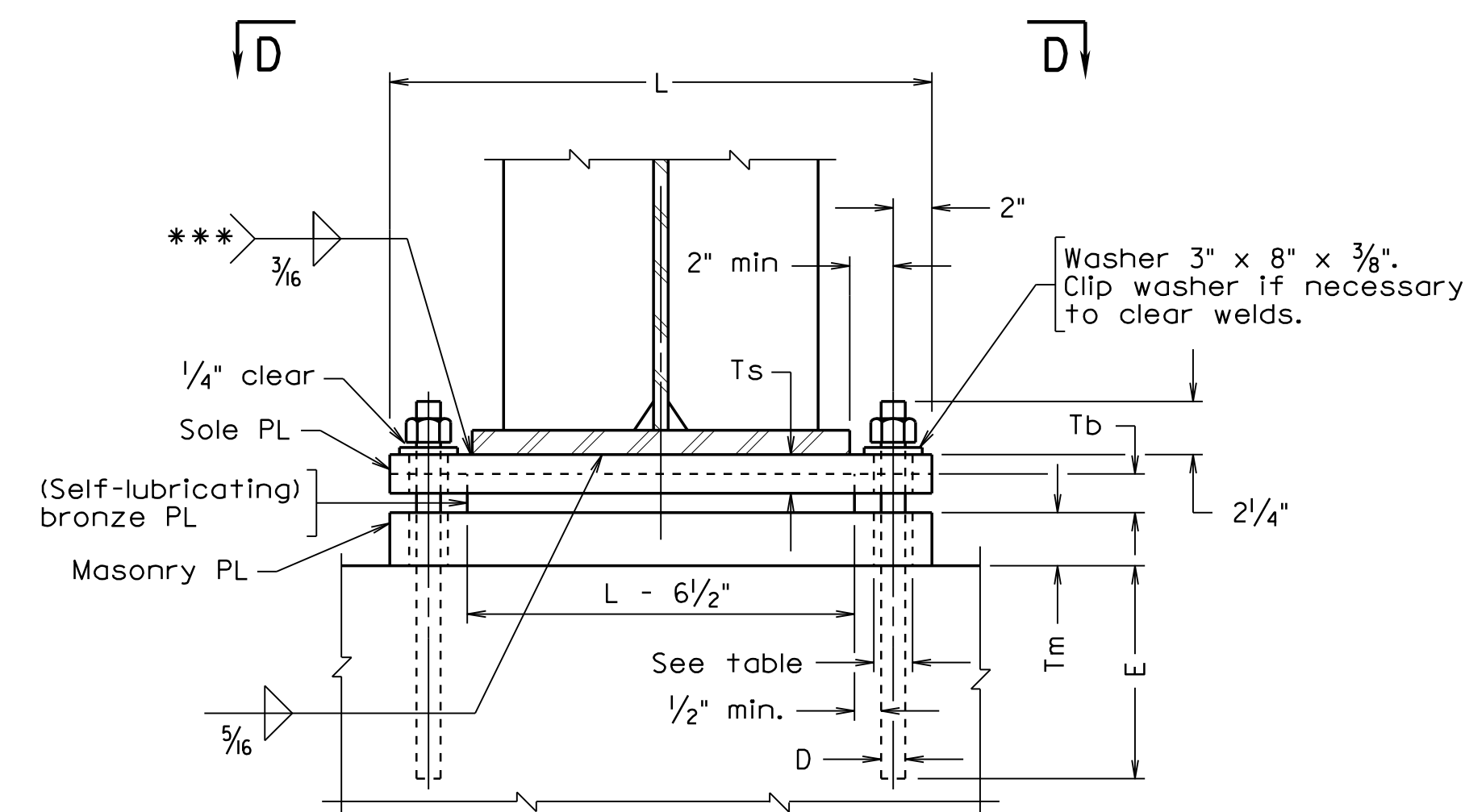
EXPANSION BEARING
ABUTMENT ELEVATION

Notes:

- Fill slots and holes in masonry plate around anchor bolts with a non-hardening caulking compound or elastic joint sealer.
- For expansion bearing, bevel sole plate to match grade if grade exceeds 1%.
- Bearing stiffeners shown are omitted if rolled beam is used.
- Radius may be machined to compensate for grade.
- Bearing shall be set so that at 60°F it is at the midpoint of its movement.
- For expansion bearings, 15" radius tolerances: Sole PL - 0", + .01"
Bronze PL - .01", + 0"

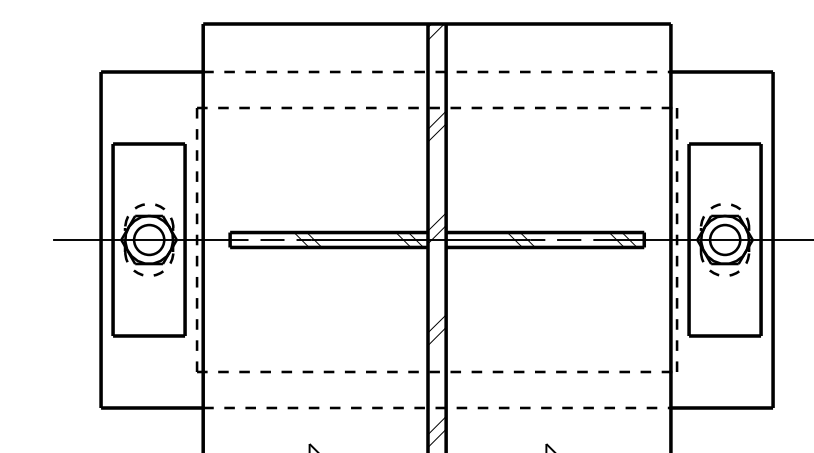


PART DETAIL OF
EXPANSION BEARING
Showing beveled sole plate



SECTION B-B

***Weld shall terminate 1/4" from edge of bearing plate.



SECTION D-D

DESIGNATION TABLE

Span	Abut.	Pier	Girder	Type	L	W	Wb	Ts	Tb	D	E	Sole plate slots	Y	Tm	% Grade	Δ	Fh	Reaction (kips)
d		3	A,L,M,N	Exp.	20	16	10	1.625	1.625	1.250	12	3 1/2" x 1 3/8"	3.625	1.250	-2.43	1.125	4	71
d		3	B,C,K	Exp.	20	16	10	1.625	1.625	1.250	12	3 1/2" x 1 3/8"	3.625	1.250	-2.43	1.125	4	71
d		3	D-J	Exp.	20	16	10	1.625	1.625	1.250	12	3 1/2" x 1 3/8"	3.625	1.250	-2.43	1.125	4	71
d	B		A,L,M,N	Exp.	20	14	8	1.250	1.250	1.250	12	3 3/4" x 1 3/8"	3.125	1.125	-2.59	1.250	4	71
d	B		B,C,K	Exp.	20	14	8	1.250	1.250	1.250	12	3 3/4" x 1 3/8"	3.125	1.125	-2.59	1.250	4	71
d	B		D-J	Exp.	20	14	8	1.250	1.250	1.250	12	3 3/4" x 1 3/8"	3.125	1.125	-2.59	1.250	4	71

Slotted holes in sole plate may be drilled or machine burned.
Dimensions Ts, Tb and Y are measured at ℓ of bearing.
All dimensions in table are in inches.

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Notes:

*Match existing slope.

**Type A milling depth at remaining existing deck shall be 1/2" and depth at new shall be 1/2". Type A Hydrodemolition shall only occur at remaining existing deck and shall be 1/2". VES Latex Modified Overlay depth at remaining existing deck shall be 2/2" and depth at new deck shall be 1/2". Type A milling depth at approach slabs shall be 1/2". VES Latex Modified Overlay depth at approach slabs shall be 3".

Final latex overlay shall be 1/2" higher than existing grade.

Contractor shall not perform milling operation without temporary shielding installed below underside of deck.

Contractor shall perform milling in Span d first and shall monitor the underside of the existing concrete deck panels for damage. If any damage occurs, Contractor shall cease milling operation and notify the Engineer.

Cost of architectural treatment for the median curb shall be included in the price bid for Architectural Treatment.

For additional information of median curb architectural treatment see general notes on sheet 2.

North overhang was not designed for traffic impact on barrier.

The Contractor shall measure the clear distance between girder ends and face of pier cap wall at Span c, Pier 3 and provide to the Engineer.

For additional deck reinforcing steel details, see sheets 37 and 63 thru 68.

For details of reinforcing steel in raised median, see sheet 69.

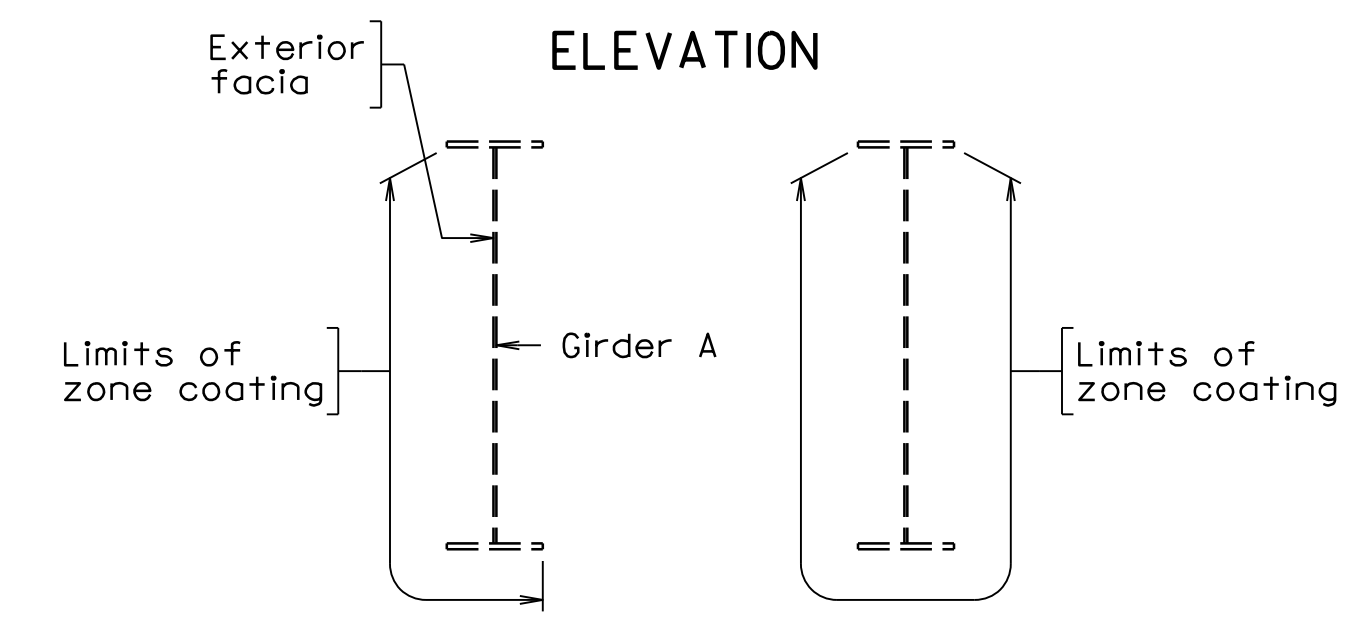
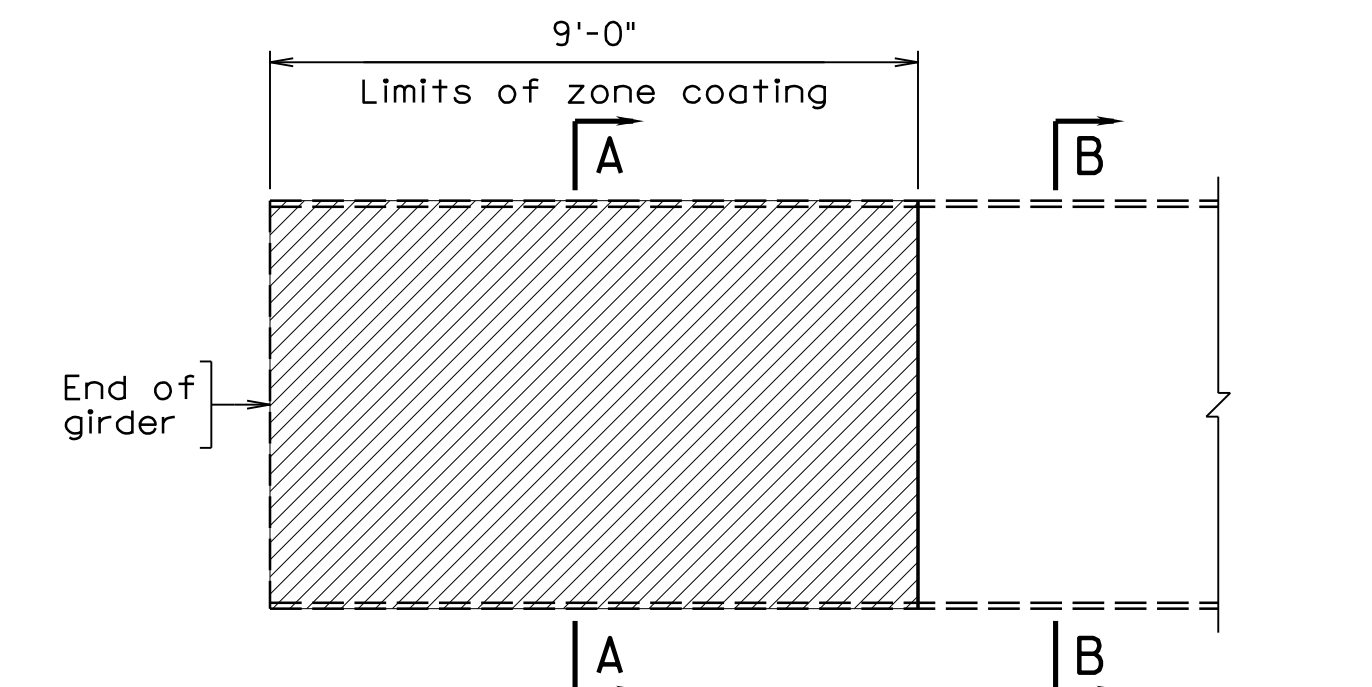
For Detail B, see sheet 71.

For pedestrian fence PF-6 details, see sheet 76.

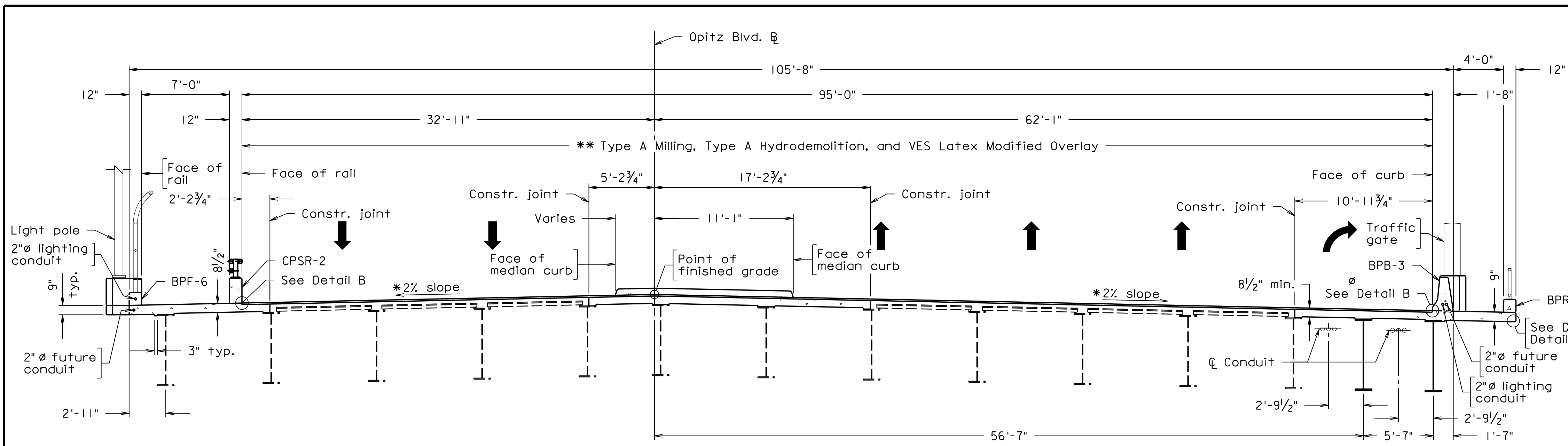
For CPSR-2 railing, see sheets 77 thru 80.

For BPB-3 parapet details, see sheet 82.

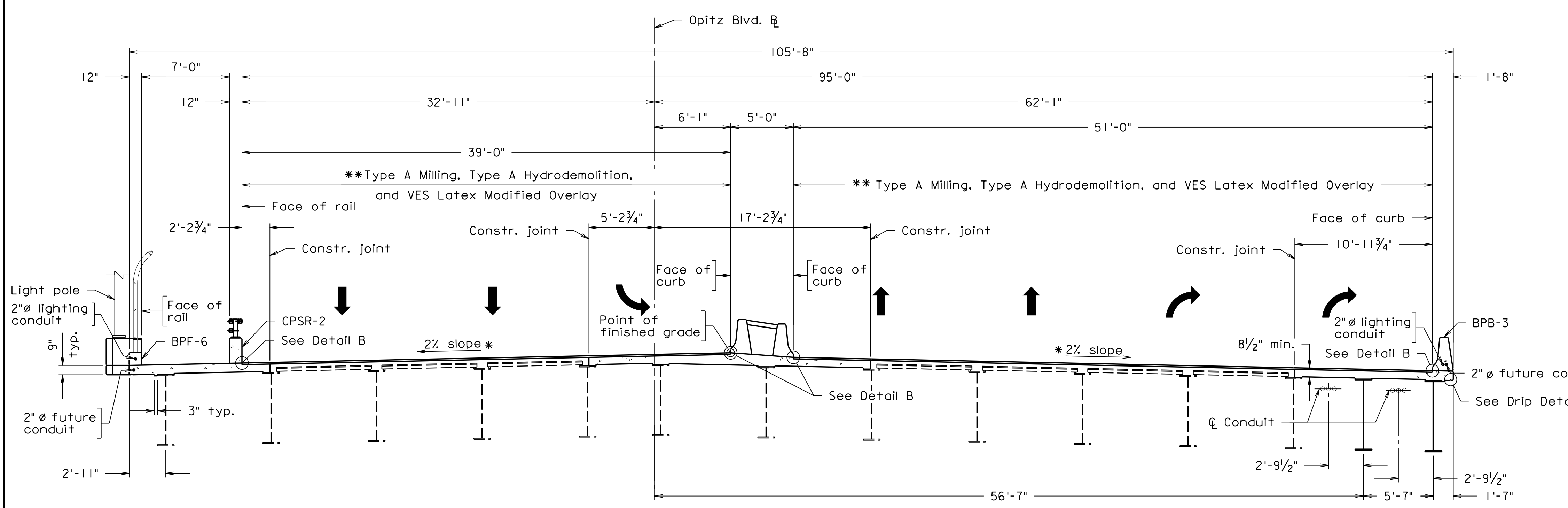
For BPR-1 pedestrian railing, see sheet 84.



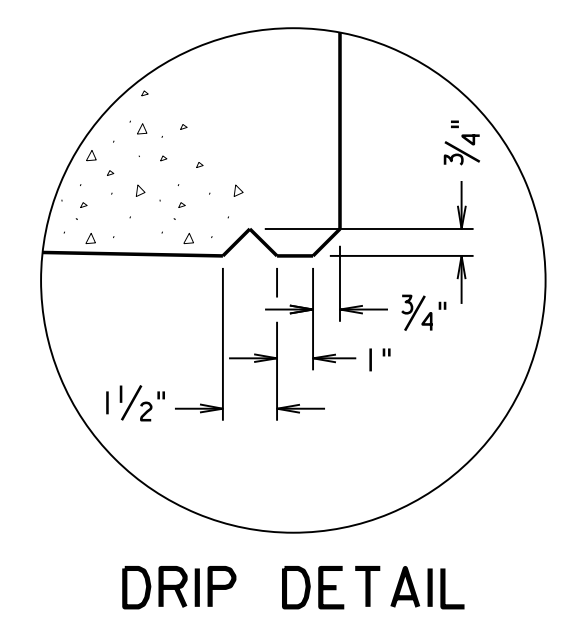
SECTION A-A SECTION B-B
ZONE COATING LIMITS



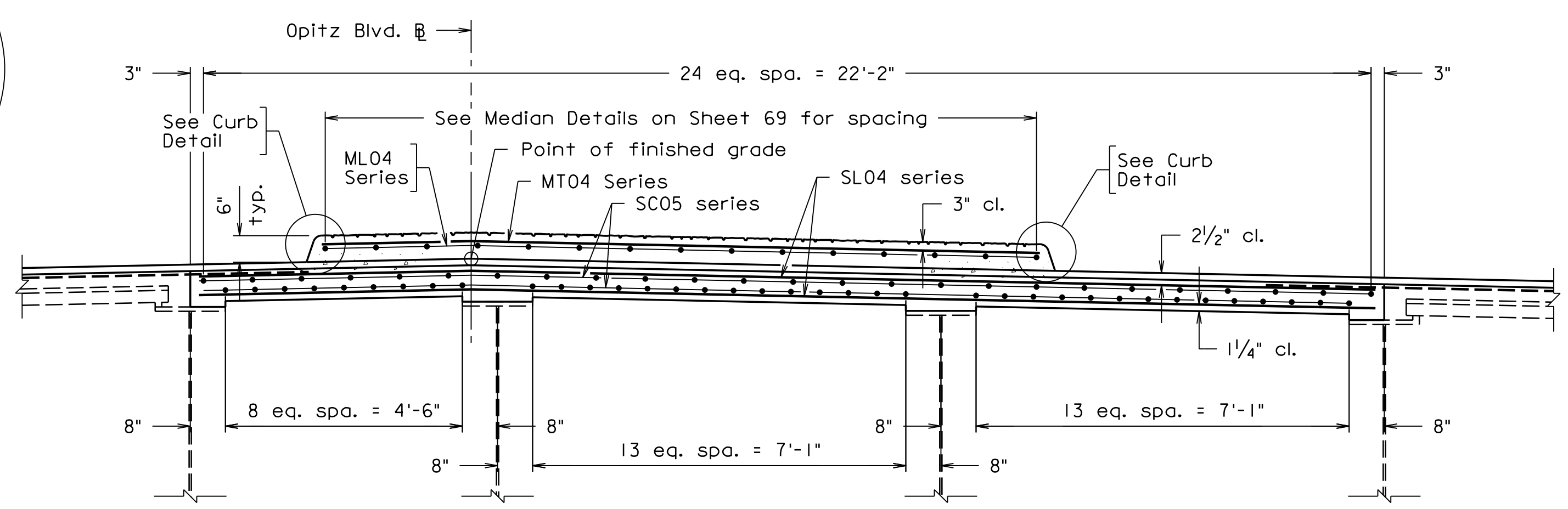
OPITZ BLVD TRANSVERSE SECTION AT MEDIAN CURB



OPITZ BLVD TRANSVERSE SECTION AT MEDIAN BARRIER

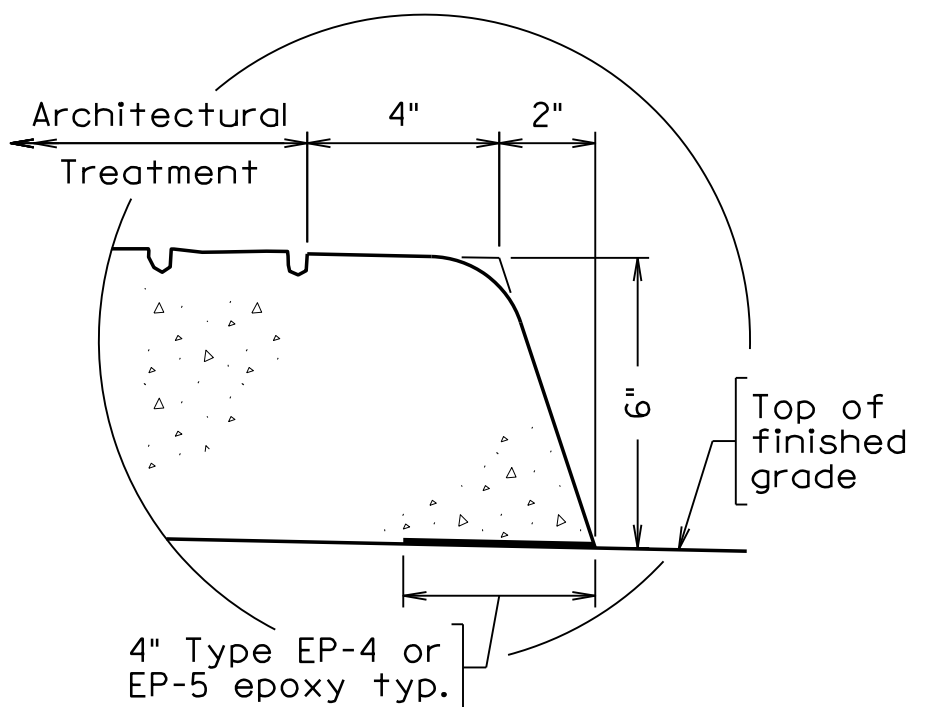


DRIP DETAIL



PART SECTION AT MEDIAN CURB

Scale: 1/2" = 1'-0"



CURB DETAIL

Scale: 3" = 1'-0"

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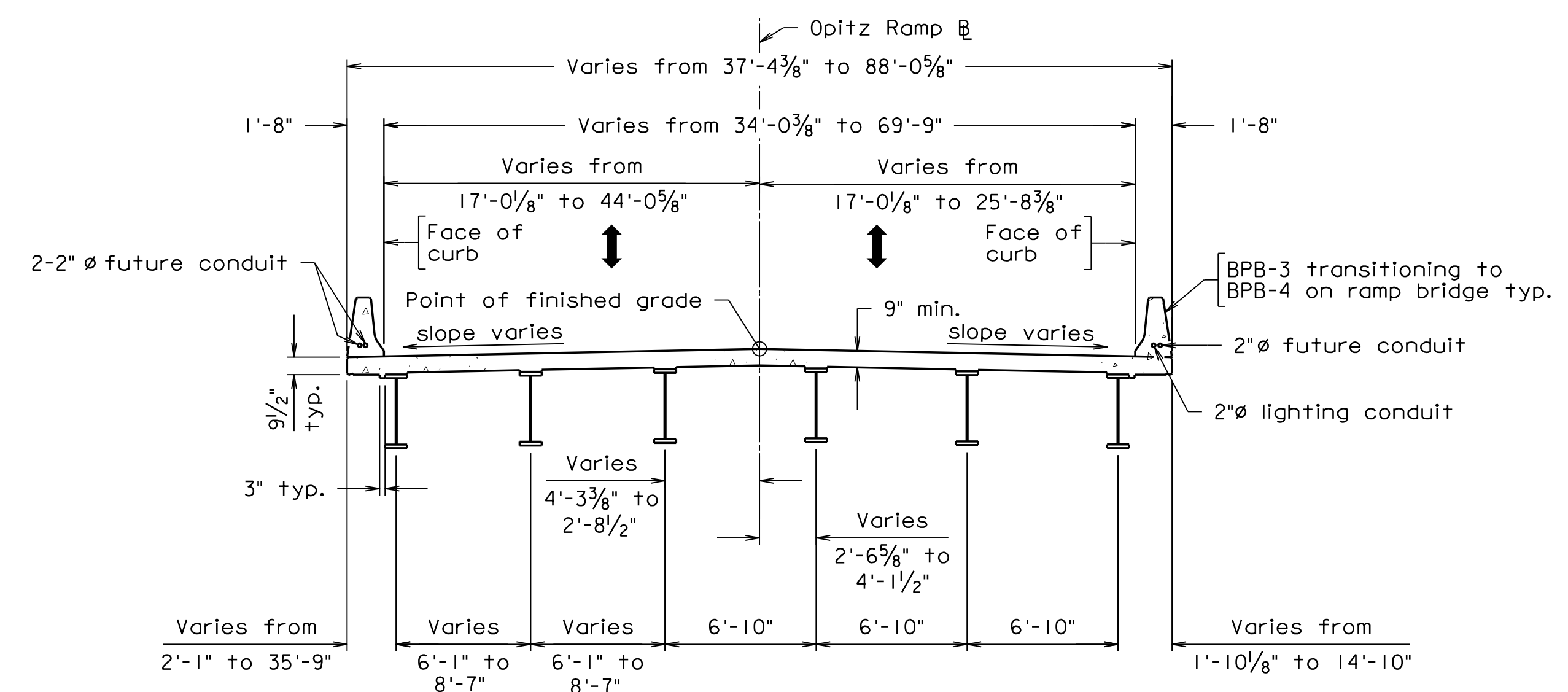
Scale: 3/16" = 1'-0" unless otherwise noted.

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TRANSVERSE SECTION 1 OF 2					
No.	Description	Date	Designed: MRO	Date	Plan No.
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			Checked: LDC		36 of 125

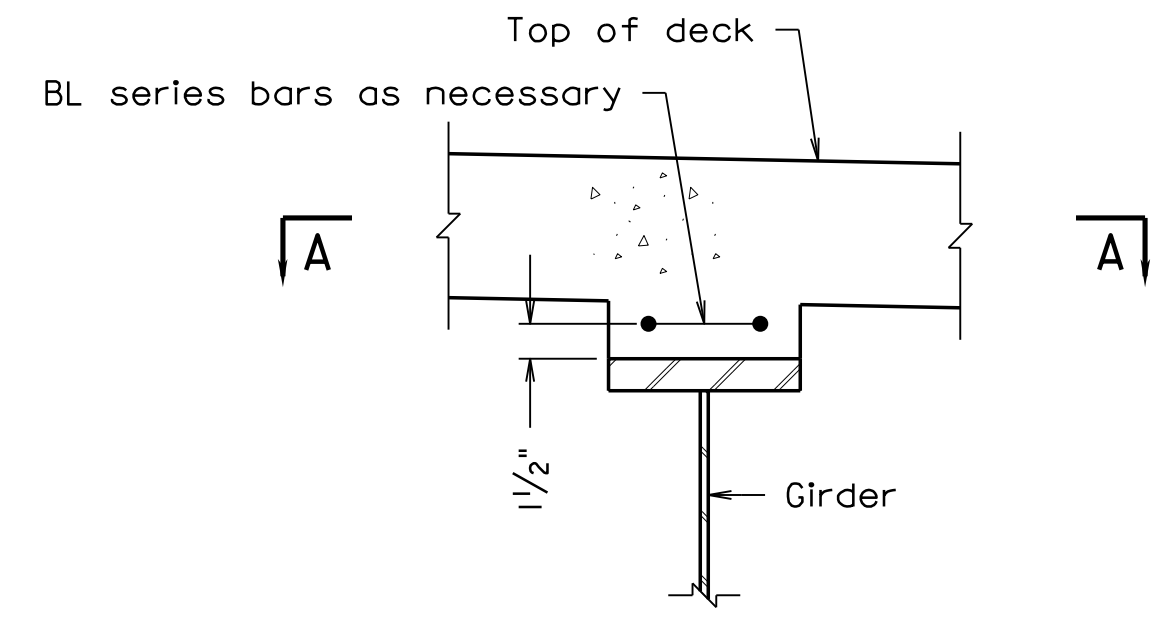
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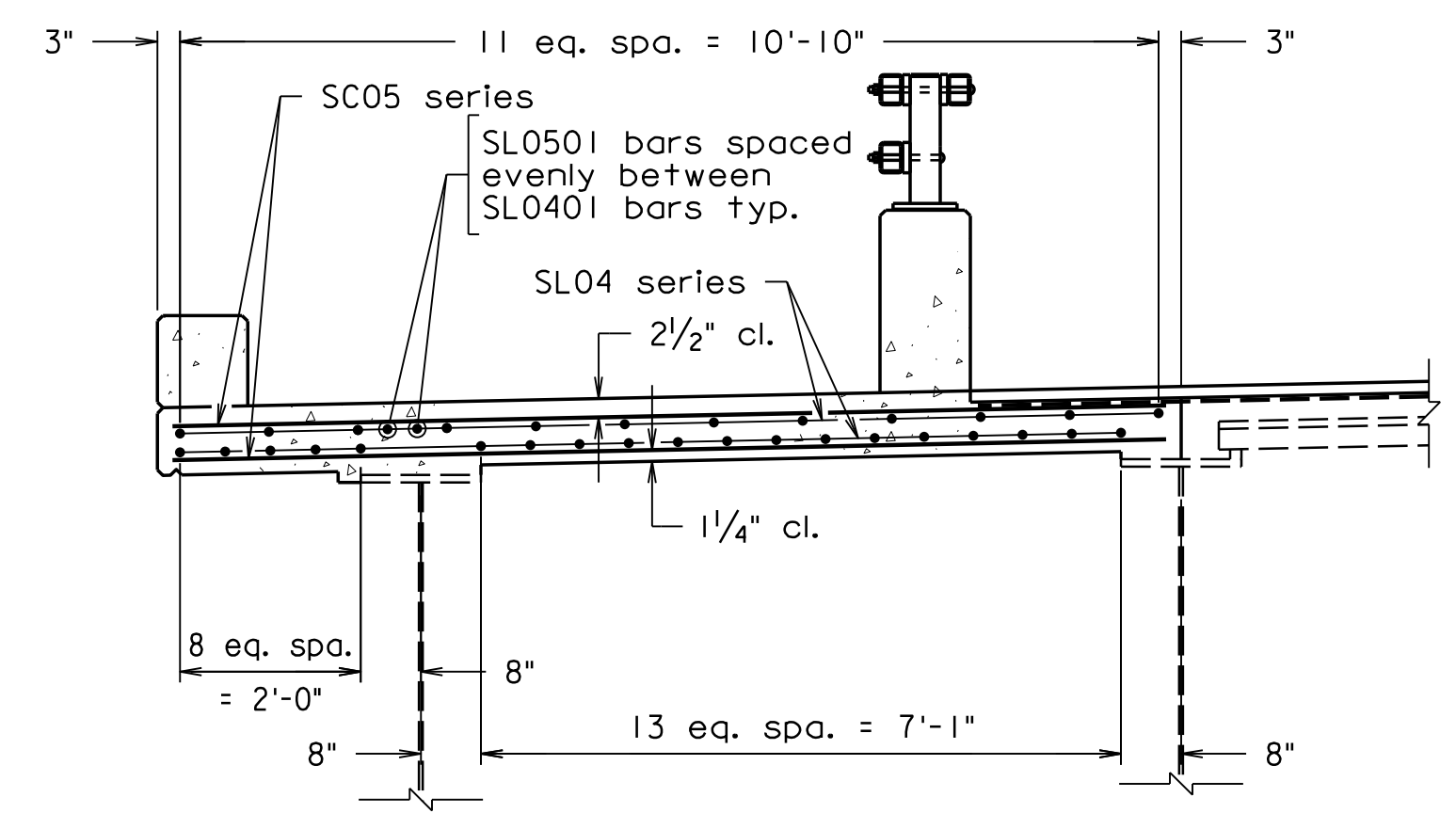


OPITZ BLVD. RAMP TRANSVERSE SECTION
Girders U, V, W and X not shown.

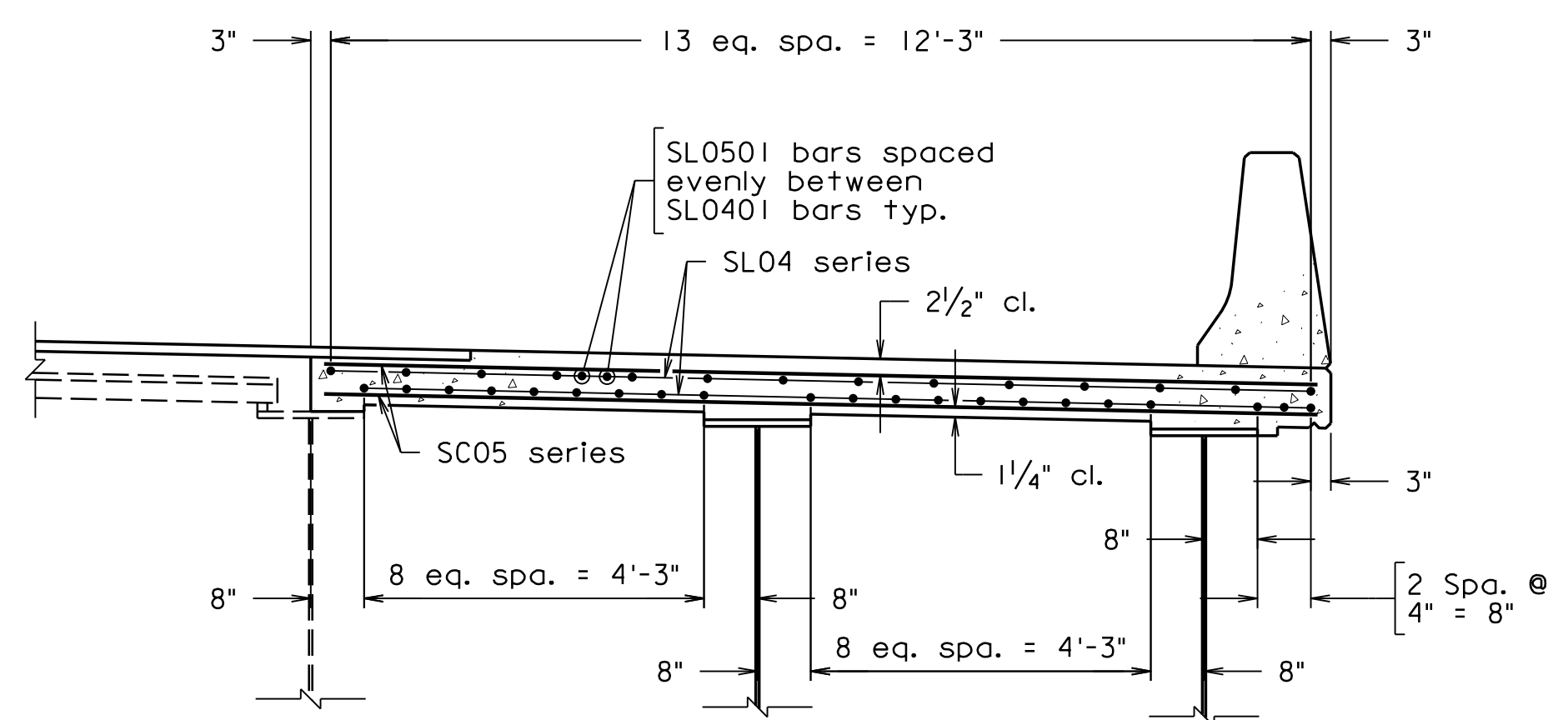
Notes:
 Bolster in Spans b, c and e are anticipated to be larger than 4 inches and additional reinforcing steel is likely to be required. For bolsters larger than 4 inches see typical bolster reinforcing detail.
 If bolster exceeds 7 inches, Contractor shall notify the Engineer prior to pouring the deck.
 For additional deck reinforcing steel details, see sheet 64 and 67.
 For BPB-3 concrete parapet details, see sheet 82 and 83.



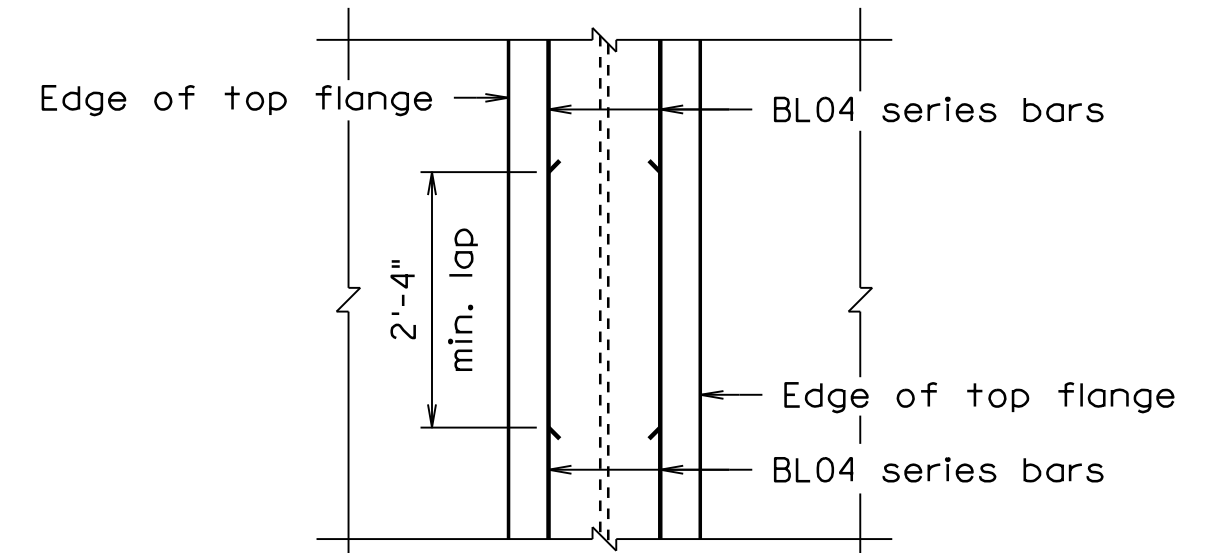
TYPICAL BOLSTER REINFORCING DETAIL
Not to scale



PART SECTION - LEFT OF OPITZ BLVD. @
Scale: 1/2" = 1'-0"



PART SECTION - RIGHT OF OPITZ BLVD. @
Scale: 1/2" = 1'-0"



SECTION A-A
Not to scale

Girder	Mark	No.	Length
Girder M	BL0401	18	40'-0"
Girder N	BL0401	18	40'-0"
Girder O	BL0401	2	40'-0"
Girder P	BL0401	2	40'-0"
Girder Q	BL0401	2	40'-0"
Girder R	BL0401	2	40'-0"
Girder S	BL0401	2	40'-0"
Girder T	BL0401	2	40'-0"
Girder U	BL0402	2	31'-0"
Girder V	BL0403	2	14'-0"
Girder W	BL0402	2	31'-0"
Girder X	BL0403	2	14'-0"

Adjust lap length for BL0401 bars over Girders M and Girder N to match girder length.
 Field cut bars to match girder length of remaining Girders.

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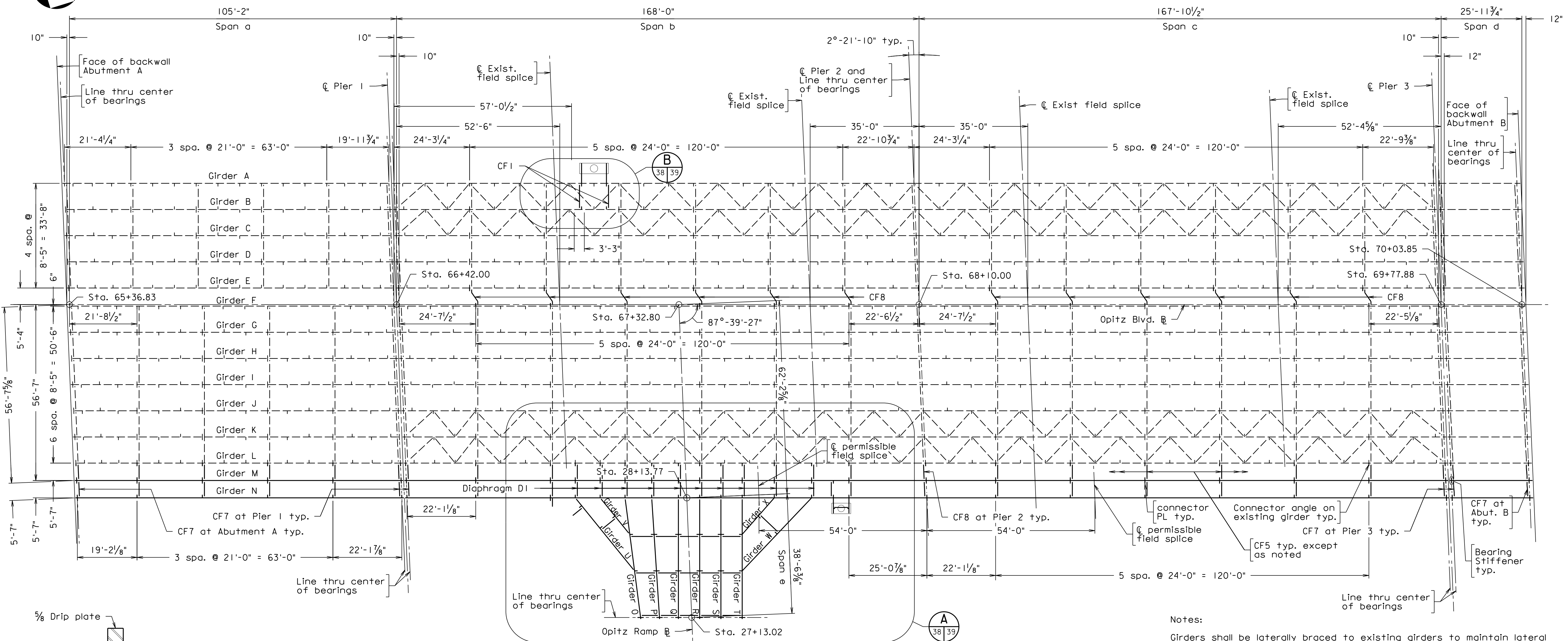
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Notes:

Girders shall be laterally braced to existing girders to maintain lateral stability during erection.

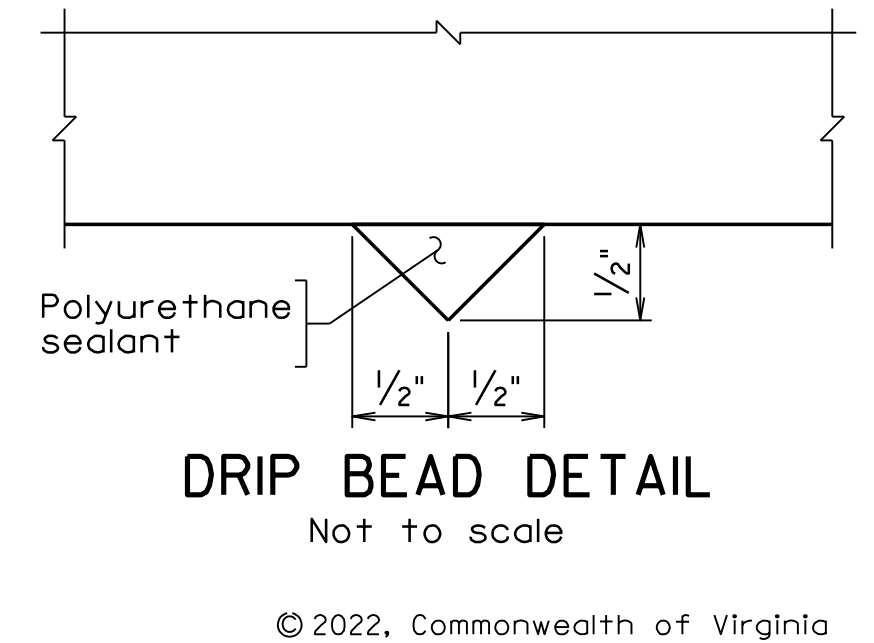
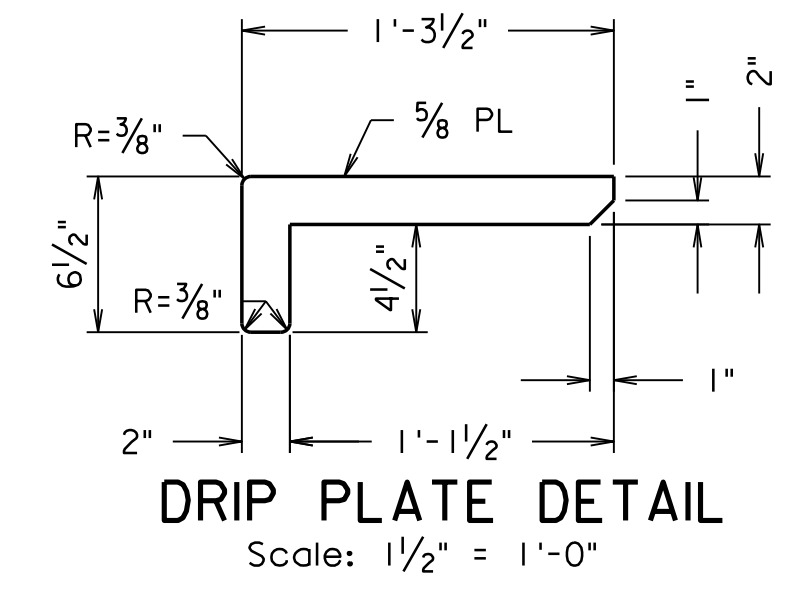
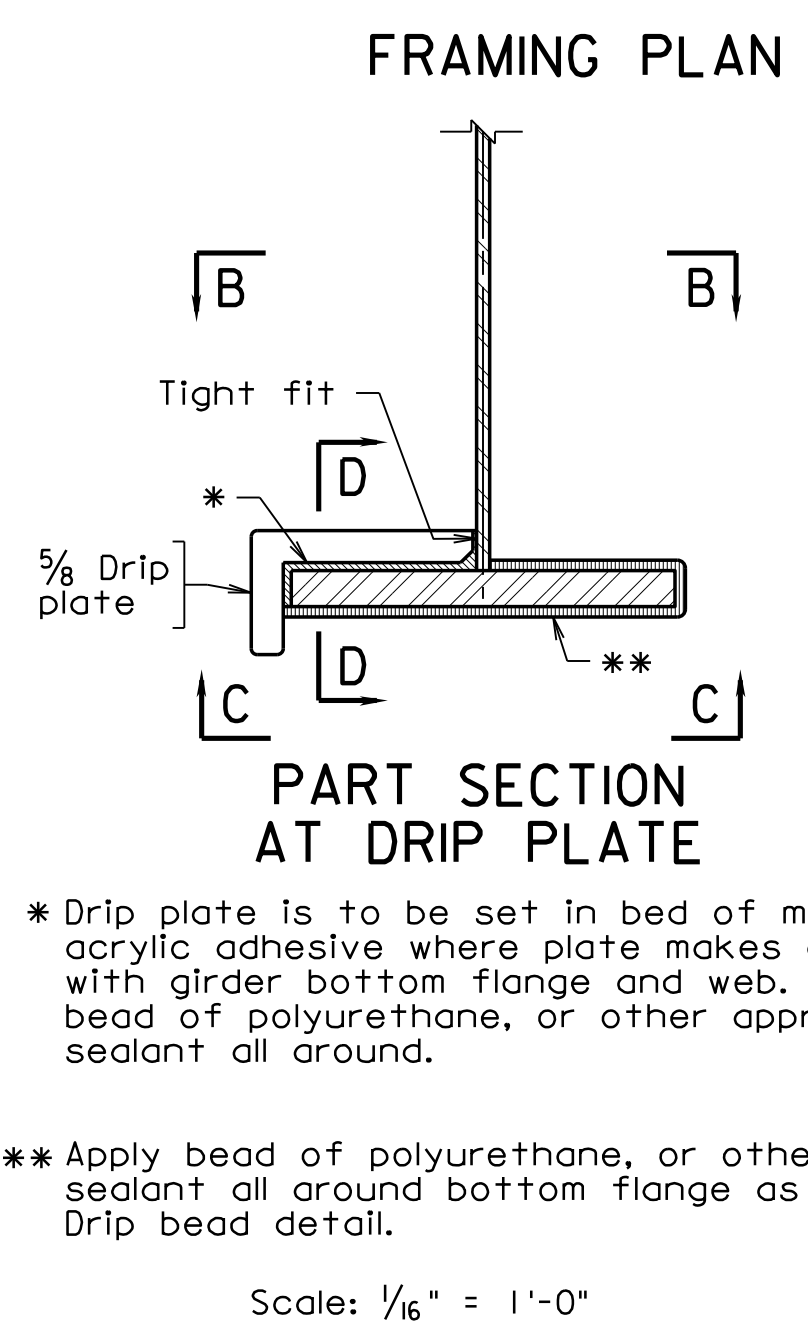
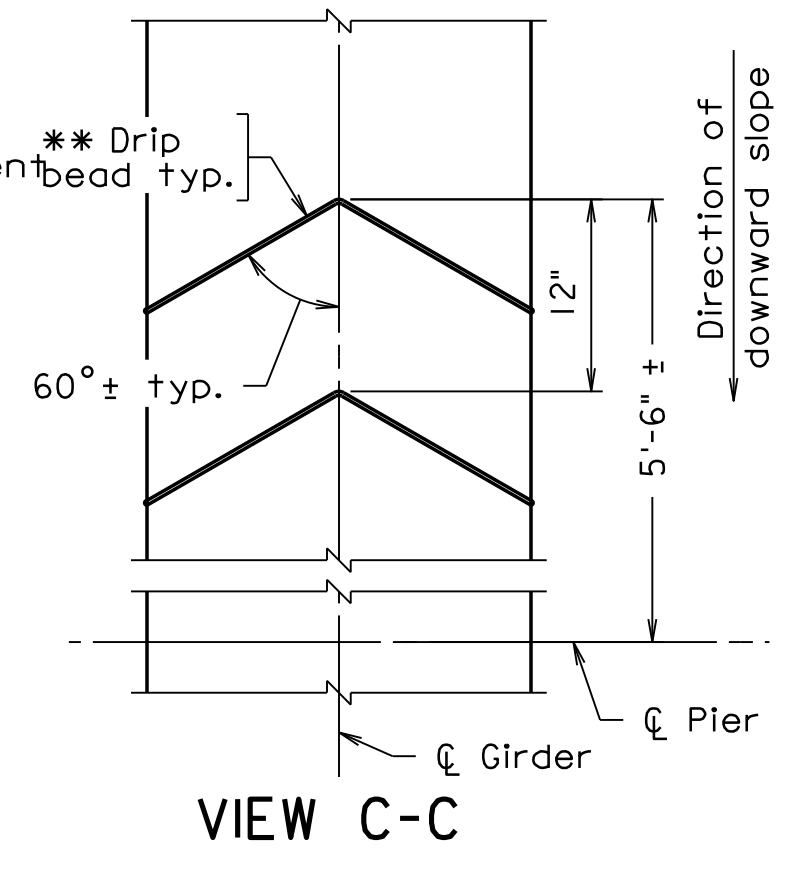
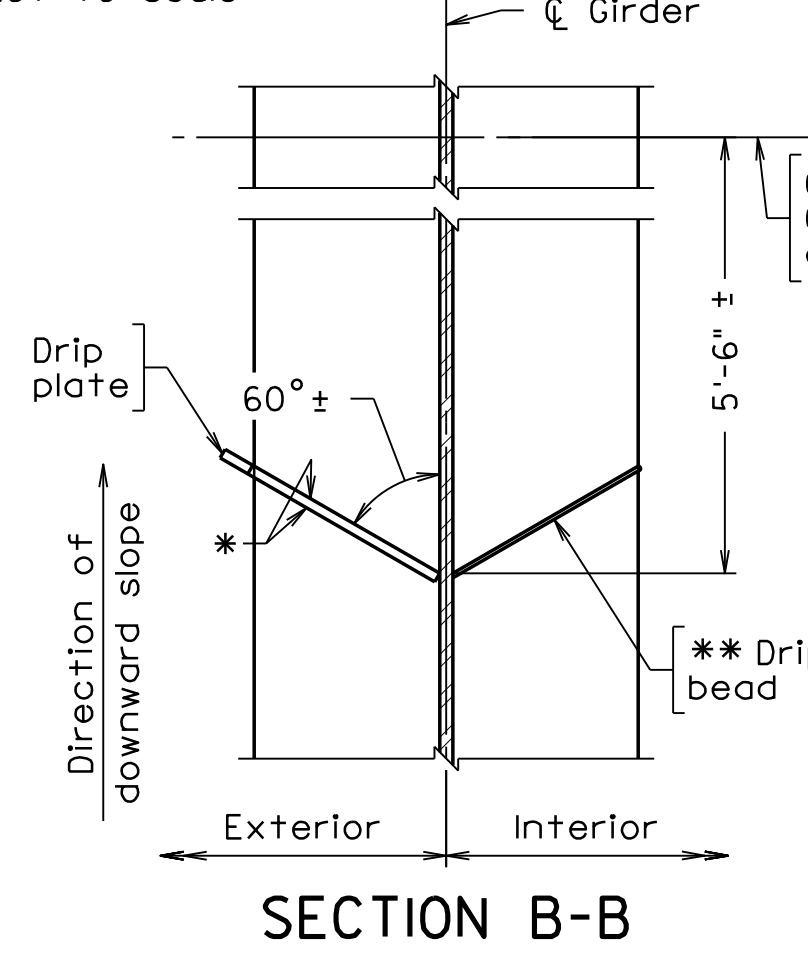
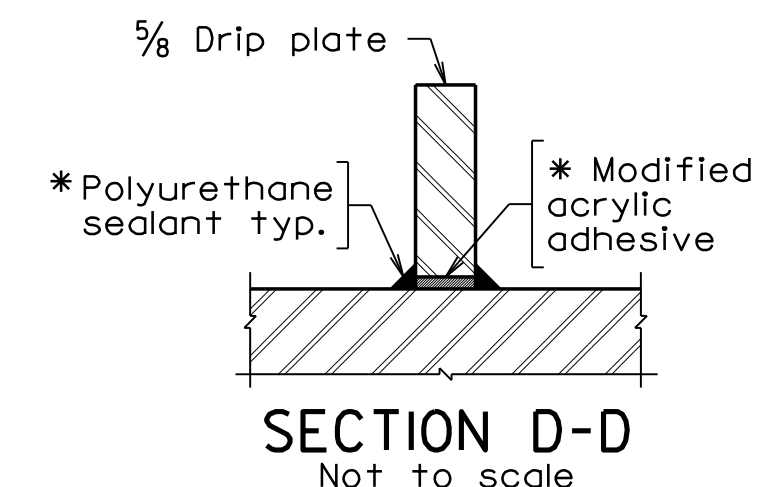
All components in Spans b, c and e shall be fully assembled by the fabricator for drilling of splice and girder connection bolt holes including girder connections, traffic signal supports and deck overhang supports to ensure proper fit-up.

Polyurethane, or other approved sealant shall conform to FS TT-S-00230C, Type II, Class A, see VDOT Specs. Sec. 407.06(i).

The cost for modified acrylic adhesive and polyurethane sealant shall be included in other bid items.

For girder details, see sheets 40 thru. 57

For bolted splice details, see sheet 58.



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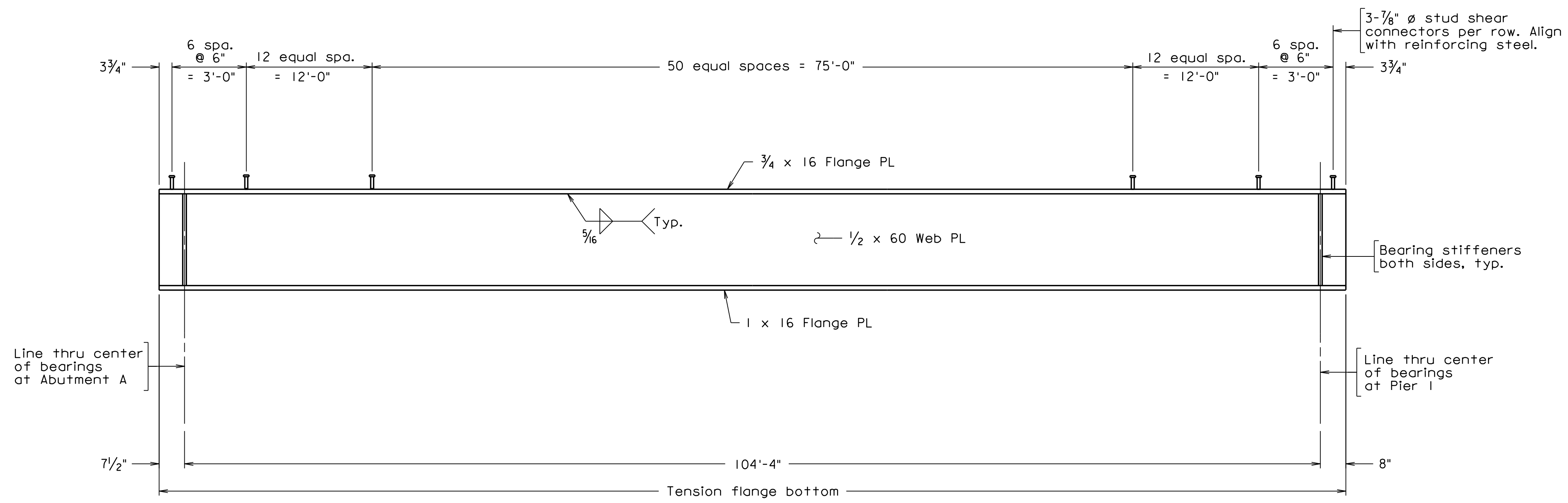
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FRAMING PLAN 1 OF 2					
No.	Description	Date	Designed: MRO.....	Date	Plan No.
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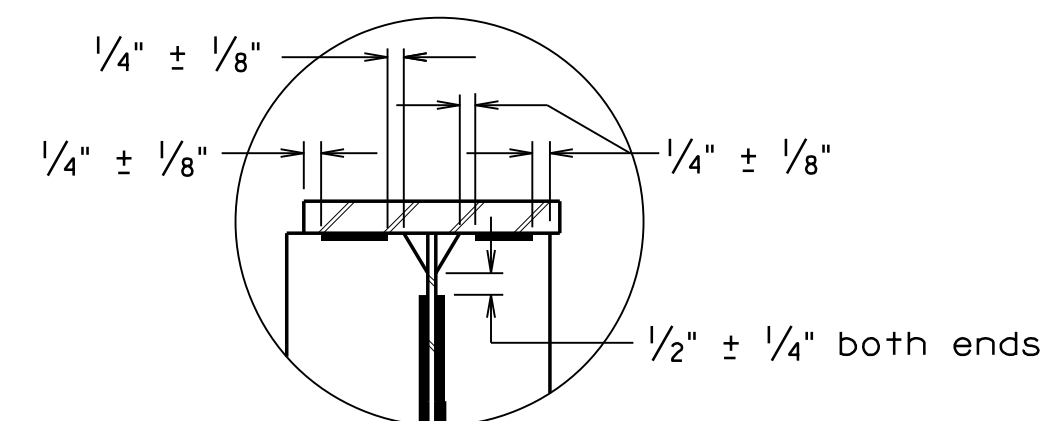
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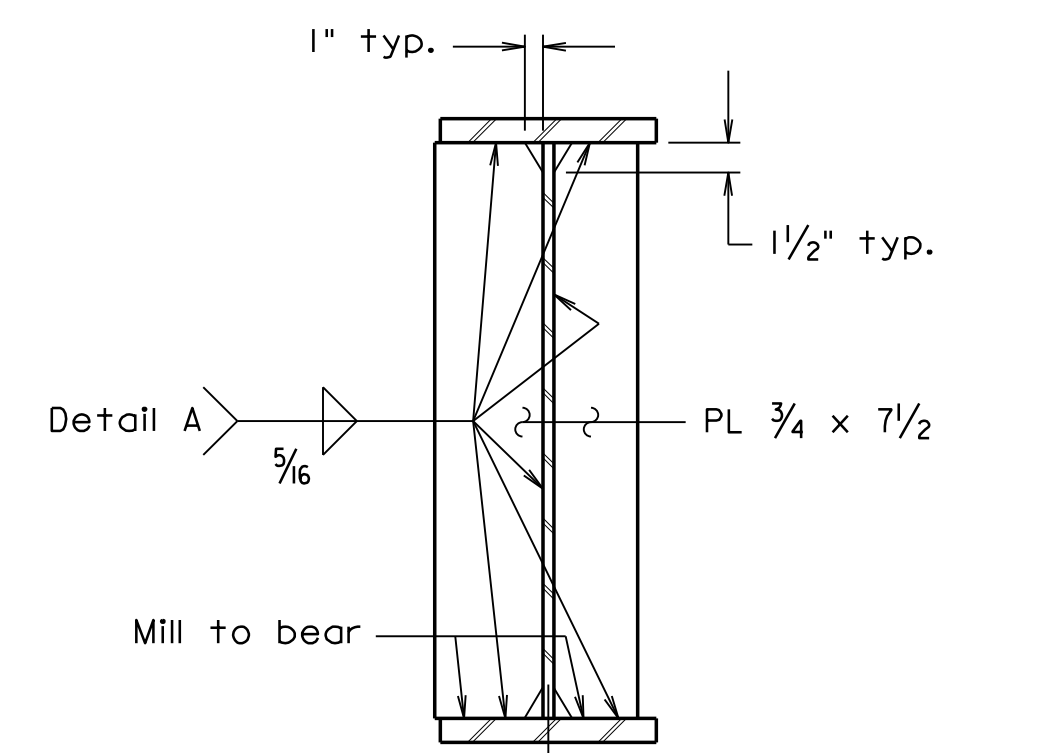
GIRDER ELEVATION

Notes:
 For spacing of intermediate diaphragm connector plates and transverse stiffeners plates, see Framing Plan, sheet 38 .
 The bottom flange and web are areas of tensile stress for Charpy V-Notch impact requirements.
 Symbol ϕ = diameter.



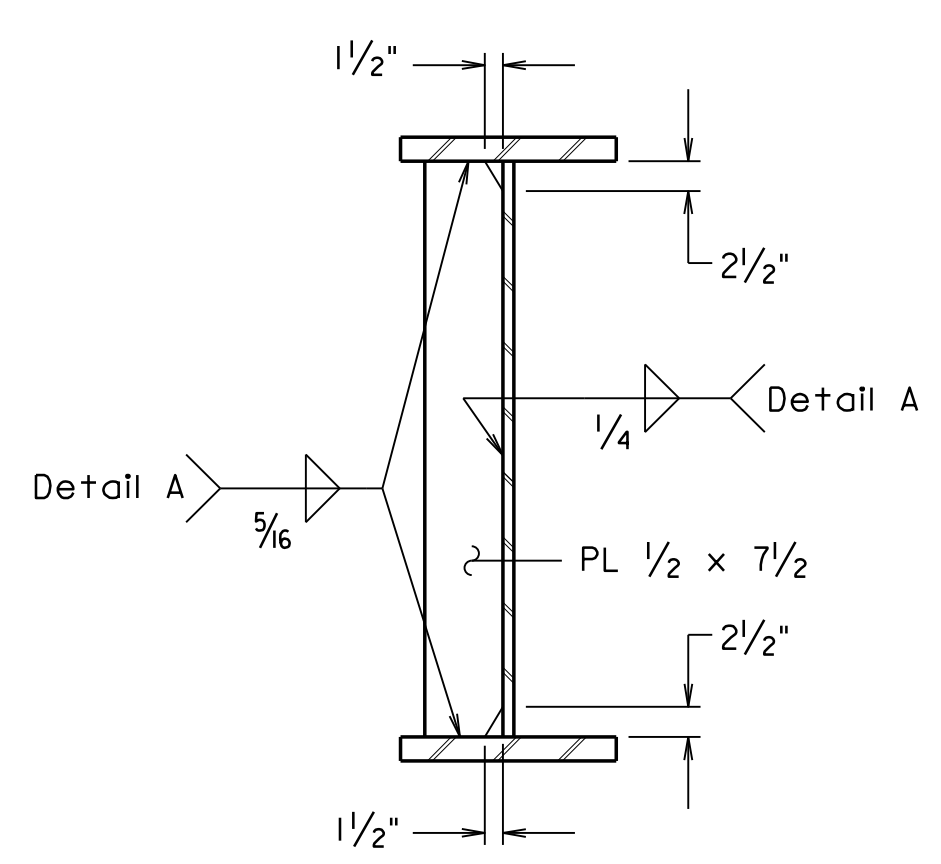
Typ. when stiffener is wider than flange
 Typ. when stiffener is narrower than flange

DETAIL A



Typ. when stiffener is wider than flange
 Typ. when stiffener is narrower than flange

BEARING STIFFENERS



CROSS FRAME CONNECTOR PLATE

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GIRDER DETAILS SPAN α				
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Revisions			Plan No. 257-38A	Sheet No. 40 of 125

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VA.			95	41
			0095-076-299, B688	

Notes:

For spacing of cross frames and intermediate diaphragm connector plates, see Framing Plan, sheet 38.

Spacing of stud shear connectors at bolted field splices, shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. This adjusted spacing shall be shown on the shop drawings.

The top and bottom flanges as shown in Girder Elevation, the web and all splice plates are areas of tensile stress for Charpy V-Notch impact requirements.

If the Contractor chooses to eliminate one or more bolted field splice(s), the Contractor shall submit their shipping and erection plans along with the shop drawings to the Department for review and approval. The shipping and erection plans shall be signed and sealed by a Professional Engineer, holding a valid license to practice engineering in the Commonwealth of Virginia. Approval for eliminating of a bolted field splice does not imply issuance of a hauling permit.

Symbol ϕ = diameter.

Webs and flanges shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

All CJP welds shall be inspected by radiographic and ultrasonic testing.

Parabolic Haunch:

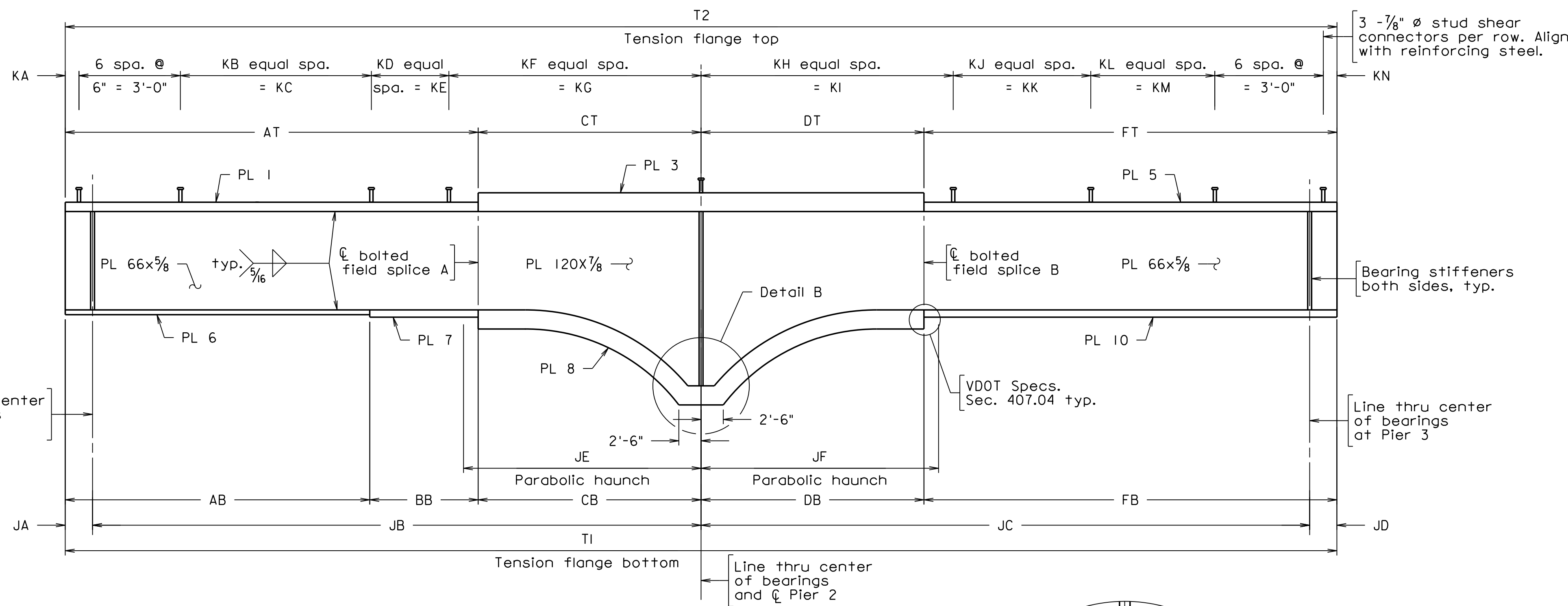
Parabolic Haunch Web Depth is defined as:

$$H = H_{min} + (A \times X^2)$$

Where:

- H = Web depth (inches)
- H_{min} = Minimum Web depth at end of hauch (inches)
- A = Constant at particular haunch (see table)
- X = Distance from end of hauch at least web depth (feet)

CONSTANT A		
Pier	Span	A
2	b	0.01578
2	c	0.01578



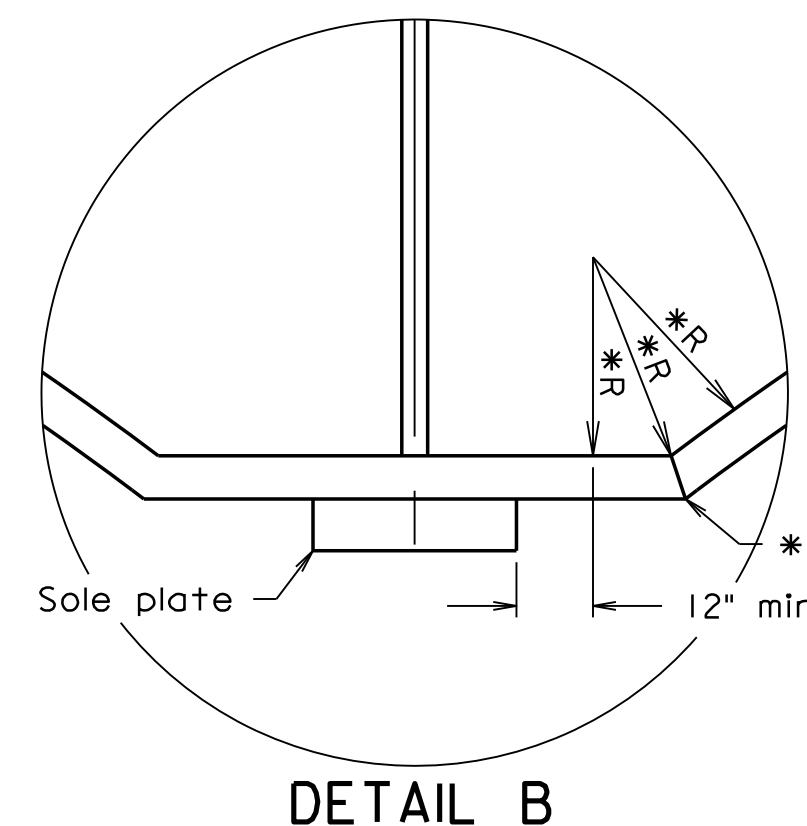
GIRDER ELEVATION

PLATE DIMENSION TABLE											
Girder	Web PL	PL 1	PL 2	PL 3	PL 4	PL 5	PL 6	PL 7	PL 8	PL 9	PL 10
M	Varies	18x1 1/2	---	20x1 1/2	---	16x1 1/2	18x1 1/2	18x2 1/4	20x1 3/4	---	18x1 1/2
N	Varies	18x1 1/2	---	20x1 1/2	---	16x1 1/2	18x1 1/2	18x2 1/4	20x1 3/4	---	18x1 1/2

GIRDER DIMENSION TABLE												
Girder	AB	AT	BB	BT	CB	CT	DB	DT	EB	ET	FB	FT
M	42'-7 1/2"	113'-9 1/2"	71'-2"	---	54'-0"	54'-0"	54'-0"	54'-0"	---	---	113'-8"	113'-8"
N	42'-7 1/2"	113'-9 1/2"	71'-2"	---	54'-0"	54'-0"	54'-0"	54'-0"	---	---	113'-8"	113'-8"

GIRDER DIMENSION TABLE																				
Girder	JA	JB	JC	JD	JE	JF	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN
M	7 1/2"	167'-2"	167'-0 1/2"	7 1/2"	58'-6"	58'-6"	3"	20	20'-0"	88	110'-0"	18	34'-6 1/2"	25	50'-0"	76	95'-0"	20	95'-5"	3"
N	7 1/2"	167'-2"	167'-0 1/2"	7 1/2"	58'-6"	58'-6"	3"	18	27'-0"	---	---	69	137'-6 1/2"	28	56'-0"	52	91'-0"	12	17'-5"	3"

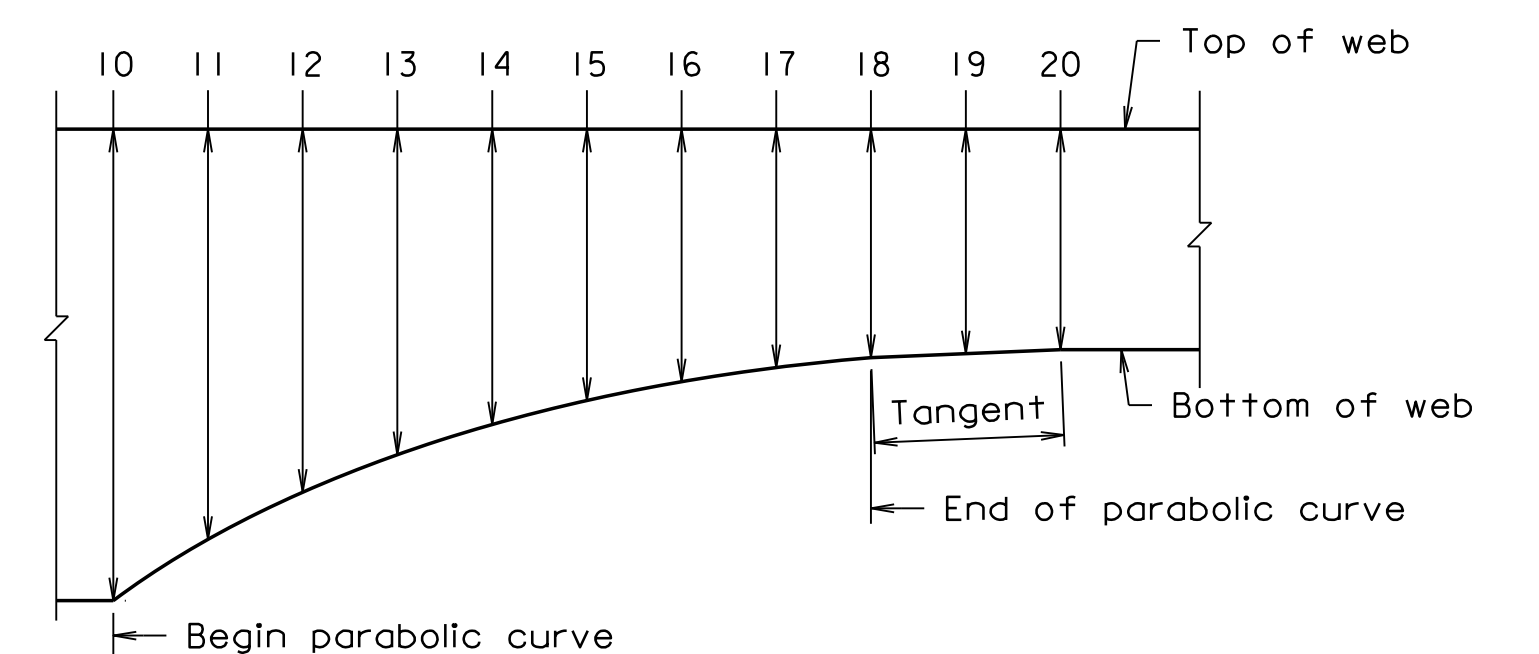
TENSION FLANGES		
Girder	T1	T2
M	335'-5 1/2"	335'-5 1/2"
N	335'-5 1/2"	335'-5 1/2"



DETAIL B

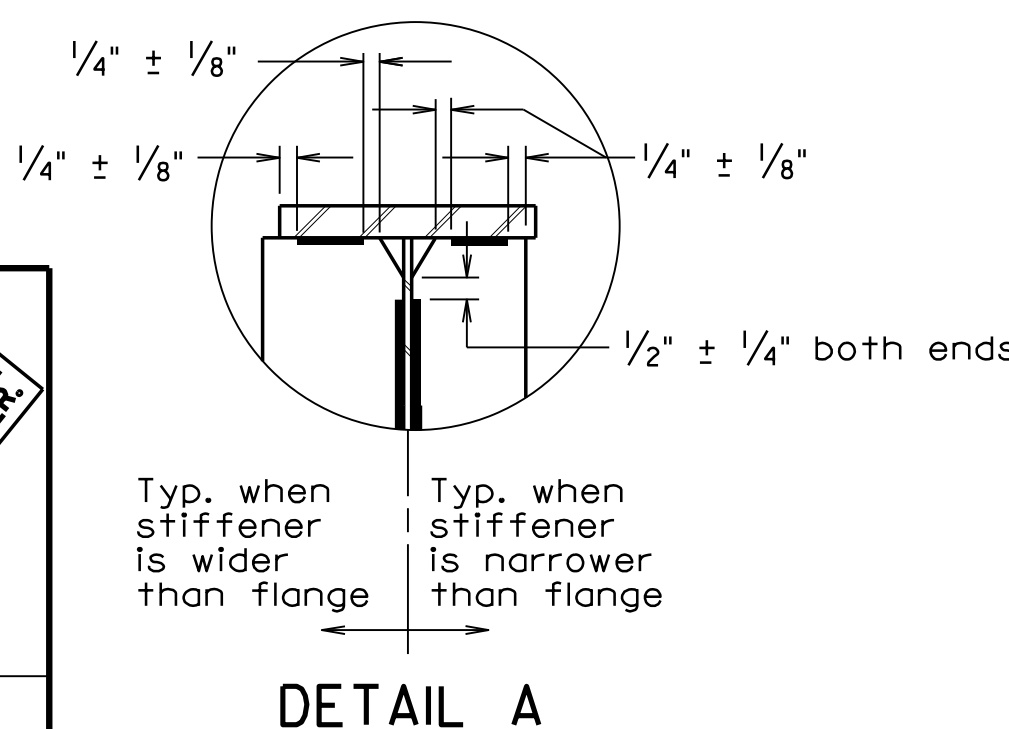
* Radius to be determined by the fabricator. As alternative, the fabricator may elect to cut and shop weld the parabolic web plate to the bottom flange plate.

** At the transition from the girder over the pier to the beginning of the parabolic web, the fabricator may either bend the flange or place a CJP weld in the bottom flange between the straight and parabolic girder sections.

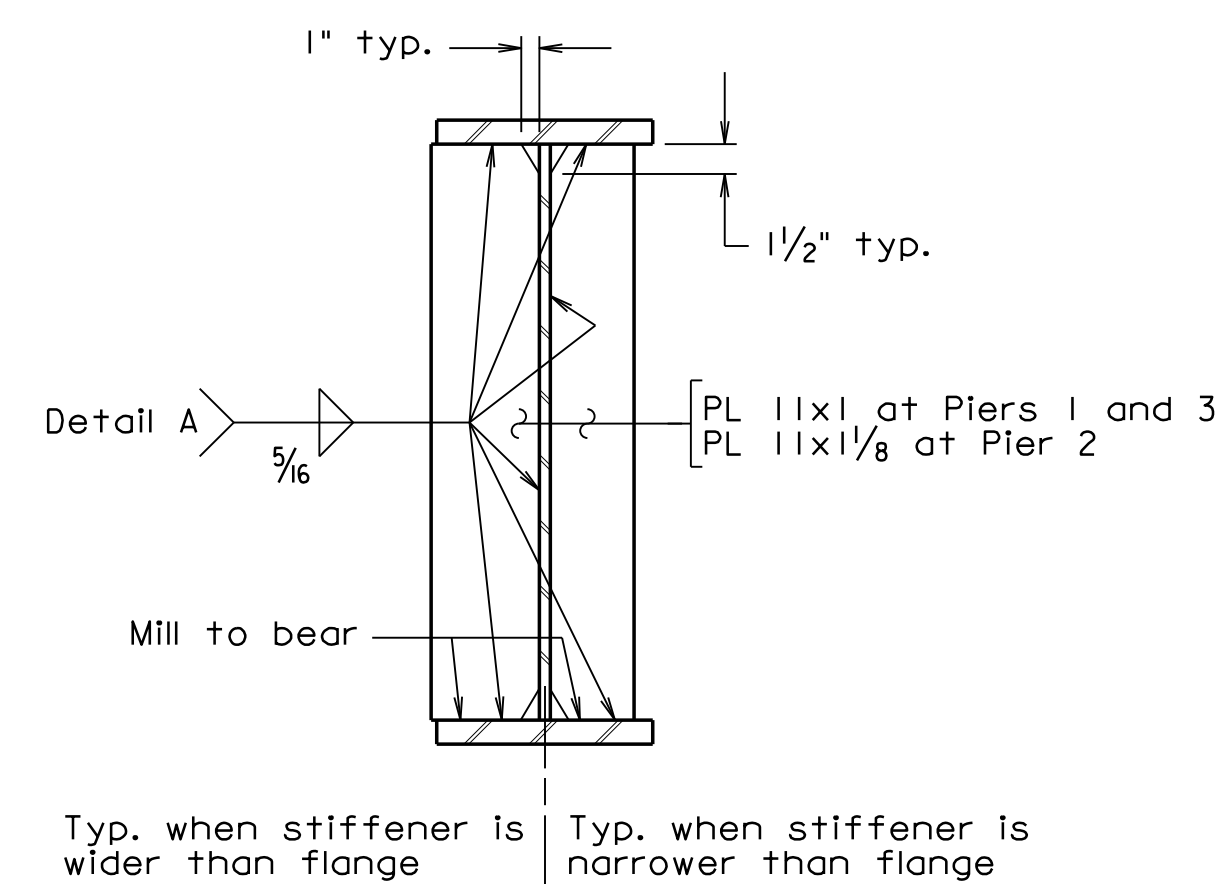


GIRDER HAUNCH DETAIL

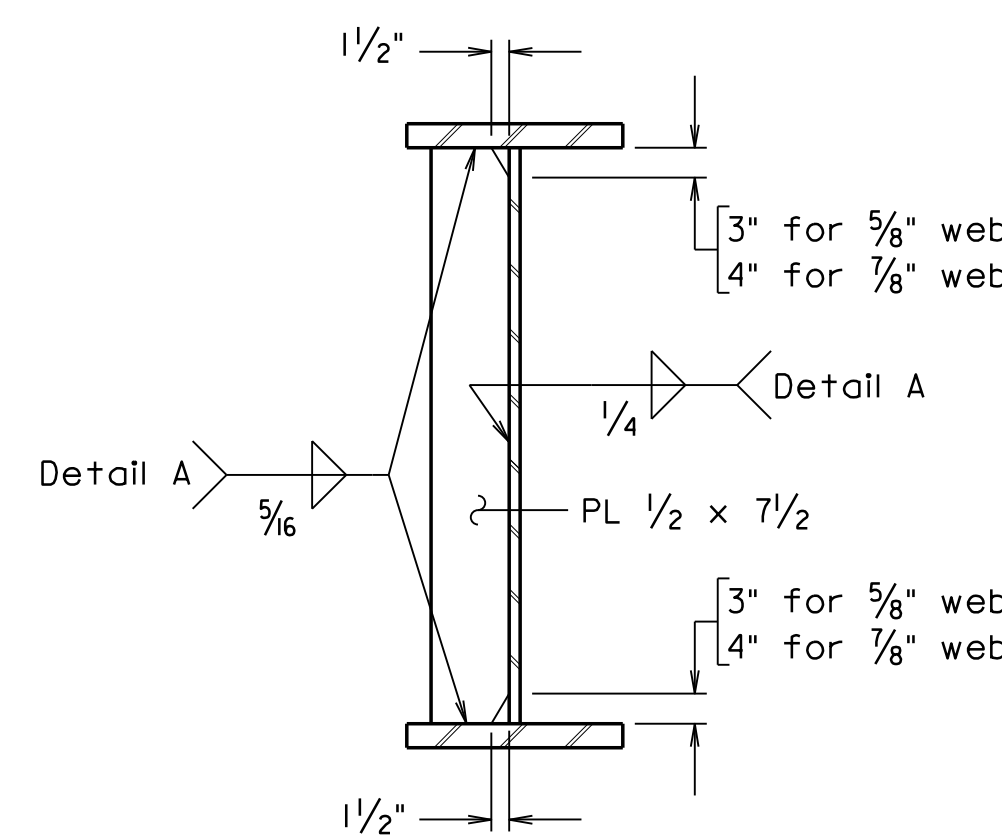
GIRDER HAUNCH DIMENSION TABLE											
Point	10	11	12	13	14	15	16	17	18	19	20
Web depth	120"	109 3/4"	100 1/2"	92 1/2"	85 1/2"	79 1/2"	74 5/8"	70 7/8"	68 1/8"	67 1/8"	66"



DETAIL A



BEARING STIFFENERS



CROSS FRAME CONNECTOR PLATE

For cross frame connector plate sizes at ramp girder connections, see sheets 55 through 57.

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GIRDER DETAILS SPANS b AND c			
No.	Description	Date	Revisions
Designed: MJJ	Date	Plan No.	Sheet No.
Drawn: MJJ	Apr. 2022	257-38A	41 of 125
Checked: MRD			

257-38A_041.dgn

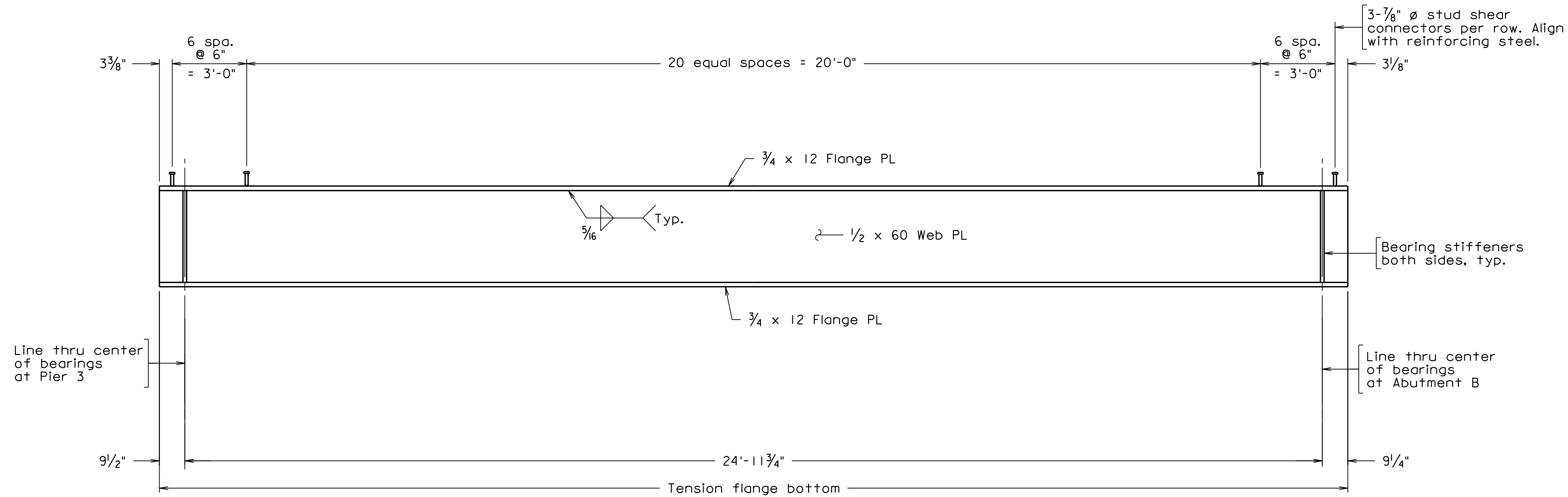
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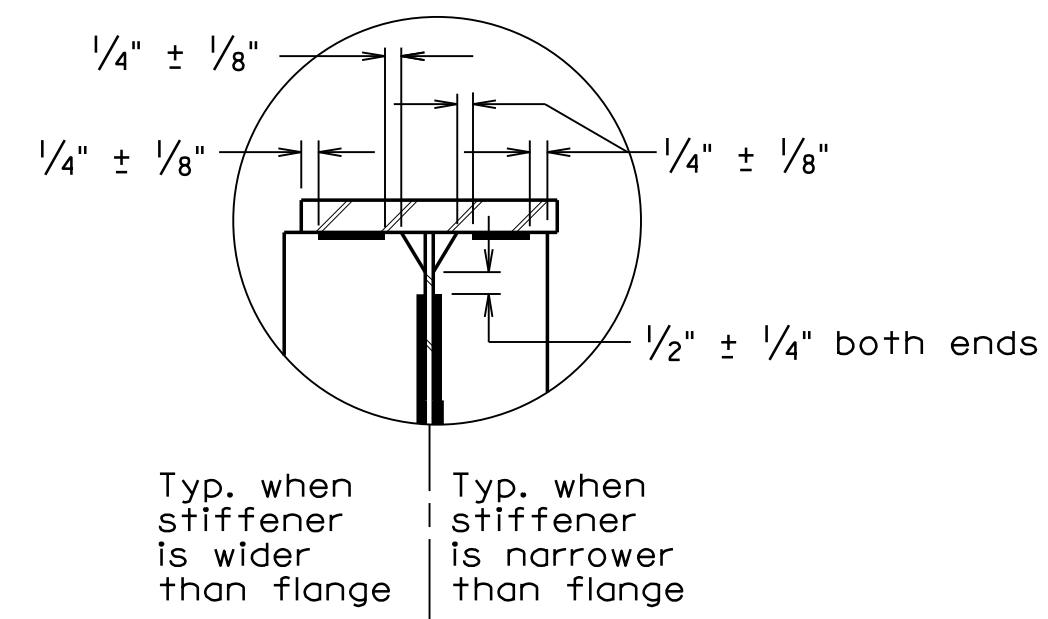
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			42

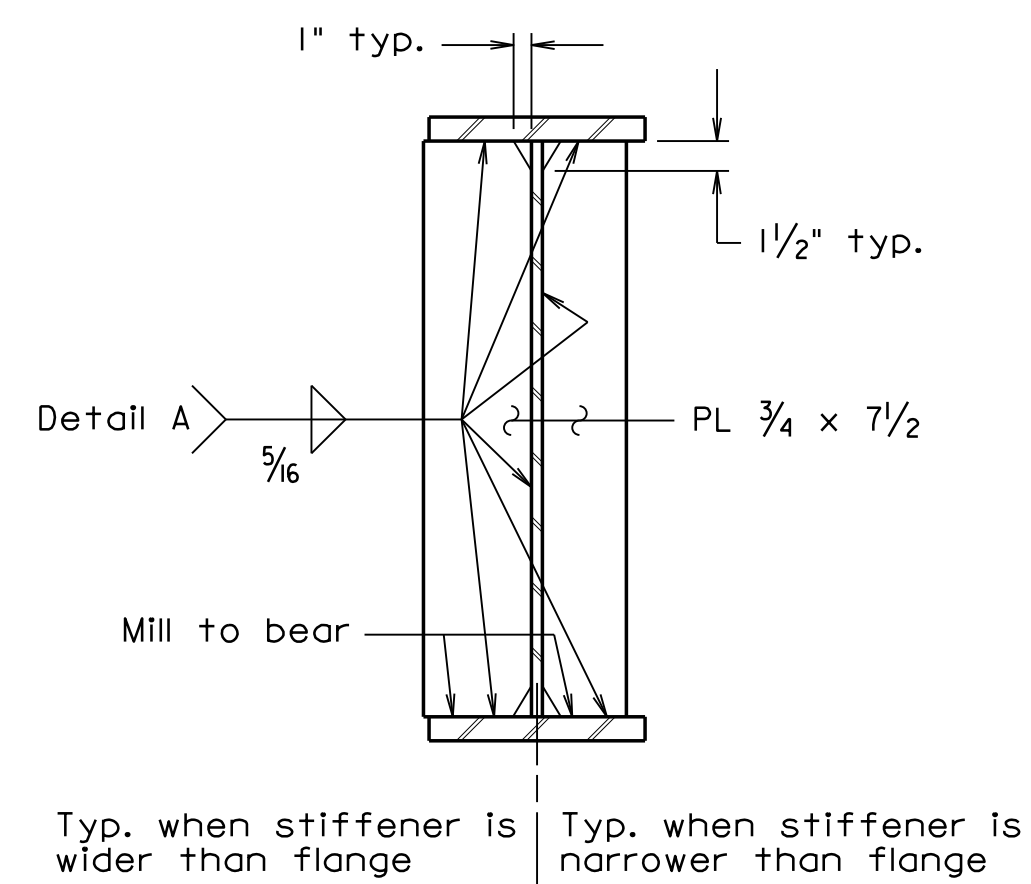
Notes:
 The bottom flange and web are areas of tensile stress for Charpy V-Notch impact requirements.
 Symbol ϕ = diameter.



GIRDER ELEVATION



DETAIL A



BEARING STIFFENERS

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GIRDER DETAILS SPAN d					
No.	Description	Date	Designed: RW.....	Date	Plan No.
			Drawn: KML.....	Apr. 2022	257-38A
			Checked: AR.....		42 of 125
Revisions					

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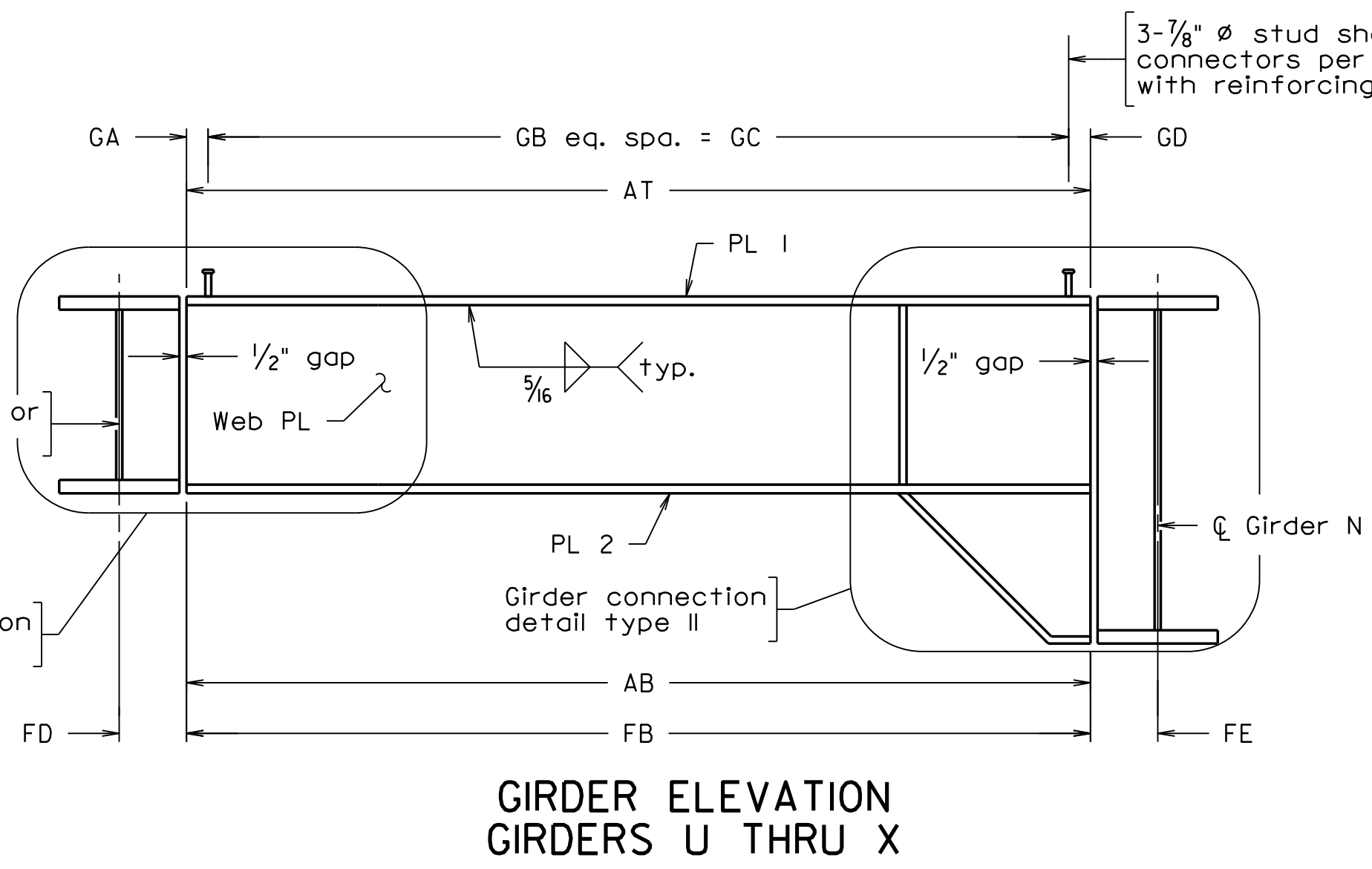
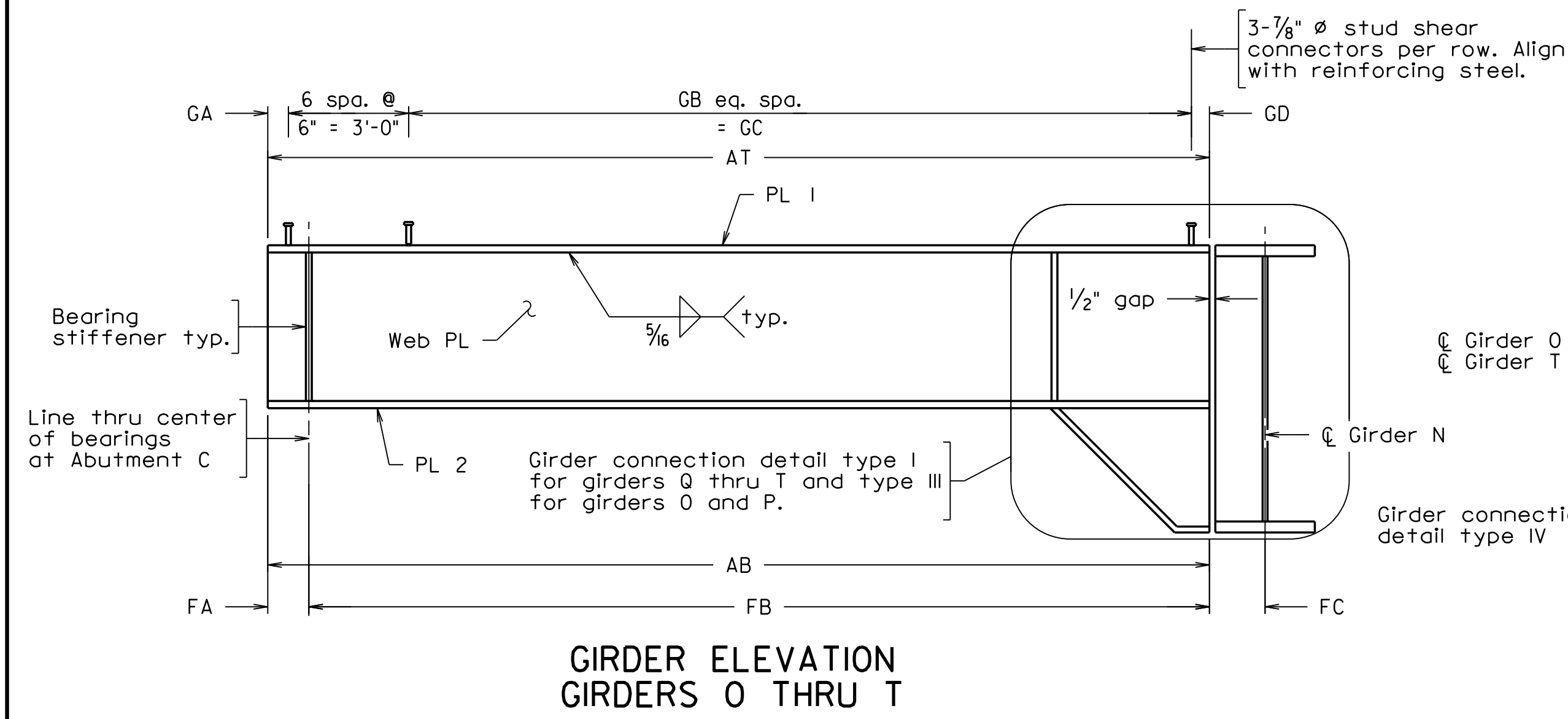
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Notes:

Spacing of stud shear connectors at bolted field splices, shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. This adjusted spacing shall be shown on the shop drawings.

The bottom flange, web, and all splice plates are areas of tensile stress for Charpy V-Notch impact requirements.

Webs, flanges and girder connections including connection plates shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

The fabricator shall take care when welding flange to web to prevent distortion in flange to ensure tight connections in girder connections.

Symbol ϕ = diameter.

For spacing of intermediate diaphragm connector plates, see Framing Plan, sheet 39.

For girder connection detail type I, see sheet 55.

For girder connection detail type II, see sheet 56.

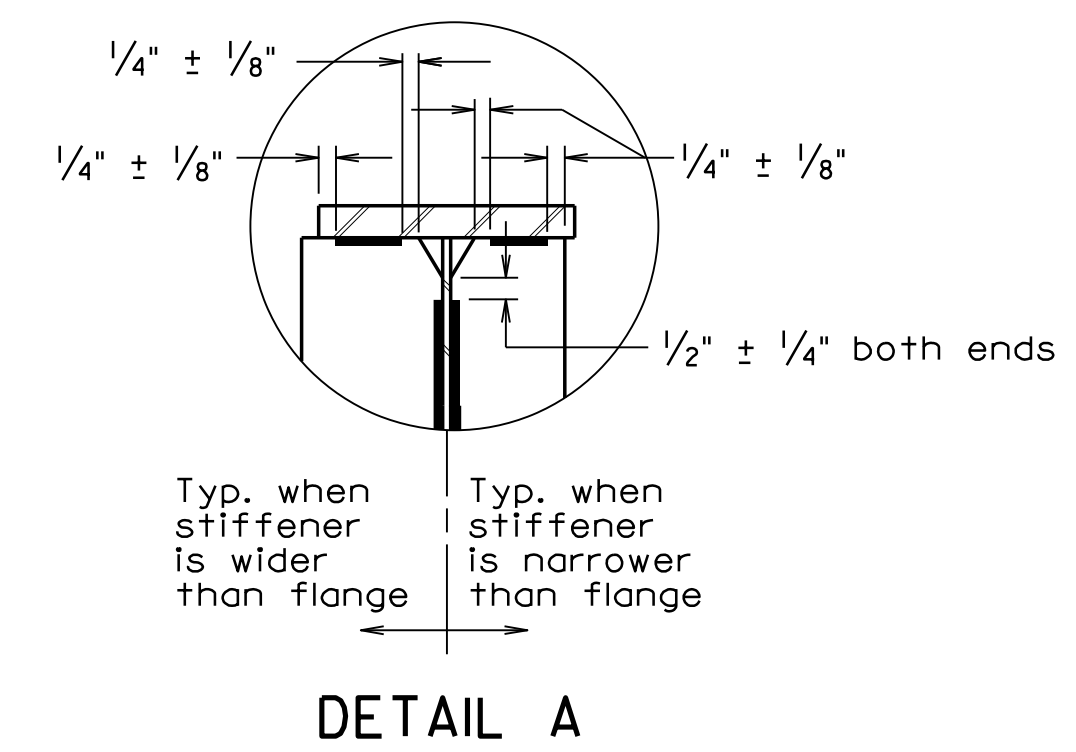
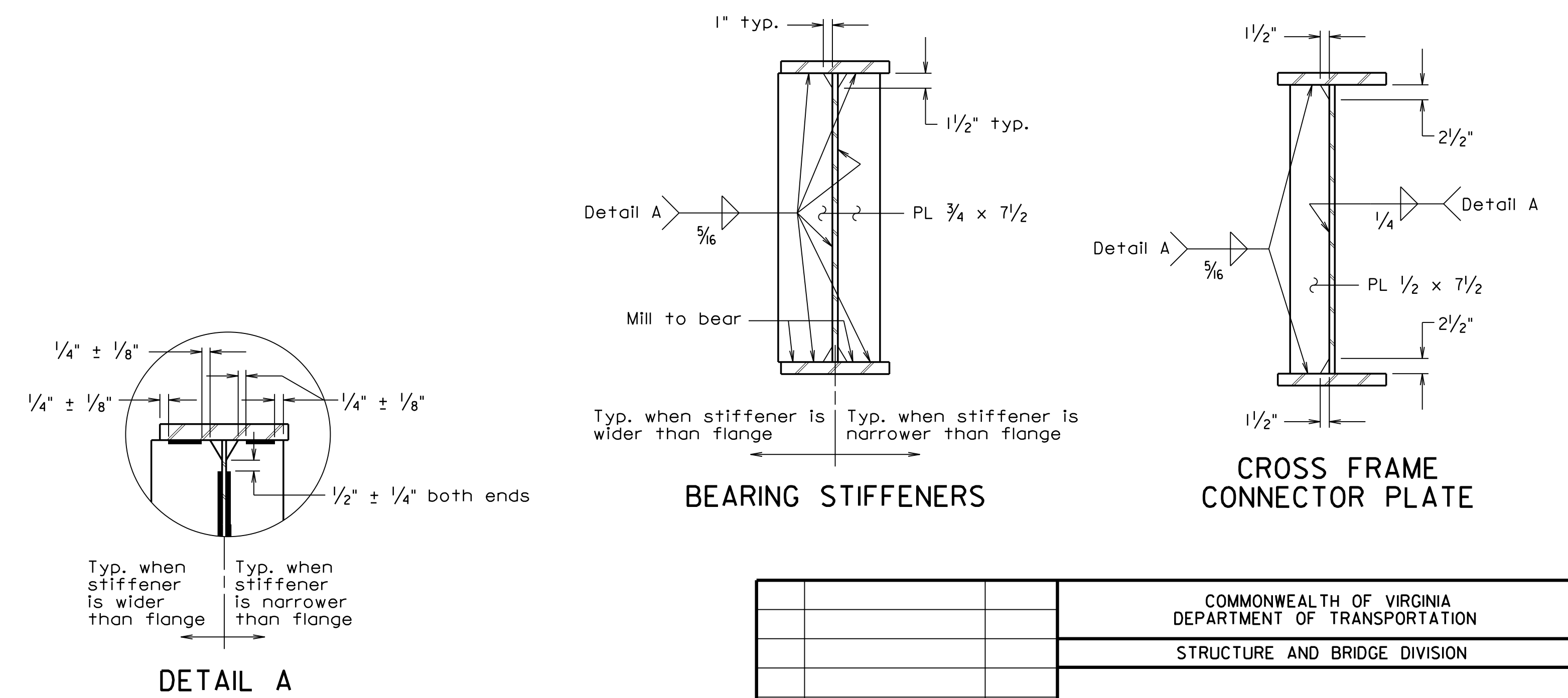
For girder connection detail type III, see sheet 57.

For girder connection detail type IV, see sheet 54.

Girder	Web PL	PL 1	PL 2
O	36 x 1/2	12 x 3/4	14 x 1 1/8
P	36 x 1/2	12 x 3/4	14 x 7/8
Q	36 x 1/2	12 x 3/4	14 x 7/8
R	36 x 1/2	12 x 3/4	14 x 7/8
S	36 x 1/2	12 x 3/4	14 x 7/8
T	36 x 1/2	12 x 3/4	14 x 1 1/8
U	36 x 1/2	12 x 3/4	14 x 7/8
V	36 x 1/2	12 x 3/4	14 x 7/8
W	36 x 1/2	12 x 3/4	14 x 7/8
X	36 x 1/2	12 x 3/4	14 x 7/8

Girder	FA	FB	FC	FD	FE
O	9"	38'-0 1/4"	9 5/8"	---	---
P	9"	37'-9 1/2"	9 1/2"	---	---
Q	9"	37'-8 1/2"	9 1/2"	---	---
R	9"	37'-8 1/2"	9 1/2"	---	---
S	9"	37'-8 1/2"	9 1/2"	---	---
T	9"	37'-8 1/2"	9 1/2"	---	---
U	---	28'-2 3/8"	---	1'-0 3/8"	1'-0 1/4"
V	---	13'-1 1/8"	---	1'-0 3/8"	1'-0 1/8"
W	---	30'-5 1/2"	---	9 1/2"	1'-2 1/2"
X	---	13'-8"	---	9 7/8"	1'-2"

Girder	AB	AT	GA	GB	GC	GD
O	38'-9 1/4"	38'-9 1/4"	3"	39	35'-3 1/4"	3"
P	38'-6 1/2"	38'-6 1/2"	3"	39	35'-0 1/2"	3"
Q	38'-5 1/2"	38'-5 1/2"	3"	39	34'-11 1/2"	3"
R	38'-5 1/2"	38'-5 1/2"	3"	39	34'-11 1/2"	3"
S	38'-5 1/2"	38'-5 1/2"	3"	39	34'-11 1/2"	3"
T	38'-5 1/2"	38'-5 1/2"	3"	39	34'-11 1/2"	3"
U	28'-2 3/8"	28'-2 3/8"	3"	36	27'-8 3/8"	3"
V	13'-1 1/8"	13'-1 1/8"	3"	21	12'-7 1/8"	3"
W	30'-5 1/8"	30'-5 1/8"	3"	38	29'-11 1/8"	3"
X	13'-8"	13'-8"	3"	21	13'-2"	3"



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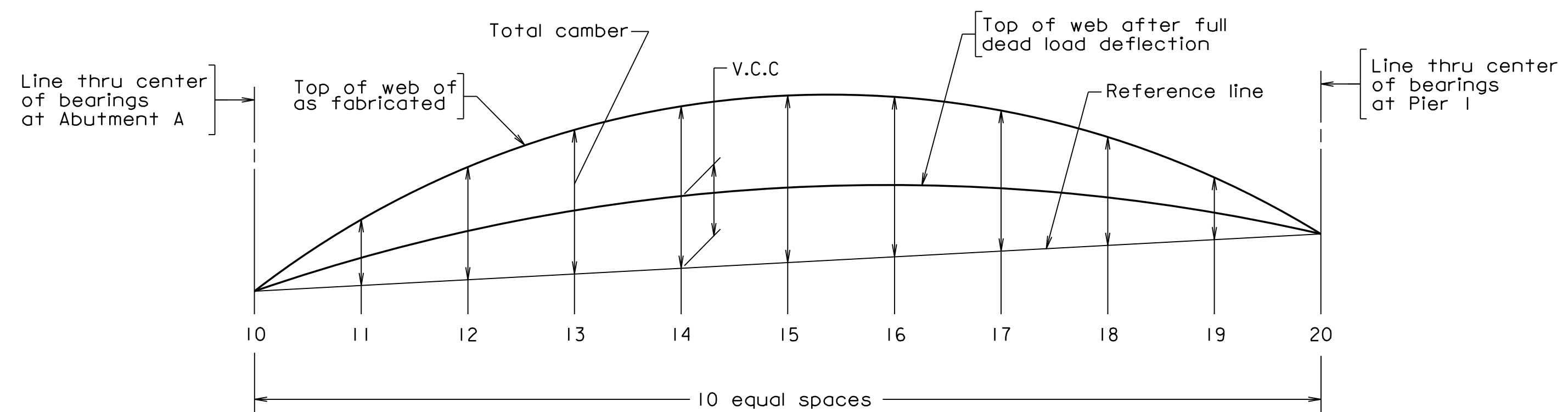
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GIRDER DETAILS SPAN e				
No.	Description	Date	Designed: WS..... Date: Apr. 2022	Sheet No. 43 of 125
Revisions		Drawn: MWL.....	Plan No. 257-38A	Checked: MRD.....

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	Point	10	11	12	13	14	15	16	17	18	19	20
Girder M	Δ_s	0"	3/16"	3/8"	1/2"	5/8"	5/8"	5/8"	1/2"	3/8"	3/16"	0"
	$\Delta's$	0"	5/8"	1 1/8"	1 1/2"	1 3/4"	1 13/16"	1 3/4"	1 1/2"	1 1/8"	5/8"	0"
	Δ_c	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	3/16"	1/8"	1/16"	0"
	V.C.C.	0"	1 3/16"	2 1/4"	3 1/4"	4 1/8"	4 5/16"	5 5/8"	6 3/16"	6 11/16"	7 1/8"	7 3/8"
	Total	0"	2 1/16"	3 7/8"	5 7/16"	6 11/16"	7 9/16"	8 3/16"	8 3/8"	8 5/16"	8"	7 3/8"
Girder N	Δ_s	0"	1/4"	7/16"	9/16"	5/8"	11/16"	5/8"	9/16"	3/8"	3/16"	0"
	$\Delta's$	0"	9/16"	1"	1 3/8"	1 5/8"	1 3/4"	1 5/8"	1 1/16"	1"	9/16"	0"
	Δ_c	0"	1/8"	3/16"	1/4"	1/4"	5/16"	1/4"	1/4"	3/16"	1/16"	0"
	V.C.C.	0"	1 3/16"	2 1/4"	3 1/4"	4 1/8"	4 5/16"	5 5/8"	6 3/16"	6 11/16"	7 1/16"	7 3/8"
	Total	0"	2 1/8"	3 7/8"	5 7/16"	6 5/8"	7 11/16"	8 1/8"	8 7/16"	8 1/4"	7 7/8"	7 3/8"

CAMBER DIAGRAM

Reference line = line between top of web at Abutment A and top of web at Pier 1 (C bearing to C bearing).
 Δ_s = Deflection of girder from its own weight after erection including diaphragms, connectors, etc.
 $\Delta's$ = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.
 Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).
V.C.C = Vertical curve camber = Distance between the reference line and top of web after full dead load deflection.
Total camber = $\Delta_s + \Delta's + \Delta_c + V.C.C.$

Sign convention: Deflections are positive if downward; negative if upward.
V.C.C. is positive if the top of web after full dead load deflection is above the reference line; and negative if below the reference line.
Total camber is positive if the top of web as fabricated is above the reference line; and negative if below the reference line.
Diagram depicts all values being positive, and is not meant to reflect actual conditions.

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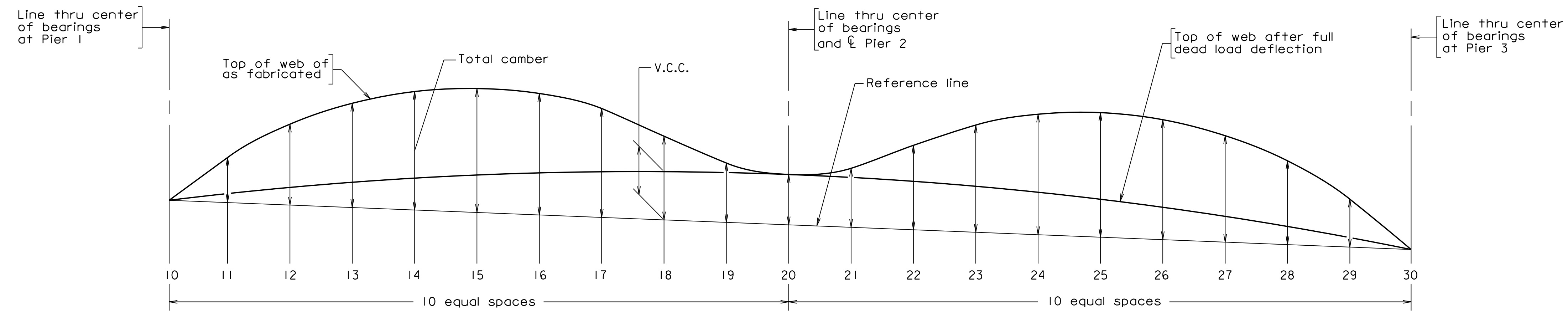
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CAMBER DIAGRAM SPAN a					
No.	Description	Date	Designed: KML..... Drawn: CBR..... Checked: JLC.....	Date Apr. 2022	Plan No. 257-38A
Revisions					Sheet No. 44 of 125



Point	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Girder M	Δ_s	1/16"	5/16"	1/2"	5/8"	3/4"	11/16"	5/8"	1/2"	5/16"	3/16"	1/16"	0"	0"	0"	1/16"	1/8"	3/16"	3/16"	3/16"	1/8"	1/16"
	Δ_s	1/16"	1/2"	13/16"	15/16"	15/16"	11/16"	11/16"	5/16"	3/16"	3/16"	5/16"	1/16"	0"	1"	1 1/16"	1 3/4"	1 13/16"	1 3/4"	1 3/8"	1 3/8"	1/16"
	Δ_c	1/16"	1/4"	7/16"	9/16"	5/8"	5/8"	9/16"	1/2"	5/16"	3/16"	1/16"	-1/16"	-1/16"	-1/8"	-1/16"	-1/16"	0"	0"	1/16"	1/16"	0"
	V.C.C.	3'-7 1/2"	3'-8 3/16"	3'-8 3/16"	3'-7 1/2"	3'-7 3/8"	3'-6 5/8"	3'-5 3/16"	3'-4 5/16"	3'-2 3/4"	3'-1"	2'-10 1/2"	2'-8 1/16"	2'-6 1/8"	2'-3 5/16"	2'-0 3/8"	1'-8 1/16"	1'-5 3/16"	1'-1 5/16"	9/8"	4 1/16"	0"
	Total	3'-8 1/8"	3'-9 1/4"	3'-9 1/2"	3'-10 1/16"	3'-9 11/16"	3'-8 3/4"	3'-7 7/16"	3'-5 3/4"	3'-3 1/16"	3'-1 9/16"	2'-11 1/4"	2'-8 5/16"	2'-6 3/4"	2'-4 3/16"	2'-1 5/8"	1'-10 5/8"	1'-7 3/16"	1'-3 1/4"	10 3/4"	5 1/16"	1/8"
Girder N	Δ_s	1/16"	3/8"	5/8"	3/4"	7/8"	1 1/8"	3/4"	9/16"	3/8"	3/16"	1/8"	0"	0"	1/16"	1/8"	3/16"	1/4"	1/4"	3/16"	1/8"	1/16"
	Δ_s	1/8"	9/16"	7/8"	1"	1 1/16"	1 1/8"	5/8"	7/16"	1/4"	3/16"	3/16"	3/8"	1 1/8"	1 1/4"	1 3/4"	2 1/8"	2 3/16"	2 1/8"	1 5/8"	7/8"	1/4"
	Δ_c	1/16"	5/16"	7/16"	9/16"	5/8"	5/8"	5/8"	1/2"	3/8"	3/16"	1/16"	0"	-1/16"	-1/16"	-1/16"	-1/16"	0"	1/16"	1/16"	0"	
	V.C.C.	3'-8"	3'-8 1/4"	3'-8 1/4"	3'-8"	3'-7 7/16"	3'-6 1/16"	3'-5 5/8"	3'-4 3/8"	3'-2 3/16"	3'-1"	2'-11"	2'-8 3/4"	2'-6 3/16"	2'-3 5/16"	2'-0 1/4"	1'-8 3/8"	1'-5 3/16"	1'-1 5/16"	9/8"	4 1/16"	0"
	Total	3'-8 1/4"	3'-9 1/2"	3'-10 3/16"	3'-10 9/16"	3'-9 7/8"	3'-8 1/16"	3'-7 5/8"	3'-5 7/8"	3'-3 1/16"	3'-1 9/16"	2'-11 3/8"	2'-9 1/8"	2'-6 1/16"	2'-4 9/16"	2'-2 1/16"	1'-11 1/8"	1'-7 5/8"	1'-3 3/4"	11"	5 3/4"	5/16"

CAMBER DIAGRAM

Reference line = line between top of web at Pier 1 and top of web at Pier 3 (center bearing to center bearing).

Δ_s = Deflection of girder from its own weight after erection including diaphragms, connectors, etc.

Δ_s = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.

Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

V.C.C. = Vertical curve camber = Distance between the reference line and top of web after full dead load deflection.

Total camber = $\Delta_s + \Delta_s + \Delta_c + V.C.C.$

Sign convention: Deflections are positive if downward; negative if upward.

V.C.C. is positive if the top of web after full dead load deflection is above the reference line; and negative if below the reference line.

Total camber is positive if the top of web as fabricated is above the reference line; and negative if below the reference line.

Diagram depicts all values being positive, and is not meant to reflect actual conditions.

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CAMBER DIAGRAM SPANS b AND c				
No.	Description	Date	Designed: KML	Date
			Drawn: CBR	Apr. 2022
			Checked: LDC	
Revisions			Plan No.	Sheet No.
			257-38A	45 of 125

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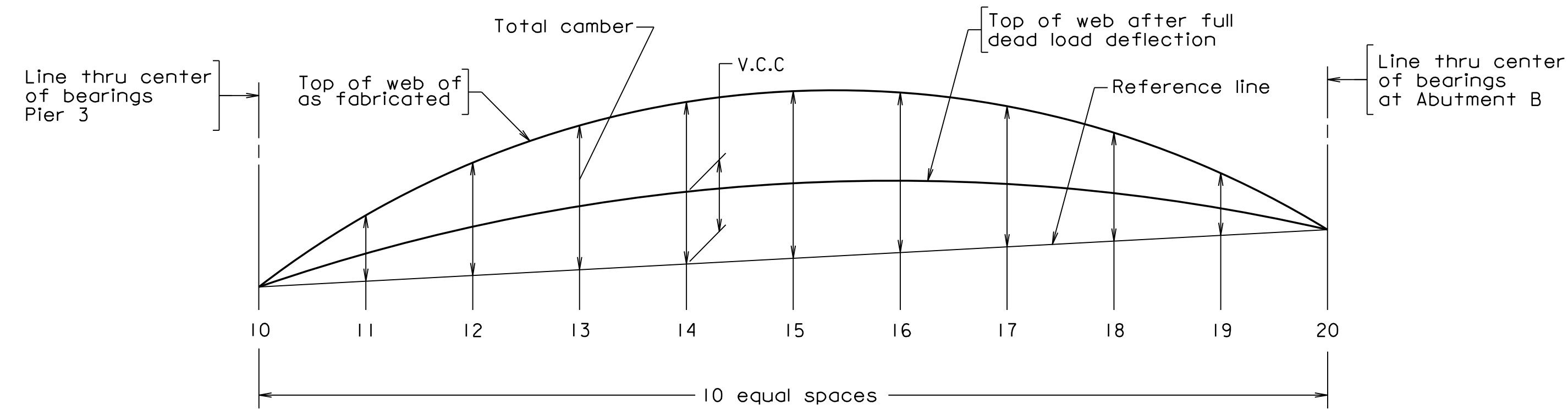
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	Point	10	11	12	13	14	15	16	17	18	19	20
Girder M	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	$\Delta's$	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	V.C.C.	7 ⁷ / ₁₆ "	6 ¹³ / ₁₆ "	6 ¹ / ₈ "	5 ³ / ₈ "	4 ⁵ / ₈ "	3 ⁷ / ₈ "	3 ¹ / ₈ "	2 ⁵ / ₁₆ "	1 ⁹ / ₁₆ "	1 ³ / ₁₆ "	0"
	Total	7 ⁷ / ₁₆ "	6 ¹³ / ₁₆ "	6 ¹ / ₈ "	5 ³ / ₈ "	4 ⁵ / ₈ "	3 ⁷ / ₈ "	3 ¹ / ₈ "	2 ⁵ / ₁₆ "	1 ⁹ / ₁₆ "	1 ³ / ₁₆ "	0"
Girder N	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	$\Delta's$	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	V.C.C.	7 ⁷ / ₁₆ "	6 ⁷ / ₈ "	6 ¹ / ₈ "	5 ³ / ₈ "	4 ⁵ / ₈ "	3 ⁷ / ₈ "	3 ¹ / ₈ "	2 ⁵ / ₁₆ "	1 ⁹ / ₁₆ "	1 ³ / ₁₆ "	0"
	Total	7 ⁷ / ₁₆ "	6 ⁷ / ₈ "	6 ¹ / ₈ "	5 ³ / ₈ "	4 ⁵ / ₈ "	3 ⁷ / ₈ "	3 ¹ / ₈ "	2 ⁵ / ₁₆ "	1 ⁹ / ₁₆ "	1 ³ / ₁₆ "	0"

CAMBER DIAGRAM

Reference line = line between top of web at Pier 3 and top of web at Abutment B (C bearing to C bearing).

Δ_s = Deflection of girder from its own weight after erection including diaphragms, connectors, etc.

$\Delta's$ = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.

Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

V.C.C. = Vertical curve camber = Distance between the reference line and top of web after full dead load deflection.

Total camber = $\Delta_s + \Delta's + \Delta_c + V.C.C.$

Sign convention: Deflections are positive if downward; negative if upward.

V.C.C. is positive if the top of web after full dead load deflection is above the reference line; and negative if below the reference line.

Total camber is positive if the top of web as fabricated is above the reference line; and negative if below the reference line.

Diagram depicts all values being positive, and is not meant to reflect actual conditions.

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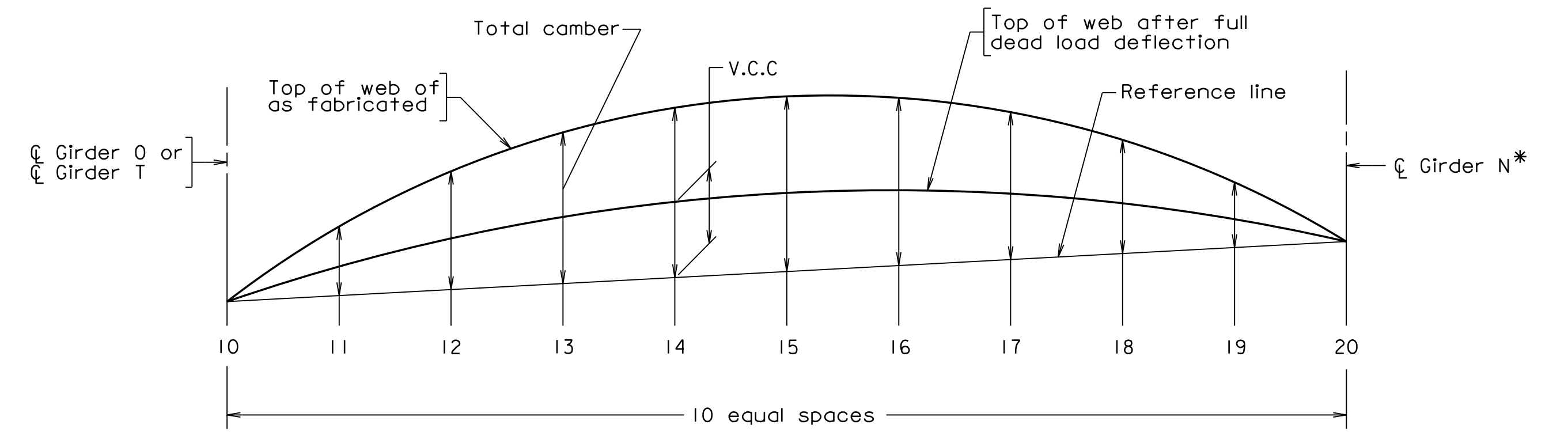
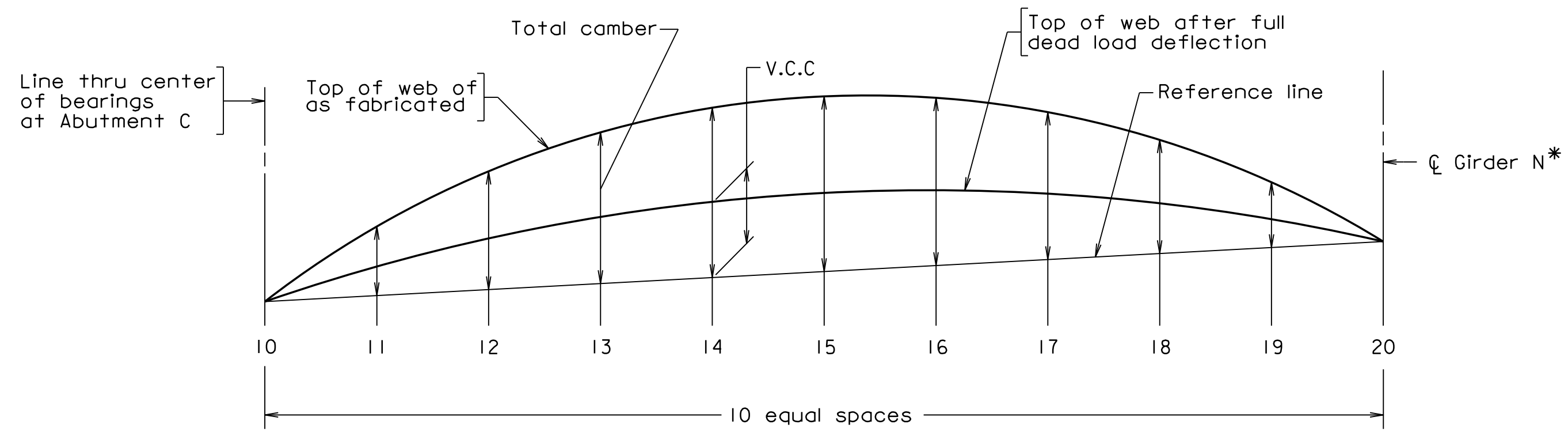
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION						
STRUCTURE AND BRIDGE DIVISION						
CAMBER DIAGRAM SPAN d						
No.	Description	Date	Designed: KML..... Drawn: CBR..... Checked: JLC.....	Date Apr. 2022	Plan No. 257-38A	Sheet No. 46 of 125
Revisions						

PROGRESS PRINT 4/1/2022



	Point	10	11	12	13	14	15	16	17	18	19	20
Girder O	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	1/4"	1/2"	1/16"	7/8"	1 1/16"	1 3/16"	1 1/4"	1 5/16"	1 3/8"	1 5/16"
	Δ_c	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	1 5/16"	1 15/16"	3 1/16"	4 1/4"	5 1/2"	6 7/8"	8 1/2"	10 3/16"	11'-0 3/16"	11'-2 5/16"
	Total	0"	1 3/16"	2 1/2"	3 3/8"	5 5/16"	6 3/4"	8 1/4"	9 5/8"	11 11/16"	11'-0 1/16"	11'-3 3/16"
Girder P	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	1/4"	3/8"	5/8"	1 1/8"	1 1/8"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 3/8"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	V.C.C.	0"	1/2"	1 1/16"	1 3/4"	2 1/2"	3 5/16"	4 1/16"	5 5/16"	7 3/8"	9"	10 3/4"
	Total	0"	3/4"	1 9/16"	2 7/16"	3 1/2"	4 7/16"	5 11/16"	7 1/8"	8 13/16"	10 1/2"	11'-0 1/4"
Girder Q	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	3/16"	3/8"	3/8"	7/16"	7/16"	1 1/16"	1 1/8"	1 1/4"	1 3/8"	1 3/8"
	Δ_c	0"	0"	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	3/16"	3/8"	3/8"	7/16"	7/16"	1 1/16"	1 1/8"	1 1/4"	1 3/8"	1 3/8"
Girder R	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"
	Δ_c	0"	0"	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"
Girder S	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"
	Δ_c	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"
Girder T	Δ_s	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"
	Δ_c	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	3/16"	5/16"	1/2"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"

	Point	10	11	12	13	14	15	16	17	18	19	20
Girder U	Δ_s	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	$\Delta_{s'}$	1 3/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/4"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 5/16"
	Δ_c	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	1 5/16"	1"	1 1/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"
Girder V	Δ_s	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	$\Delta_{s'}$	1 3/16"	1 3/16"	1 3/16"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 5/16"
	Δ_c	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	1 5/16"	1 5/16"	1 5/16"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"	1 3/8"
Girder W	Δ_s	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	$\Delta_{s'}$	9/16"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"
	Δ_c	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	1 1/16"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Girder X	Δ_s	3/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"	1/8"
	$\Delta_{s'}$	7/8"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"
	Δ_c	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	V.C.C.	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	1 1/8"	1"	1"	1"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"

CAMBER DIAGRAM GIRDERS O THRU T

CAMBER DIAGRAM GIRDERS U THRU X

* Fabricator to note that Girder N shall be treated as an elastic foundation.

Reference line = line between top of web at Abutment C and top of web at Girder N (C bearing to face of web).
 Δ_s = Deflection of girder from its own weight after erection including diaphragms, connectors, etc.
 $\Delta_{s'}$ = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.
 Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).
V.C.C. = Vertical curve camber = Distance between the reference line and top of web after full dead load deflection.
Total camber = $\Delta_s + \Delta_{s'} + \Delta_c + V.C.C.$
Sign convention: Deflections are positive if downward; negative if upward.
V.C.C. is positive if the top of web after full dead load deflection is above the reference line; and negative if below the reference line.
Total camber is positive if the top of web as fabricated is above the reference line; and negative if below the reference line.
Diagram depicts all values being positive, and is not meant to reflect actual conditions.

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PAC PLANS
PROGRESS PRINT 4/1/2022
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STRUCTURE AND BRIDGE DIVISION					
CAMBER DIAGRAM SPAN e					
No.	Description	Date	Designed: KML	Date	Plan No.
			Drawn: CBR	Apr. 2022	257-38A
			Checked: LDC		47 of 125

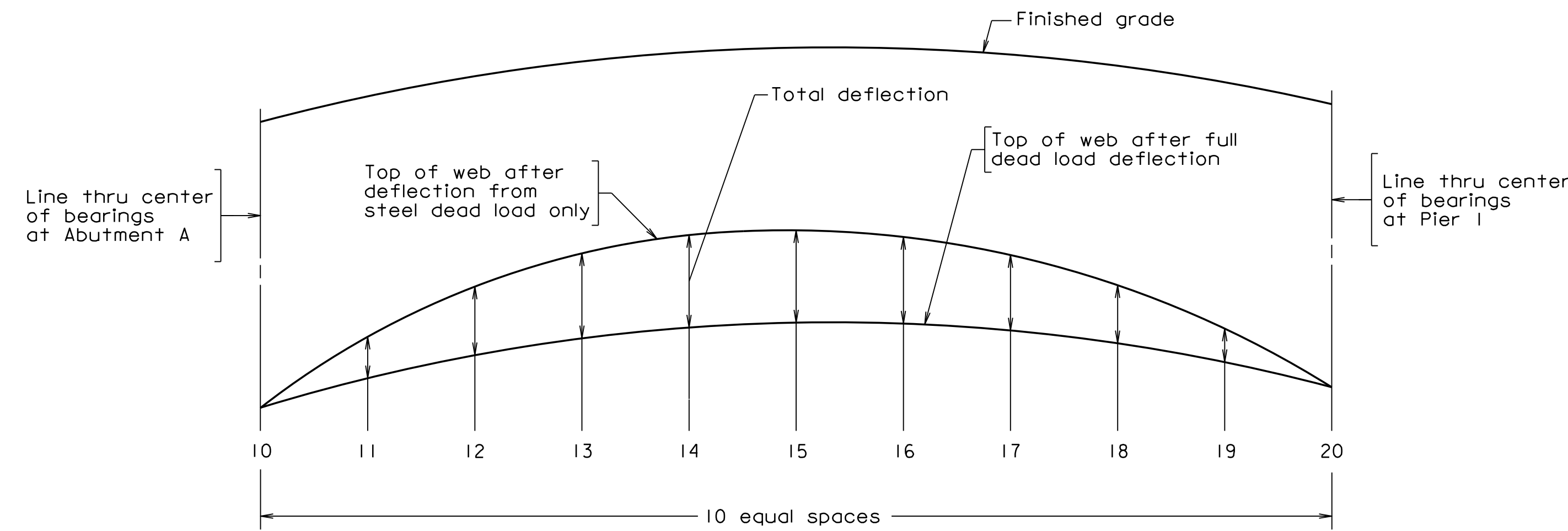
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SGCAMI 04-30-2020

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

PROGRESS PRINTING FOR REFERENCE NOT TO BE USED FOR RISK OF USER

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			95	0095-076-299, B688	48



Notes:

Top of existing Girders A, B, E, F, G, H and L are to be surveyed prior to pouring proposed deck slab over these girders. Dead load deflections provided are given relative to the top of the girders after the existing deck slab has been removed.

	Point	10	11	12	13	14	15	16	17	18	19	20
Girder A	Δ_s	0"	3/16"	1/16"	1 3/8"	1 5/8"	1 11/16"	1 5/8"	1 3/8"	1/16"	9/16"	0"
	Δ_c	0"	1/8"	3/16"	1/4"	5/16"	5/16"	5/16"	1/4"	3/16"	1/8"	0"
	Total	0"	5/8"	1 1/4"	1 5/8"	1 15/16"	2"	1 15/16"	1 5/8"	1 1/4"	5/8"	0"
Girder B	Δ_s	0"	5/8"	5/8"	1 3/8"	1 5/8"	1"	1 5/8"	1 3/8"	5/8"	5/16"	0"
	Δ_c	0"	1/16"	3/16"	1/4"	1/4"	1/4"	1/4"	1/4"	3/16"	1/16"	0"
	Total	0"	7/16"	3/4"	1 1/16"	1 1/4"	1 5/16"	1 1/4"	1 1/16"	3/4"	7/16"	0"
Girder E	Δ_s	0"	1/4"	7/16"	9/16"	1 1/16"	1 1/16"	1 1/16"	9/16"	7/16"	1/4"	0"
	Δ_c	0"	1/16"	3/16"	1/4"	1/4"	3/16"	1/4"	1/4"	3/16"	1/16"	0"
	Total	0"	5/16"	5/8"	1 3/16"	1 5/16"	1 1/16"	1 5/16"	1 3/16"	5/8"	5/16"	0"
Girder F	Δ_s	0"	3/16"	1 1/16"	1 3/8"	1 5/8"	1 11/16"	1 5/8"	1 3/8"	1 1/16"	9/16"	0"
	Δ_c	0"	1/4"	7/16"	9/16"	1 1/16"	1 1/16"	1 1/16"	9/16"	7/16"	1/4"	0"
	Total	0"	1 1/16"	1 1/2"	1 1 1/16"	2 5/16"	2 7/16"	2 5/16"	1 1 1/16"	1 1/2"	1 3/16"	0"
Girder G	Δ_s	0"	5/8"	1 1/4"	1 11/16"	1 5/8"	2"	1 5/8"	1 11/16"	1 1/4"	5/8"	0"
	Δ_c	0"	1/16"	3/16"	1/4"	1/4"	1/4"	1/4"	1/4"	3/16"	1/16"	0"
	Total	0"	3/4"	1 3/8"	1 7/8"	2 3/16"	2 3/16"	2 3/16"	1 7/8"	1 3/8"	3/4"	0"
Girder H	Δ_s	0"	5/16"	5/8"	1 3/16"	1 5/8"	1"	1 5/8"	1 3/16"	5/8"	5/16"	0"
	Δ_c	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	1/16"	0"
	Total	0"	3/8"	1 1/16"	1 5/16"	1 1 1/16"	1 1 1/16"	1 1 1/16"	1 5/16"	1 1/16"	3/8"	0"
Girder L	Δ_s	0"	3/16"	7/16"	9/16"	5/8"	1 1/16"	5/8"	9/16"	7/16"	3/16"	0"
	Δ_c	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	0"	0"
	Total	0"	1/4"	7/16"	5/8"	3/4"	3/4"	3/4"	5/8"	7/16"	1/4"	0"
Girder M	Δ_s	0"	5/8"	1 1/8"	1 1/2"	1 3/4"	1 13/16"	1 3/4"	1 1/2"	1 1/8"	5/8"	0"
	Δ_c	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	3/16"	1/8"	1/16"	0"
	Total	0"	1 1/16"	1 1/4"	1 1 1/16"	1 15/16"	2"	1 15/16"	1 1 1/16"	1 1/4"	1 1/16"	0"
Girder N	Δ_s	0"	3/16"	1"	1 3/8"	1 5/8"	1 3/4"	1 5/8"	1 7/16"	1"	9/16"	0"
	Δ_c	0"	1/8"	3/16"	1/4"	1/4"	5/16"	1/4"	1/4"	3/16"	1/16"	0"
	Total	0"	1 1/16"	1 3/16"	1 5/8"	1 7/8"	2 1/16"	1 7/8"	1 11/16"	1 3/16"	5/8"	0"

Δ_s = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.

Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

DEAD LOAD DEFLECTIONS

TOP OF DECK ELEVATIONS ALONG \bar{C} GIRDER											
Point	10	11	12	13	14	15	16	17	18	19	20
Girder M	215.99	216.08	216.17	216.26	216.33	216.40	216.45	216.50	216.54	216.58	216.60
Girder N	215.88	215.97	216.07	216.15	216.22	216.29	216.34	216.39	216.43	216.47	216.49

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PAC PLANS
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STRUCTURE AND BRIDGE DIVISION					
DEAD LOAD DEFLECTIONS AND SLAB ELEVATIONS SPAN α					
No.	Description	Date	Designed: KML.....	Date	Plan No.
			Drawn: CBR.....	Apr. 2022	257-38A
			Checked: LDC.....		48 of 125

PROGRESS PRINT 4/1/2022

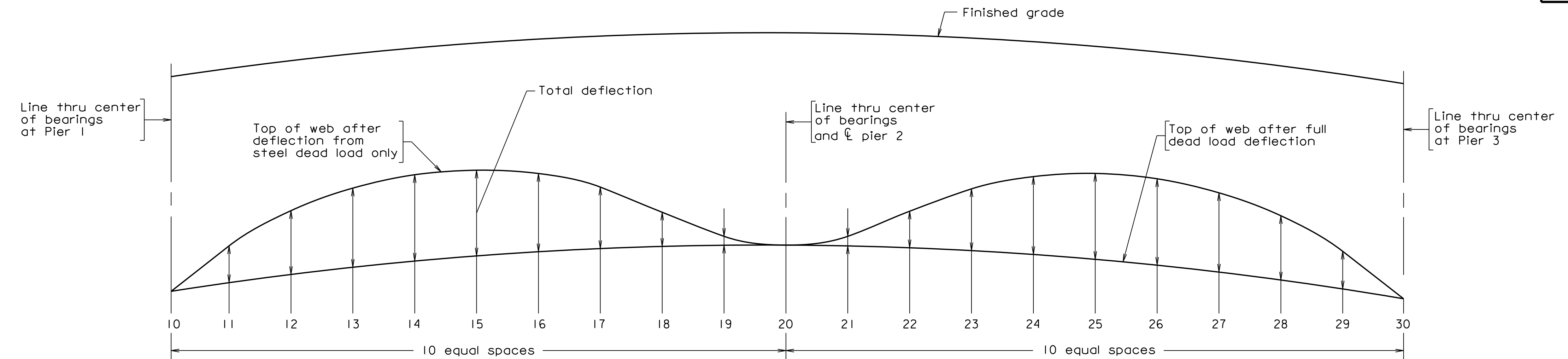
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04-30-2020

SGDL1

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WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER



	Point	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Girder L	Δ_{s1}	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	1/8"	1/8"	1/16"	0"	-1/16"	-1/16"	-1/16"	-1/8"	-1/8"	-1/16"	-1/16"	-1/16"	0"	0"
	Δ_{s2}	1/16"	3/8"	5/8"	3/4"	3/4"	11/16"	1/2"	5/16"	3/16"	1/8"	3/16"	5/16"	9/16"	15/16"	11/4"	11/2"	19/16"	17/16"	11/8"	11/16"	1/16"
	Δ_c	0"	3/16"	3/8"	1/2"	9/16"	5/8"	9/16"	7/16"	5/16"	1/8"	1/16"	-1/16"	-1/16"	-1/8"	-1/16"	-1/16"	0"	0"	0"	0"	0"
	Total	1/16"	5/8"	11/8"	17/16"	11/2"	11/2"	11/4"	7/8"	5/8"	5/16"	1/4"	3/16"	7/16"	3/4"	11/16"	19/16"	11/2"	13/16"	11/16"	11/16"	1/16"
Girder M	Δ_{s1}	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	1/8"	1/8"	1/16"	0"	-1/16"	-1/16"	-1/8"	-1/8"	-1/8"	-1/16"	-1/16"	-1/16"	0"	0"
	Δ_{s2}	1/16"	7/16"	11/16"	3/4"	3/4"	5/8"	1/2"	5/16"	3/16"	1/8"	3/16"	3/8"	3/4"	11/8"	19/16"	17/8"	15/16"	13/16"	11/16"	13/16"	1/16"
	Δ_c	1/16"	1/4"	7/16"	9/16"	5/8"	5/8"	9/16"	1/2"	5/16"	3/16"	1/16"	-1/16"	-1/16"	-1/8"	-1/16"	-1/16"	0"	0"	1/16"	1/16"	0"
	Total	1/8"	3/4"	11/4"	11/2"	19/16"	17/16"	11/4"	15/16"	5/8"	3/8"	1/4"	1/4"	5/8"	7/8"	13/8"	11/16"	19/16"	13/4"	17/16"	7/8"	1/16"
Girder N	Δ_{s1}	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	1/8"	1/8"	1/16"	0"	-1/16"	-1/16"	-1/8"	-1/8"	-1/8"	-1/16"	-1/16"	-1/16"	-1/16"	0"
	Δ_{s2}	1/8"	1/2"	3/4"	13/16"	3/4"	5/8"	7/16"	1/4"	1/8"	1/8"	3/16"	7/16"	7/8"	13/8"	17/8"	21/4"	29/16"	23/16"	11/16"	15/16"	1/4"
	Δ_c	1/16"	5/16"	7/16"	9/16"	5/8"	5/8"	9/16"	1/2"	3/8"	3/16"	1/16"	0"	-1/16"	-1/16"	-1/16"	-1/16"	0"	1/16"	1/16"	1/16"	0"
	Total	3/16"	7/8"	15/16"	19/16"	19/16"	17/16"	11/4"	15/16"	5/8"	3/8"	1/4"	3/8"	3/4"	13/16"	11/16"	21/16"	23/16"	23/16"	11/16"	15/16"	1/4"

Δ_{s1} = Deflection of girder from dead load of ramp girders.
 Δ_{s2} = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.
 Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

DEAD LOAD DEFLECTIONS

TOP OF DECK ELEVATIONS ALONG \bar{C} GIRDER																					
Point	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Girder M	216.60	216.62	216.62	216.60	216.56	216.49	216.41	216.30	216.17	216.02	215.85	215.67	215.45	215.22	214.96	214.68	214.38	214.05	213.70	213.33	212.94
Girder N	216.49	216.51	216.51	216.49	216.45	216.38	216.29	216.19	216.06	215.91	215.74	215.55	215.34	215.10	214.84	214.56	214.26	213.93	213.59	213.22	212.82

257-38A_049.dgn
04-30-2020
SGDL D2

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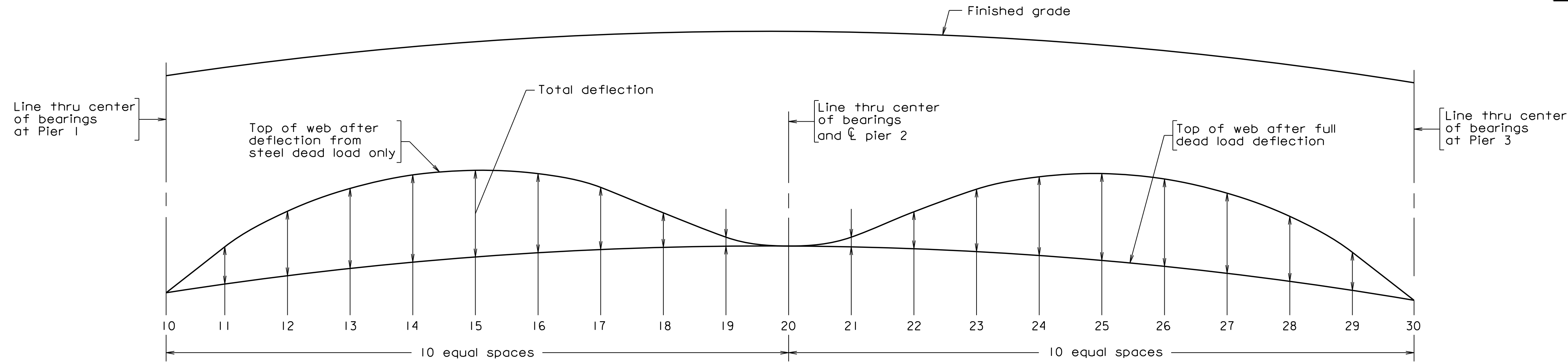
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STRUCTURE AND BRIDGE DIVISION			
DEAD LOAD DEFLECTIONS AND SLAB ELEVATIONS SPANS b AND c 1 OF 2			
No.	Description	Date	Revisions
Designed: KML	Date	Plan No.	Sheet No.
Drawn: CBR	Apr. 2022	257-38A	49 of 125
Checked: LDC			



	Point	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Girder A	Δ_s	1/16"	5/8"	1 1/16"	1 3/8"	1 7/16"	1 5/16"	1 1/16"	3/4"	7/16"	1/4"	3/16"	1/4"	3/8"	5/8"	1 5/16"	1 3/16"	1 1/4"	1"	9/16"	1/16"	1/16"
	Δ_c	0"	1/16"	1/8"	1/8"	3/16"	1/8"	1/8"	1/16"	1/16"	1/16"	0"	1/16"	1/16"	1/16"	1/8"	1/8"	3/16"	1/8"	1/8"	1/16"	0"
	Total	1/16"	1 1/16"	1 3/16"	1 1/2"	1 5/8"	1 7/16"	1 3/16"	1 1/16"	1/2"	5/16"	3/16"	5/16"	3/4"	1 1/16"	1 5/16"	1 1/2"	1 3/8"	1 1/8"	5/8"	1/16"	1/16"
Girder B	Δ_s	1/16"	7/16"	3/4"	1 5/16"	1"	7/8"	3/4"	1/2"	5/16"	3/16"	1/8"	3/16"	5/16"	7/16"	5/8"	1 1/16"	7/8"	1 1/16"	1 1/8"	3/8"	1/16"
	Δ_c	0"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	1/16"	0"	0"	0"	1/16"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	0"
	Total	1/16"	1/2"	7/8"	1 1/16"	1 1/8"	1"	7/8"	3/4"	3/16"	3/16"	1/8"	3/16"	3/8"	1/2"	3/4"	1 1/16"	1 1/8"	1 1/16"	1 3/16"	5/8"	1/16"
Girder E	Δ_s	1/16"	7/16"	3/4"	1 5/16"	1"	1 5/16"	3/4"	1/2"	5/16"	3/16"	1/8"	3/16"	5/16"	7/16"	5/8"	1 1/16"	1"	1 5/16"	3/4"	7/16"	1/16"
	Δ_c	0"	0"	1/16"	0"	0"	0"	0"	0"	0"	0"	0"	1/16"	1/8"	3/16"	1/4"	1/4"	1/4"	1/4"	3/16"	1/8"	0"
	Total	1/16"	7/16"	3/4"	1 5/16"	1"	1 5/16"	3/4"	1/2"	5/16"	3/16"	1/8"	1/4"	7/16"	3/4"	1"	1 3/16"	1 1/4"	1 3/16"	1 5/16"	9/16"	1/16"
Girder F	Δ_s	1/8"	1 1/16"	1 7/8"	2 5/16"	2 3/8"	2 1/8"	1 5/8"	1 1/16"	9/16"	5/16"	1/4"	1/2"	7/8"	1 1/2"	2 3/16"	2 3/4"	3"	2 13/16"	2 1/4"	1 5/16"	1/8"
	Δ_c	0"	0"	1/16"	0"	0"	0"	0"	-1/16"	0"	0"	0"	1/16"	1/8"	3/16"	1/4"	1/4"	5/16"	1/4"	3/16"	1/8"	0"
	Total	1/8"	1 1/16"	1 5/8"	2 5/16"	2 3/8"	2 1/8"	1 5/8"	1"	9/16"	5/16"	1/4"	3/16"	7/16"	1 1/16"	2 7/16"	3"	3 5/16"	3 1/16"	2 7/16"	1 7/16"	1/8"
Girder C	Δ_s	1/8"	1 3/16"	1 3/8"	1 3/4"	1 13/16"	1 5/8"	1 1/4"	1 3/16"	7/16"	1/4"	3/16"	3/8"	1 1/16"	1 3/16"	1 11/16"	2 1/16"	2 1/4"	2 1/8"	1 11/16"	1"	1/16"
	Δ_c	0"	0"	0"	0"	0"	0"	-1/16"	-1/16"	0"	0"	0"	1/16"	1/8"	3/16"	1/4"	1/4"	1/4"	1/4"	3/16"	1/8"	0"
	Total	1/8"	1 3/16"	1 3/8"	1 3/4"	1 13/16"	1 5/8"	1 1/4"	1 3/16"	7/16"	1/4"	3/16"	3/8"	1 1/16"	1 3/16"	1 15/16"	2 5/16"	2 1/2"	2 3/8"	1 7/8"	1 1/8"	1/16"
Girder H	Δ_s	1/16"	9/16"	7/8"	1 1/8"	1 3/16"	1 1/16"	1 3/16"	9/16"	5/16"	3/16"	3/16"	1/4"	1/2"	1 1/16"	1 1/8"	1 3/8"	1 1/2"	1 3/8"	1 1/16"	5/8"	1/16"
	Δ_c	0"	0"	0"	0"	0"	0"	-1/16"	-1/16"	0"	0"	0"	1/16"	1/8"	3/16"	3/16"	1/4"	1/4"	3/16"	3/16"	1/8"	0"
	Total	1/16"	9/16"	7/8"	1 1/8"	1 3/16"	1 1/16"	1 3/16"	9/16"	5/16"	3/16"	3/16"	1/4"	1/2"	1 1/16"	1 5/8"	1 5/8"	1 3/4"	1 9/16"	1 1/4"	5/8"	1/16"

Δ_s = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.
 Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

DEAD LOAD DEFLECTIONS

Not to scale

PAC PLANS
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STRUCTURE AND BRIDGE DIVISION					
DEAD LOAD DEFLECTIONS AND SLAB ELEVATIONS SPANS b AND c 2 OF 2					
No.	Description	Date	Designed: KML.....	Date	Plan No.
			Drawn: CBR.....	Apr. 2022	257-38A
			Checked: LDC.....		Sheet No.
Revisions					50 of 125

PROGRESS PRINT 4/1/2022

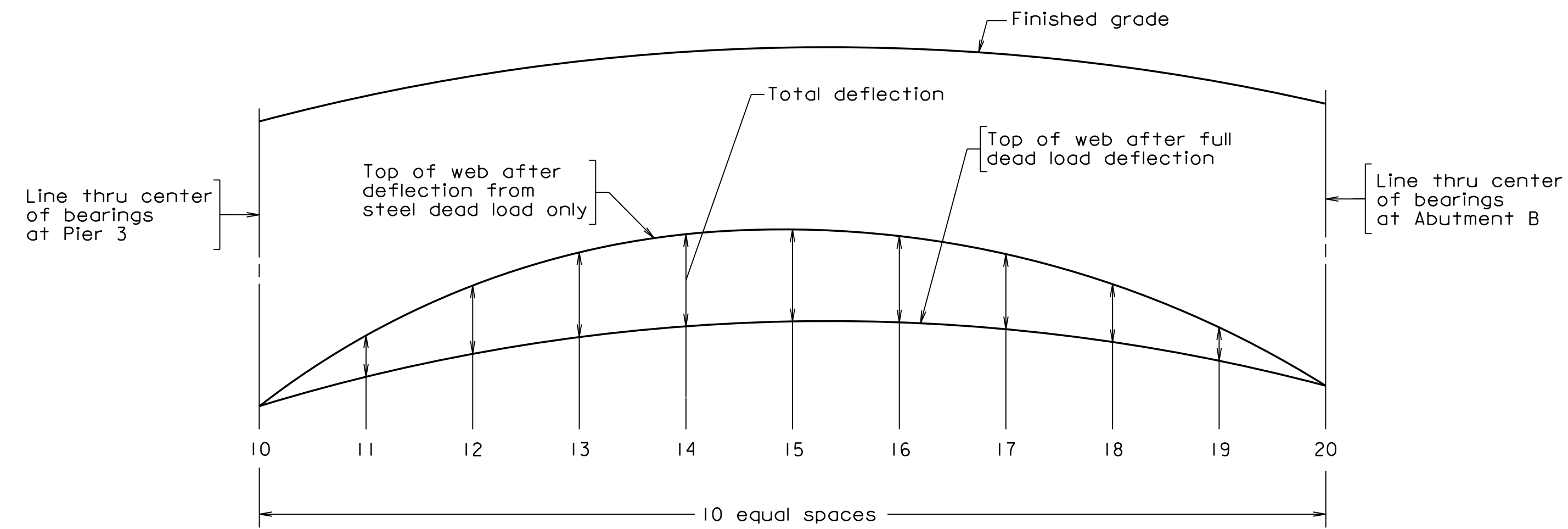
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 RICHMOND, VA
 STRUCTURAL ENGINEER



Notes:

Top of existing Girders A, B, E, F, G, H and L are to be surveyed prior to pouring proposed deck slab over these girders. Dead load deflections provided are given relative to the top of the girders after the existing deck slab has been removed.

	Point	10	11	12	13	14	15	16	17	18	19	20
Girder A	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
Girder B	Δ_s	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	0"	0"	0"
Girder E	Δ_s	0"	0"	0"	0"	0"	1/16"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	0"	0"	1/16"	0"	0"	0"	0"	0"
Girder F	Δ_s	0"	0"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	0"	0"
Girder G	Δ_s	0"	0"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	1/16"	1/8"	1/8"	1/8"	1/8"	1/8"	1/16"	0"	0"
Girder H	Δ_s	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	0"	0"	0"
Girder L	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
Girder M	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
Girder N	Δ_s	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δ_c	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Total	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"

Δ_s = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance.

Δ_c = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

DEAD LOAD DEFLECTIONS

TOP OF DECK ELEVATIONS ALONG \bar{C} GIRDER											
Point	10	11	12	13	14	15	16	17	18	19	20
Girder M	212.90	212.84	212.78	212.71	212.65	212.59	212.53	212.46	212.40	212.33	212.27
Girder N	212.78	212.72	212.66	212.60	212.53	212.47	212.41	212.34	212.28	212.21	212.15

Not to scale

PAC PLANS
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STRUCTURE AND BRIDGE DIVISION					
DEAD LOAD DEFLECTIONS AND SLAB ELEVATIONS SPAN \bar{d}					
No.	Description	Date	Designed: KML..... Drawn: CBR..... Checked: JLC.....	Date Apr. 2022	Plan No. / Sheet No. 257-38A / 51 of 125
Revisions					

PROGRESS PRINT 4/1/2022

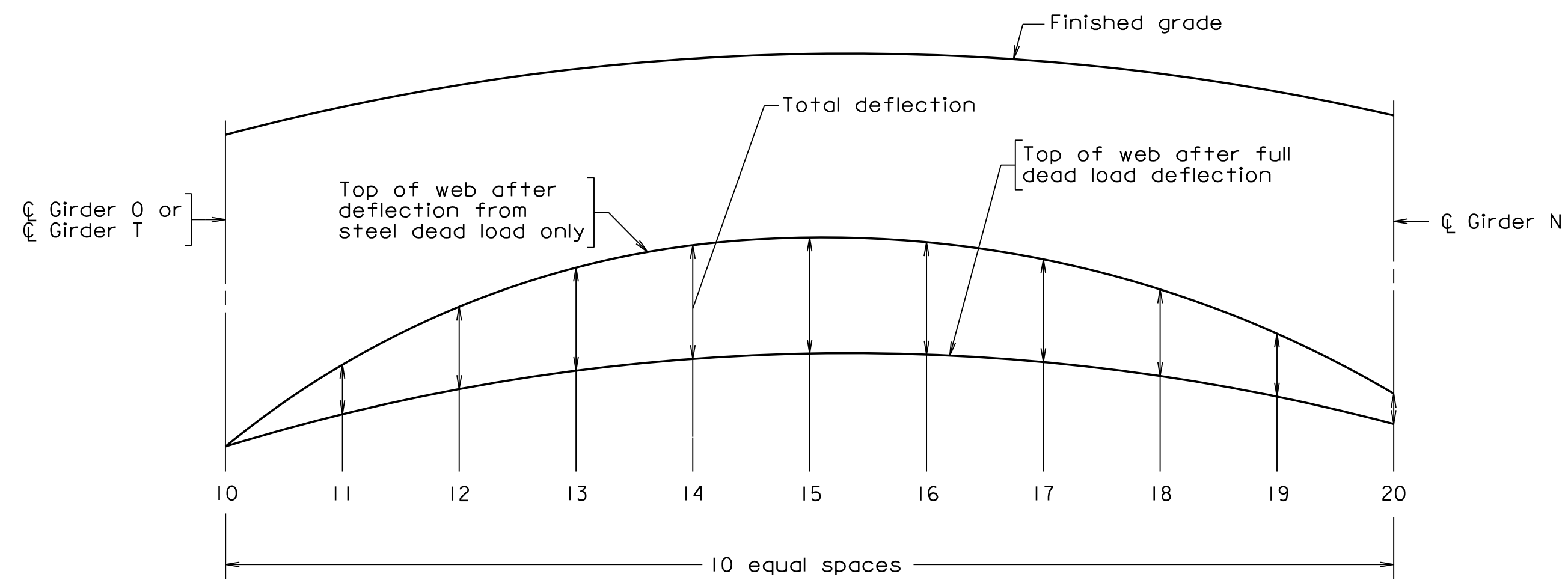
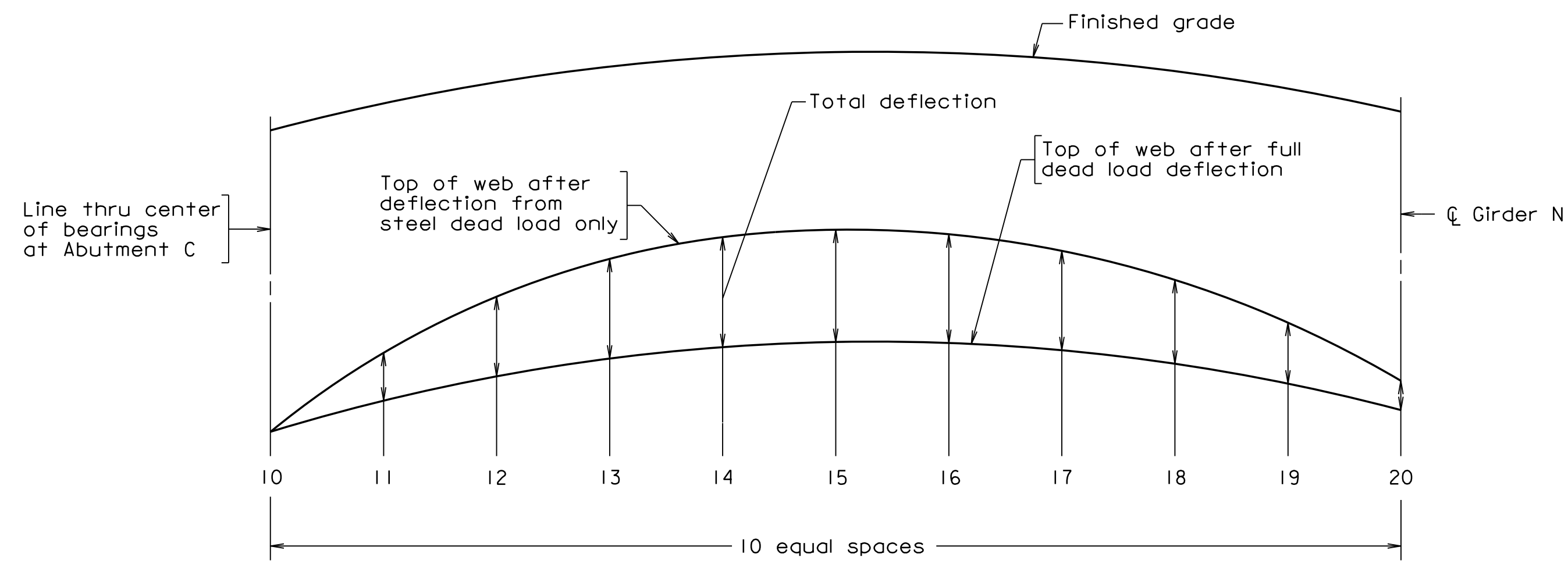
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 STRUCTURAL ENGINEER



	Point	10	11	12	13	14	15	16	17	18	19	20
Girder O	Δ's1	0"	1/8"	1/4"	3/8"	7/16"	9/16"	5/8"	11/16"	3/4"	3/4"	3/4"
	Δ's2	0"	1/8"	1/4"	5/16"	7/16"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"
	Δc	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
Girder P	Δ's1	0"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	11/16"
	Δ's2	0"	1/8"	1/4"	5/16"	7/16"	1/2"	9/16"	9/16"	5/8"	5/8"	5/8"
	Δc	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
Girder Q	Δ's1	0"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	11/16"
	Δ's2	0"	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	Δc	0"	1/16"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	5/8"
Girder R	Δ's1	0"	0"	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"
	Δ's2	0"	1/16"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"
	Δc	0"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"	9/16"
Girder S	Δ's1	0"	1/16"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"
	Δ's2	0"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"	9/16"
	Δc	0"	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
Girder T	Δ's1	0"	1/8"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"	1/2"
	Δ's2	0"	0"	0"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	Δc	0"	1/16"	1/8"	3/16"	1/4"	1/4"	5/16"	3/8"	7/16"	7/16"	7/16"
Total		0"	3/16"	3/8"	9/16"	11/16"	1"	1"	1"	1"	1 1/16"	1"

Δ's1 = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance on Girder N.
 Δ's2 = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance on ramp.
 Δc = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

**DEAD LOAD DEFLECTIONS
GIRDERS O THRU T**

TOP OF DECK ELEVATIONS ALONG C GIRDER											
Point	10	11	12	13	14	15	16	17	18	19	20
Girder O	215.24	215.32	215.40	215.49	215.59	215.70	215.81	215.94	216.08	216.25	216.43
Girder P	215.36	215.44	215.52	215.61	215.71	215.79	215.89	216.01	216.14	216.27	216.40
Girder Q	215.47	215.56	215.65	215.73	215.82	215.91	215.99	216.09	216.21	216.29	216.36
Girder R	215.50	215.58	215.66	215.74	215.81	215.89	215.96	216.04	216.22	216.25	216.33
Girder S	215.36	215.43	215.51	215.59	215.66	215.74	215.81	215.89	216.00	216.14	216.29
Girder T	215.21	215.29	215.36	215.44	215.51	215.59	215.66	215.75	215.87	216.04	216.25

	Point	10	11	12	13	14	15	16	17	18	19	20
Girder U	Δ's1	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	Δ's2	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δc	7/16"	7/16"	1/2"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"
Girder V	Δ's1	5/8"	5/8"	5/8"	11/16"	11/16"	11/16"	11/16"	3/4"	3/4"	3/4"	3/4"
	Δ's2	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δc	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
Girder W	Δ's1	3/8"	7/16"	7/16"	7/16"	7/16"	7/16"	7/16"	7/16"	3/8"	3/8"	3/8"
	Δ's2	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δc	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"
Girder X	Δ's1	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
	Δ's2	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
	Δc	9/16"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"
Total		5/8"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"

Δ's1 = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance on Girder N.
 Δ's2 = Deflection of girder from dead load of concrete deck slab, bolster and construction tolerance on ramp.
 Δc = Deflection of girder from permanent dead load added after deck slab is cast (e.g. parapet).

**DEAD LOAD DEFLECTIONS
GIRDERS U THRU X**

TOP OF DECK ELEVATIONS ALONG C GIRDER											
Point	10	11	12	13	14	15	16	17	18	19	20
Girder U	215.58	215.62	215.67	215.73	215.79	215.86	215.95	216.07	216.20	216.33	216.48
Girder V	215.50	215.56	215.61	215.67	215.72	215.78	215.84	215.92	215.97	216.03	216.09
Girder W	215.94	216.04	216.15	216.29	216.46	--	--	--	--	--	--
Girder X	215.74	215.81	215.88	215.97	216.17	--	--	--	--	--	--

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
DEAD LOAD DEFLECTIONS AND SLAB ELEVATIONS SPAN e					
No.	Description	Date	Designed: KML	Date	Plan No.
			Drawn: CBR	Apr. 2022	257-38A
			Checked: LDC		52 of 125

PAC PLANS
PROGRESS PRINT 4/1/2022
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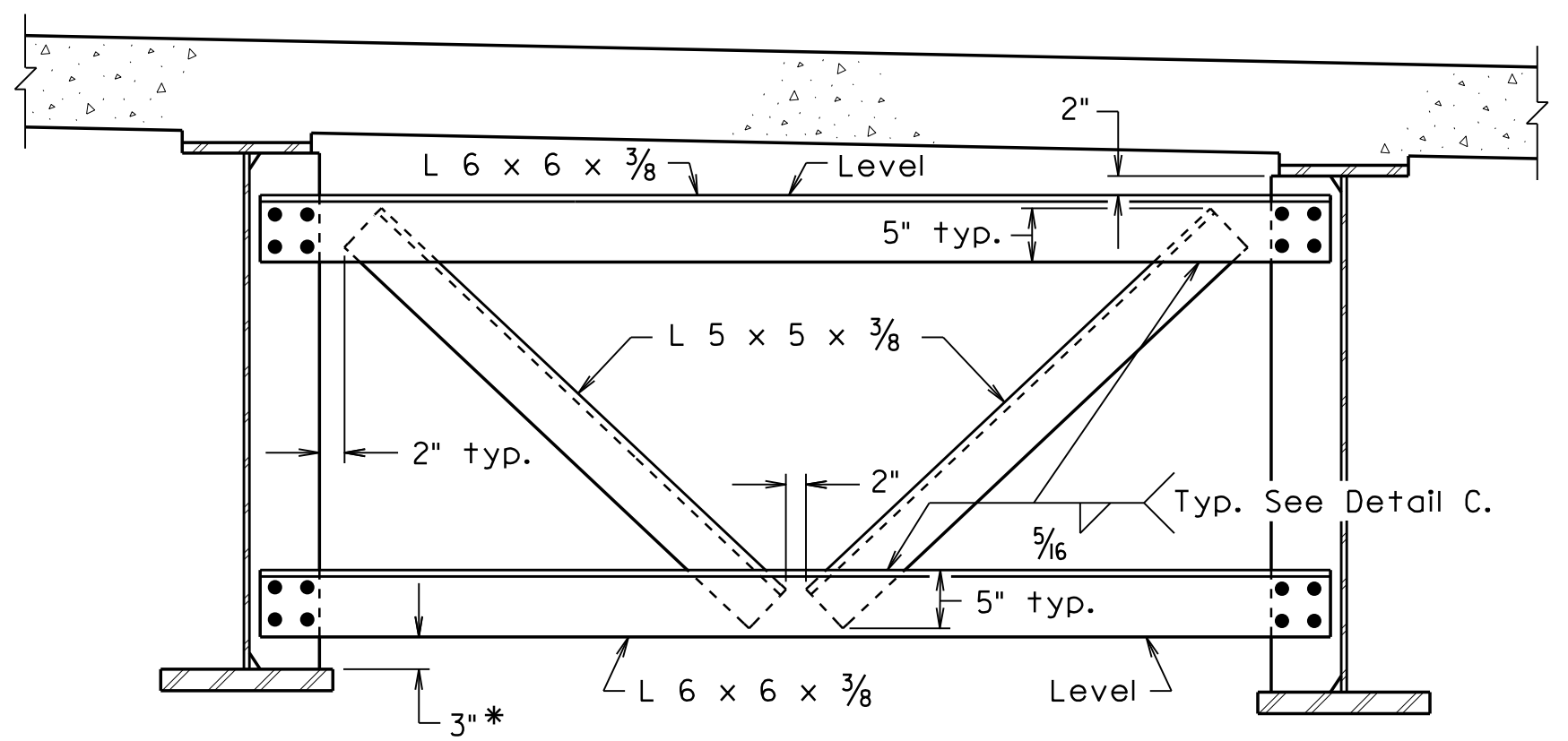
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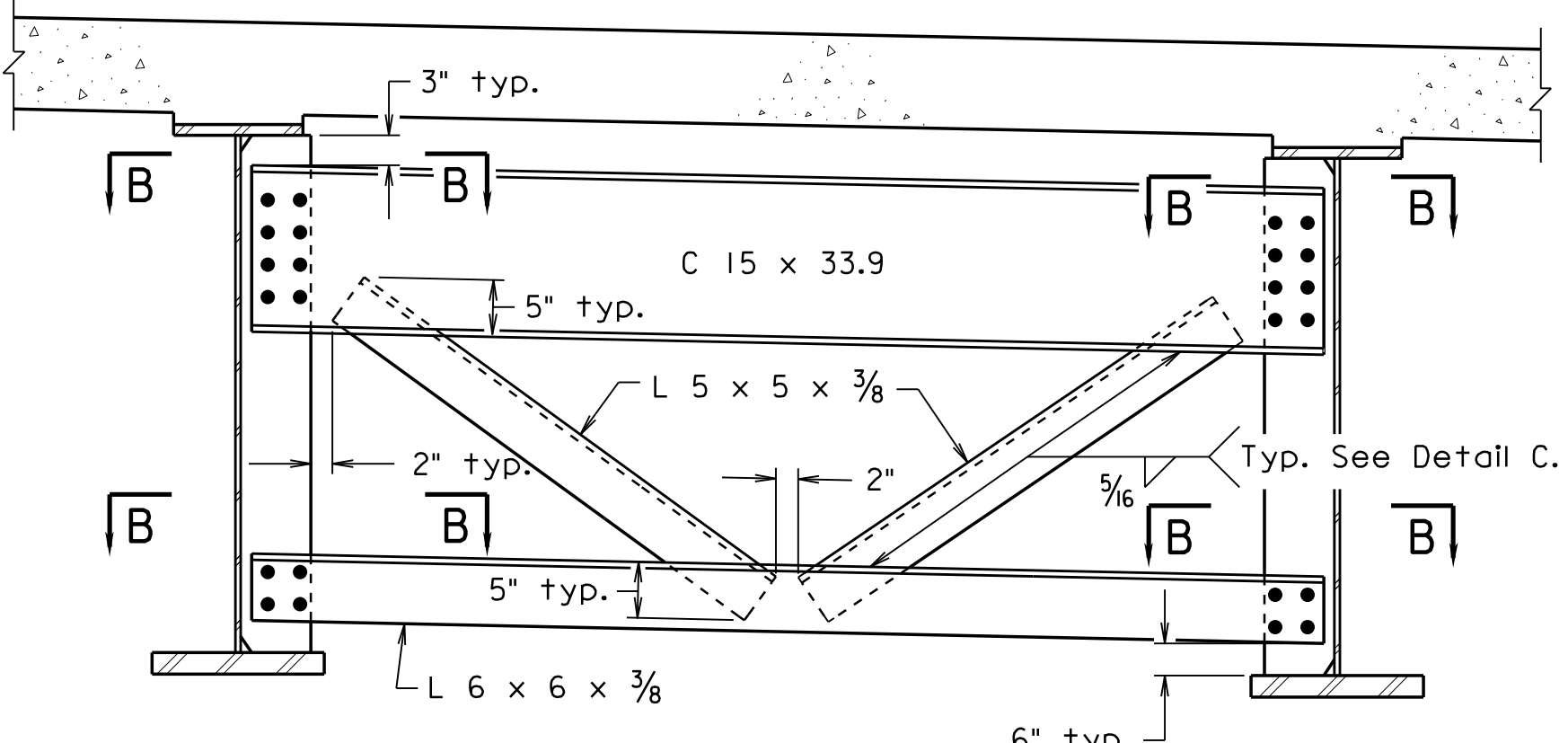
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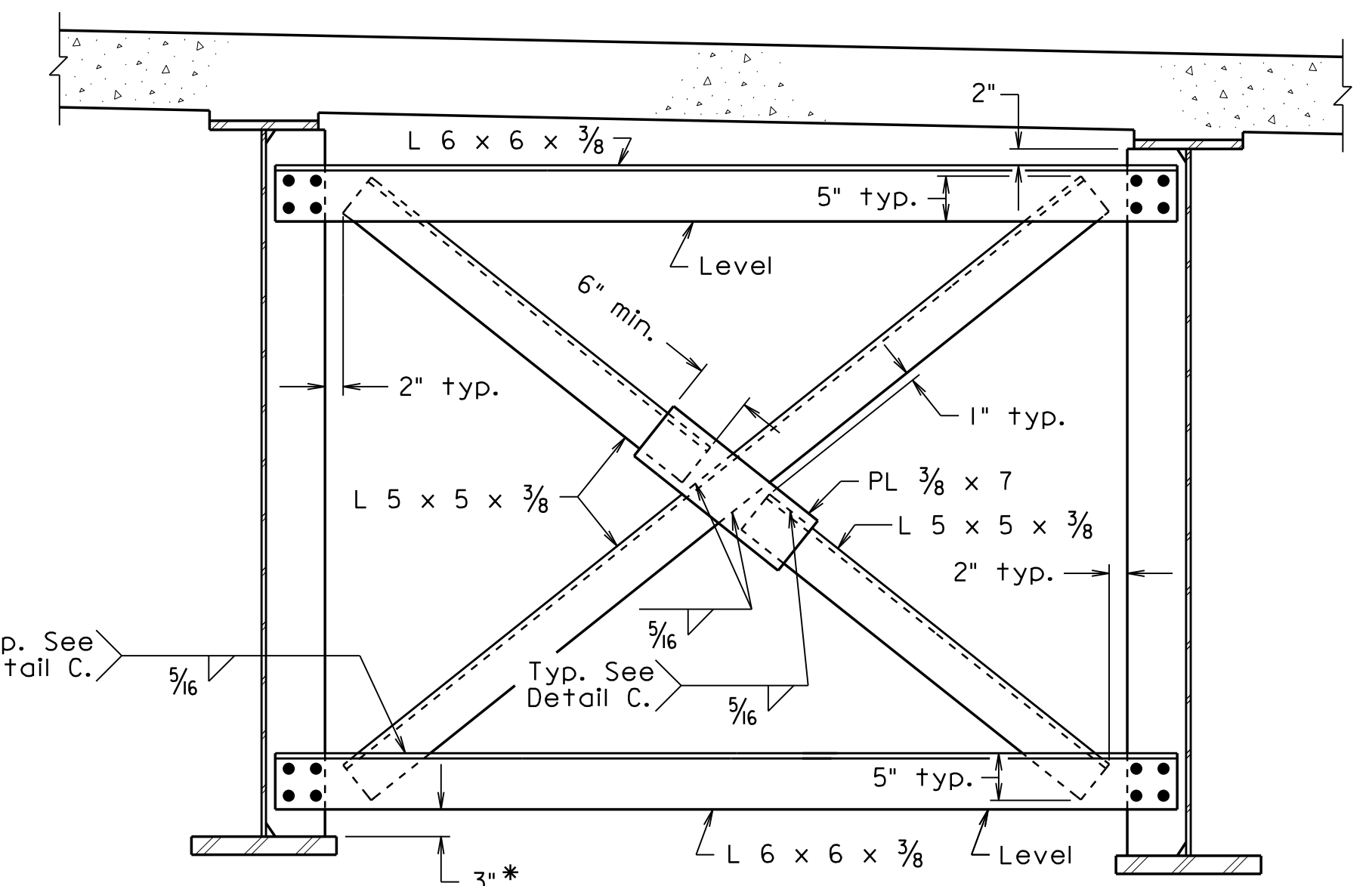


INTERMEDIATE CROSS FRAME - CF1
* Dimension shall be 6" at piers

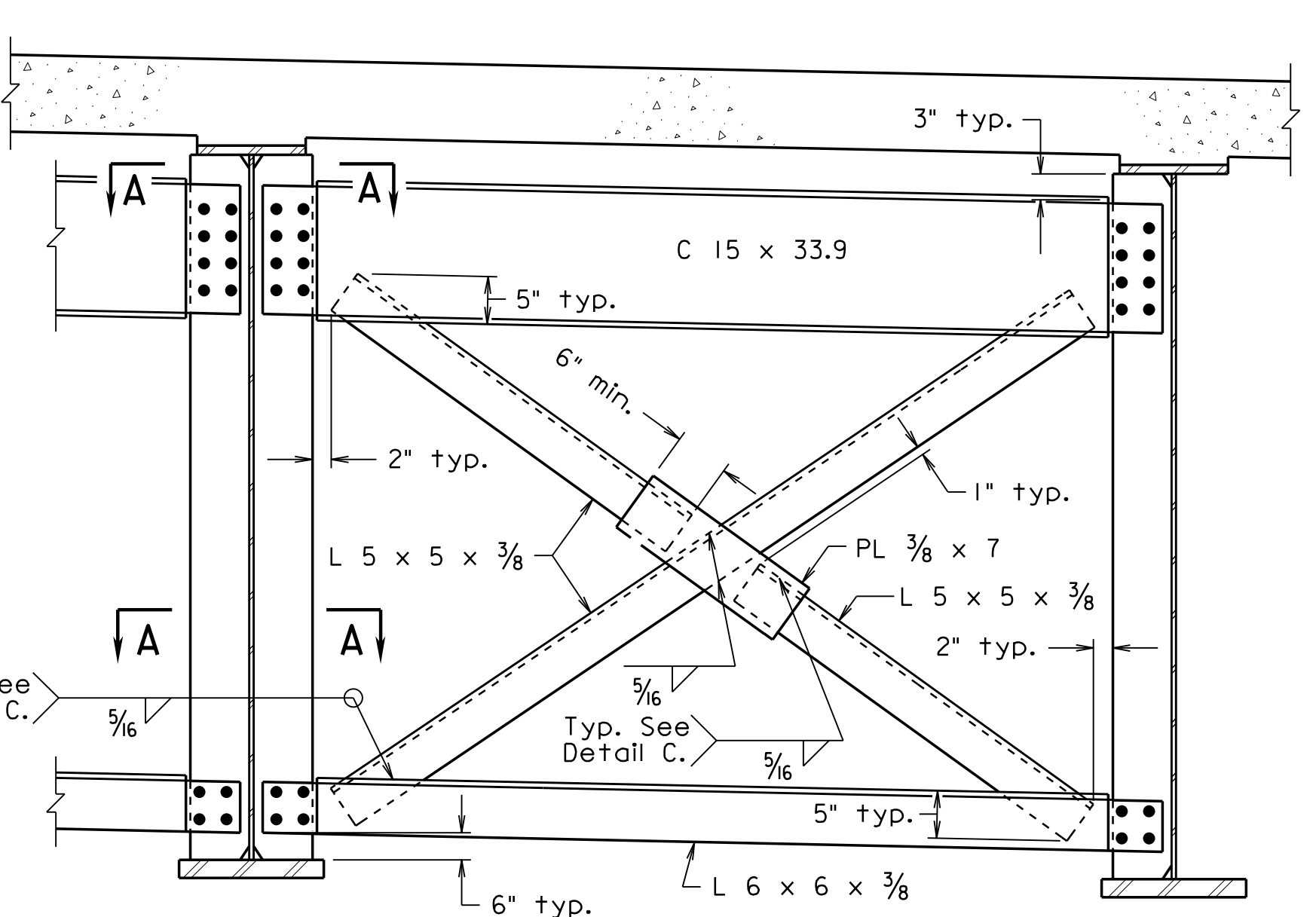


END CROSS FRAME - CF2

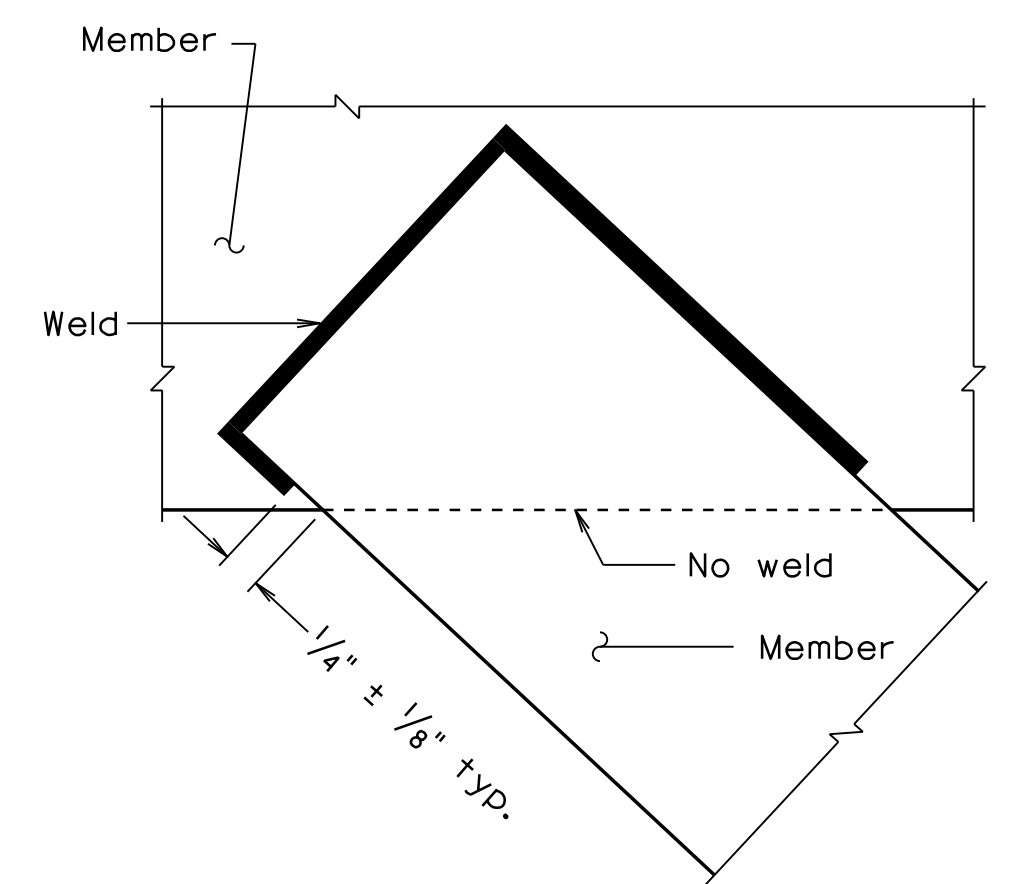
Note:
All welding of structural steel and quality control inspection of welds, including field welding and quality control inspection of field welding, shall be the responsibility of the Contractor in accordance with Section 407.04(l) of the Specifications.
Webs and flanges shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.



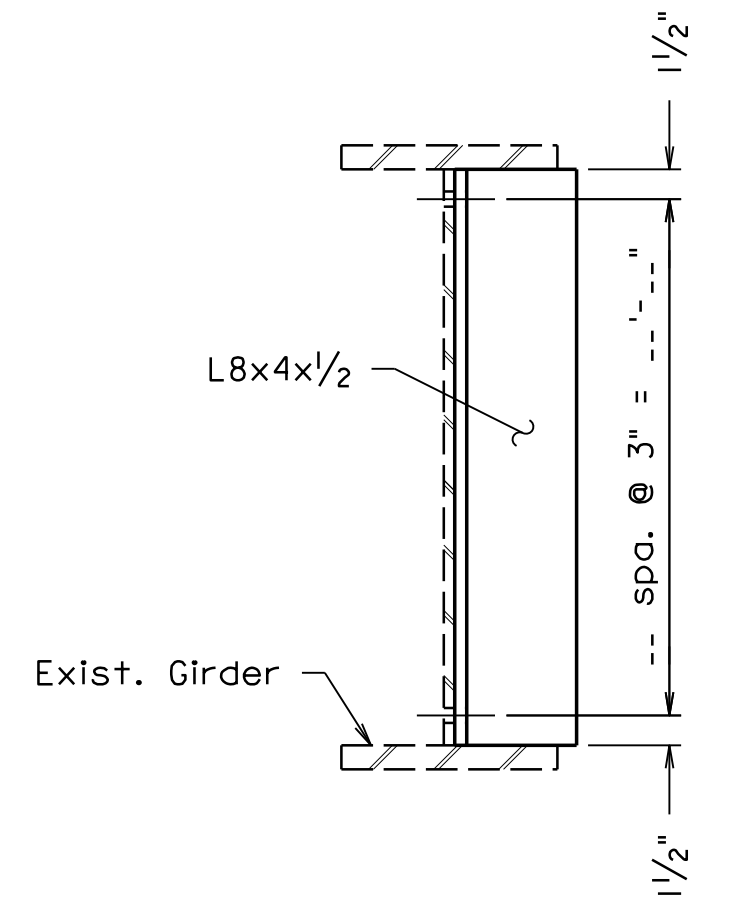
INTERMEDIATE CROSS FRAME - CF5
* Dimension shall be 6" at piers



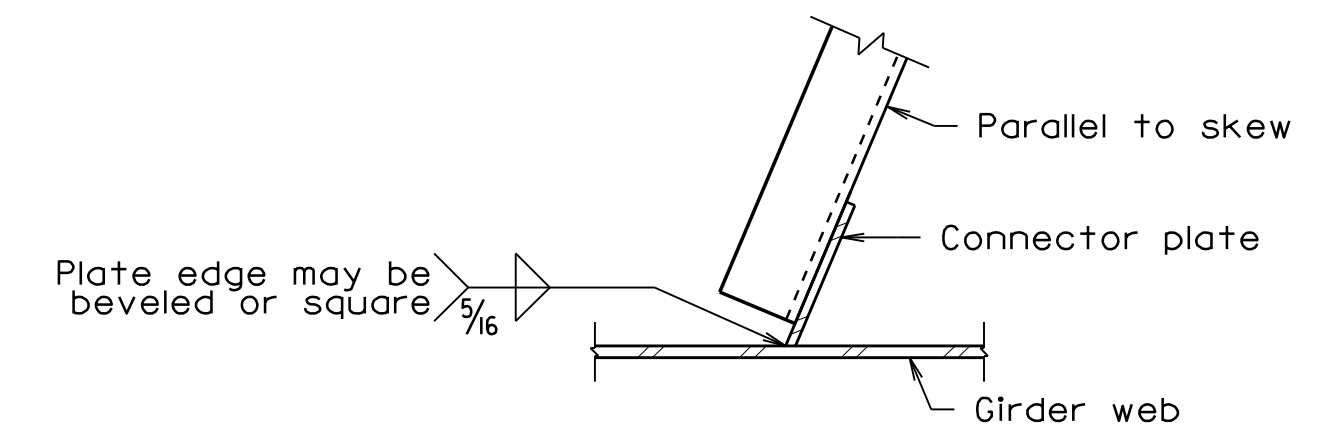
END CROSS FRAME - CF7



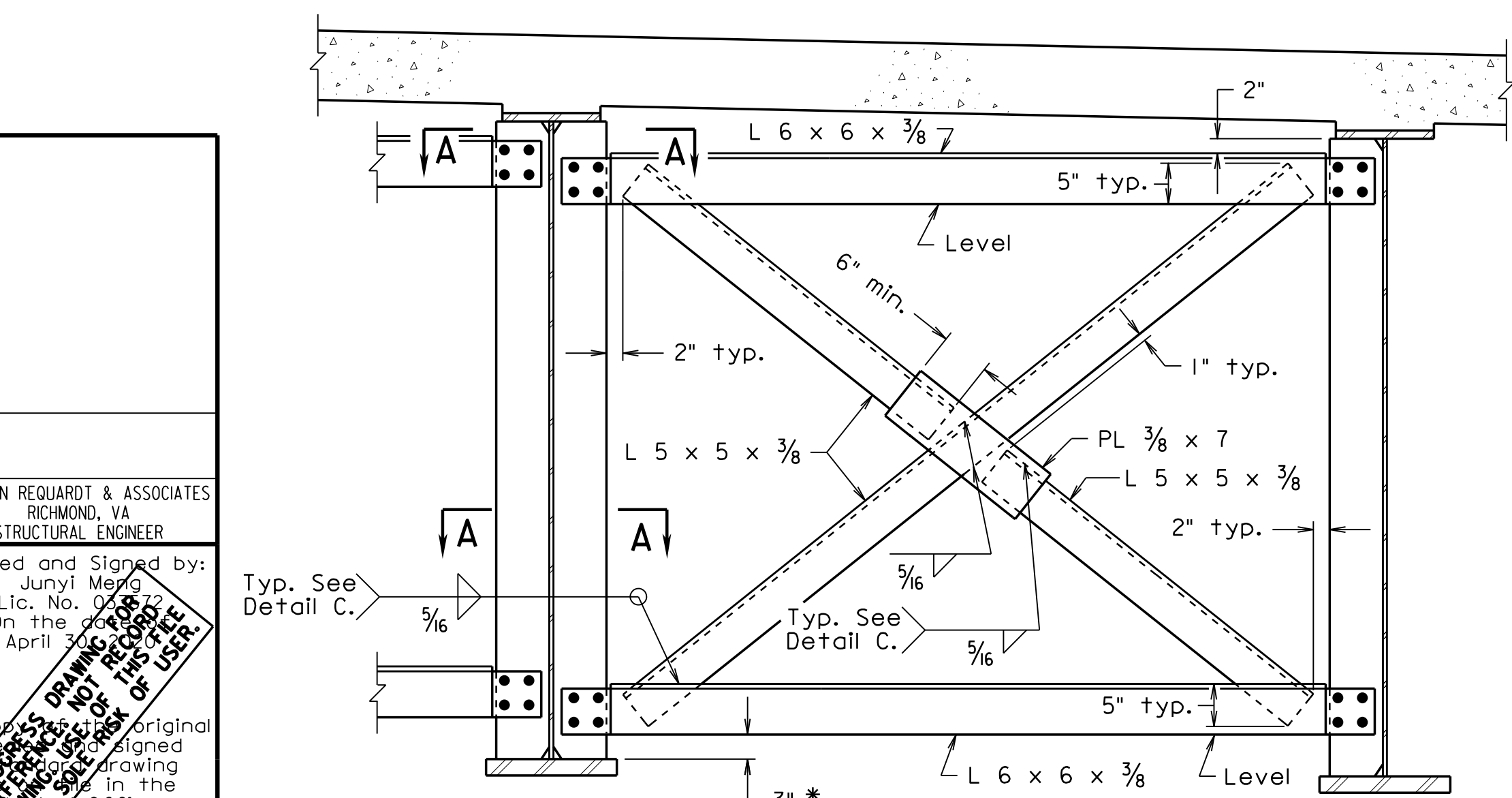
DETAIL C



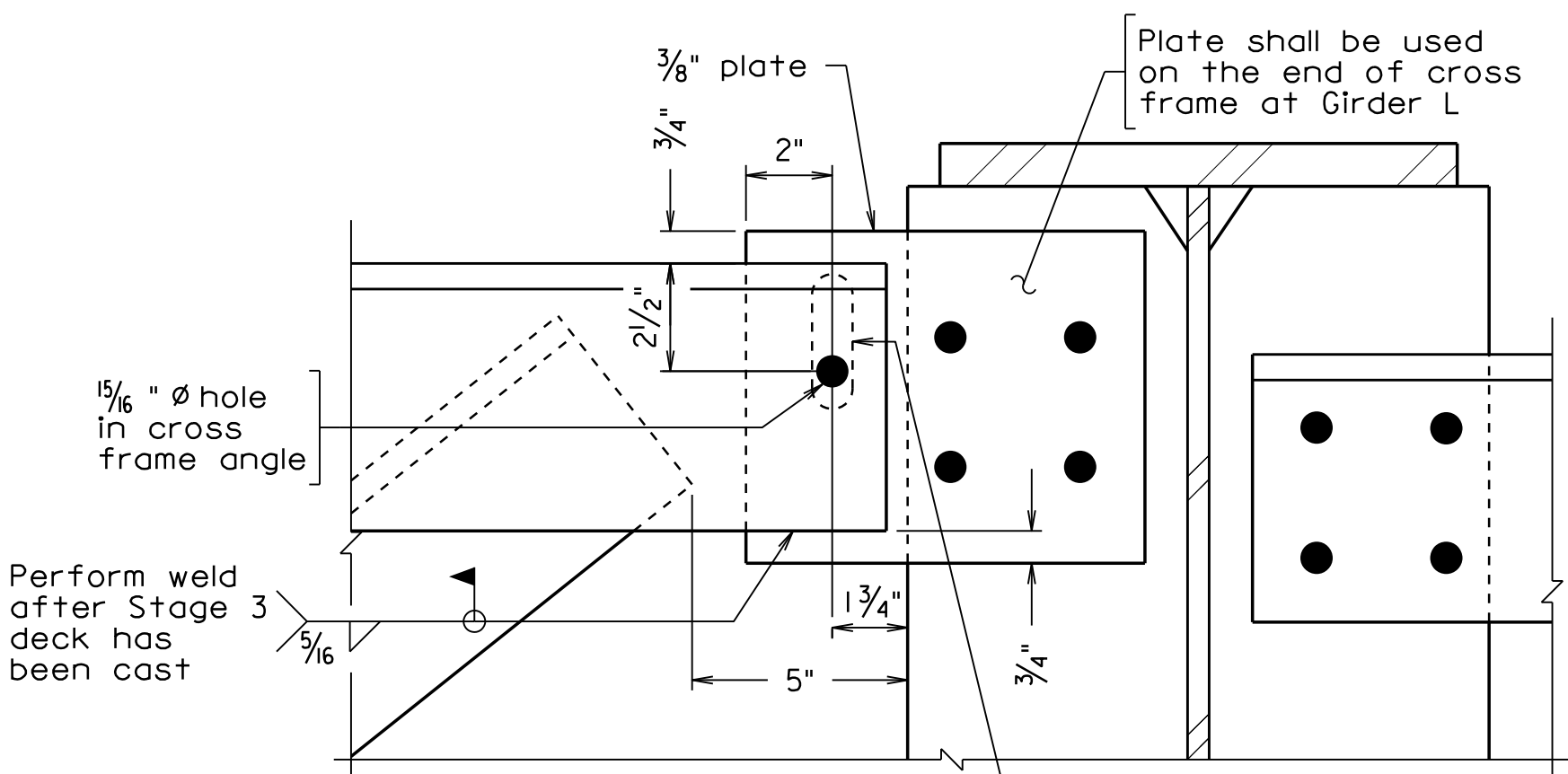
CONNECTOR ANGLE DETAIL



SECTION B-B

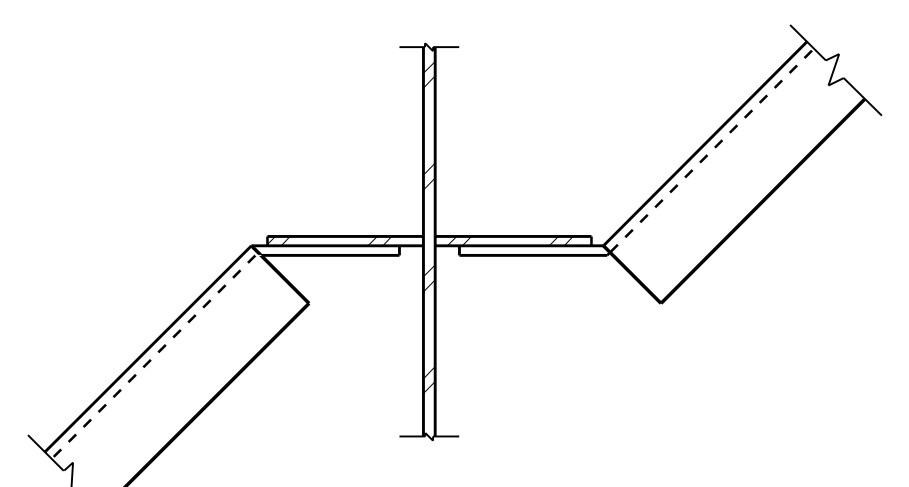


INTERMEDIATE CROSS FRAME - CF8
* Dimension shall be 6" at piers



STAGED CONSTRUCTION CROSS FRAME CONNECTION DETAIL

**PAC PLANS
PROGRESS PRINT 4/1/2022
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FOR CONSTRUCTION**



SECTION A-A

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
CROSSFRAME DETAILS					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		53 of 125
Revisions					

257-38A_053.dgn
04-30-2020
BCF-4

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER
Sealed and Signed by:
Junyi Meng
Lic. No. 020672
On the date of April 1, 2022
I, the undersigned, being a duly Licensed Professional Engineer in the State of Virginia, do hereby certify that the above is a true and correct copy of the original drawing as designed and prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Virginia.
VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			54

Notes:

All welding of structural steel and quality control inspection of welds, including field welding and quality control inspection of field welding, shall be the responsibility of the Contractor in accordance with Section 407.04(i) of the Specifications.

All flanges and webs are considered tension members.

Diaphragms D1 and D2 are considered a primary member and shall be subject to Charpy V-Notch impact requirements.

All webs, flanges and plates on this sheet shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

Depth of diaphragm web plate shall match depth of girder web plate at connection location. Note that diaphragms at girder connections for Girders T, W and X are located within the parabolic haunch of Girders M and N.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1/2". The adjusted spacing shall be shown on the shop drawings.

All bolts shall be 7/8" high strength ASTM A325 Type I.

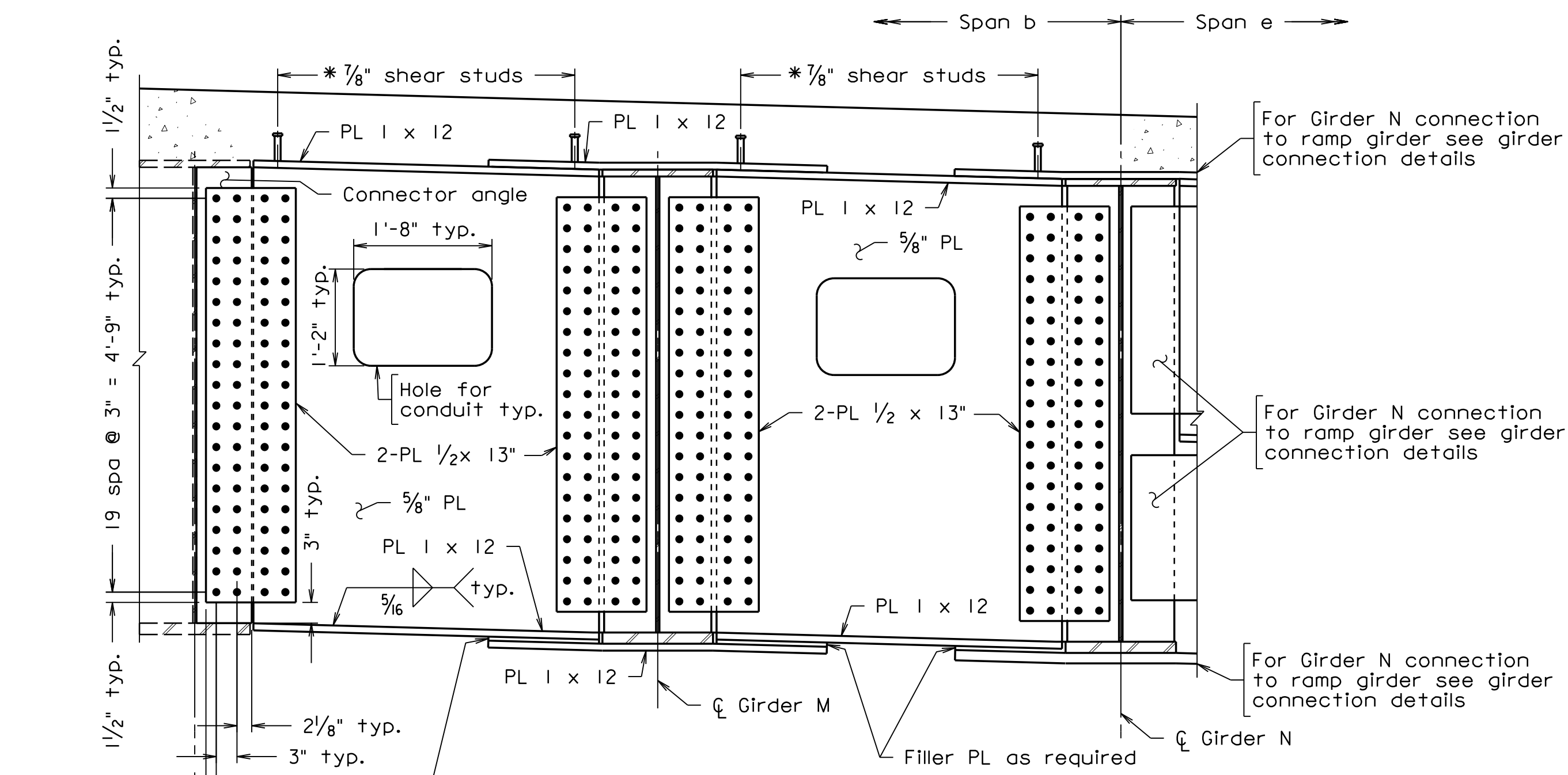
All bolt holes shall be standard size.

* 3-7/8" stud shear connectors per row at 6" maximum spacing.

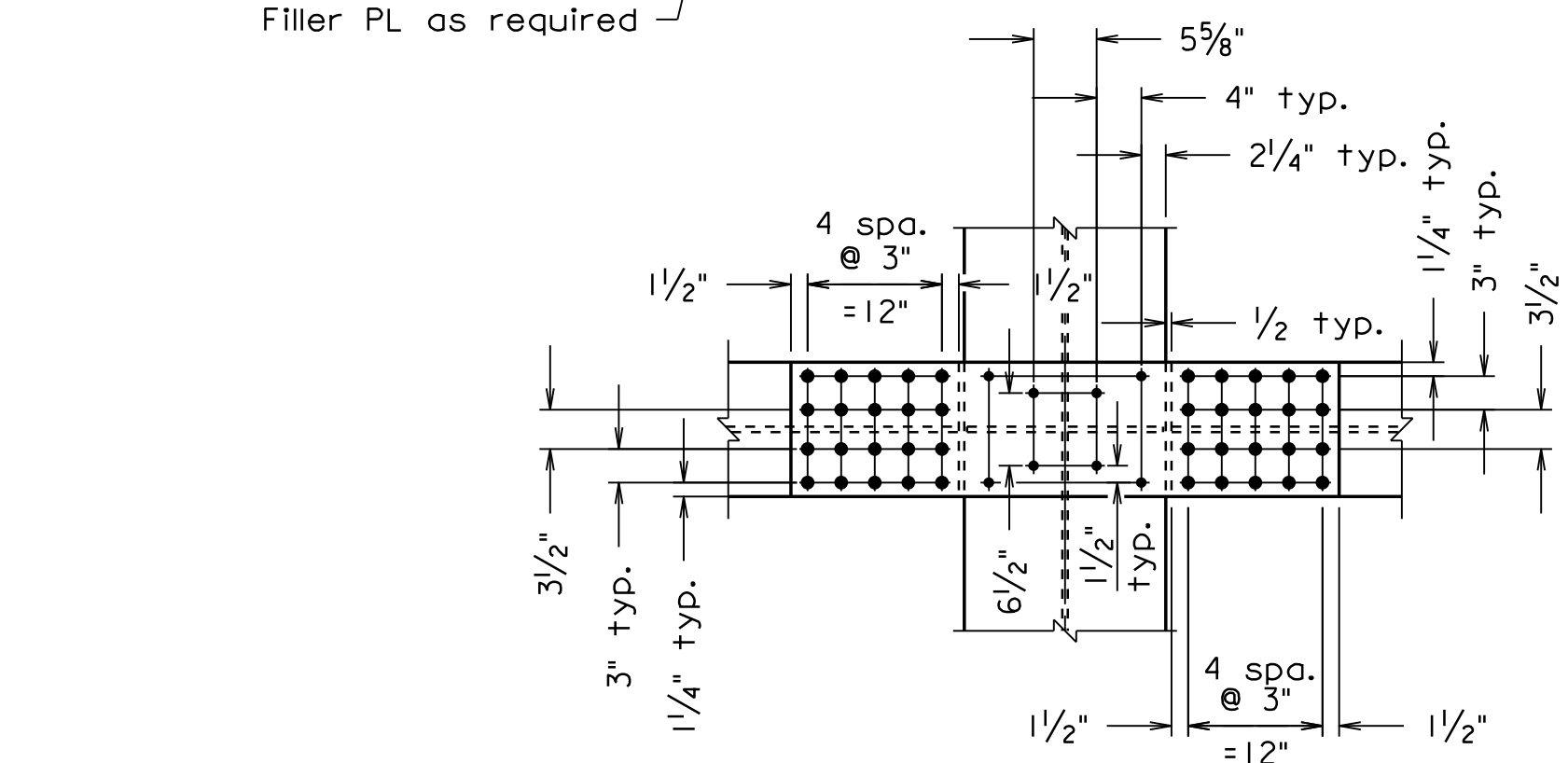
For diaphragm and connection type locations, see sheets 38 and 39.

For ramp girder details see sheet 43.

For other Girder Connection Details, see sheets 55, 56 and 57.

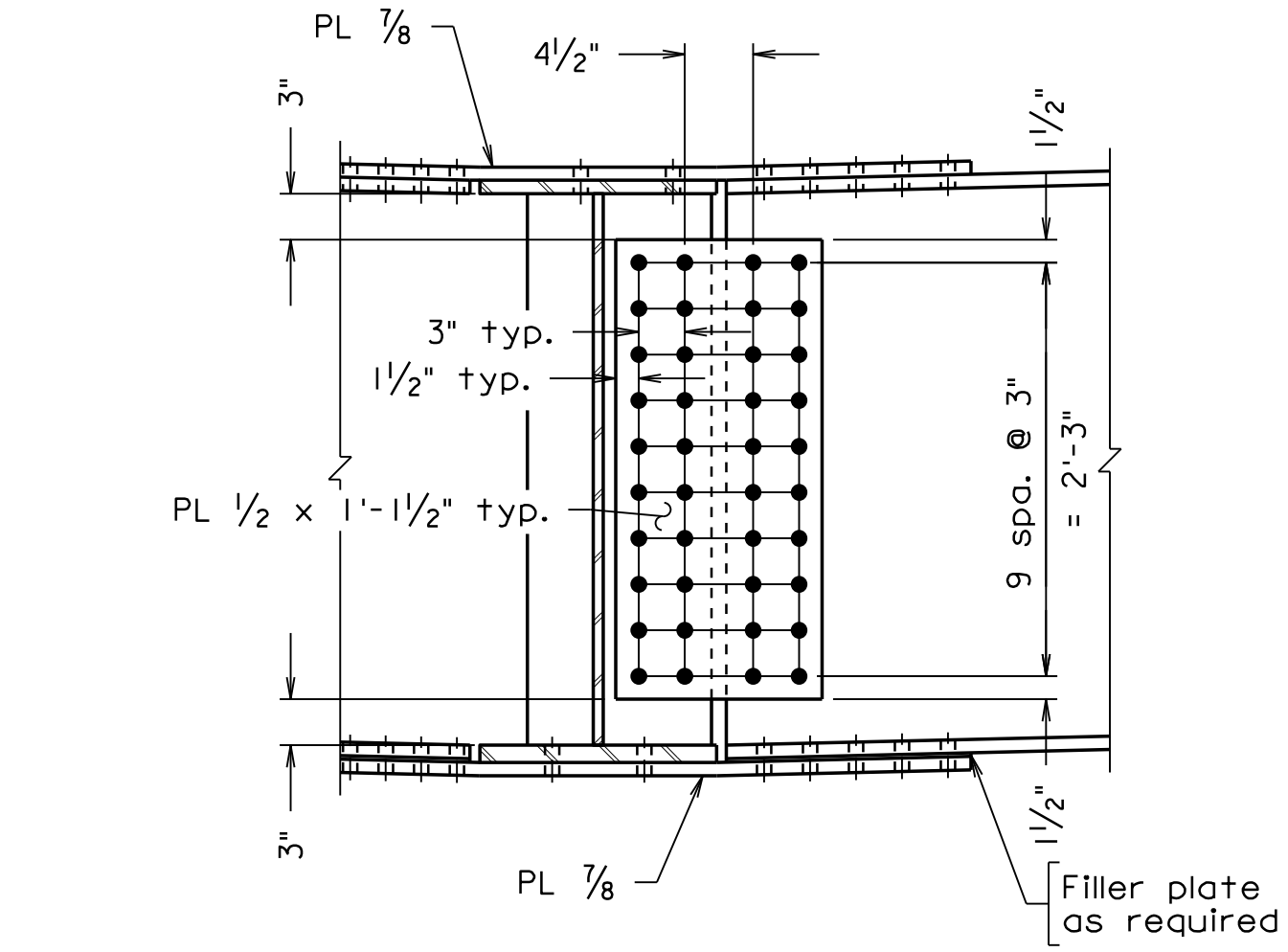


DIAPHRAGM D1



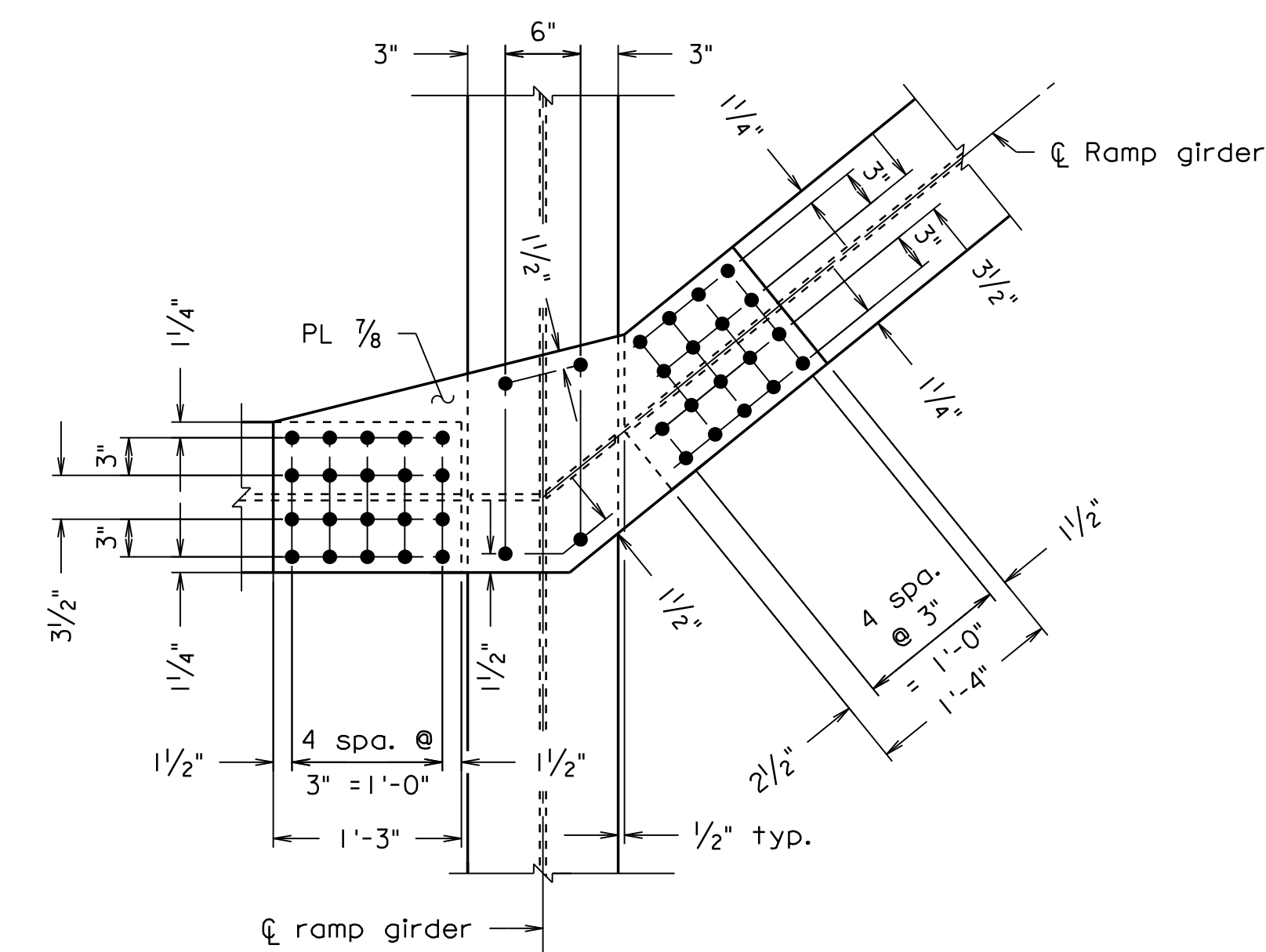
PLAN - FLANGE - GIRDER M - D1

Top flange shown, bottom flange similar



CONNECTION DETAIL TYPE IV - ELEVATION

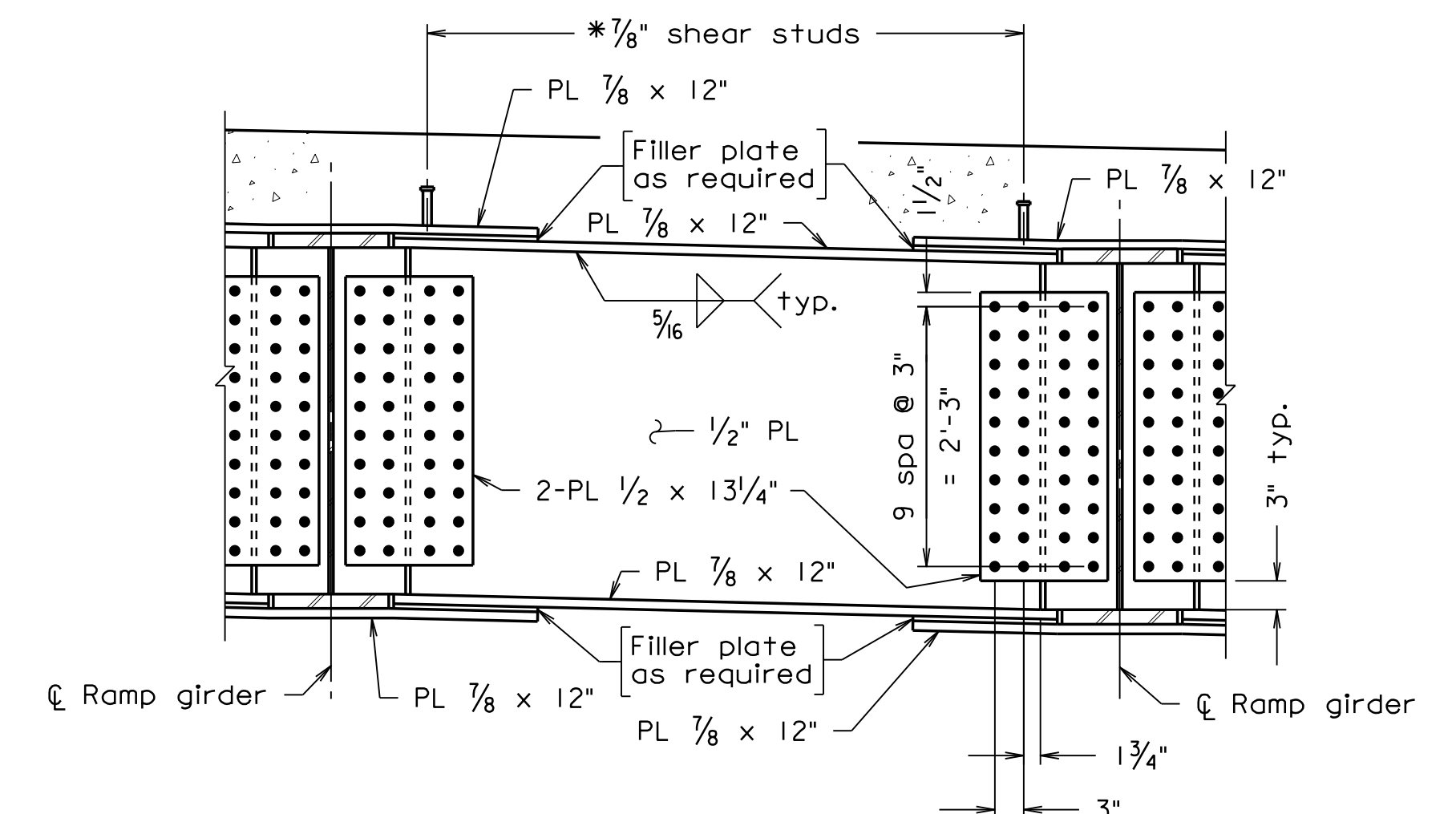
Scale: 1" = 1'-0"



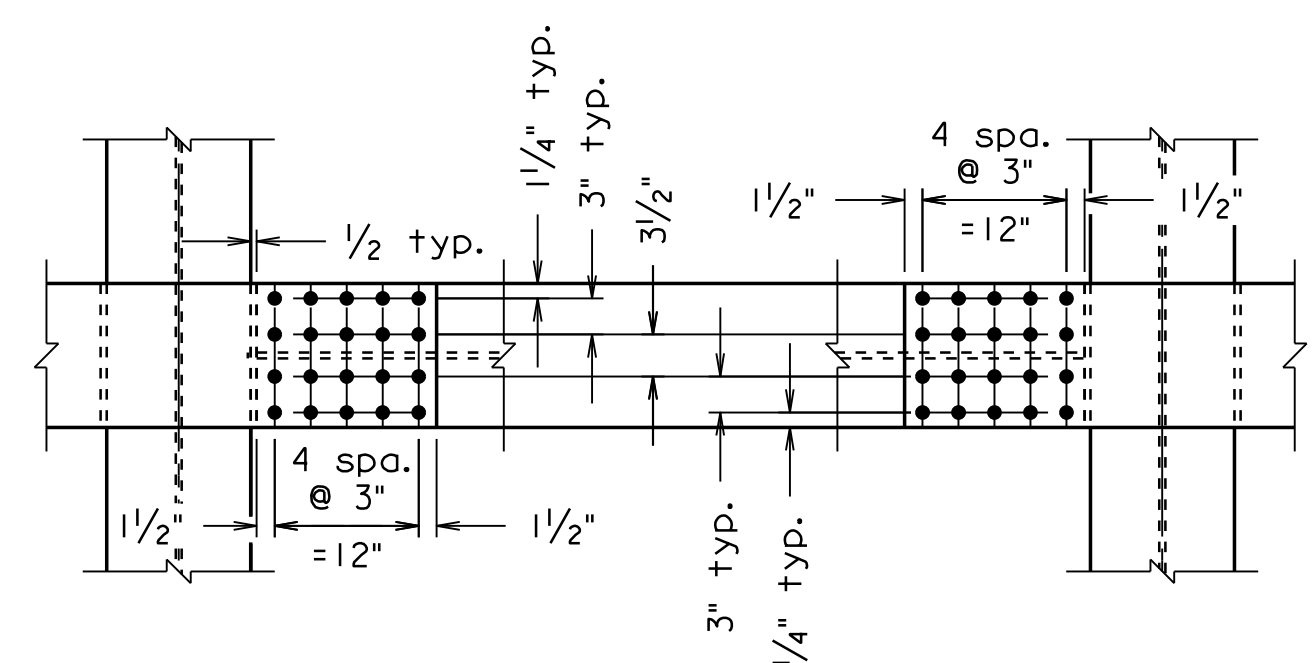
CONNECTION DETAIL TYPE IV - PLAN - FLANGE

Web plates not shown for clarity
Top flange shown, bottom flange similar

Scale: 1" = 1'-0"



DIAPHRAGM D2



PLAN - FLANGE - D2

Scale: 3/4" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION				
DIAPHRAGM AND GIRDER CONNECTION DETAILS				
No.	Description	Date	Designed: C.R.R. Drawn: C.R.R. Checked: M.B.R.	Sheet No.
	Revisions		Date: Apr. 2022	257-38A 54 of 125

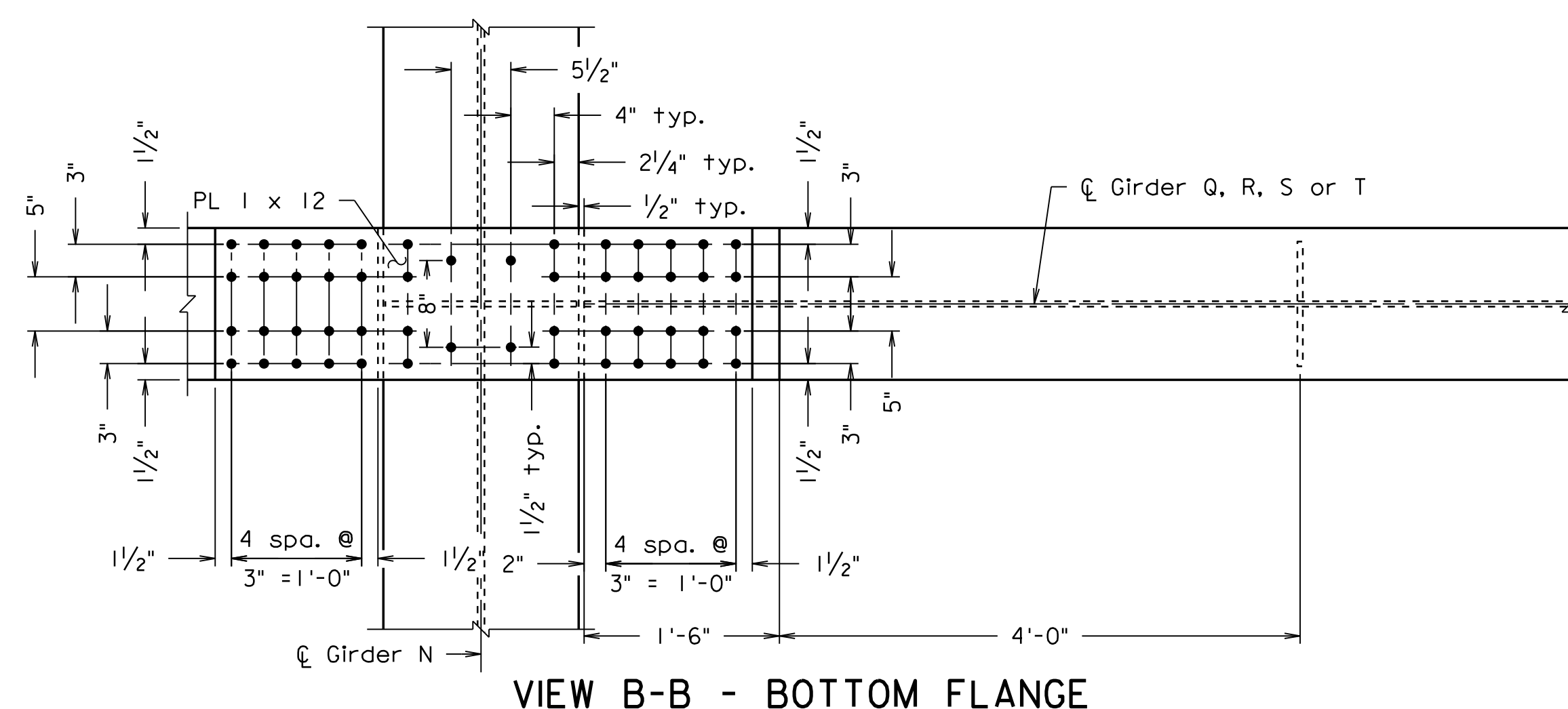
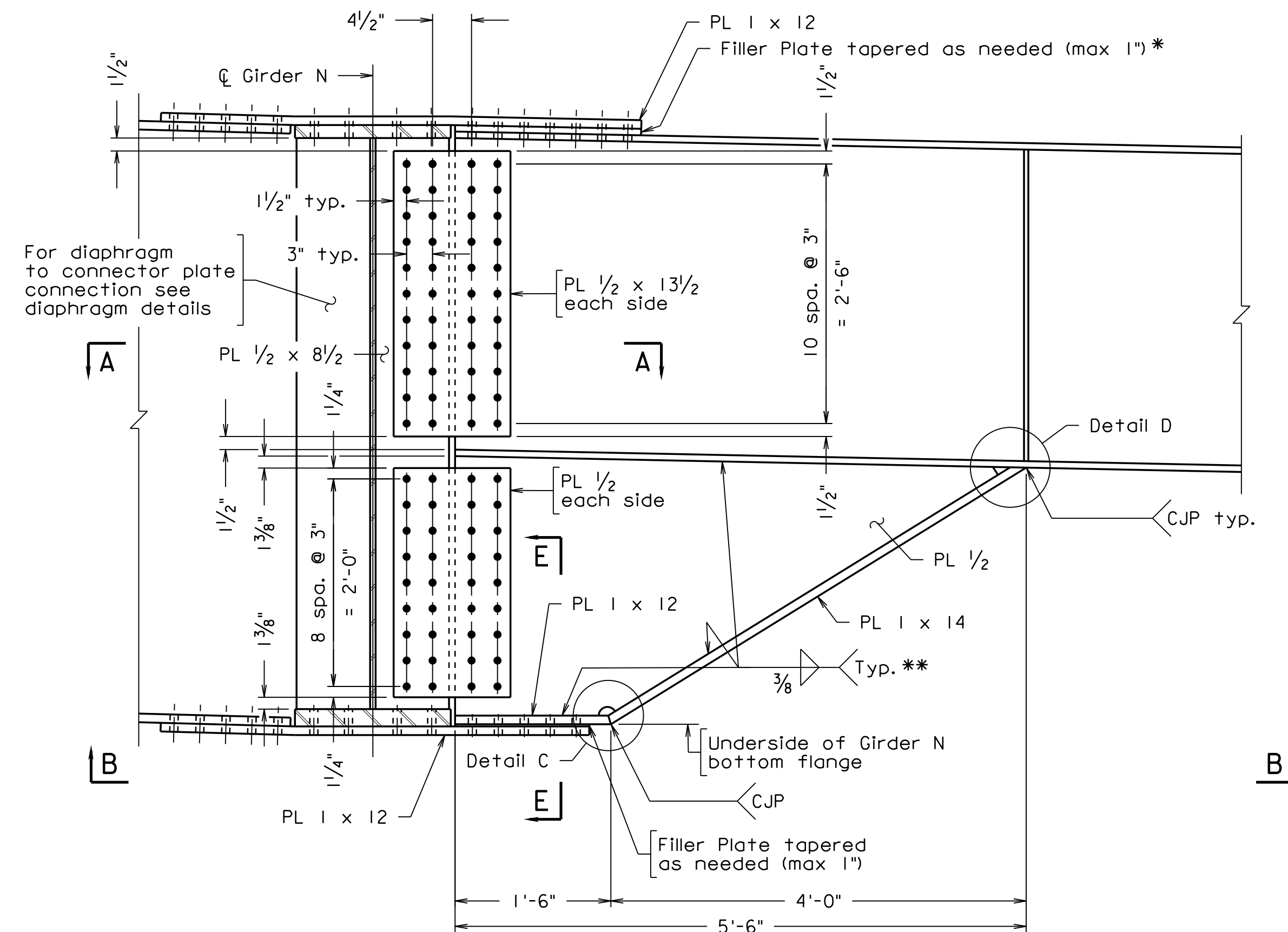
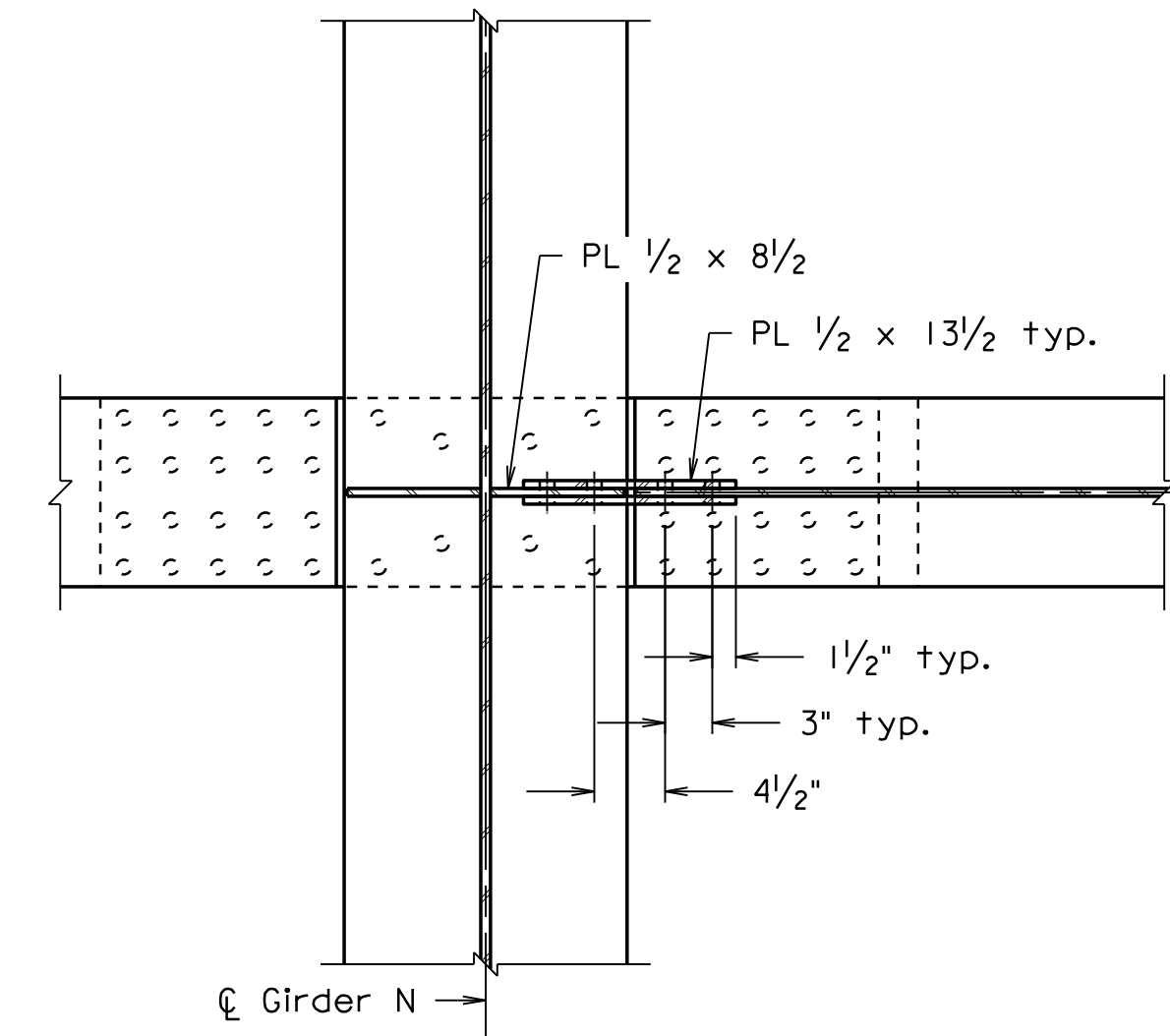
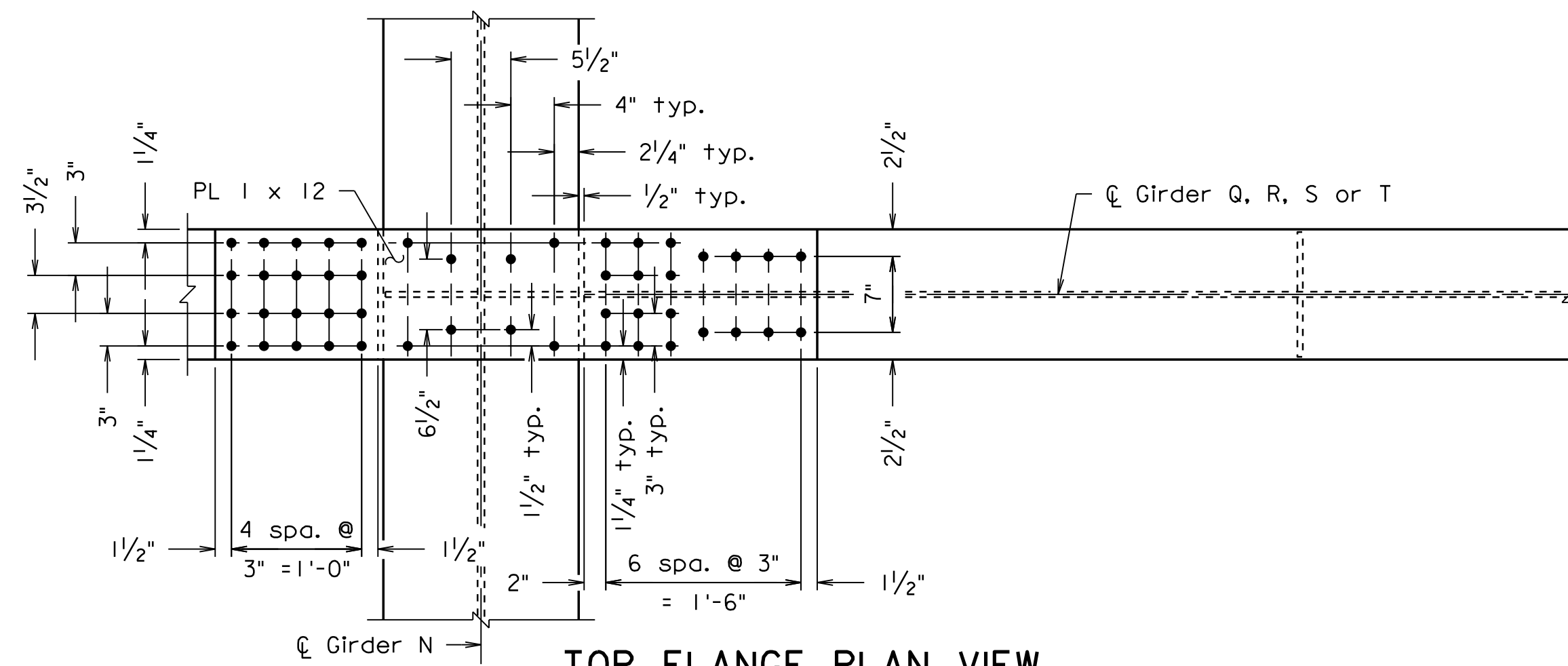
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257-38A_054.dgn

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RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				55



Notes:

All webs, flanges and plates on this sheet shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

The depth of lower girder web plate shall be fabricated such that the top of web of the girder is in line with Girder N top of web and the bottom of bottom flange plate is in line with the bottom of bottom flange of Girder N. Note that connection at Girder T is located within the parabolic haunch of Girder N.

* Filler plates may be tapered in both directions to account for camber and profile grade of both girders at connection.

Splice plates shall be fabricated with the direction of roll in direction of primary girder.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1 1/2". The adjusted spacing shall be shown on the shop drawings.

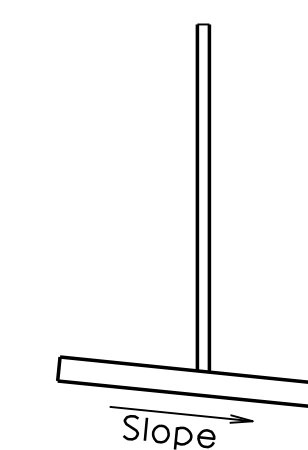
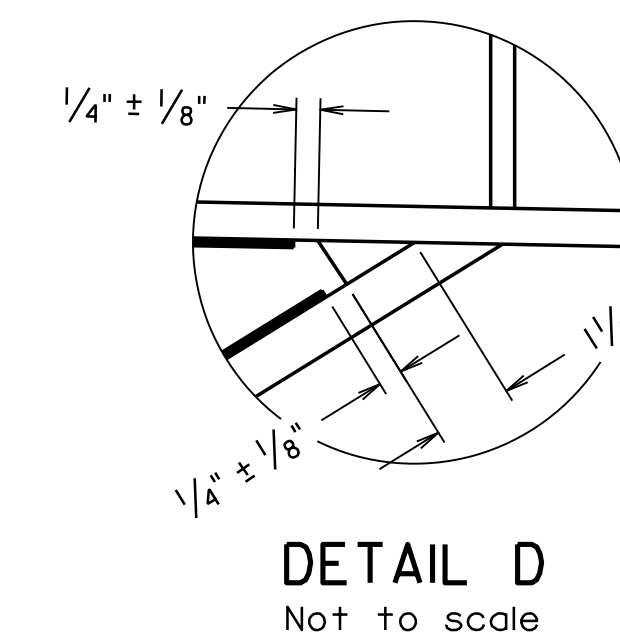
Complete joint penetration welds shall be inspected by ultrasonic testing in accordance with AWS D1.5 and VTM 30.

** Full length of fillet welds shall be inspected by magnetic particle testing.

For locations of connection type details, see sheets 38 and 39.

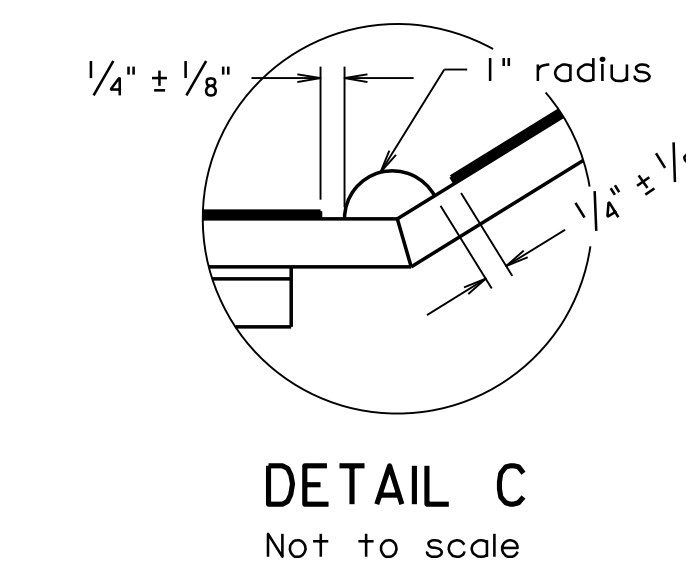
For ramp girder details, see sheet 43.

For diaphragm details, see sheets 53 and 54.



Slope flange to match instantaneous slope of Girder N at connection

SECTION E-E
AT GIRDER T, W AND X ONLY
Not to scale



257-38A_055.dgn

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PAC PLANS
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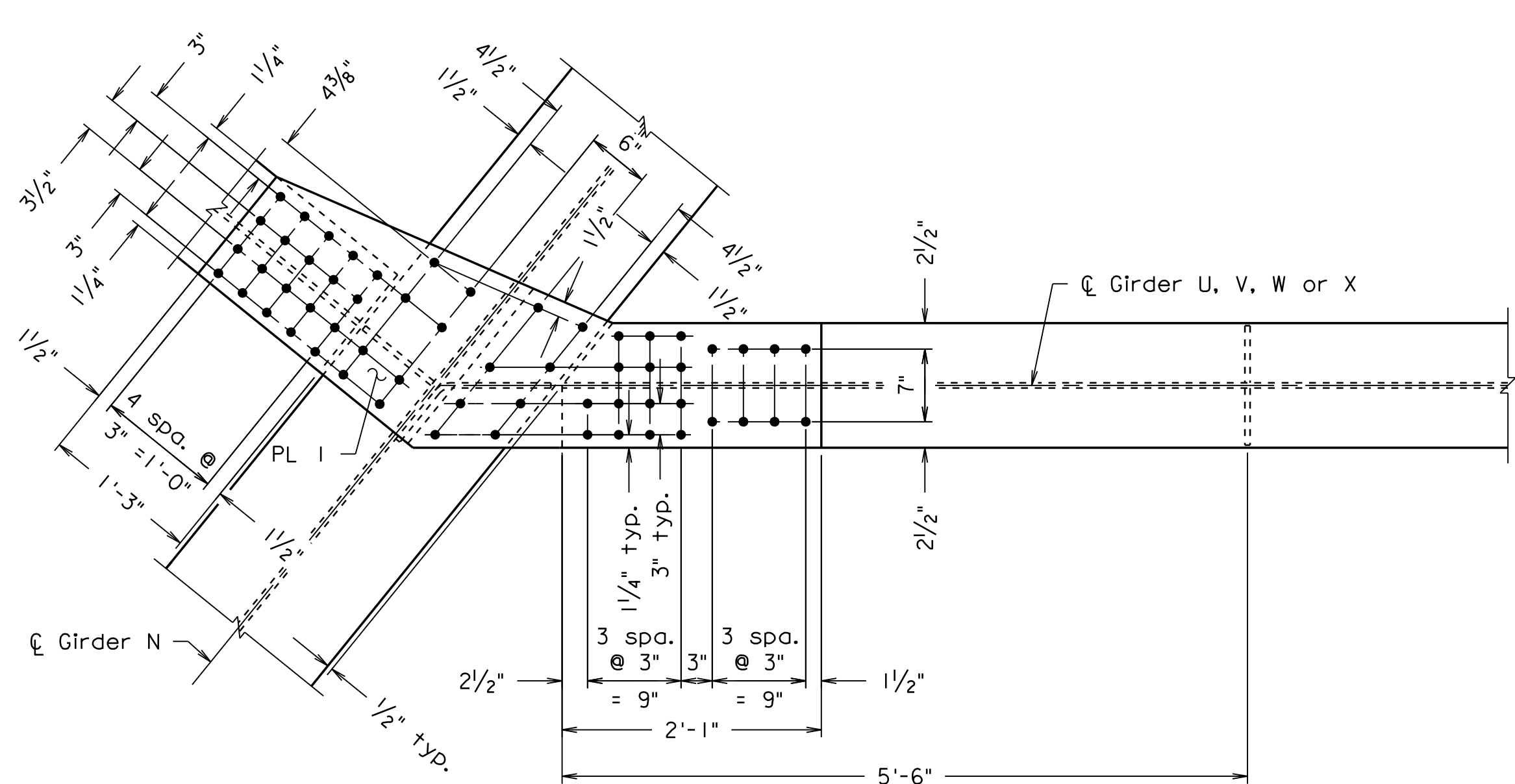
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Scale: 1" = 1'-0", unless otherwise noted.

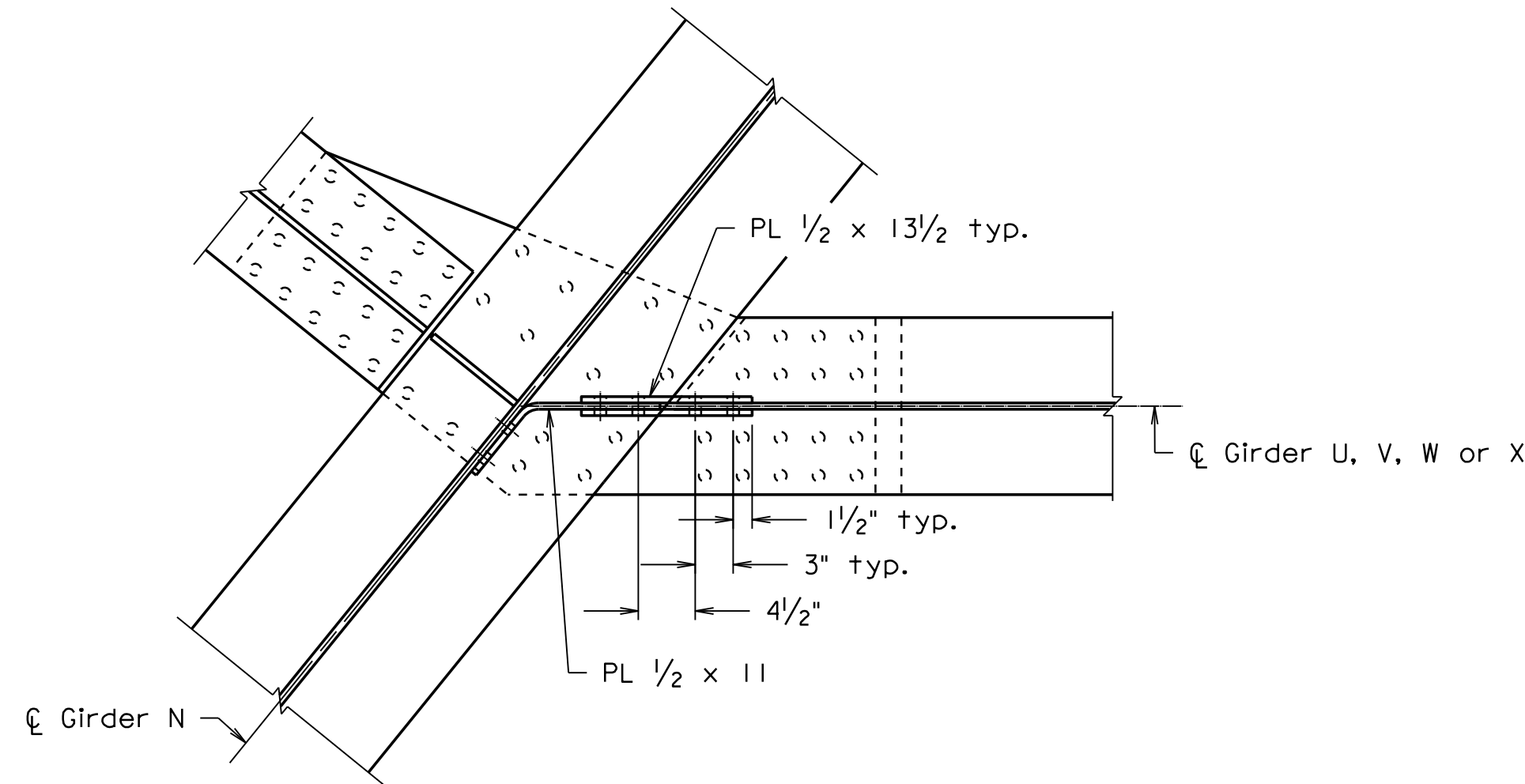
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
GIRDER CONNECTION DETAILS 1 OF 3					
No.	Description	Date	Designed: KML	Date	Plan No.
			Drawn: BRB	Apr. 2022	257-38A
			Checked: WRA		55 of 125
Revisions					

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			56



TOP FLANGE PLAN
Web plates not shown for clarity



SECTION A-A

Notes:

All webs, flanges and plates on this sheet shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

The depth of lower girder web plate shall be fabricated such that the top of web of the girder is in line with Girder N top of web and the bottom of bottom flange plate is in line with the bottom of bottom flange of Girder N. Note that connections at Girders W and X are located within the parabolic haunch of Girder N.

*Filler plates may be tapered in both directions to account for camber and profile grade of both girders at connection.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1/2". The adjusted spacing shall be shown on the shop drawings.

Complete joint penetration welds shall be inspected by UT in accordance with AWS D1.5 and VTM 30.

** Full length of fillet weld between web and flange shall be inspected by magnetic particle testing.

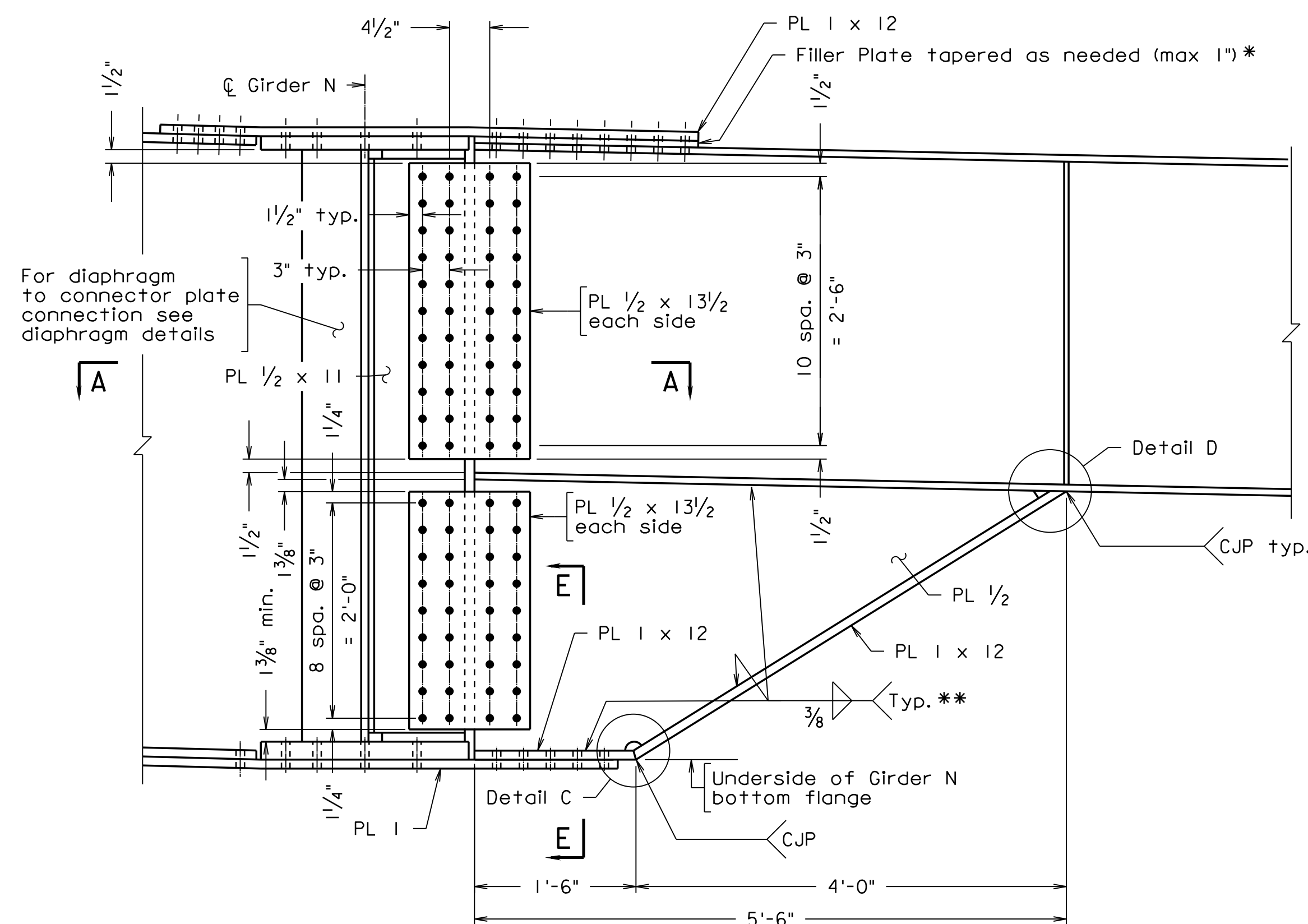
Splice plates shall be cut with the direction of roll parallel to Girder U, V W or X.

For locations of connection type details, see sheets 38 and 39.

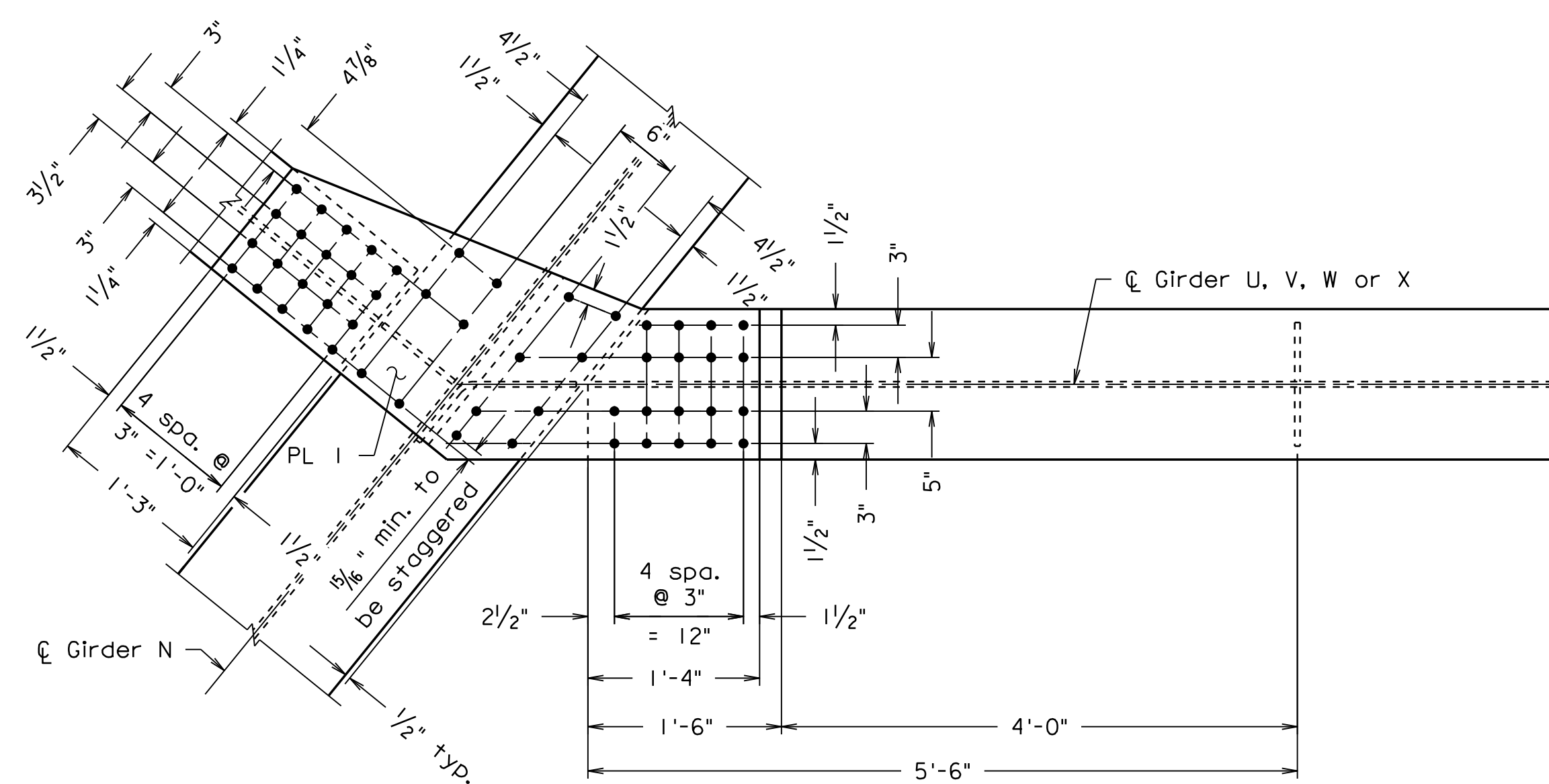
For ramp girder details, see sheet 43.

For diaphragm details, see sheets 53 and 54.

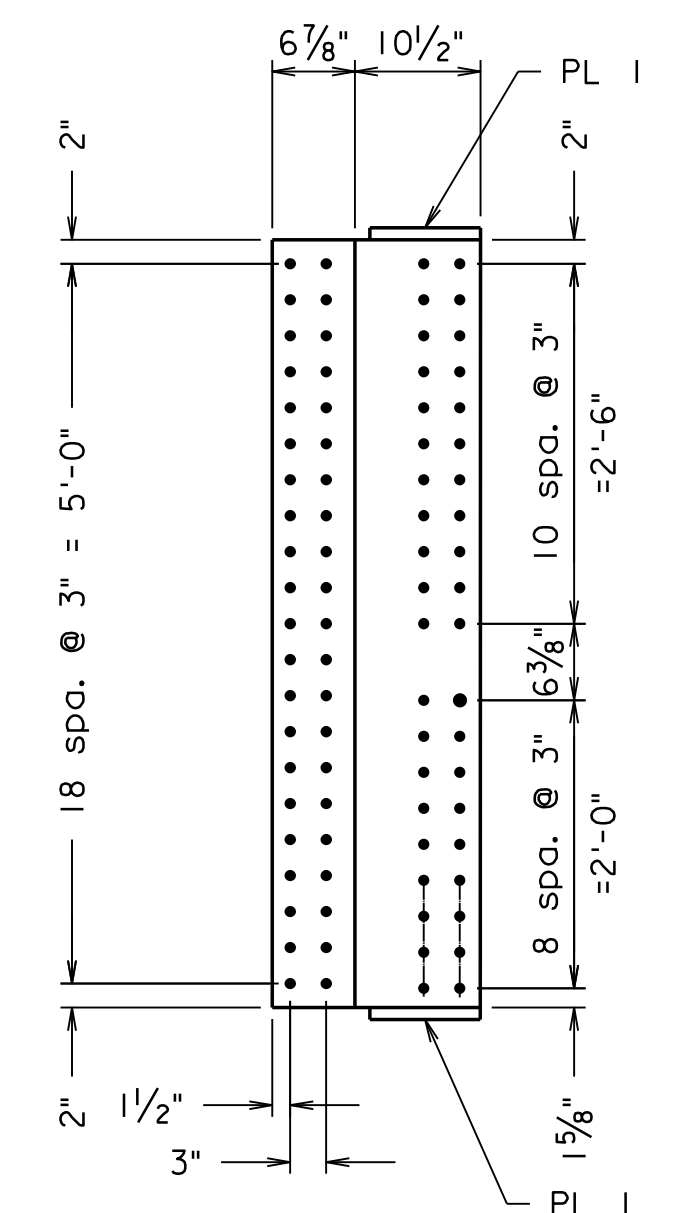
For Detail C, Detail D and Section E, see sheet 55.



CONNECTION DETAIL TYPE II



BOTTOM FLANGE PLAN - REFLECTIVE VIEW
Web plates not shown for clarity



BENT PLATE SUB ASSEMBLY ELEVATION
scale: 3/4" = 1'-0"

257-38A_056.dgn

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 RICHMOND, VA
 STRUCTURAL ENGINEER

Scale: 1" = 1'-0"

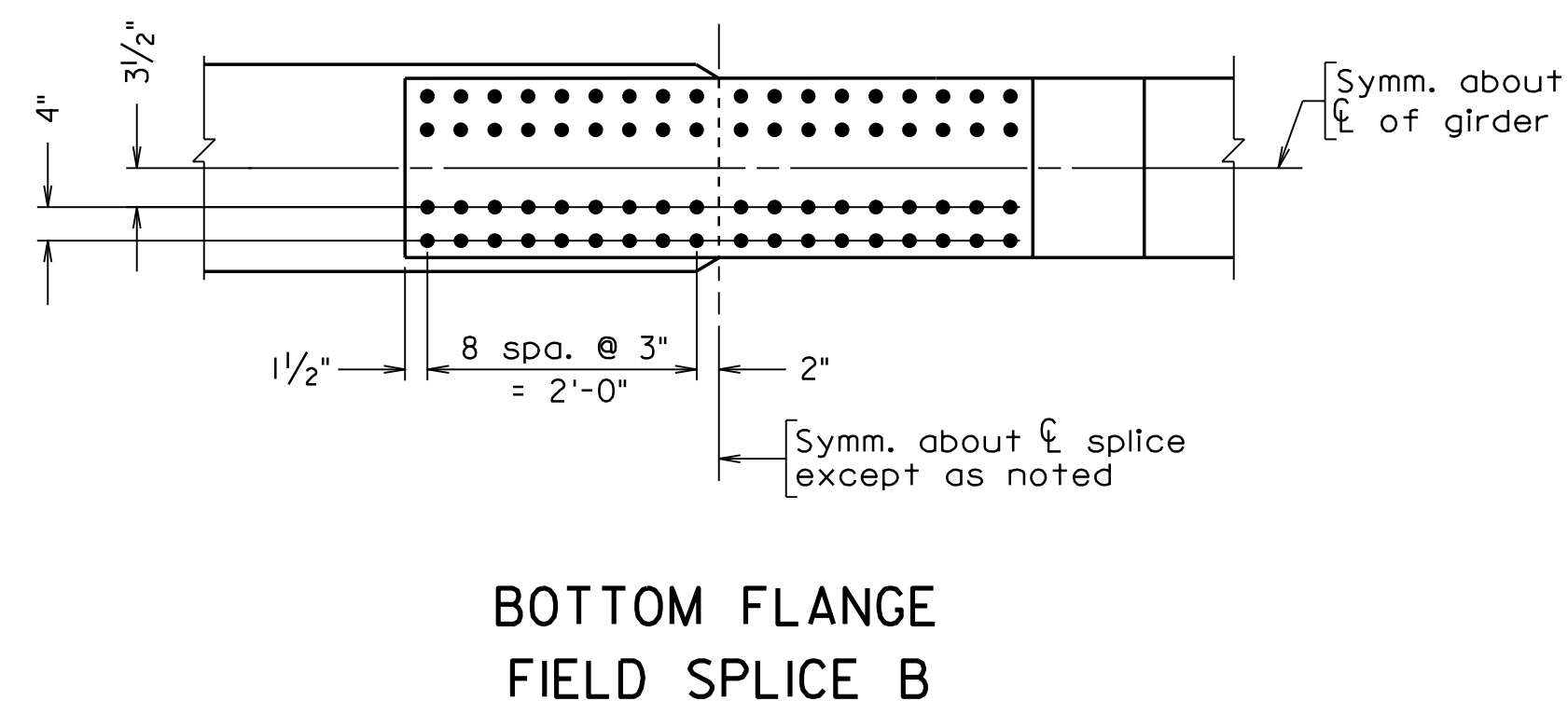
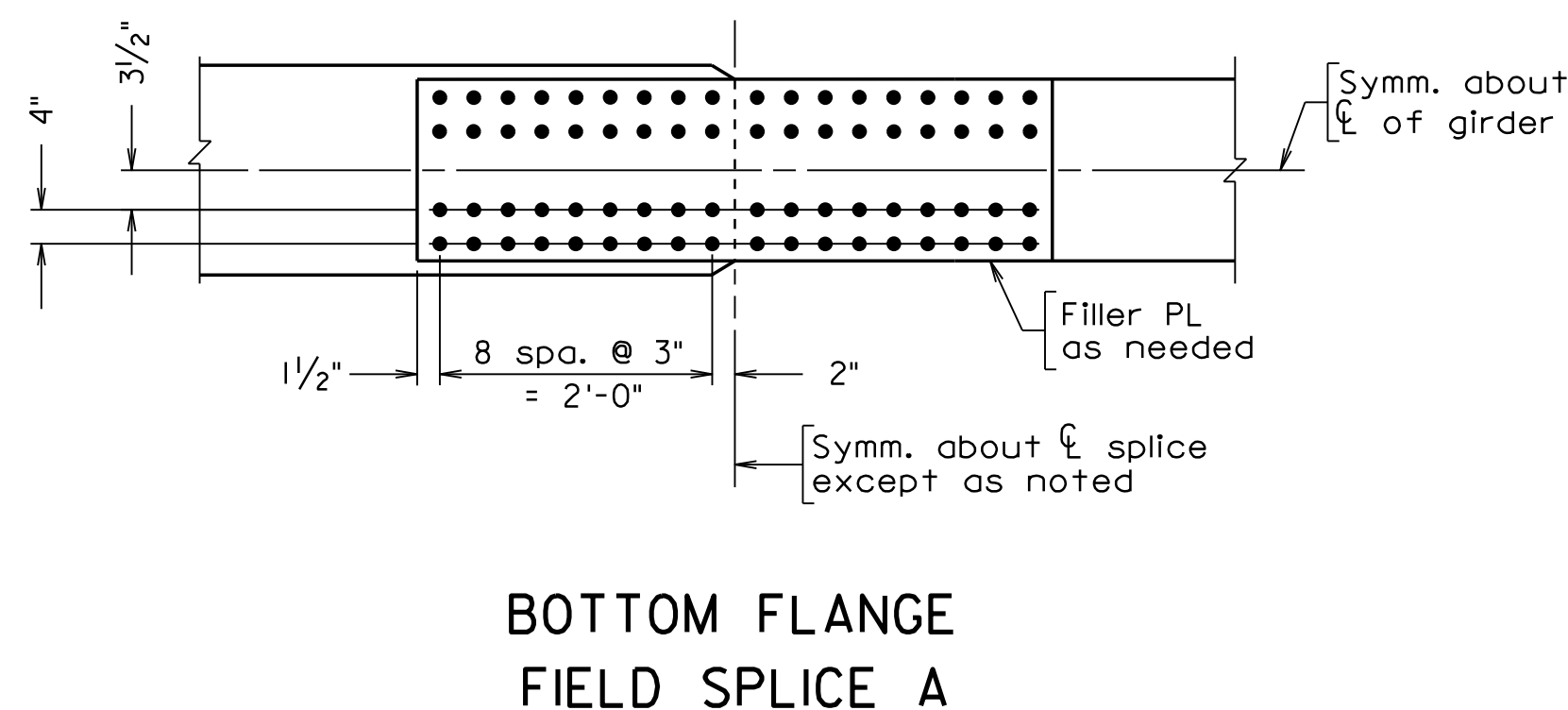
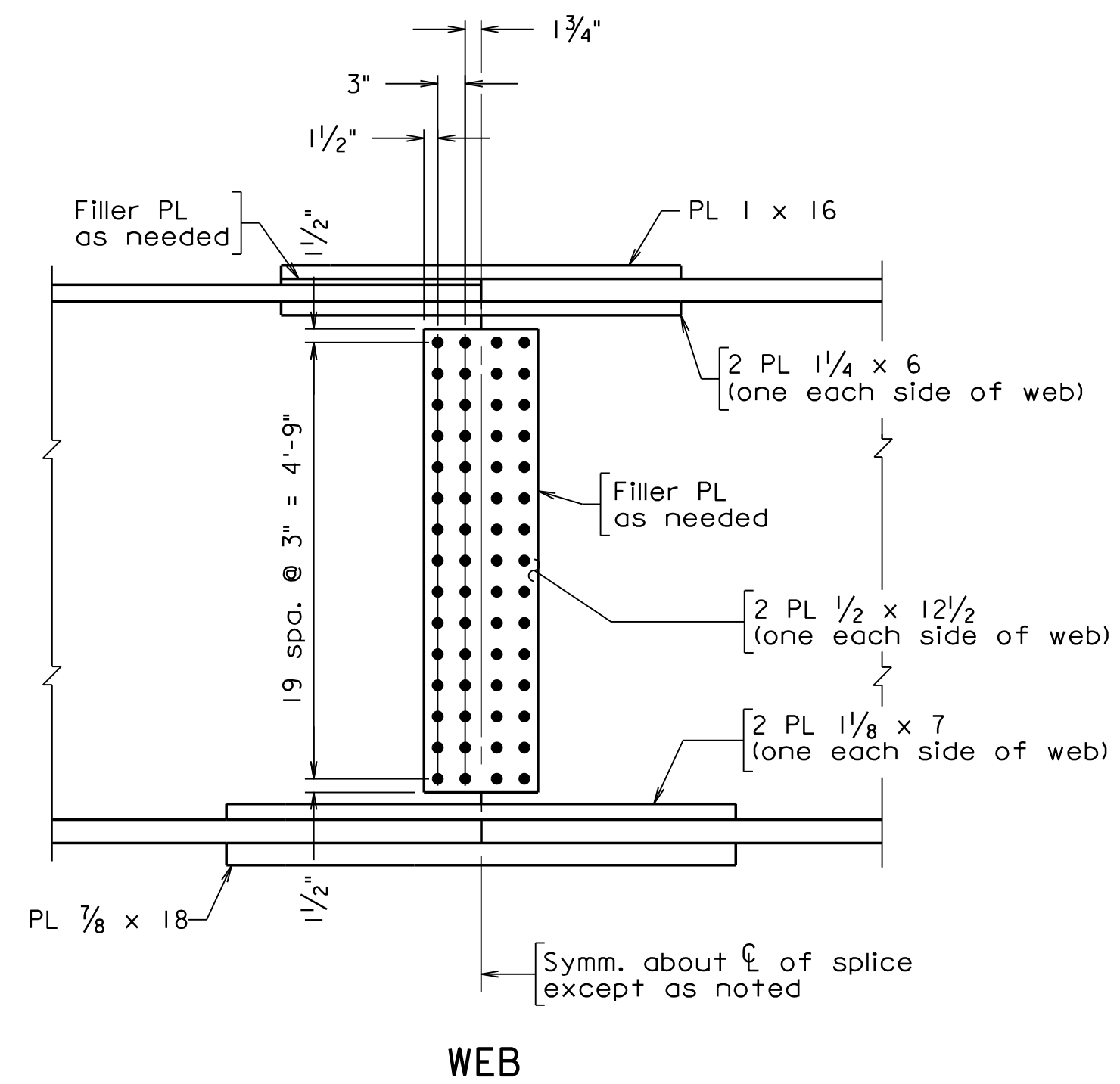
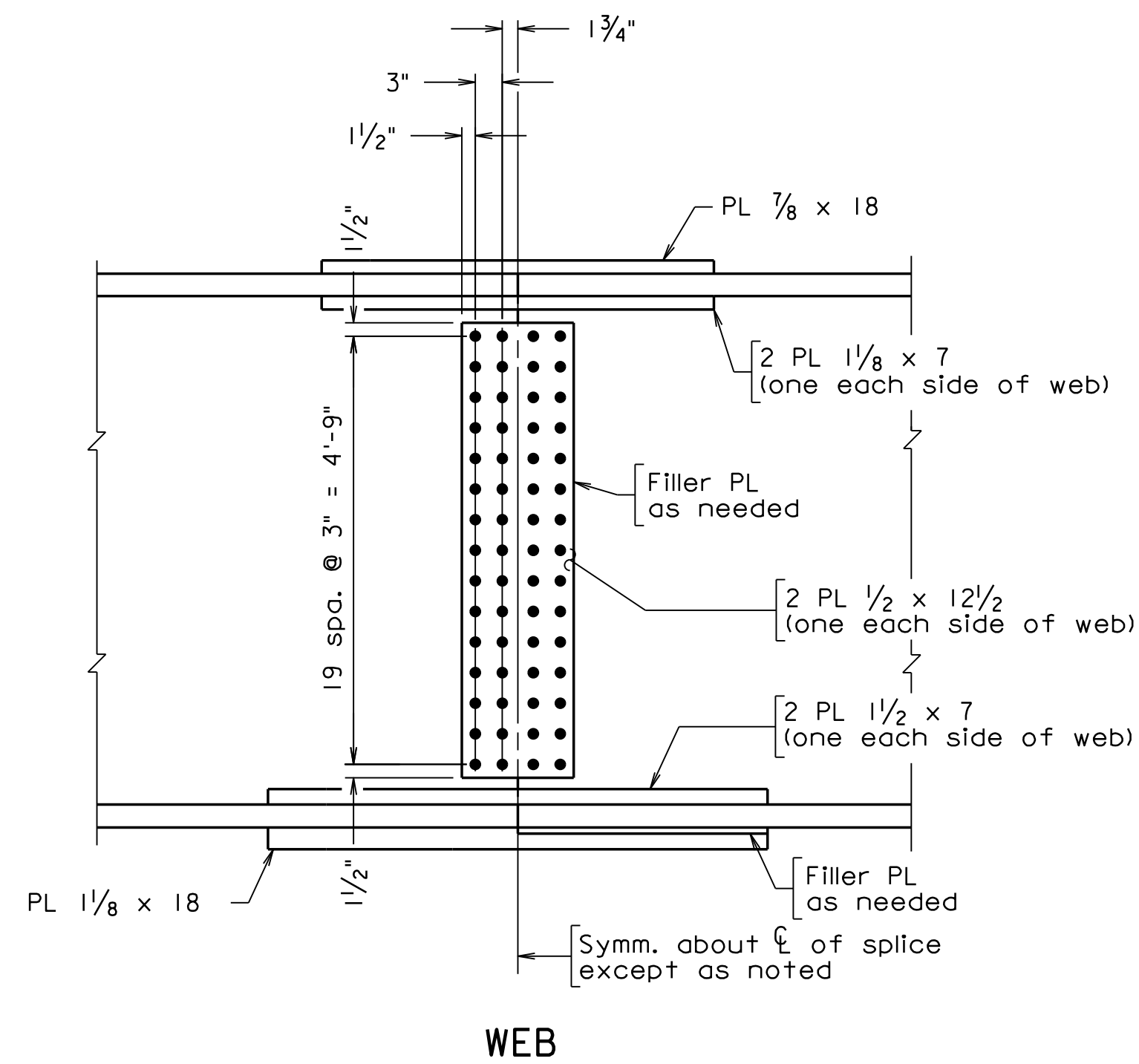
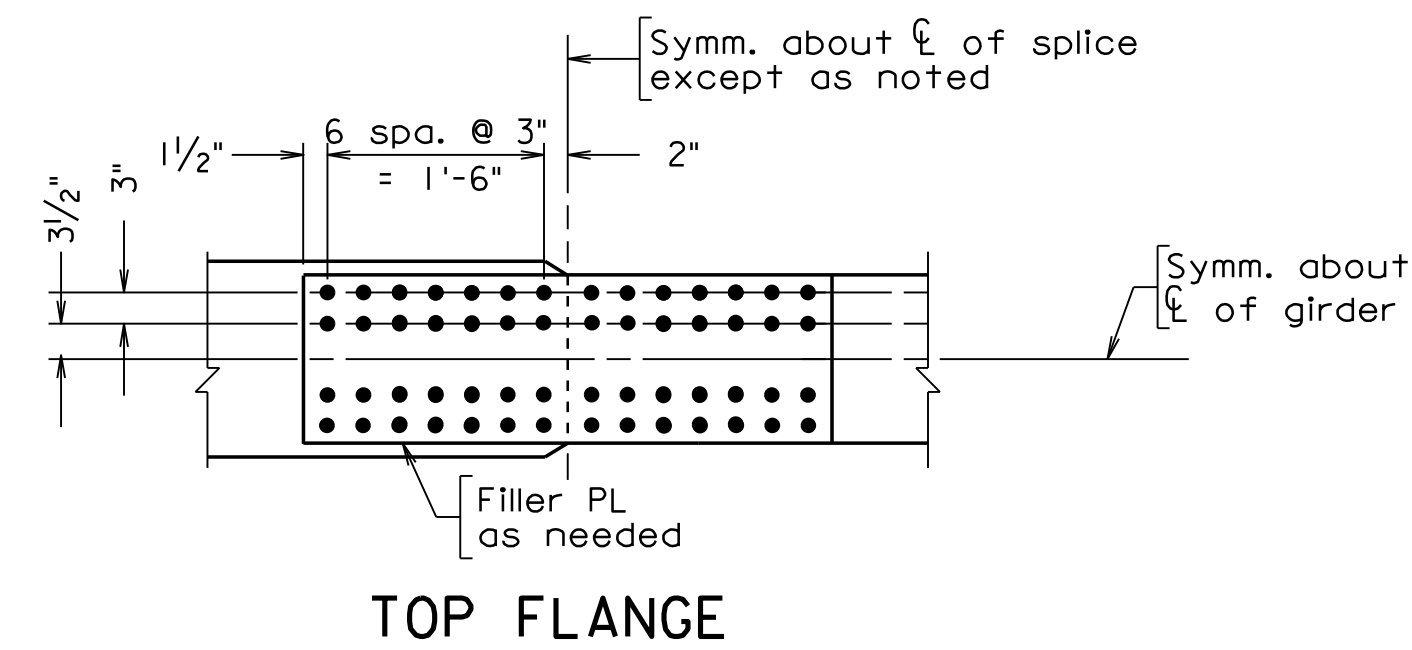
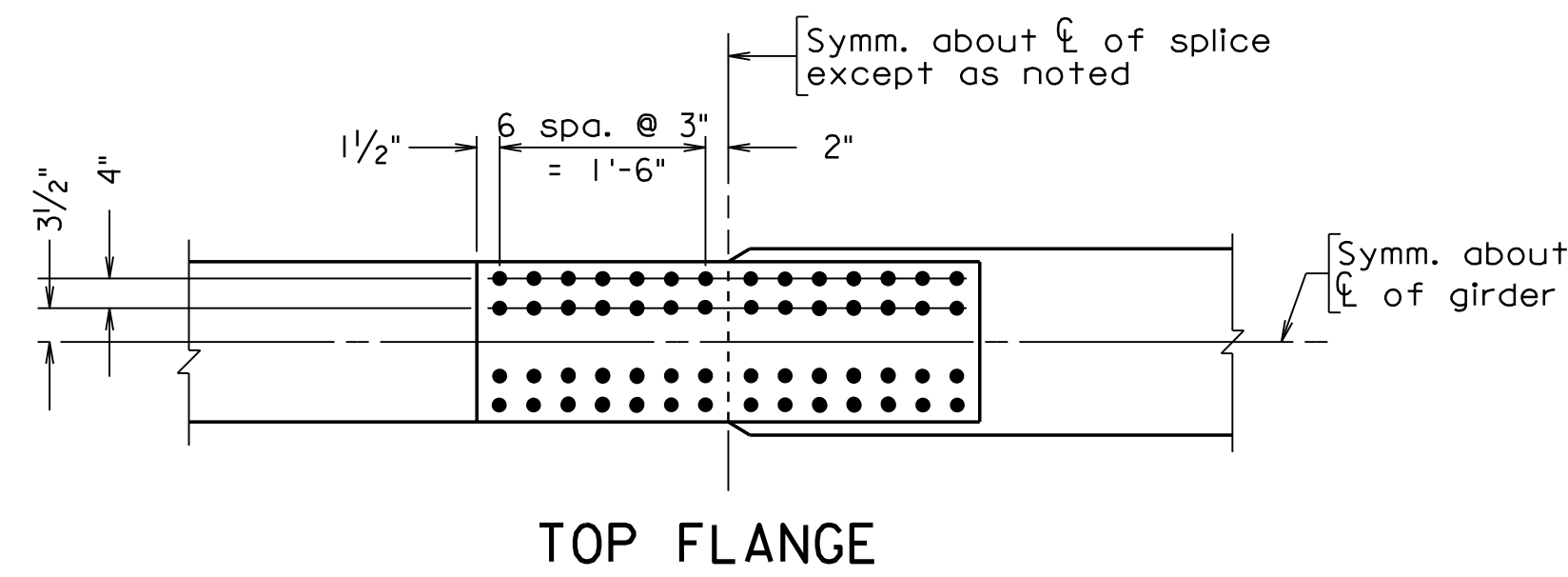
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GIRDER CONNECTION DETAILS 2 OF 3					
No.	Description	Date	Designed: KML	Date	Plan No.
			Drawn: ...BBB	Apr. 2022	257-38A
			Checked: .WRA		56 of 125
Revisions					

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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			58



Notes:

Splice plates shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

For bolted field splice locations see Framing Plan on sheet 38.

For details of girders at splice locations, see sheet 41.

257-38A_058.dgn

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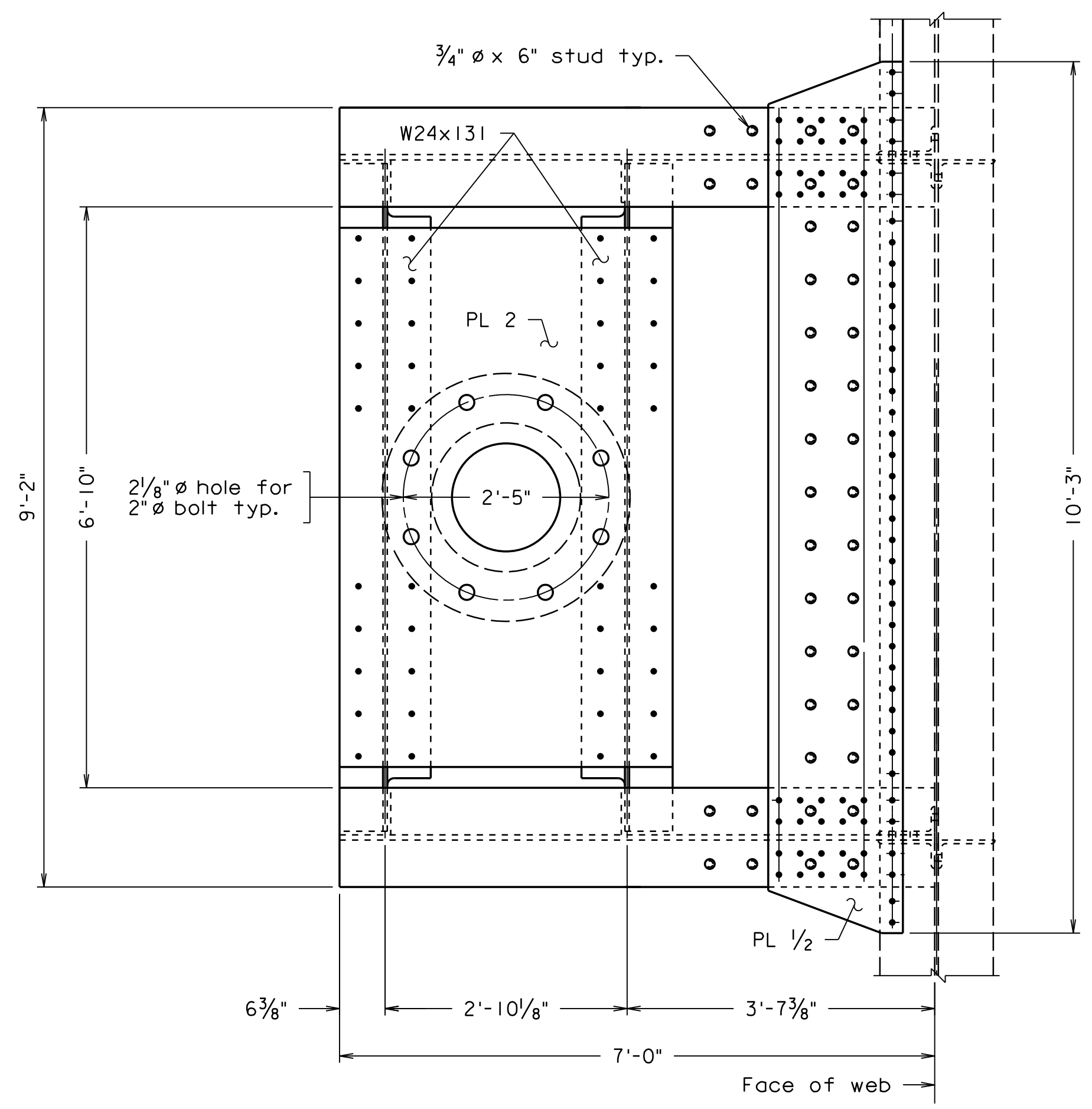
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DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
GIRDER SPLICE DETAILS					
No.	Description	Date	Designed: KML	Date	Plan No.
			Drawn: BRB	Apr. 2022	257-38A
			Checked: WRA		Sheet No.
Revisions					58 of 125

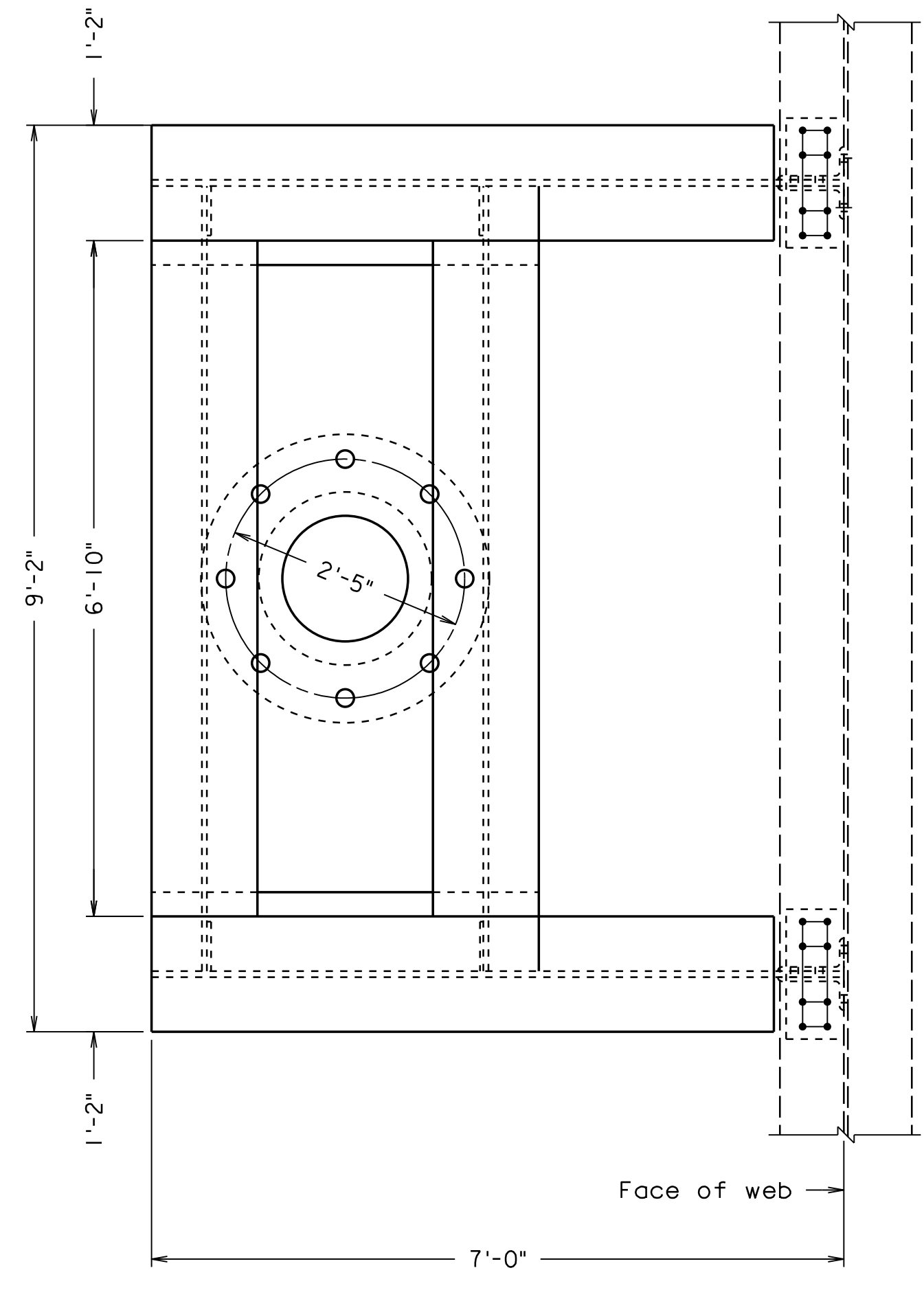
Not to scale

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			59



TOP VIEW A-A
Deck and curb not shown for clarity.



BOTTOM VIEW B-B
Top flange bolt holes not shown for clarity

Notes:

For traffic signal support location, see sheet 39.

Factored loads used for design:
 Axial: 11 kips
 Shear: 9 kips
 Moment: 280 k-ft
 Torsion: 275 k-ft

All bolts on this sheet are 7/8" ϕ unless otherwise noted and use standard size holes.

For traffic signal conduit system, see sheet 91

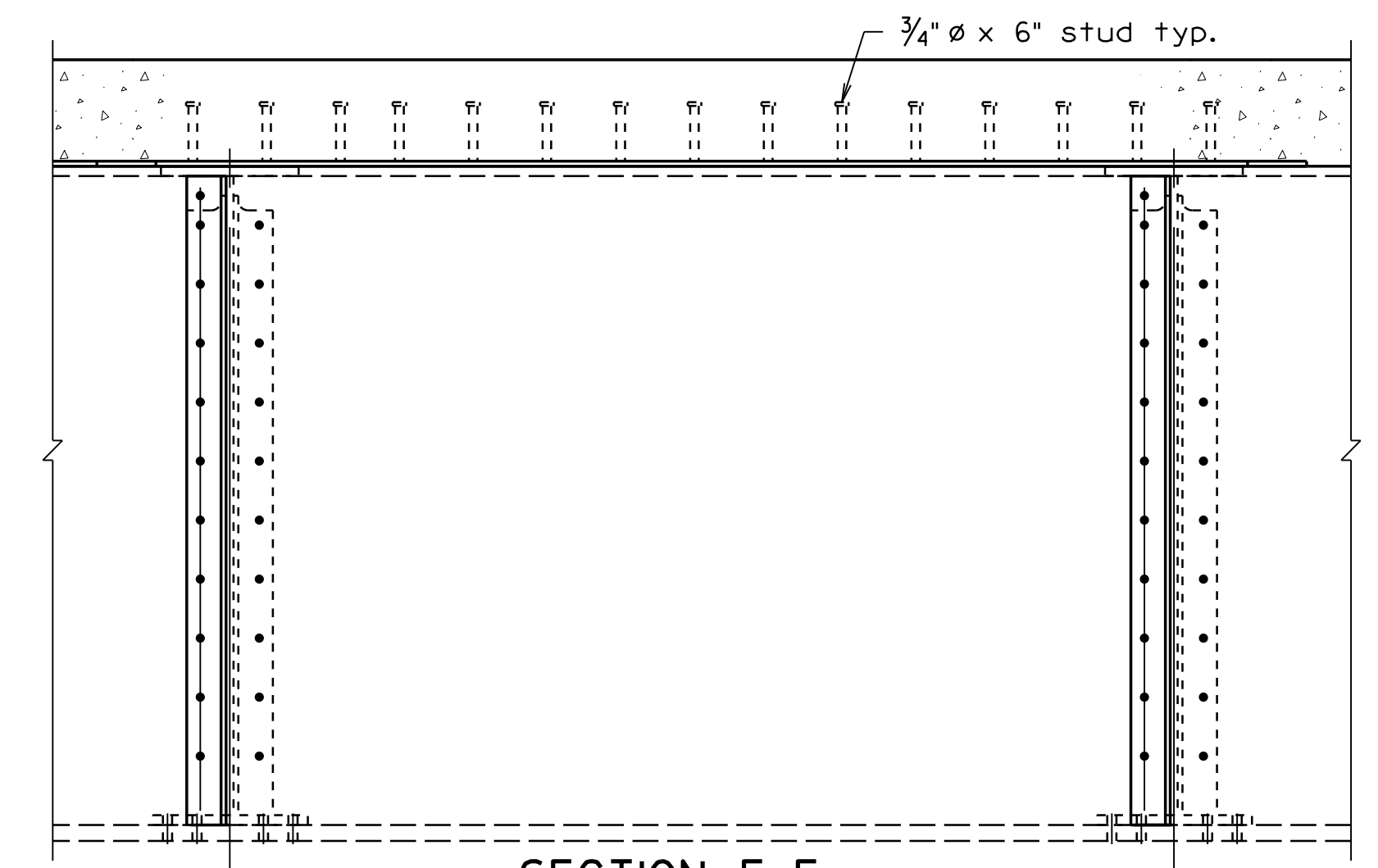
All webs, flanges and plates on this sheet shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

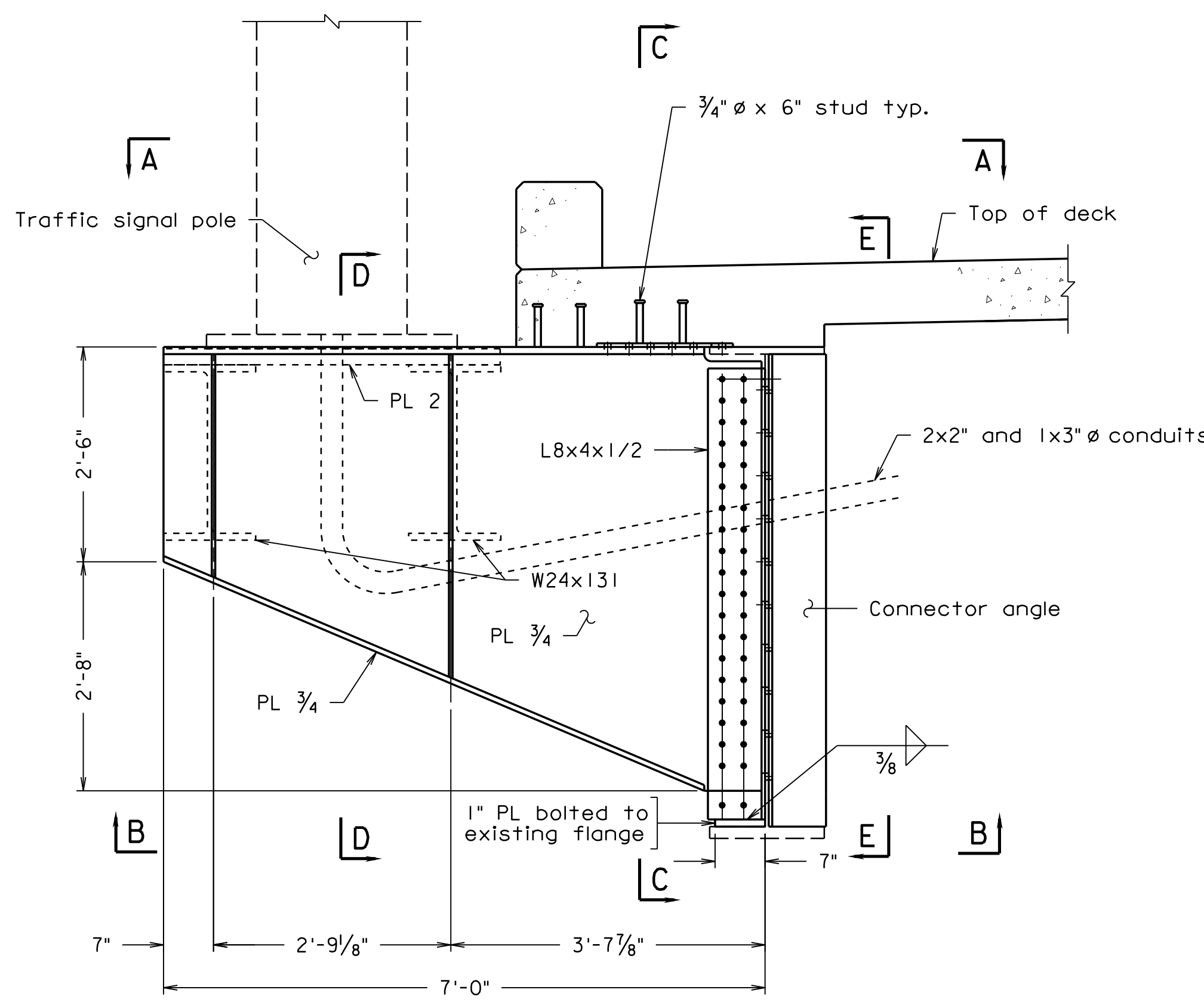
Complete joint penetration welds shall be inspected by UT in accordance with AWS D1.5 and VTM 30.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1/2". The adjusted spacing shall be shown on the shop drawings.

Holes in existing girder shall be made utilizing a low profile magnetic drill. Edges shall be ground smooth and shall be zone coated.

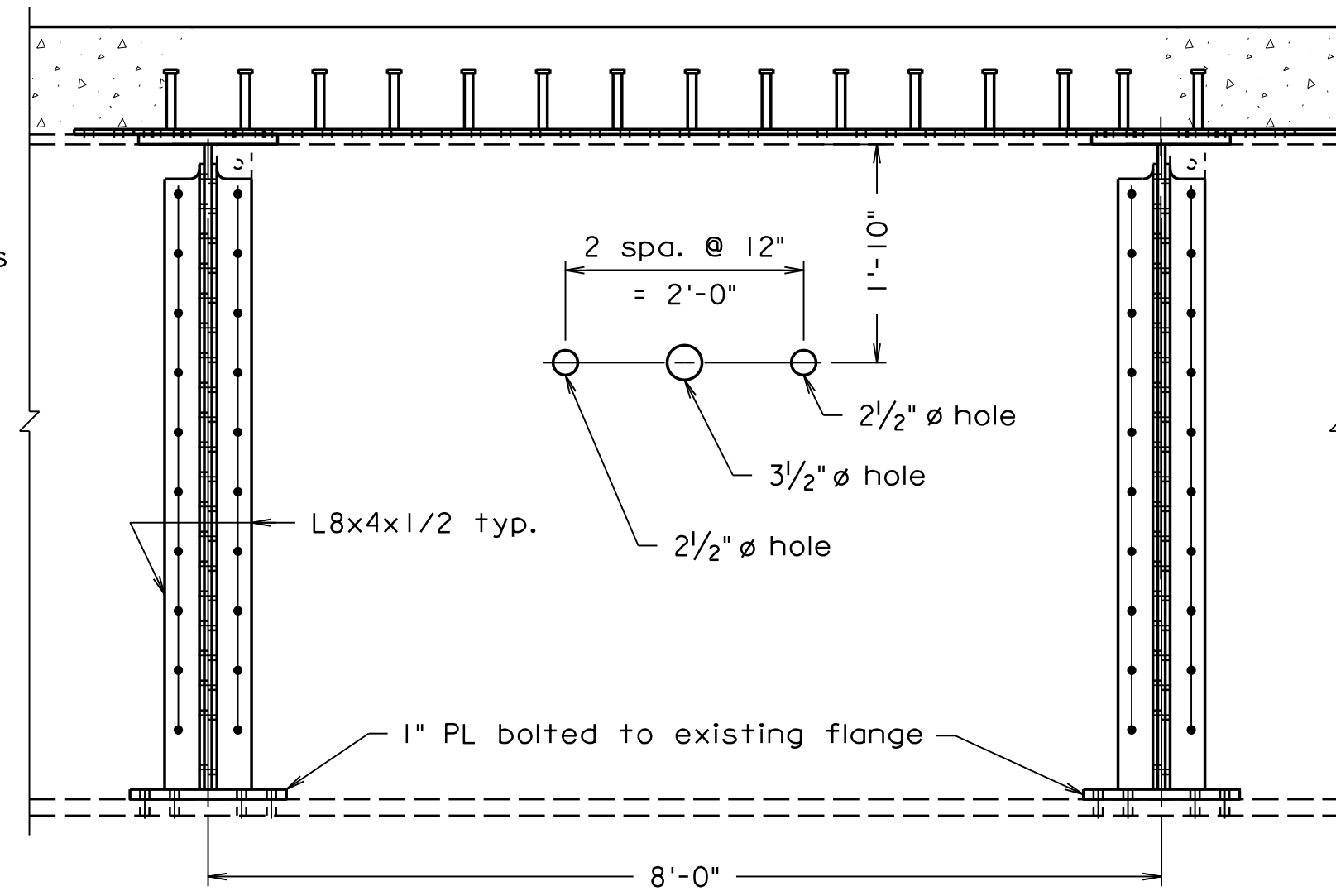


SECTION E-E

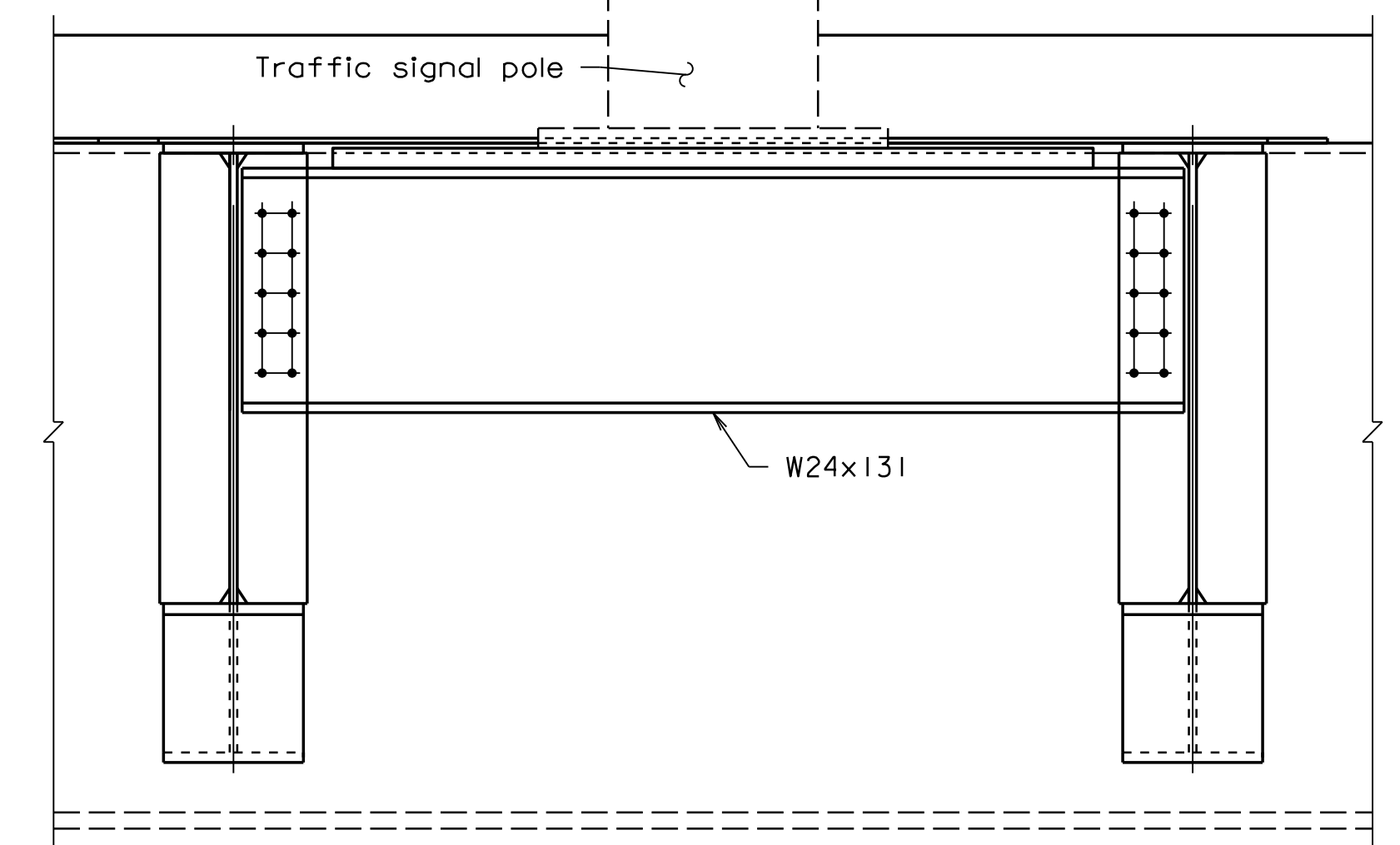


TRAFFIC SIGNAL SUPPORT NORTH
Fence not shown for clarity

Updated concept of traffic support provided for VDOT approval. Details will be completed after concept is approved.



SECTION C-C
* Shear studs can be excluded where they conflict with top flange connection angle bolts



SECTION D-D
Connections to girder not show for clarity

257-38A_059.dgn

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PAC PLANS
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION		TRAFFIC SIGNAL SUPPORT NORTH	
No.	Description	Date	Revisions
Designed: WRA.....		Date	Plan No.
Drawn: WRA.....		Apr. 2022	257-38A
Checked: WRA.....			59 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			95	0095-076-299, B688	60

Notes:

For traffic signal support location, see sheet 39.

Factored loads used for design:
 Axial: 9 kips
 Shear: 8 kips
 Moment: 245 k-ft
 Torsion: 220 k-ft

All bolts on this sheet are 7/8" unless otherwise noted and use standard size holes.

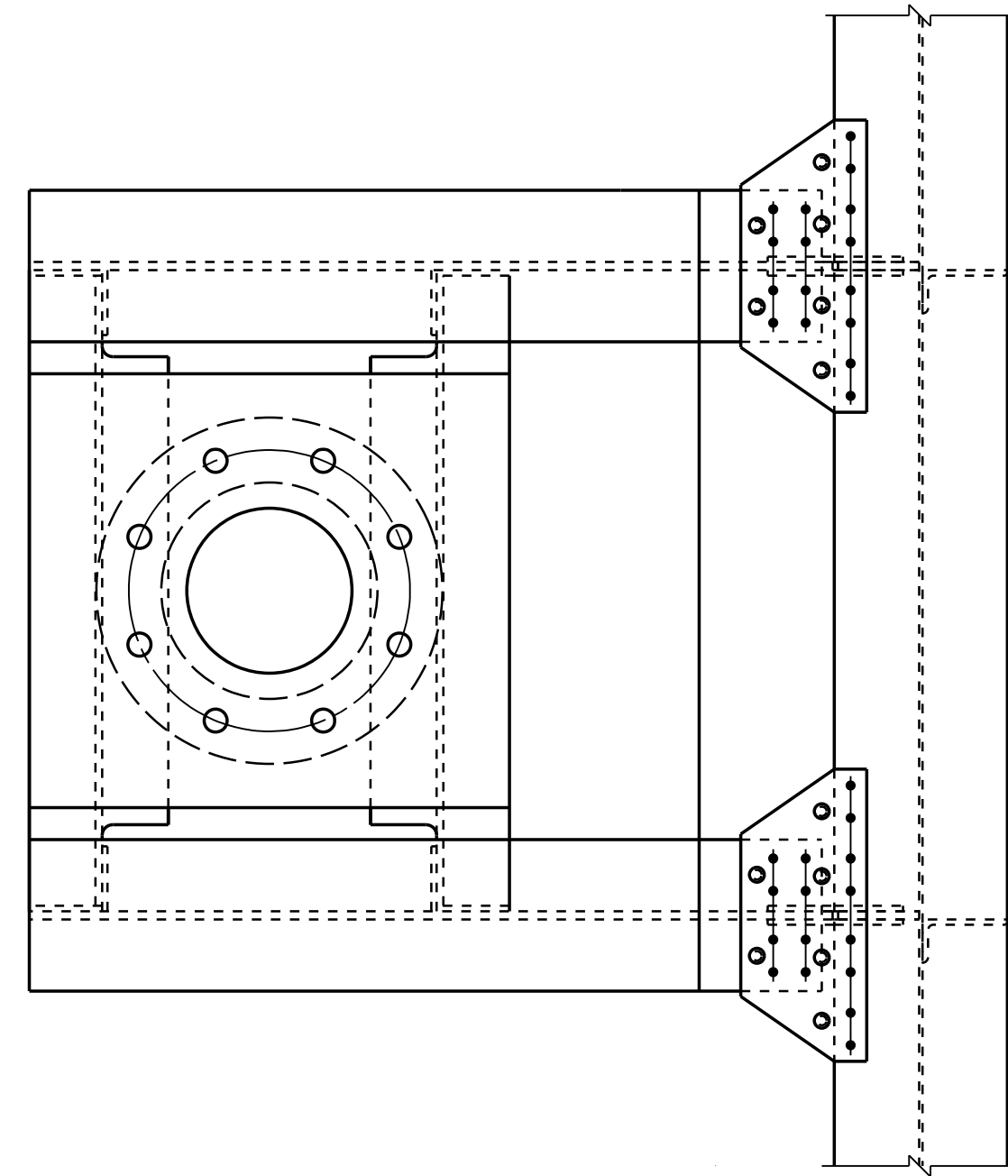
For traffic signal conduit system, see sheet 91

All webs, flanges and plates on this sheet shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

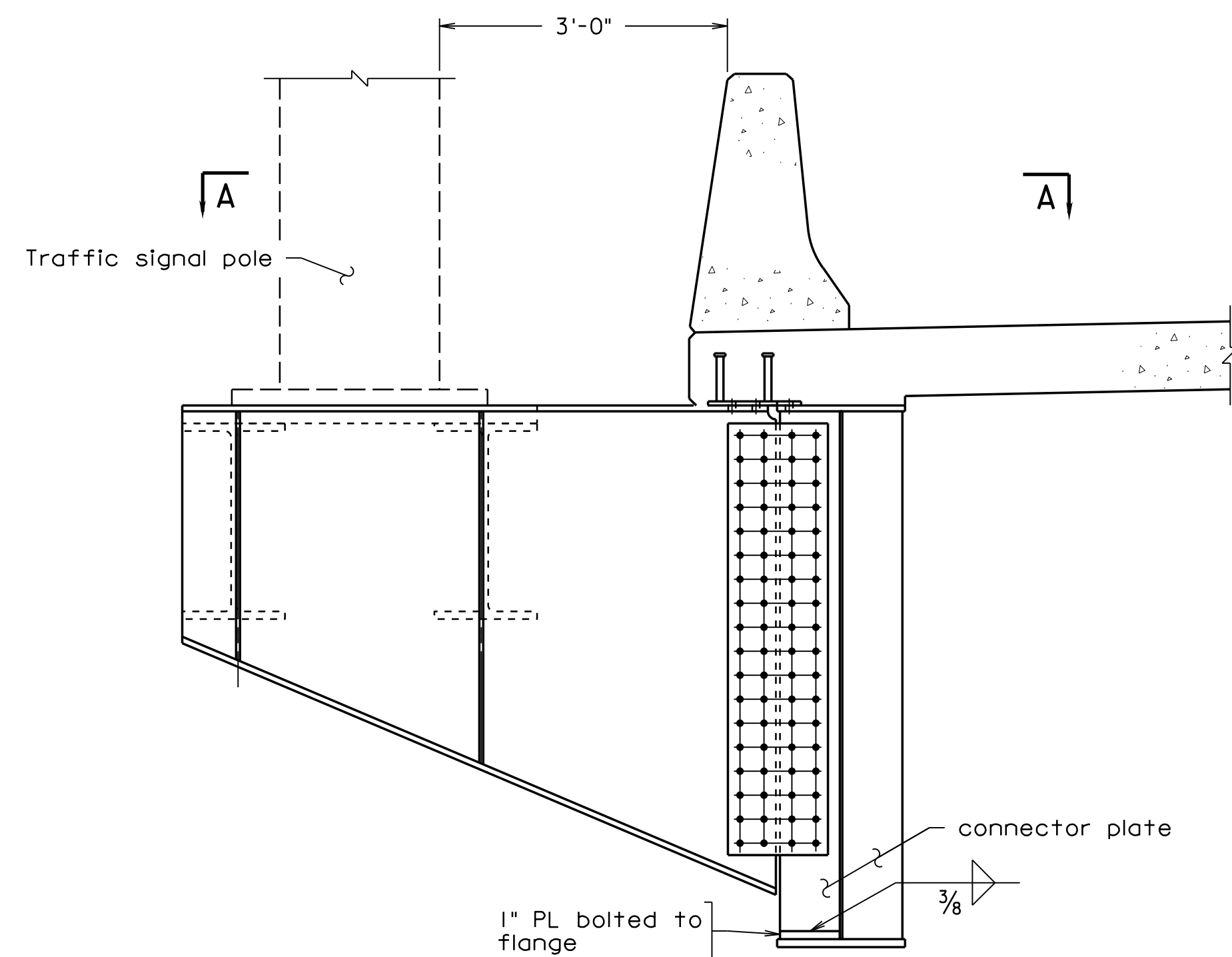
Complete joint penetration welds shall be inspected by UT in accordance with AWS D1.5 and VTM 30.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1/2". The adjusted spacing shall be shown on the shop drawings.



TOP - VIEW A-A
 Deck and parapet not shown for clarity.

Updated concept of traffic support provided for VDOT approval on Signal Support North. Details for Signal Support South will be similar except as shown.



TRAFFIC SIGNAL SUPPORT SOUTH

257-38A_060.dgn

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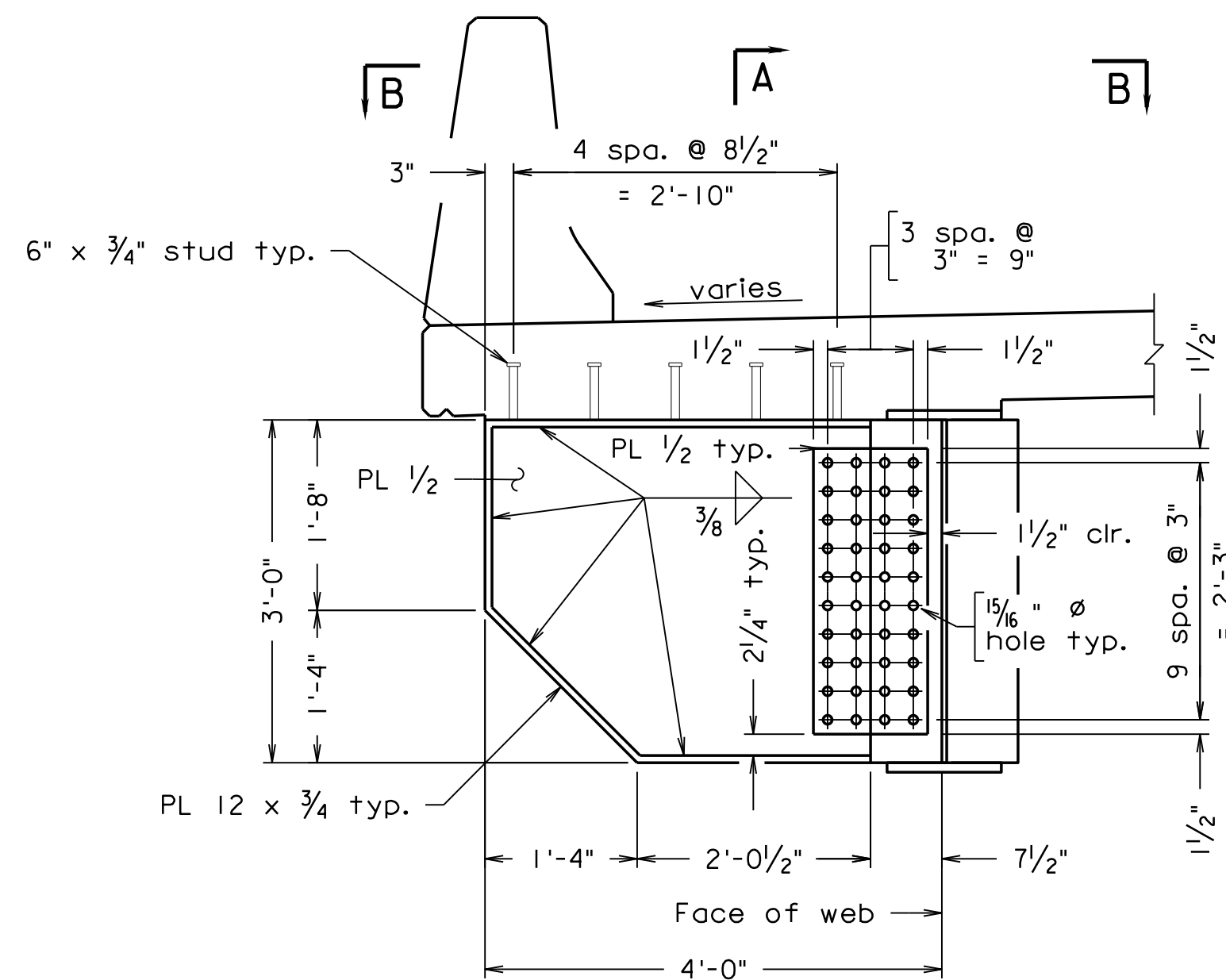
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STRUCTURE AND BRIDGE DIVISION					
TRAFFIC SIGNAL SUPPORT SOUTH					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
			Drawn: WRA.....	Apr. 2022	257-38A
			Checked: WRA.....		60 of 125

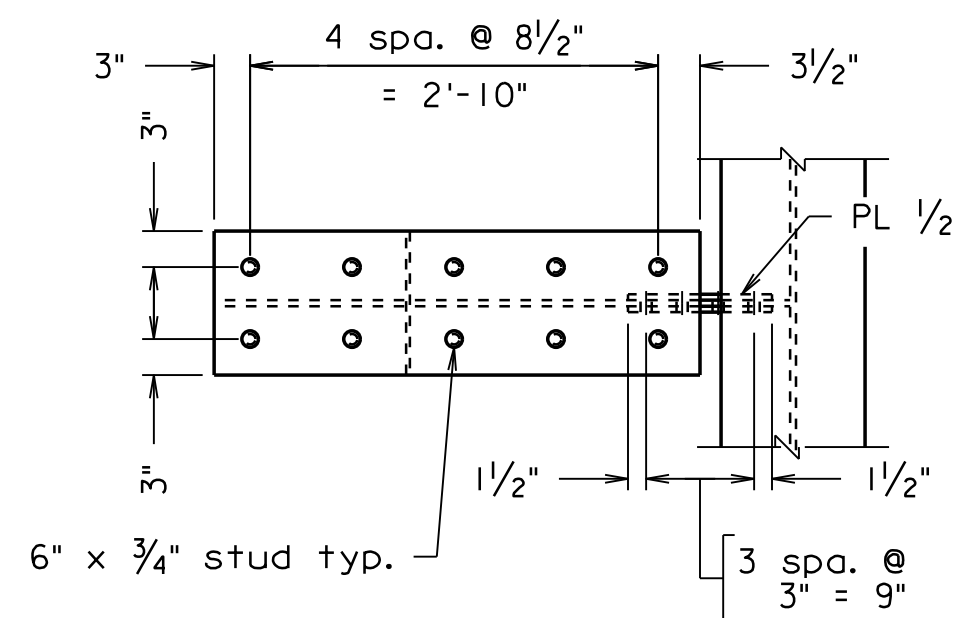
Scale: 3/4" = 1'-0"

PROGRESS PRINT 4/1/2022

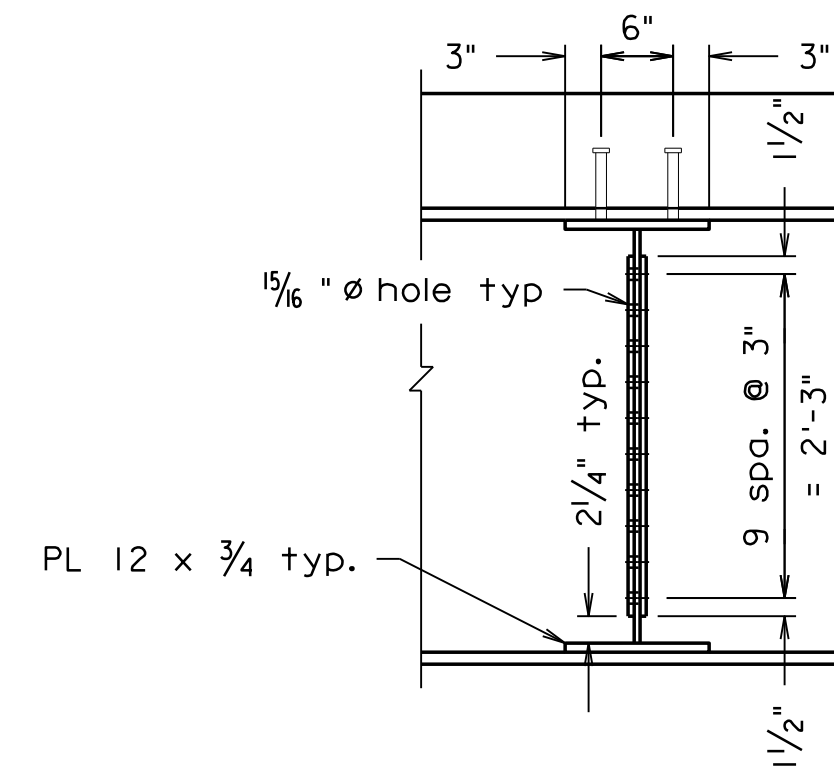
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			61



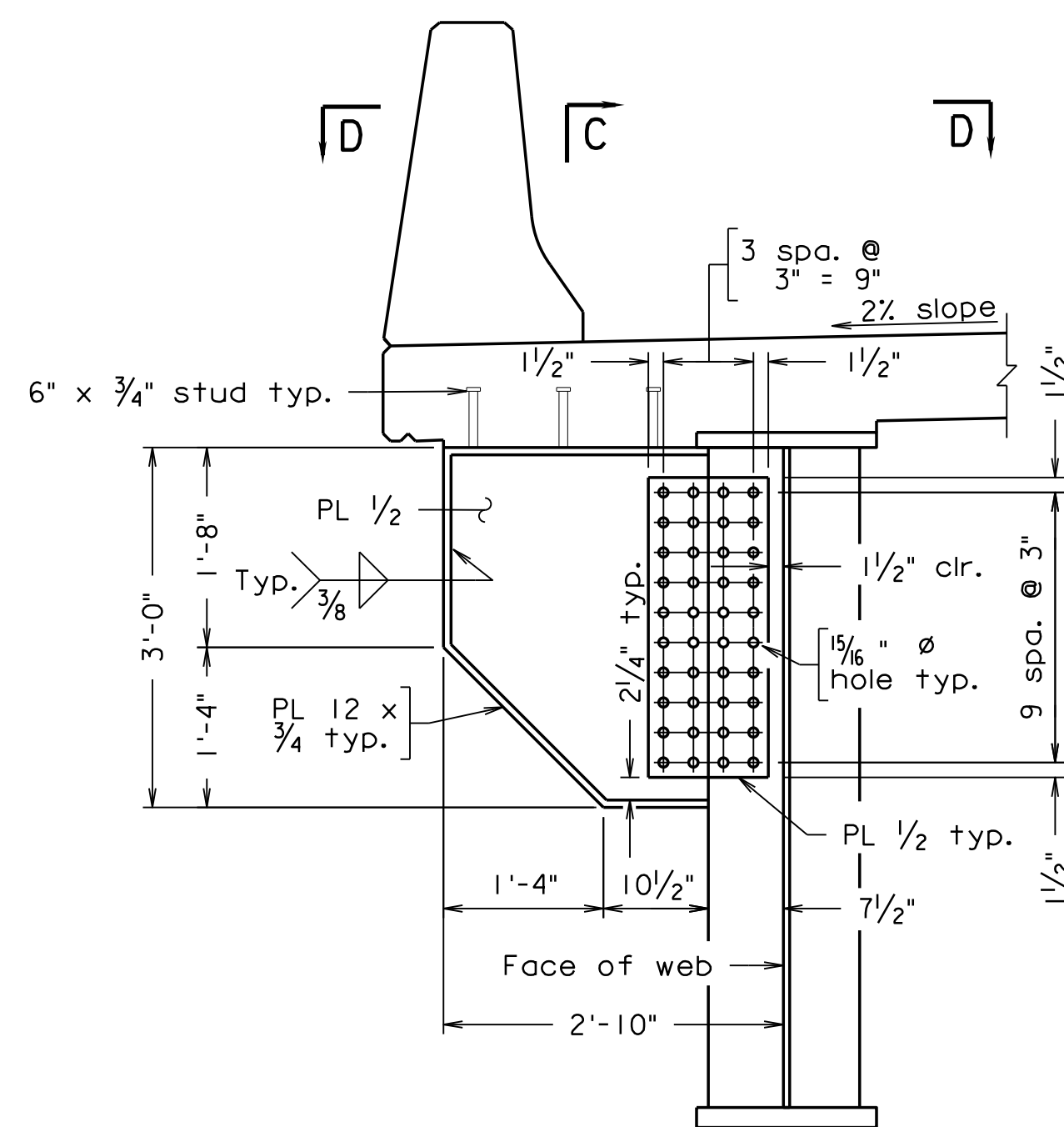
DECK OVERHANG SUPPORT AT GIRDER U



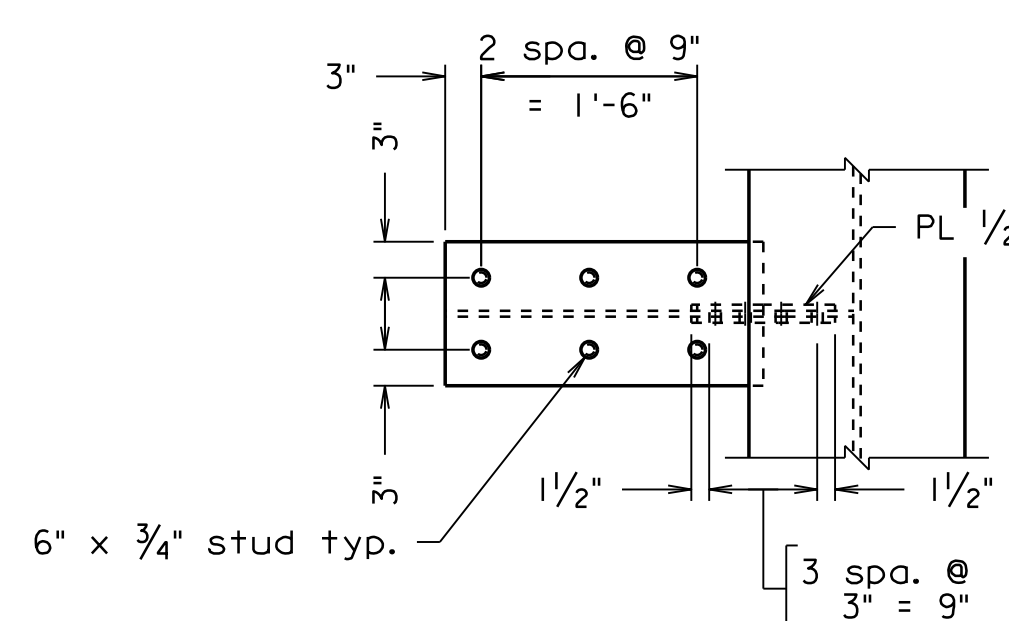
Deck not shown for clarity
TOP - VIEW B-B



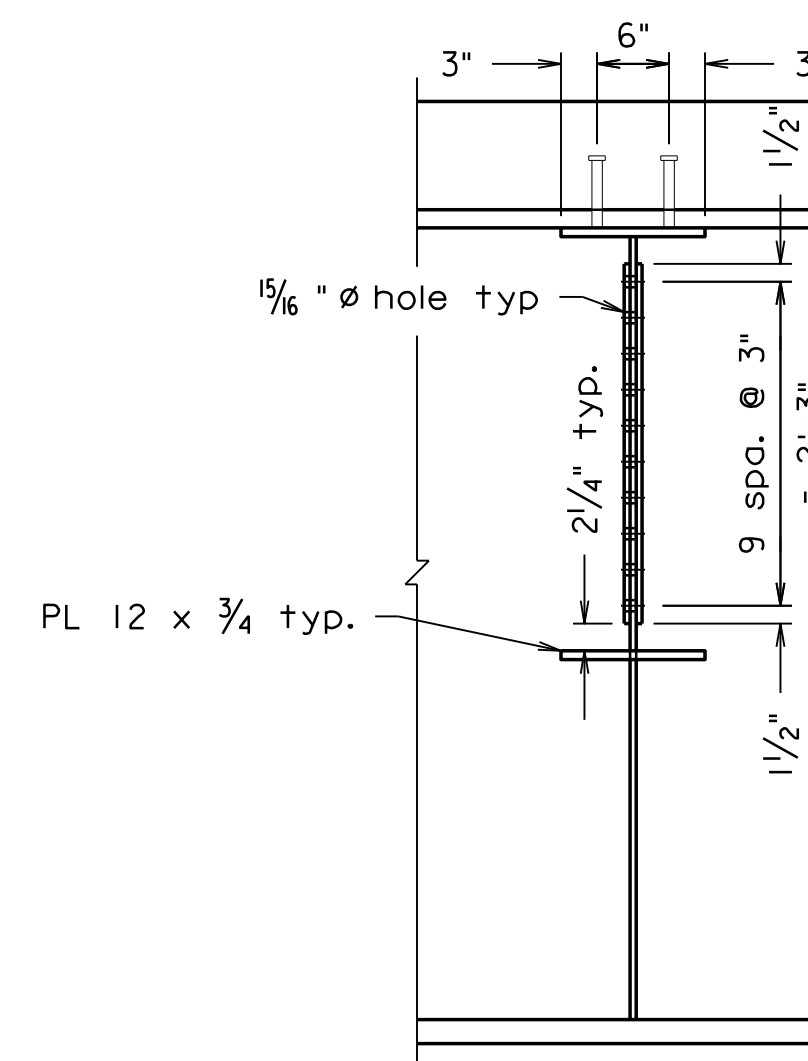
SECTION A-A



DECK OVERHANG SUPPORT AT GIRDER N



Deck not shown for clarity
TOP - VIEW D-D



SECTION C-C

Notes:

For deck overhang support locations, see sheet 39.

Webs, flanges and connection plates shall be fabricated, tested and inspected in accordance with fracture critical requirements and in accordance with Clause 12 of the AWS-D1.5 Bridge Welding Code.

All flanges and webs are considered tension members.

Complete joint penetration welds shall be inspected by UT in accordance with AWS D1.5 and VTM 30.

Spacing of stud shear connectors at connections shall be adjusted to clear edges of splice plates and locations of bolts allowing for proper clearance to meet bolt tightening requirements. Stud shear connectors shall have a minimum edge distance of 1 1/2". The adjusted spacing shall be shown on the shop drawings.

257-38A_061.dgn

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WHITMAN REQUARDT & ASSOCIATES
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PAC PLANS
 PROGRESS PRINT 4/1/2022
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DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
DECK OVERHANG SUPPORT DETAILS					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
			Drawn: WRA.....	Apr. 2022	257-38A
			Checked: WRA.....		61 of 125
Revisions					

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			61a

Notes:

For sign and sign connection details see roadway plans.

Sign support structure at MSE moment slab is for a maximum sign of X' wide by X' tall.

All structural steel shall be ASTM A709, Grade 50 and hot dipped galvanized in accordance with ASTM A123.

All anchor bolts, nuts and washers shall be hot dipped galvanized.

Anchor bolt specifications:

Nuts (Top): ASTM F467 Alloy 6262-T9 or 6061-T6.
(Bottom): ASTM A563.

Thread series for all nuts to be UNC-2B.

Washers: (Top): ASTM B209 Alloy Alclad 2024-T3 or T4, 2 1/4" o x 0.165".

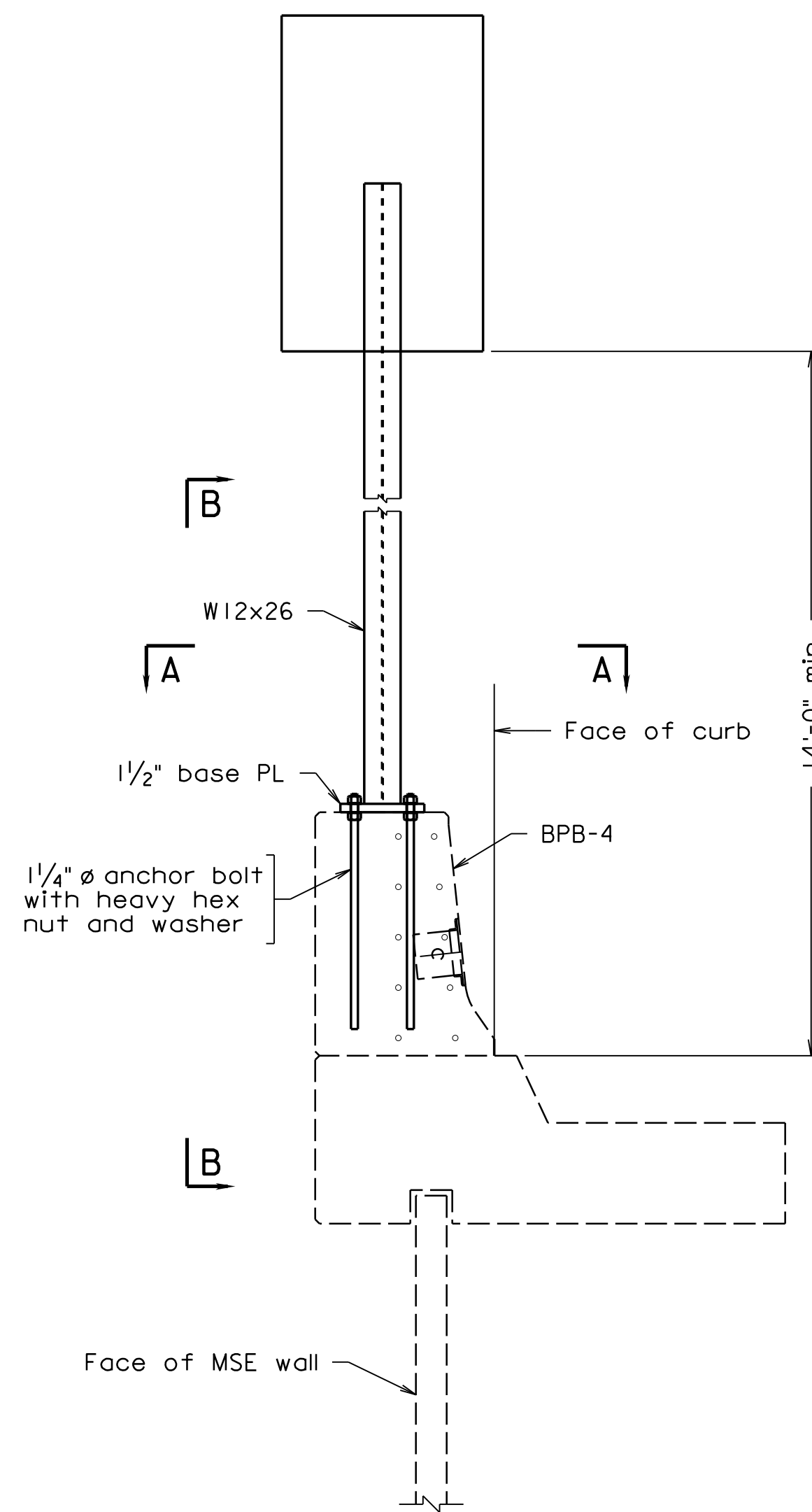
(Bottom): ASTM F844.

Rods: ASTM A276, type 430 or 410 annealed, hot-finished. Threads on rods may be rolled or cut. 3/2" at each end of rod shall be threaded. Each rod shall be supplied with 2 washers and 2 nuts.

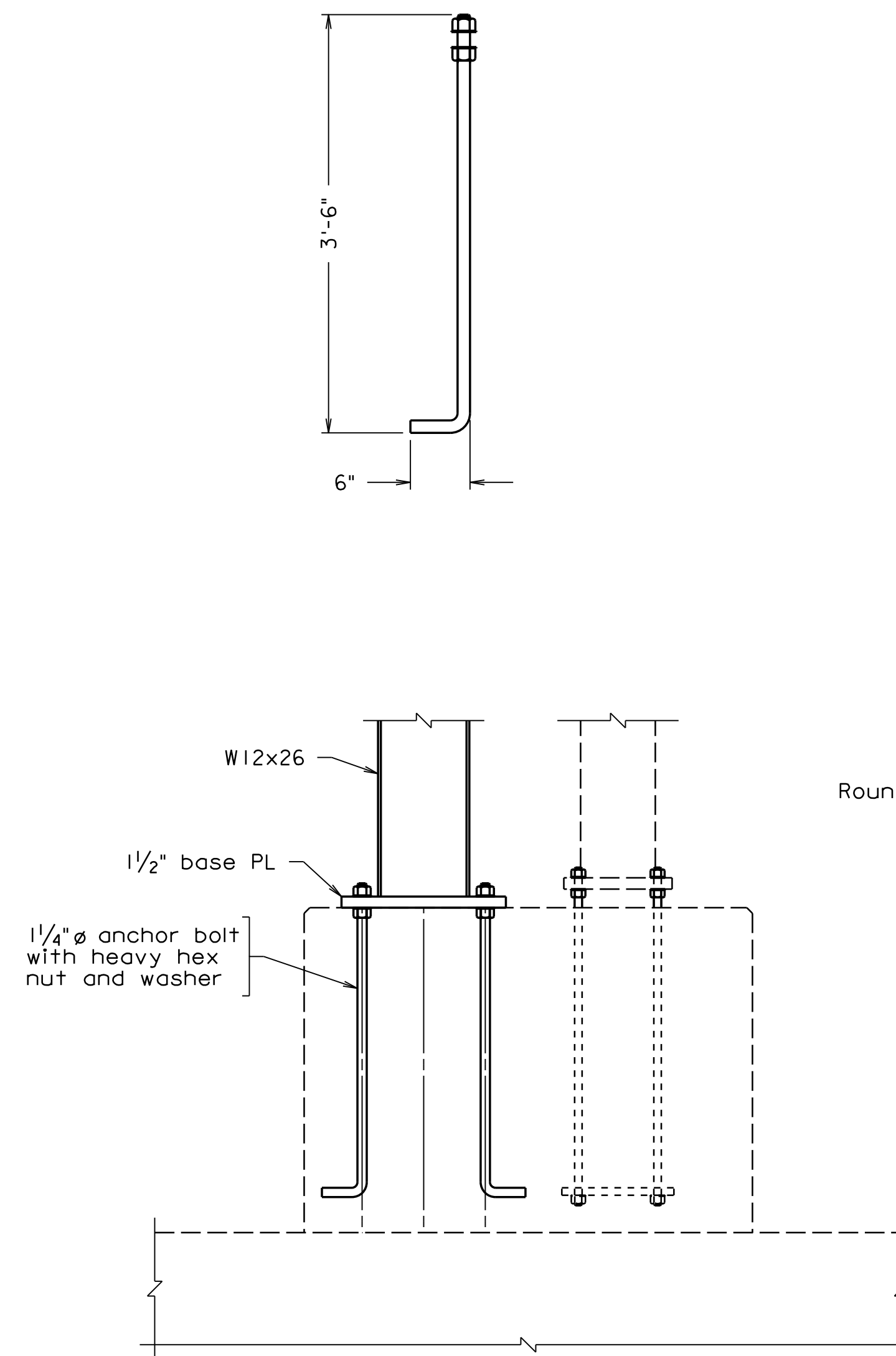
In the designations noted above, top refers to hardware above the top of baseplate. Bottom refers to hardware below the baseplate including embedment in concrete.

For parapet blister details, see sheet 94.

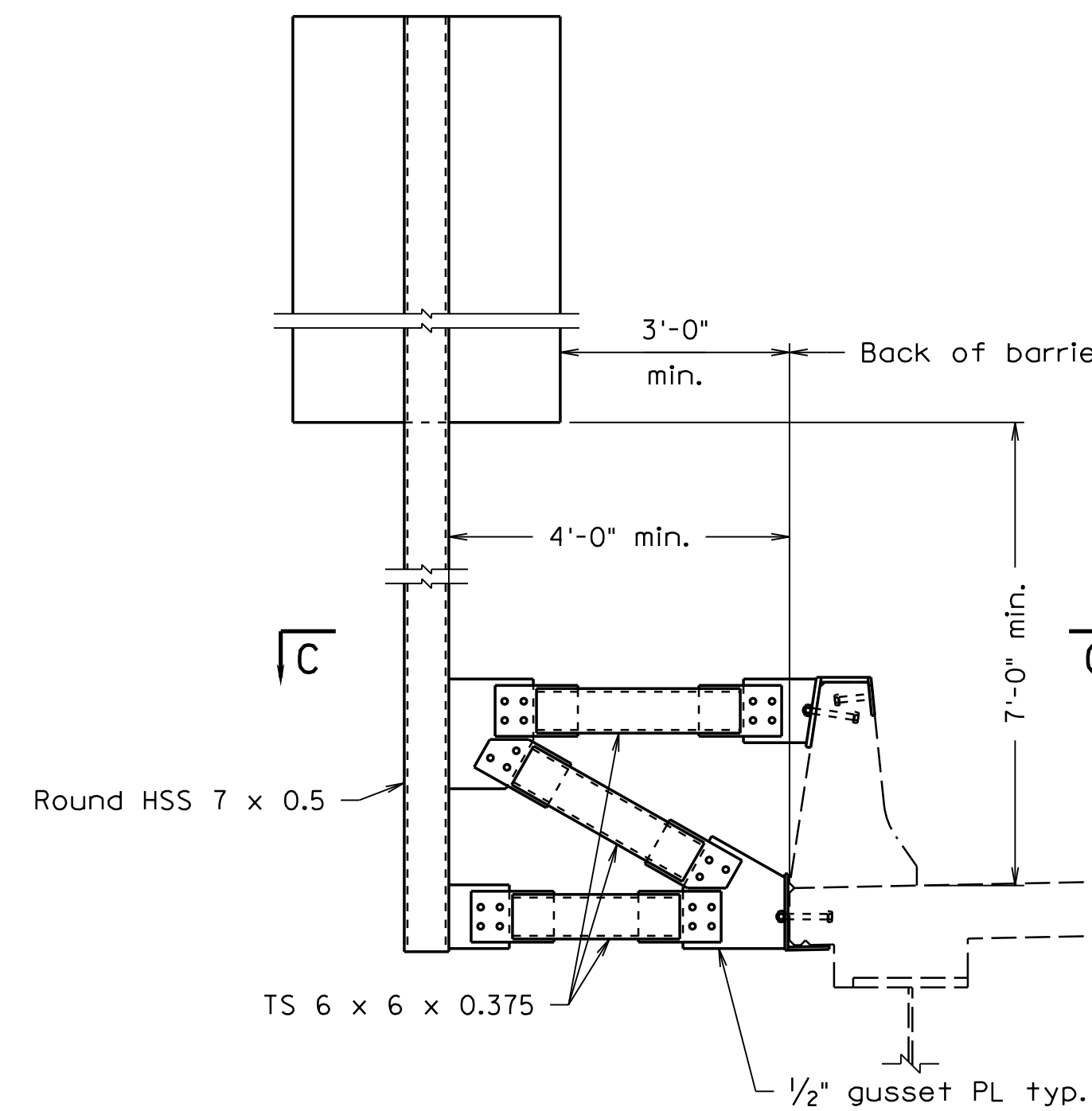
Sign structure supports shall be incidental to pay item Structural Steel Plate Girder.



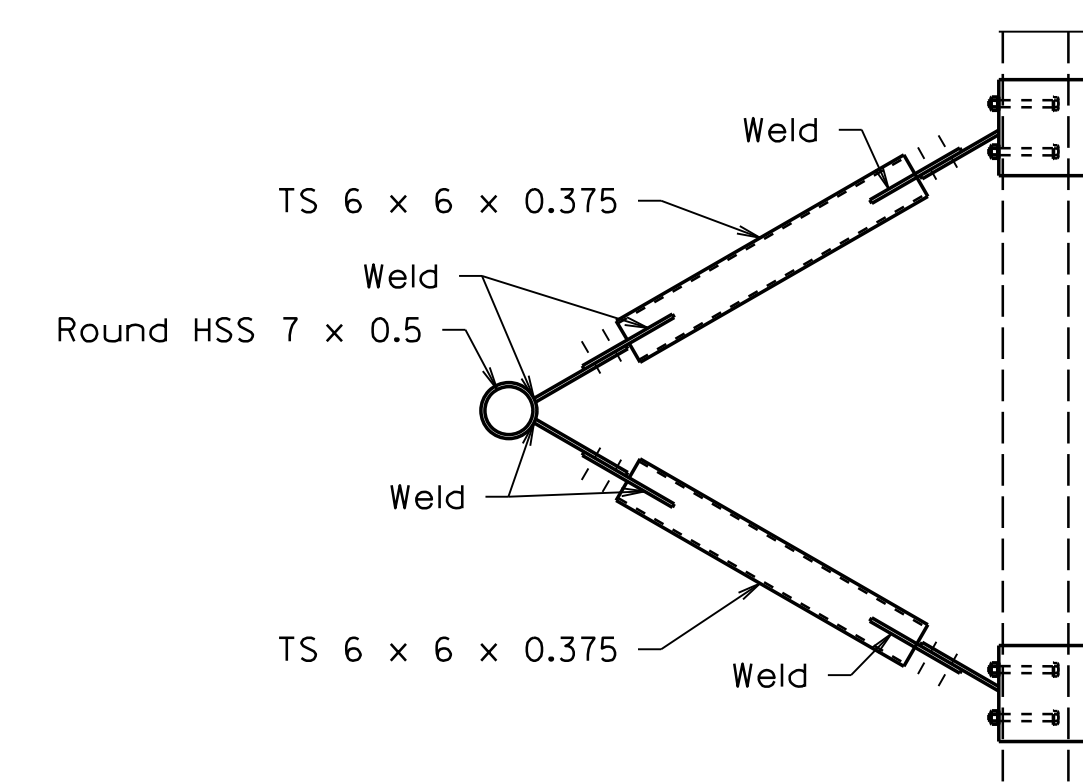
TYPICAL SIGN SUPPORT ON MSE WALL



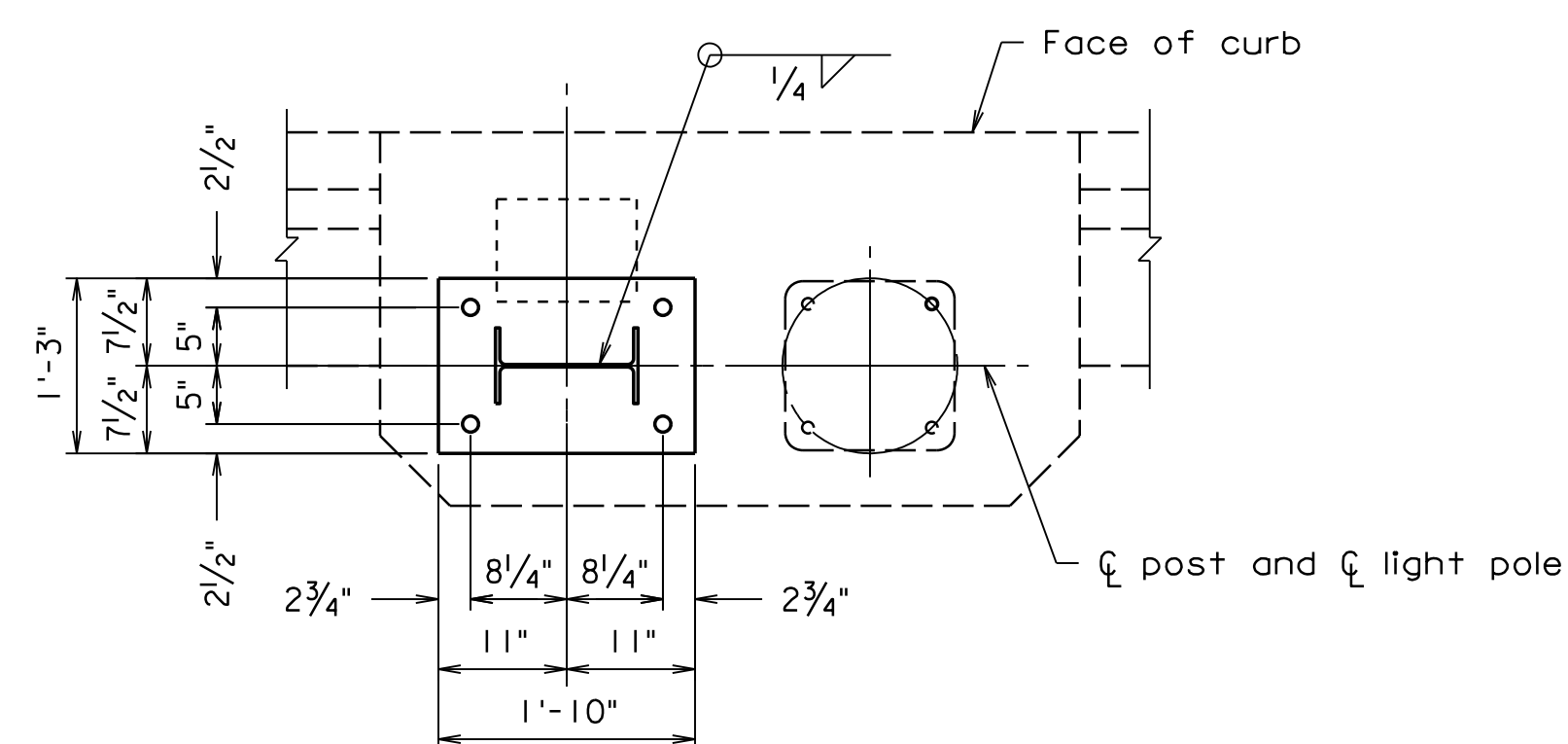
SECTION B-B



TYPICAL SIGN SUPPORT ON BRIDGE



SECTION C-C



SECTION A-A

257-38A_061a.dgn

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SIGN STRUCTURE SUPPORT DETAILS	
No.	Description
Revisions	
Designed: MRD.....	Date
Drawn: MRD.....	Apr. 2022
Checked: WRA.....	
Plan No.	Sheet No.
257-38A	61a of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			62



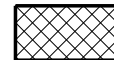
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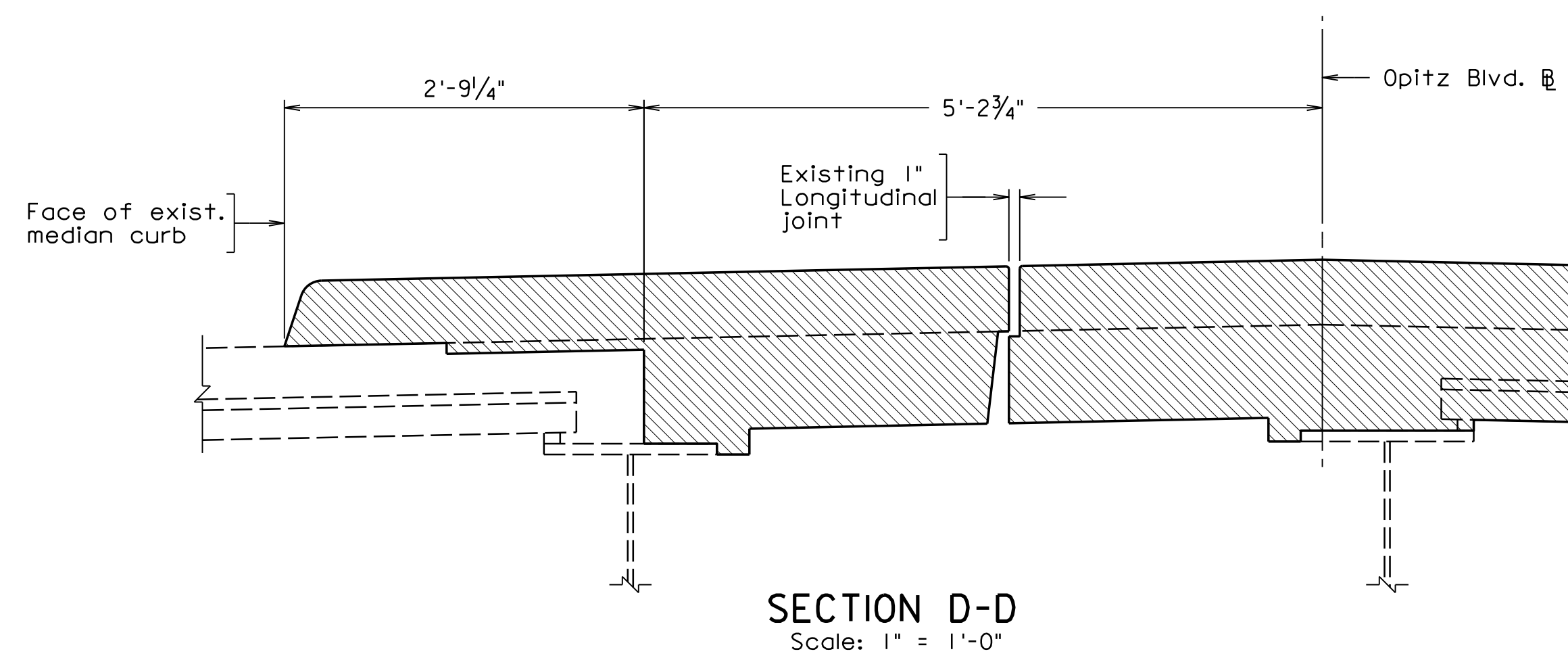
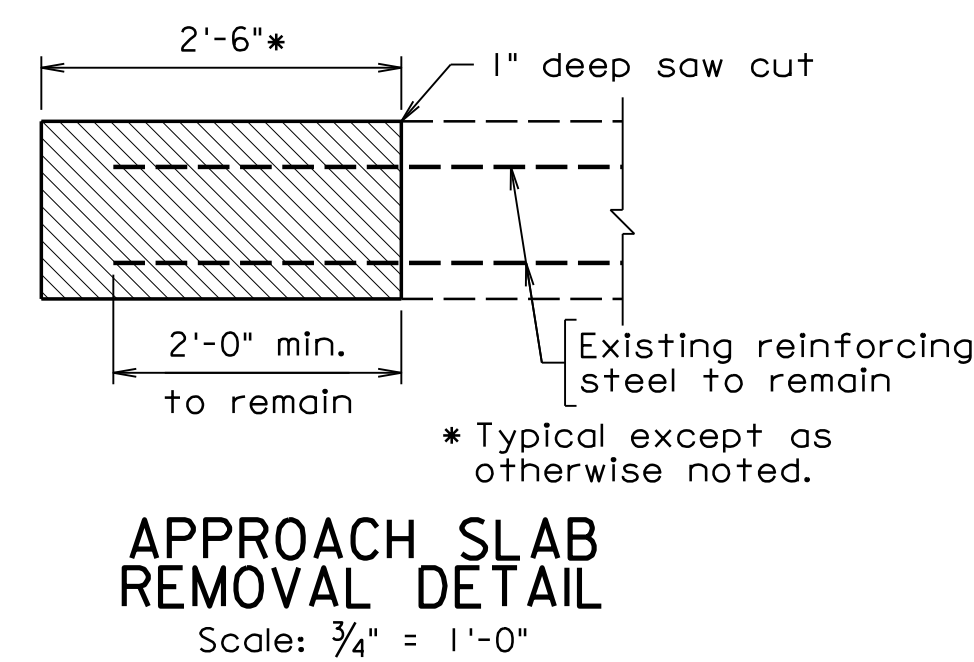
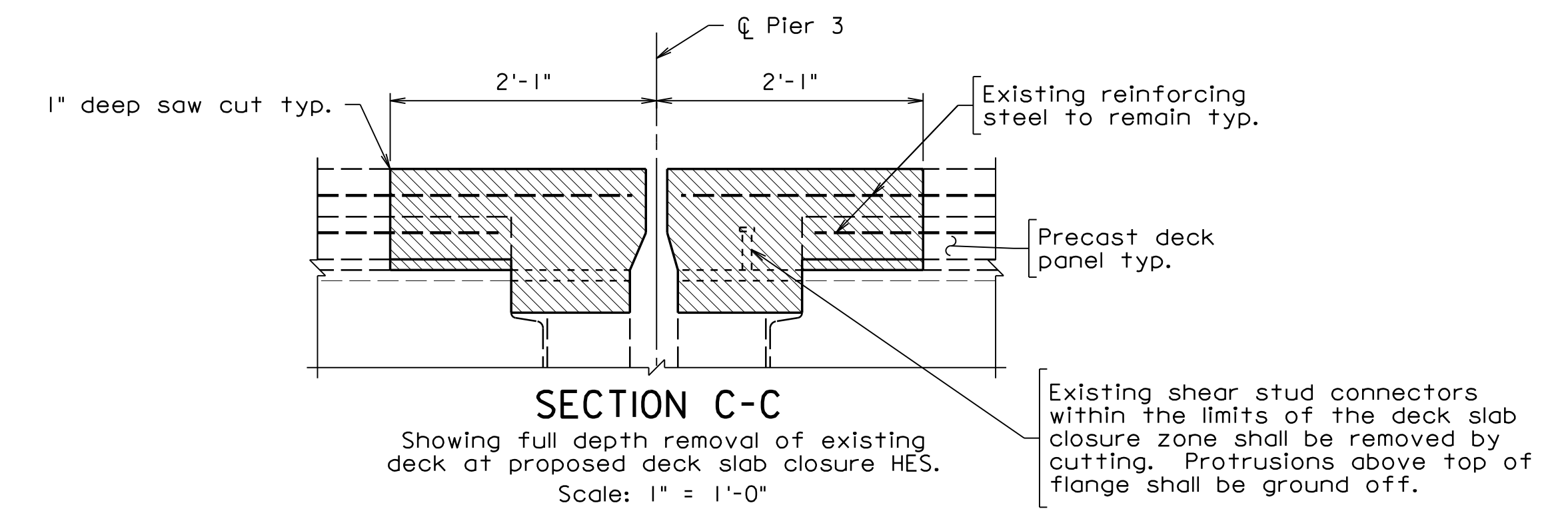
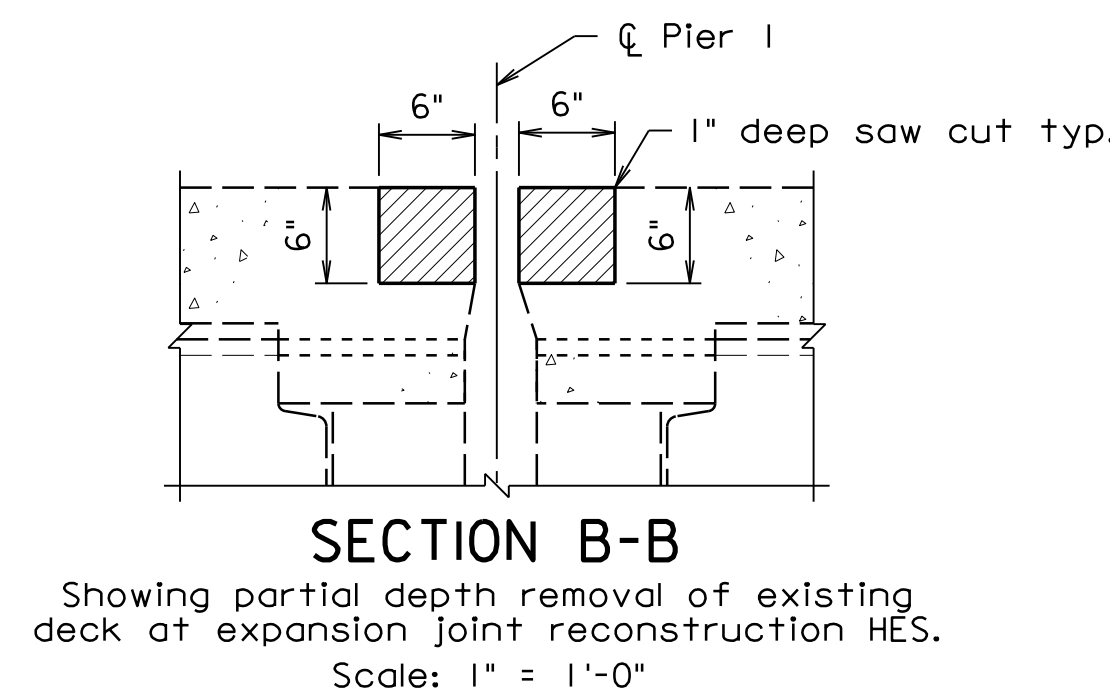
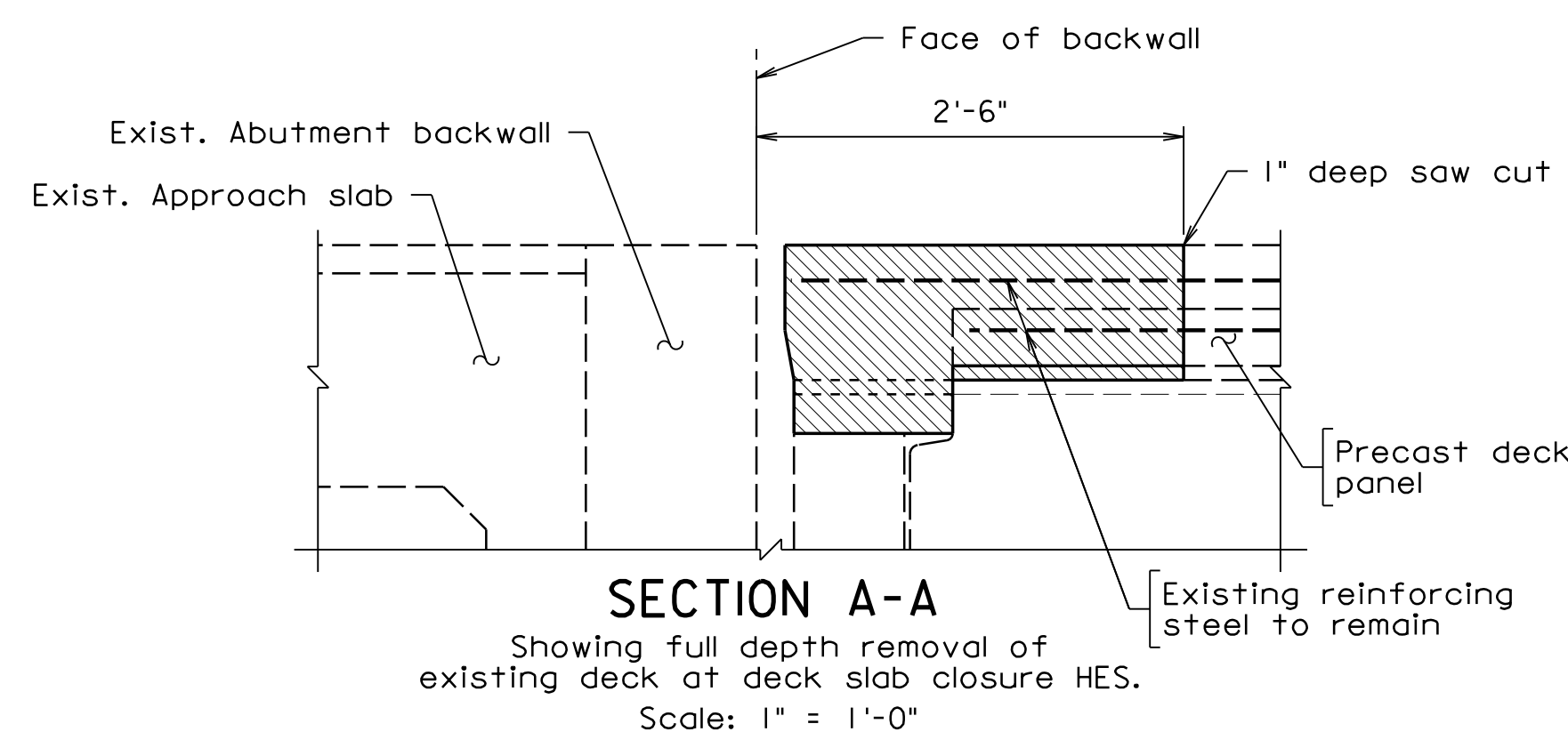
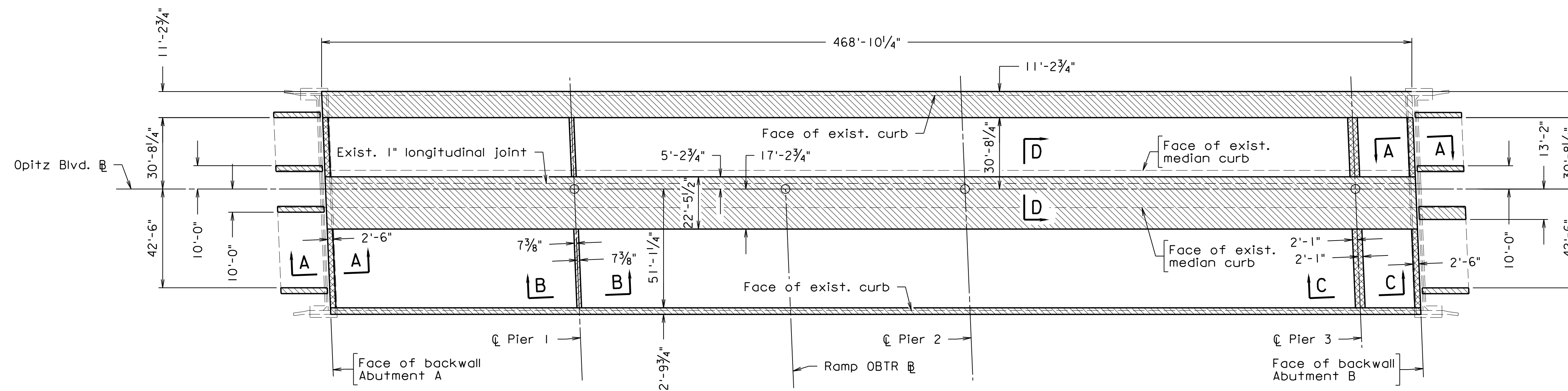
Existing reinforcing steel that is to remain shall be cleaned and repaired in accordance with Section 412.03 of the specifications.

Contractor shall take care not to damage portion of existing structure to remain in service.

Saw cutting where designated will not be paid for as a separate pay item but shall be included in the cost of other appropriate pay items.

For details of deck slab closure, see sheet 68.

-  Indicates limits of removal of existing deck and approach slab.
-  Indicates limits of joint reconstruction HES.
-  Indicates limits of deck slab closure HES.



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DECK SLAB AND APPROACH SLAB LIMITS OF REMOVAL			
No.	Description	Date	Designed: MRD..... Date Drawn: MRD..... Checked: J.S.....
			Apr. 2022
Revisions			Plan No. 257-38A Sheet No. 62 of 125

PROGRESS PRINT 4/1/2022

257-38A_062.dgn

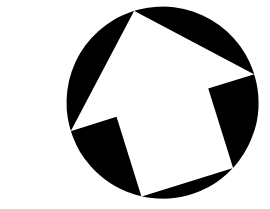
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Scale: 1" = 30' unless otherwise noted.

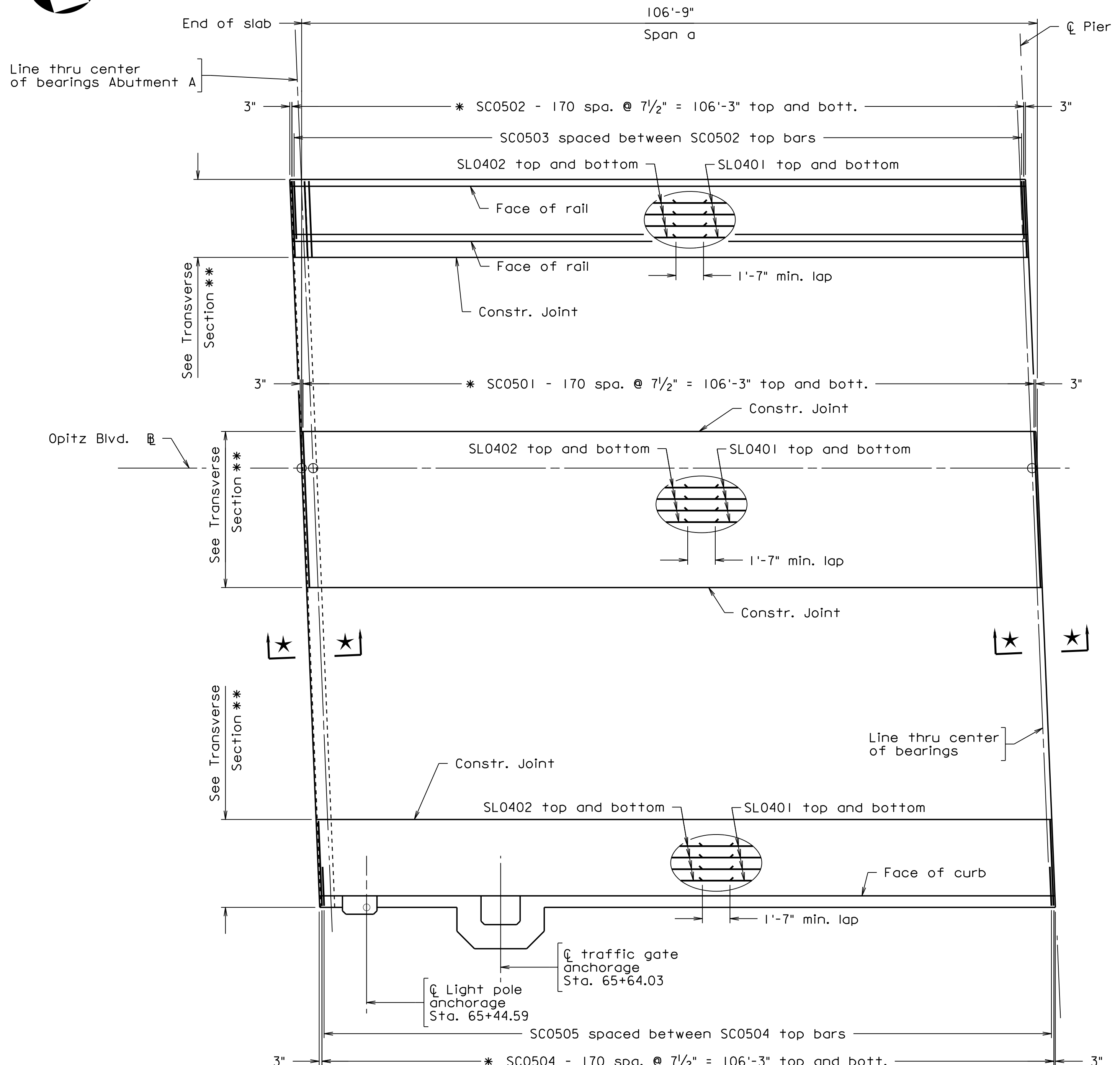
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STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				63



Notes:

- * Spacing of SC0501, SC0502 and SC0504 bars shall match existing deck transverse reinforcing bars where lapping with deck reinforcing to remain. Spacing shall not exceed 8". Contractor shall notify the Engineer if any discrepancies are found.
 - ** See Transverse Section for spacing of SL04 Series bars. SL05 Series bars shall be spaced between SL04 Series bars.
- The 1/2" expanded rubber joint filler shall extend the full length of the deck slab extension at Abutment C. The cost of the 1/2" expanded rubber joint filler shall be included in the bid price for concrete low shrinkage Class A4 modified.
- Forms for the deck slab ends shall be attached to the girders only; the forms shall not be attached to or locked against any part of the abutment or ground. The deck ends and forms must be free to move relative to the abutment.
- Mechanical couplers shall be used for installation of deck extension, joint reconstruction and joint removal at construction joints.
- For Transverse Sections see sheets 36 and 37.
- For parapet details, see sheets 77 thru 86.
- For details of light pole anchorage, see sheets 94 and 95.
- For details of traffic gate anchorage, see sheet 97.



DECK PLAN - SPAN a

Raised median and overlay not shown for clarity.

★ For typical Deck Slab End Details, see sheets 66 thru 68.

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Scale: 3/32" = 1'-0"

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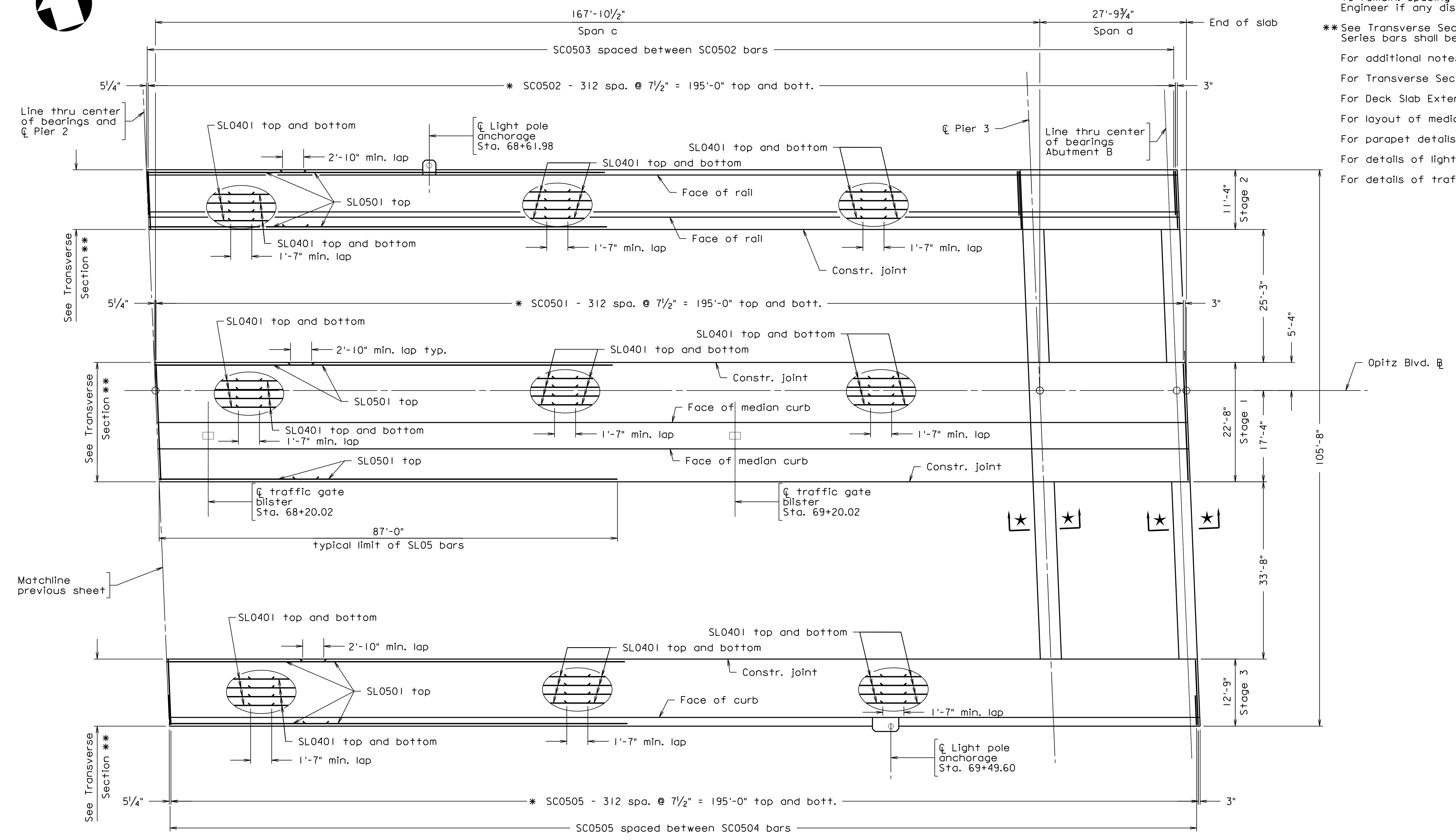
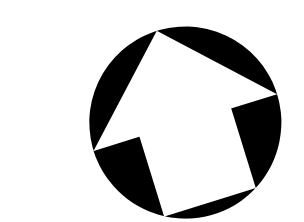
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
DECK PLAN SPAN a					
No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn: MRD.....	Apr. 2022	257-38A
			Checked: J.S.....		63 of 125
Revisions					

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			65

Notes:

- * Spacing of SC0501, SC0502 and SC0504 bars shall match existing deck transverse reinforcing bars where lapping with deck reinforcing to remain. Spacing shall not exceed 8". Contractor shall notify the Engineer if any discrepancies are found.
- ** See Transverse Section for spacing of SL04 Series bars. Two SL05 Series bars shall be equally spaced between each top SL04 Series bar.

For additional notes, see sheet 63.
 For Transverse Sections see sheets 36 and 37.
 For Deck Slab Extension Details see sheet 66.
 For layout of median barrier on the deck, see sheets 69.
 For parapet details, see sheets 76 thru 86.
 For details of light pole anchorage, see sheets 94 and 95.
 For details of traffic gate anchorage, see sheet 97.



DECK PLAN SPAN c AND d
 Raised median and overlay not shown for clarity.

★ For typical Deck Slab End Details, see sheets 66 thru 68.

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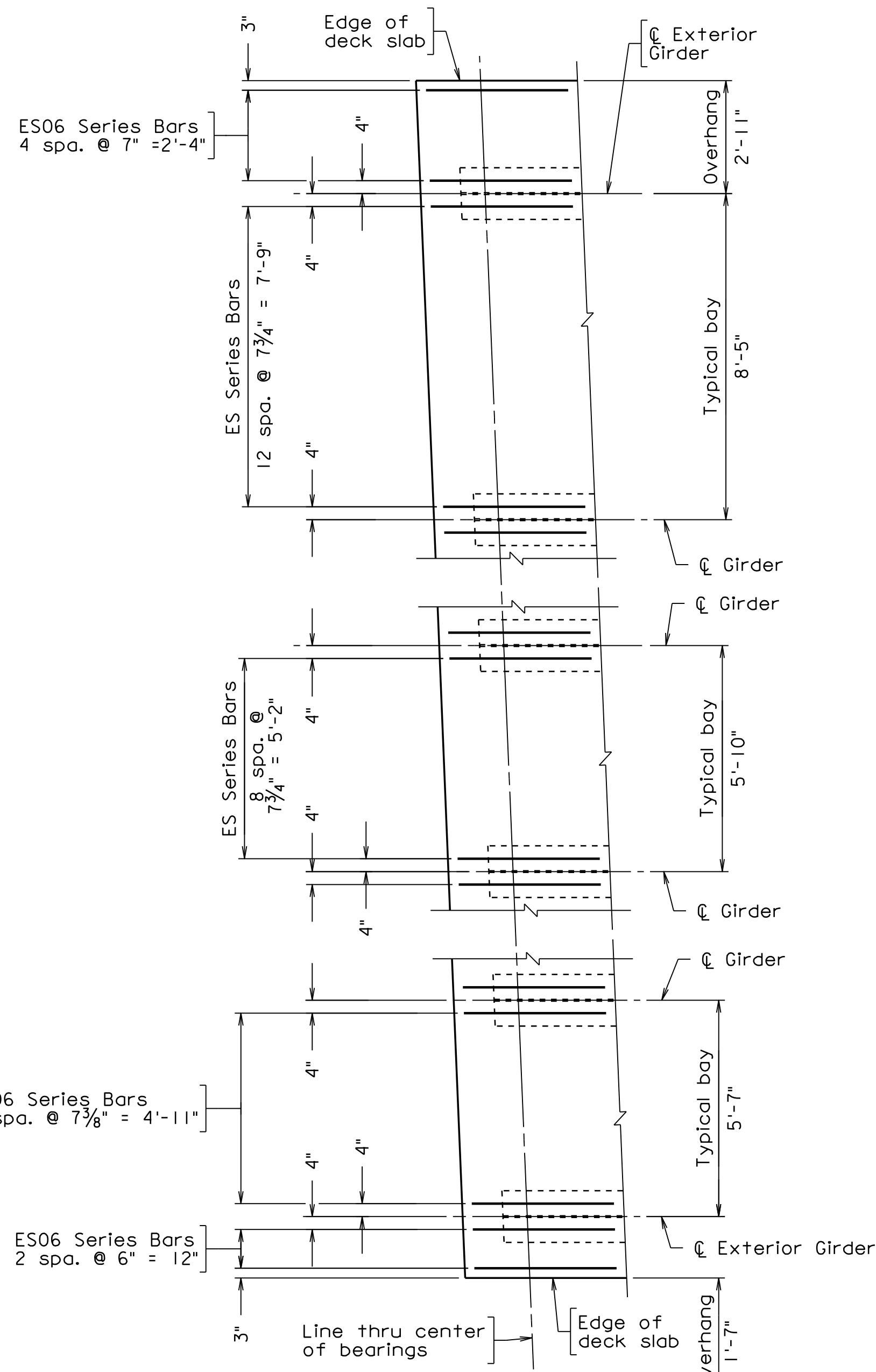
Scale: 3/32" = 1'-0" unless otherwise noted.

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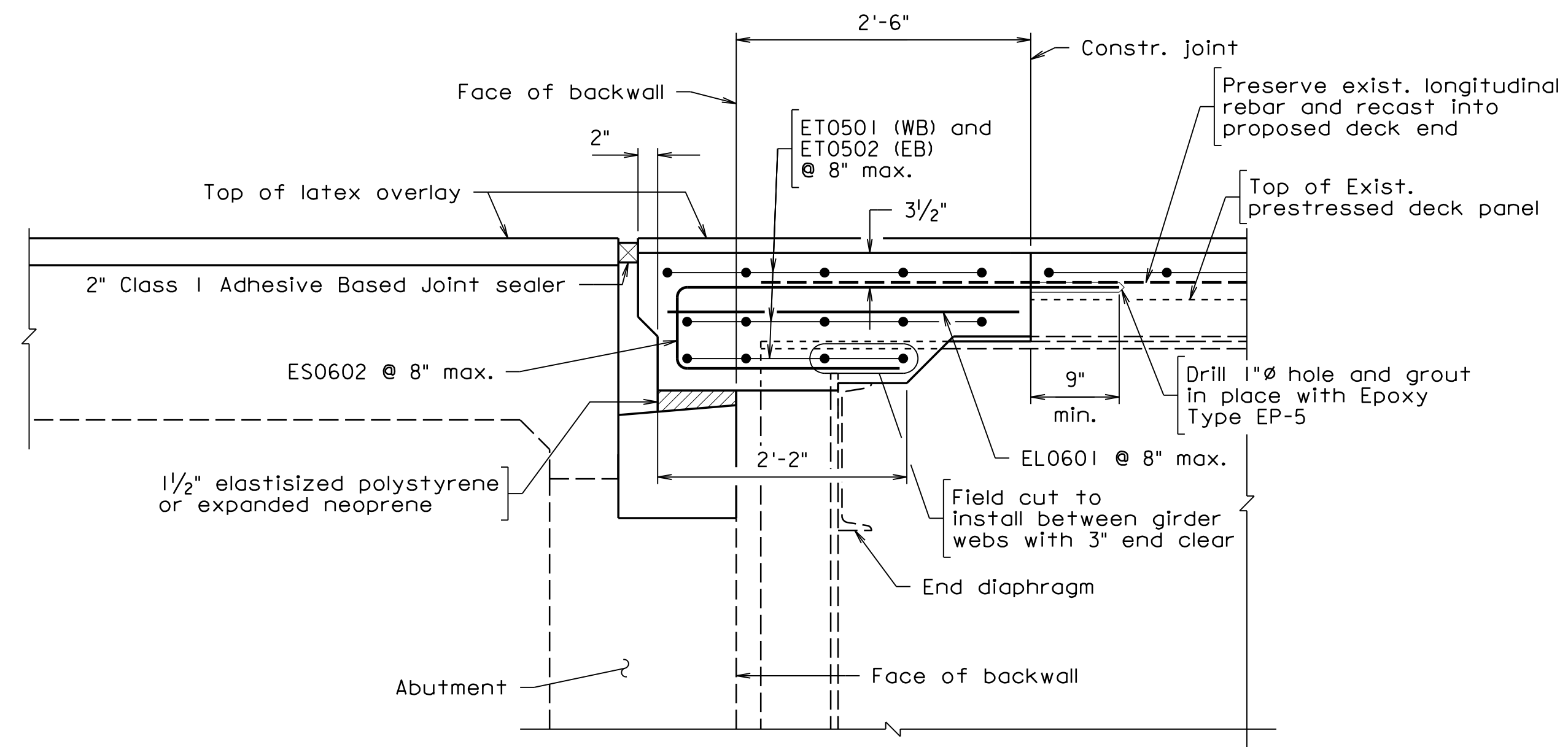
COMMONWEALTH OF VIRGINIA				
DEPARTMENT OF TRANSPORTATION				
STRUCTURE AND BRIDGE DIVISION				
DECK PLAN SPANS c AND d				
No.	Description	Date	Designed: MRD.....	Sheet No.
			Drawn: MRD.....	65 of 125
			Checked: J.S.....	
Revisions			Date	Plan No.
			Apr. 2022	257-38A

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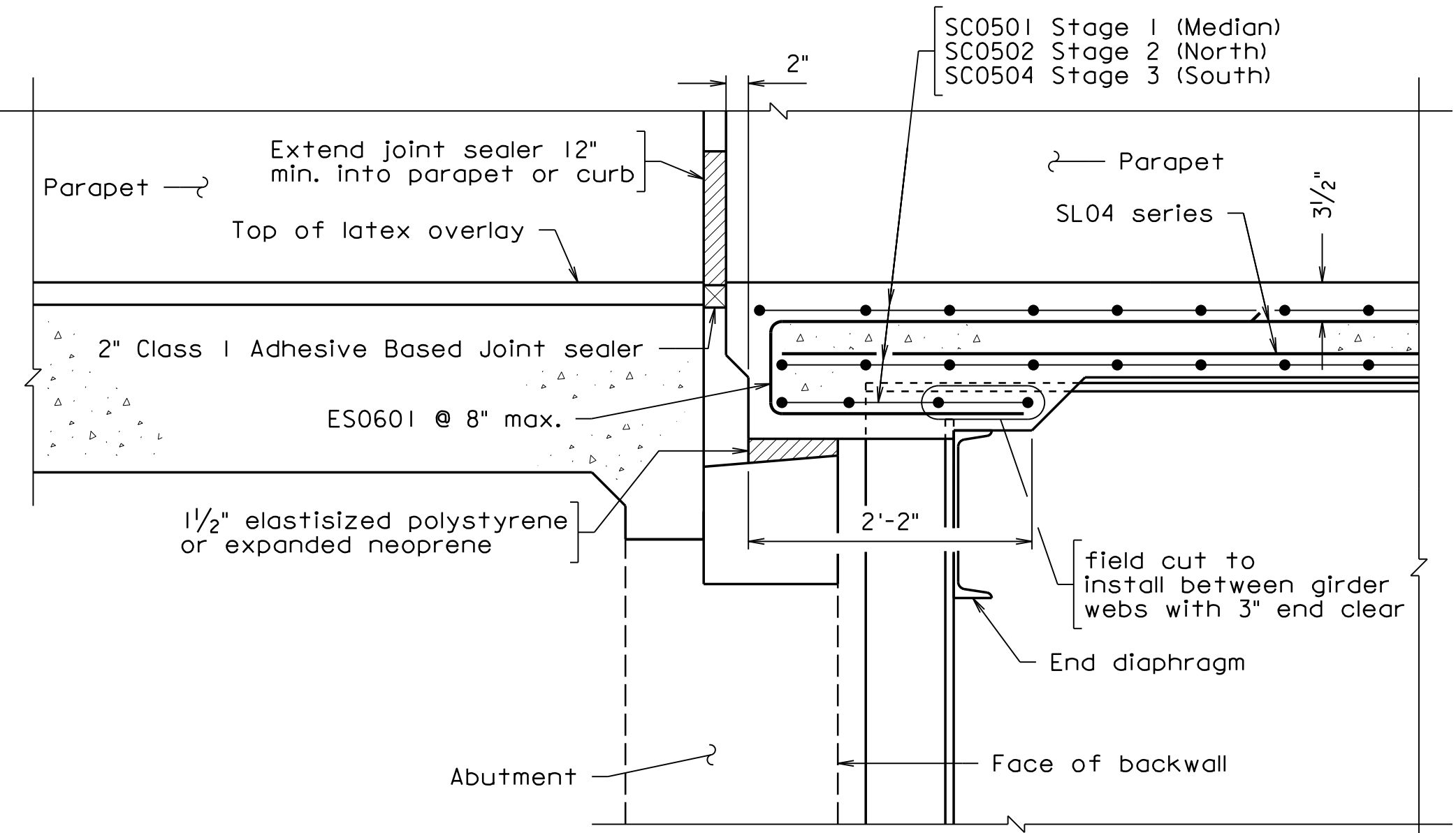
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			66



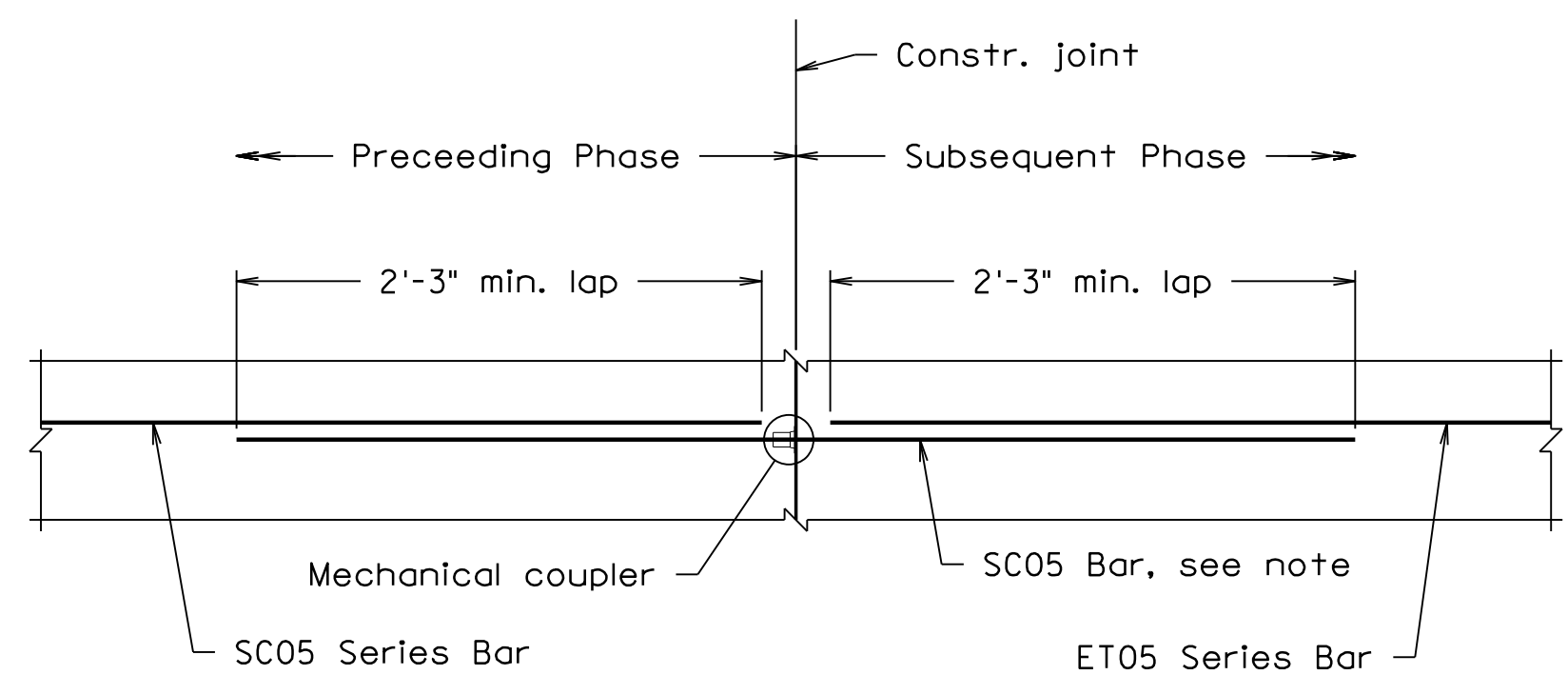
PART PLAN
 Abutment A shown, B similar opposite hand
 Showing ES06 series bar spacing only



**DECK SLAB SECTION THROUGH DECK JOINT
 IN EXISTING DECK AT ABUTMENT A AND B**
 Scale: 1" = 1'-0"



**DECK SLAB SECTION THROUGH DECK JOINT
 IN NEW DECK AT ABUTMENT A AND B**
 Scale: 1" = 1'-0"



MECHANICAL SPLICE DETAIL
 Not to scale

Scale: 3/8" = 1'-0" unless otherwise noted.

Note:

SC05 Series reinforcing shall be installed with SC05 coupler bar with mechanical coupler at face of pour. When Deck Slab Closure and Joint Reconstruction are installed the coupler shall be attached and lapped with ET05 Series bars.

Contractor shall install couplers or SC05 coupler bars for ET05 Series at any construction joint necessary for their means and methods to perform Deck Slab Closure or Joint Reconstruction.

The number of SC05 coupler bars shall be determined by Contractor and is not included in reinforcing steel schedule.

For details of the Class I adhesive based joint sealer, see sheet 74.

257-38A_066.dgn

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DECK DETAILS 1 OF 3					
No.	Description	Date	Designed: MRD	Date	Plan No.
			Drawn: MRD	Apr. 2022	257-38A
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Revisions					

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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	95	0095-076-299, B688
			67

Notes:

ES0502 bars shall be generally spaced with SC0507 bars maintaining proper edge distance from face of web.

The 1/2" expanded rubber joint filler shall extend the full length of the deck slab extension at Abutment C. The cost of the 1/2" expanded rubber joint filler shall be included in the bid price for concrete low shrinkage Class A4 modified.

Spacing of anchor bolts shall be determined by controller cabinet manufacturer.

Reinforcing steel shall be adjusted as necessary for installation of anchor bolts. Anchor bolt pattern shall be installed centered on foundation.

Pipe penetration sleeves in controller cabinet foundation shall be arranged in a circular pattern and align with 12" diameter penetration sleeve in deck.

Penetration sleeve shall extend through stay-in-place forms.

Controller cabinet foundation and incidental items including penetration sleeves shall be incidental to Bridge Conduit System.

For deck slab plan see sheet 64.

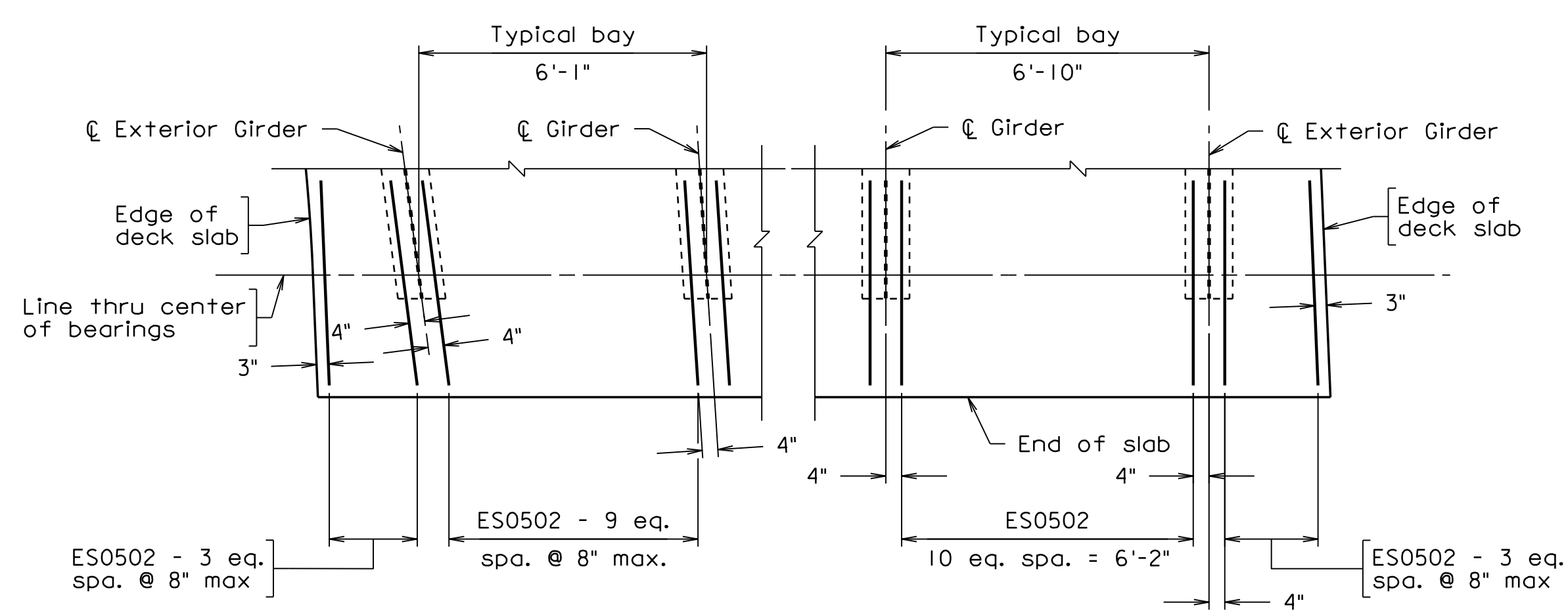
For Transverse Sections see sheets 36 and 37.

For layout of raised median and median barrier on the deck, see sheets 69.

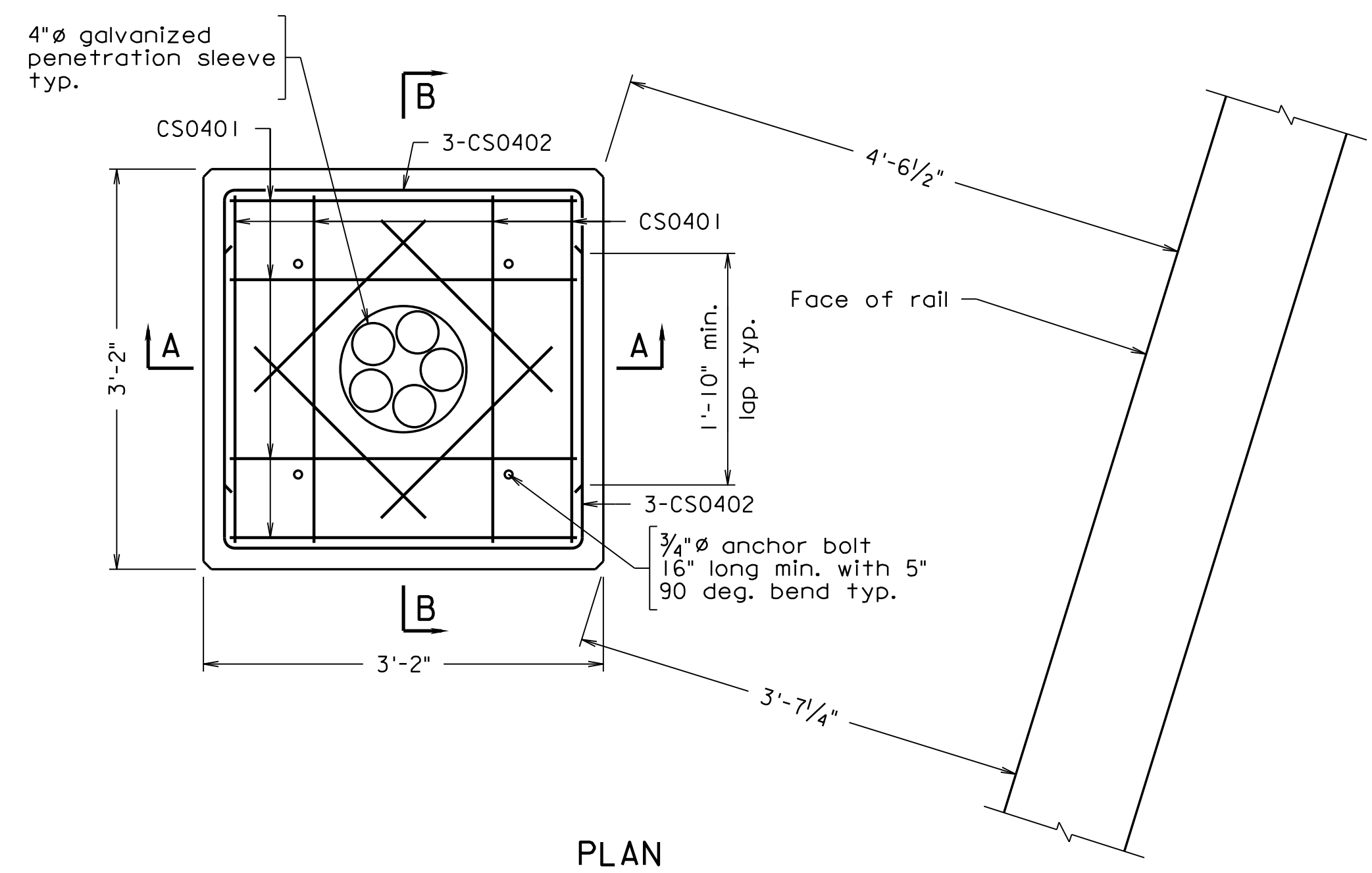
For parapet details, see sheets 76 thru 86.

For details of light pole anchorage, see sheets 94 and 95.

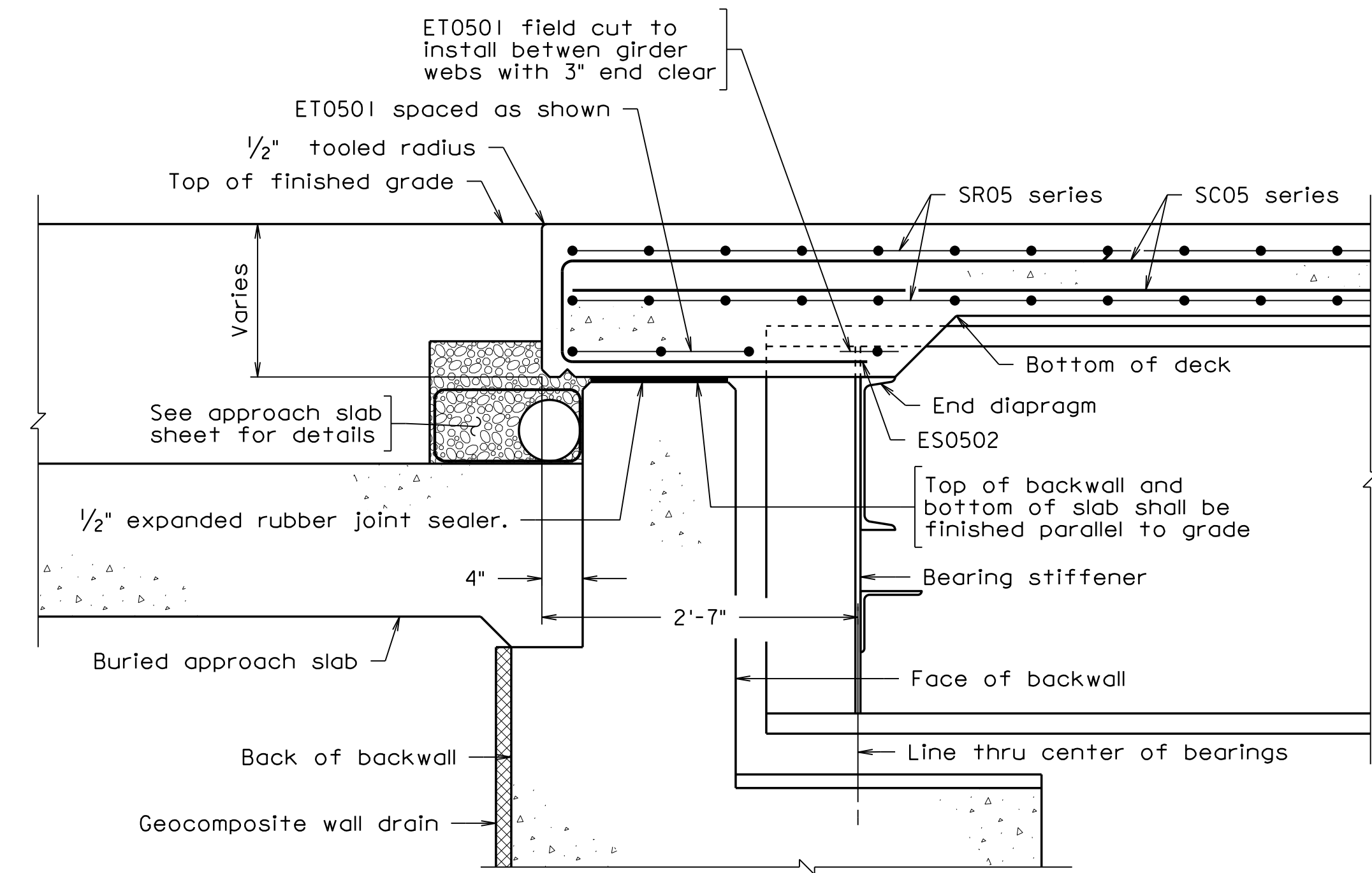
For details of traffic gate anchorage, see sheet 97.



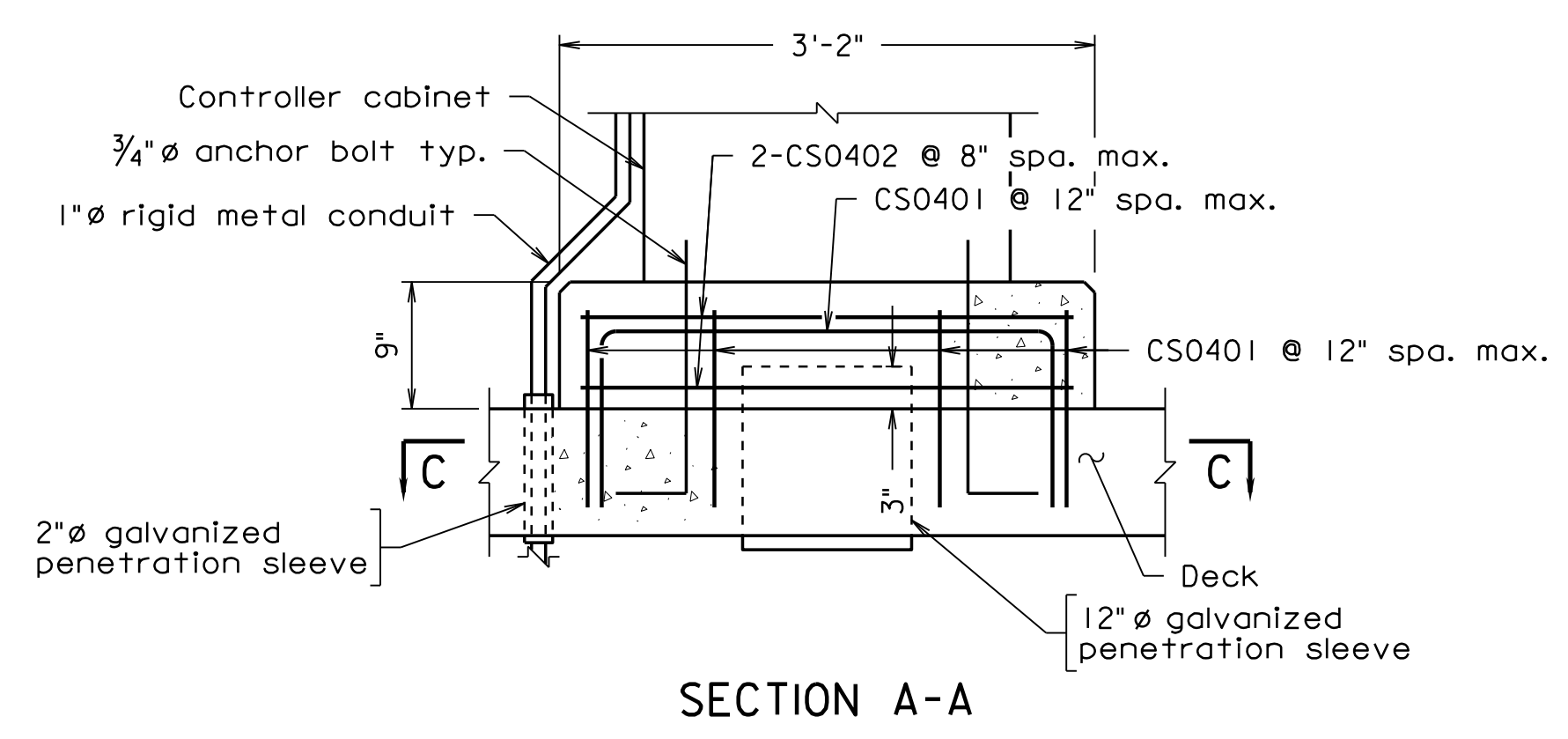
RAMP PART PLAN
Showing ES0502 bar spacing only



PLAN



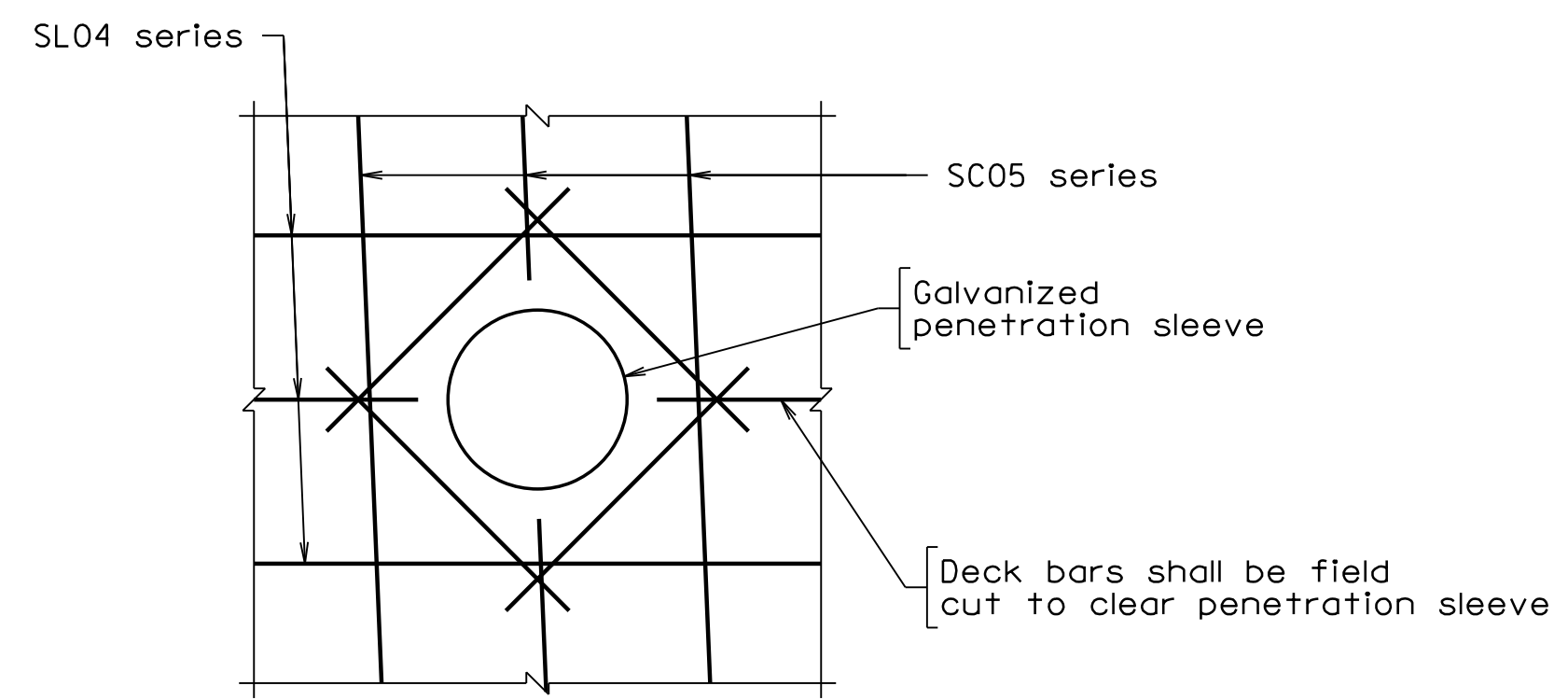
SLAB END DETAIL AT ABUTMENT C
Scale: 1" = 1'-0"



SECTION A-A

CABINET FOUNDATION PAD

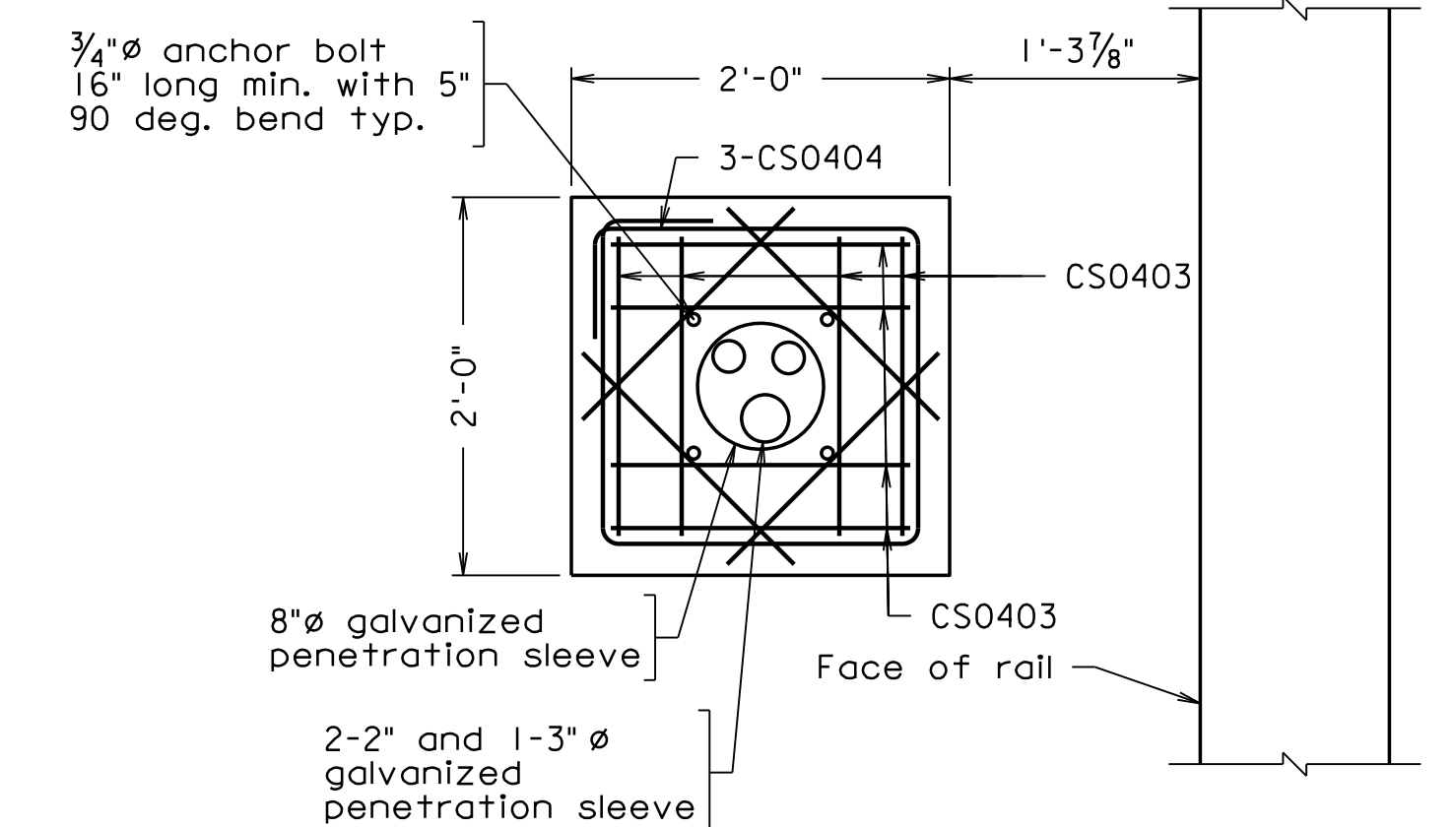
Scale: 1" = 1'-0"
Note: Reinforcing steel shall be spaced around conduit



SECTION C-C

Note: Penetration sleeve shall be located such that only one deck transverse bar and one longitudinal bar are interrupted.

Scale: 3/8" = 1'-0" unless otherwise noted.



SE-5 ELECTRIC SERVICE FOUNDATION

257-38A_067.dgn

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DECK DETAILS					
2 OF 3					
No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn: MRD.....	Apr. 2022	257-38A
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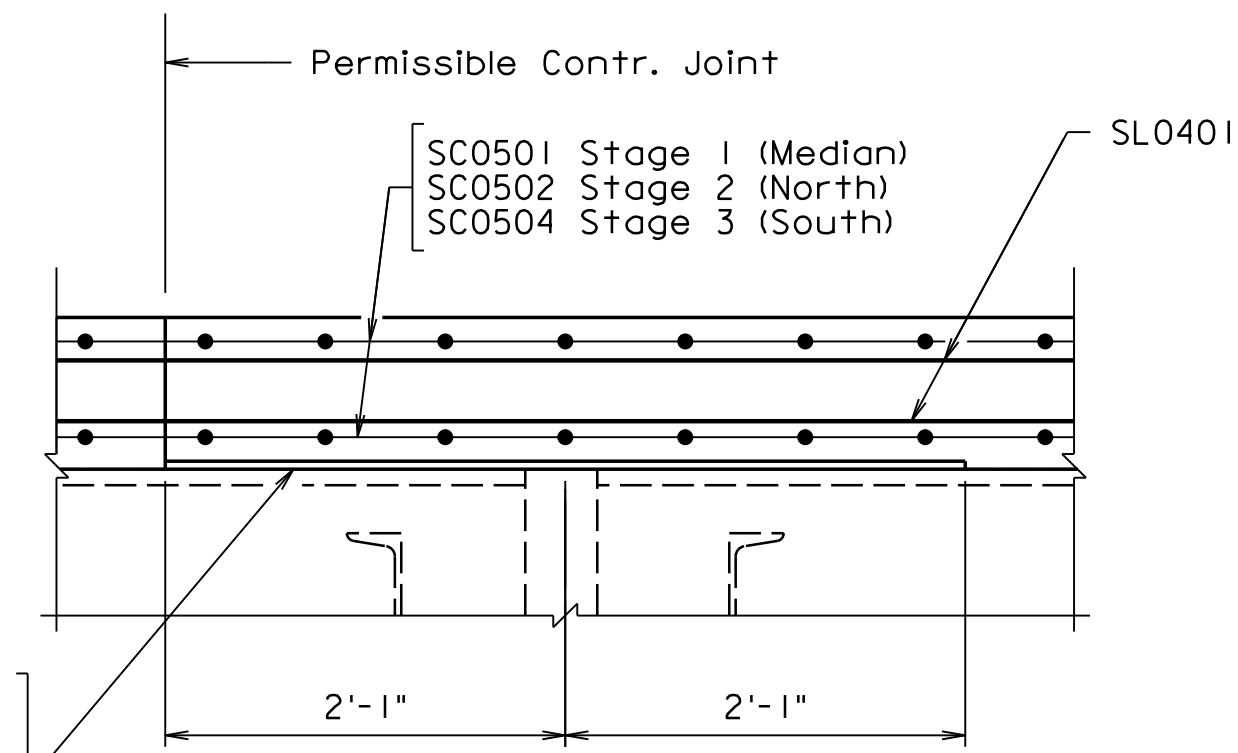
STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			95	0095-076-299, B688	68

Notes:

SE05 Series reinforcing shall be installed with SC05 coupler bar with mechanical coupler at face of pour. When Deck Slab Closure and Joint Reconstruction are installed the coupler shall be attached and lapped with SE05 Series bars.

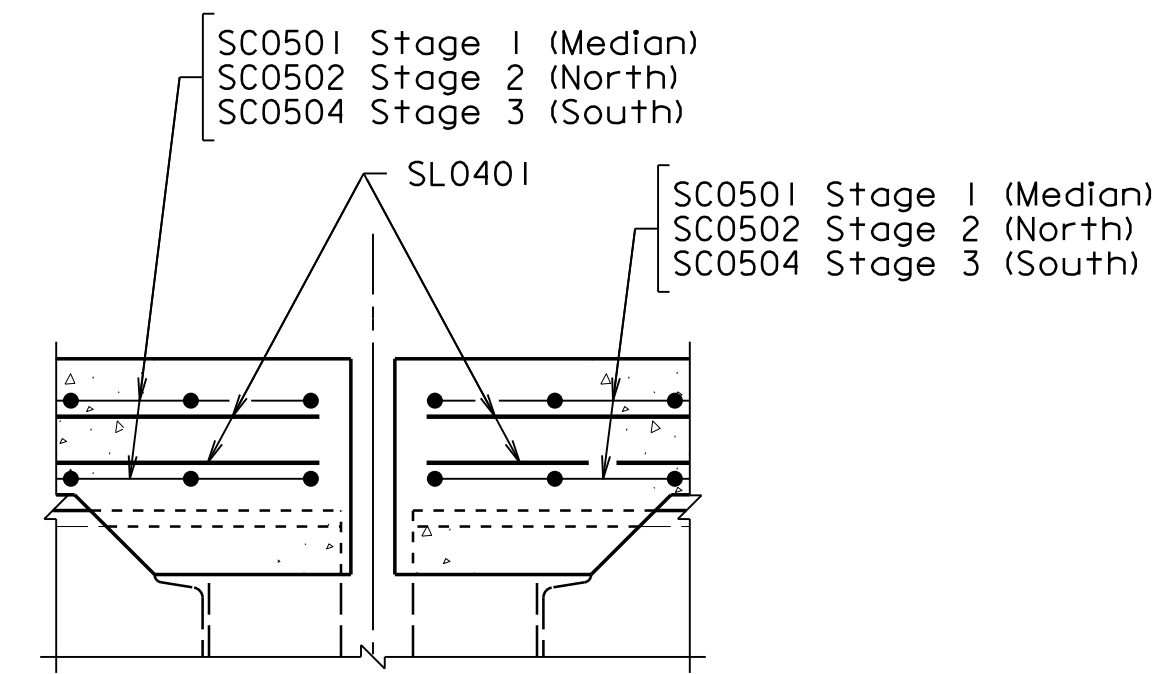
Contractor shall install couplers or coupler bars for SE05 Series at any construction joint necessary for their means and methods to perform Deck Slab Closure or Joint Reconstruction.

For elastomeric expansion dam details, see sheet 73.

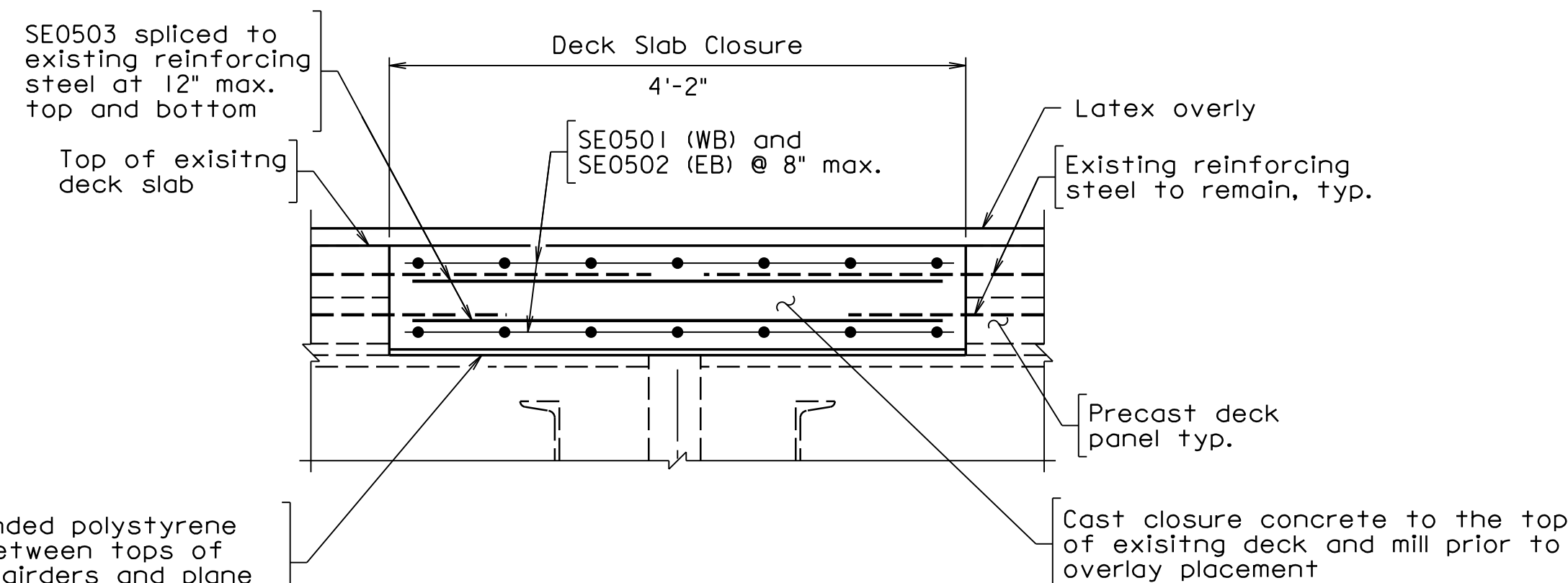


1/2" expanded polystyrene placed between tops of existing girders and plane of bottom of slab.

DECK SLAB SECTION THROUGH DECK CONTINUITY IN NEW DECK OVER PIER 3

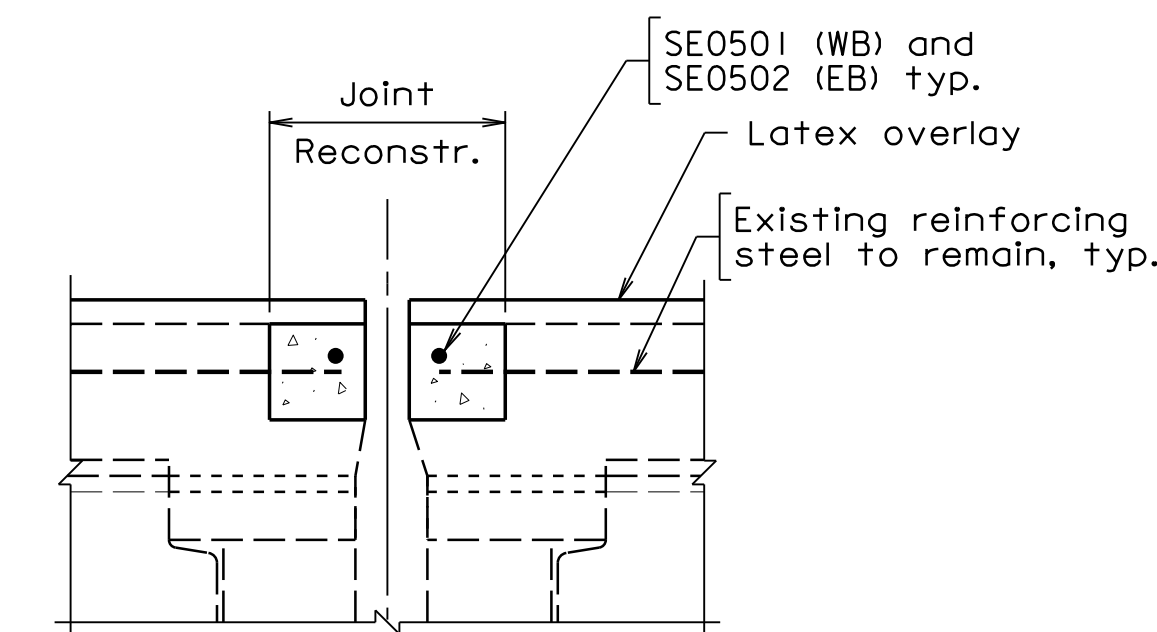


DECK SLAB SECTION THROUGH DECK JOINT IN NEW DECK OVER PIER 1

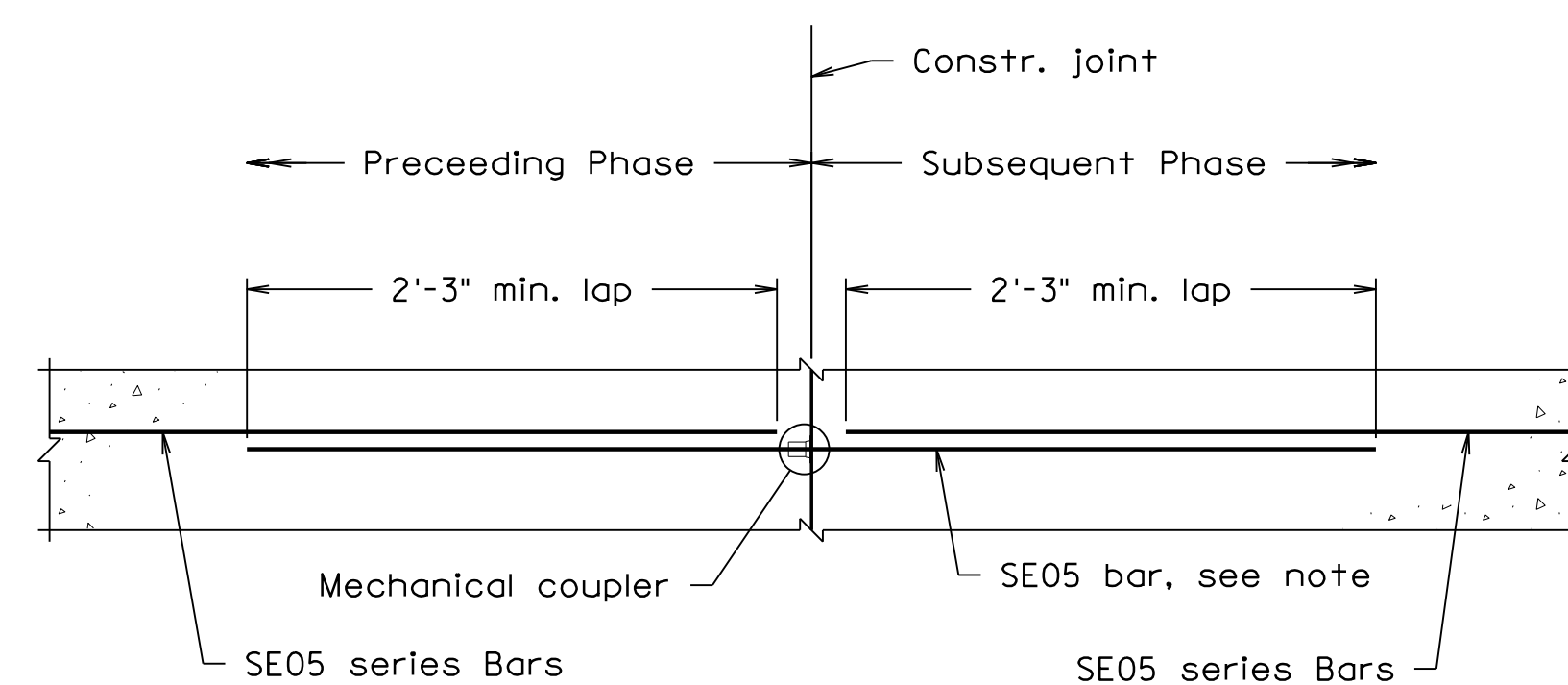


1/2" expanded polystyrene placed between tops of existing girders and plane of bottom of existing slab.

DECK SLAB SECTION THROUGH DECK CONTINUITY IN EXISTING DECK OVER PIER 3



DECK SLAB SECTION THROUGH DECK JOINT IN EXISTING DECK OVER PIER 1



MECHANICAL SPLICE DETAIL
Not to scale

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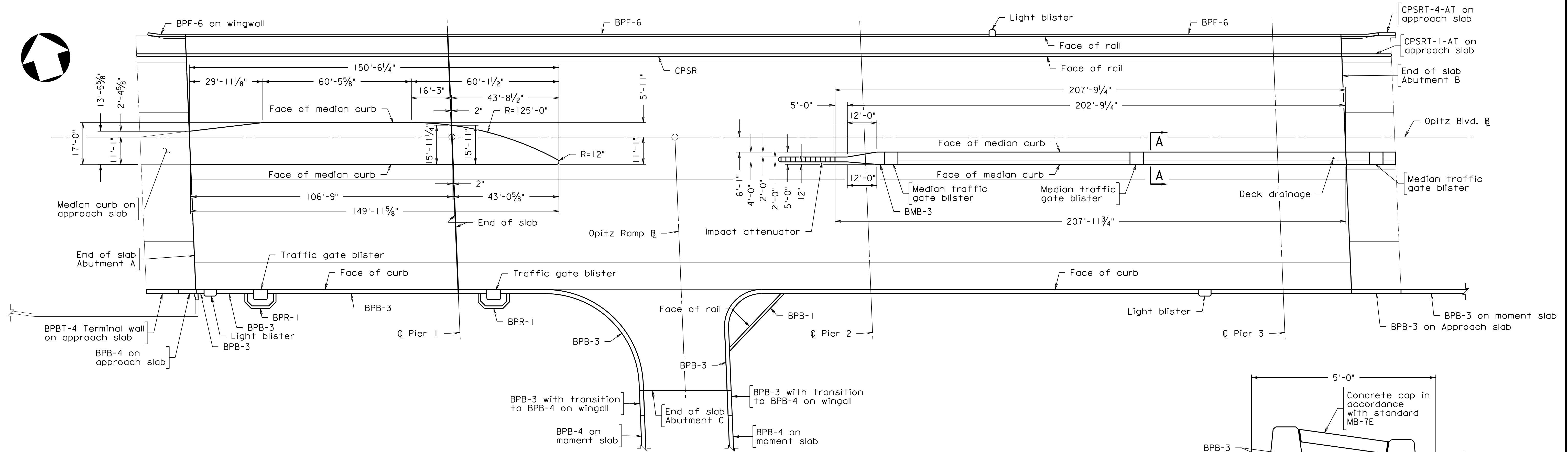
PAC PLANS
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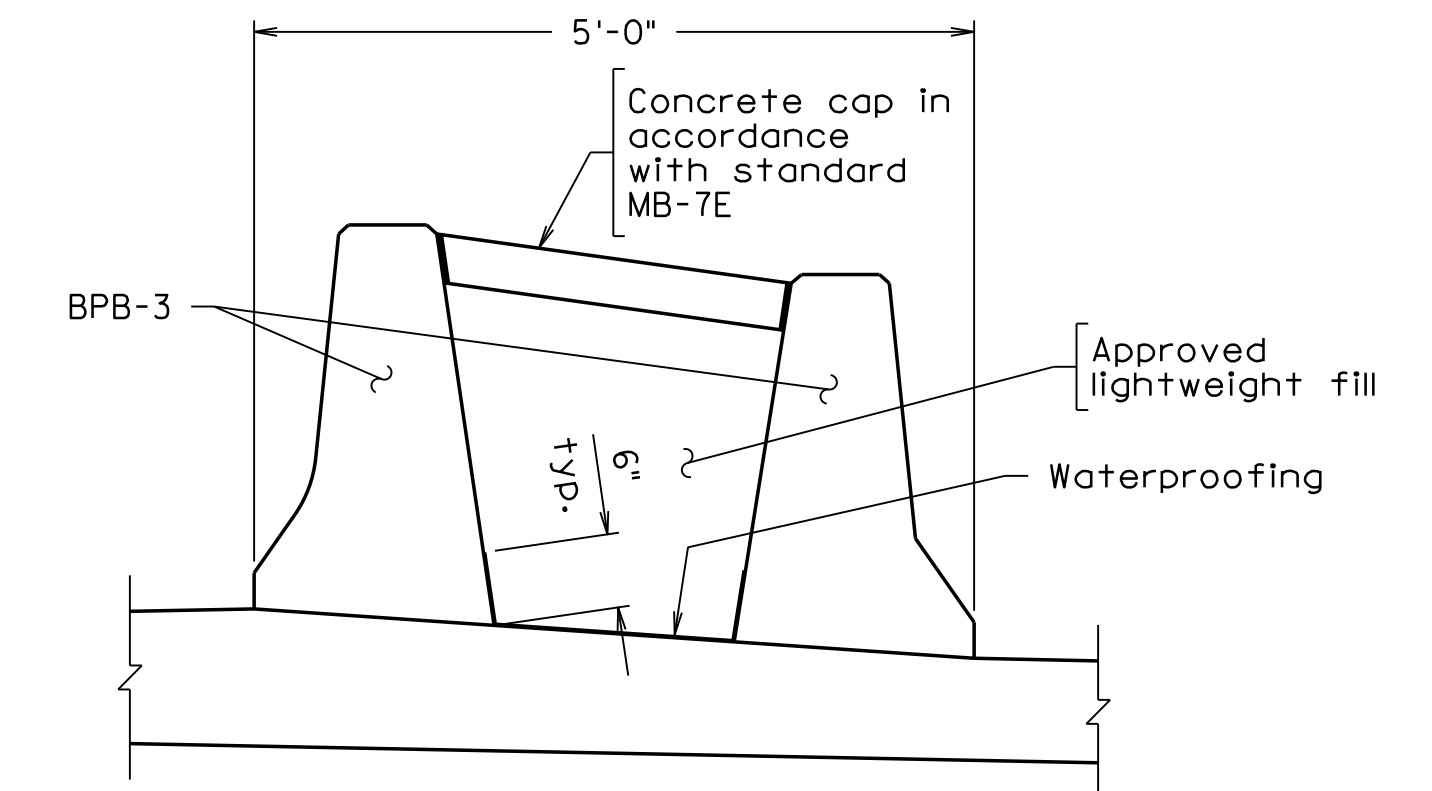
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DECK DETAILS 3 OF 3					
No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn: MRD.....	Apr. 2022	257-38A
			Checked: J.S.....		68 of 125
Revisions					

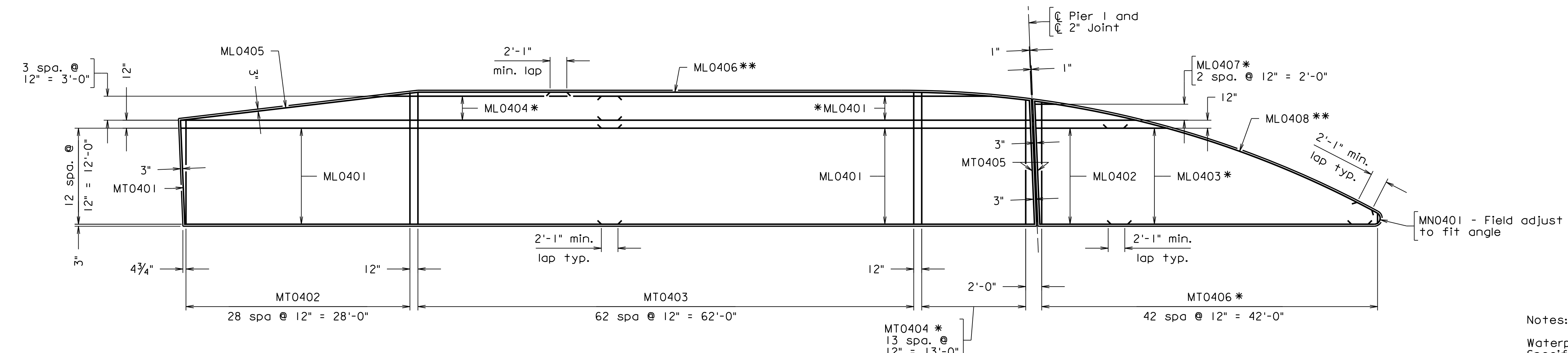
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DECK MEDIAN AND MEDIAN BARRIER LAYOUT PLAN



SECTION A-A

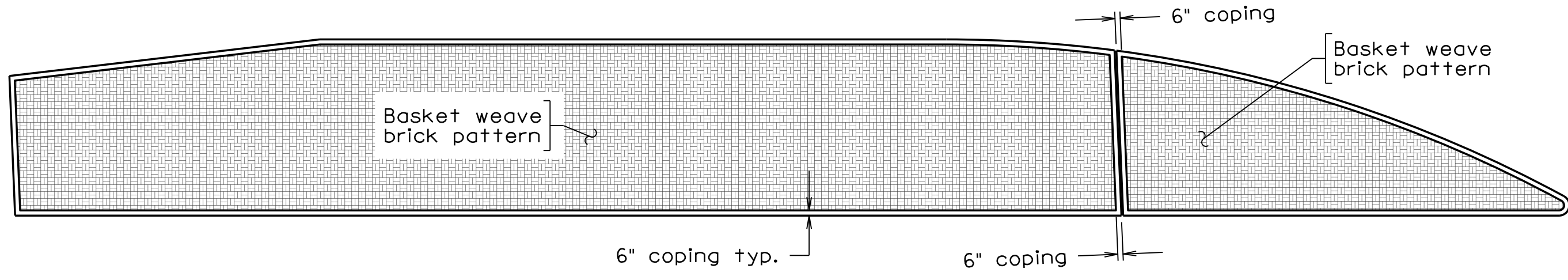


DECK MEDIAN PLAN

Scale: 1/8" = 1'-0"

* Field cut as necessary to fit curve.
** Field bend as necessary to match curve

Notes:
Waterproofing shall be in accordance with Section 416 of the Specifications.
Waterproofing shall be incidental to other items.
Maximum relief for architectural treatment on median curb shall be 1/4".
For BPB-3 details, see sheet 81.



MEDIAN BRICK PATTERN PLAN

Scale: 3/32" = 1'-0"

Scale: 1" = 20' unless otherwise noted.

PAC PLANS
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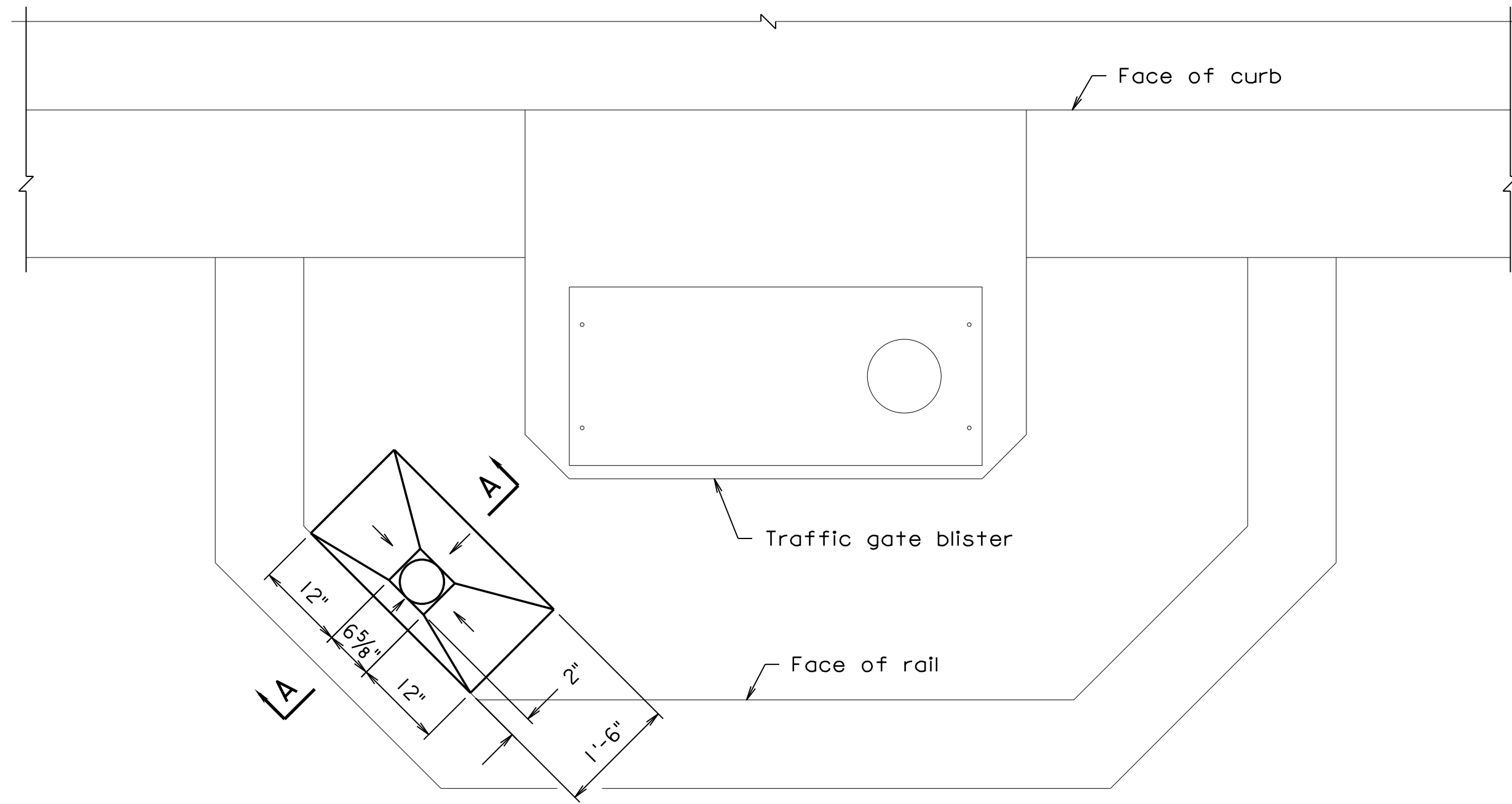
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STRUCTURE AND BRIDGE DIVISION					
DECK SLAB MEDIAN CURB AND BARRIER LAYOUT PLAN					
No.	Description	Date	Designed: MRO	Date	Plan No.
			Drawn: MRO	Apr. 2022	257-38A
			Checked: J.S.		69 of 125
Revisions					

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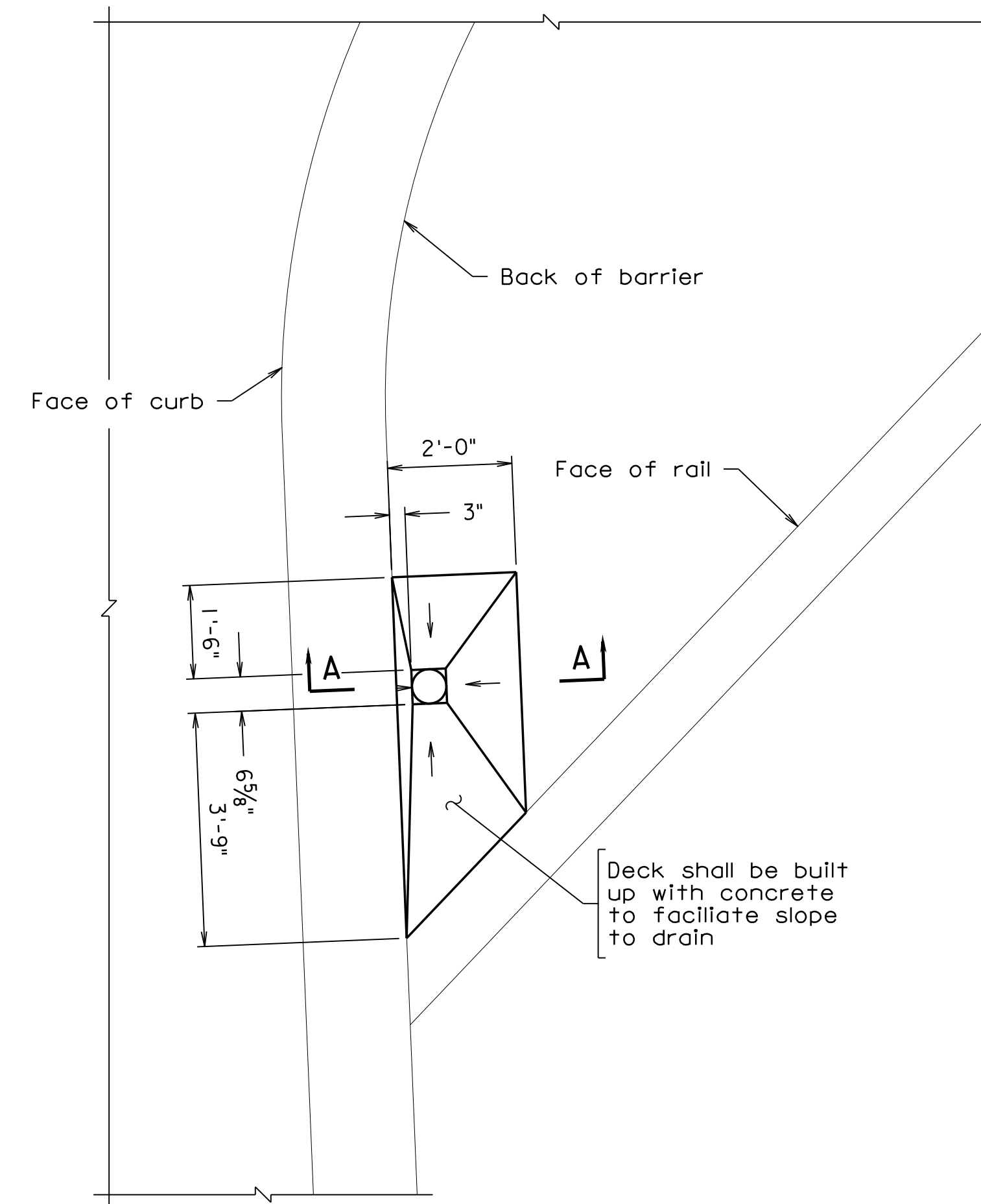
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DECK DRAINAGE PLAN AT TRAFFIC GATE BLISTER

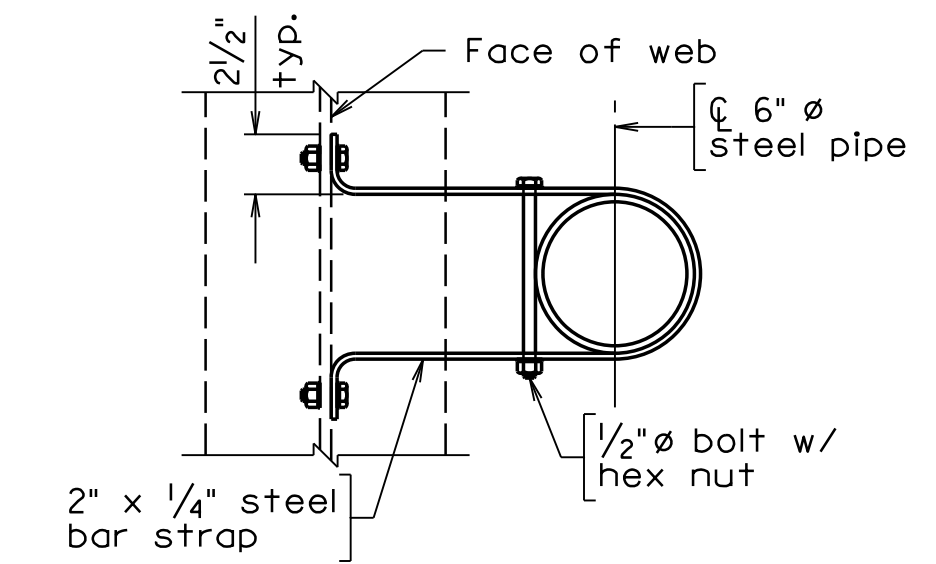


DECK DRAINAGE PLAN AT TRAFFIC CONTROLLER CABINET PLATFORM

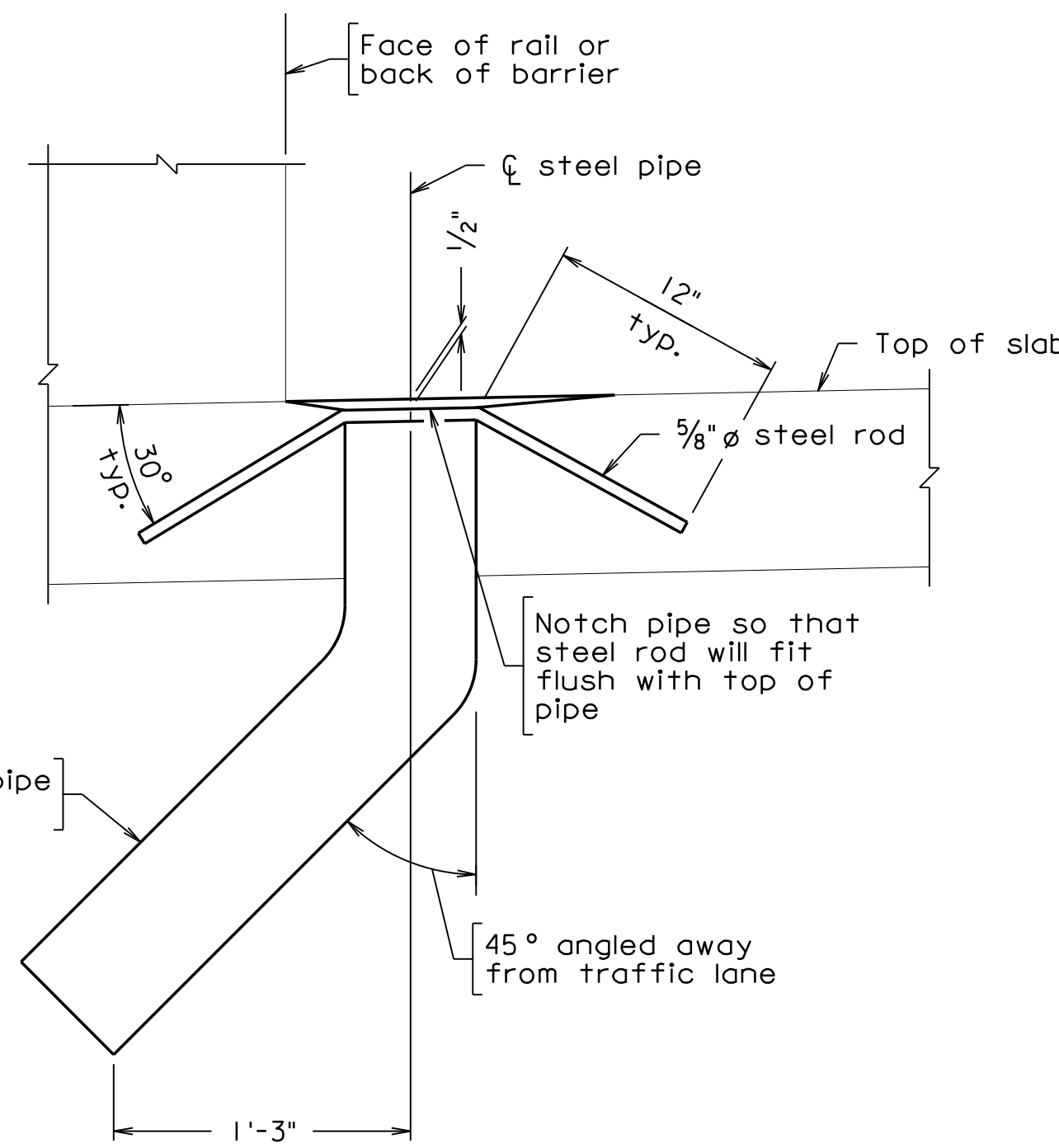
Scale: 1/2" = 1'-0"

Notes:

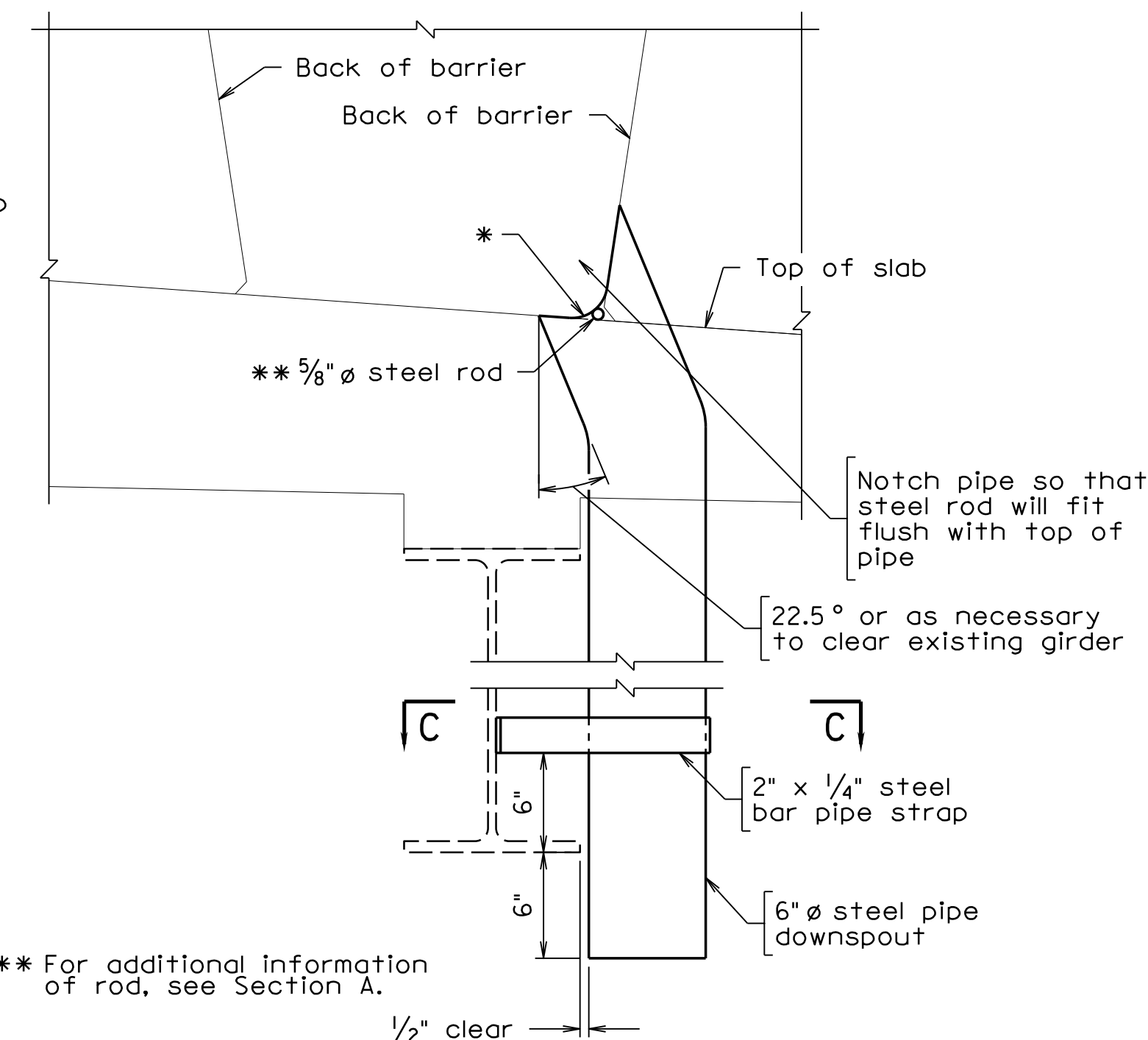
- Cope steel pipe to allow for installation at interface of deck and barrier.
- Steel pipe may be shifted to avoid barrier reinforcing steel.
- Steel pipe downspouts shall be ASTM A53 Schedule 40 black seamless steel pipe.
- Steel plates, bars and rods shall be ASTM A36. All bolts shall be ASTM A325.
- Downspout pipe assemblies and attachments to include all steel plates, pipe, bars, bolts and nuts, and U-bolts shall be hot dipped galvanized after fabrication.
- Attachment of galvanized elements to weathering steel members shall be accomplished by placing a neoprene or vinyl washer between the contact surfaces of the weathering steel and the galvanized element.
- Cost for furnishing and installing all components of deck drainage system shall be incidental to pay item Structural Steel Plate Girders.



SECTION C-C
Scale: 1/2" = 1'-0"

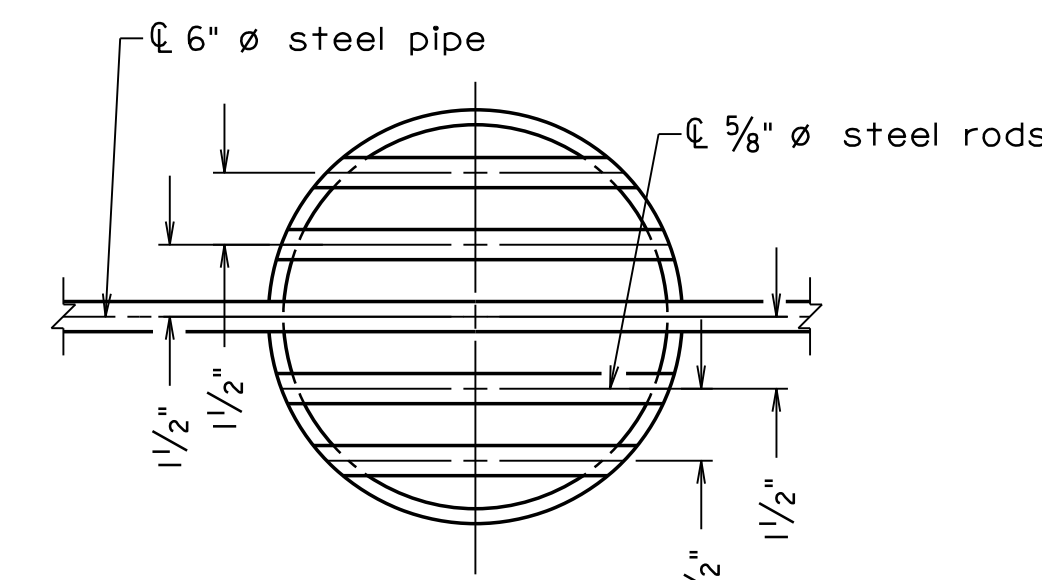


SECTION A-A
Scale: 1/2" = 1'-0"

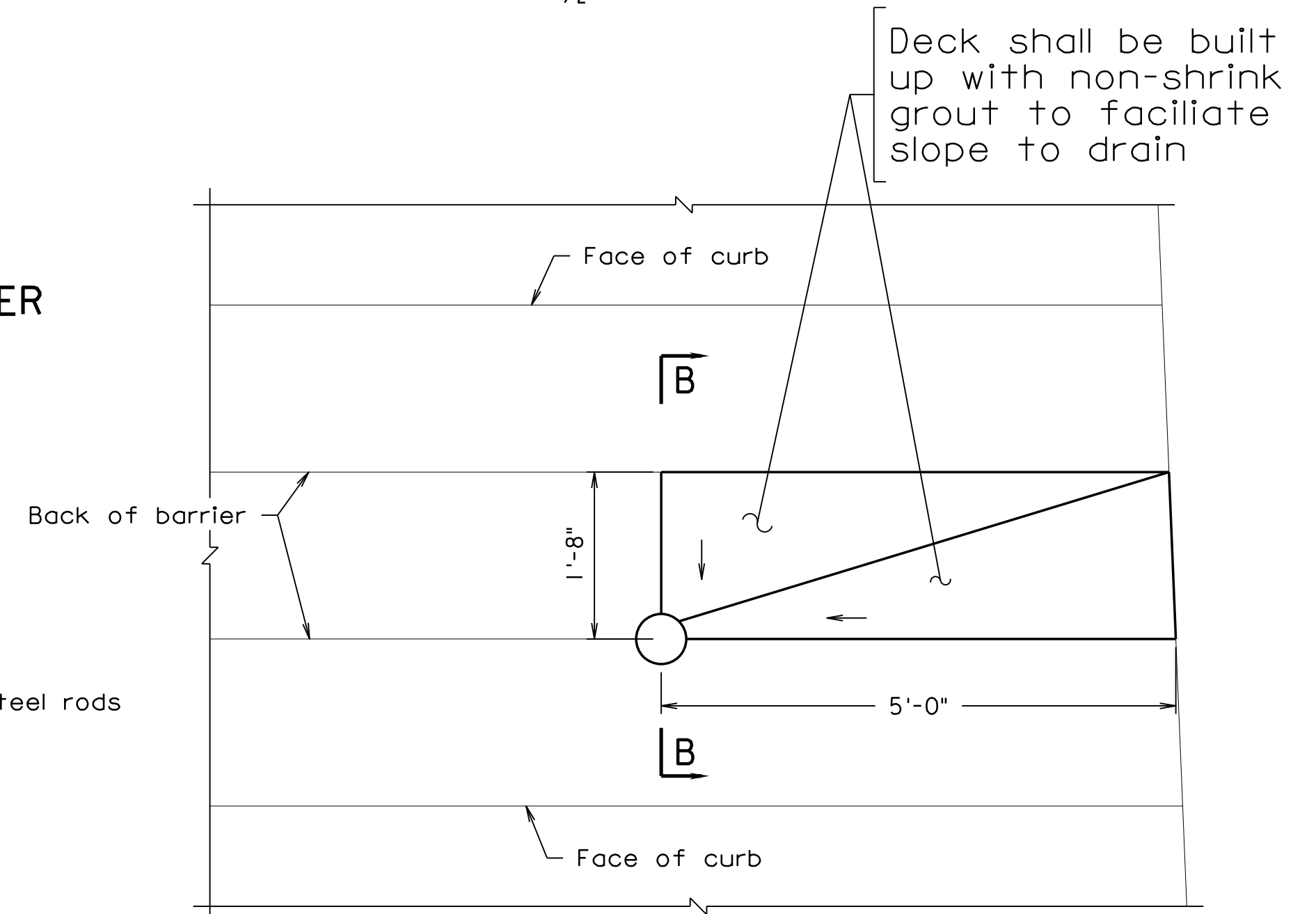


SECTION B-B
Scale: 1/2" = 1'-0"

Scale: 3/4" = 1'-0" unless otherwise noted.



DOWNSPOUT DRAINAGE INLET
OPENING DETAIL
Not to scale



DECK DRAINAGE PLAN AT MEDIAN BARRIER

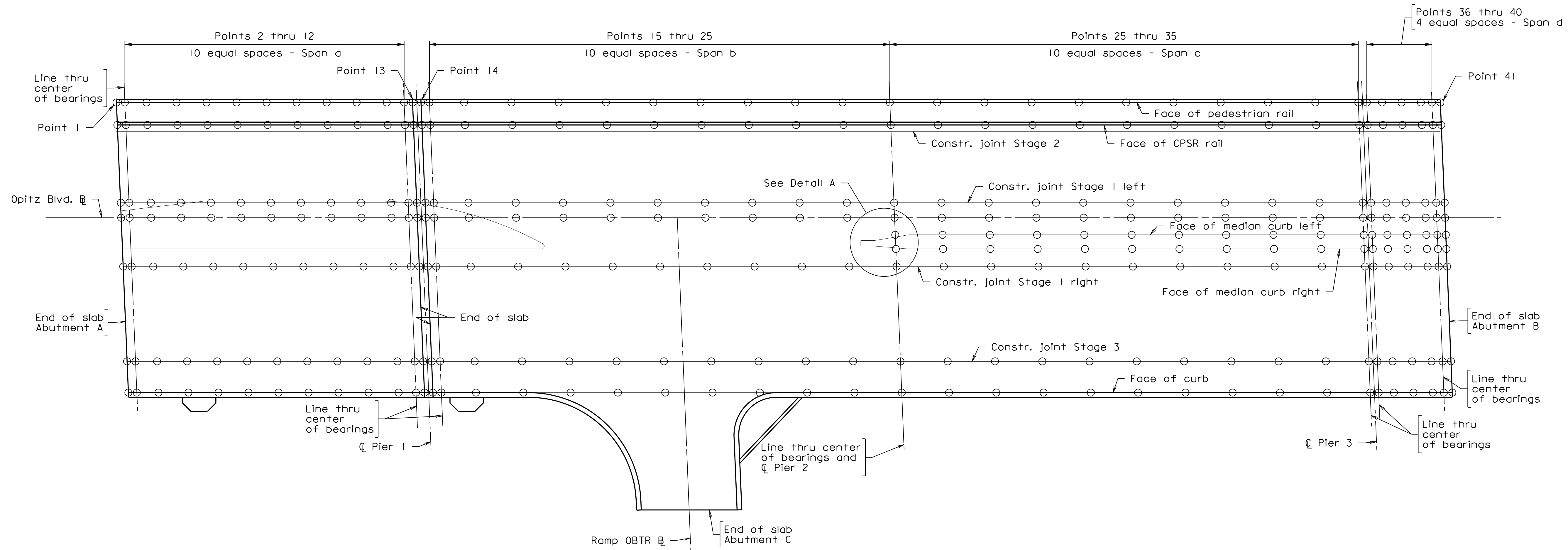
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
DECK DRAINAGE DETAILS					
No.	Description	Date	Designed: MRO.....	Date	Plan No.
			Drawn: MRO.....	Apr. 2022	257-38A
			Checked: J.S.S.....		69a of 125
Revisions					



DECK SLAB ELEVATIONS

TOP OF DECK SLAB ELEVATION TABLE

Point	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
* Face of Pedestrian Rail	216.24	216.26	216.36	216.45	216.54	216.62	216.69	216.75	216.80	216.84	216.88	216.91	216.91	216.91	216.91	216.94	216.94	216.92	216.88	216.82	216.74	216.64
* Face of CPSR Rail	216.41	216.42	216.52	216.62	216.70	216.78	216.85	216.91	216.96	217.00	217.04	217.07	217.07	217.07	217.07	217.10	217.10	217.08	217.04	216.98	216.90	216.80
Constr. joint at Stage 2	217.01	217.03	217.13	217.22	217.30	217.38	217.45	217.51	217.56	217.60	217.63	217.66	217.66	217.66	217.66	217.69	217.69	217.67	217.63	217.57	217.49	217.38
Constr. joint at Stage 1 Left	217.08	217.09	217.19	217.29	217.37	217.45	217.51	217.57	217.62	217.67	217.70	217.73	217.73	217.73	217.75	217.76	217.74	217.70	217.64	217.55	217.45	
Opitz Blvd. B	216.96	216.98	217.08	217.17	217.25	217.33	217.39	217.45	217.50	217.55	217.58	217.61	217.61	217.61	217.61	217.63	217.63	217.62	217.57	217.51	217.43	217.33
* Face of Median Curb Left	216.86	216.88	216.98	217.07	217.15	217.23	217.30	217.35	217.41	217.45	217.48	217.51	217.51	217.51	217.51	217.53	217.53	217.51	217.47	217.41	217.33	217.22
* Face of Median Curb Right	216.78	216.79	216.89	216.99	217.07	217.14	217.21	217.27	217.32	217.36	217.40	217.42	217.42	217.43	217.45	217.45	217.43	217.39	217.33	217.24	217.14	
Constr. joint Stage 1 Right	216.08	216.10	216.19	216.28	216.37	216.44	216.51	216.56	216.61	216.66	216.69	216.71	216.71	216.71	216.72	216.74	216.74	216.71	216.67	216.61	216.52	216.41
Constr. joint Stage 3	215.86	215.88	215.98	216.07	216.15	216.22	216.29	216.35	216.39	216.44	216.47	216.49	216.49	216.49	216.50	216.51	216.51	216.49	216.45	216.38	216.30	216.19
* Face of Curb																						

Point	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
* Face of Pedestrian Rail	216.52	216.37	216.21	216.03	215.82	215.59	215.34	215.06	214.76	214.44	214.10	213.74	213.35	213.31	213.16	213.00	212.84	212.68	212.64
* Face of CPSR Rail	216.68	216.53	216.37	216.18	215.97	215.74	215.49	215.21	214.92	214.60	214.25	213.89	213.50	213.46	213.31	213.15	213.00	212.84	212.79
Constr. joint at Stage 2	217.26	217.11	216.94	216.76	216.55	216.32	216.06	215.79	215.49	215.16	214.82	214.45	214.07	214.02	213.87	213.72	213.56	213.40	213.35
Constr. joint at Stage 1 Left	217.32	217.18	217.01	216.83	216.62	216.38	216.13	215.85	215.55	215.23	214.88	214.52	214.13	214.09	213.93	213.78	213.62	213.46	213.42
Opitz Blvd. B	217.20	217.05	217.06	216.94	216.73	216.50	216.24	215.97	215.67	215.35	215.00	214.63	214.25	214.20	214.05	213.89	213.74	213.57	213.53
* Face of Median Curb Left	217.10	216.95	216.78	216.60	216.39	216.15	215.90	215.62	215.32	215.00	214.65	214.29	213.90	213.85	213.70	213.55	213.39	213.23	213.18
* Face of Median Curb Right	217.01	216.86	216.70	216.51	216.30	216.07	215.81	215.53	215.23	214.91	214.56	214.20	213.81	213.76	213.61	213.46	213.30	213.14	213.09
Constr. joint Stage 1 Right	216.29	216.14	215.97	215.78	215.57	215.33	215.07	214.79	214.49	214.17	213.82	213.45	213.06	213.01	212.86	212.71	212.55	212.38	212.34
Constr. joint Stage 3	216.06	215.91	215.74	215.55	215.34	215.10	214.84	214.56	214.26	213.94	213.59	213.22	212.83	212.78	212.63	212.47	212.31	212.15	212.11
* Face of Curb																			

Notes:

Deck slab elevations are on top of finished roadway at faces of rails/curbs and at edges of proposed latex. Those shown on Opitz Blvd. BL are at point of finished grade denoted on the transverse section.

Straight line interpolation for intermediate elevations on top of finished roadway may be made in any direction between any two adjacent points.

For additional notes, see sheet 70a.

* Locations where deck has 1/2 inch step. Elevations at these locations are provided for the deck at 1/2 inch lower. Deck shall be at projected existing top of deck under bridge barriers. For clarification, see Detail B on sheet 71.

** For Detail A, see sheet 71.

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DECK SLAB ELEVATIONS SPAN a THRU SPAN d			
No.	Description	Date	Revisions
Designed: MRD.....	Date	Plan No.	Sheet No.
Drawn: CBR.....	Apr. 2022	257-38A	70 of 125
Checked: J.S.....			

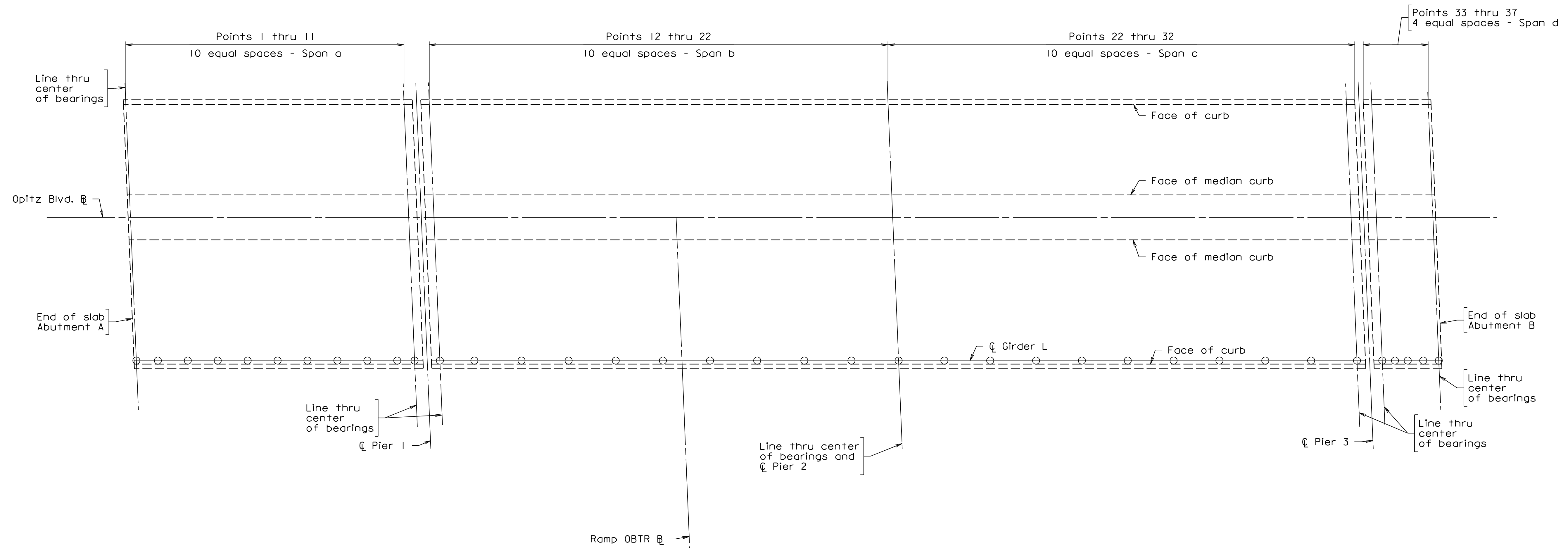
Scale: 1" = 20' unless otherwise noted.

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STRUCTURAL ENGINEER



EXISTING DECK SLAB ELEVATIONS

TOP OF DECK SLAB ELEVATION TABLE

Point	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Girder L Plan	216.24	216.26	216.36	216.45	216.54	216.62	216.69	216.75	216.80	216.84	216.88	216.91	216.91	216.91	216.91	216.94	216.94	216.92	216.88	216.82	216.74	
Girder L Field																						

Notes:

As this project includes widening, longitudinal and transverse joint closure, overhang reconstruction and overlay, consideration of existing deck elevations will be important to ensure that proper cross slope and grade are maintained throughout the project. Widening is based on maintaining the existing cross slope and grade along Opitz Blvd. For all operations, Contractor shall check proposed work based on existing cross slope that will be achieved by elevations proposed here-in. If field discrepancies are found, elevations shall be adjusted in coordination and with approval of the Engineer.

Deck shall be cast to match existing cross slope and projected existing top of deck except at locations within limits of mill and overlay. To reduce the required milling, deck within limits of mill and overlay shall be cast 1/2 inch lower than the existing top of deck and match existing cross slope. Concrete cover shall also be reduced by 1/2 inch. Below the proposed overlay the reconstructed deck shall be milled 1/2" and the existing deck shall be milled 1 inch to provide a uniform milled surface 1/2 inch below final surface of latex overlay. Overlay shall be at a constant depth within tolerance and match the existing cross slope. Top of overlay shall be 1/2 inch higher than existing top of deck. Deck in Span e shall be cast full depth and full concrete cover; final deck surface shall match top of overlay 1/2 inch higher than existing top of deck).

Top of deck elevations on sheets 70-71 and 48-52 are to top of cast deck and not to top of overlay. Elevations are calculated based on a best fit profile and match existing cross slope. Elevations within limits of overlay reflect 1/2 inch lower than top of projected existing deck. If field conditions prevent reconstruction of the deck as noted above, Contractor shall notify the Engineer.

CPSR rail and BPB-3 parapets shall be cast on projected top of existing deck and at traffic face where overlay limit occurs there will be a 1/2 inch step in the reconstructed deck. For typical detail see Detail B on sheet 71.

Point of finished grade shall be at Opitz Blvd. baseline except at median barrier. The point of finished grade at the median barrier shall be the north face of median barrier. The top of deck shall transition from matching existing cross slope at start of median barrier to opposite of existing cross slope at end of deck transition. The south face of median barrier shall match existing top of deck. The top of deck under the median barrier shall be a straight slope from north face to south face. Limits of overlay extend to face of median barrier and there will be a 1/2 inch step at both faces of median barrier. See Detail A for additional information.

Contractor shall survey top of existing deck at Girder L prior to and after removal of existing overhang in Stage 3. Notify the Engineer if any elevations vary by more than 1/2 inch in the table. Elevations may be adjusted to compensate for variability along Girder L in coordination with the Engineer.

For limits of mill and overlay see sheet 36.

For Detail A, see sheet 71.

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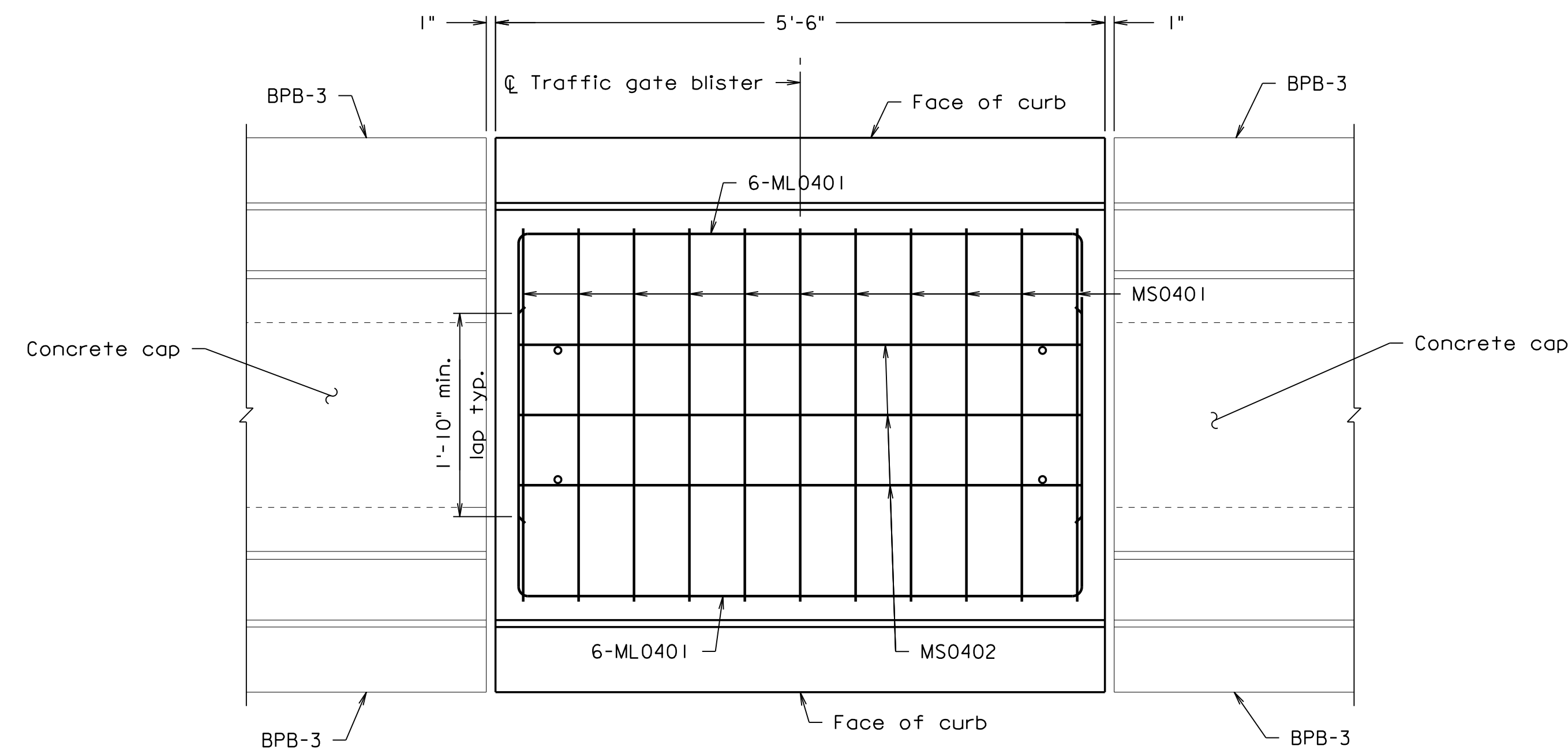
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION				
EXISTING DECK SLAB ELEVATIONS GIRDER L				
No.	Description	Date	Designed: MRD..... Date Drawn: CBR..... Checked: G.S.....	Plan No. 257-38A Sheet No. 70a of 125
Revisions		Apr. 2022		

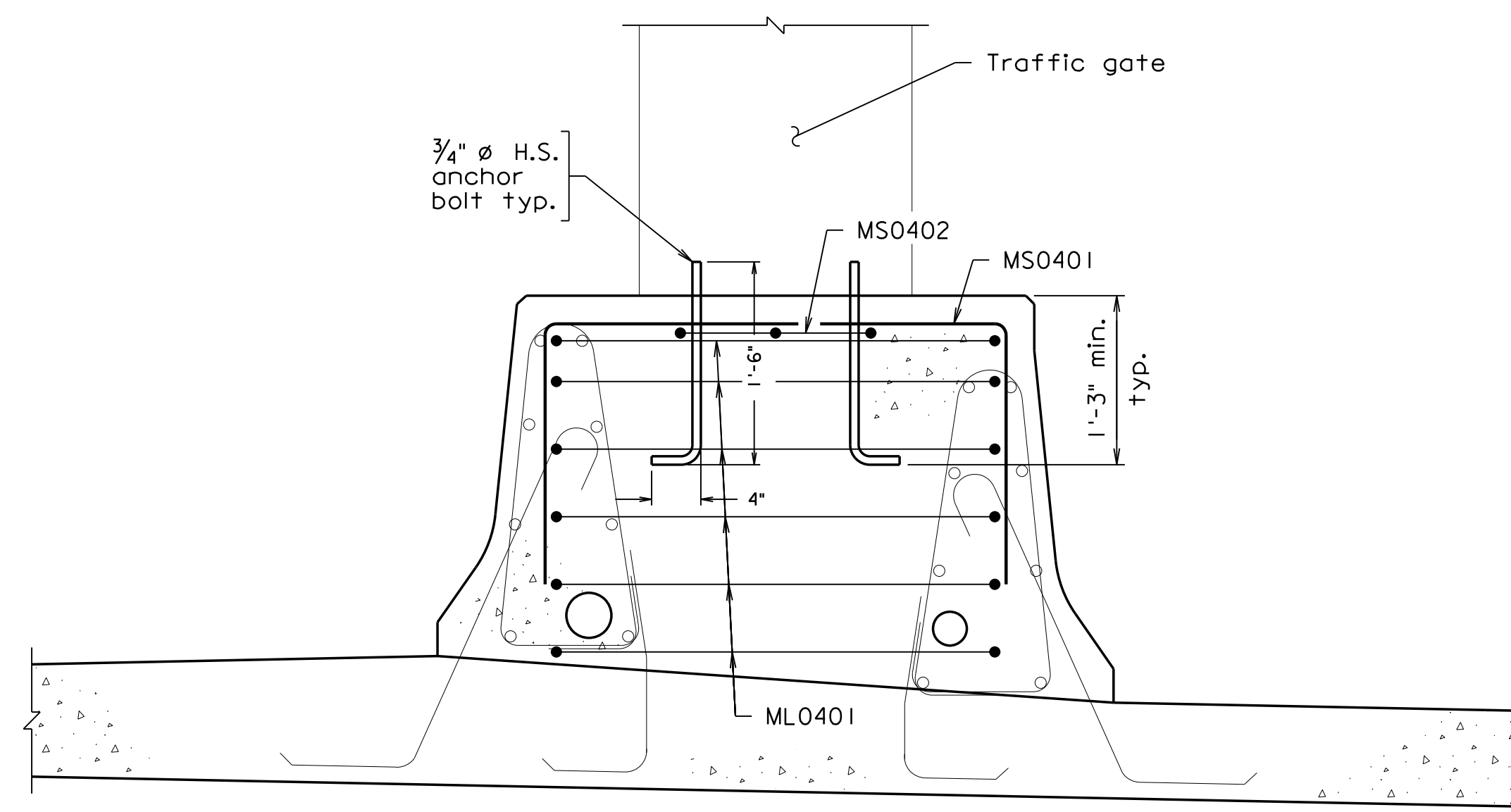
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STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				72

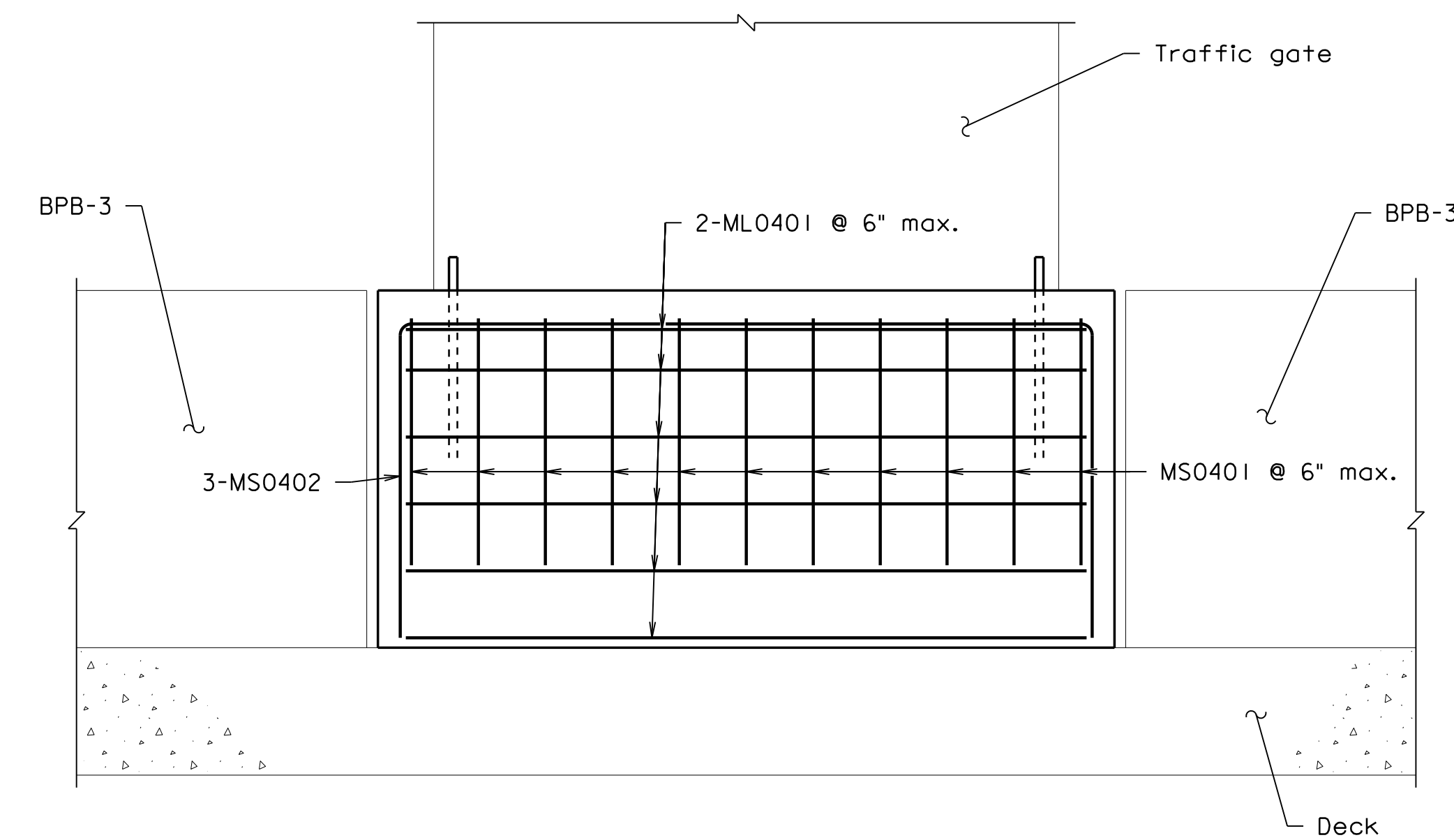
Notes:
 Reinforcing steel shall be incidental to NS median Barrier.
 See sheet 81 for NS median barrier.
 Anchor bolts shall be hot dip galvanized.
 For location of traffic gate blisters, see sheet 65.



PLAN AT TRAFFIC GATE BLISTER
 Parapet reinforcing steel and traffic gate not shown for clarity.



SECTION AT TRAFFIC GATE BLISTER
 Deck reinforcing steel not shown for clarity



ELEVATION AT TRAFFIC GATE BLISTER
 Parapet and deck reinforcing steel not shown for clarity.

257-38A_072.dgn

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Scale: 1" = 1'-0"

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION				
STRUCTURE AND BRIDGE DIVISION				
MEDIAN TRAFFIC GATE BLISTER DETAILS				
No.	Description	Date	Designed: WRA..... Drawn: WRA..... Checked: WRA.....	Date Apr. 2022
Revisions			Plan No. 257-38A	Sheet No. 72 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				73

Notes:

Shop drawings of the dam and corresponding slab opening(s) and anchor details shall be submitted to the Engineer for review in accordance with Section 105.10 of the Specifications.

Non-stainless ferrous metal shall be ASTM A36 and shall be thermal spray coated in accordance with Section 411 of the Specifications.

All bolts, nuts, washers and screws shall be ASTM A276, Type 304 stainless steel.

Sidewalk and median cover plates shall be ASTM A36 with non-slip (deformed) surface.

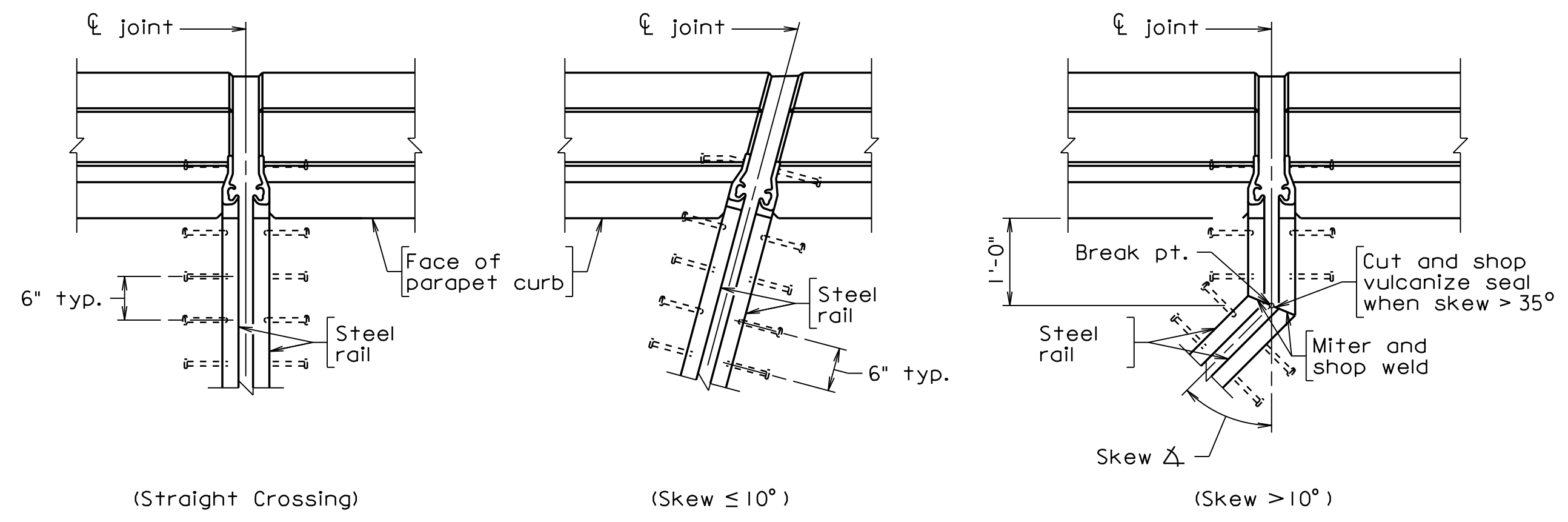
Steel sections shall be furnished in minimum lengths of 18' and shall be field welded into continuous sections. Welds shall be ground smooth in areas where they will be in contact with the elastomer.

Where the total length of the joint is less than 40', the minimum length of steel sections shall be half of the total length of the joint.

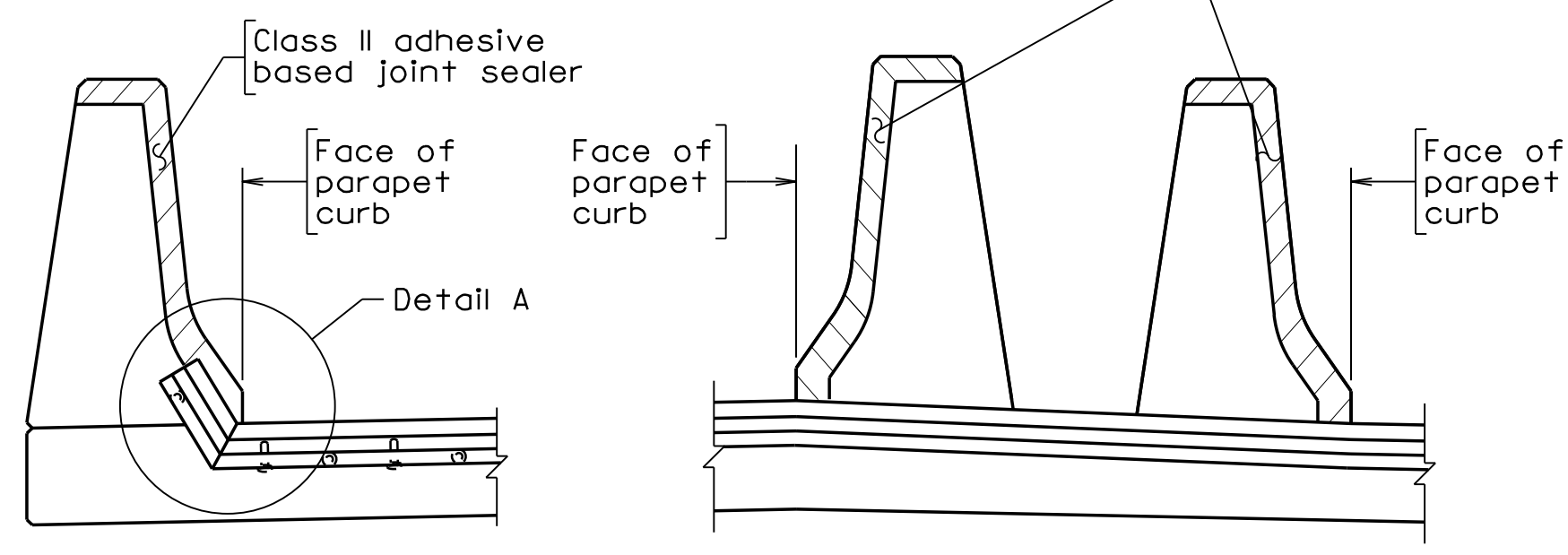
Cost of Class II adhesive based joint sealer associated to Elastomeric Expansion Dam is to be included in the bid price of Elastomeric Expansion Dam.

Abutment	Pier	A (at 60°F)	t	Total Movement	Skew Angle
	1	2"	1/4"	3 3/4"	2°21'10"

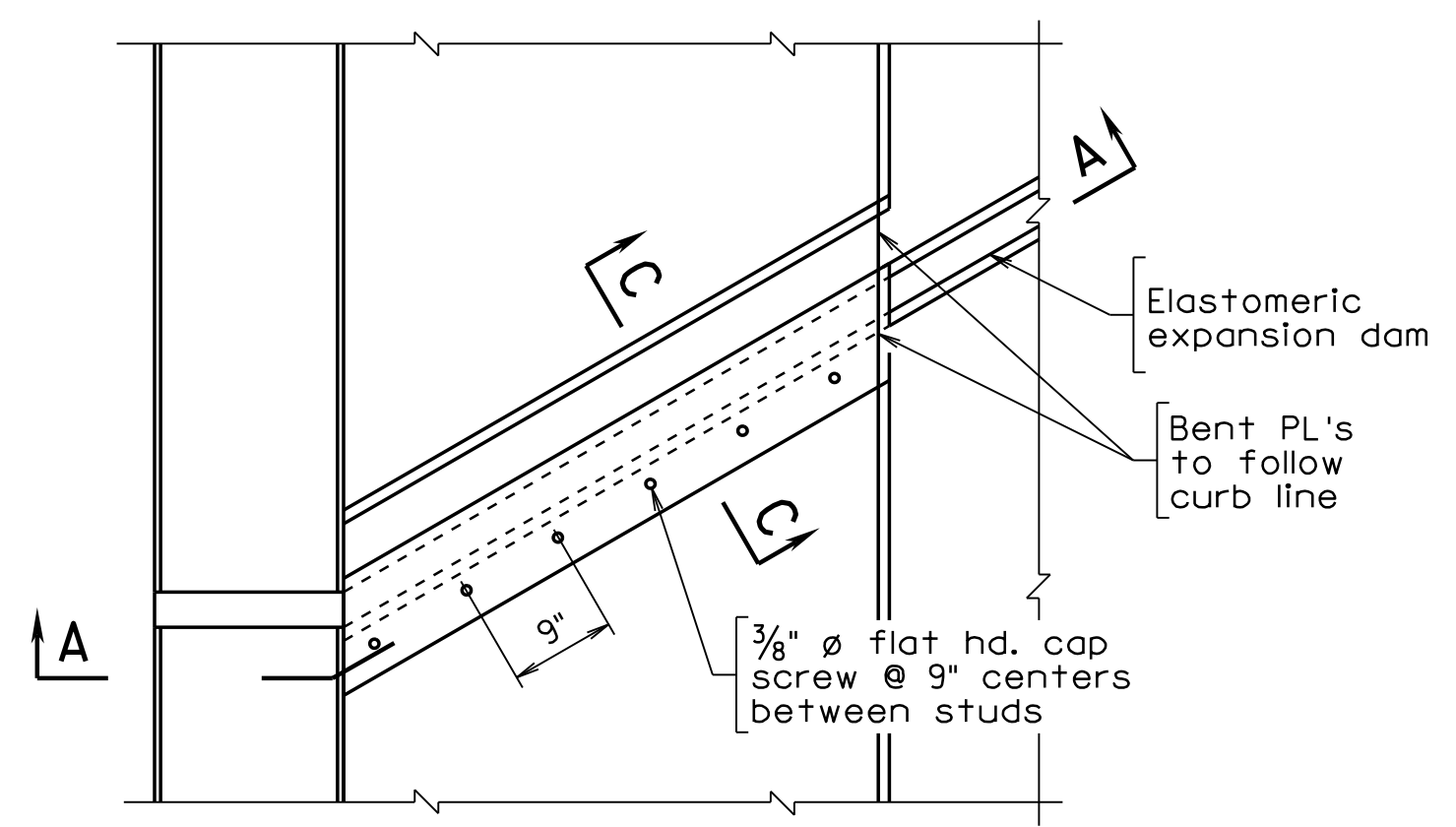
"A" shall be increased or decreased for every 10°F temperature drop or rise respectively by "t". "A" is measured perpendicular to the joint centerline.



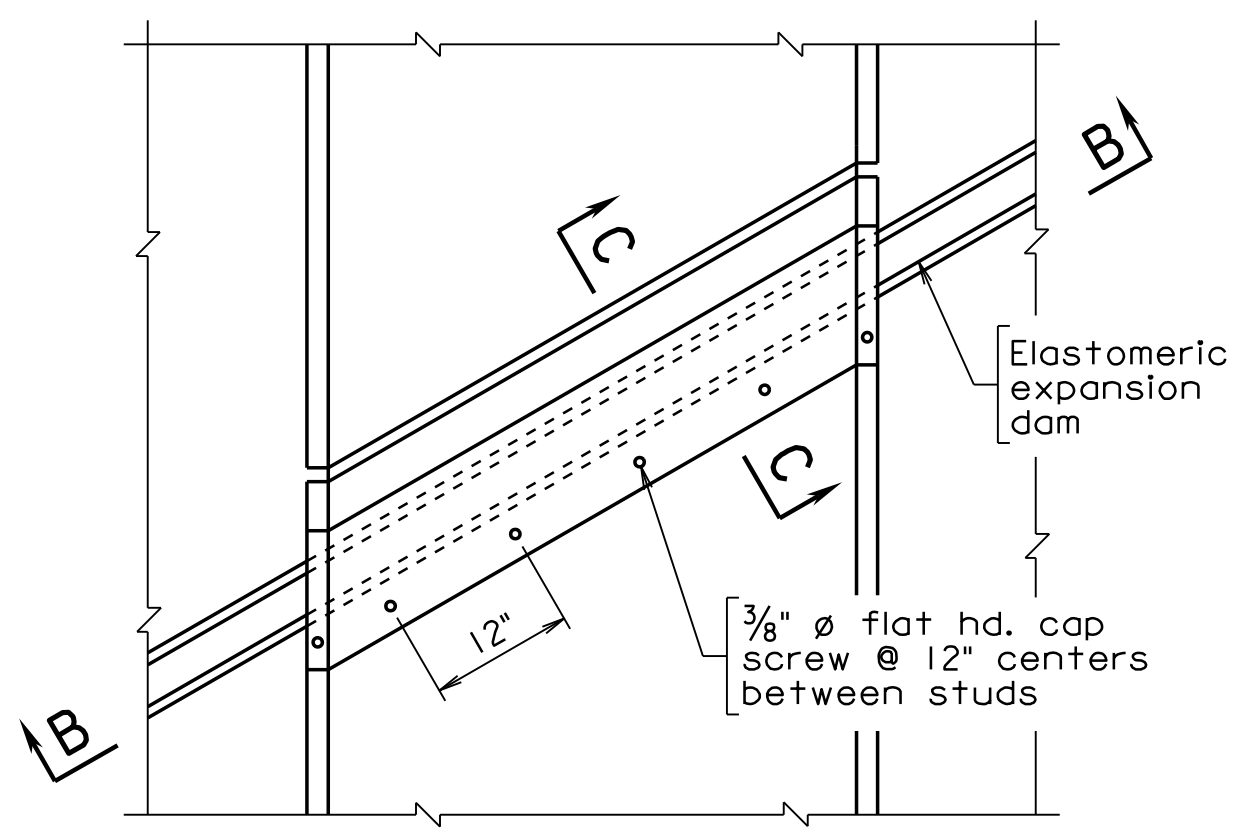
PARTIAL PLANS AT PARAPETS



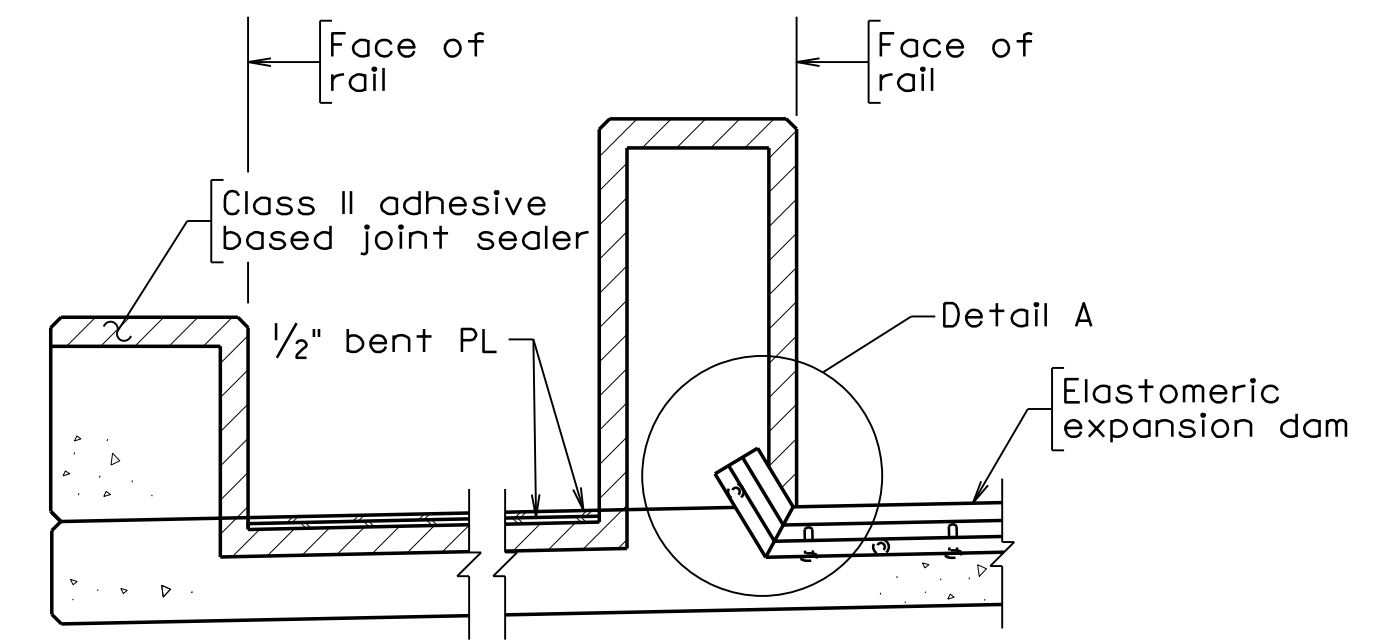
PARAPET SECTION PARAPET MEDIAN SECTION



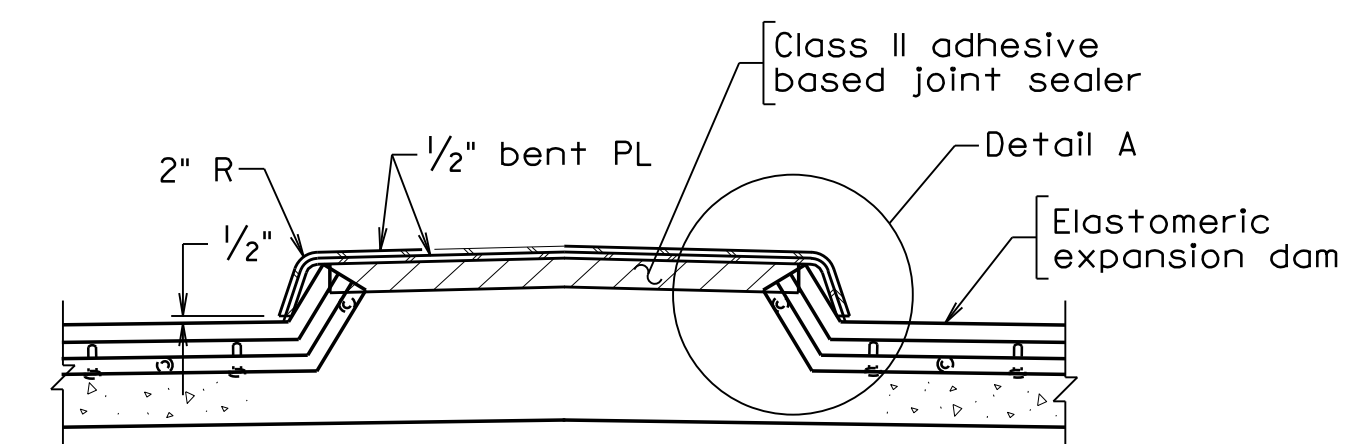
PLAN AT SIDEWALK



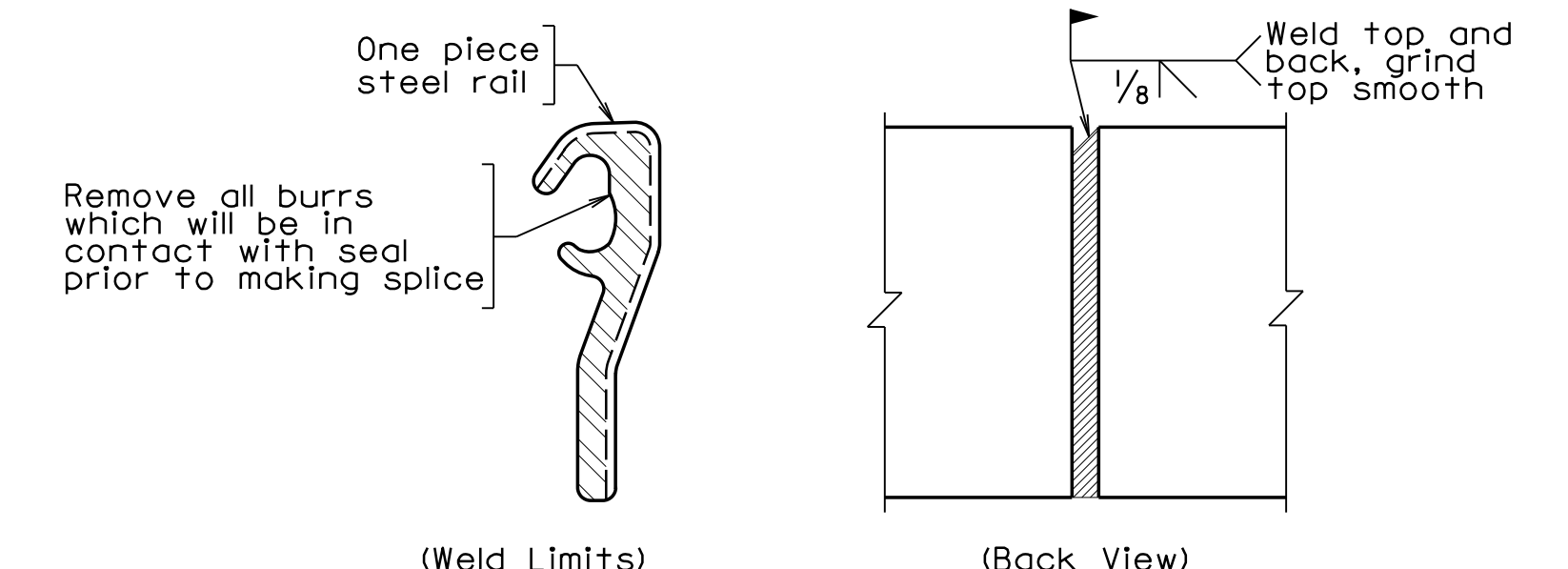
PLAN AT RAISED MEDIAN



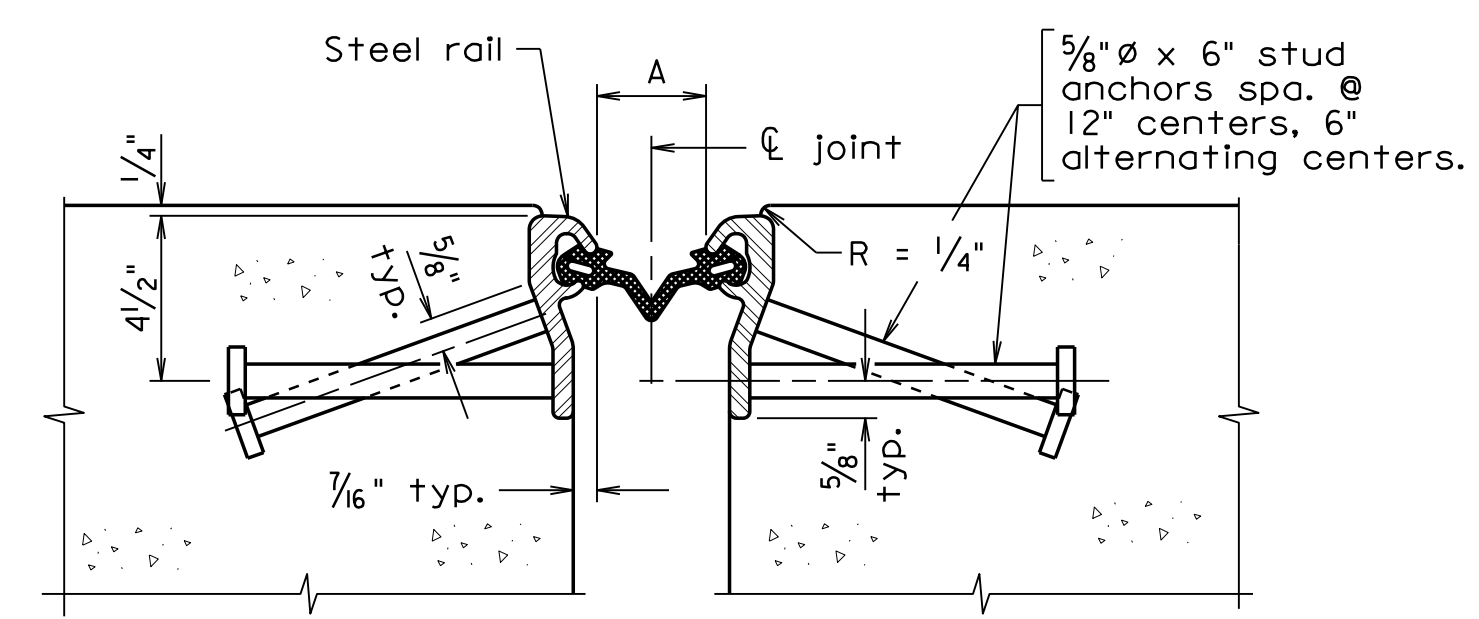
SECTION A-A



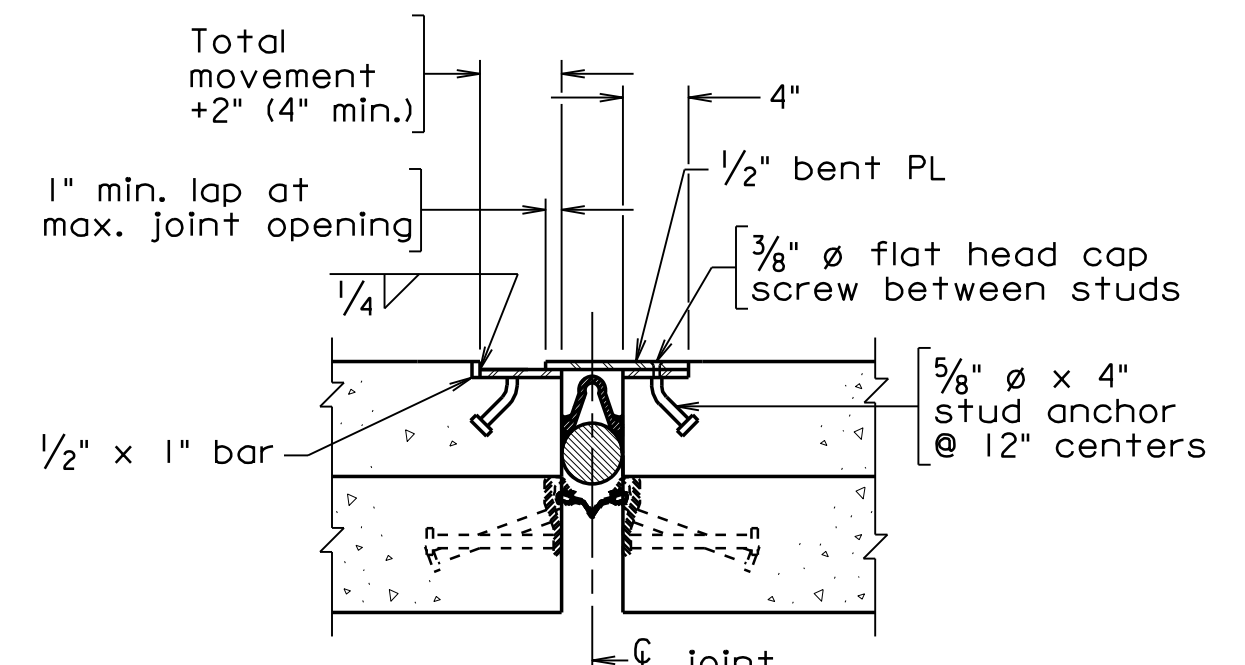
SECTION B-B



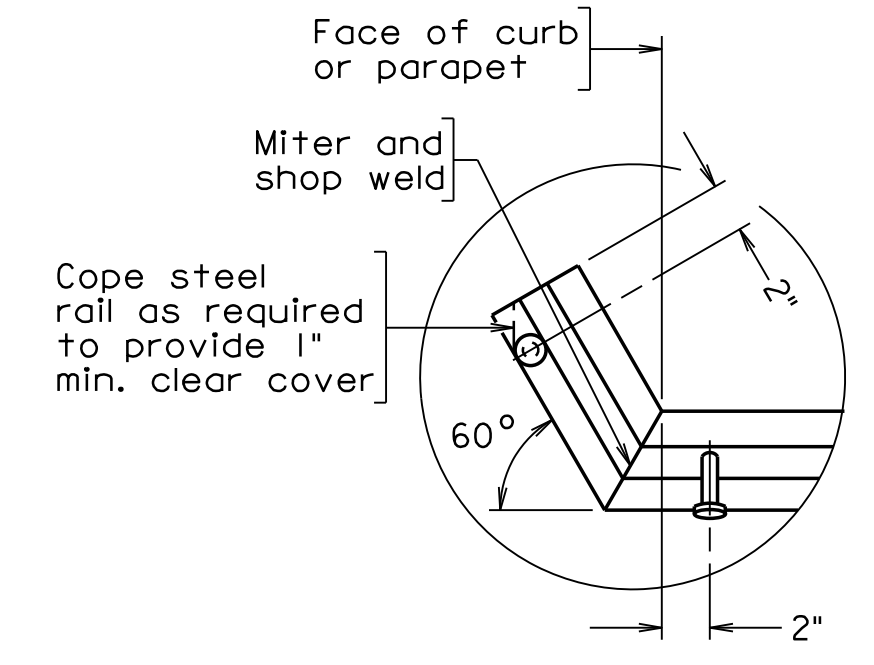
FIELD SPLICE DETAIL



TYPICAL SECTION



SECTION C-C



DETAIL A

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STRUCTURE AND BRIDGE DIVISION					
ELASTOMERIC EXPANSION DAM					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn:CRR.....	Apr. 2022	257-38A
			Checked: .MRD.....		73 of 125
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STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				74

Notes:

Sealer shall be installed in one continuous piece except for sidewalk and barrier areas.

Joint width 'w' is the final joint width of the cured concrete when placed at 60°F. The width 'w' shall be increased or decreased for every 10°F temperature drop or rise respectively by t. When formed, joint width 'w' shall be reduced by the amount Δ to compensate for the opening of the joint caused by the deflection of the beam when the deck concrete is placed. If the joint is formed so that the form material will not move and the joint will not open as the deck concrete is placed, then adjustment Δ shall not be made.

$$\text{Fixed Bearing: } \Delta = \frac{4d \Delta's}{L}$$

$$\text{Expansion Bearing: } \Delta = \frac{d \Delta's}{L}$$

d = Total rotation depth from top of slab to point of rotation on bearing.

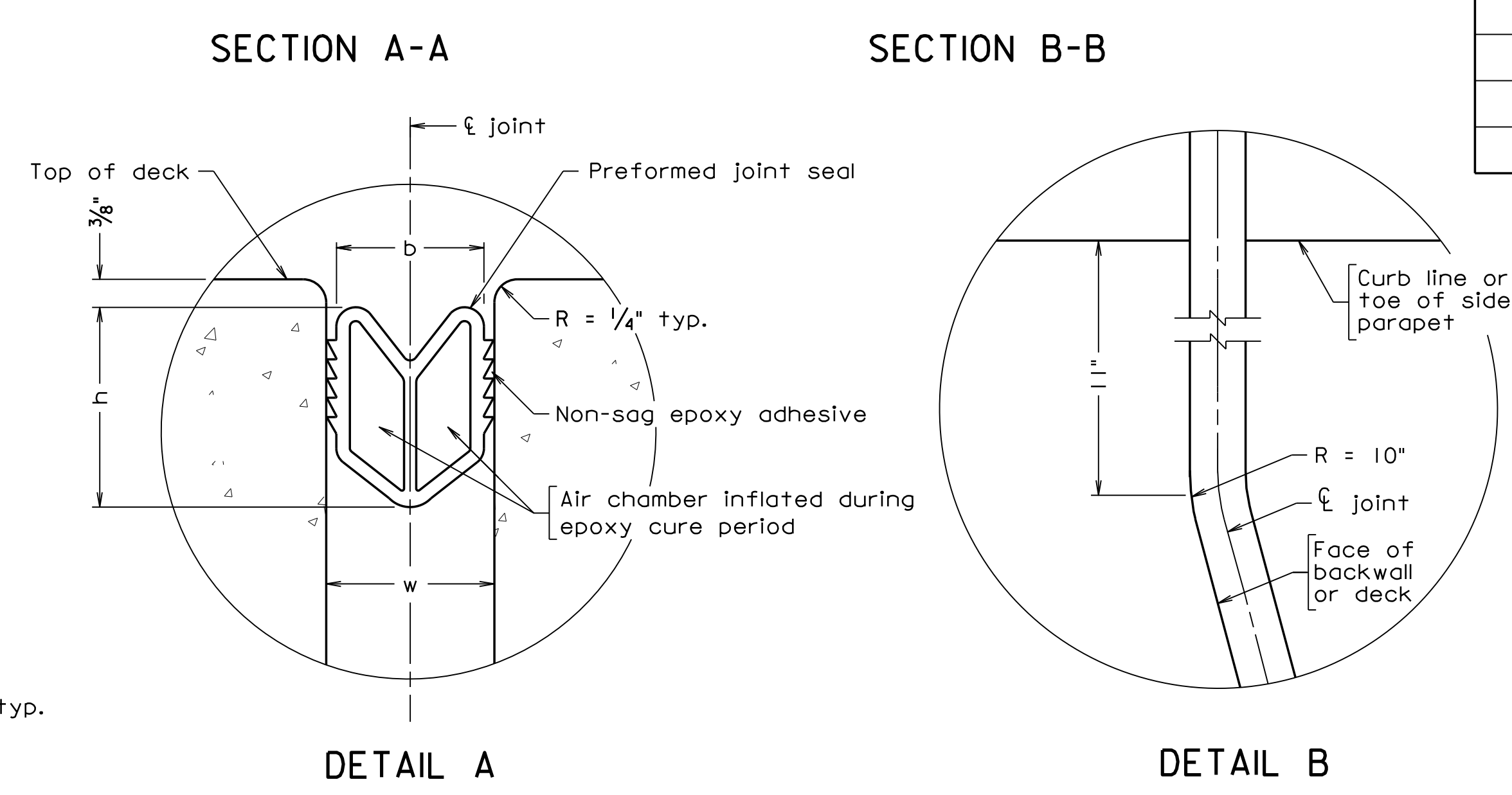
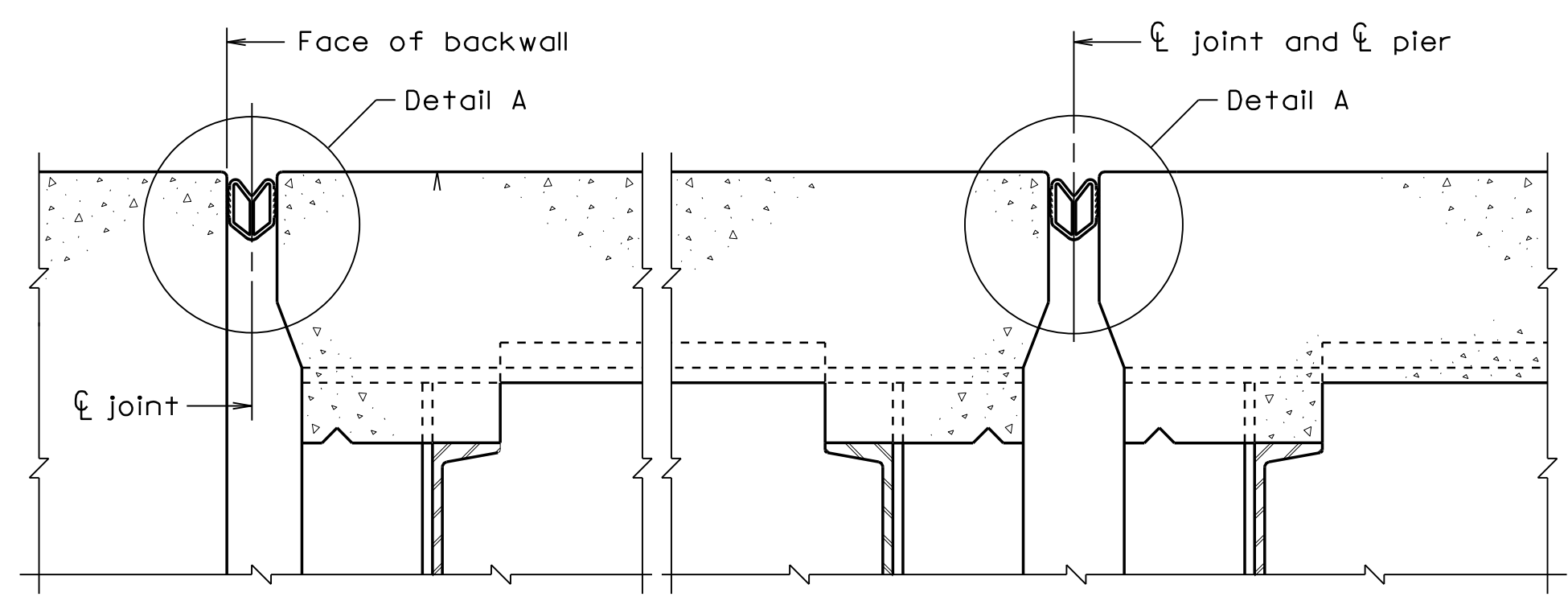
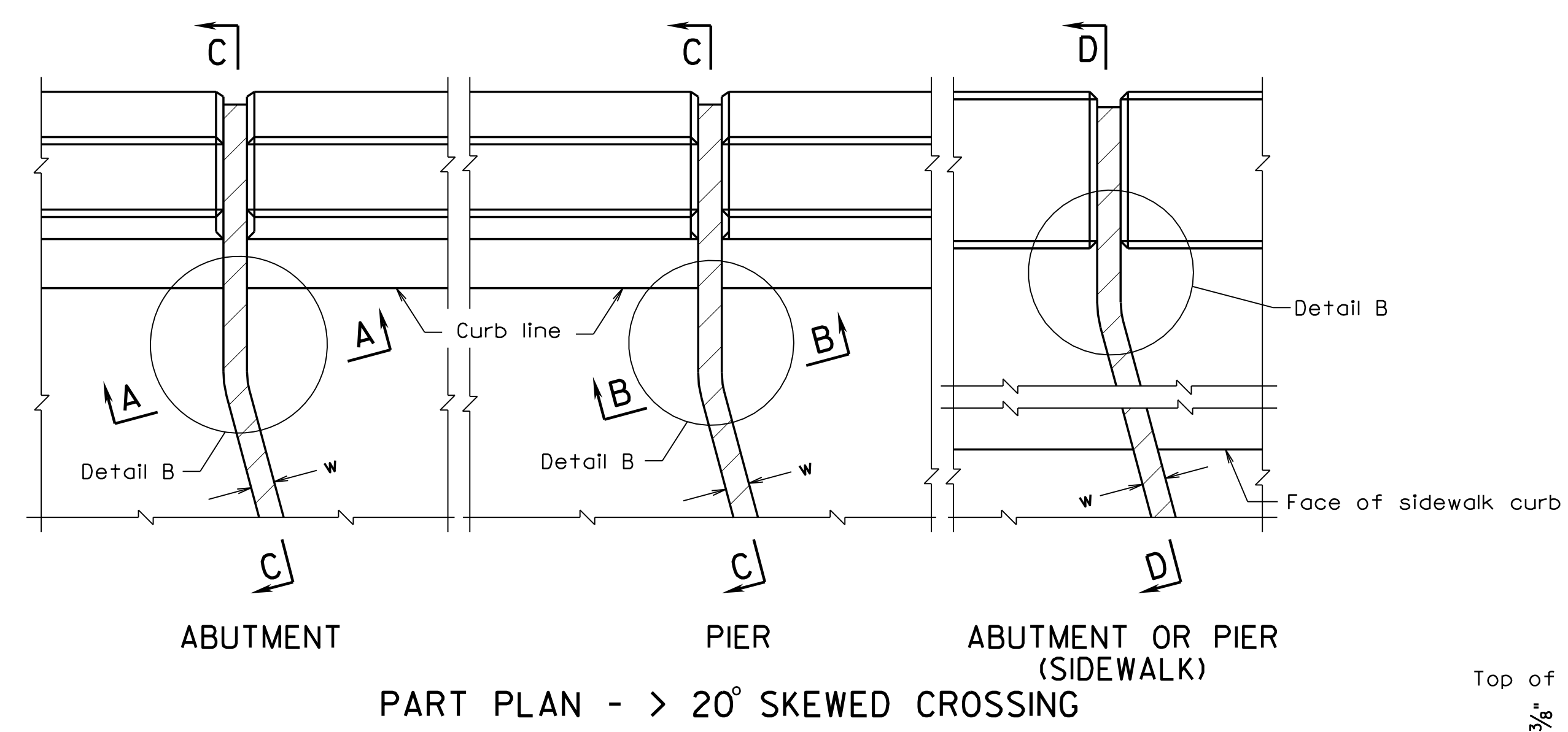
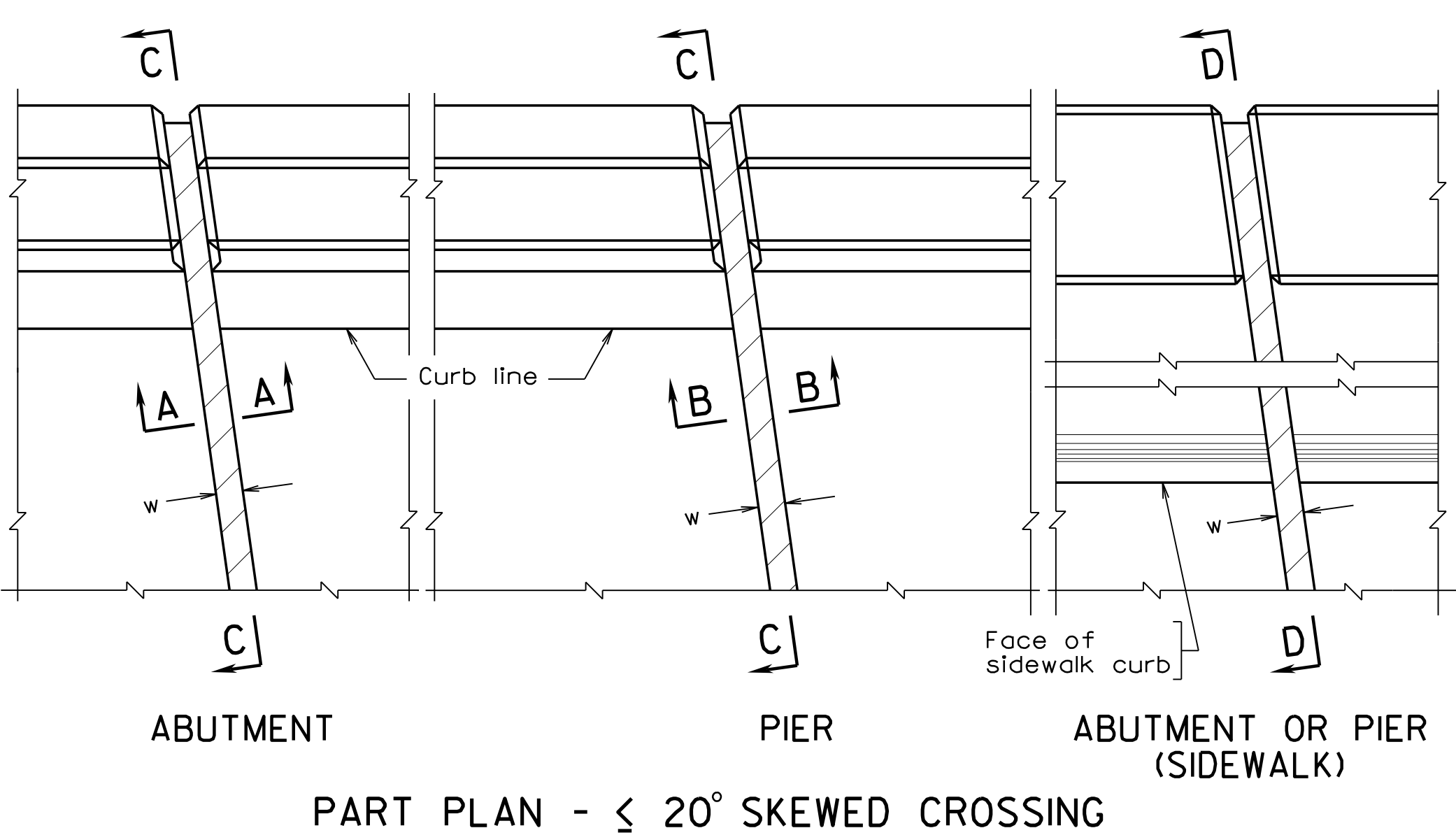
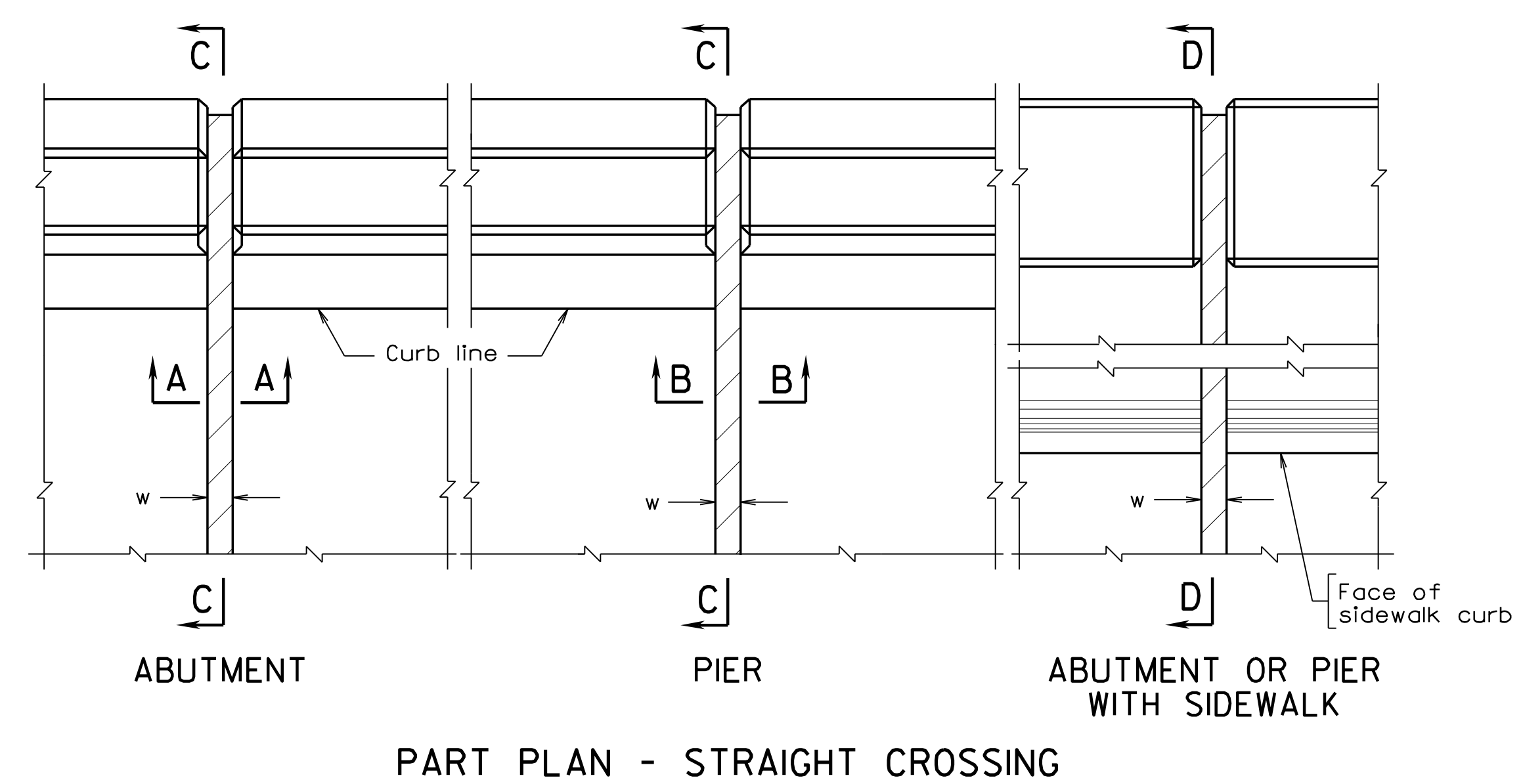
Δ's = Deflection of beam at midspan from dead load of concrete deck slab and bolsters. (See Dead Load Deflection Diagram.)

L = Length of span.

Δ = Compensation for joint opening due to deflection of beam during placement of concrete deck slab and bolsters for the last span placed adjacent to the joint.

All the dimensions are in the same units.

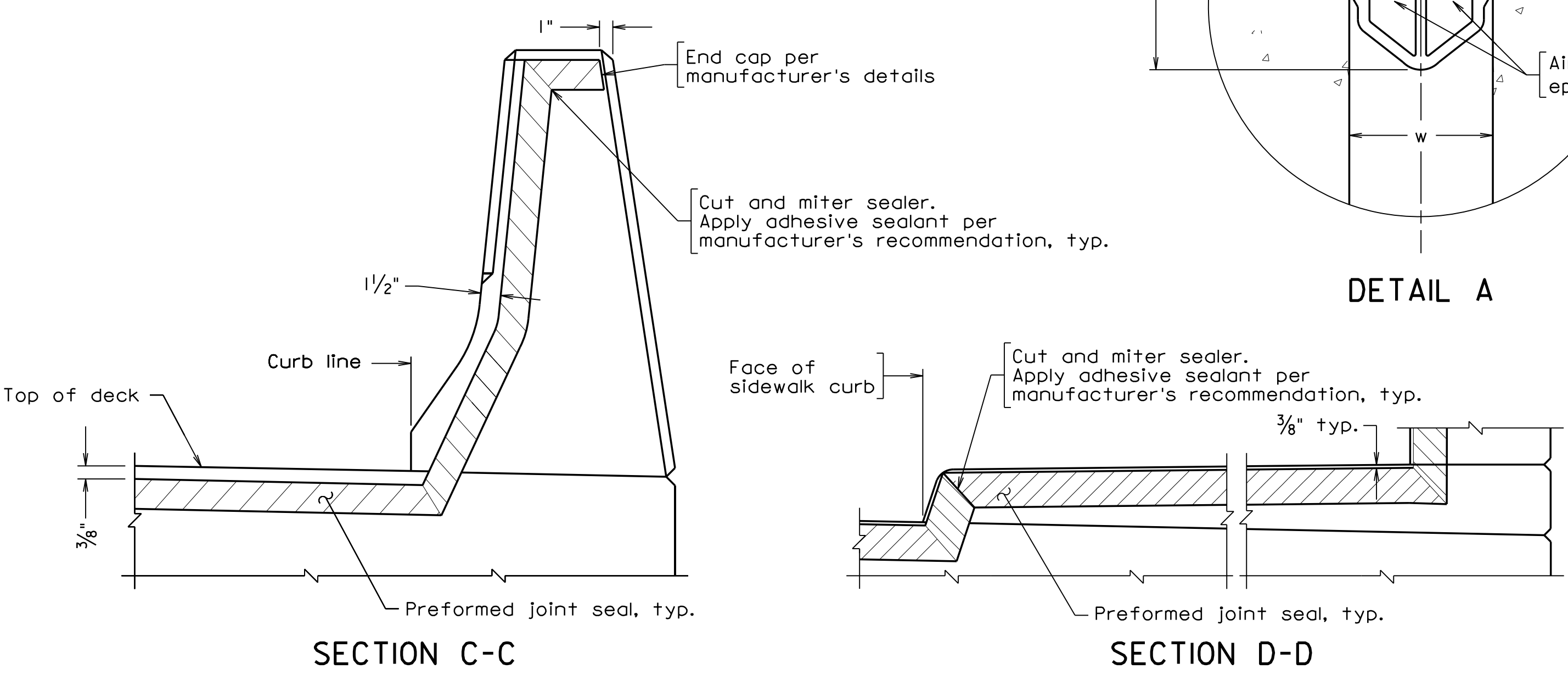
Graphics on this standard for the barrier shown may not match all barriers on bridge. All other details apply.



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Abutment	Pier	Sealer Size b	Sealer Depth h	Joint Width w	t	Skew Angle

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
CLASS I ADHESIVE BASED JOINT SEALER					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		74 of 125
Revisions					

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			75

Notes:

Sealer shall be installed in one continuous piece except for sidewalk and barrier areas.

Joint width 'w' is the final joint width of the cured concrete when placed at 60°F. The width 'w' shall be increased or decreased for every 10°F temperature drop or rise respectively by t. When formed, joint width 'w' shall be reduced by the amount Δ to compensate for the opening of the joint caused by the deflection of the beam when the deck concrete is placed. If the joint is formed so that the form material will not move and the joint will not open as the deck concrete is placed, then adjustment Δ shall not be made.

$$\text{Fixed Bearing: } \Delta = \frac{4d \Delta's}{L}$$

$$\text{Expansion Bearing: } \Delta = \frac{d \Delta's}{L}$$

d = Total rotation depth from top of slab to point of rotation on bearing.

Δ's = Deflection of beam at midspan from dead load of concrete deck slab and bolsters. (See Dead Load Deflection Diagram.)

L = Length of span.

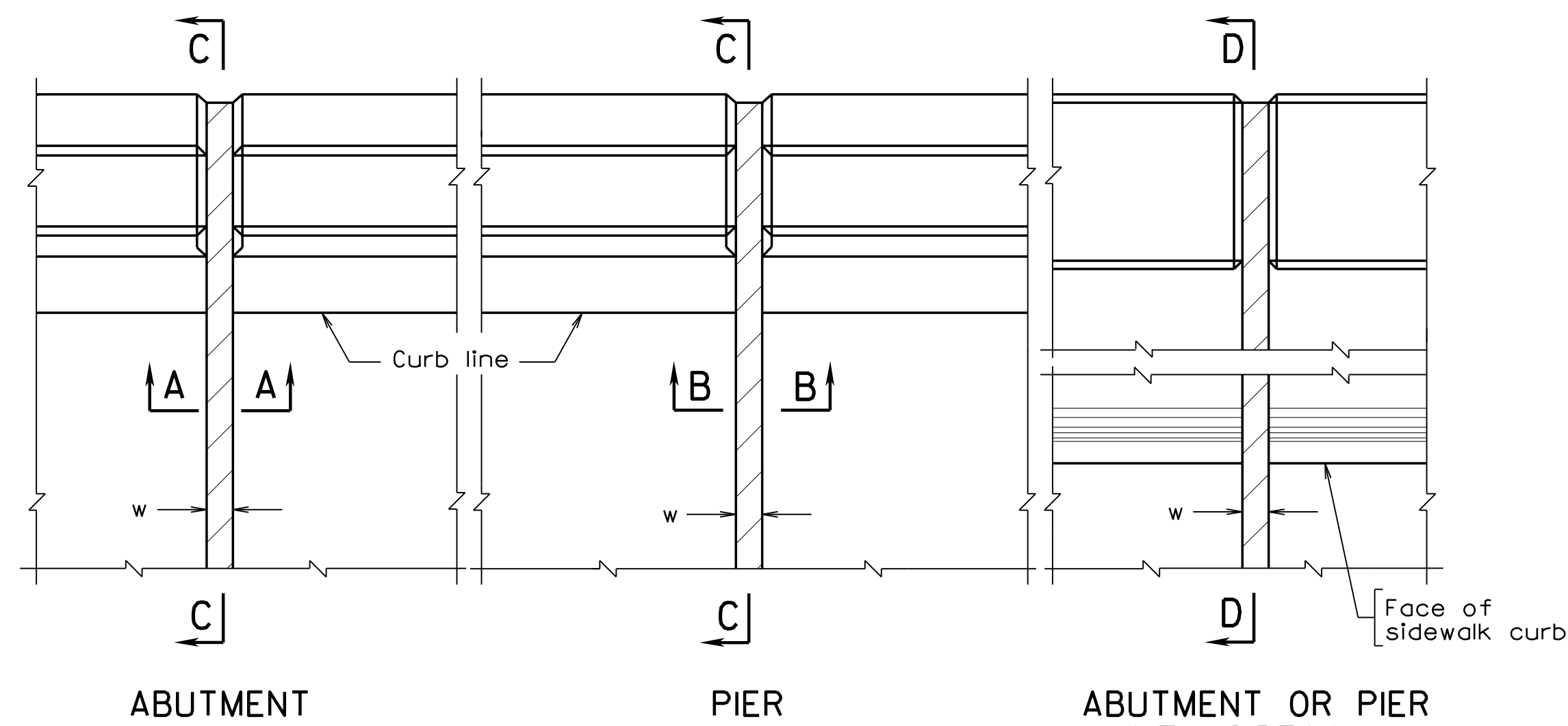
Δ = Compensation for joint opening due to deflection of beam during placement of concrete deck slab and bolsters for the last span placed adjacent to the joint.

All the dimensions are in the same units.

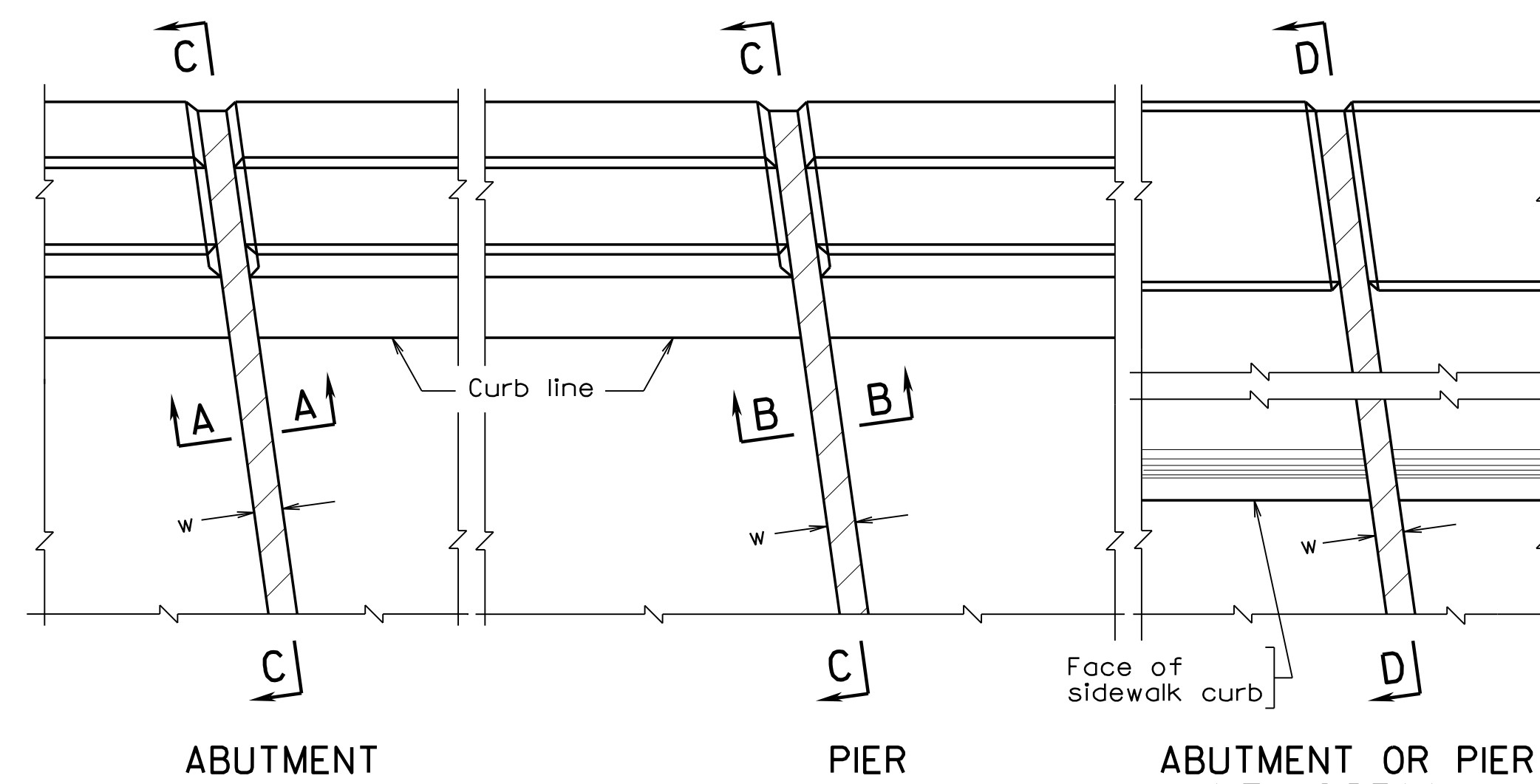
Class II adhesive joint sealer shall be incidental to other items.

Graphics on this standard for the barrier shown may not match all barriers on bridge. All other details apply.

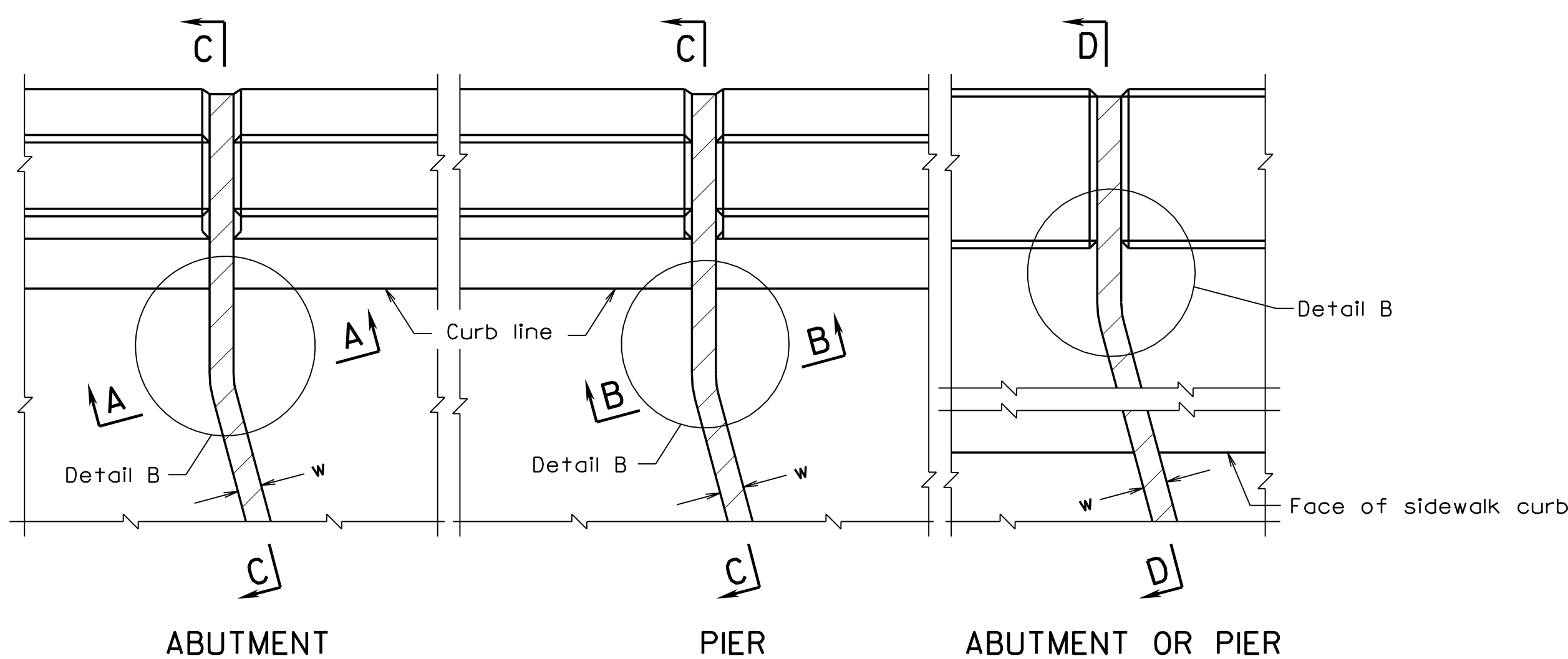
Abutment	Pier	Sealer Size b	Sealer Depth h	Joint Width w	t	Skew Angle



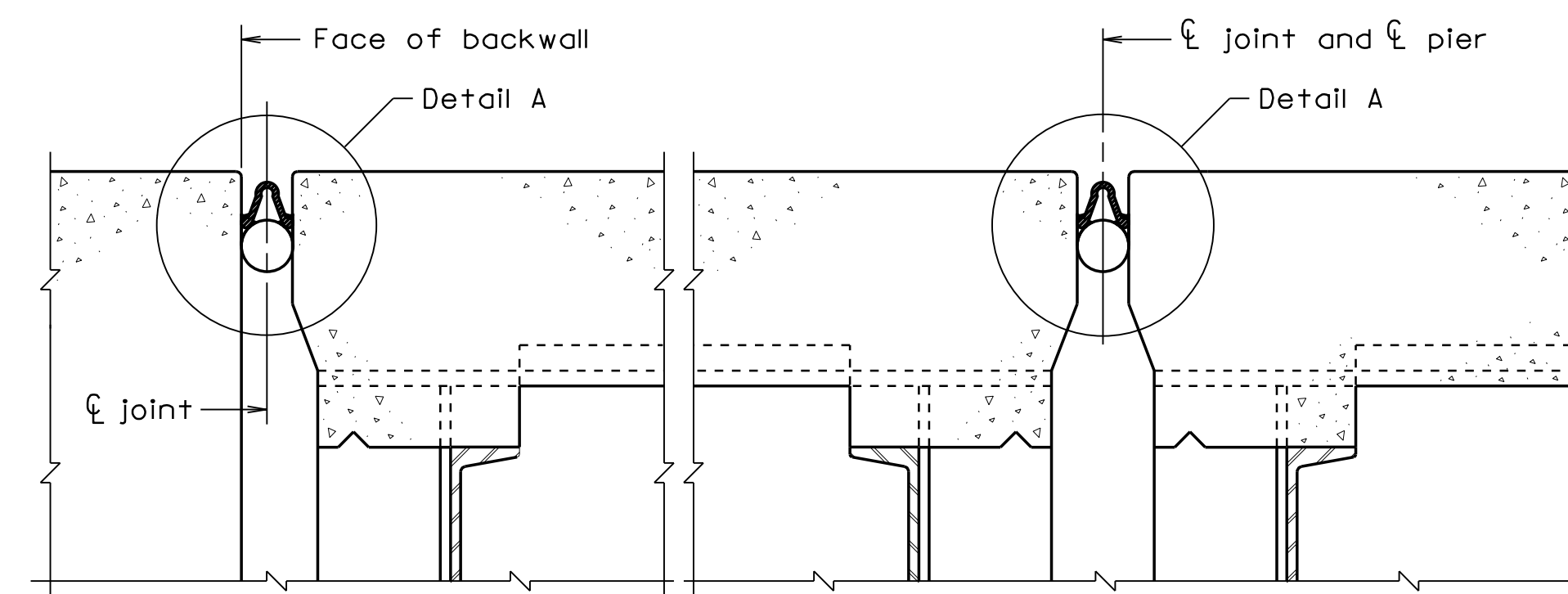
PART PLAN - STRAIGHT CROSSING



PART PLAN - ≤ 20° SKEWED CROSSING

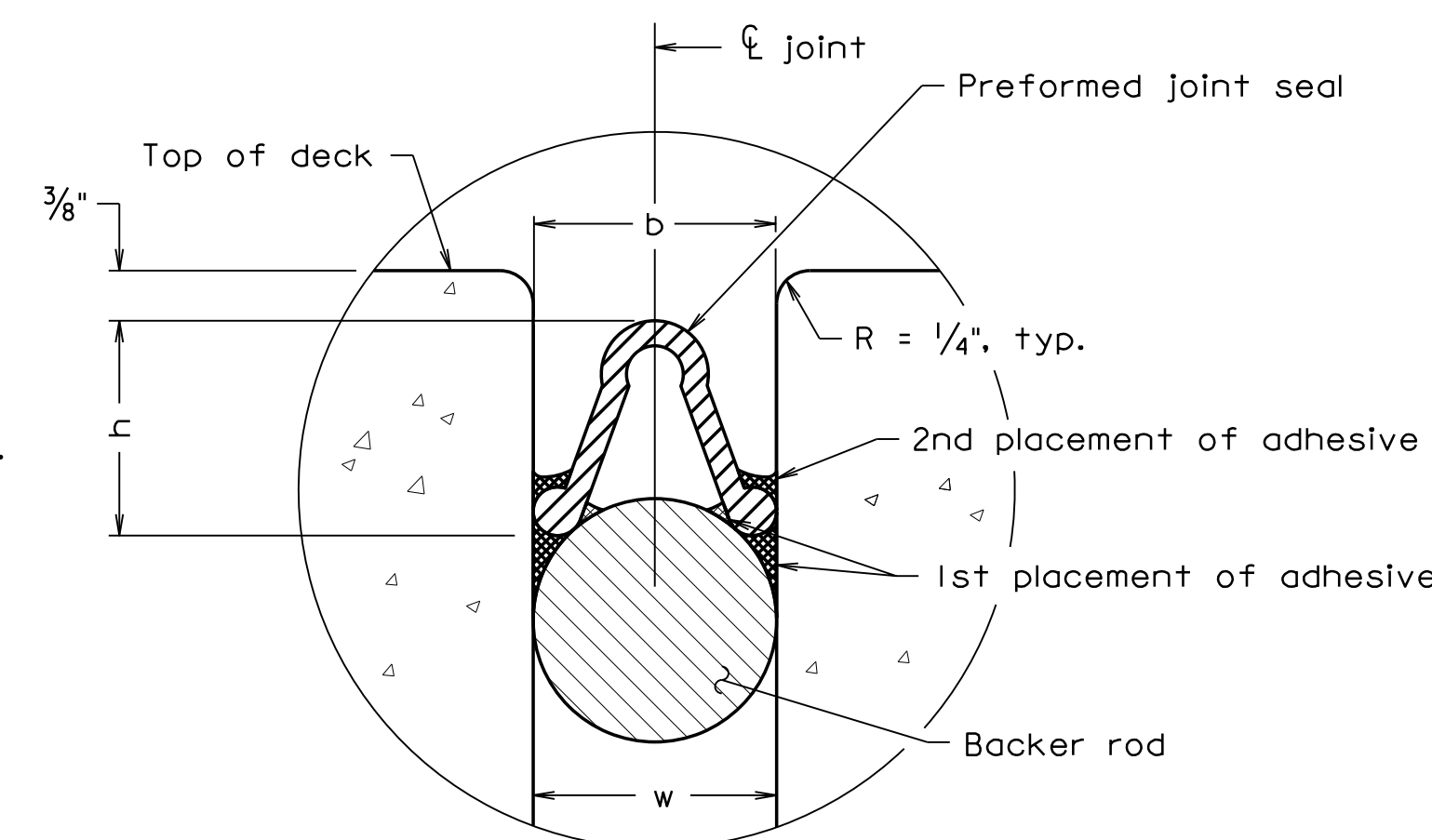


PART PLAN - > 20° SKEWED CROSSING

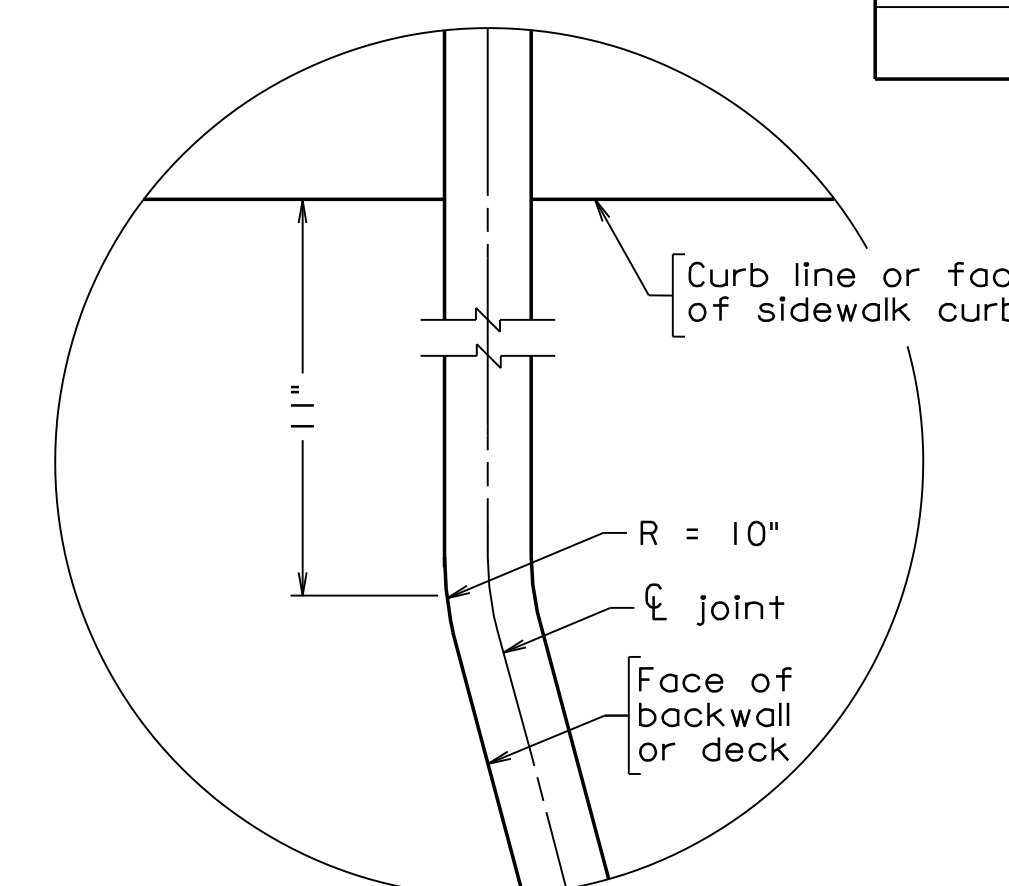


SECTION A-A

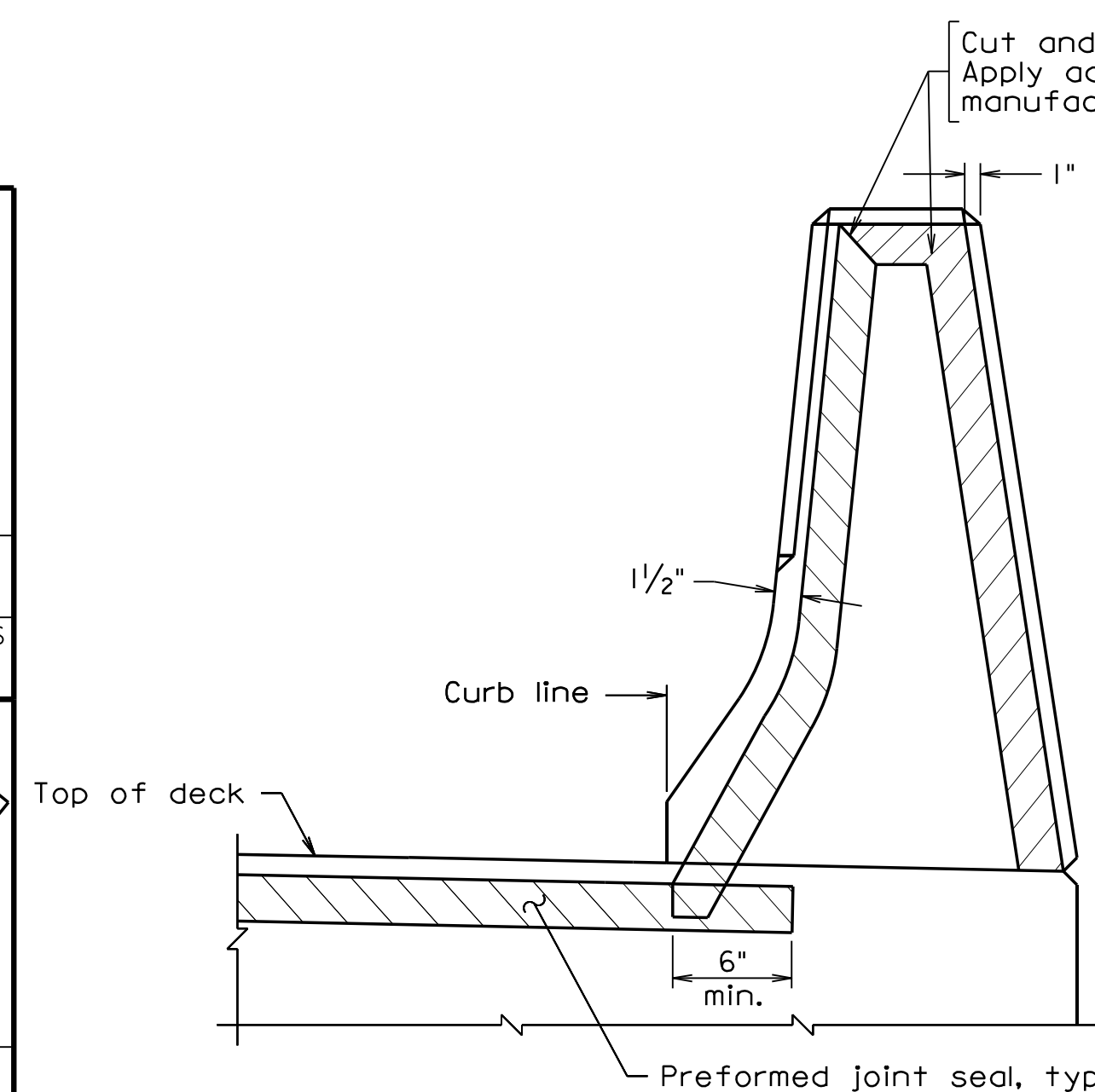
SECTION B-B



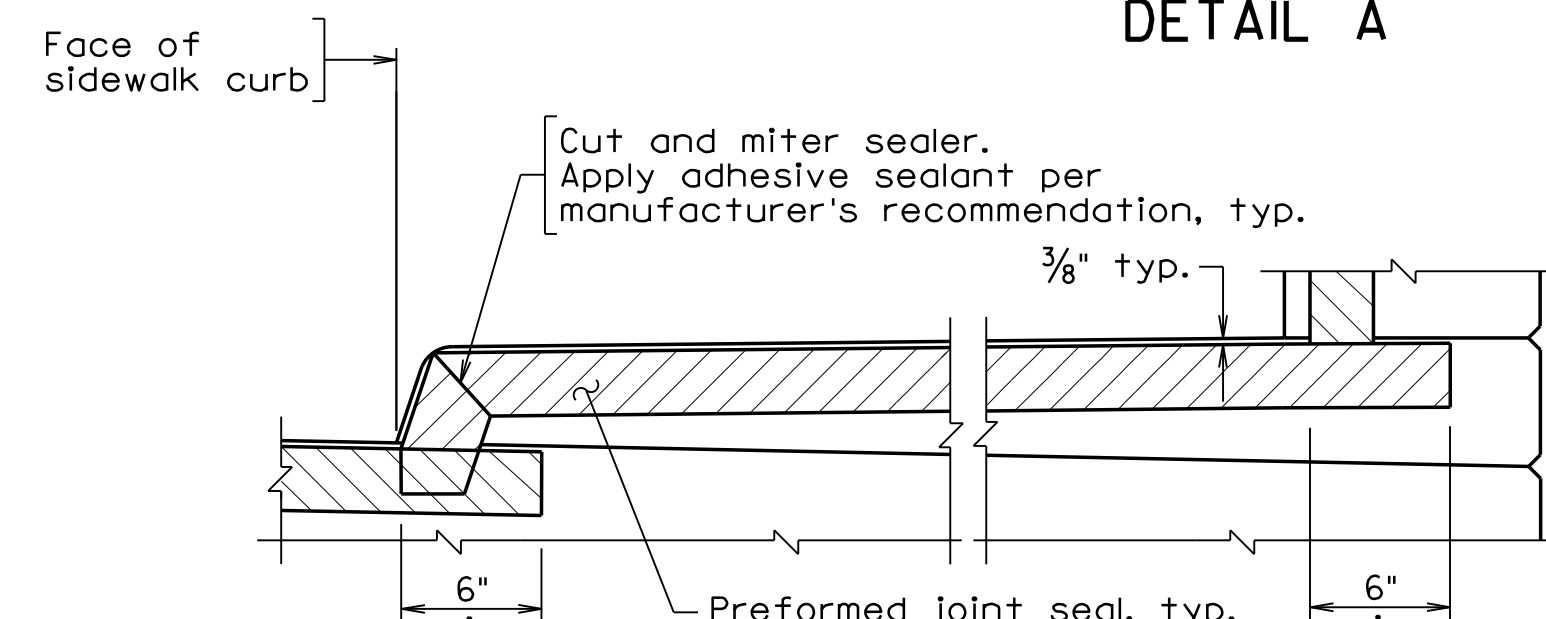
DETAIL A



DETAIL B



SECTION C-C



SECTION D-D

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CLASS II ADHESIVE BASED JOINT SEALER					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		75 of 125
Revisions					

PROGRESS PRINT 4/1/2022

257-38A_075.dgn

05-03-2018

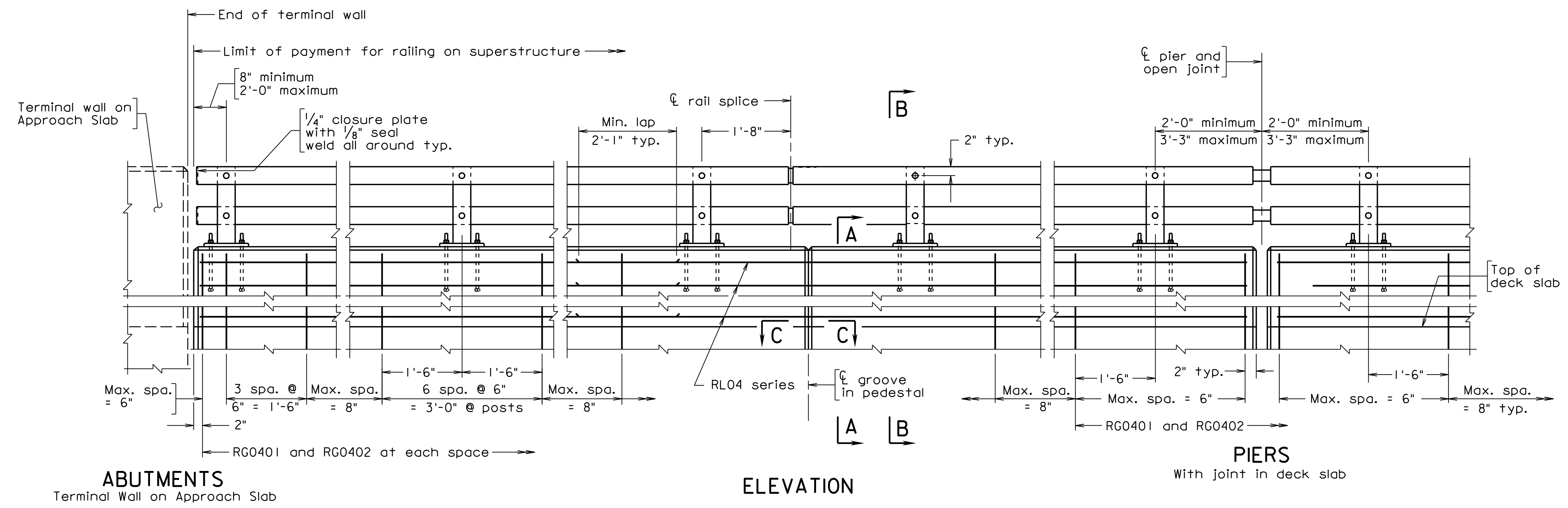
BDEJ-2

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RICHMOND, VA
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VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT	NO.
VA.		95	0095-076-299, B688	77



ABUTMENTS
Terminal Wall on Approach Slab

ELEVATION

PIERS
With joint in deck slab

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Low Shrinkage Class A4 Modified (Lightweight).

All bevels for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.

For details and reinforcing steel schedule of terminal wall, see sheet 79.

Posts and rail members shall be ASTM A500 Grade B steel. Plates shall be ASTM A36 steel. Steel pipe sleeves shall be ASTM A53.

Bolts for attaching rails to post are 3/4" diameter round head (with slot in head), ASTM A449. All other bolts shall be ASTM F3125 Grade A325 unless otherwise indicated in the details. Nuts shall be ASTM A563 Grade DH or ASTM A194 Grade 2H. Washers shall be ASTM F436.

For bolts attaching rails to posts, bolt extensions beyond nut shall be limited to the smaller of one and a half finishing turns or 1/4". If the extension is longer, excess shall be cut off and the edges of the bolt end ground so that no sharp edges remain. Cold galvanizing shall be applied to damaged galvanized areas.

All bolts shall be snug tightened.

All steel shall be hot dip galvanized.

Posts shall be equally spaced within a span. Maximum spacing is 6'-8".

Posts shall be seated on neoprene pads 1/8" minimum thickness, having a nominal durometer hardness of 60. Pads shall conform to post base dimensions.

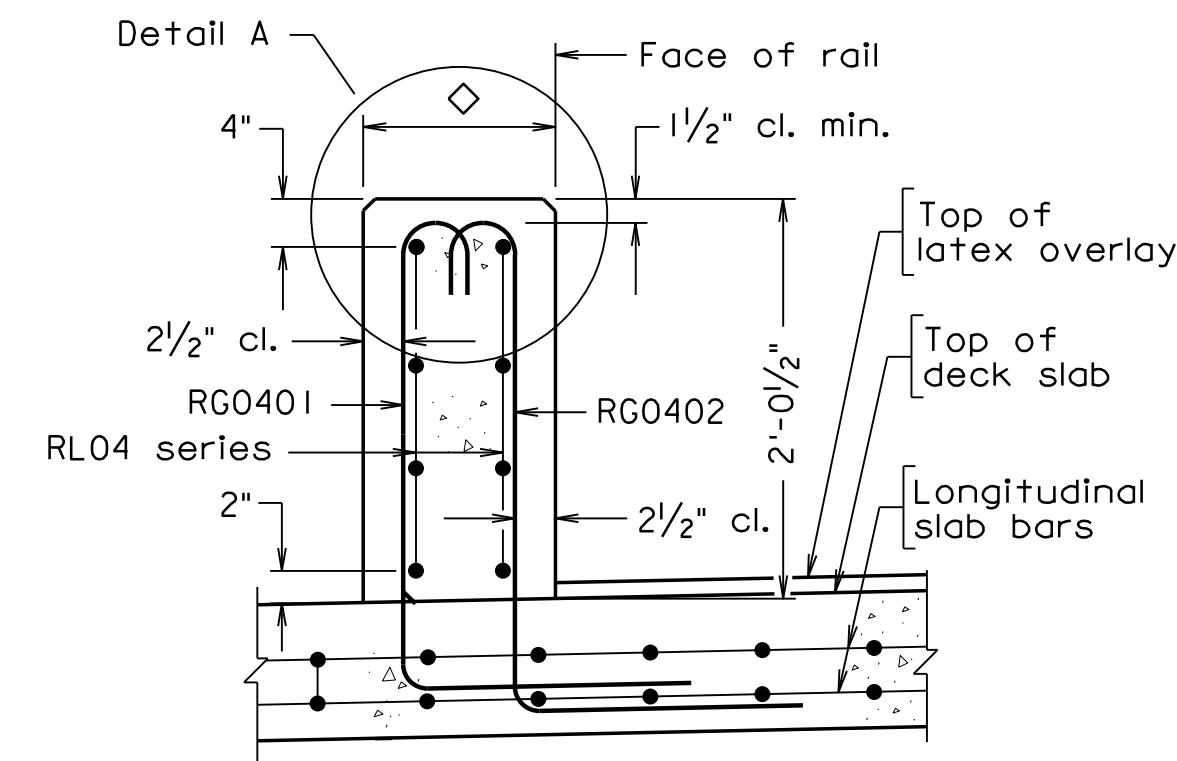
Posts shall be vertical in transverse direction and normal to longitudinal profile grade. Cut bottom of posts to meet these configurations.

Rails to be continuous over a minimum of 3 posts before splicing.

Bid price for architectural treatment includes concrete in relief and coping.

For additional notes, see sheet 78.

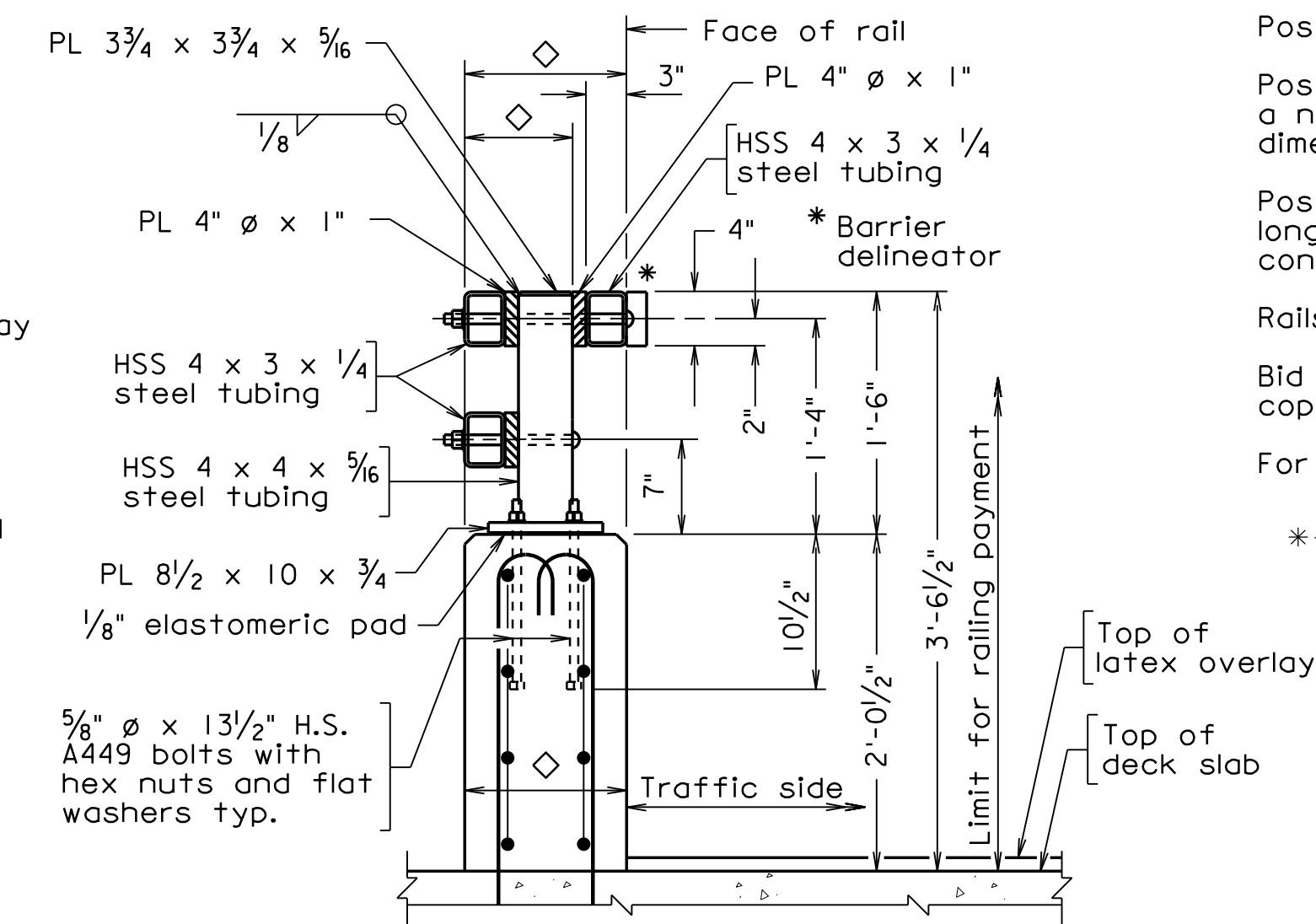
** The cover tolerance referenced in the VDOT Road and Bridge Specifications as -0" to +1/2" is shifted to -1/4" to +1/4" for placement of the RG04 series bars.



SECTION A-A

Scale: 1" = 1'-0"

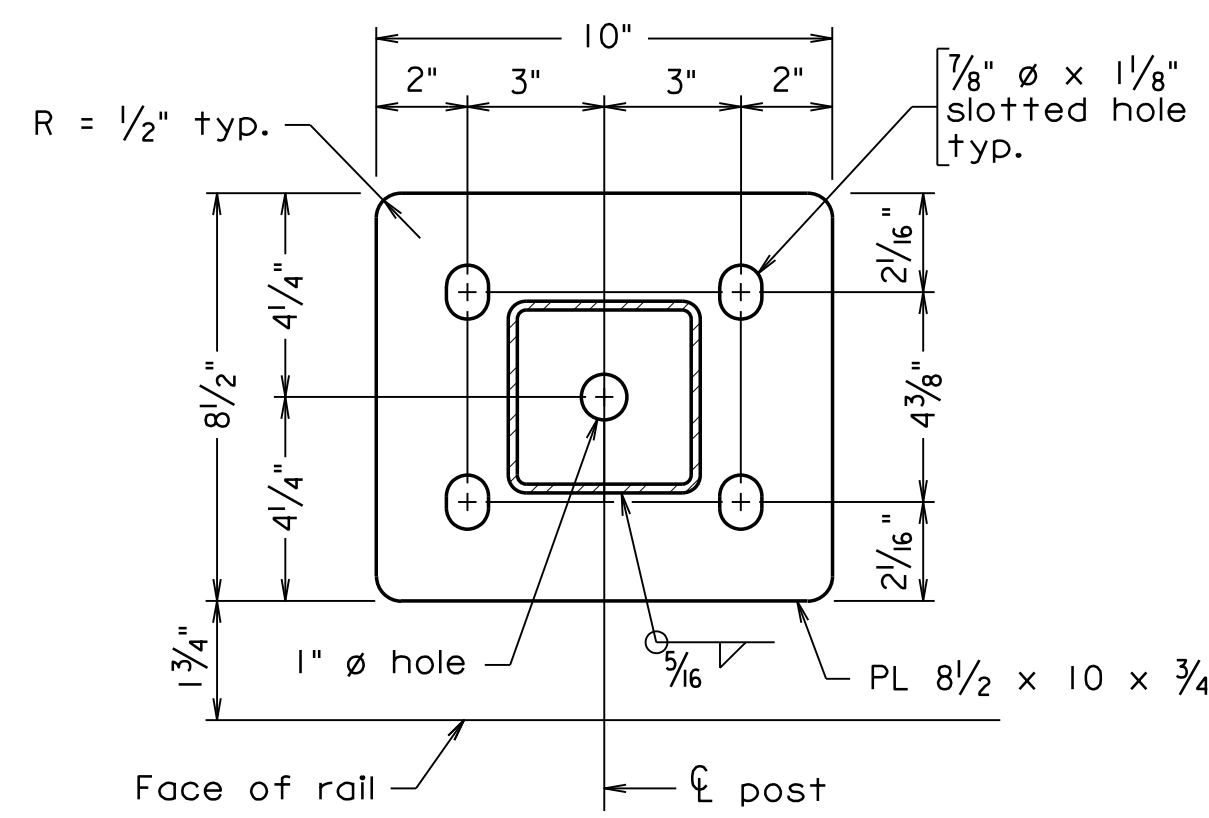
Transverse rebar in deck or approach slab not shown for clarity



SECTION B-B

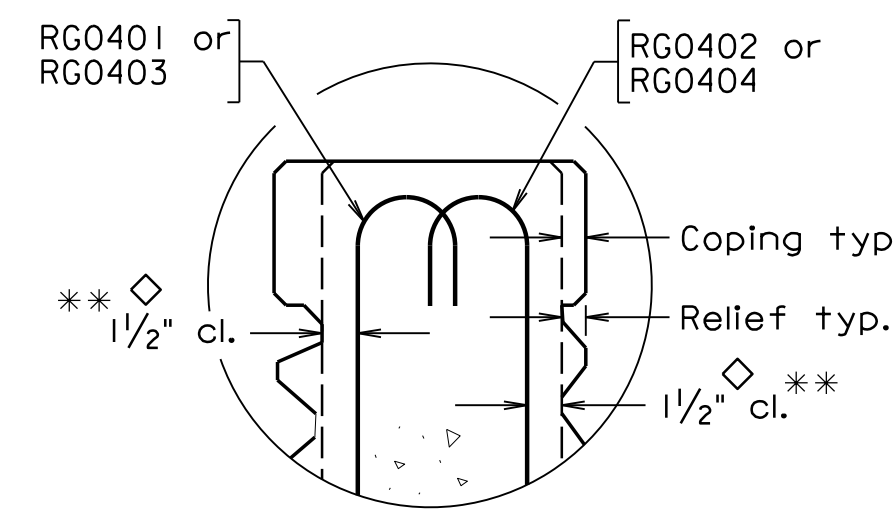
Scale: 1" = 1'-0"

Bolts through base plate shall be contained inside rebar cage



BASE PLATE DETAIL

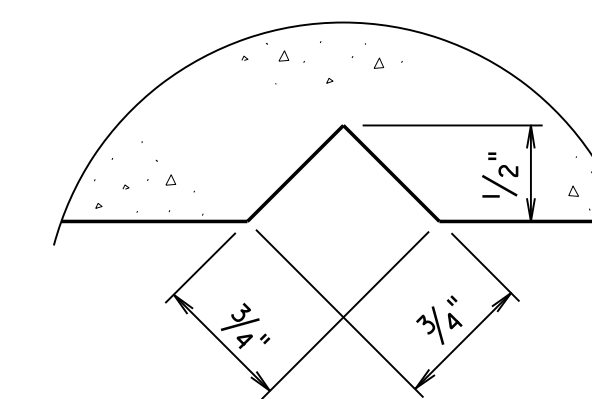
Not to scale



DETAIL A

Shown with architectural treatment on both sides

◇ For dimensions and architectural treatment details, see sheet 80. For minimum cover, see Detail A.



SECTION C-C

Full scale

Groove detail for both sides of rail

REINFORCING STEEL SCHEDULE					
RG0401	RG0402				
Mark	Size	No.	Length	Pin ϕ	Location
RG0401	#4		4'-6 1/2"	3"	Parapet
RG0402	#4		4'-7 3/8"	3"	Parapet
RL04	#4				Parapet

Dimensions in bending diagram are out-to-out of bars.

PROGRESS DRAWING FOR
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CPSPR-2-AT MOD. 10-31-2019 257-38A_0177.dgn

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PAC PLANS
PROGRESS PRINT 4/1/2022
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Scale: 3/4" = 1'-0" unless otherwise noted.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
42"-CPSPR RAILING WITH ARCHITECTURAL TREATMENT (CPSPR-2-AT)					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn:CRR.....	Apr. 2022	257-38A
			Checked: .MRD.....		77 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				78

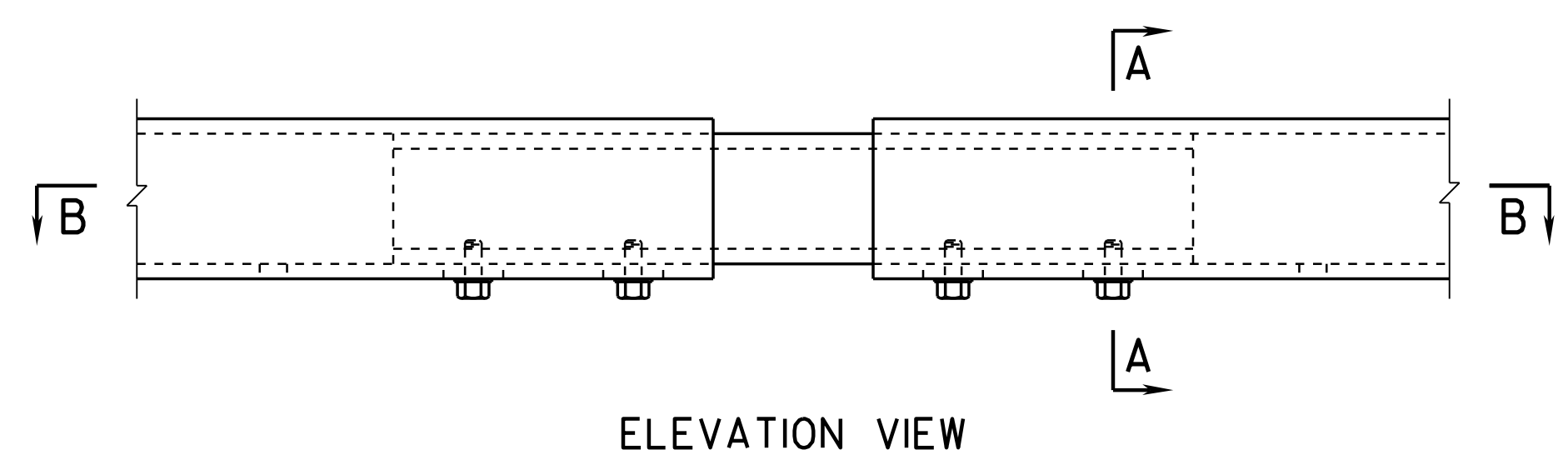
Notes (cont'd):

Drain holes shall be 1/2" diameter and shall be provided in all rails approximately half-way between posts except at open joints near pier(s). Drain holes shall be provided at each end of rail.

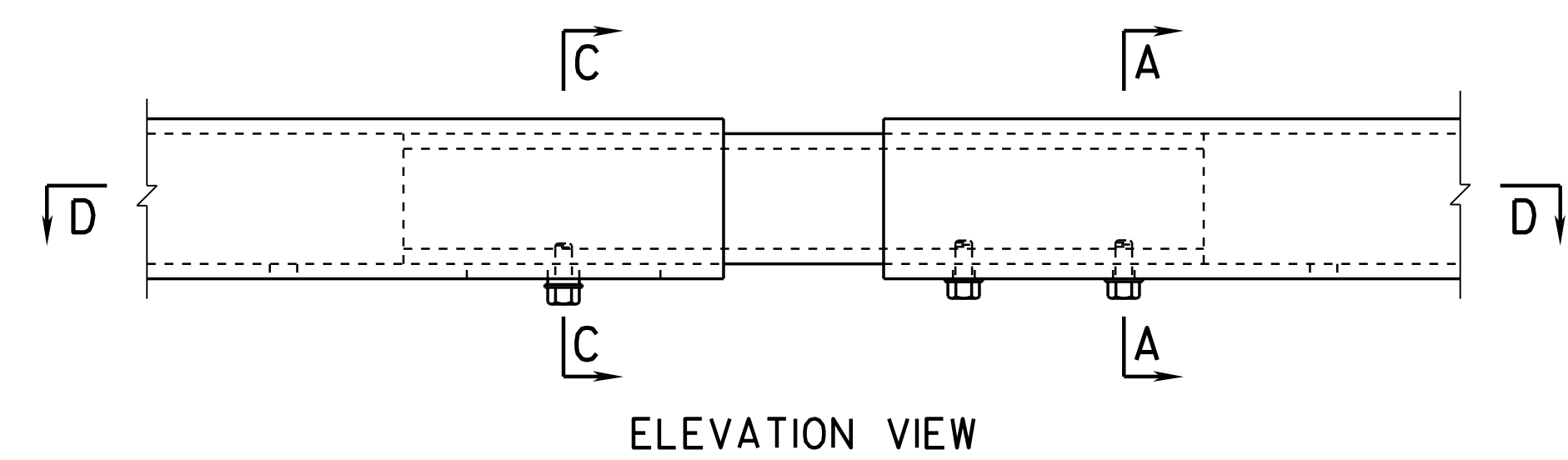
Barrier delineator size, color, and spacing shall be in accordance with the Specifications.

Maximum spacing of grooves in pedestal shall be limited to 3 x post spacing, shall be centered between posts and shall be no closer than 10'-0" to ends of pedestal. Where deck slab is continuous over a pier, a groove in pedestal shall be provided at the pier.

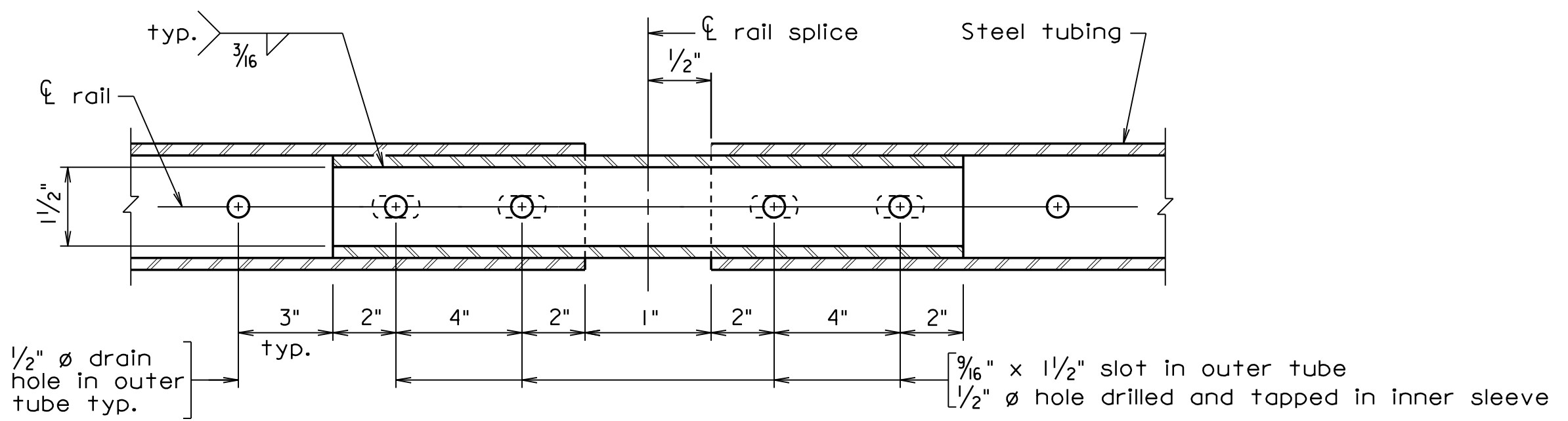
Alternate details for inner sleeve rail fabrication and bolted connection to outer tube may be submitted, but only used if approved by the Structure and Bridge Division Engineering Services Program Area. No thru-bolt connections will be approved.



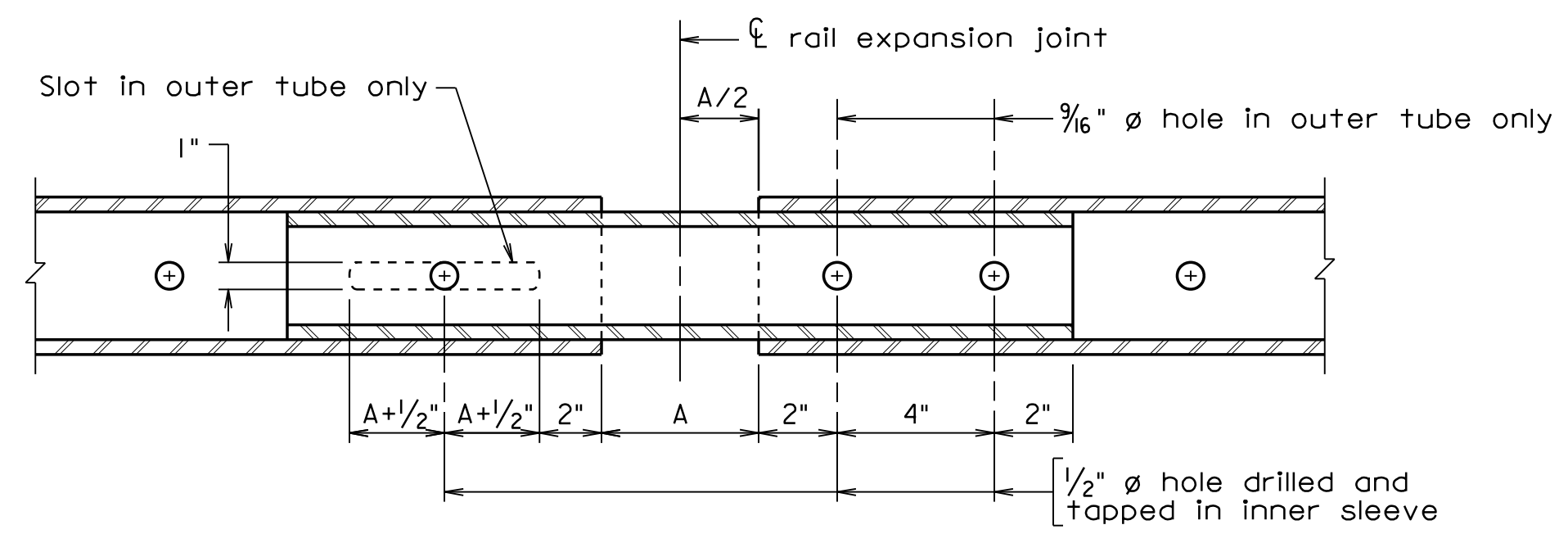
ELEVATION VIEW



ELEVATION VIEW

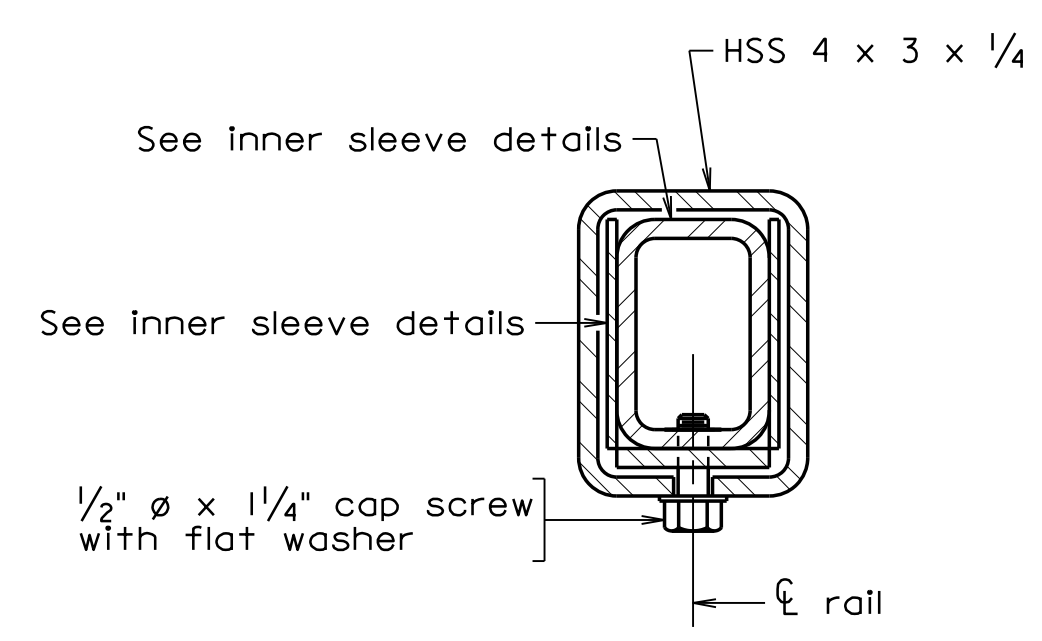


SECTION B-B



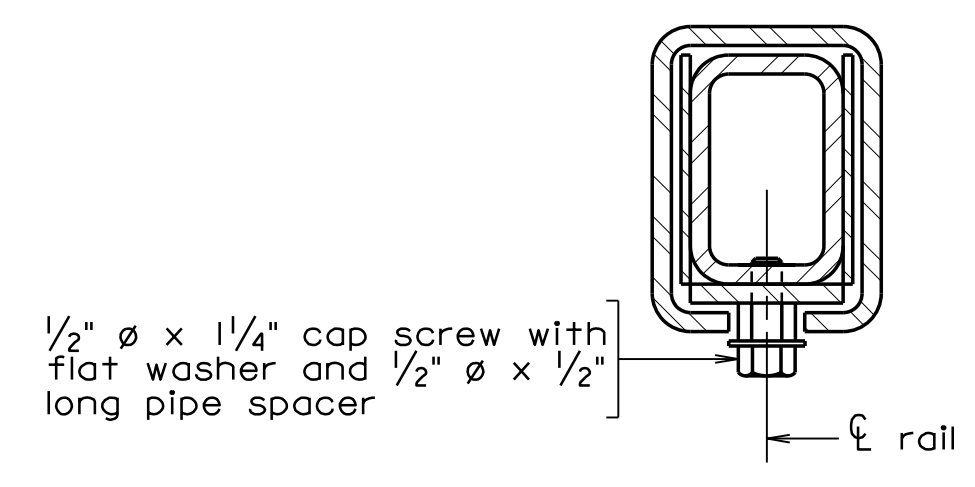
SECTION D-D

For details and dimensions not shown, see Section B-B.



SECTION A-A
SECTION AT RAIL SPLICE

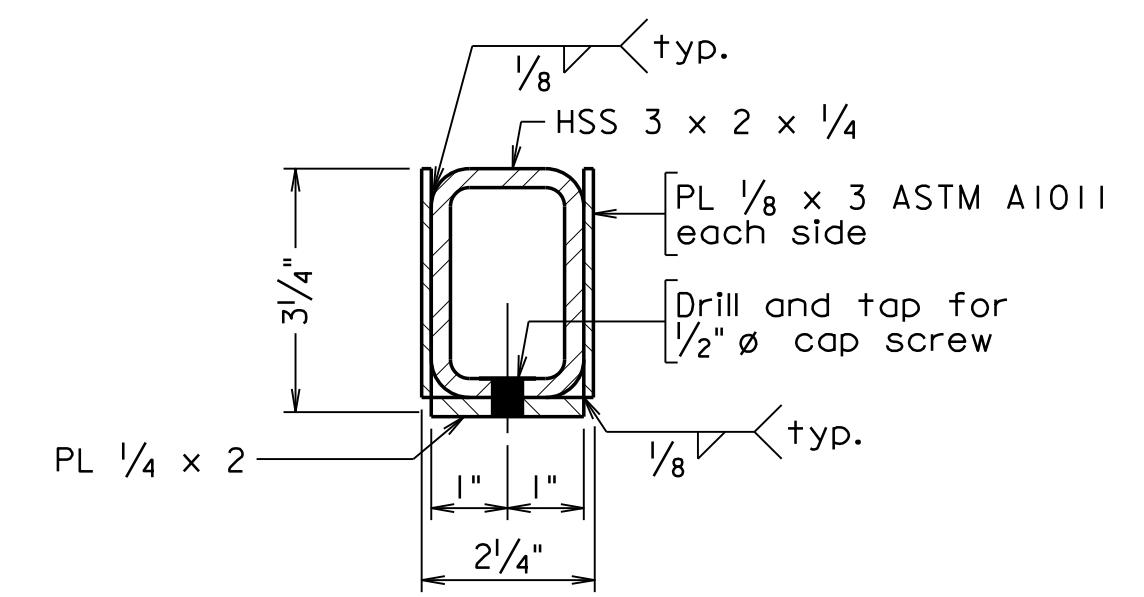
RAIL SPLICE DETAILS



SECTION C-C

Details not shown similar to Section A-A.

RAIL EXPANSION JOINT DETAILS



INNER SLEEVE DETAILS

257-38A_078.dgn

04-30-2021

CPSR-3

WHITMAN REGARDOT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Junyi Meng
Lic. No. 02072
On the date of
April 2022

A copy of the original signed drawing is being filed in the Office.

VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

PAC PLANS
PROGRESS PRINT 4/1/2022
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Not to scale

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION				
STRUCTURE AND BRIDGE DIVISION				
CPSR RAIL CONNECTIONS AND NOTES (CPSR-3)				
No.	Description	Date	Designed: CRR	Date
			Drawn: CRR	Plan No.
			Checked: MRD	Sheet No.
Revisions			Apr. 2022	257-38A
				78 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE 95	0095-076-299, B688

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Low Shrinkage Class A4 Modified.

All bevels for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.

For details and reinforcing steel schedule of railing, see sheet 77.

Each terminal wall shall be cast as one piece.

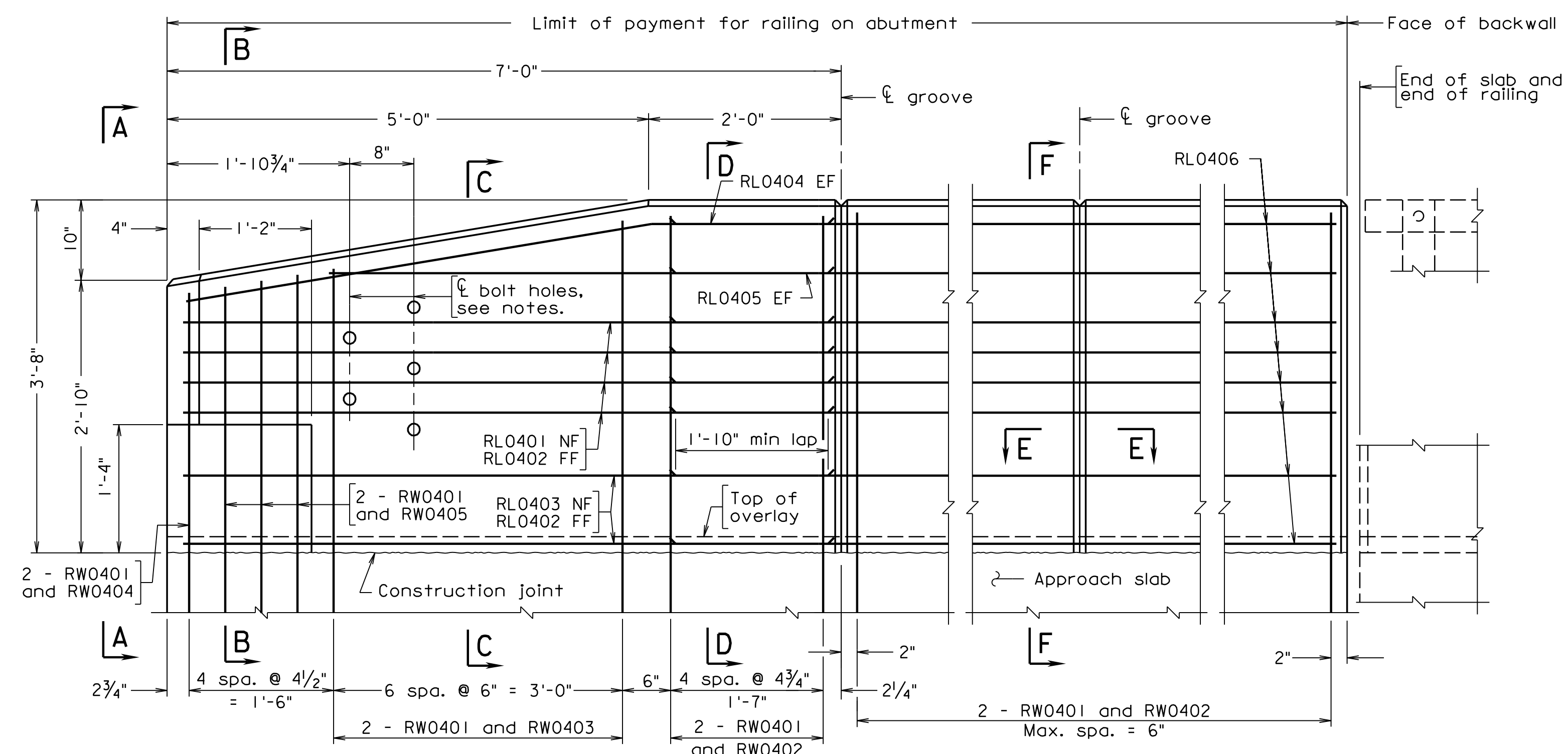
Terminal walls are detailed to take guardrail attachment for MGS.

For details of wingwall below construction joint, see abutment details.

Holes, where shown, shall be formed with sleeves of 1/4" diameter nominal pipe.

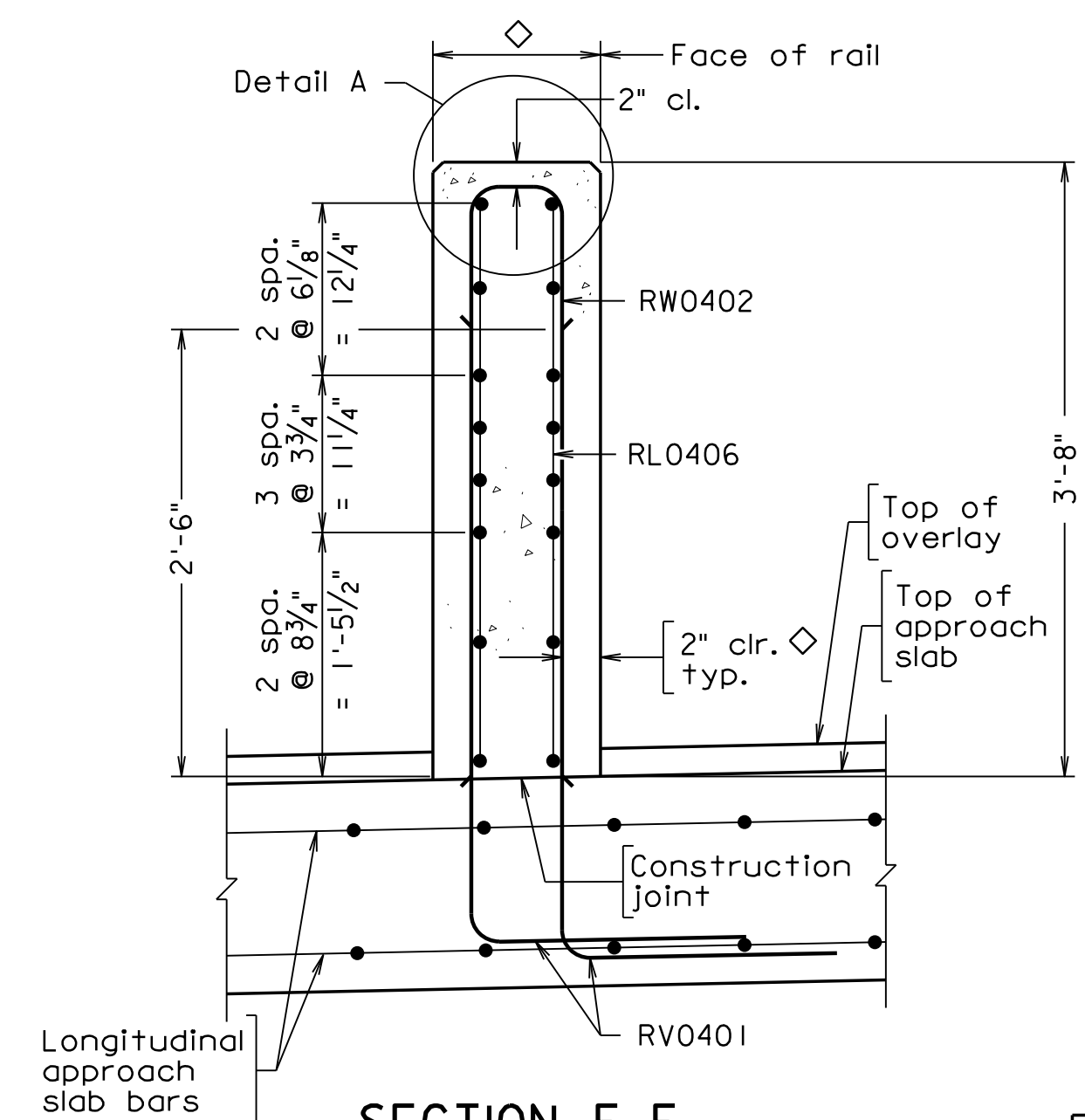
Spacing of grooves for U-back wings shall be approximately 8'-0".

Bid price for architectural treatment includes concrete in relief and coping.



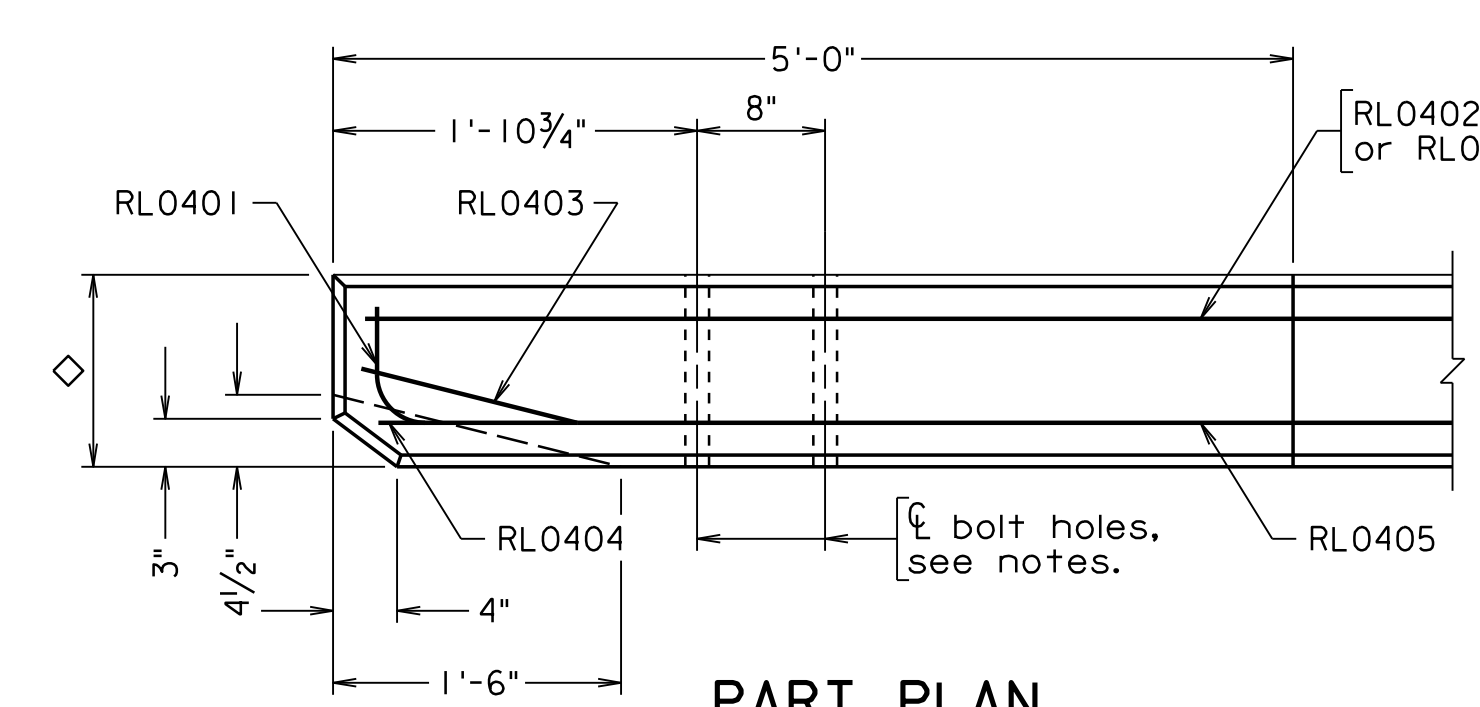
TERMINAL WALL ELEVATION

APPROACH SLAB ELEVATION

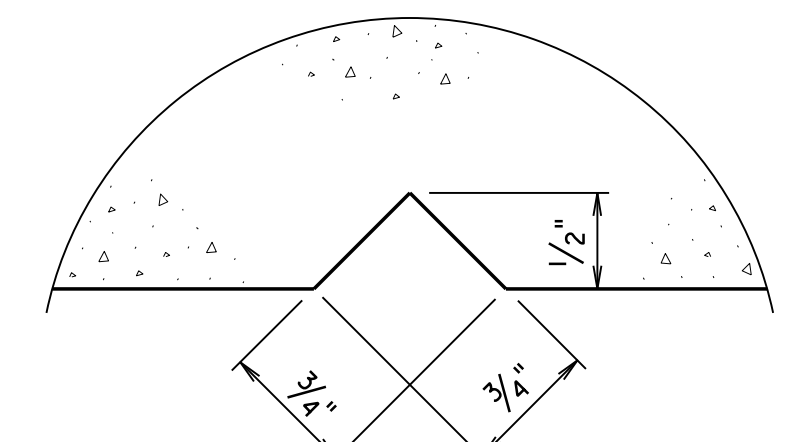


SECTION F-F
AW series bars may / may not be aligned or positioned with RW bars as shown

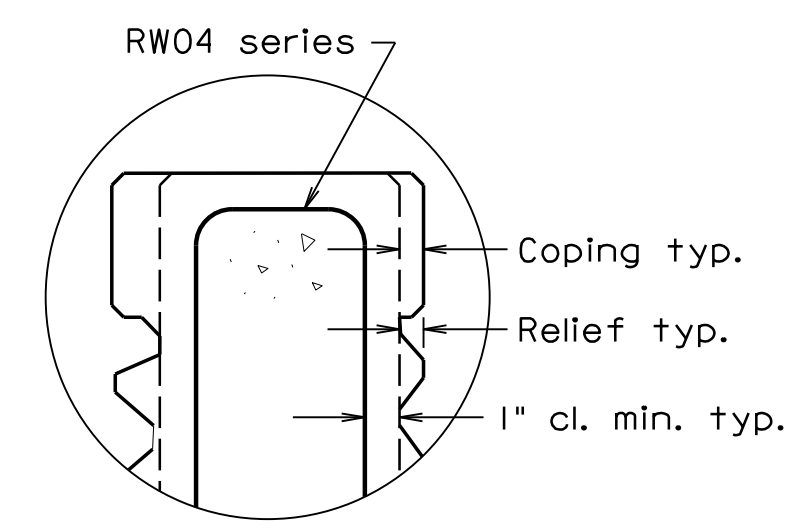
For dimensions and architectural treatment details, see sheet 80. For minimum cover, see Detail A.



PART PLAN



SECTION E-E
Full scale
Groove detail for both sides of rail

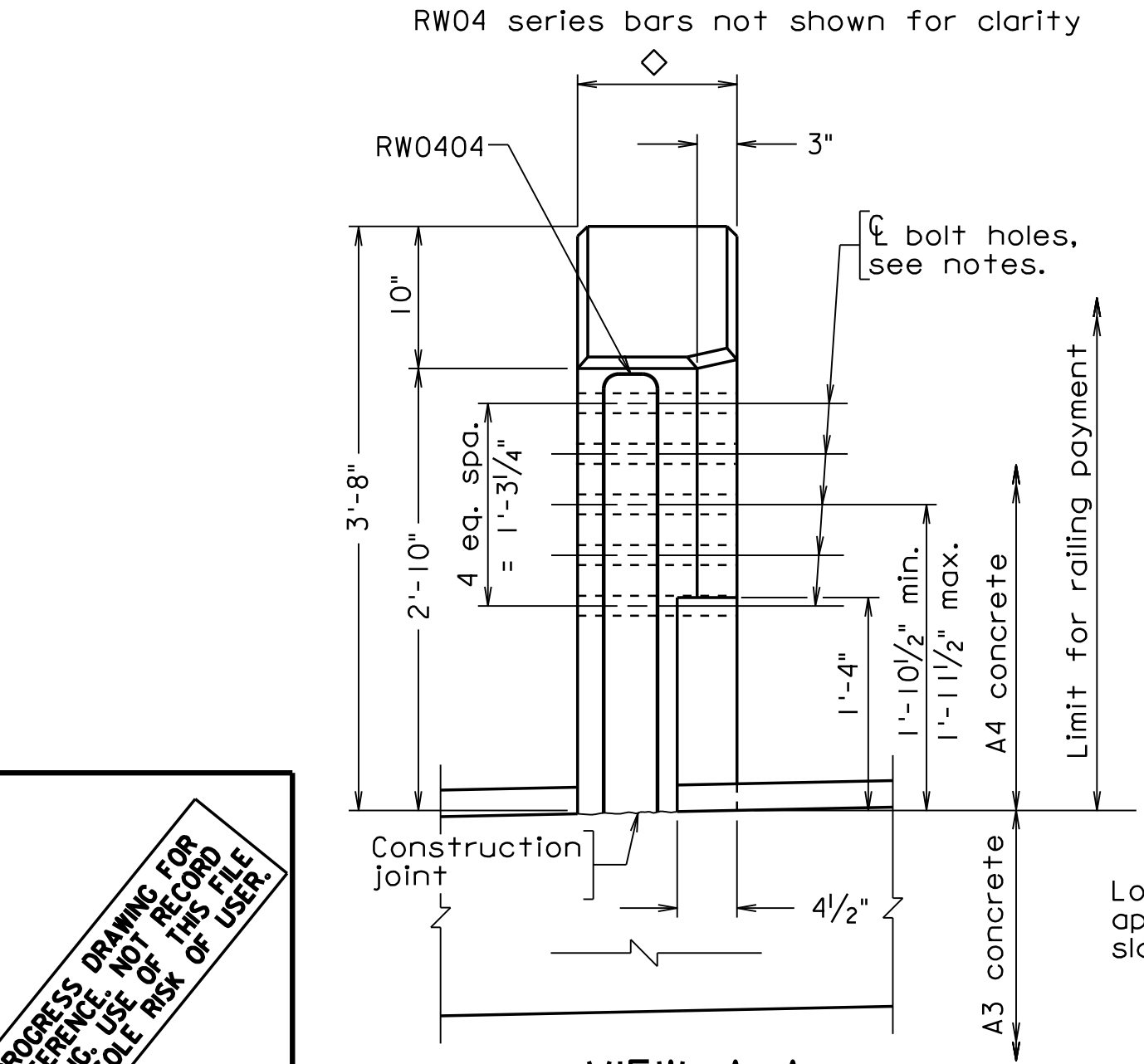


DETAIL A
Not to scale
Shown with architectural treatment on both sides

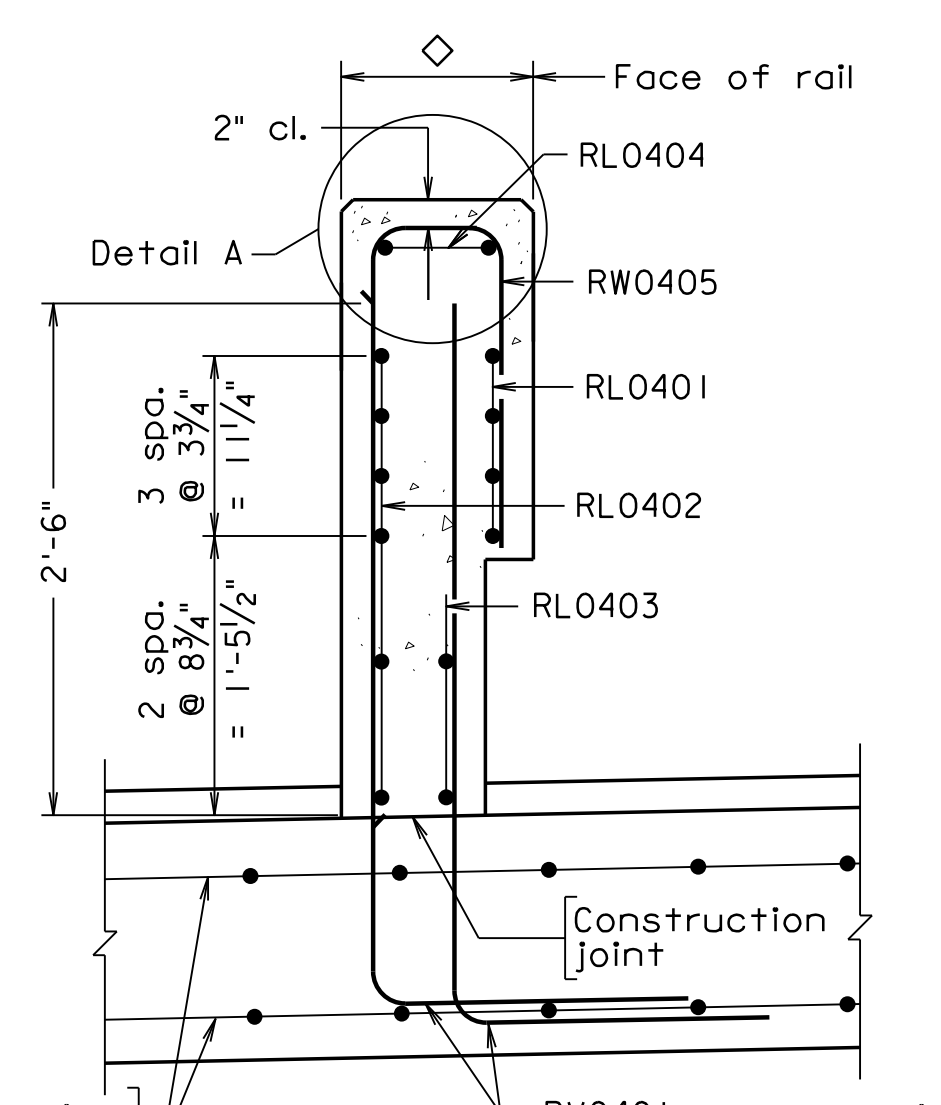
REINFORCING STEEL SCHEDULE

RL0401	6'-8"	7 3/8"	6"	Terminal wall
RL0403	6'-8 1/2"	4 5/8"	3"	Terminal wall
RL0404	6'-9"	10 1/4"	3"	Terminal wall
RL0405	5'-2"	4'-11 1/8"	3"	Terminal wall
RV0401	4'-4"	3'-5 1/4"	3"	Terminal wall and approach slab
RW0402	7'-1 1/2"	8"	3"	Terminal wall
RW0403	from 6'-0 1/2" to 7'-0 1/2"	8"	3"	Terminal wall
RW0404	5'-2"	8"	3"	Terminal wall
RW0405	from 4'-3 1/2" to 4'-6 1/2"	8"	3"	Terminal wall

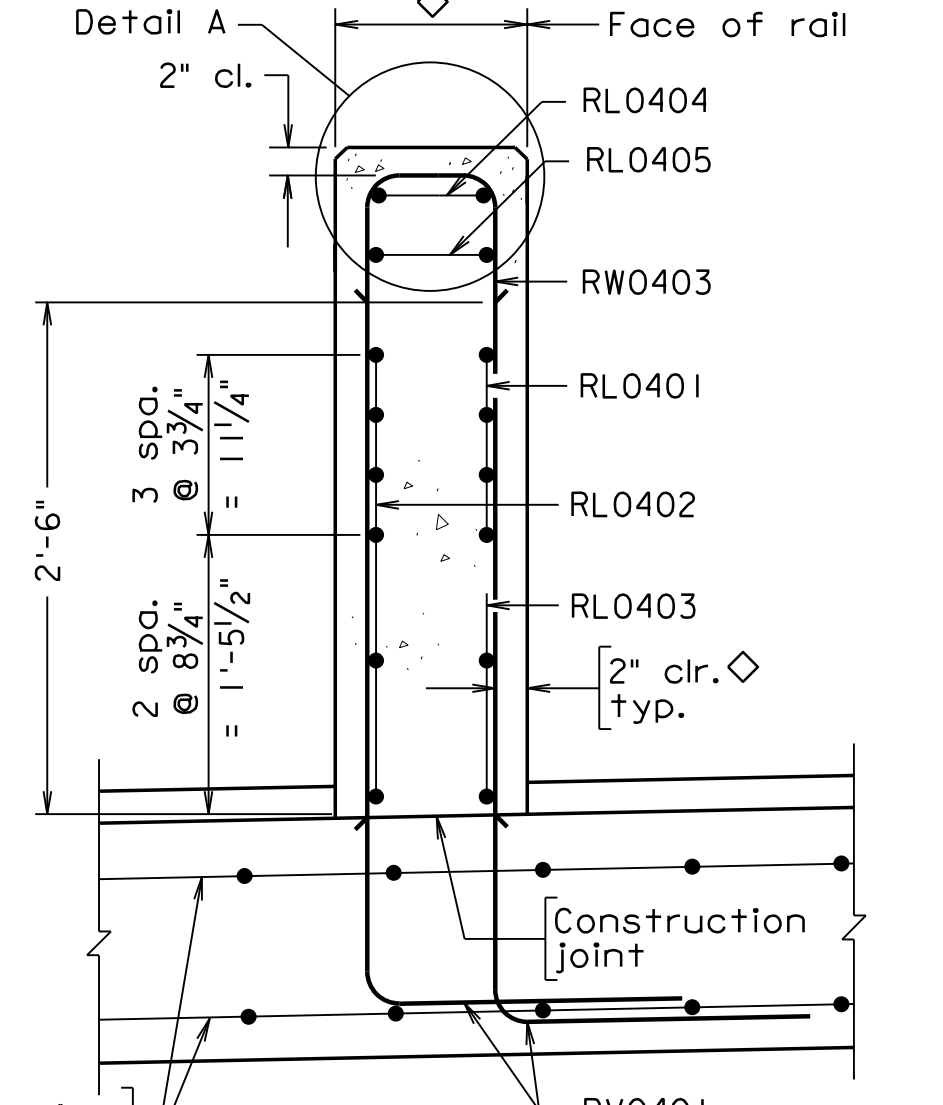
Dimensions in bending diagram are out-to-out of bars.



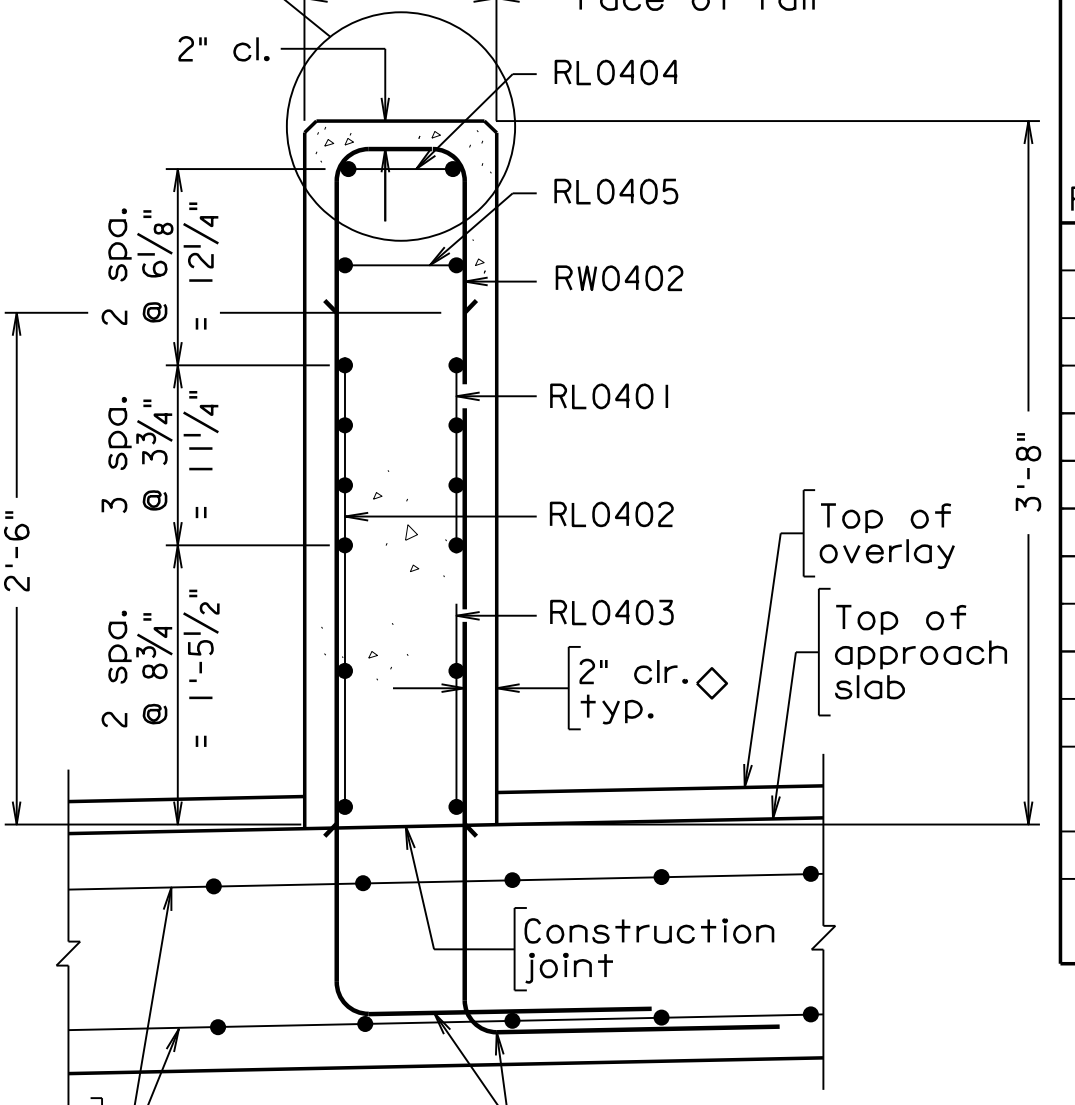
VIEW A-A
Shown RW0404 only for clarity



SECTION B-B
AW series bars may / may not be aligned or positioned with RW bars as shown



SECTION C-C
AW series bars may / may not be aligned or positioned with RW bars as shown



SECTION D-D
AW series bars may / may not be aligned or positioned with RW bars as shown

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42" CPSR TERMINAL WALL WITH ARCHITECTURAL TREATMENT (CPSRT-1-AT)				
No.	Description	Date	Designed: CRR..... Drawn: CRR..... Checked: MRD.....	Plan No. 257-38A Sheet No. 79 of 125

PROGRESS PRINT 4/1/2022

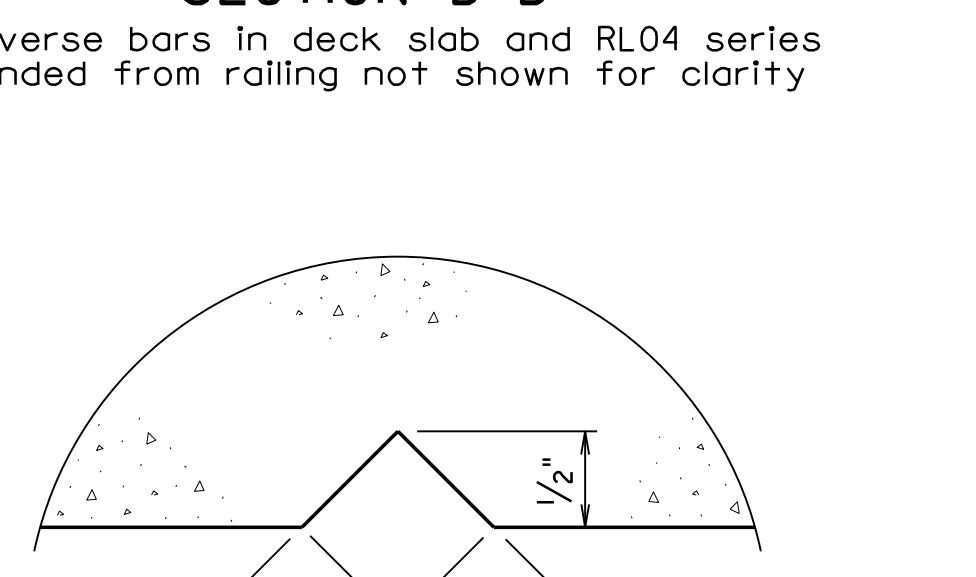
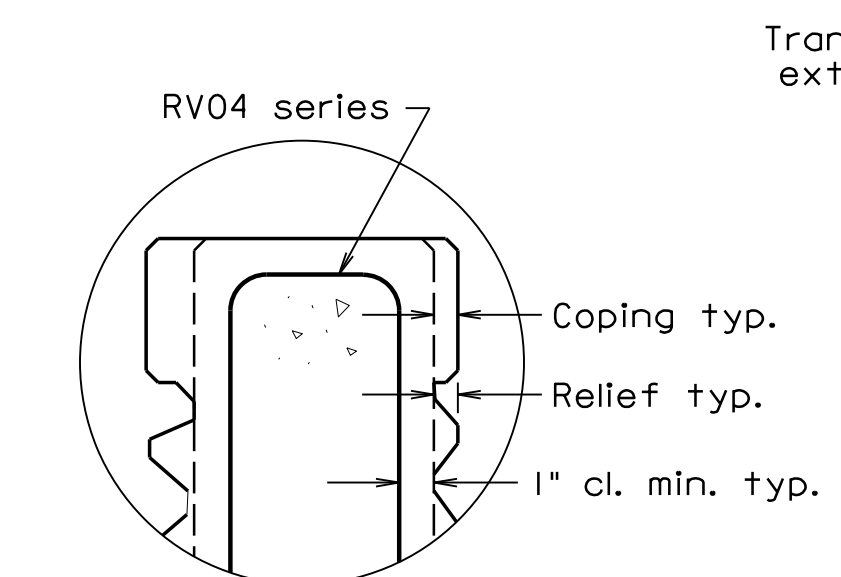
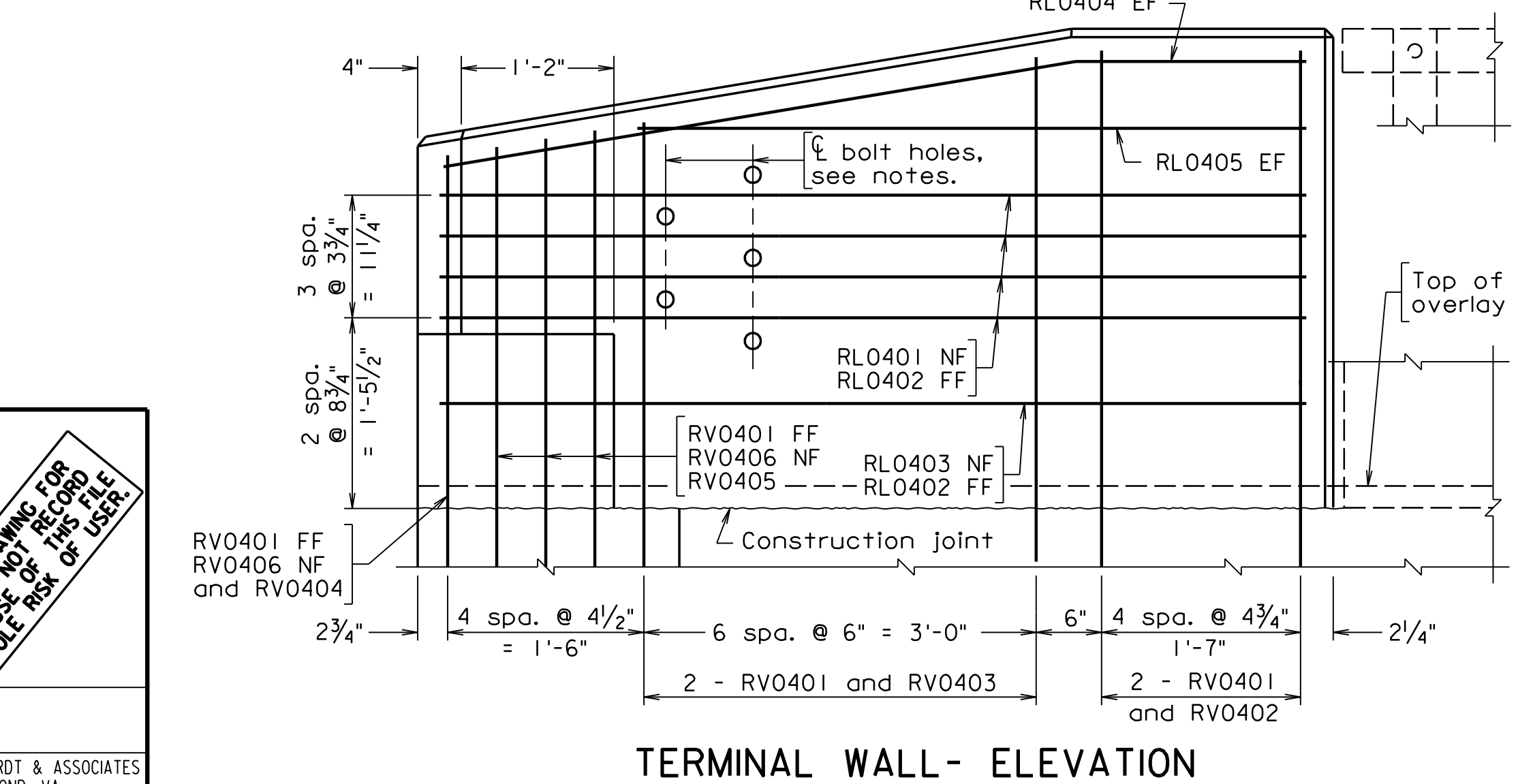
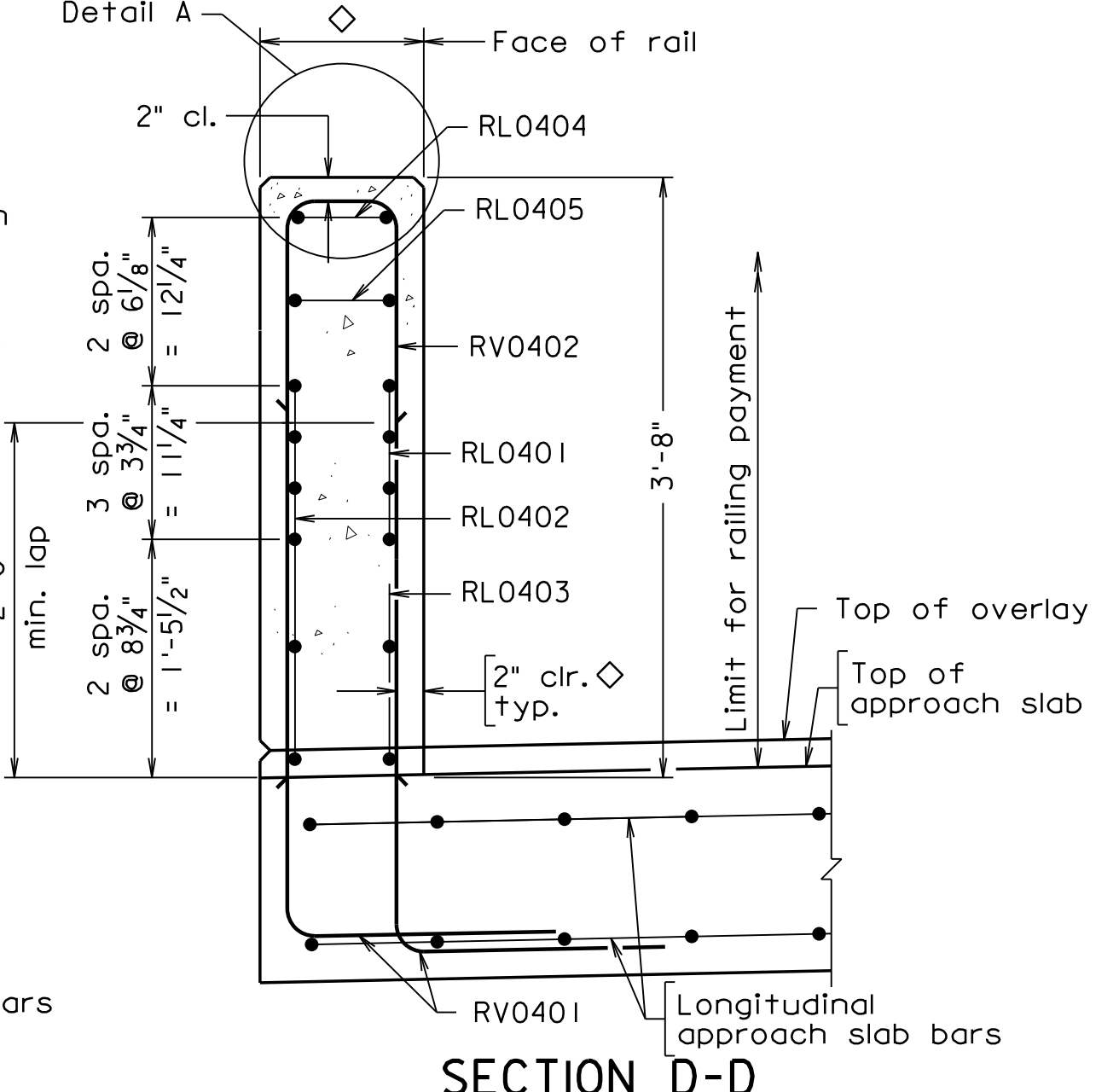
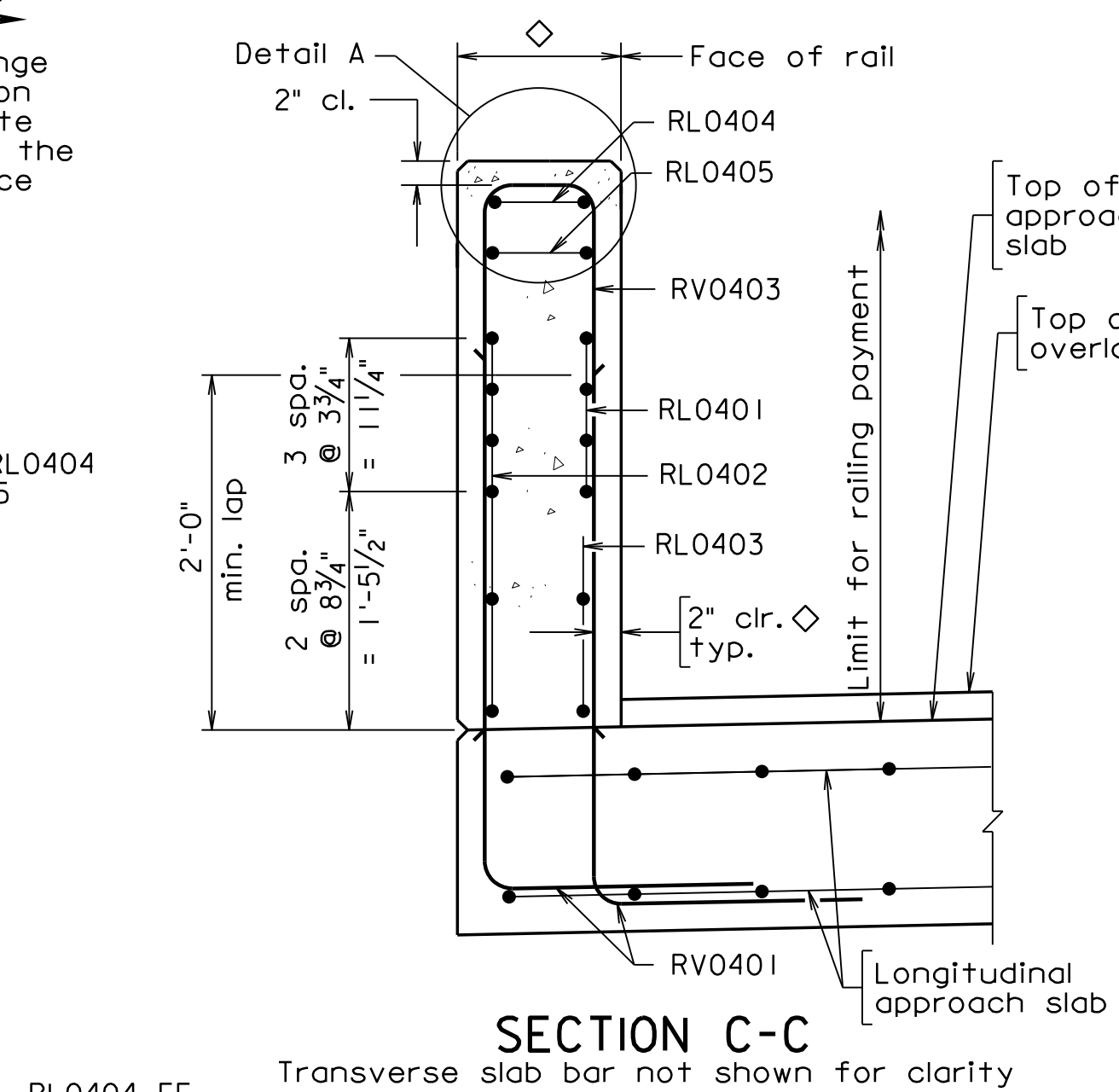
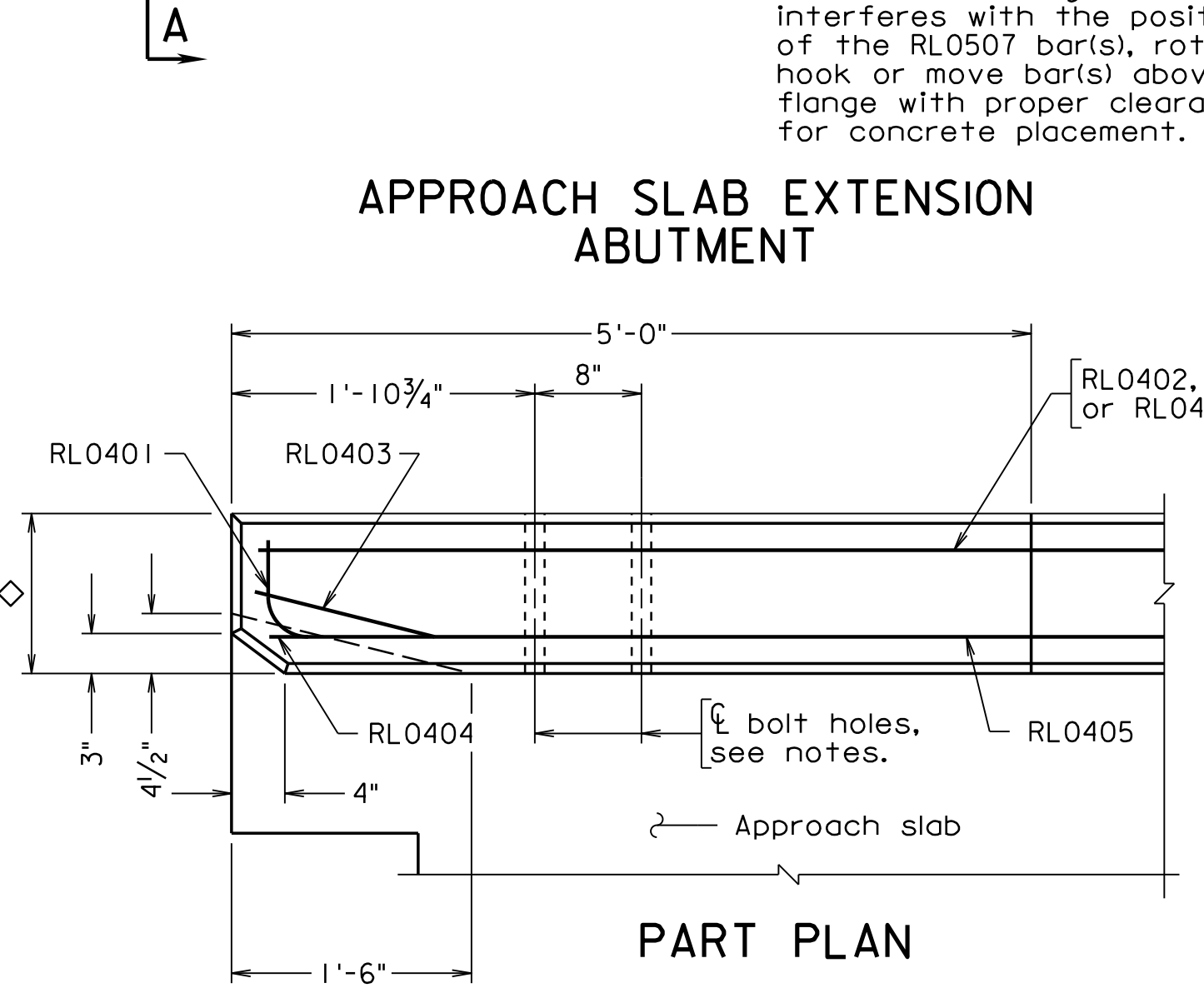
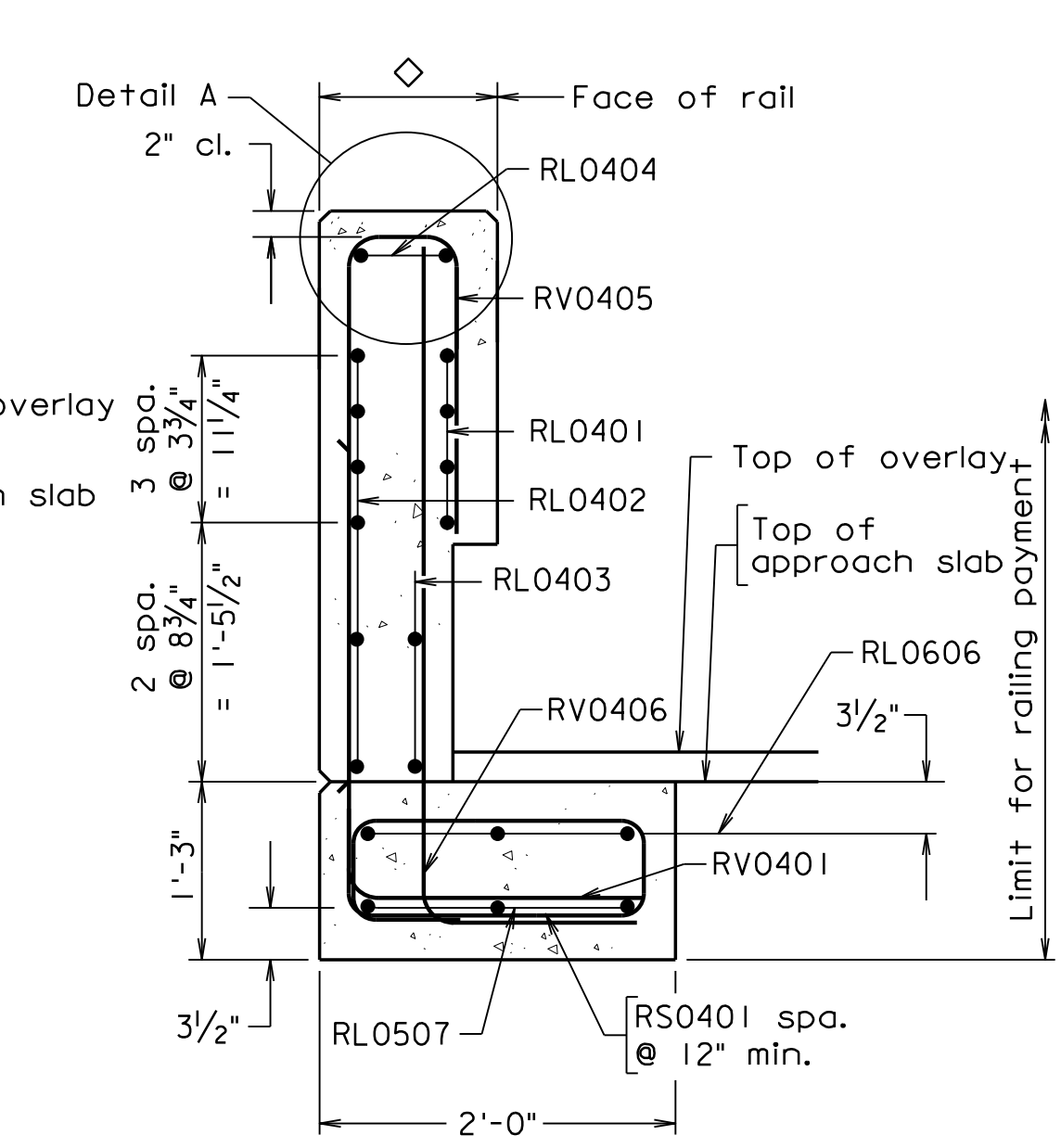
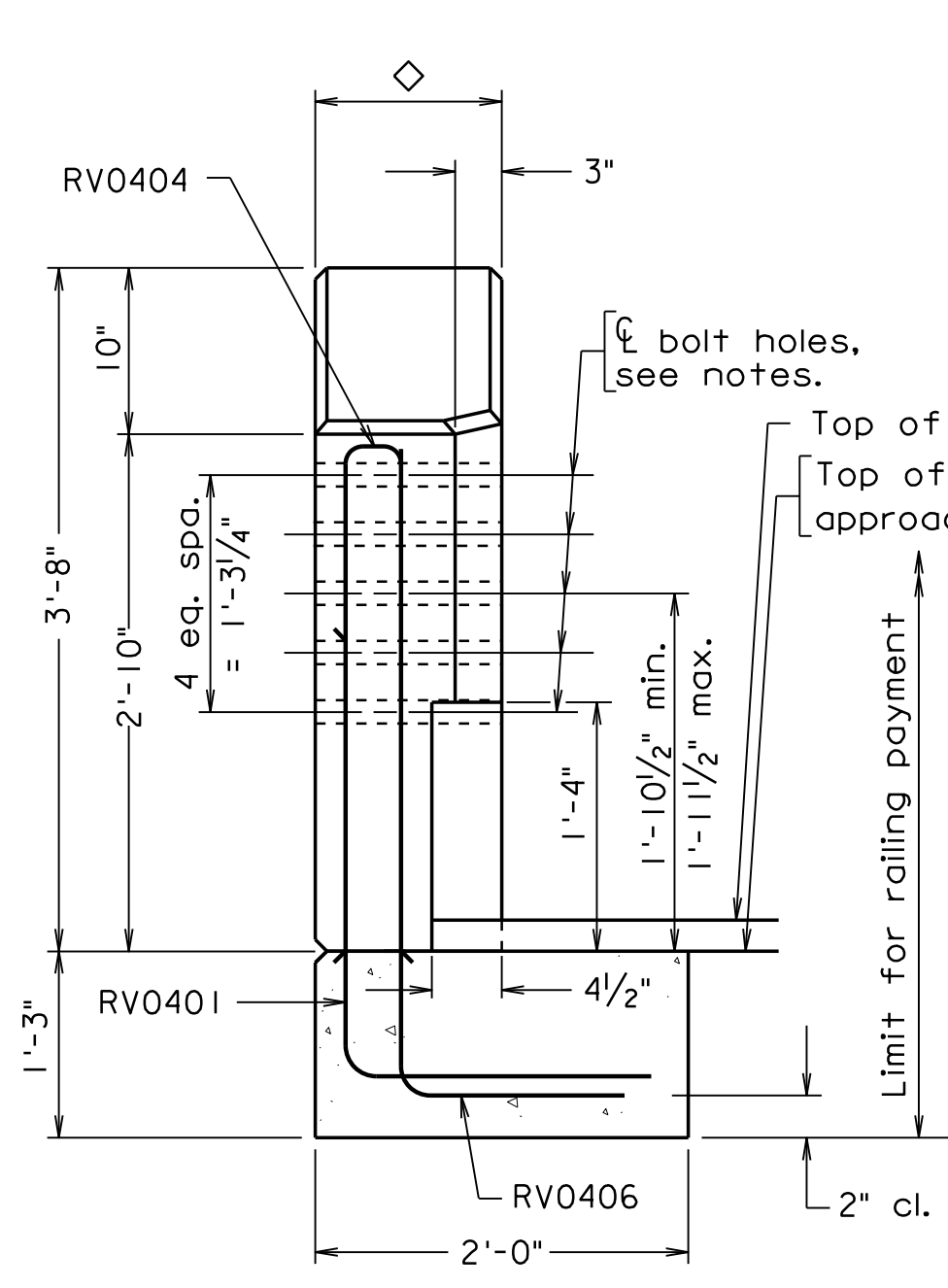
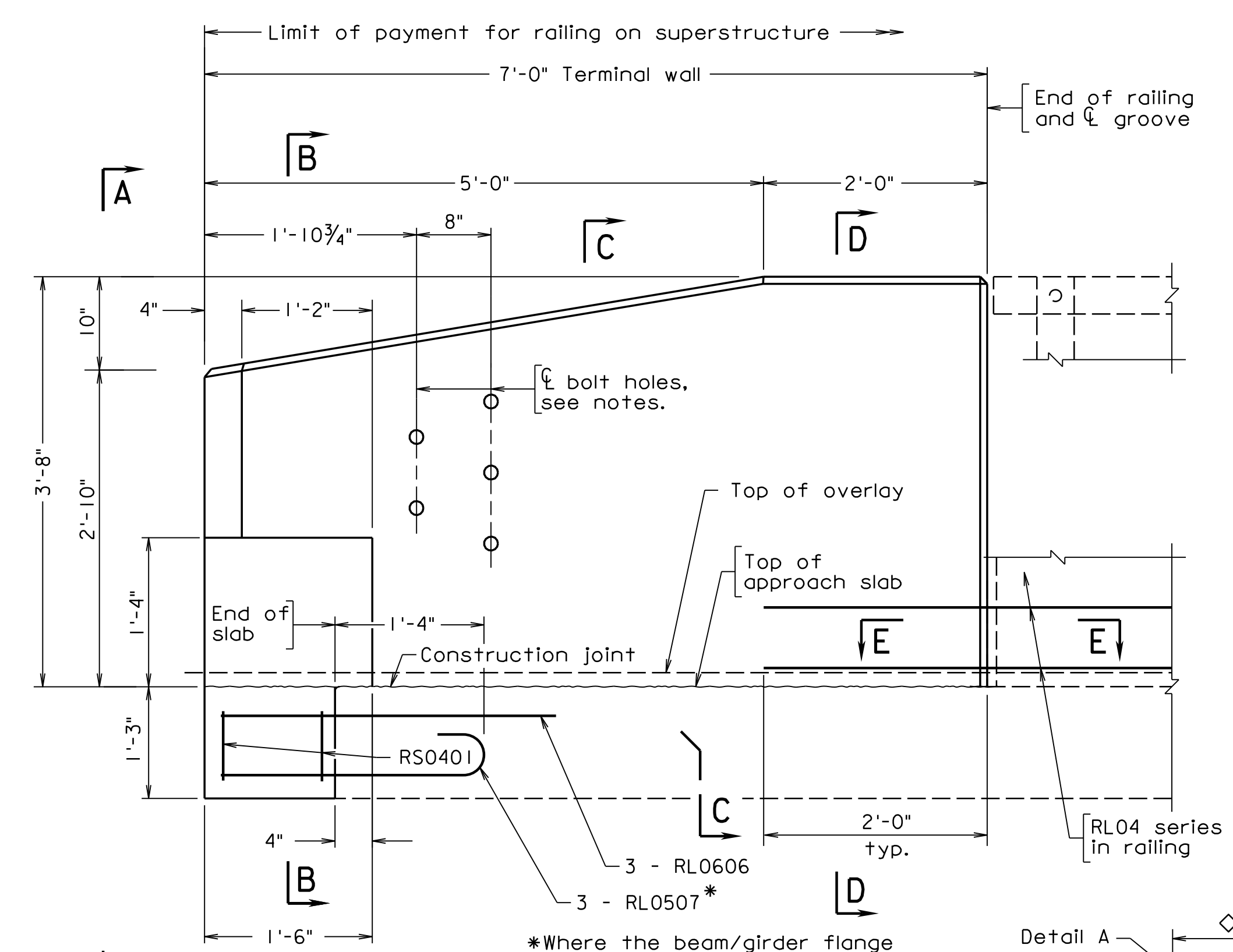
CPSRT-1-AT MOD. 10-31-2019 257-38A_079.dgn

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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE 95	0095-076-299, B688
			79a

Notes:
 Plan dimensions shown are measured in the respective horizontal and vertical planes.
 The Contractor shall determine all dimensions and details necessary for installation.
 All concrete shall be Low Shrinkage Class A4 Modified (lightweight).
 All bevels for concrete shall be 3/4".
 All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.
 For details and reinforcing steel schedule of railing, see sheet 77.
 Each terminal wall shall be cast as one piece.
 Terminal walls are detailed to take guardrail attachment for MGS.
 Holes, where shown, shall be formed with sleeves of 1/4" diameter nominal pipe.
 Bid price for architectural treatment includes concrete in relief and coping.



REINFORCING STEEL SCHEDULE

Mark	Size	No.	Pin ø	Length	Location
RL0401	#4	6"		7'-2"	Terminal wall
RL0402	#4			6'-8"	Terminal wall
RL0403	#4	3"		6'-8 1/2"	Terminal wall
RL0404	#4	3"		6'-9"	Terminal wall
RL0405	#4			5'-2"	Terminal wall
RL0606	#6			4'-0"	Terminal wall end support
RL0507	#5	3 3/4"		3'-4"	Terminal wall end support
RS0401	#4	3"			Terminal wall end support
RV0401	#4	3"		4'-4"	Terminal wall
RV0402	#4	3"		7'-1 1/2"	Terminal wall
RV0403	#4	3"		From 6'-0 1/2" to 7'-0 1/2"	Terminal wall
RV0404	#4	3"		5'-2"	Terminal wall
RV0405	#4	3"		From 4'-3 1/2" to 4'-6 1/2"	Terminal wall
RV0406	#4	3"		From 4'-3 1/4" to 4'-5 1/2"	Terminal wall

Mark	Size	No.	Pin ø	Length	Location
RV0401	#4	3"		3'-5 1/4"	Terminal wall
RV0406	#4			vary from 4'-0 1/2" to 4'-2 3/4" by 3/4"	Terminal wall
RV0401	#4			1'-10 1/2"	Terminal wall
RV0406	#4			1'-1 1/2"	Terminal wall
RV0402	#4			8"	Terminal wall
RV0403	#4			8"	Terminal wall
RV0404	#4			4"	Terminal wall
RV0405	#4			8"	Terminal wall
RS0401	#4			1'-1"	Terminal wall

Dimensions in bending diagram are out-to-out of bars.

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
42" CPSR TERMINAL WALL WITH ARCHITECTURAL TREATMENT (CPSRT-4-AT)					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		79a of 125

PAC PLANS
 PROGRESS PRINT 4/1/2022
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Scale: 1" = 1'-0" unless otherwise noted.
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CPSRT-4-AT MOD. 04-30-2021 257-38A_079a.dgn

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 STRUCTURAL ENGINEER

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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE 95	0095-076-299, B688
			81

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Low Shrinkage Class A4 Modified (Lightweight).

All bevels for concrete shall be 3/4".

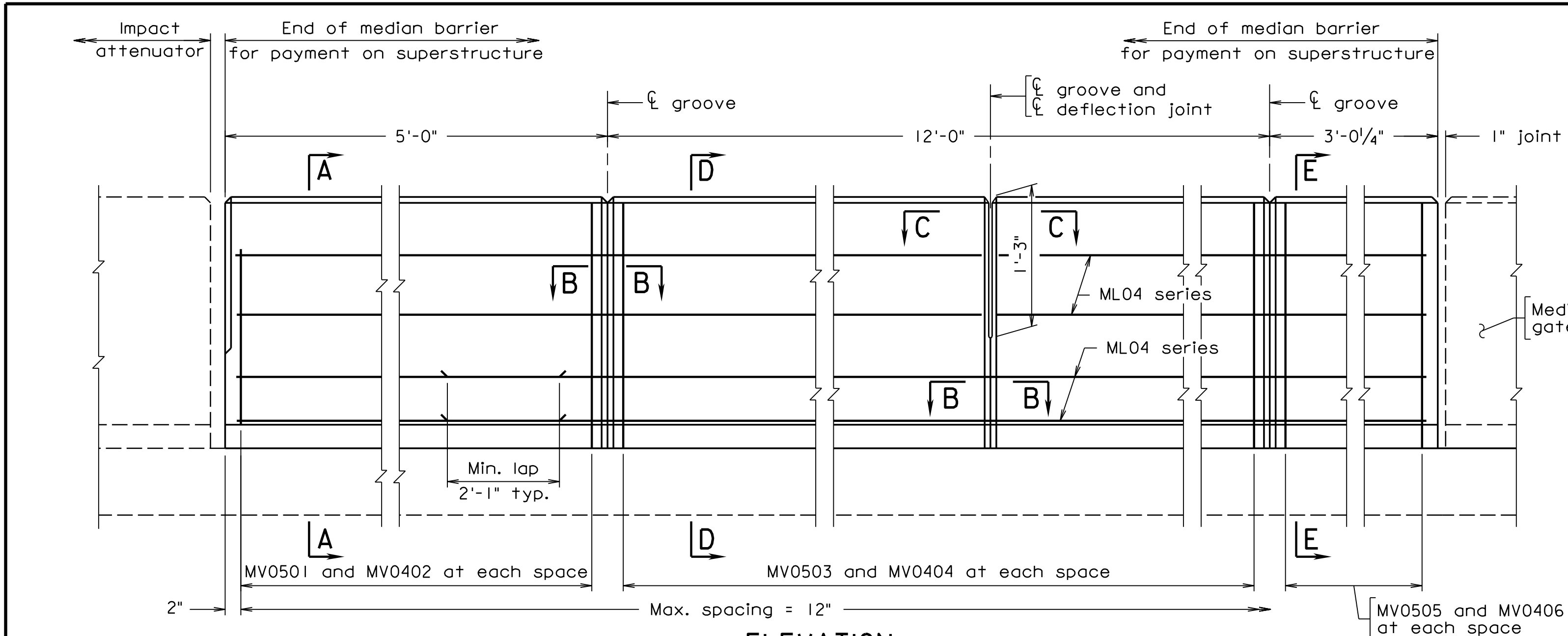
The reinforcing steel shown has been detailed based on a standard 1/4" per foot cross slope and for an 8 1/2" slab depth. The Contractor shall adjust the reinforcing steel as required for other cross slopes and slab depths.

All reinforcing bars shall be Corrosion Resistant Reinforcing Steel, Class II.

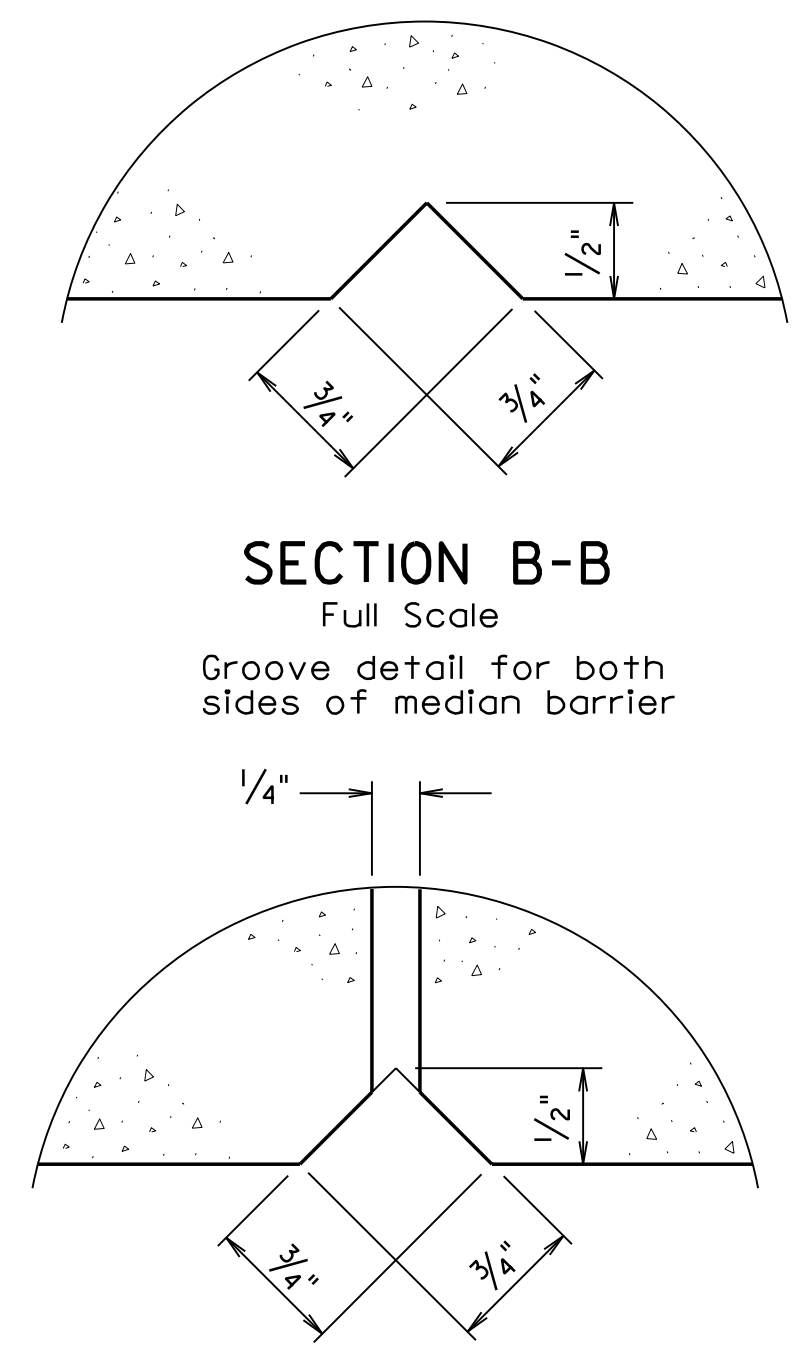
Use groove and deflection joint over pier.

Spacing of grooves shall be approximately 8'-0". If lighting standard is used (see Bridge Conduit System), groove shall be located approximately 4'-0" from centerline of light standard. Spacing of deflection joints shall not exceed three groove spaces.

Barrier Delineator size, color, and spacing shall be in accordance with the Specifications.

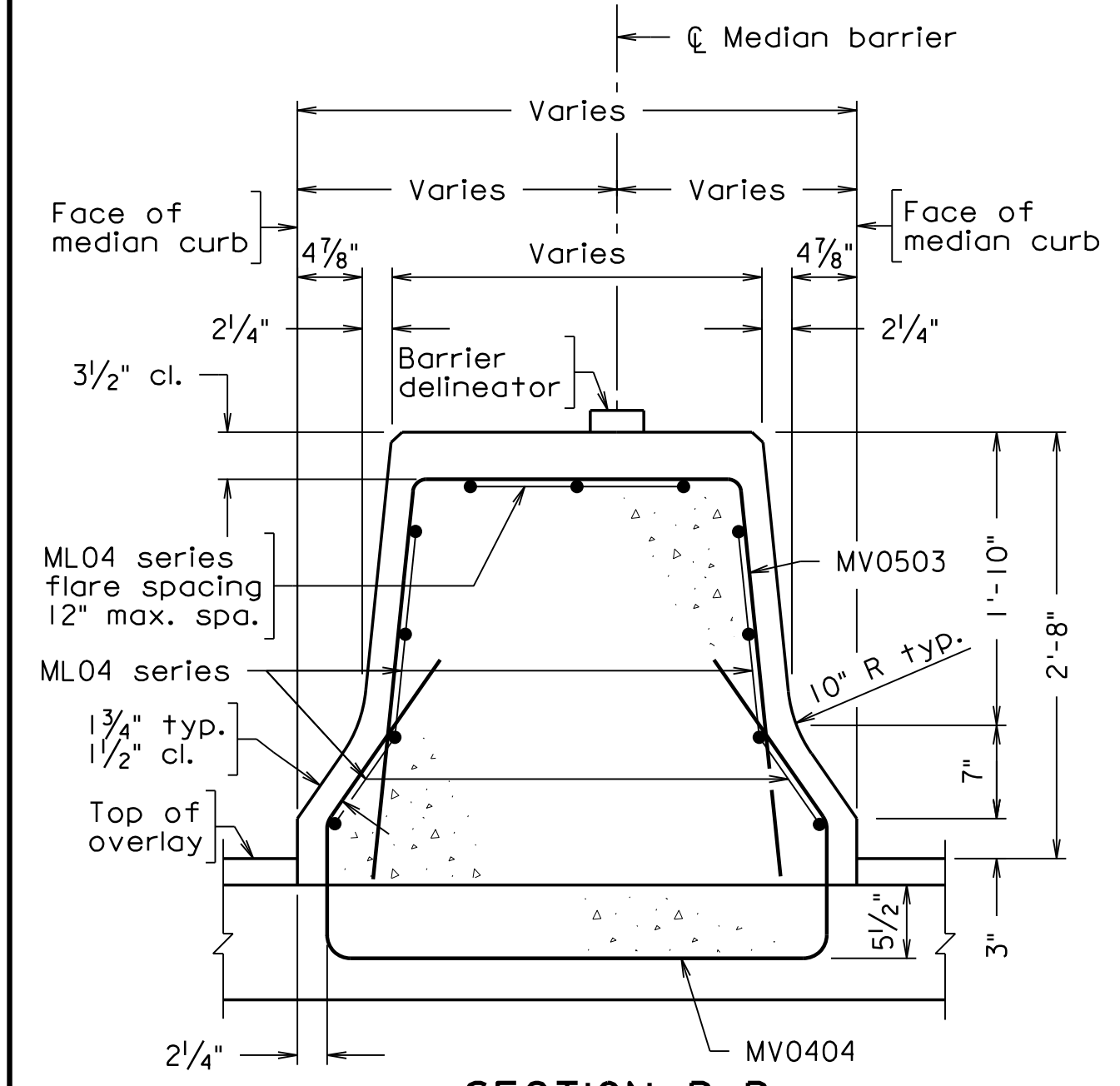


ELEVATION

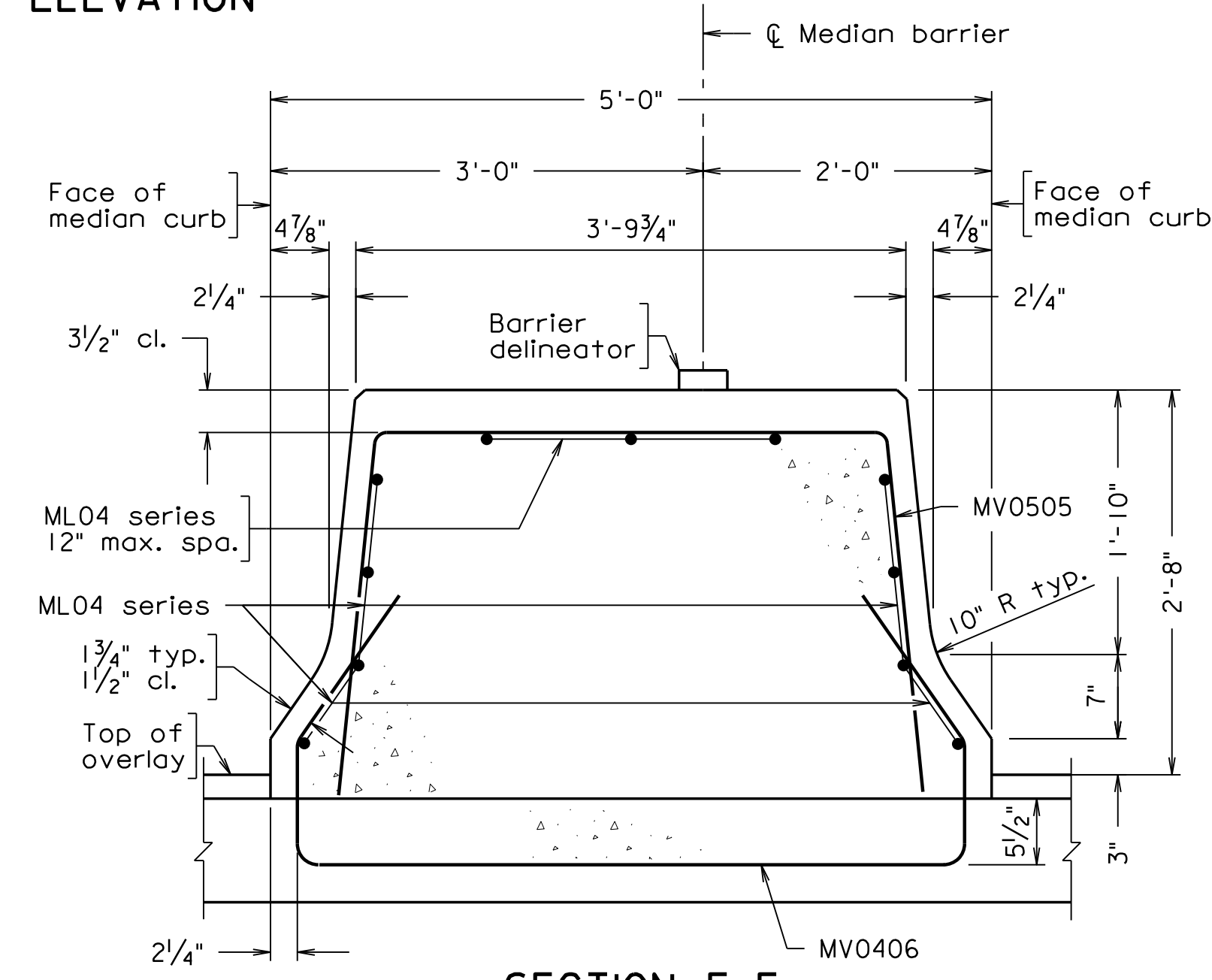


SECTION B-B
Full Scale
Groove detail for both sides of median barrier

SECTION C-C
Full Scale
Deflection joint detail for both sides of median barrier



SECTION D-D



SECTION E-E

ALTERNATE REINFORCING STEEL SCHEDULE

Mark	No.	Size	Pin ø	Length	Location
MV0402		#4	3"	5'-5"	Median barrier
MV0404		#4	3"	----	Median barrier
MV0406		#4	3"	----	Median barrier
ML04		#4	----	----	Median barrier

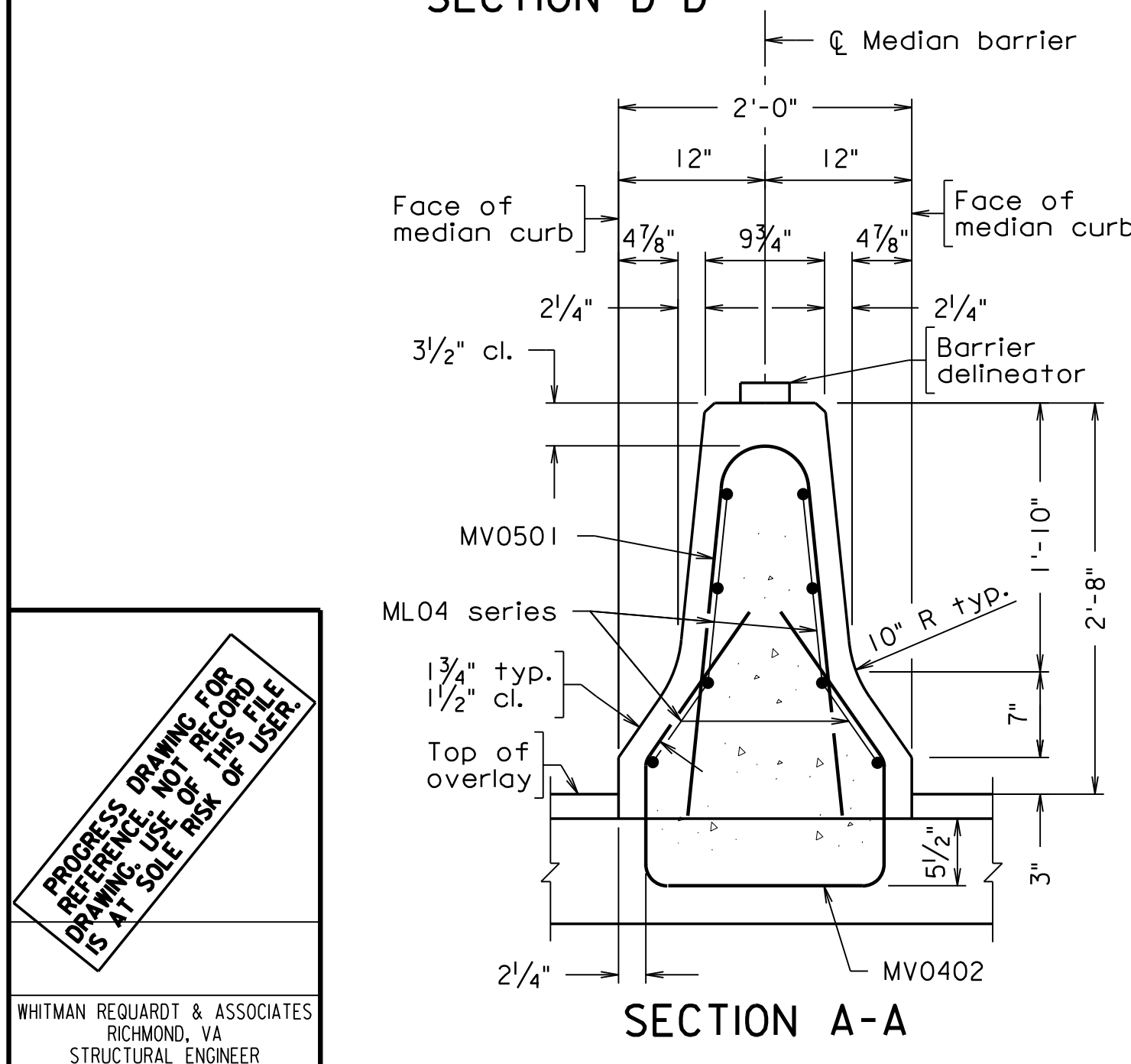
Dimensions in bending diagram are out-to-out of bars.

REINFORCING STEEL SCHEDULE

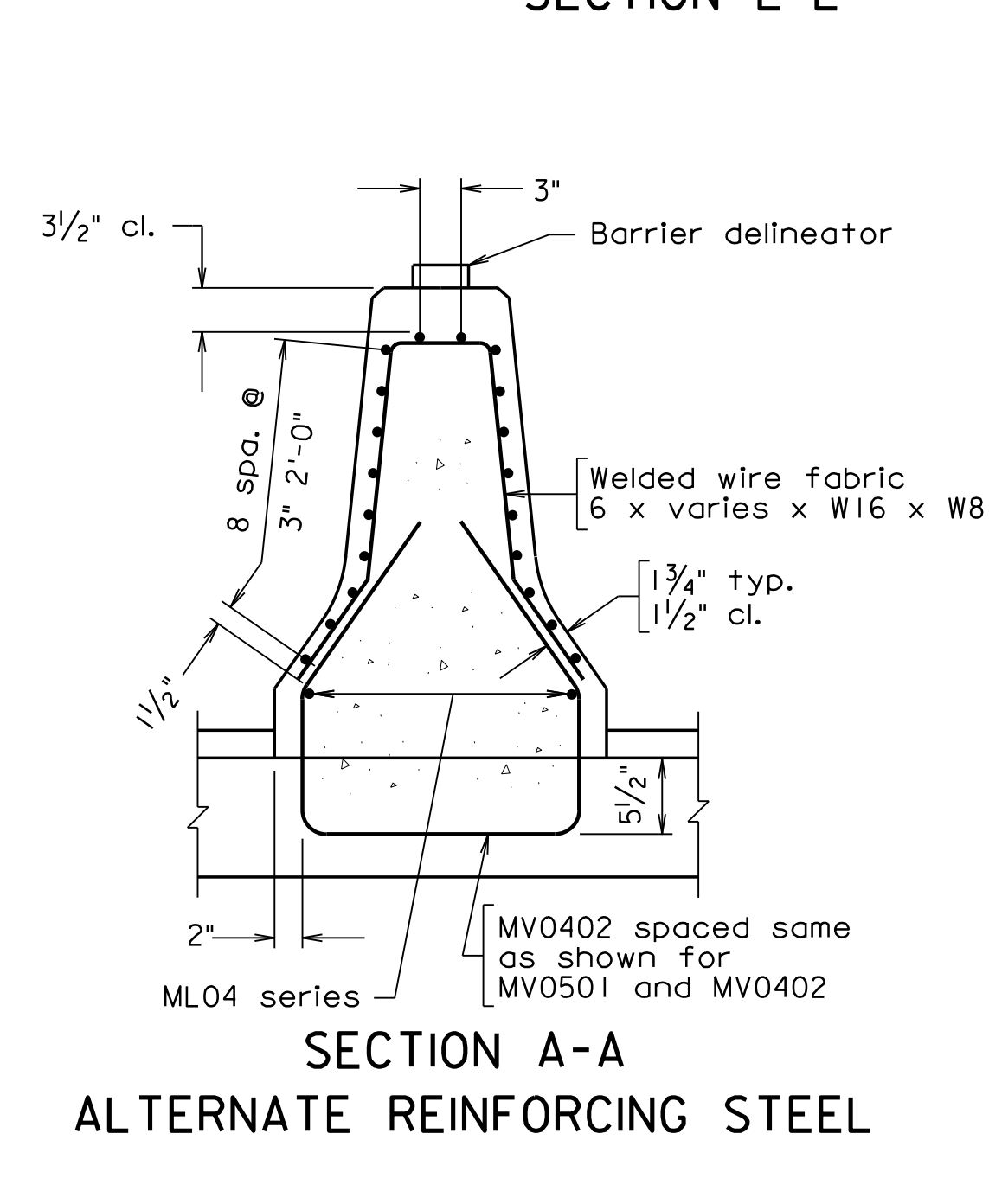
Mark	No.	Size	Pin ø	Length	Location
MV0501		#5	7"	5'-5"	Median barrier
MV0402		#4	3"	5'-9"	Median barrier
MV0503		#5	3 3/4"	from 5'-4 5/8" to 8'-4 5/8"	Median barrier
MV0404		#4	3"	from 5'-8 7/8" to 8'-8 7/8"	Median barrier
MV0505		#5	3 3/4"	8'-4 5/8"	Median barrier
MV0406		#4	3"	8'-8 7/8"	Median barrier
ML04		#4	----	----	Median barrier

Dimensions in bending diagram are out-to-out of bars, except as shown.

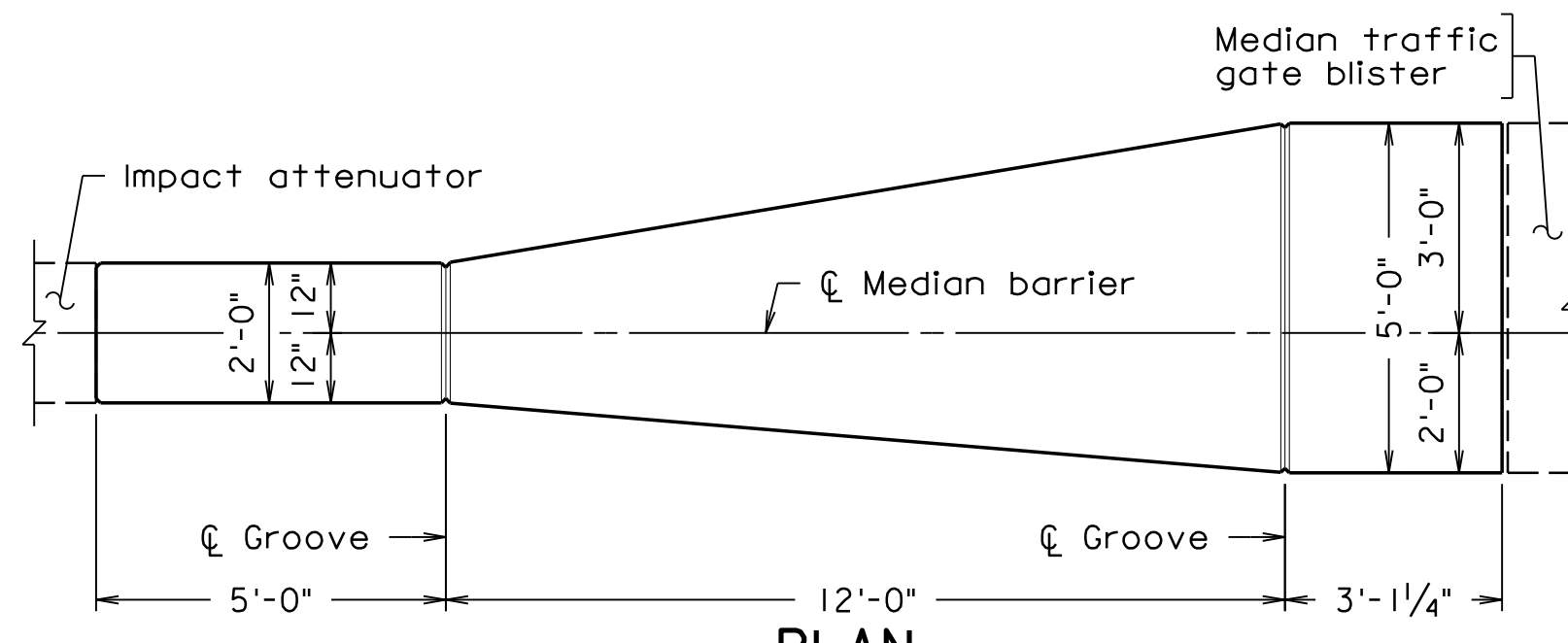
Gross concrete quantities (C.Y.) = Lin. ft. x 0.121 for all concrete above roadway slab.



SECTION A-A



SECTION A-A
ALTERNATE REINFORCING STEEL



PLAN
Scale: 3/8" = 1'-0"

PAC PLANS
PROGRESS PRINT 4/1/2022
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Scale: 1" = 1'-0" unless otherwise shown.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
CAST-IN-PLACE CONCRETE MEDIAN BARRIER (F-SHAPE) (BMB-3A)					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
	Revisions		Drawn: CRR.....	Apr. 2022	257-38A
			Checked: MRD.....		81 of 125

PROGRESS PRINT 4/1/2022

257-38A_081.dgn

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RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				82

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Low Shrinkage Class A4 Modified (lightweight) on bridge deck slab and approach slab, Low Shrinkage Class A4 Modified on moment slab.

All levels for concrete shall be 3/4".

The reinforcing steel shown has been detailed based on a standard 1/4" per foot cross slope and for an 8 1/2" slab depth. The Contractor shall adjust the reinforcing steel as required for other cross slopes and slab depths.

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.

Use groove and deflection joint over pier.

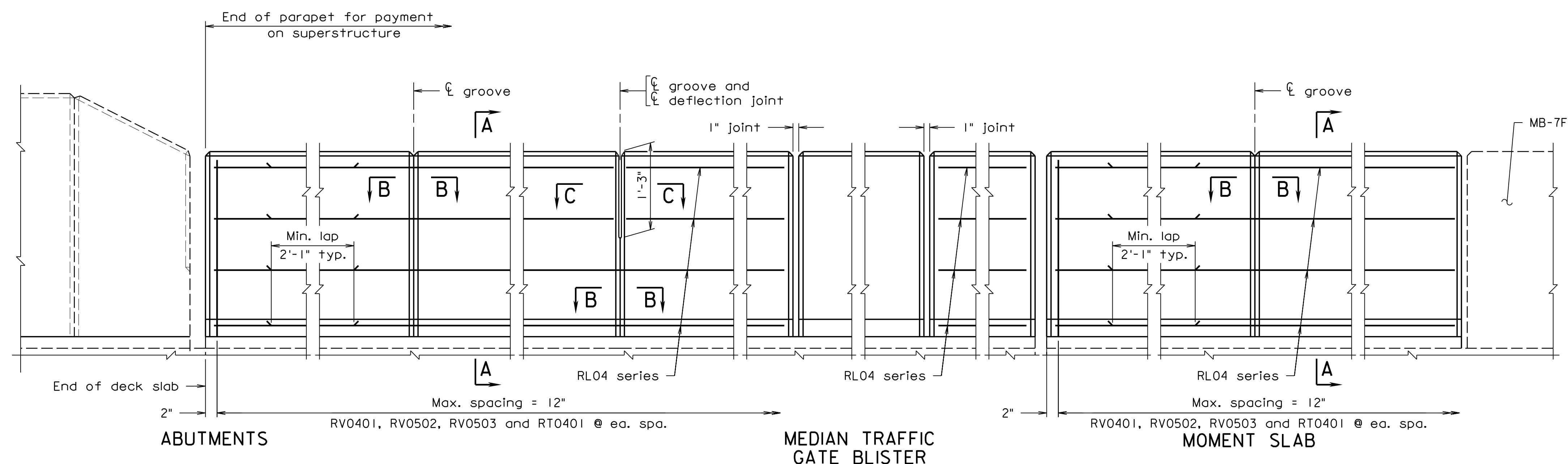
Spacing of grooves is to be approximately 8'-0". If lighting standard is used (see bridge conduit system, groove shall be located approximately 4'-0" from centerline of light standard. Spacing of deflection joints shall not exceed three groove spaces.

Barrier delineator size, color and spacing shall be in accordance with the Specifications.

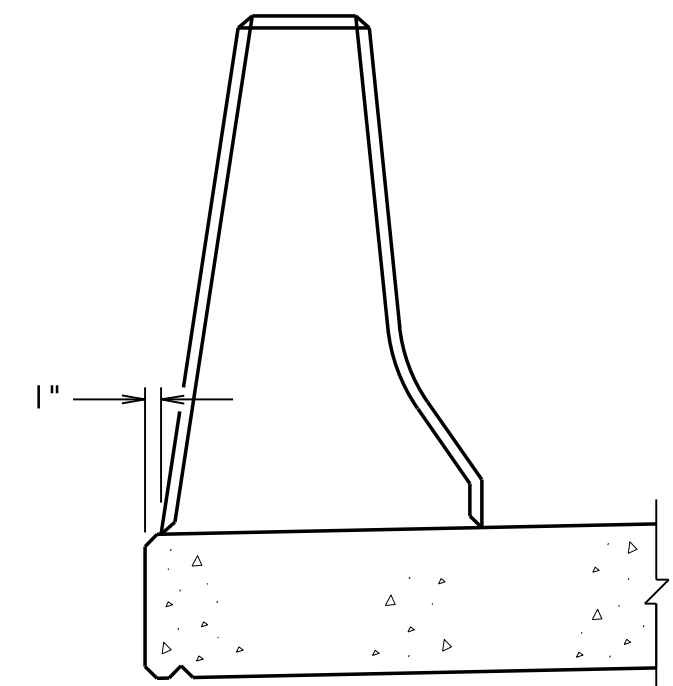
For extruded parapets: During extrusion, if there are open joints at abutment(s) or pier(s), they shall be formed by the use of lubricated plates or other means so that uniformity of the opening and chamfers is maintained. Dimension of 1", as shown in Section thru Joints for Extrusion Only, is for additional deck slab that shall be cast at Contractor's expense. Dimension(s) to face of curb shall not be reduced.

Parapet (including terminal wall) shall not be extruded if pedestrian fencing will be attached.

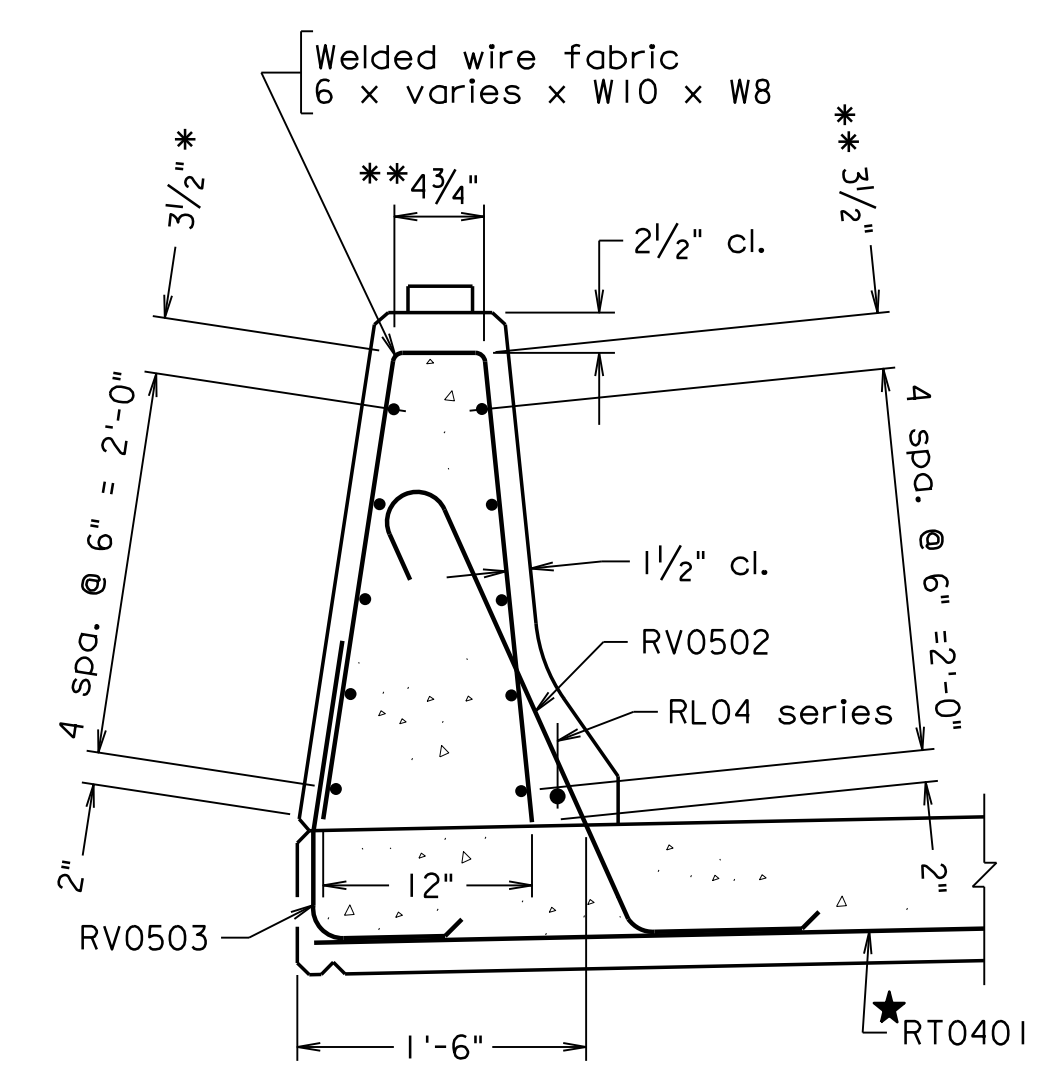
For details and reinforcing steel schedule of terminal wall, see sheet 83.



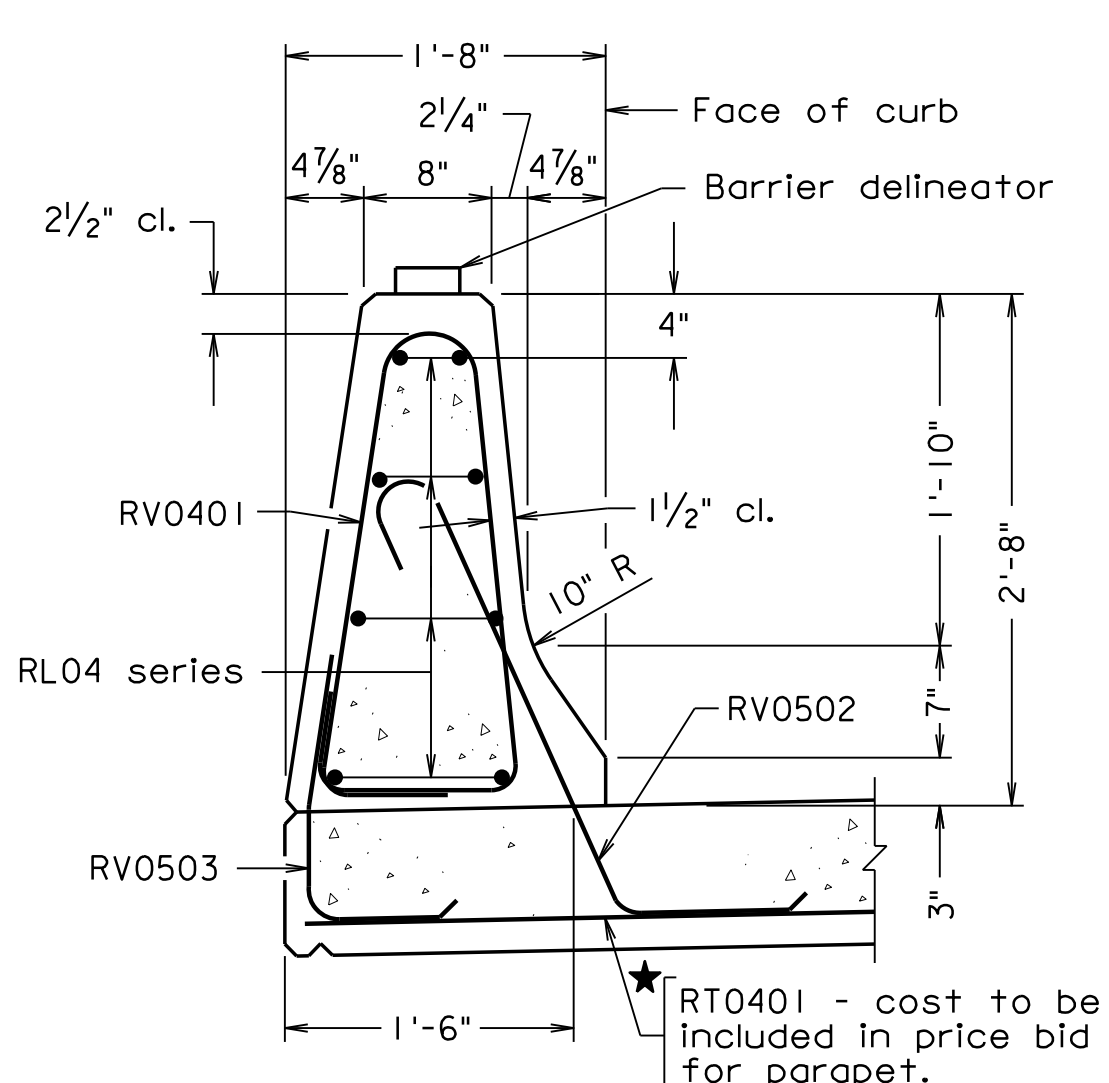
ELEVATION



SECTION THRU JOINTS FOR EXTRUSION ONLY



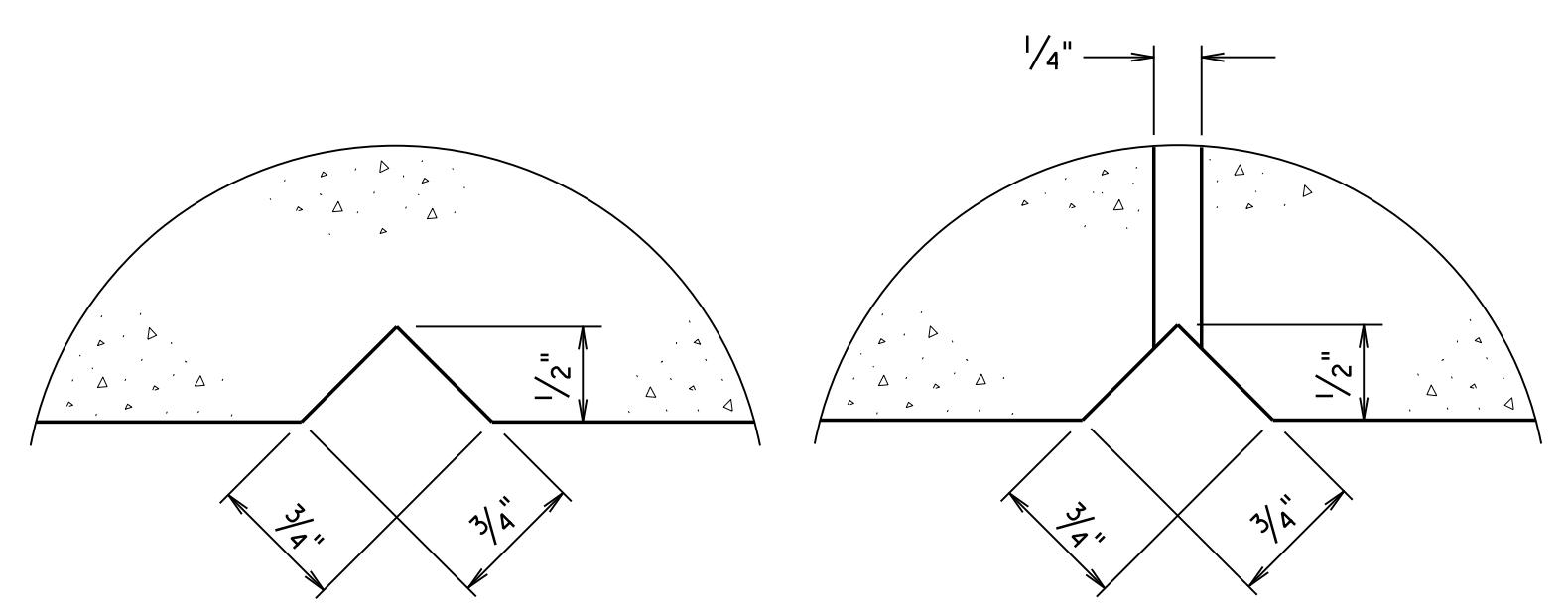
SECTION A-A ALTERNATE REINFORCING STEEL



SECTION A-A

REINFORCING STEEL SCHEDULE					
Mark	No.	Size	Pin ϕ	Length	Location
★RT0401		#4	—	3'-0"	Slab
RV0401		#4	3"	7'-3"	Parapet
RV0502		#5	3 3/4"	4'-7"	Parapet
RV0503		#5	3 3/4"	2'-4"	Parapet
RL04		#4	—	—	Parapet

Dimensions in bending diagram are out-to-out of bars, except as shown.
 Gross concrete quantities (C.Y.) = Lin. Ft. x 0.105
 All concrete above roadway slab
 ★ Used only when deck transverse reinforcement is parallel to skew of bridge



SECTION B-B Full scale

SECTION C-C Full scale

Groove detail for both sides of parapet

Deflection joint detail for both sides of parapet

MOD. 10-31-2019 257-38A_082.dgn

BPB-3A
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Scale: 1" = 1'-0" unless otherwise shown.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
CAST-IN-PLACE CONCRETE PARAPET (F-SHAPE) (BPB-3A)					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		82 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			84

Notes:

Posts shall be set vertical. Rails shall be set parallel to the top of pedestal.

Posts shall be equally spaced, not to exceed 6'-0".

Rail expansion joints shall be provided at intervals not exceeding 30'-0" and at all panels spanning deck expansion joints. Rails shall be continuous over a minimum of 3 posts before splicing.

Anchor bolts shall be high-strength and shall be galvanized.

Threaded rods shall be ASTM A307 and shall be galvanized.

Plates shall be ASTM A709, Grade 36 and shall be galvanized.

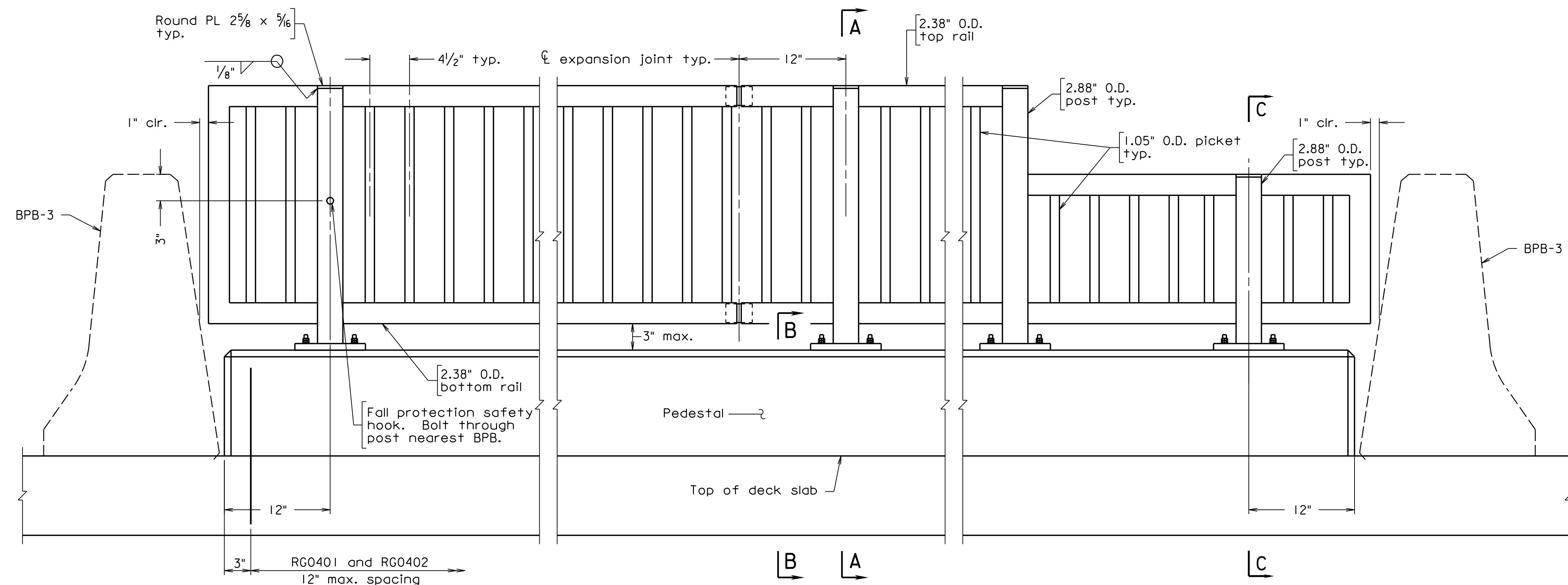
All posts, rails, pickets and pipes shall be welded or seamless steel galvanized pipe conforming to ASTM F1083 schedule 40, except gripping handrail shall be schedule 80.

Railing shall be grounded in accordance with Section 410 of the Specifications.

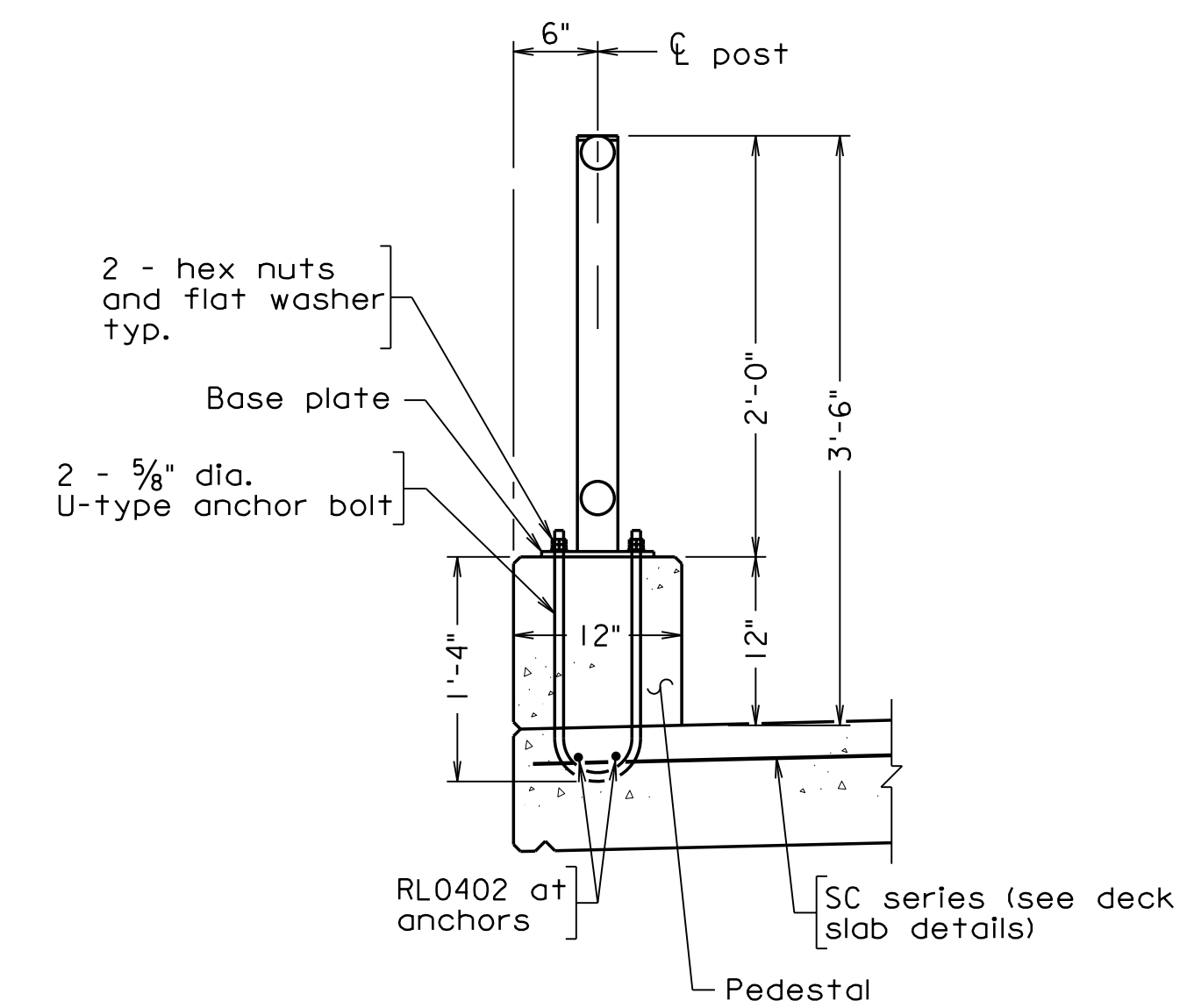
All concrete shall be Low Shrinkage Class A4 Modified (lightweight).

Chamfers for concrete shall be 3/4".

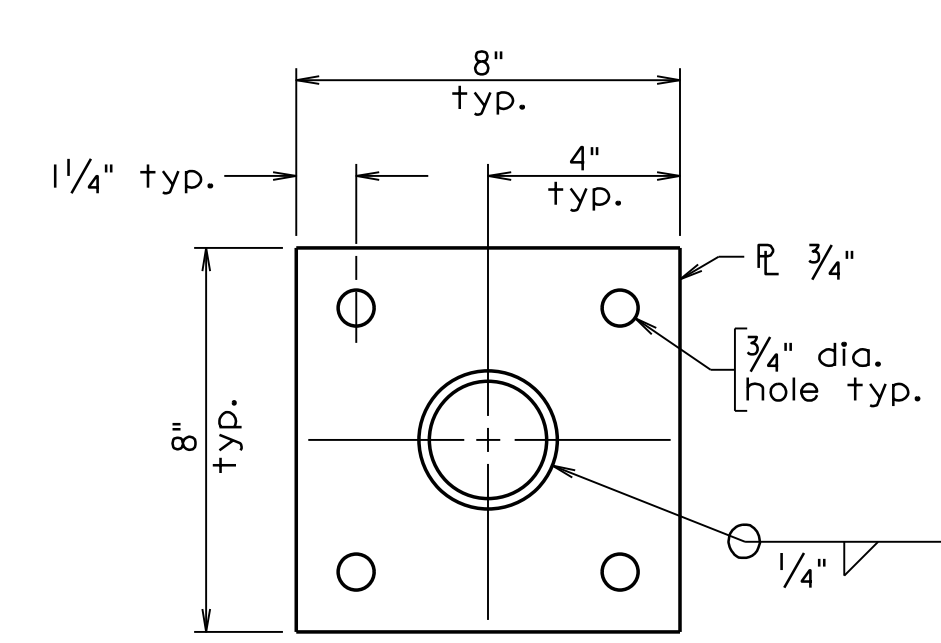
All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.



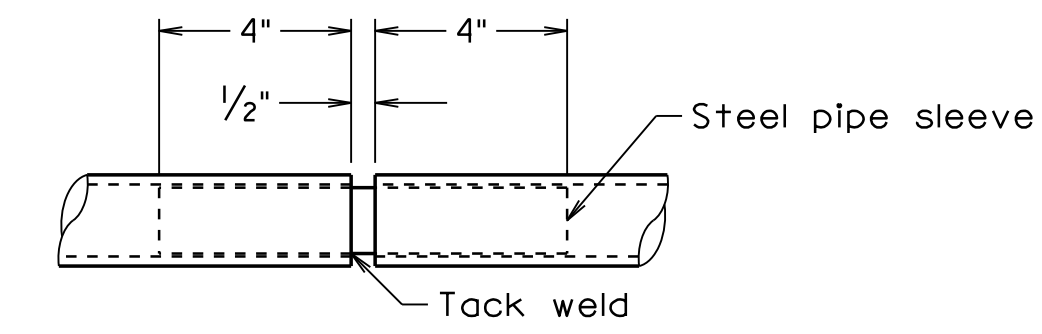
ELEVATION
Scale: 1/2" = 1'-0"
(located where traffic gate arm is in open position)



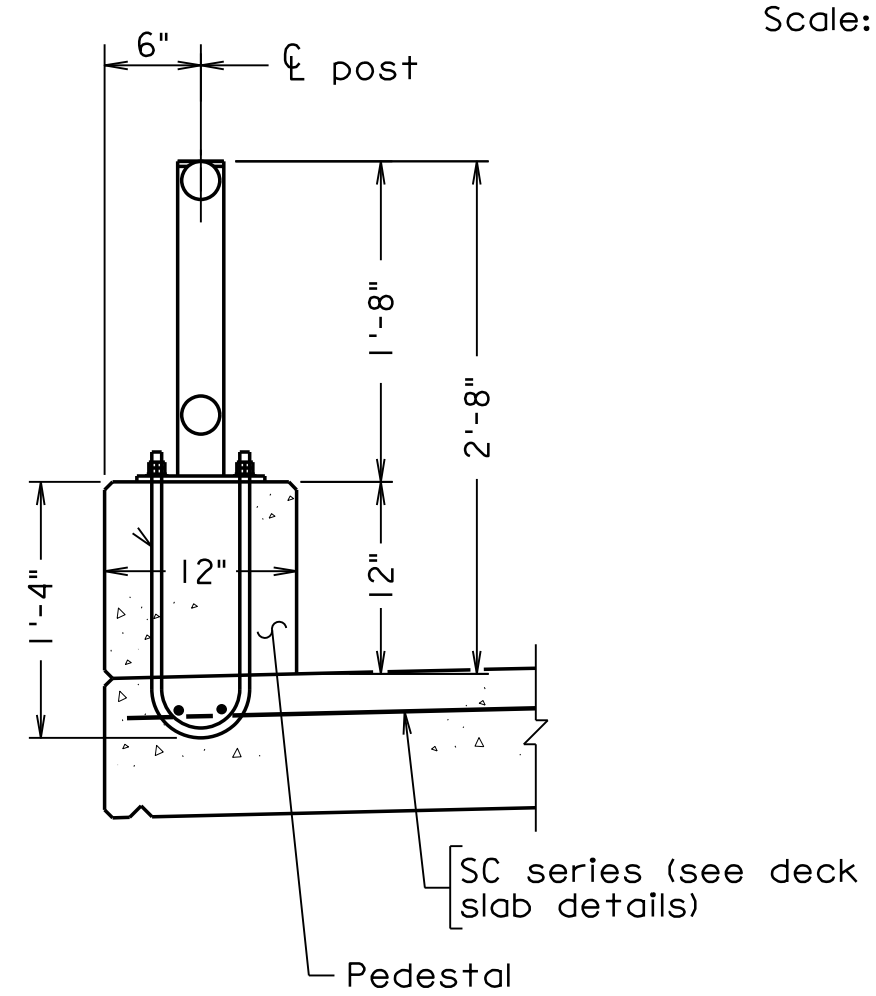
SECTION A-A
Scale: 1" = 1'-0"



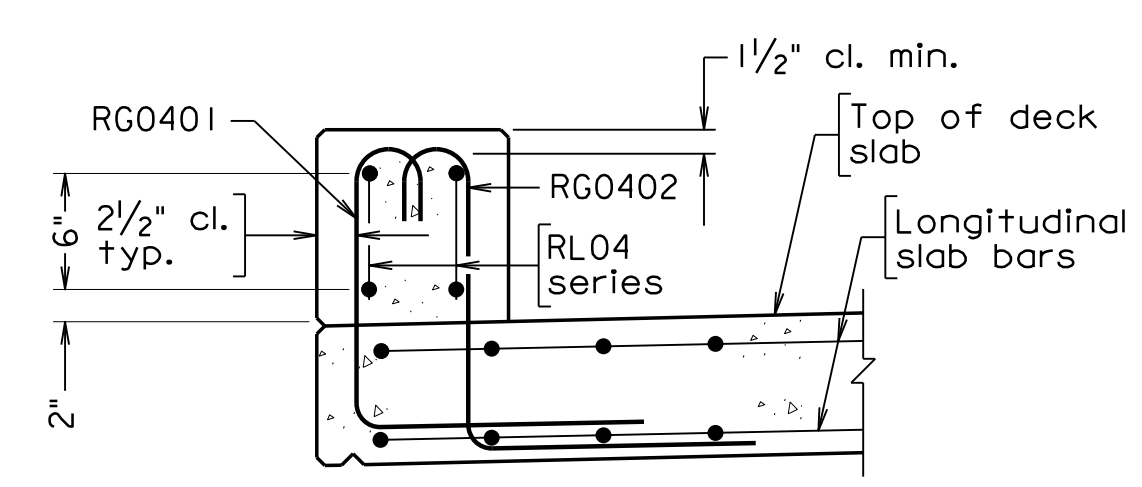
BASE PLATE DETAIL
Scale: 3" = 1'-0"



TYPICAL EXPANSION JOINT DETAIL
FOR TOP/BOTTOM RAIL AND GRIPPING HANDRAIL
Scale: 3" = 1'-0"



SECTION C-C
Scale: 1" = 1'-0"
For additional information not shown, see Section A-A.



SECTION B-B
Transverse rebar in deck slab not shown for clarity
Scale: 1" = 1'-0"

REINFORCING STEEL SCHEDULE					
RG0401	RG0402				
Mark	Size	No.	Length	Pin ϕ	Location
RG0401	#4		3'-5 3/8"	3"	Pedestal/deck slab
RG0402	#4		3'-6 3/8"	3"	Pedestal/deck slab
RL04	#4				Pedestal
RL0402	#4		1'-6"		Deck slab

Dimensions in bending diagram are out-to-out of bars.
Contractor shall determine number and lengths necessary for installation.

257-38A_084.dgn

BPR-1 MOD. 04-30-2021

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REFERENCE. NO RECORD FILE
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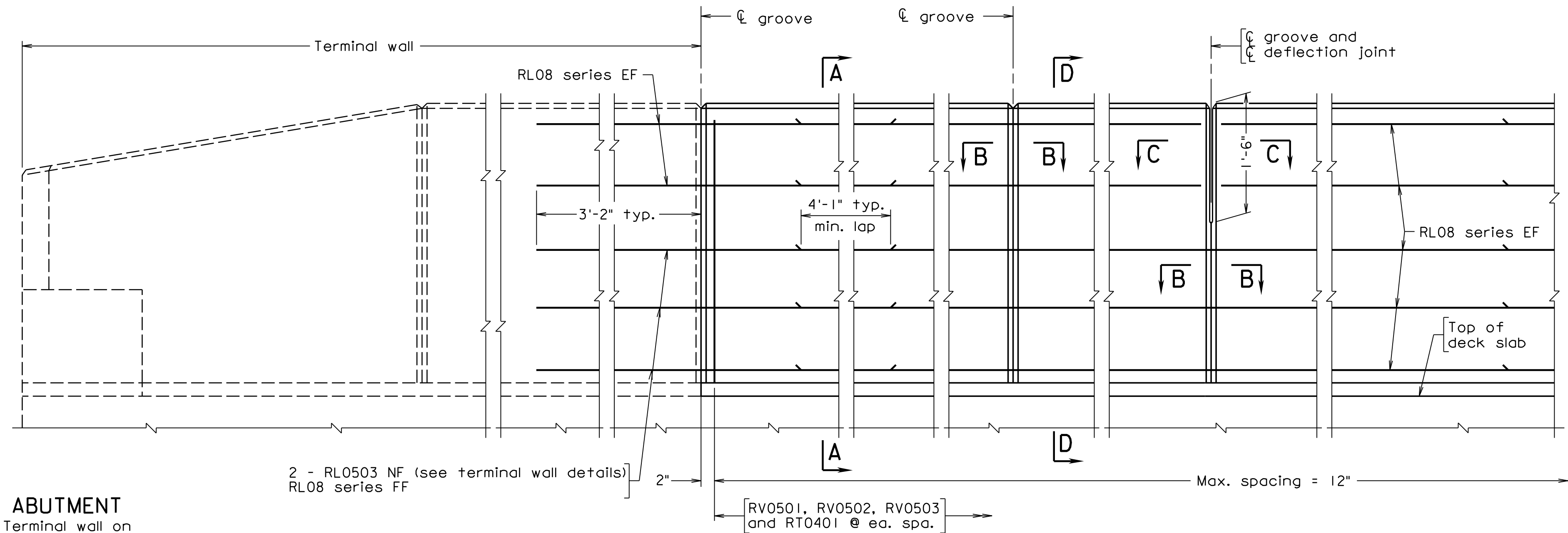
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
42" PEDESTRIAN RAILING (BPR-1)					
No.	Description	Date	Designed: MRO.....	Date	Plan No.
			Drawn: MRO.....	Apr. 2022	257-38A
			Checked: WRA.....		84 of 125
Revisions					

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				85



ABUTMENT
Terminal wall on superstructure

ELEVATION

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Low Shrinkage Class A4 Modified.

All chamfers for concrete shall be 3/4".

The reinforcing steel shown has been detailed based on a standard 1/4" per foot cross slope and for an 8 1/2" slab depth. The Contractor shall adjust the reinforcing steel as required for other cross slopes and slab depths.

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class II.

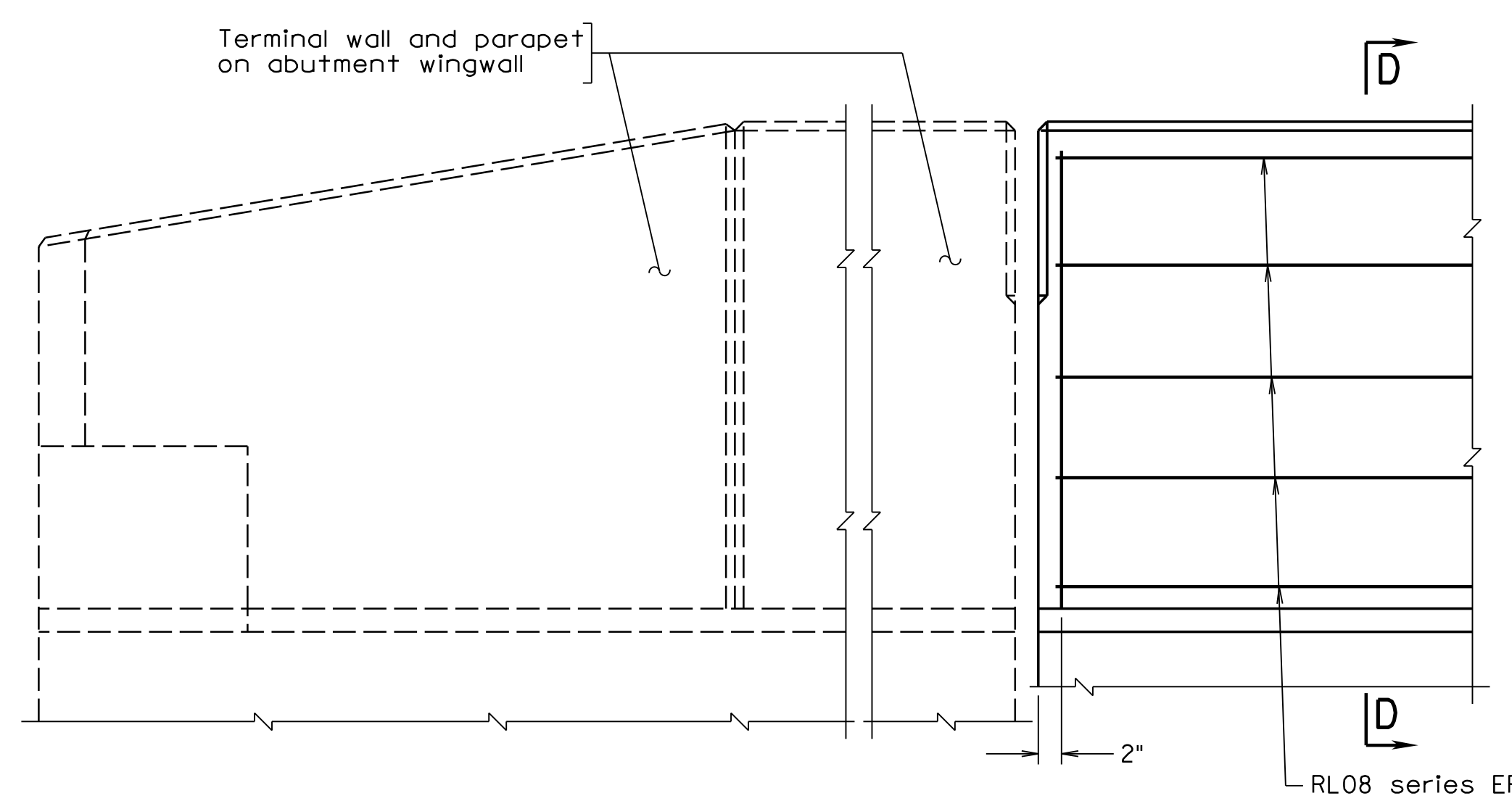
Use groove and deflection joint over pier.

Spacing of grooves is to be approximately 8'-0". If lighting standard is used (see bridge conduit system), groove shall be located approximately 4'-0" from centerline of light standard. Spacing of deflection joints shall not exceed three groove spaces.

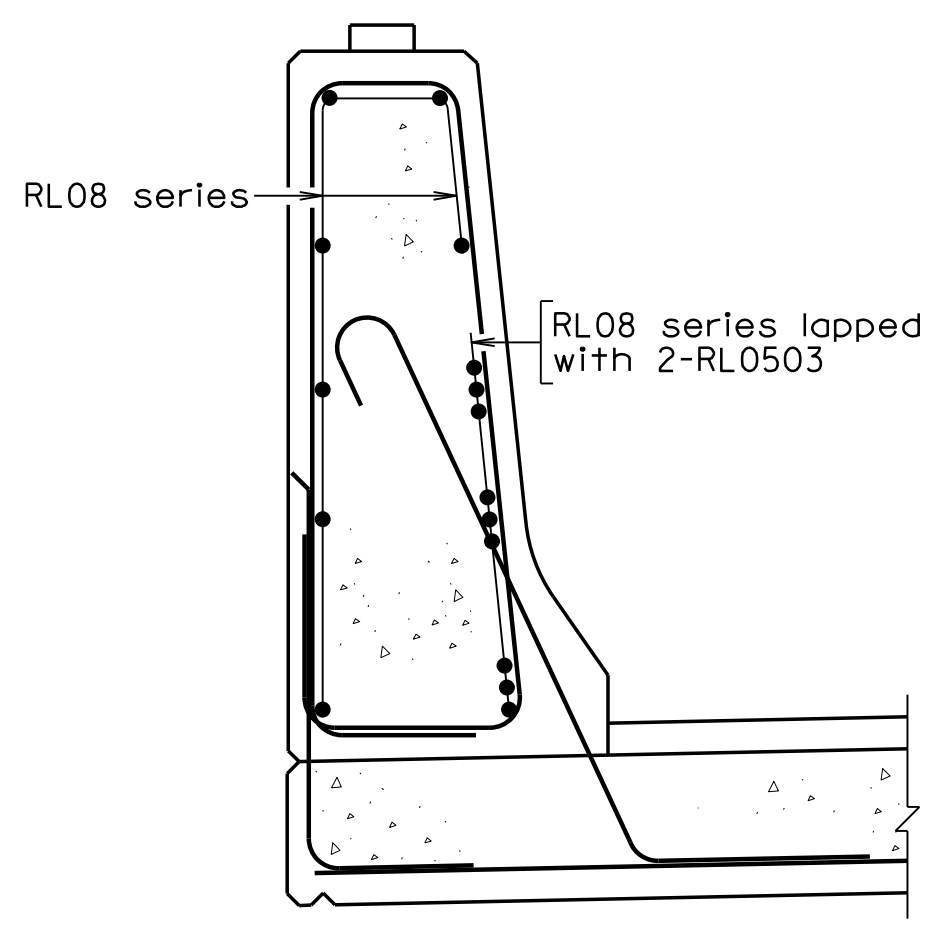
Barrier delineator size, color and spacing shall be in accordance with the Specifications.

Parapet (including terminal wall) shall not be extruded if pedestrian fencing will be attached.

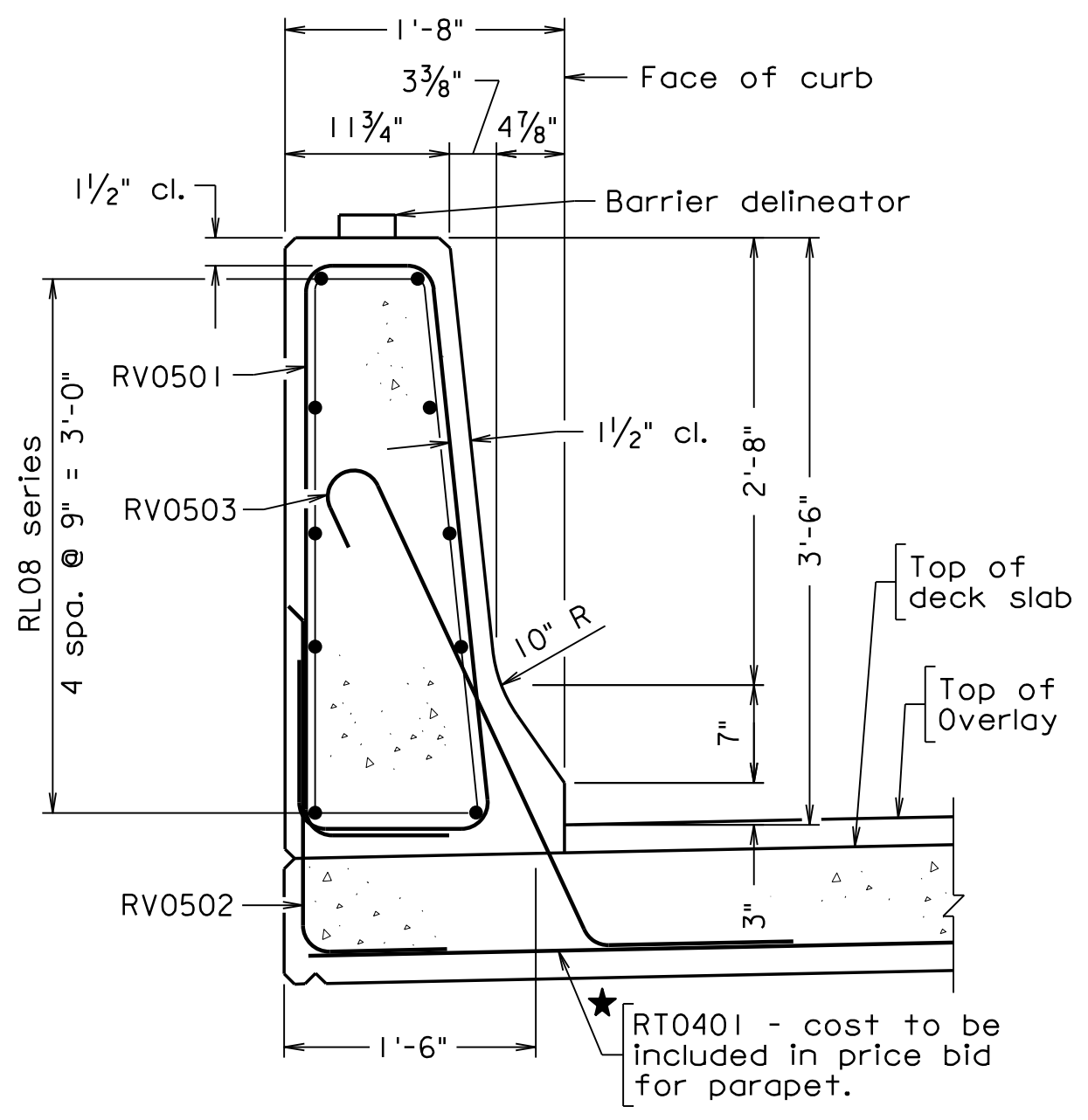
For details and reinforcing steel schedule of terminal wall, see sheet 79.



PART ELEVATION
For use with terminal wall on wingwall



SECTION A-A
For dimensions and details not shown, see Section D-D



SECTION D-D

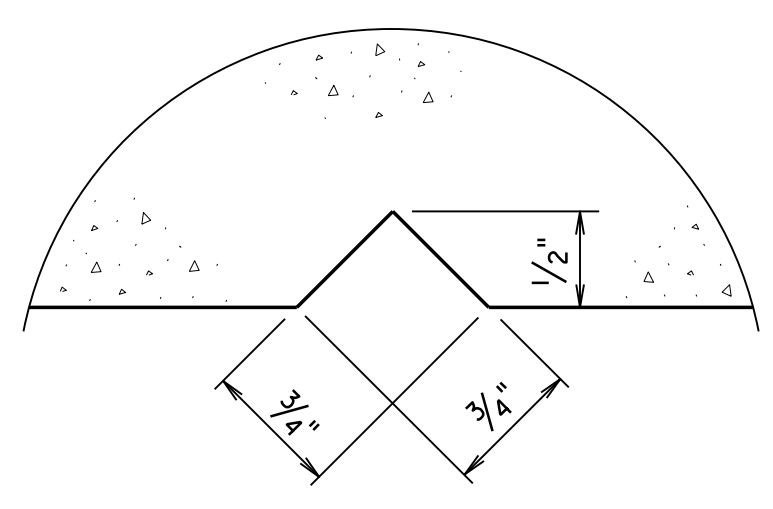
REINFORCING STEEL SCHEDULE					
RV0501	RV0502	RV0503			
Mark	No.	Size	Pin ø	Length	Location
★RT0401		#4	—	4'-0"	Deck slab
RV0501		#5	3 3/4"	9'-5"	Parapet
RV0502		#5	3 3/4"	2'-7"	Parapet
RV0503		#5	3 3/4"	5'-0"	Parapet
RL08		#8	—		Parapet and terminal wall

Dimensions in bending diagram are out-to-out of bars, except as shown.

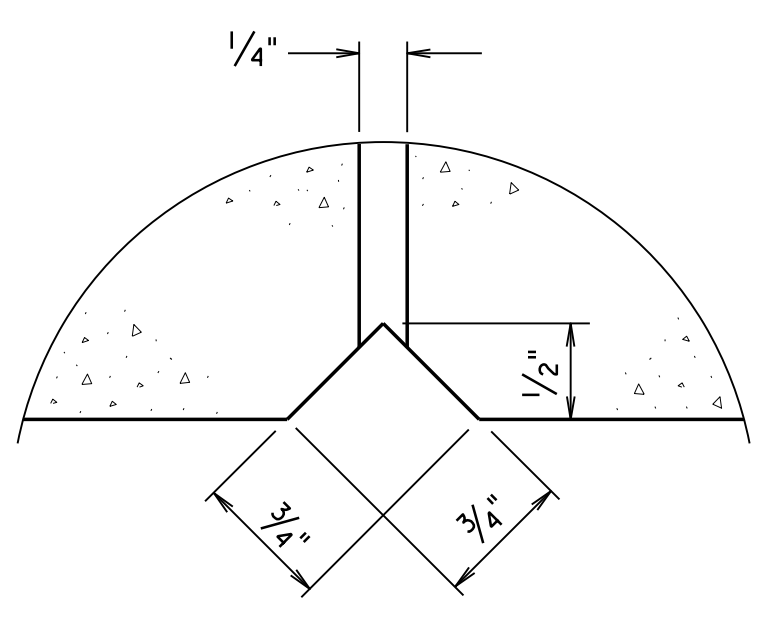
Gross concrete quantities (C.Y.) = Lin. Ft. x 0.158

All concrete above deck slab.

★ Used only when deck transverse reinforcement is parallel to skew of bridge.



SECTION B-B
Full scale
Groove detail for both sides of parapet



SECTION C-C
Full scale
Deflection joint detail for both sides of parapet

Scale: 1" = 1'-0" unless otherwise shown.

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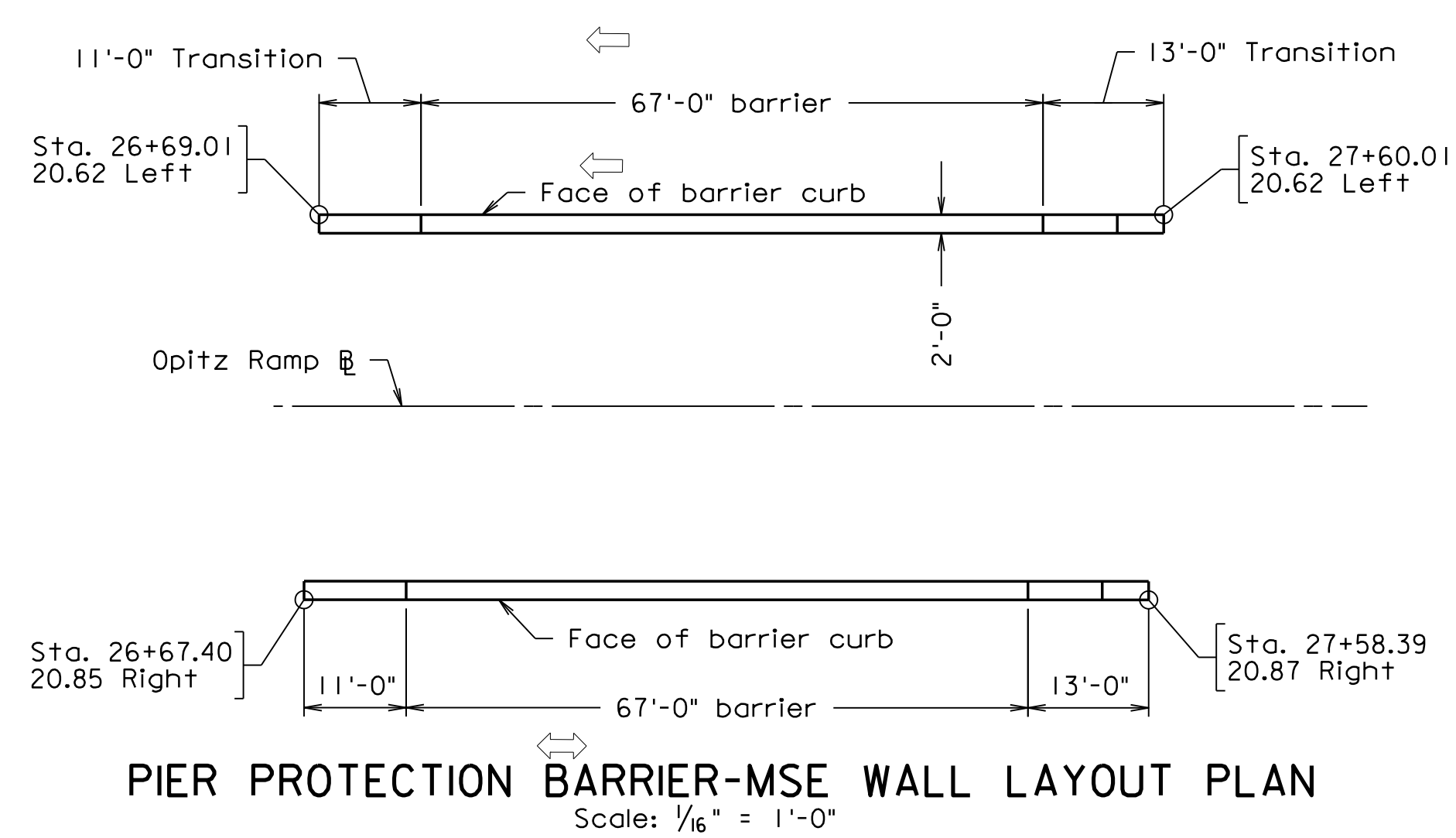
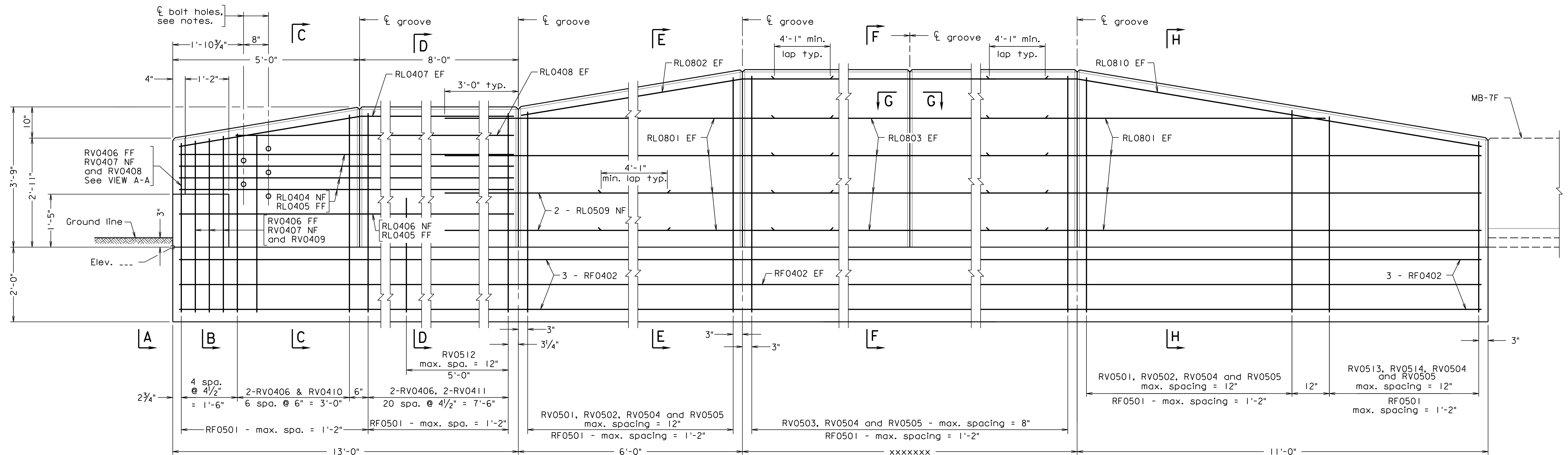
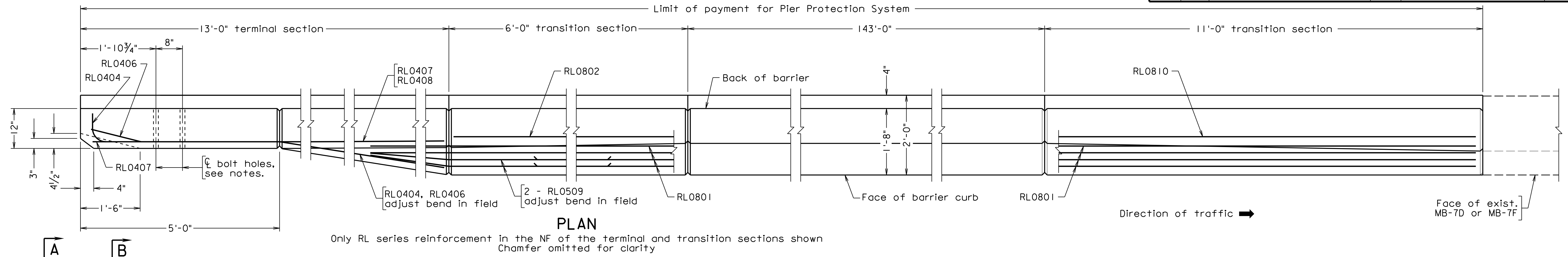
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
42" CAST-IN-PLACE CONCRETE PARAPET (F-SHAPE) (BPB-4)					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn:CRR.....	Apr. 2022	257-38A
			Checked: MRD.....		85 of 125
Revisions					

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BPB-4 MOD. 04-30-2021 257-38A_085.dgn

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WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER



Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Class A4.

All chamfers for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class I except as indicated in the reinforcing steel schedule.

Spacing of grooves shall be approximately 8'-0". Spacing of transverse construction joints for crack control shall be at approximately 24'-0" to coincide with centerline of groove. Transverse construction joint through barrier and footing shall be at the same location.

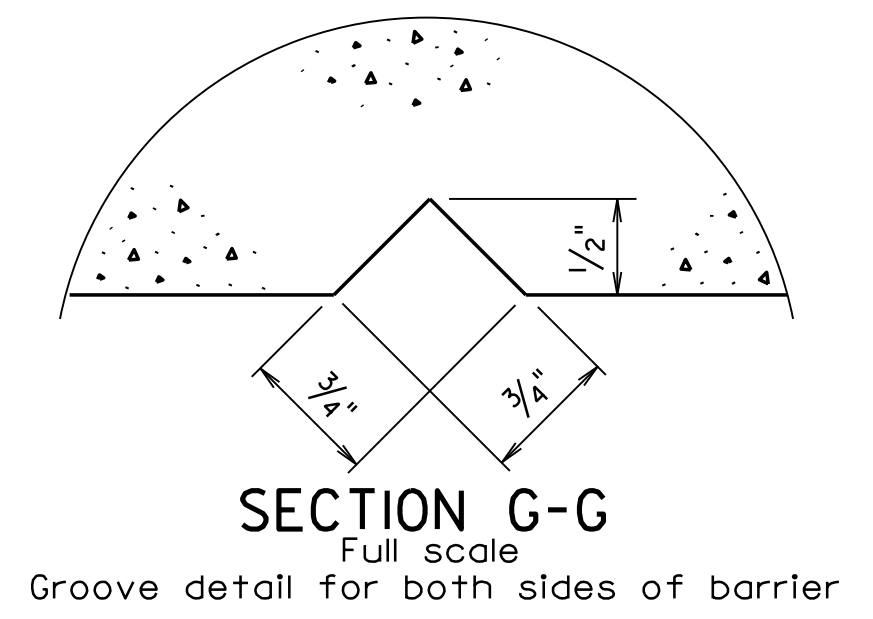
Barrier delineator size, color and spacing shall be in accordance with the Specifications.

Terminal sections are detailed to take guardrail attachment GR-FOA-5.

Holes, where shown, shall be formed with sleeves of 1/4" diameter nominal pipe.

For reinforcing steel schedule and details not shown, see sheet 90.

Scale: 3/4" = 1'-0" unless otherwise shown.



PAC PLANS
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION		STRUCTURE AND BRIDGE DIVISION	
PIER PROTECTION SYSTEM 54" HIGH (BPPS-1A) 1 OF 4			
No.	Description	Date	Revisions
Designed: CRR	Date	Plan No.	Sheet No.
Drawn: CRR	Apr. 2022	257-38A	86 of 125
Checked: MRD			

BPPS-1A MOD. 10-30-2020 257-38A_086.dgn

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID	STATE	SHEET
VA.	PROJECT	ROUTE	NO.
		95	87
		0095-076-299, B688	

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Class A4.

All chamfers for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class I except as indicated in the reinforcing steel schedule.

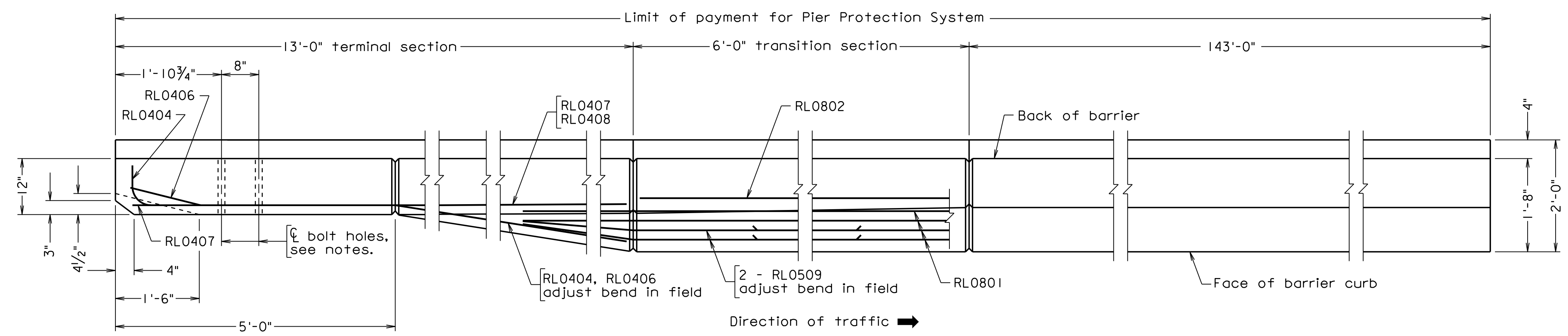
Spacing of grooves shall be approximately 8'-0". Spacing of transverse construction joints for crack control shall be at approximately 24'-0" to coincide with centerline of groove. Transverse construction joint through barrier and footing shall be at the same location.

Barrier delineator size, color and spacing shall be in accordance with the Specifications.

Terminal sections are detailed to take guardrail attachment GR-F0A-5.

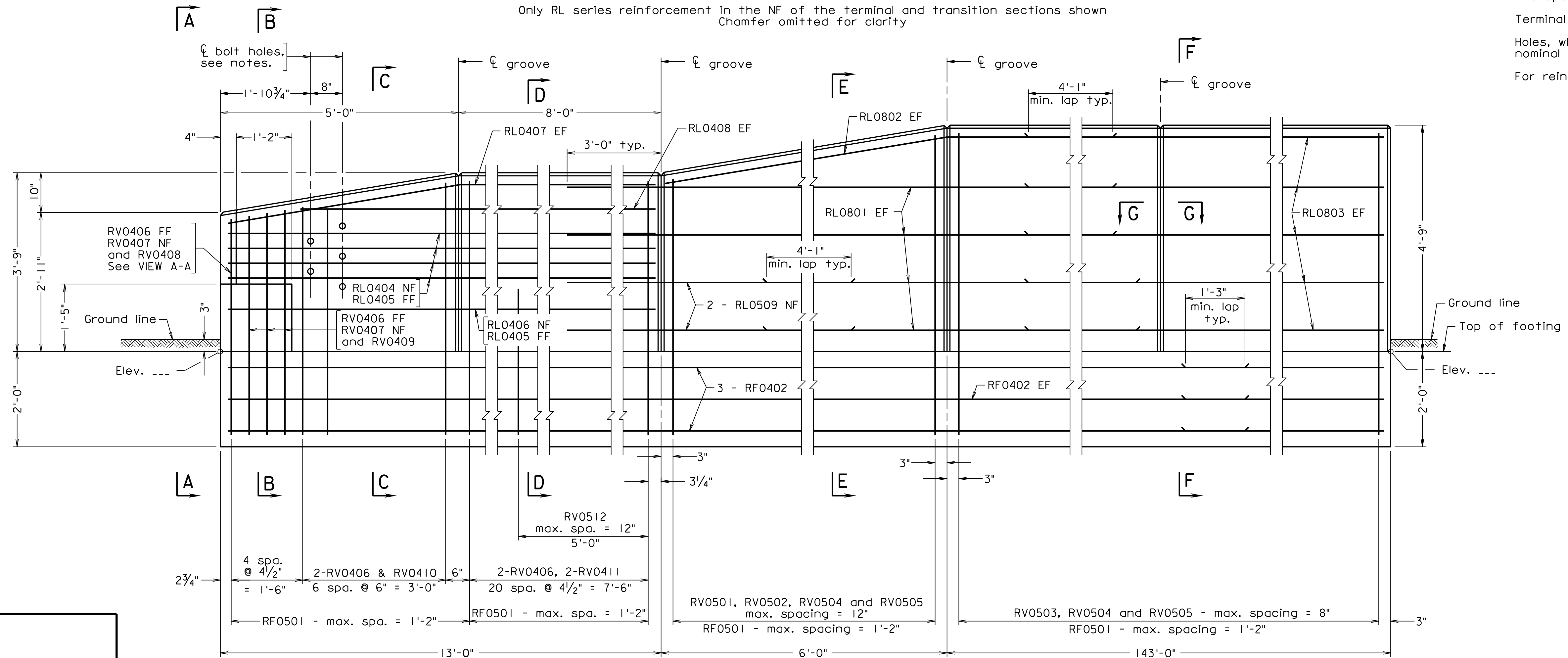
Holes, where shown, shall be formed with sleeves of 1 1/4" diameter nominal pipe.

For reinforcing steel schedule and details not shown, see sheet 90.

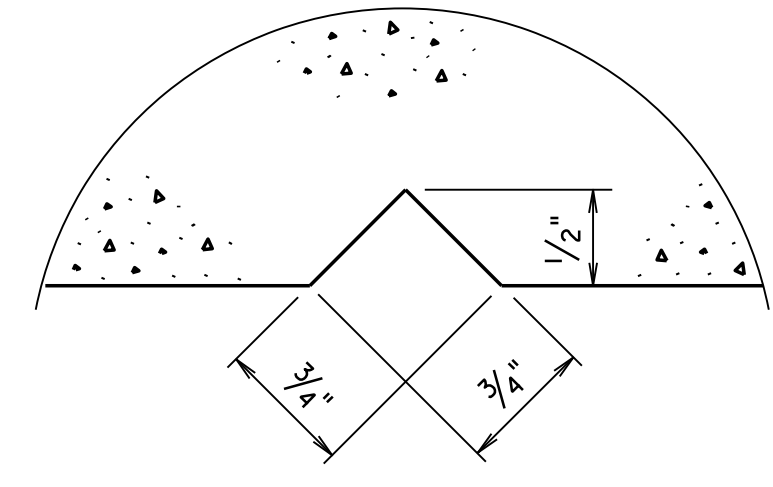


PLAN

Only RL series reinforcement in the NF of the terminal and transition sections shown
Chamfer omitted for clarity

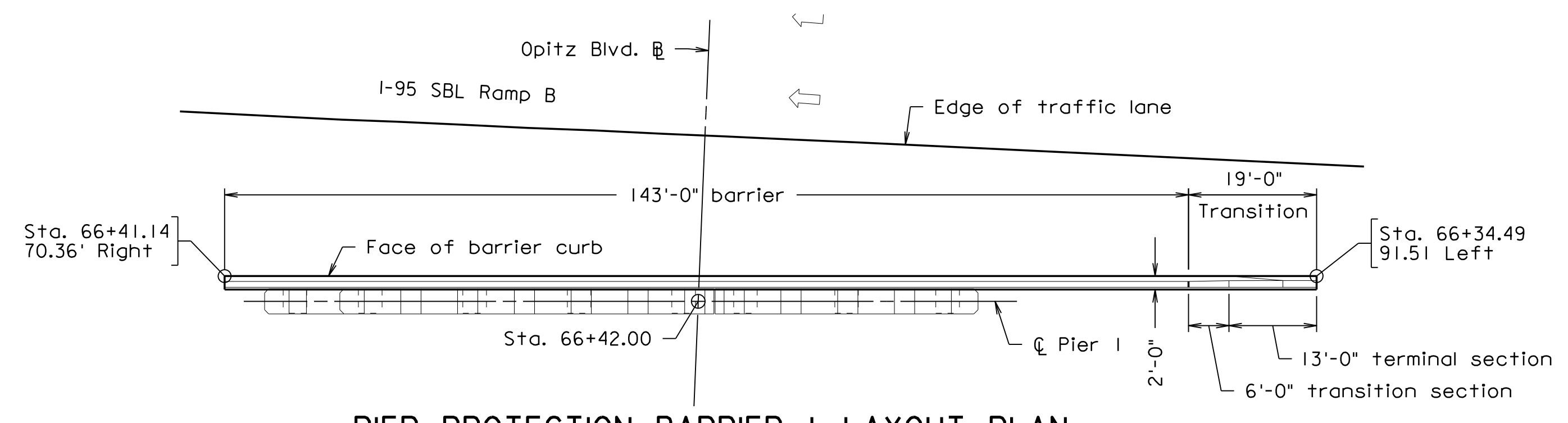


ELEVATION



SECTION G-G

Full scale
Groove detail for both sides of barrier



PIER PROTECTION BARRIER-I LAYOUT PLAN

Scale: 1/16" = 1'-0"

Scale: 3/4" = 1'-0" unless otherwise shown.

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PIER PROTECTION SYSTEM 54" HIGH (BPPS-1A) 2 OF 4			
No.	Description	Date	Revisions
Designed: CRR	Date	Plan No.	Sheet No.
Drawn: CRR	Apr. 2022	257-38A	87 of 125
Checked: MRD			

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257-38A_087.dgn

BPPS-1A 10-30-2020

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Juryl Meyer
Lic. No. 074212
On the 04th day of
October

A copy of the original
signed drawing
shall be retained in the
office.

VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE 95	0095-076-299, B688
			88

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Class A4.

All chamfers for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class I except as indicated in the reinforcing steel schedule.

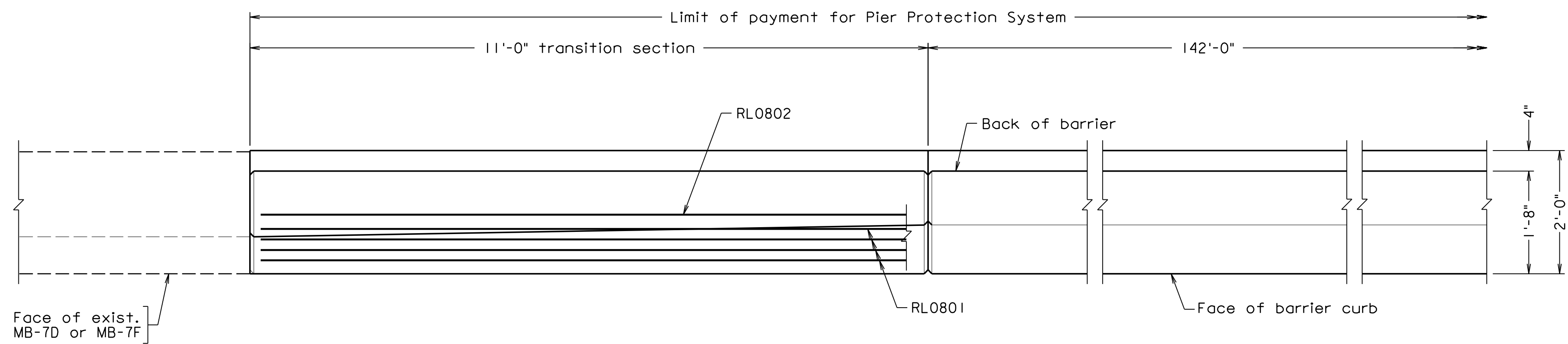
Spacing of grooves shall be approximately 8'-0". Spacing of transverse construction joints for crack control shall be at approximately 24'-0" to coincide with centerline of groove. Transverse construction joint through barrier and footing shall be at the same location.

Barrier delineator size, color and spacing shall be in accordance with the Specifications.

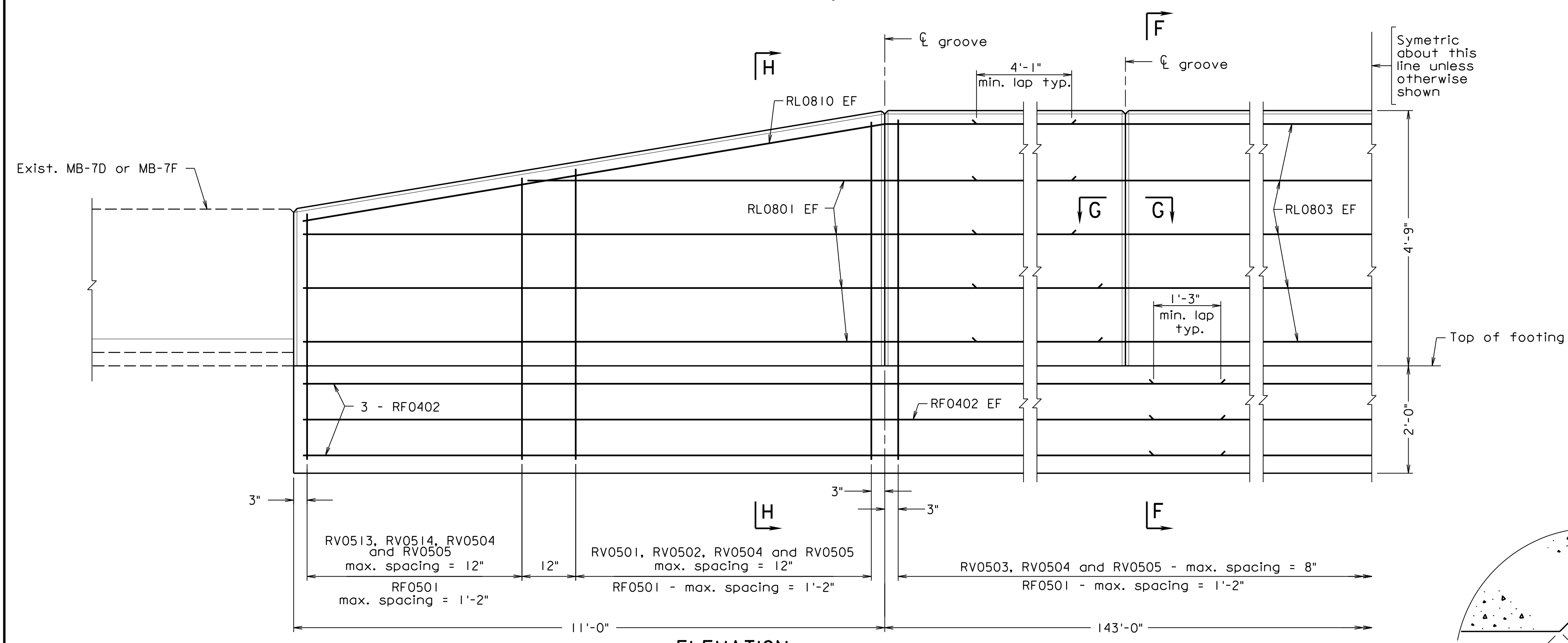
Terminal sections are detailed to take guardrail attachment GR-F0A-5.

Holes, where shown, shall be formed with sleeves of 1 1/4" diameter nominal pipe.

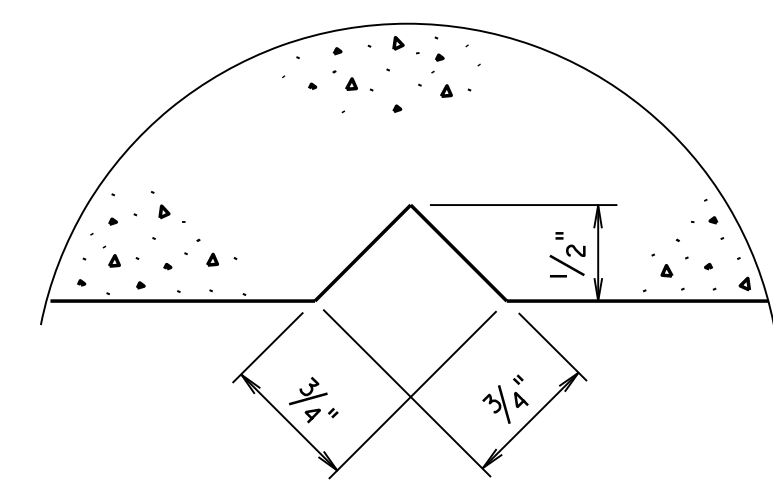
For reinforcing steel schedule and details not shown, see sheet 90.



PLAN
Only RL series reinforcement in the NF of the terminal and transition sections shown
Chamfer omitted for clarity

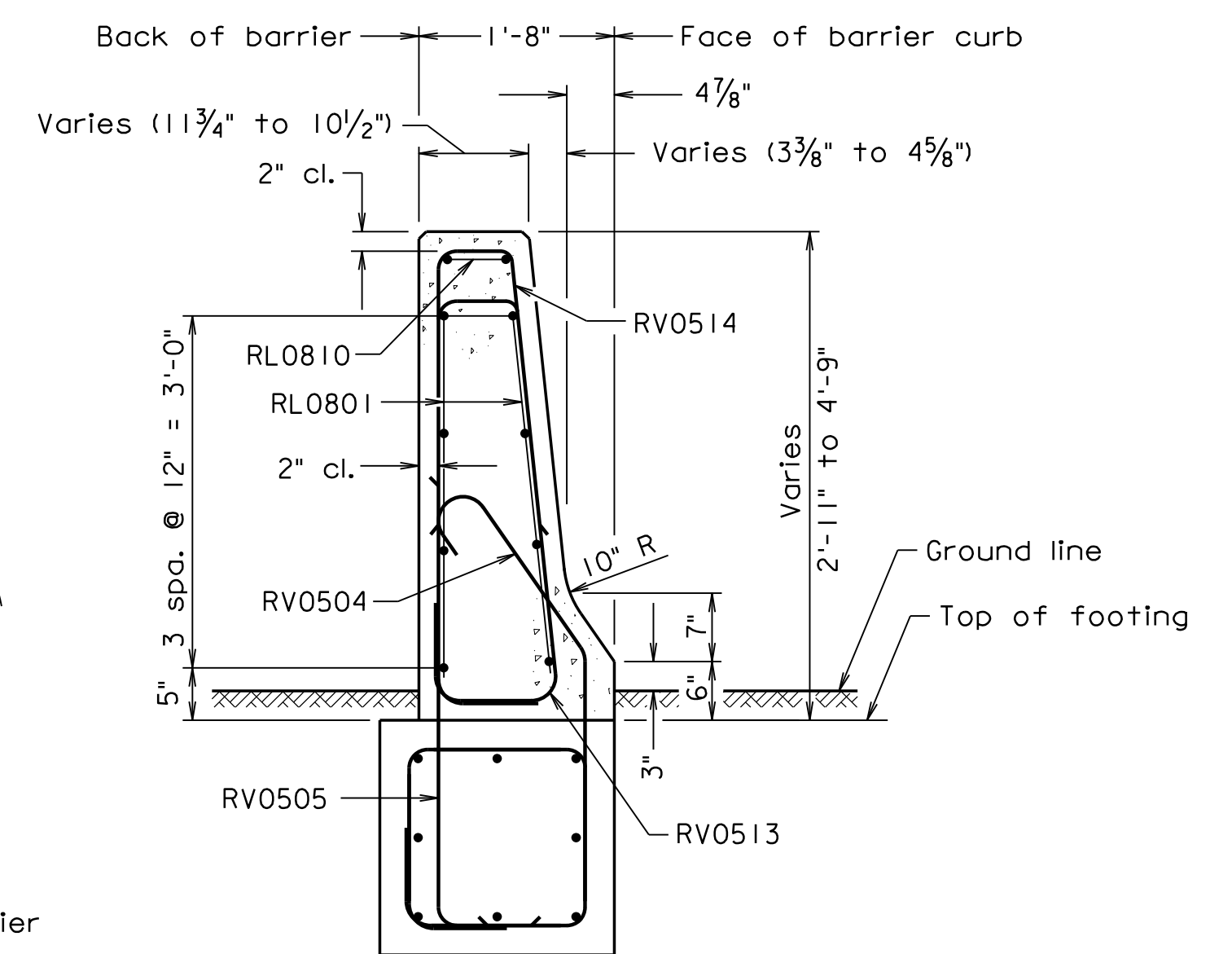


ELEVATION

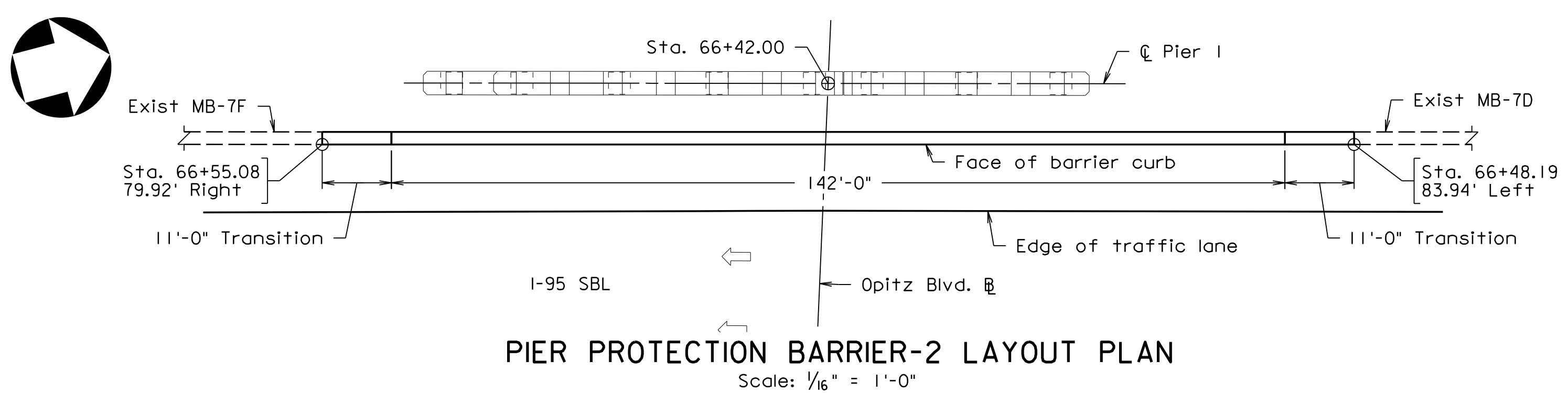


SECTION G-G

Full scale
Groove detail for both sides of barrier



SECTION H-H



PIER PROTECTION BARRIER-2 LAYOUT PLAN

Scale: 1/16" = 1'-0"

Scale: 3/4" = 1'-0" unless otherwise shown.

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STRUCTURE AND BRIDGE DIVISION					
PIER PROTECTION SYSTEM 54" HIGH (BPPS-1A) 3 OF 4					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		88 of 125
Revisions					

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RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			89

Notes:

Plan dimensions shown are measured in the respective horizontal and vertical planes.

The Contractor shall determine all dimensions and details necessary for installation.

All concrete shall be Class A4.

All chamfers for concrete shall be 3/4".

All reinforcing steel shall be Corrosion Resistant Reinforcing Steel, Class I except as indicated in the reinforcing steel schedule.

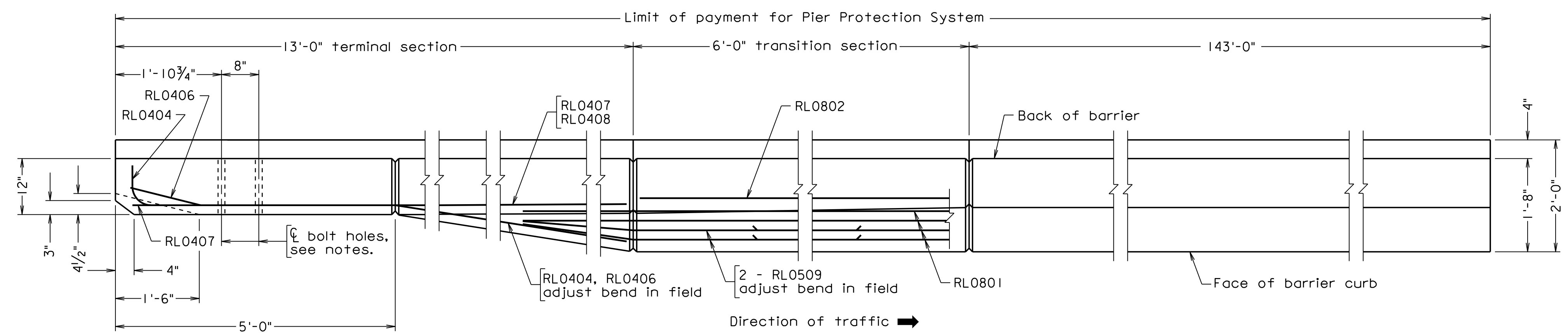
Spacing of grooves shall be approximately 8'-0". Spacing of transverse construction joints for crack control shall be at approximately 24'-0" to coincide with centerline of groove. Transverse construction joint through barrier and footing shall be at the same location.

Barrier delineator size, color and spacing shall be in accordance with the Specifications.

Terminal sections are detailed to take guardrail attachment GR-F0A-5.

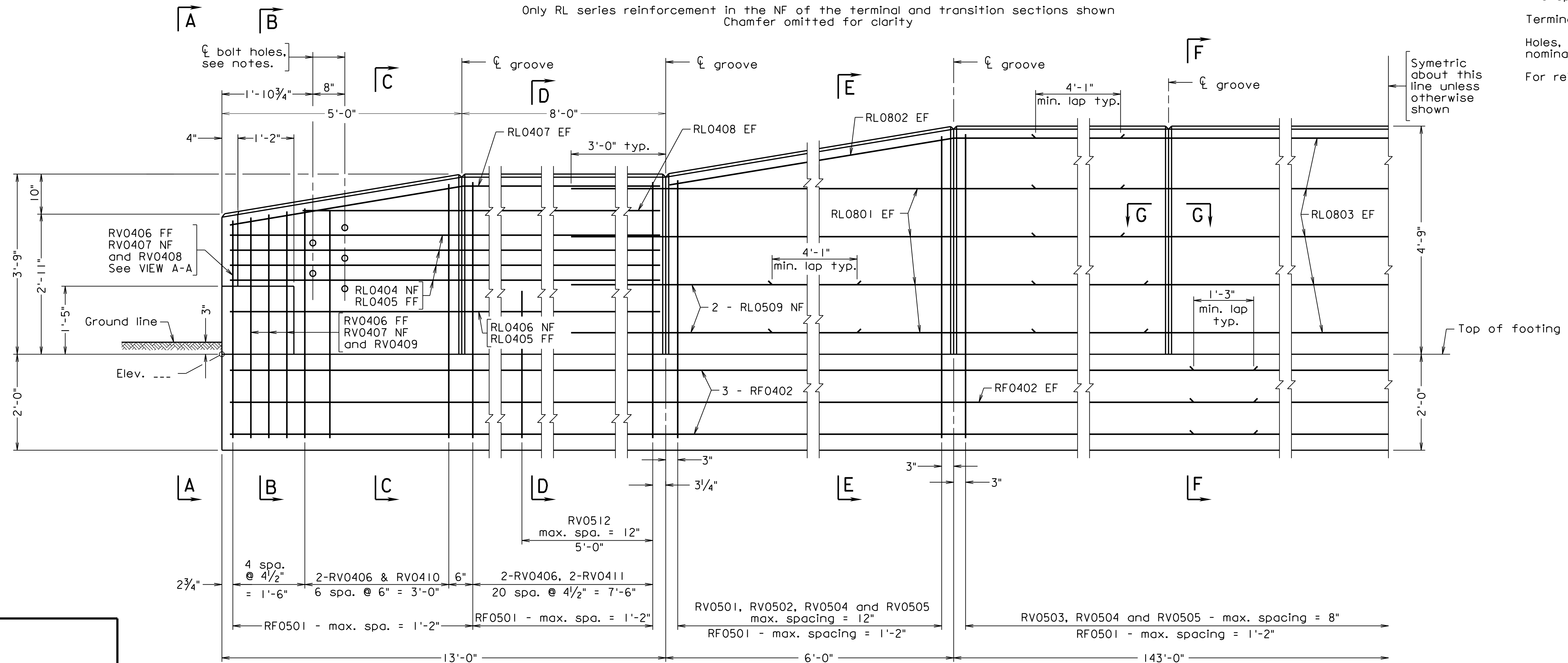
Holes, where shown, shall be formed with sleeves of 1 1/4" diameter nominal pipe.

For reinforcing steel schedule and details not shown, see sheet 90.

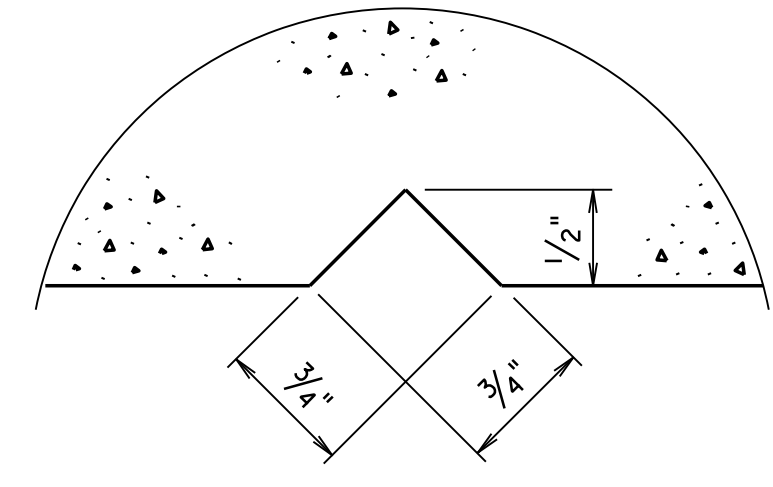


PLAN

Only RL series reinforcement in the NF of the terminal and transition sections shown
Chamfer omitted for clarity

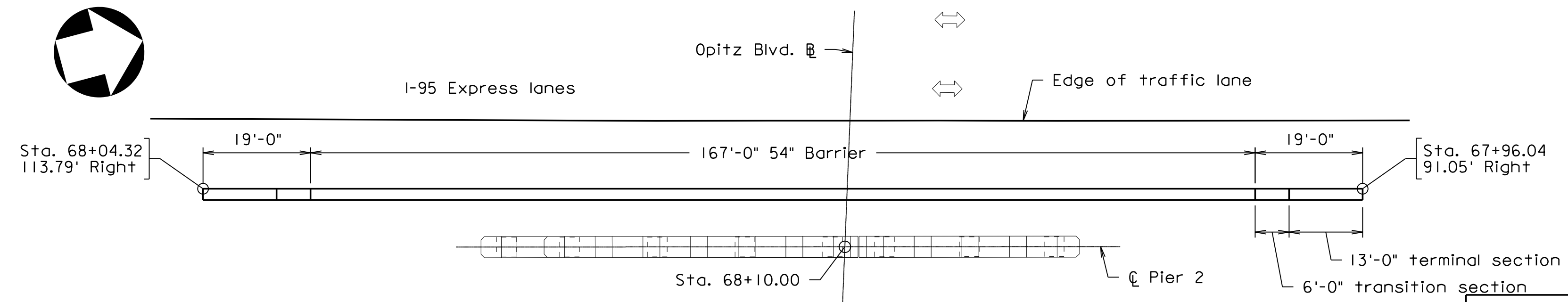


ELEVATION



SECTION G-G

Full scale
Groove detail for both sides of barrier



PIER PROTECTION BARRIER-3 LAYOUT PLAN

Scale: 1/16" = 1'-0"

Scale: 3/4" = 1'-0" unless otherwise shown.

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STRUCTURE AND BRIDGE DIVISION					
PIER PROTECTION SYSTEM 54" HIGH (BPPS-1A) 4 OF 4					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		89 of 125
Revisions					

PROGRESS PRINT 4/1/2022

257-38A_089.dgn

BPPS-1A 10-30-2020

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Juryl Meyer
Lic. No. 07012
On the 12th day of
October

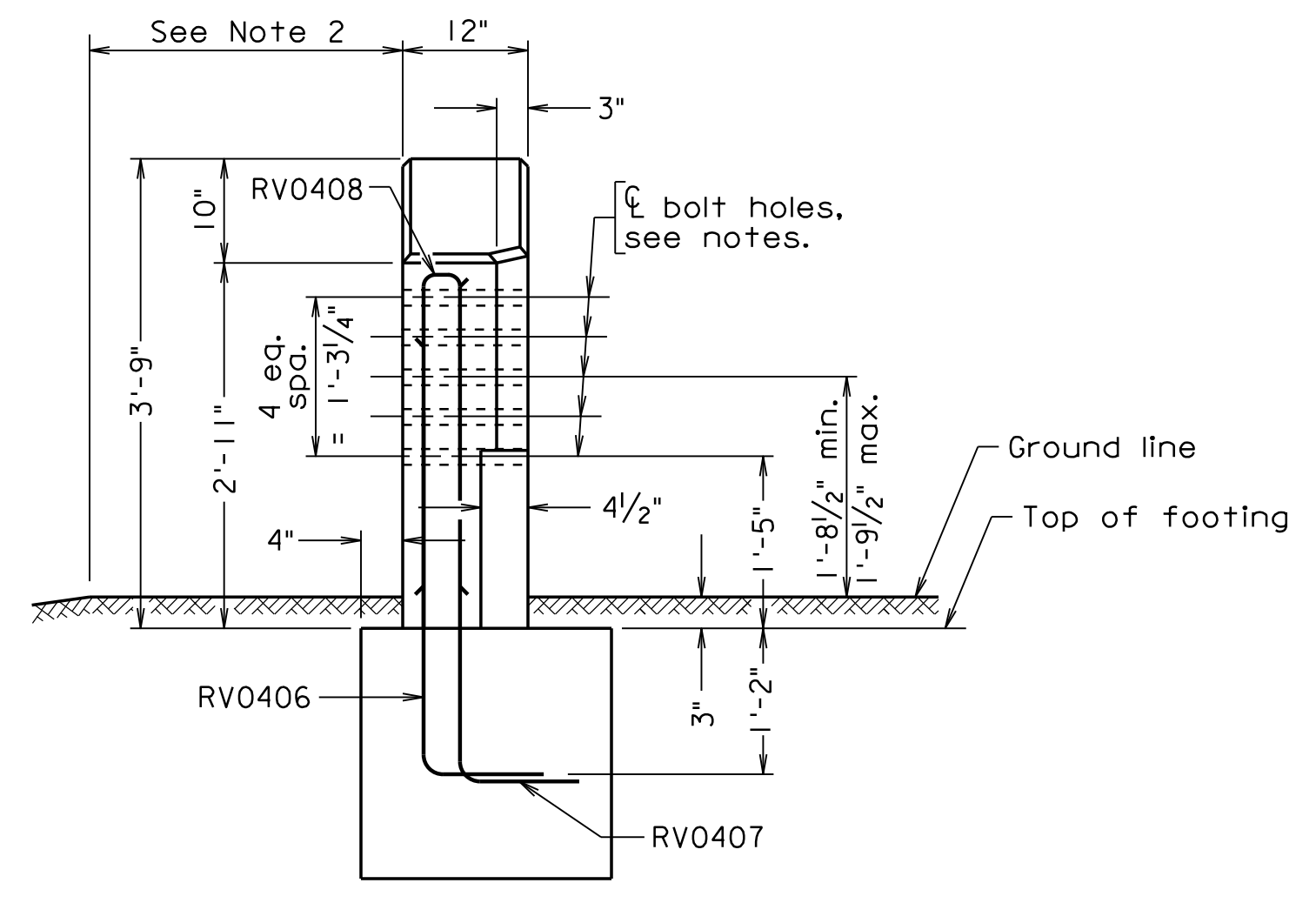
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drawing shall be retained
in the office.

VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

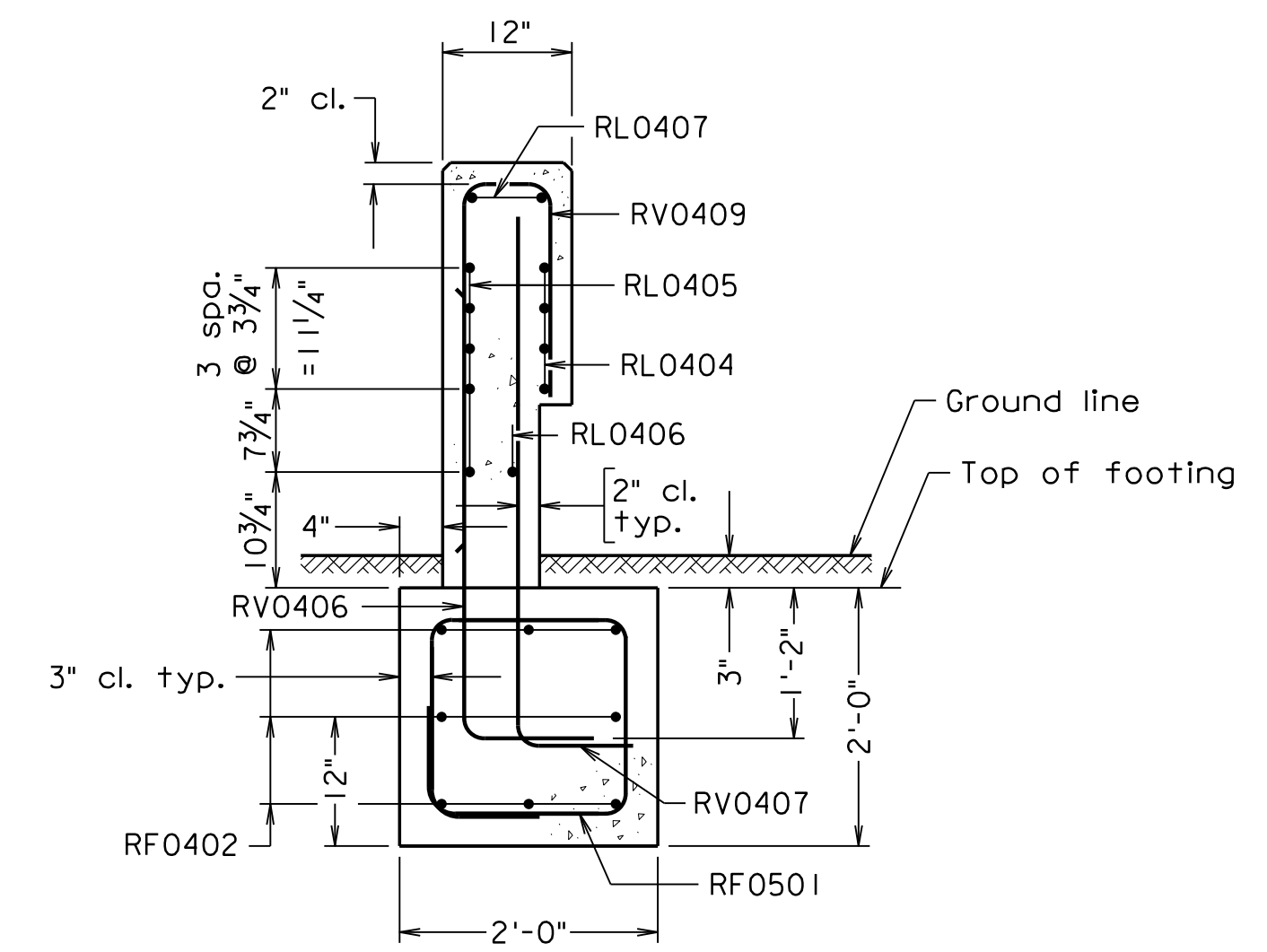
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			90

- Notes:
1. Footing dimensions and RF series bars are typical in all sections, but only labeled in SECTION B-B.
 2. 2'-6" min. from the break line of embankment unless footing adjacent to a permanent structure.



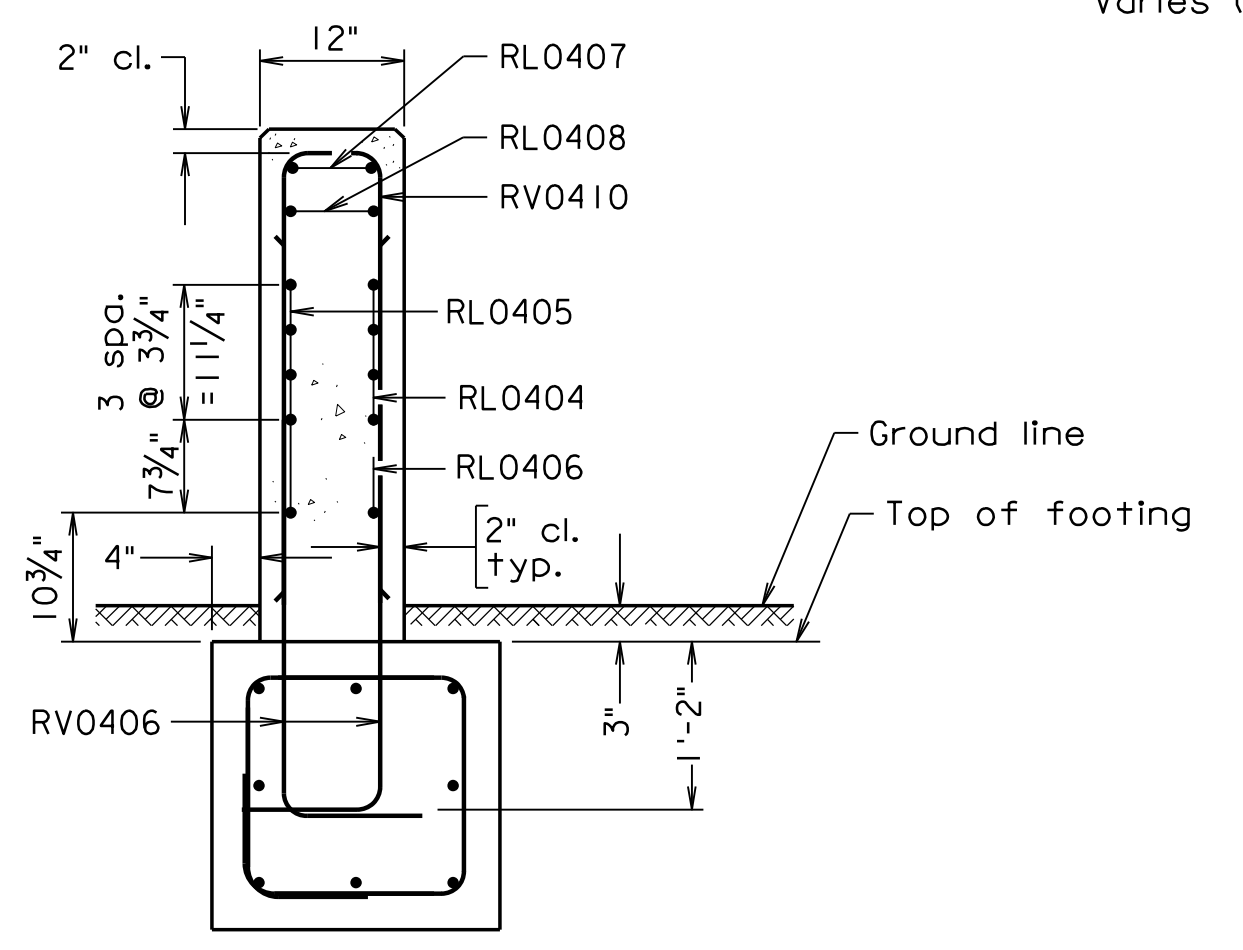
VIEW A-A

For clarity, only bars RV0406, RV0407 and RV0408 shown

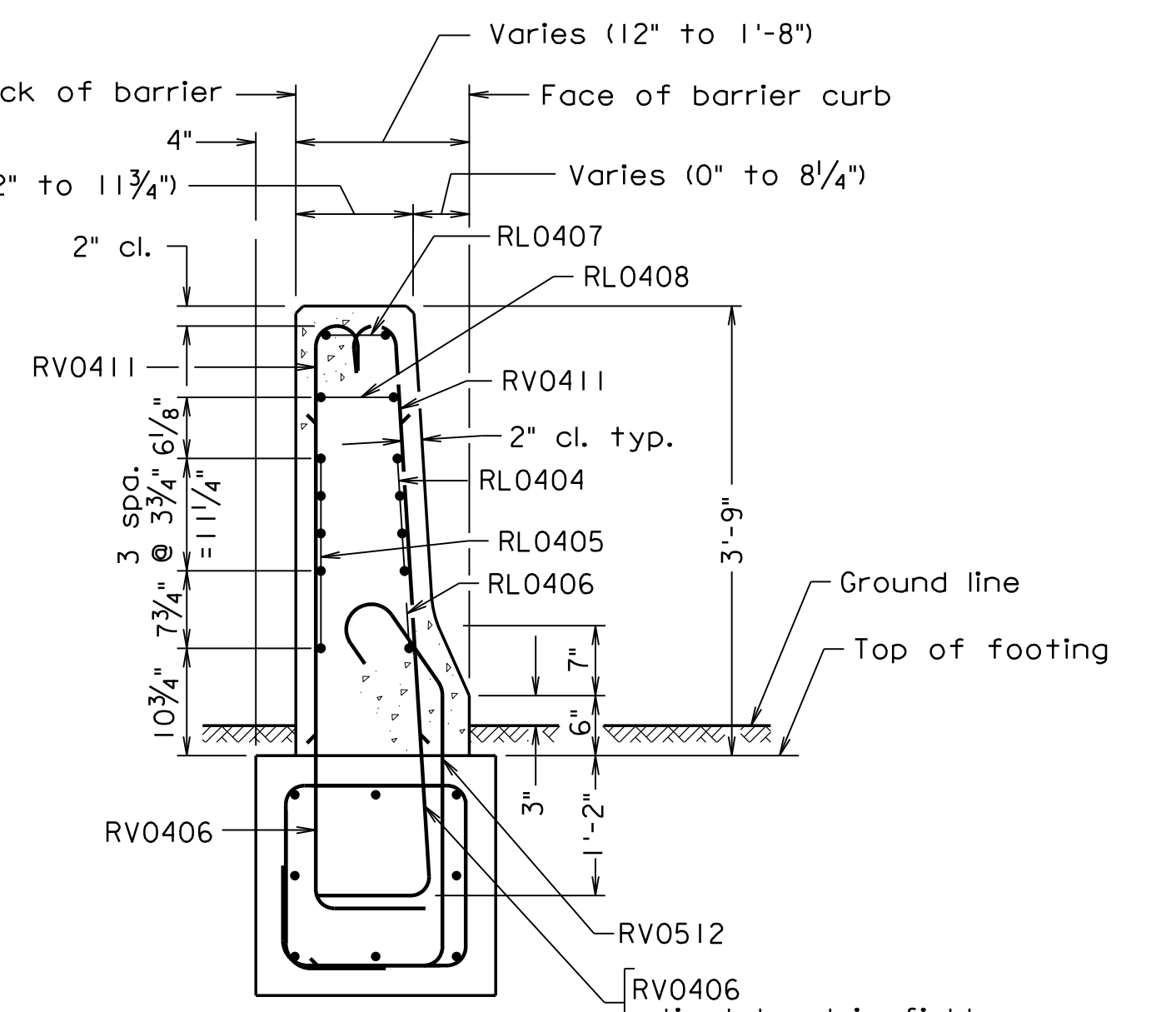


SECTION B-B

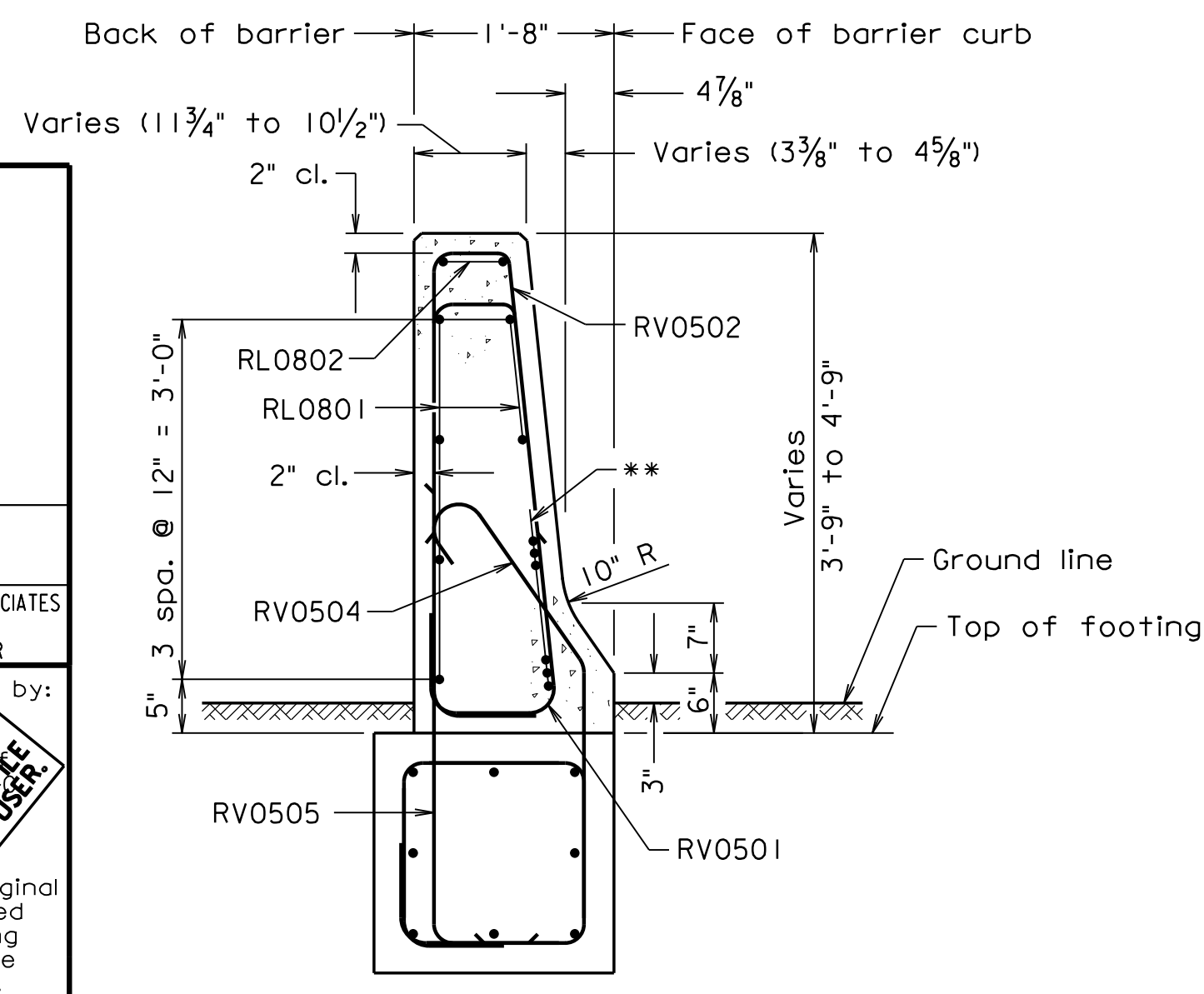
Bolt holes not shown



SECTION C-C

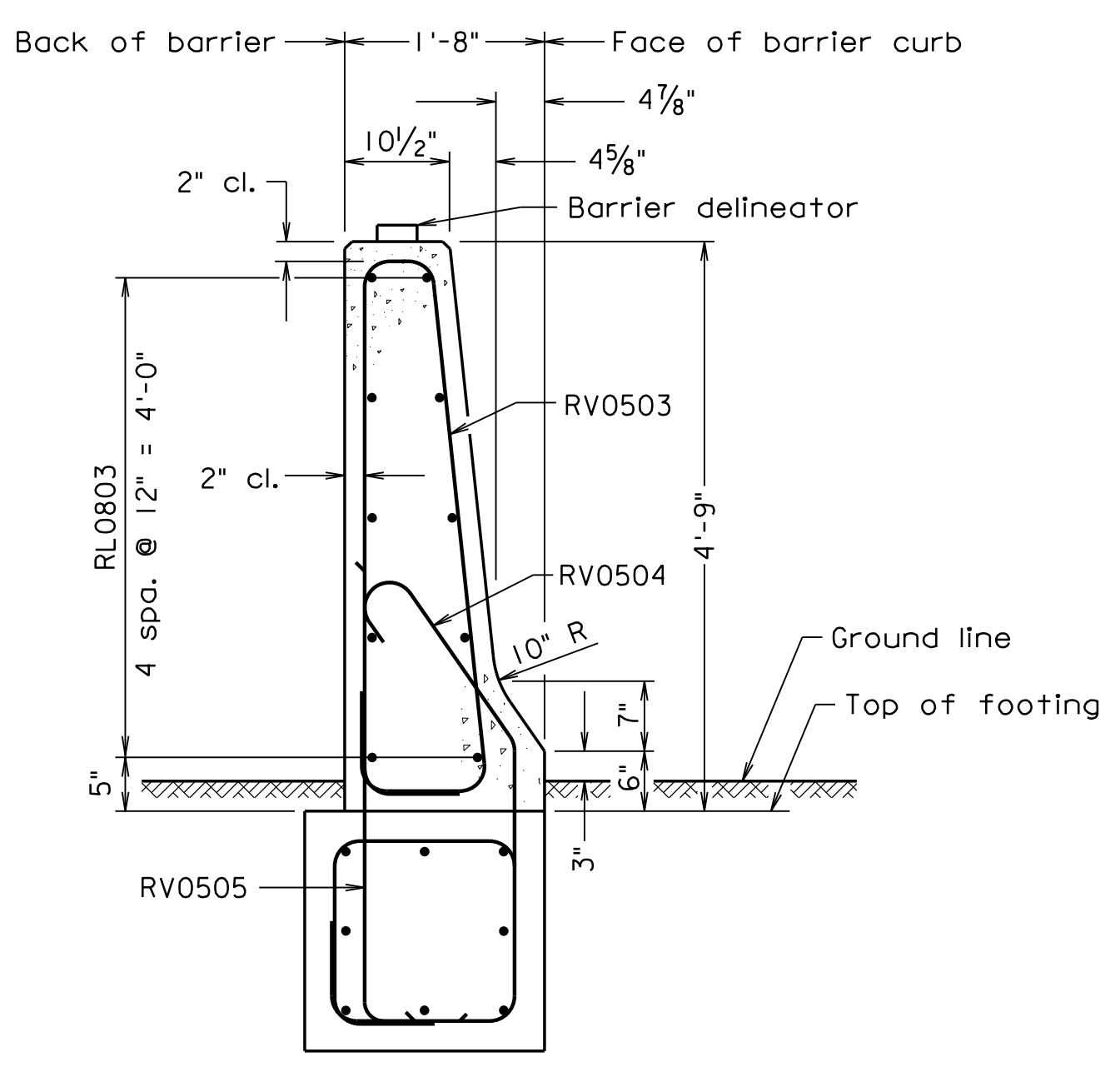


SECTION D-D



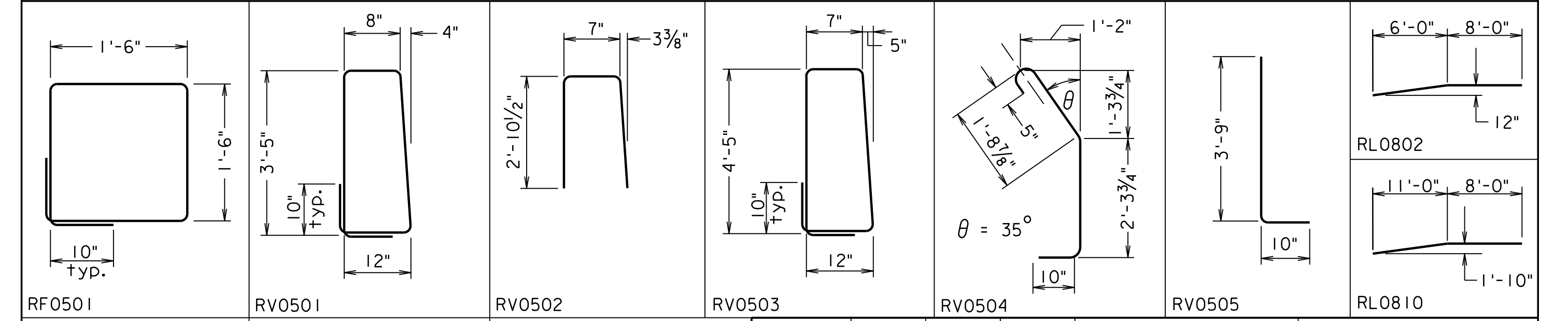
SECTION E-E

** RL0801 lapped with 2-RL0509



SECTION F-F

REINFORCING STEEL SCHEDULE



Mark	No.	Size	Pin o	Length	Location
RV0501	--	#5	3 3/4"	9'-7"	Barrier
RV0502	--	#5	3 3/4"	6'-2"	Barrier
RV0503	--	#5	3 3/4"	11'-6"	Barrier
RV0504	#5	3 3/4"		5'-4"	Barrier/footing
RV0505	#5	3 3/4"		4'-6"	Barrier/footing
RV0406	#4	3"		3'-8"	Terminal wall/footing
RV0407	#4	3"		4'-4"	Terminal wall/footing
RV0408	#4	2"		5'-8"	Terminal wall
RV0409	#4	3"		from 4'-7" to 4'-10"	Terminal wall
RV0410	#4	3"		from 6'-7" to 7'-7"	Terminal wall
RV0411	#4	3"		4'-1"	Terminal wall
RV0512	#5	3 3/4"		4'-7"	Terminal wall/footing
RV0513	#5	3 3/4"		7'-11"	Barrier
RV0514	#5	3 3/4"		5'-6"	Barrier
RL0801	#8			17'-0"	Barrier/Terminal wall
RL0802	#8	6"		14'-1"	Barrier
RL0803	#8				Barrier
RL0404	#4	6"		13'-0"	Terminal wall
RL0405	#4			12'-8"	Terminal wall
RL0406	#4	3"		12'-8"	Terminal wall
RL0407	#4	3"		12'-9"	Terminal wall
RL0408	#4			11'-5"	Terminal wall
RL0509	#5	3 3/4"		8'-0"	Barrier/Terminal wall
RL0810	#8	6"		8'-0"	Barrier/Terminal wall
*RF0501	#5	3 3/4"		7'-1"	Footing
*RF0402	#4				Footing

Dimensions in bending diagram are out-to-out of bars.
*All RF series bars shall be ASTM A615, Grade 60.

BPPS-2A 10-30-2020 257-38A_090.dgn

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Juryli Mera
Lic. No. 074212
On the date of
October 12, 2022

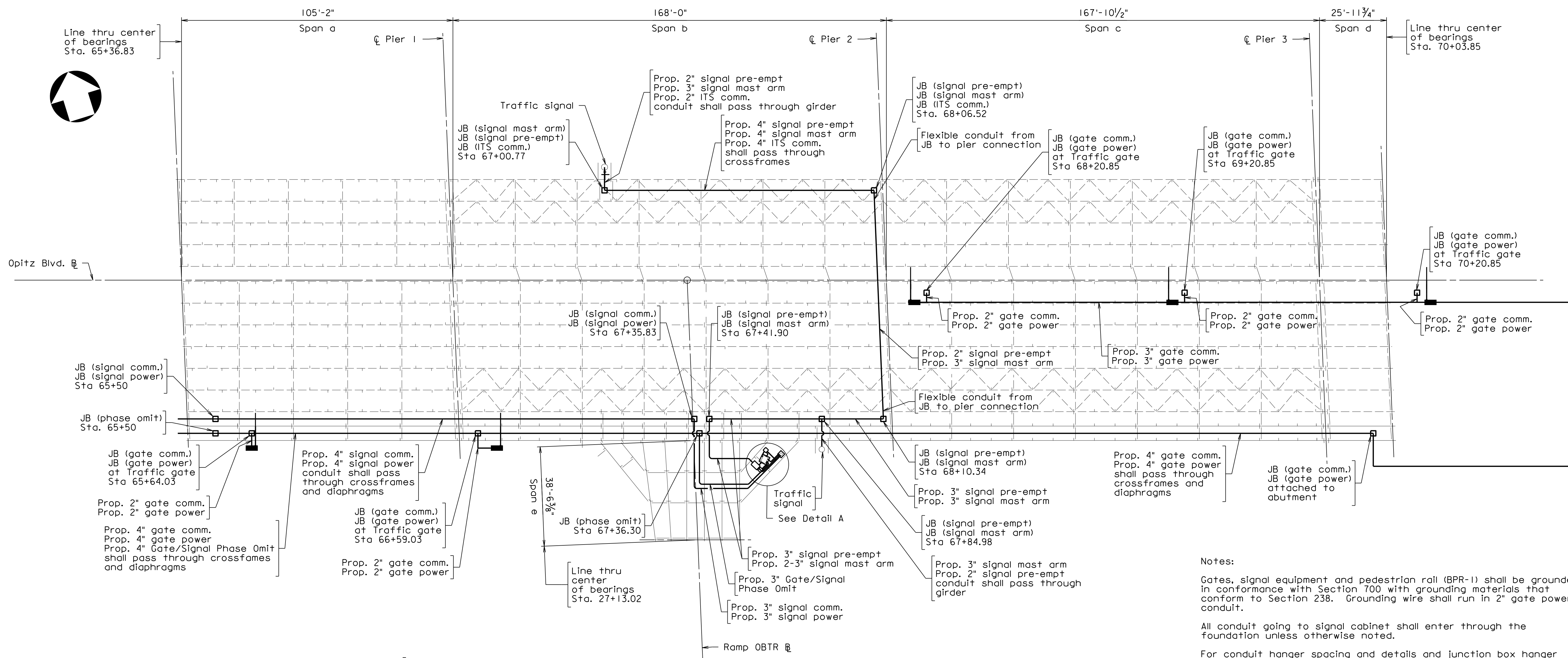
A copy of this original
drawing is to be
maintained in the
designer's office.

VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

**PAC PLANS
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
PIER PROTECTION SYSTEM 54" HIGH (BPPS-2A)					
No.	Description	Date	Designed: CRR	Date	Plan No.
	Revisions		Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		90 of 125

Scale: 3/4" = 1'-0" unless otherwise shown © 2022, Commonwealth of Virginia



CONDUIT PLAN

Notes:

Gates, signal equipment and pedestrian rail (BPR-1) shall be grounded in conformance with Section 700 with grounding materials that conform to Section 238. Grounding wire shall run in 2" gate power conduit.

All conduit going to signal cabinet shall enter through the foundation unless otherwise noted.

For conduit hanger spacing and details and junction box hanger details, see sheet 92.

For conduit details at Abutment B, see sheet 93.

Conduit will pass under girders unless indicated to pass through girder. For girder conduit hole access, see sheets 59 thru 60.

JB is for junction box.

For additional information on signal cabinet and SE-5 pole and details of conduits connecting to bridge conduit system at the abutments, see roadway plans.

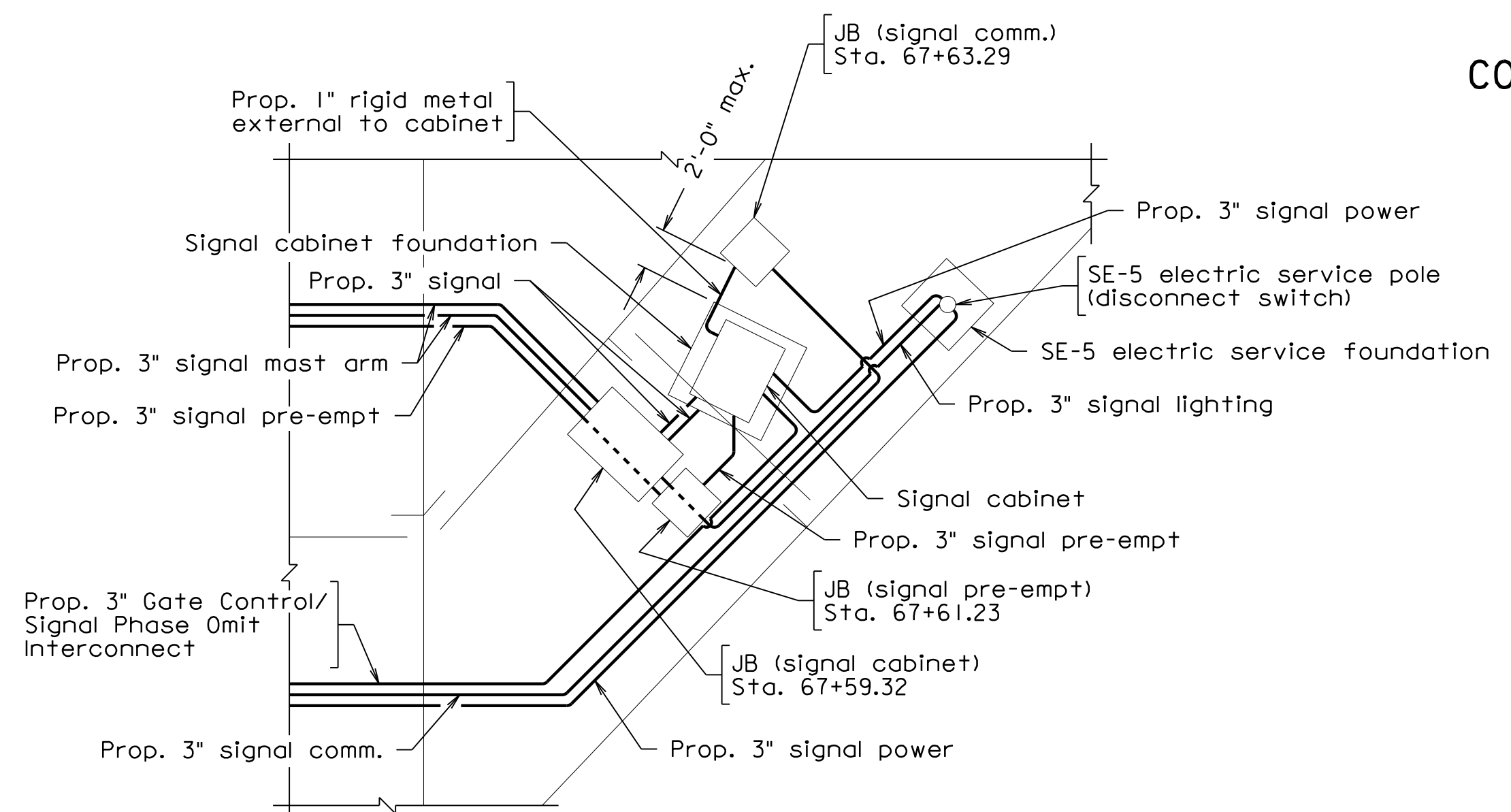
For signal cabinet and SE-5 pole foundation details and conduit penetration in deck slab details, see sheet 67.

For conduit details on Pier 2 see sheet 93.

For conduit details on MSE Wall No. 2, see sheet 125.

For lighting conduit details not shown, see sheets 94, 95, and 96.

JUNCTION BOX SIZES	
Signal comm.	18"x18"x8"
Signal power	18"x18"x8"
Signal cabinet	36"x24"x24"
Signal pre-empt	12"x12"x6"
Phase omit	18"x18"x8"
Gate comm.	24"x24"x12"
Gate power	18"x18"x8"
Signal mast arm	30"x18"x18"



DETAIL A

**PAC PLANS
PROGRESS PRINT 4/1/2022
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
BRIDGE CONDUIT PLAN					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
			Drawn: WRA.....	Apr. 2022	257-38A
			Checked: WRA.....		91 of 125
Revisions					

Scale: 1" = 20' unless otherwise noted.

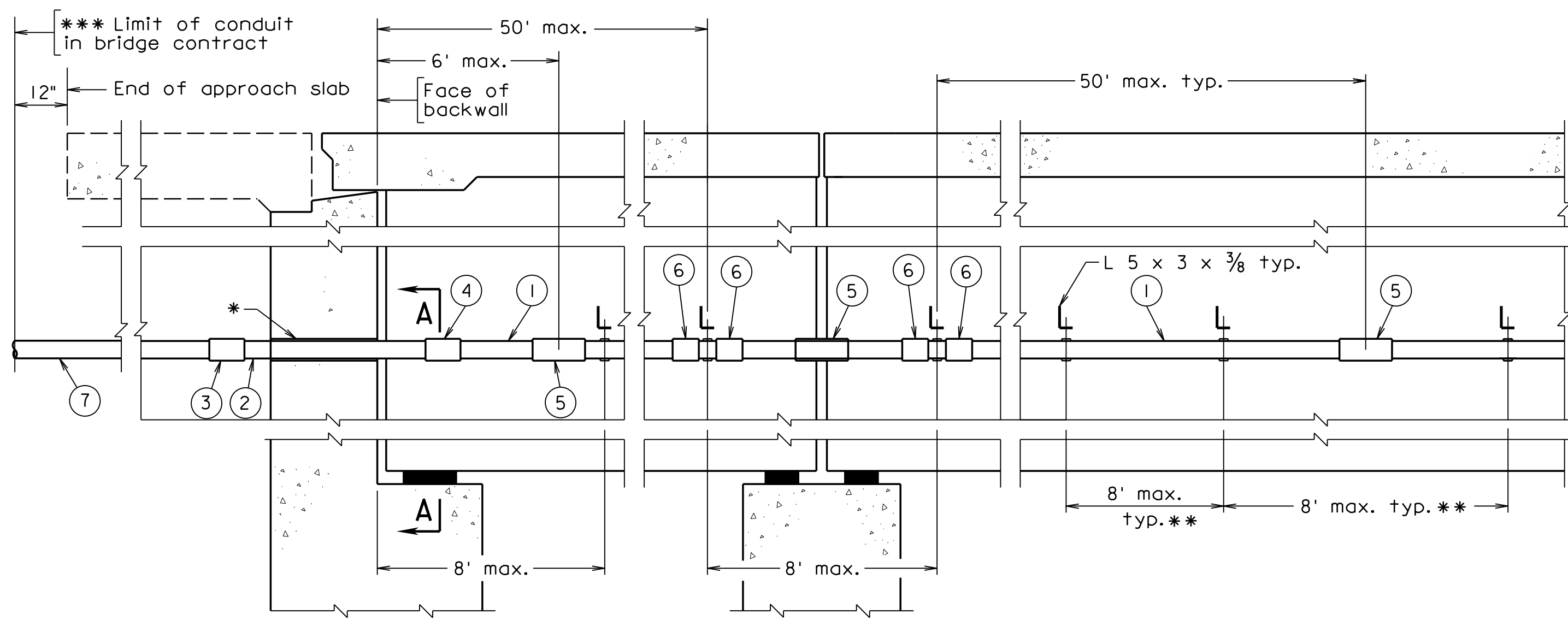
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			92



ABUTMENT A
(Micro Abutment)

PIER
Expansion joint required at Pier 1 and Pier 3

ELEVATION

* Wrap with Geotextile separation fabric before placing backwall concrete

** Spacing shown is for maximum spacing of hangers for 4" diameter conduit. Maximum spacing of hanger shall be 6'-0" for 3" diameter conduit in Span e.

- ① 4" ϕ Fiberglass Reinforced Epoxy (FRE) duct
- ② 4" ϕ galv. steel duct
- ③ FRE-galv. adaptor
- ④ Galv.-FRE adaptor
- ⑤ FRE exp. joint
- ⑥ FRE lock ring
- ⑦ 4" ϕ Polyvinyl chloride (PVC) pipe

Notes:

FRE expansion joints shall be sliding sleeve type to accommodate at least 4" of expansion or contraction in each direction.

In no case shall expansion joints be spaced more than 100 ft.

Duct splices shall be adhesive bonded bell and spigot.

Threaded couplings shall be used on steel conduit.

For beams/girders that are weathering steel:
- steel angles, fittings and rods shall be weathering steel
- H.S. bolts shall be ASTM F3125 Grade A325 Type 3

For beams/girders that are painted steel or galvanized:
- steel angles, fittings and rods shall be galvanized
- H.S. bolts shall be ASTM F3125 Grade A325 Type 1 galvanized

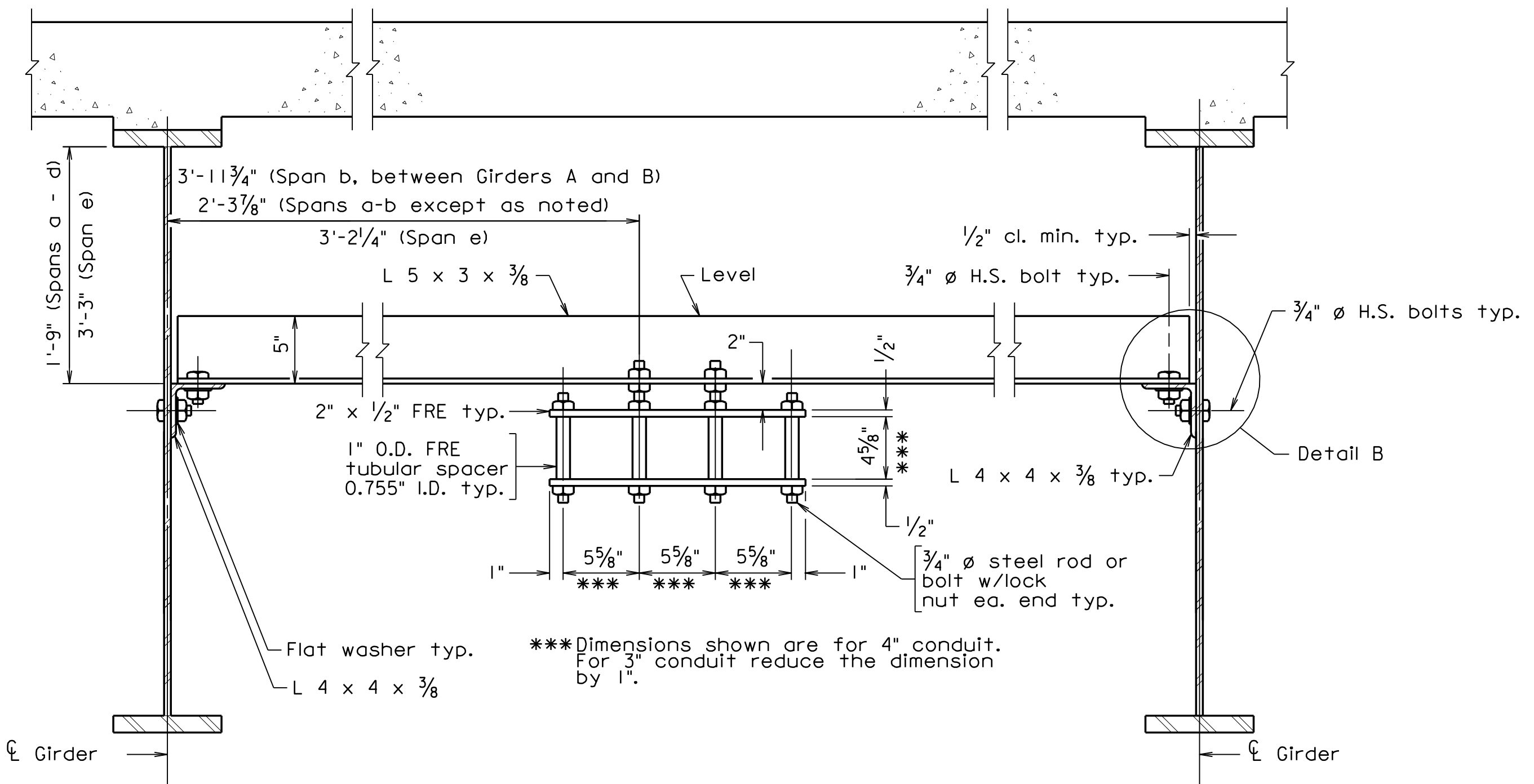
Hanger details shown are designed to support as many as 8 conduits.
Dead Loads: Cables: 8.5 lbs./ft. per conduit
Conduit: 1.5 lbs./ft.

Underground installation of FRE conduit shall be in accordance with Road and Bridge Standards ECI-1 except the minimum spacing between ducts shall be $\frac{3}{4}$ ".

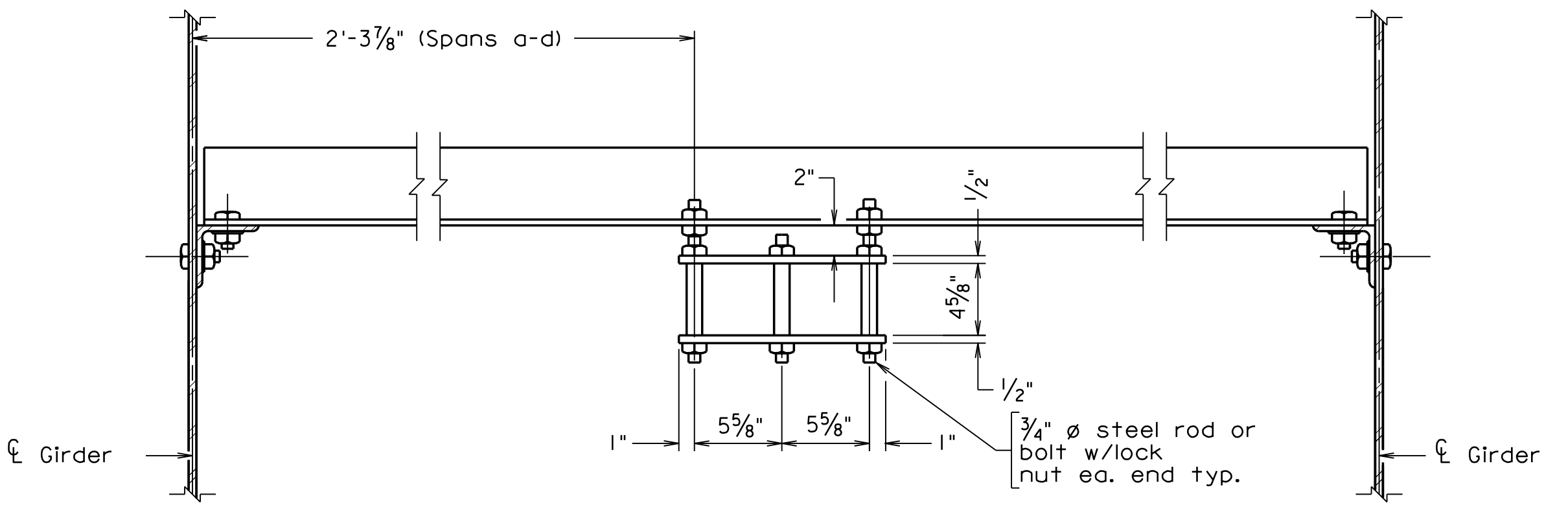
Vertical conduit runs shall be galvanized steel duct with FRE-galv. adaptors as necessary.

For conduit and junction box sizes and layout, see sheet 91.

Conduit shall pass under girders, diaphragms and cross frames unless otherwise noted to pass through as indicated in the conduit plan on sheet 91.



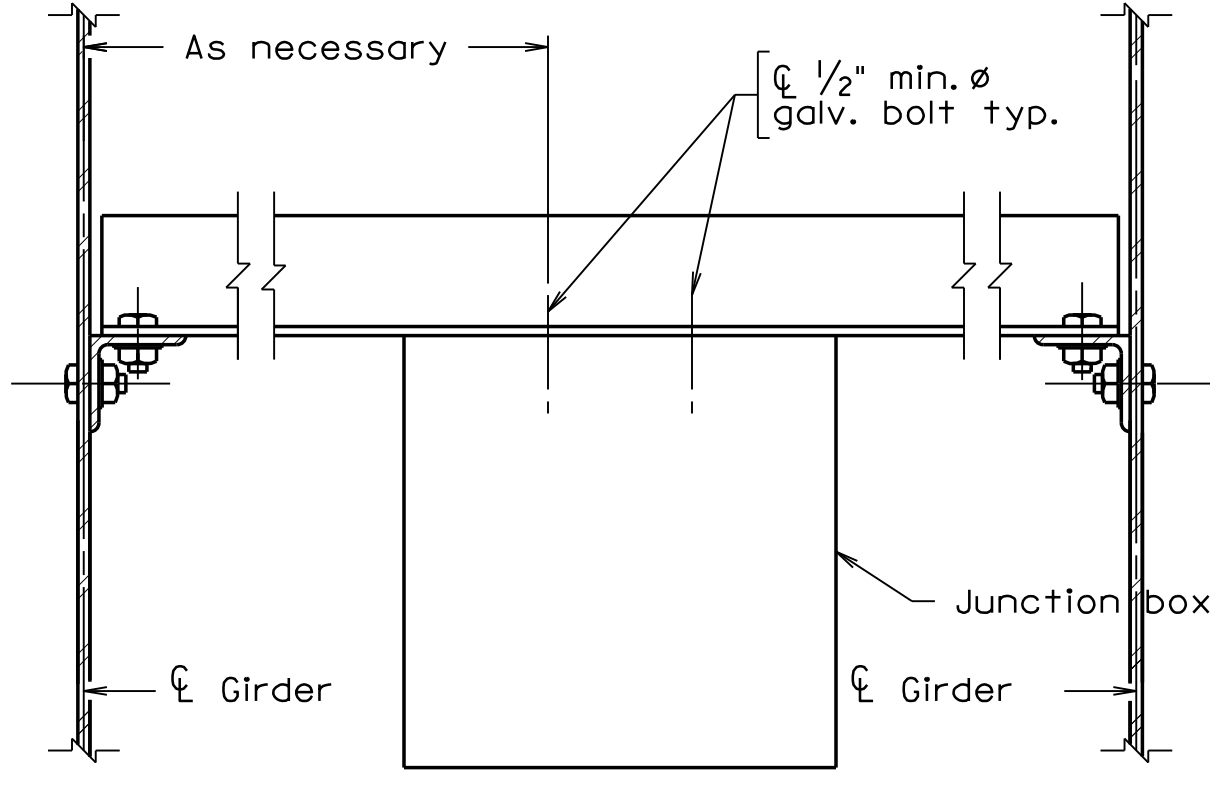
TYPICAL CONDUIT SUPPORT DETAIL FOR 3 CONDUITS



TYPICAL CONDUIT SUPPORT DETAIL FOR 2 CONDUITS

For additional information not shown see Typical Conduit Support Detail for 3 Conduits.

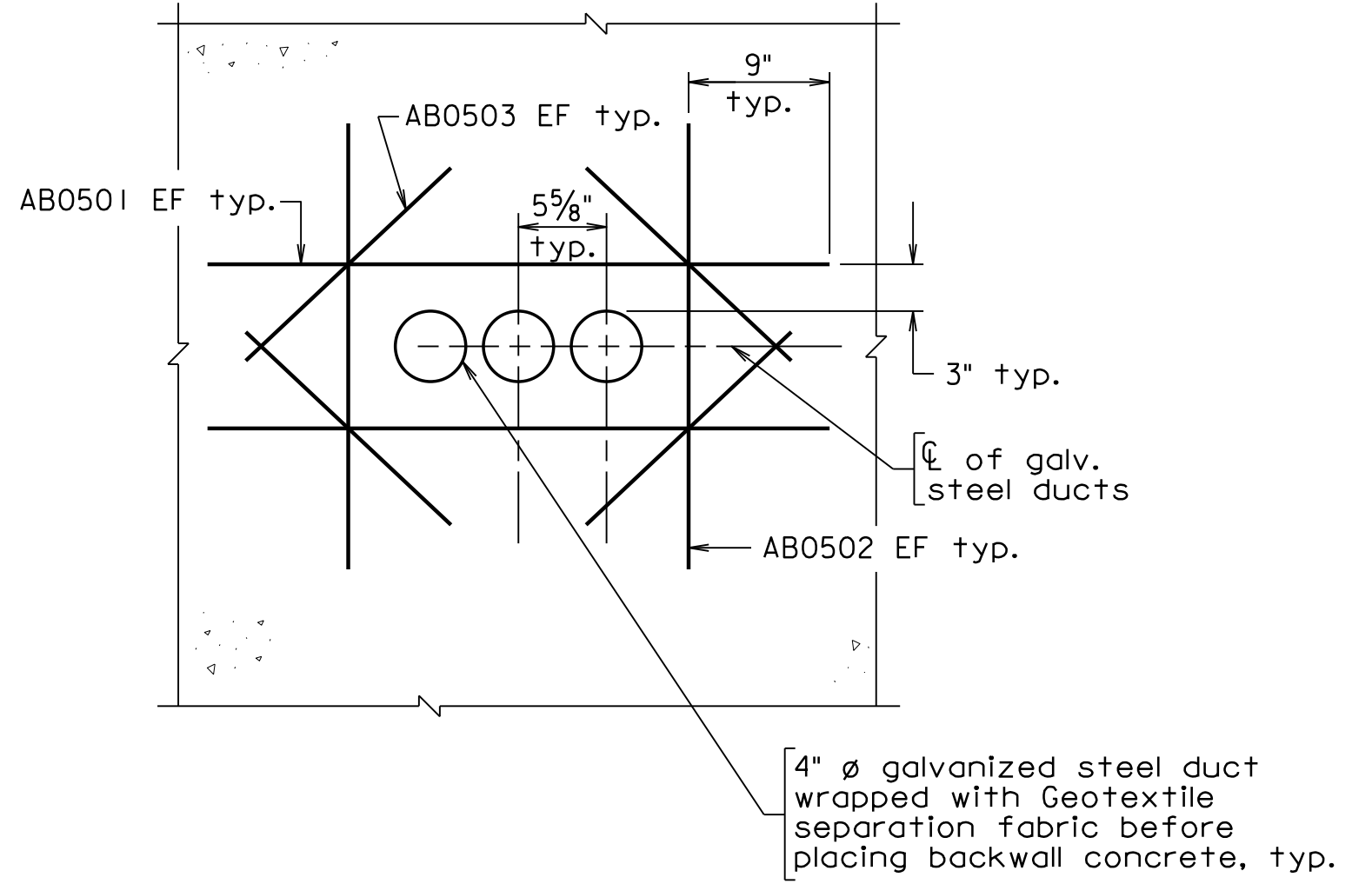
Not to scale



TYPICAL JUNCTION BOX SUPPORT DETAIL

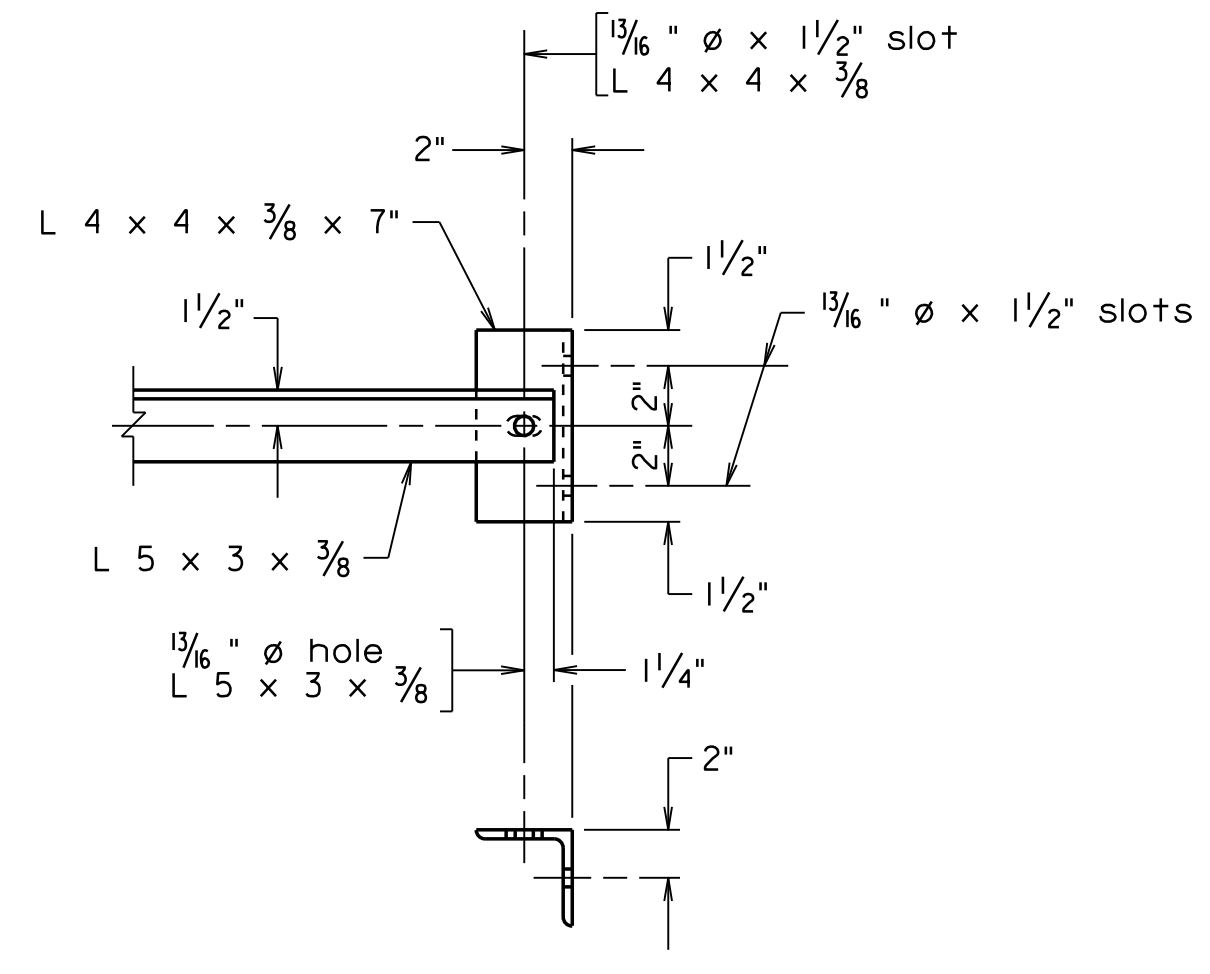
For additional information not shown see Typical Conduit Support Detail for 3 Conduits.

Bolts shall be per manufacturer's recommendations.



PIPE PENETRATION DETAIL

For location of conduit, see sheet 11.

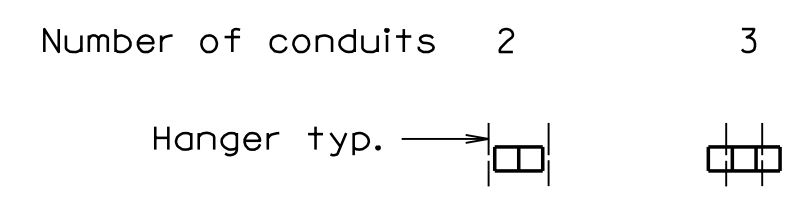


DETAIL B

PAC PLANS
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CONDUIT FORMATIONS



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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
COMMUNICATION LINES CONDUIT SYSTEM 1 OF 2					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn: CRR.....	Apr. 2022	257-38A
			Checked: MRD.....		92 of 125
Revisions					

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			93

Notes:

See sheet 92 for additional notes and details.

Steel tubing and plates for support bracket shall be galvanized.

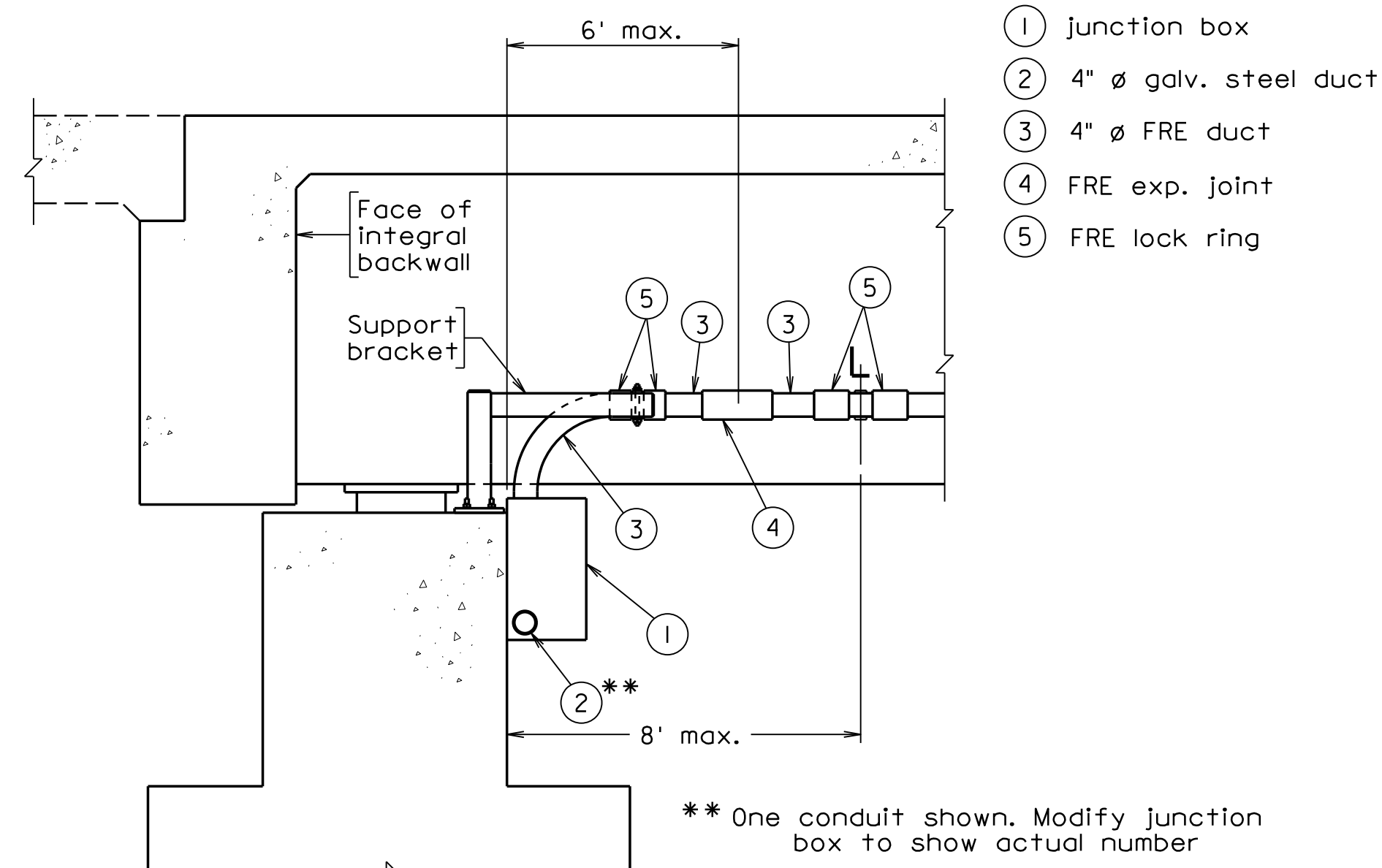
Hanger details shown are designed to support as many as 8 conduits.
Dead Loads: Cables: 8.5 lbs./ft. per conduit
Conduit: 1.5 lbs./ft.

Conduit and junction boxes shall be attached to pier cap and columns and MSE wall coping with approved embedded galvanized concrete anchors.

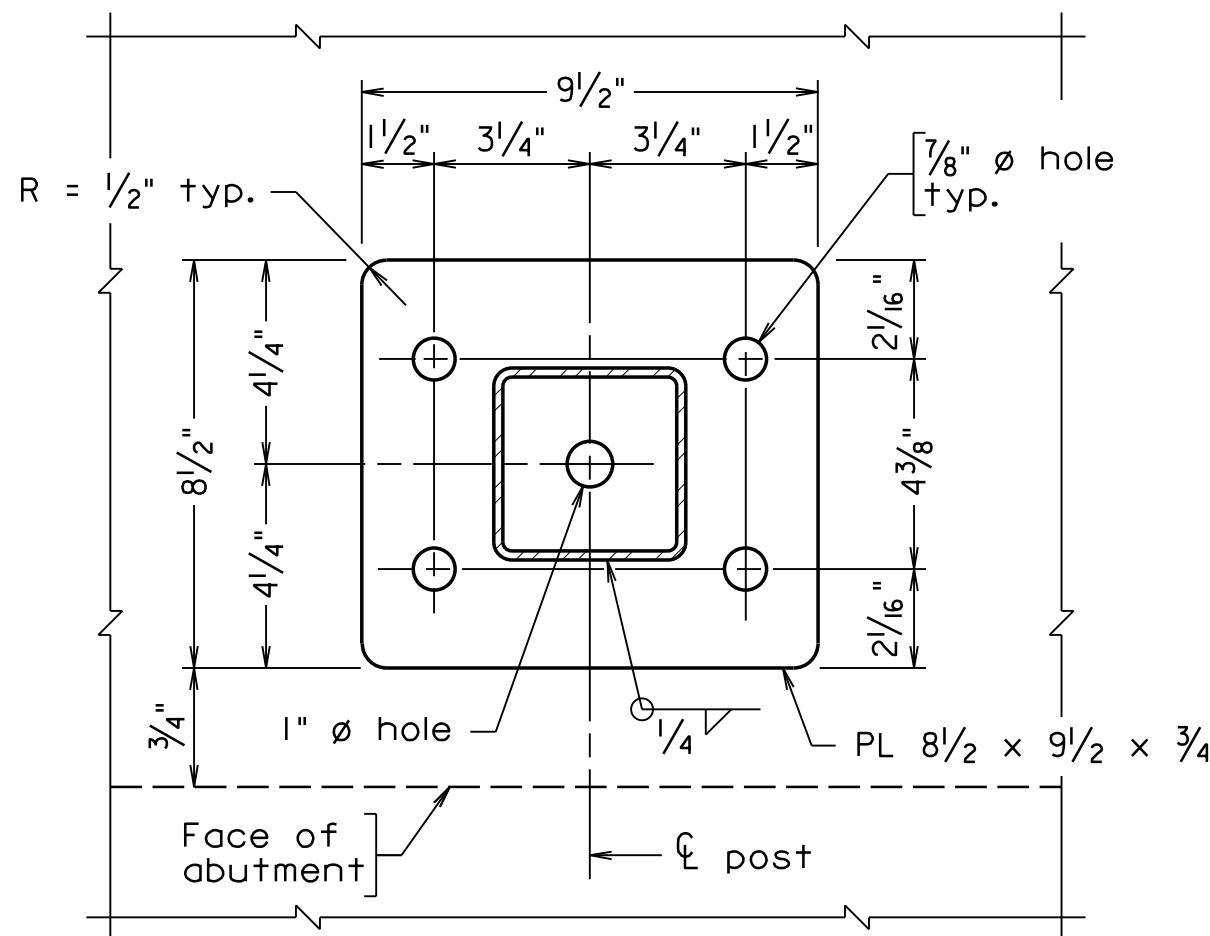
Conduit attached to pier and MSE wall shall be galvanized steel duct.

Lighting and future conduit shall pass through deck with embedded 4" galvanized pipe sleeve. Sleeve shall be located between reinforcing steel.

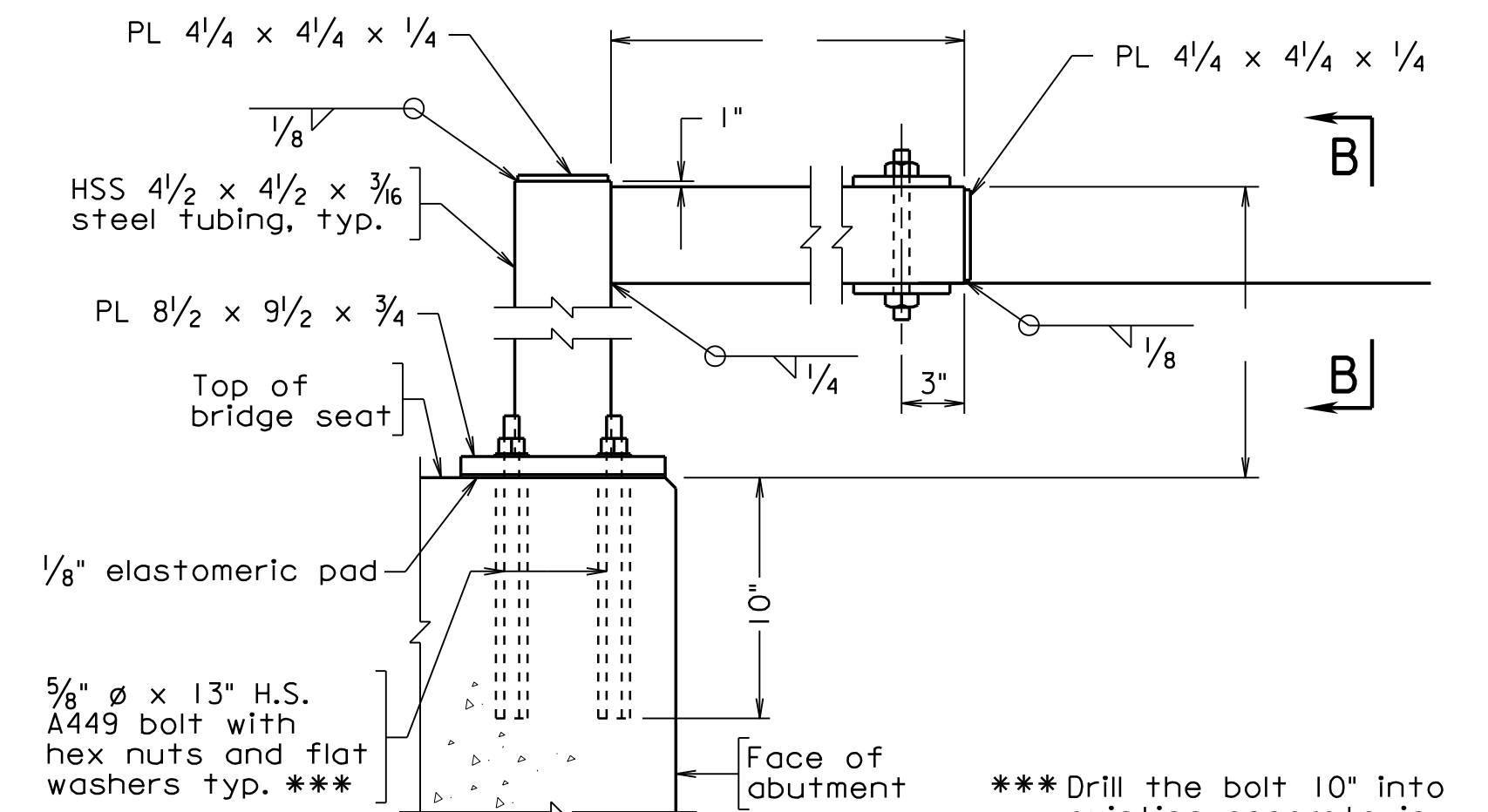
Junction box sizes noted on sheet 91.



ABUTMENT
(Abutments except full-integral)
For use at Abutment B

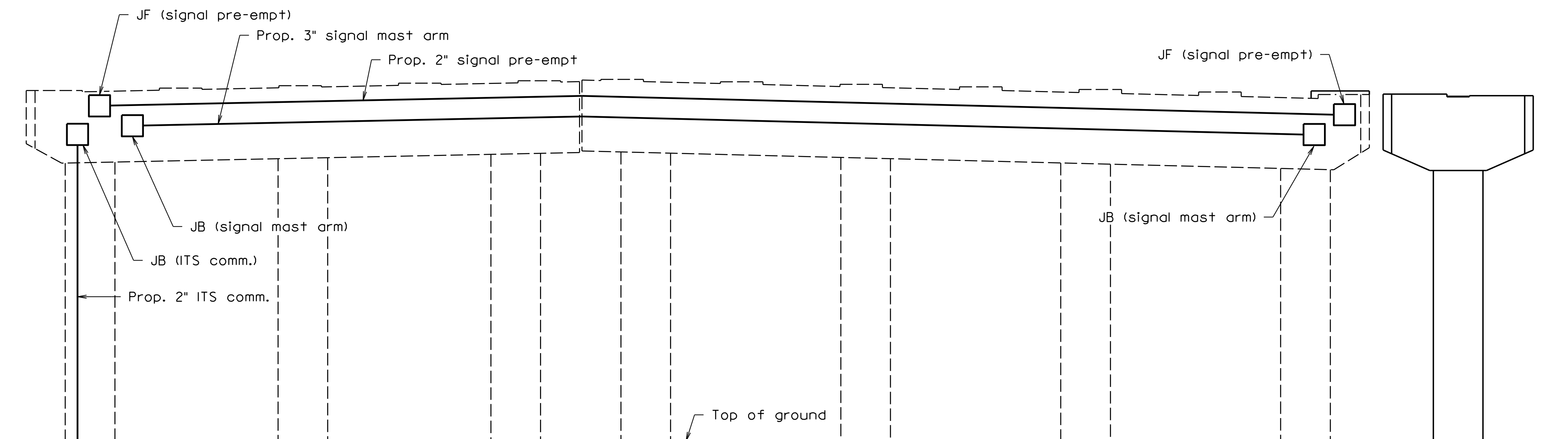


BASE PLATE DETAIL



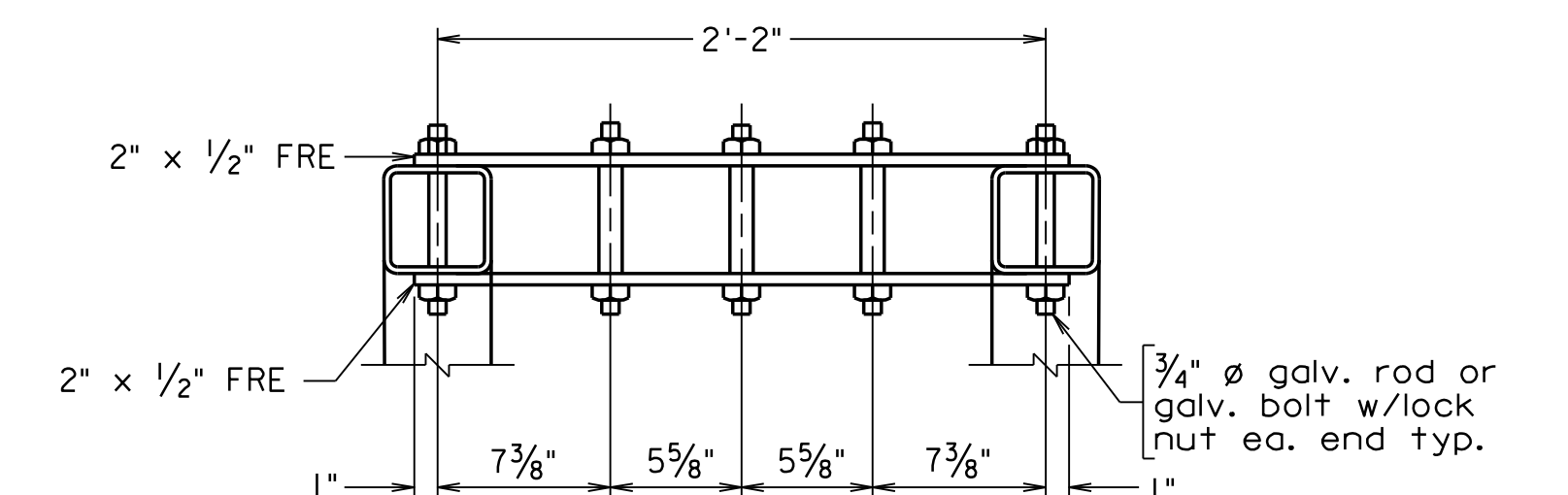
SUPPORT BRACKET
(2 required per abutment)

***Drill the bolt 10" into existing concrete in 1/8" hole and grout in place with Epoxy Type EP-5



Flexible conduit between junction boxes on pier and junction boxes in girder bays

ELEVATION OF CONDUIT ON PIER 2



VIEW B-B

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COMMUNICATION LINES CONDUIT SYSTEM 2 OF 2					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn: CRR.....	Apr. 2022	257-38A
			Checked: MRD.....		93 of 125
Revisions					

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Notes:

All reinforcing bars shall be corrosion resistant reinforcing steel - class II.

Cut or bend bars to clear junction chamber.

Close adherence to the manufacturer's requirements in regard to clearances for the installation of deflection fittings shall be observed.

Junction chamber frame and cover to be galvanized, after fabrication, in accordance with ASTM A123.

Anchor bolt specifications:

Nuts (Top): ASTM F467 Alloy 6262-T9 or 6061-T6.
(Bottom): ASTM A563.
Thread series for all nuts to be UNC-2B.

Washers: (Top): ASTM B209 Alloy Alclad 2024-T3 or T4, 2/4" ϕ x 0.165".
(Bottom): ASTM F844.

Rods: 1" diameter, ASTM A276, type 303 or 316 annealed, hot-finished. Threads on rods may be rolled or cut. 3/2" at each end of rod shall be threaded. Each rod shall be supplied with 3 washers and 3 nuts.

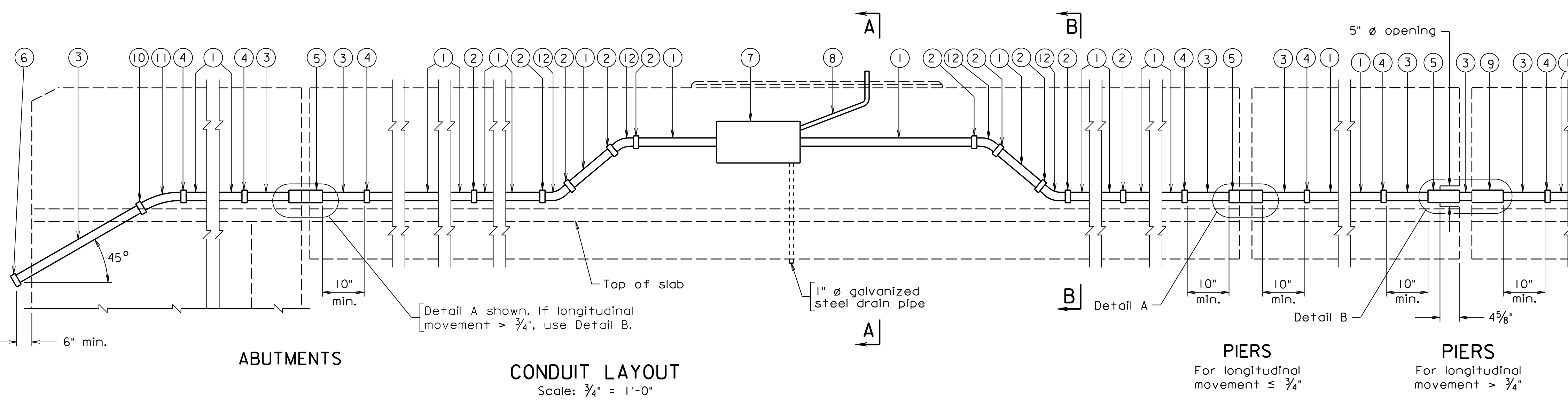
In the designations noted above, top refers to hardware above the top of baseplate. Bottom refers to hardware below the baseplate including embedment in concrete.

Longitudinal movement is the maximum amount of movement of the expansion and deflection fitting calculated for placement at 60° F and shall be adjusted in accordance with manufacturer's requirements. The amount of movement shall be increased or decreased for every 10° F temperature drop or rise respectively by t.

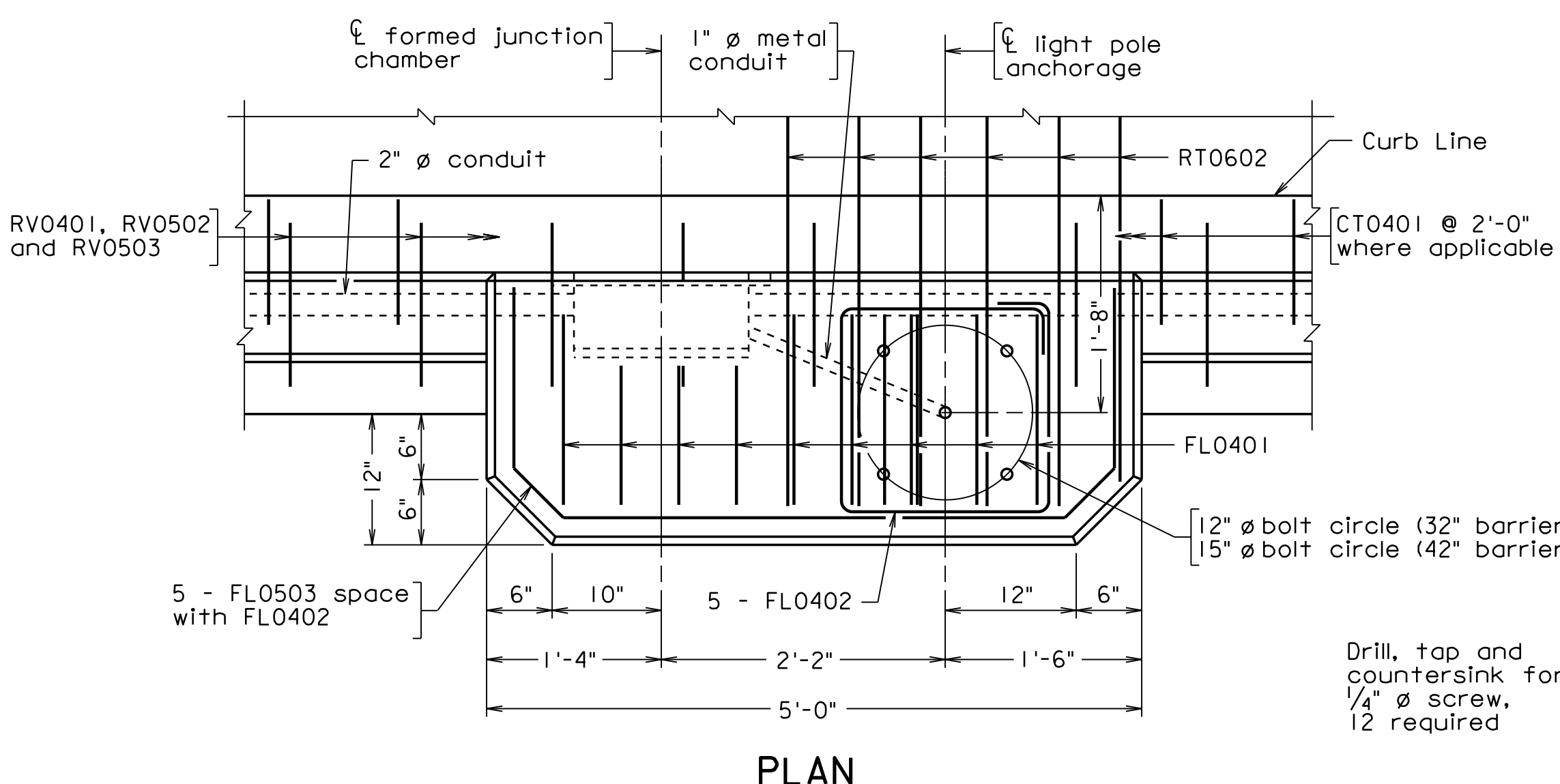
The Contractor shall determine all dimensions and details necessary for installation.

Conduit shall be grounded in conformance with Section 700 with grounding materials that conform to Section 238.

Standard does not reflect conduit size and adjustments for 42" barrier.



- ① 2" ϕ nonmetallic conduit
- ② Nonmetallic coupling
- ③ 2" ϕ metal conduit
- ④ Adapter to connect nonmetallic conduit to metal conduit
- ⑤ Metal expansion and deflection fitting
- ⑥ 2" ϕ pipe cap
- ⑦ 8" x 6" x 1'-4" formed junction chamber
- ⑧ 1" ϕ metal conduit.
- ⑨ Metal expansion fitting
- ⑩ Pipe coupling
- ⑪ 2" ϕ 45° 13" R steel elbow
- ⑫ 2" ϕ 45° 9/2" R nonmetallic elbow



Abutment	Pier	Longitudinal Movement	t	Detail Type

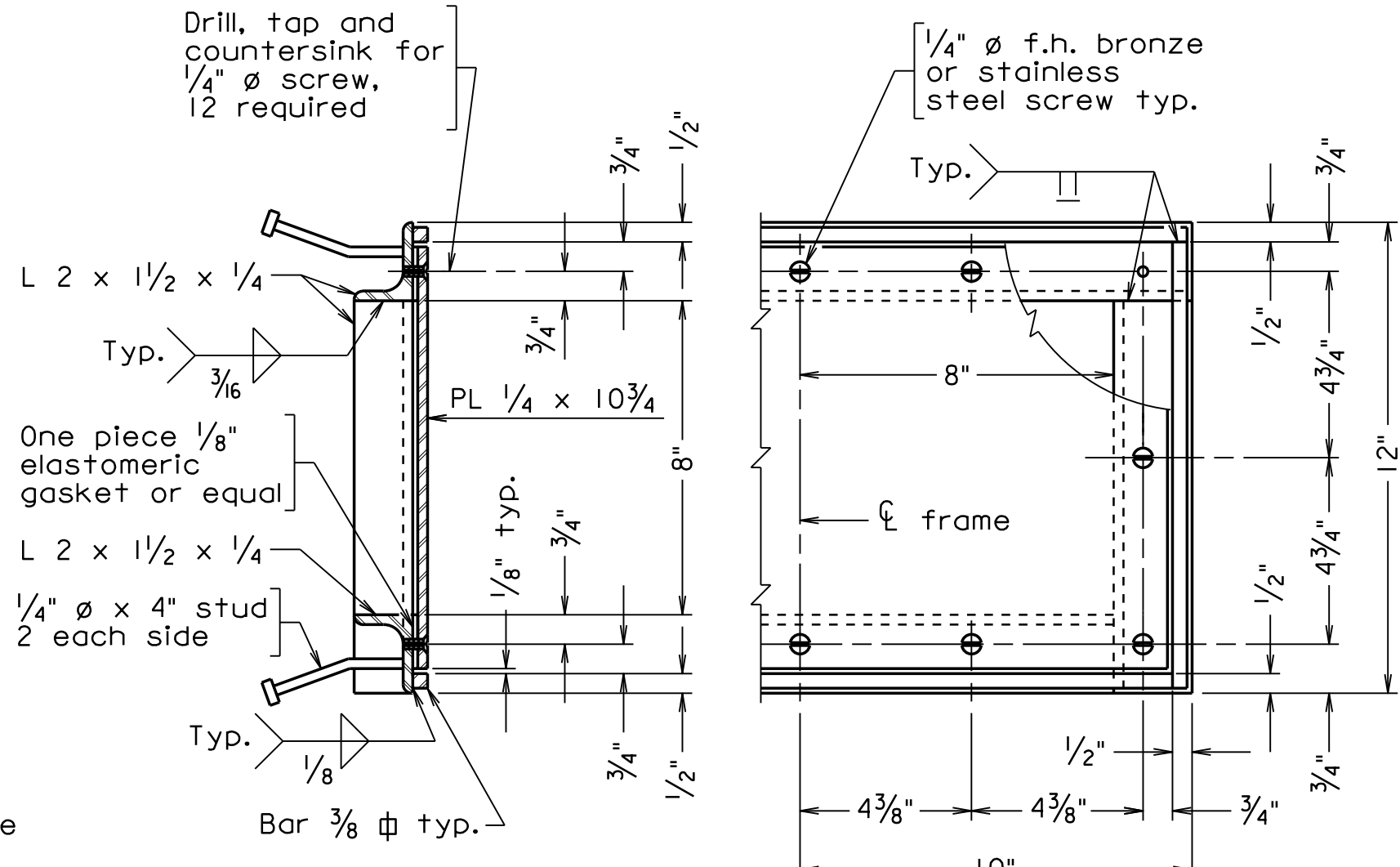
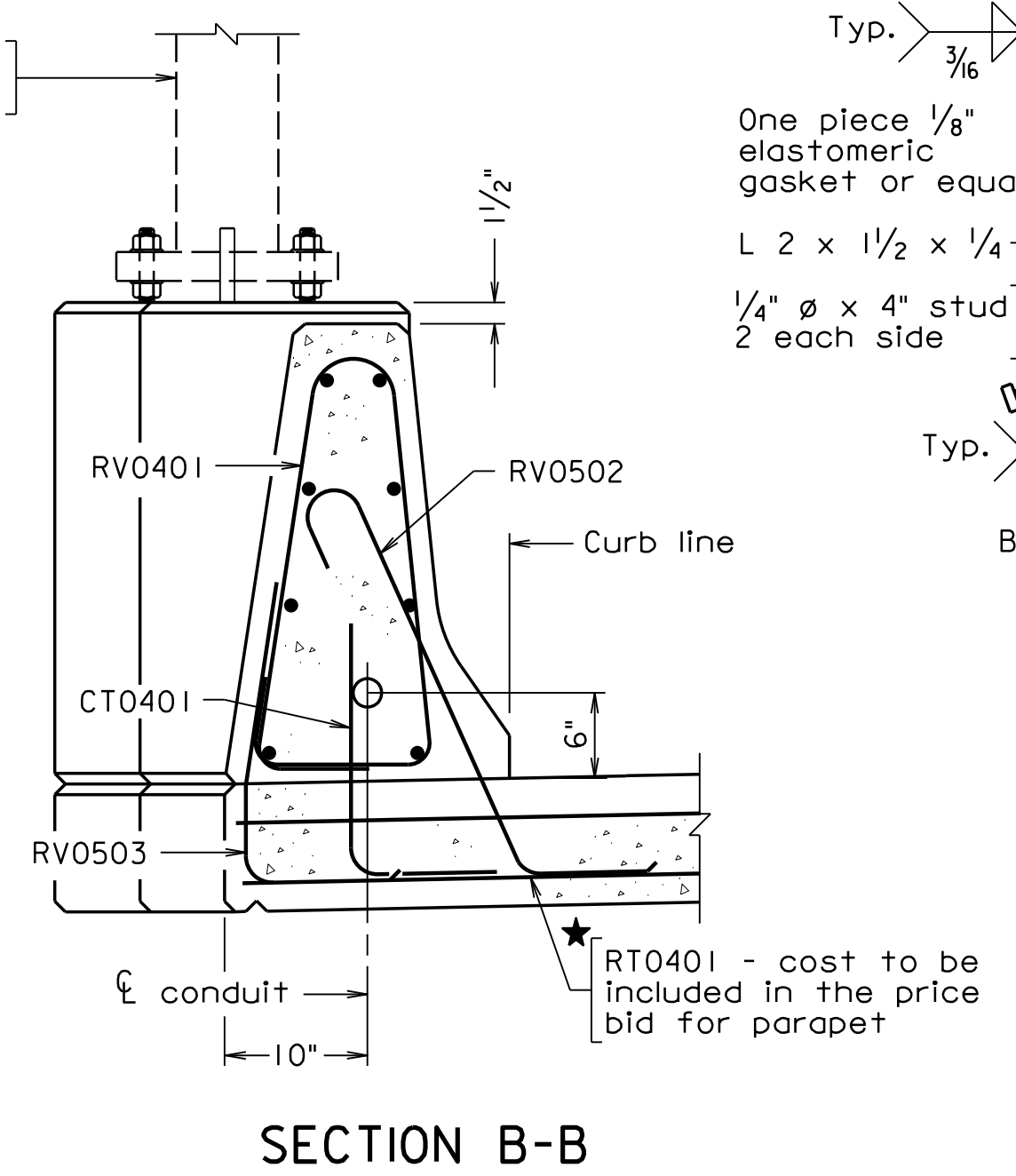
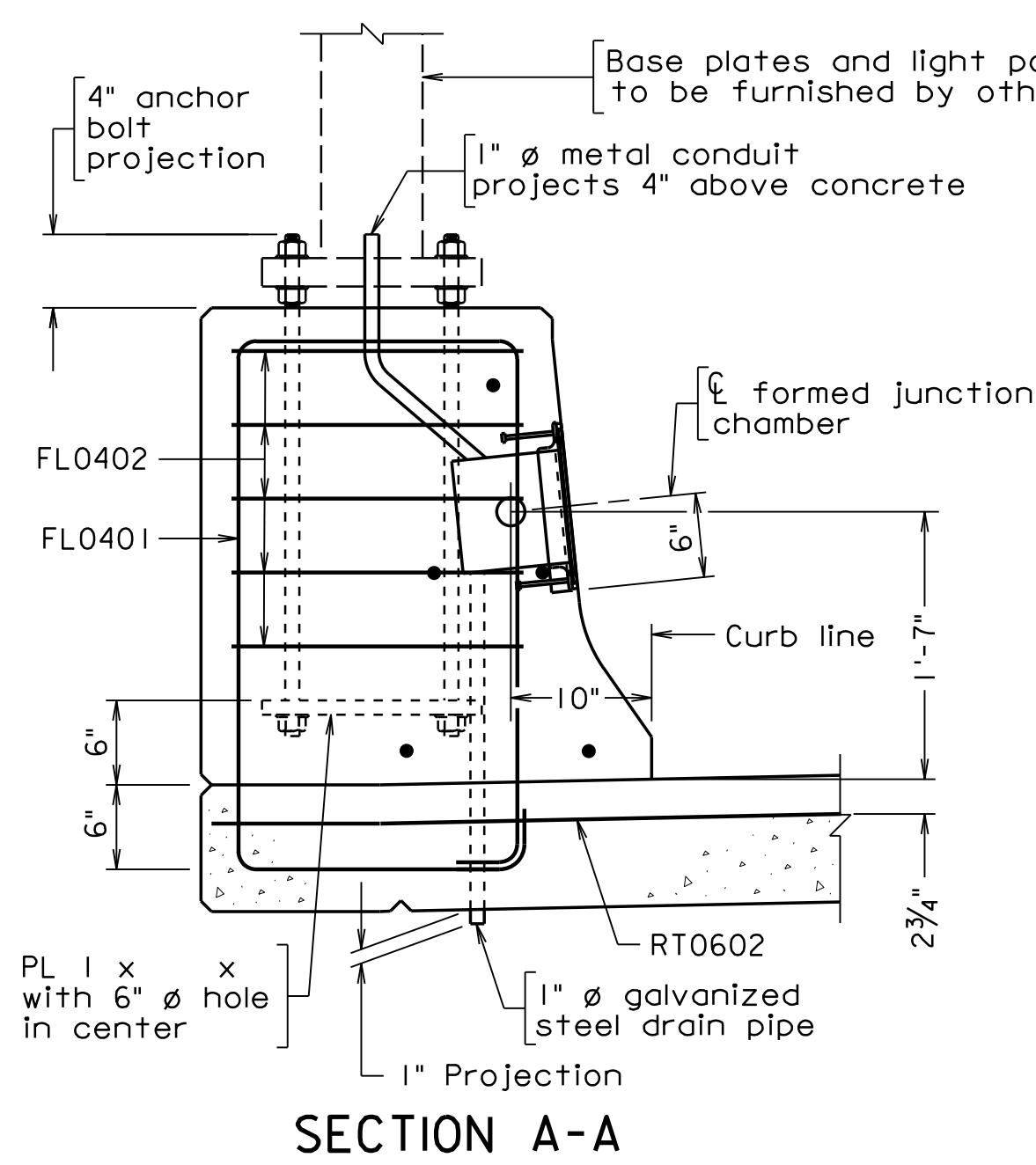
When deck is continuous over pier, expansion and deflection fitting detail is not required.

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REINFORCING STEEL SCHEDULE

Mark	No.	Size	Pin ϕ	Length	Location
FL0401		#4	2"	9'-8"	Light base
FL0402		#4	2"	6'-8"	Light base
FL0503		#5	3 3/4"	7'-5"	Light base
CT0401		#4	3"	2'-5"	Conduit tie
RV0401	⊙	#4			
RV0502	⊙	#5			
RV0503	⊙	#5			
★RT0401	⊙	#4			
RT0602		#6			Top of deck slab

Dimensions in bending diagram are out-to-out of bars.

⊙ Bars RV0401, RV0502, RV0503 and RT0401 are detailed and accounted for on parapet detail sheet.

★ Used only when deck transverse reinforcement is parallel to skew of bridge

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BRIDGE CONDUIT SYSTEM 1 OF 3					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn:CRR.....	Apr. 2022	257-38A
			Checked: M.R.D.....		94 of 125

PROGRESS PRINT 4/1/2022

Notes:

All reinforcing bars shall be Corrosion Resistant Reinforcing Steel, Class ...

Cut or bend bars to clear junction chamber.

Close adherence to the manufacturer's requirements in regard to clearances for the installation of deflection fittings shall be observed.

Junction chamber frame and cover to be galvanized, after fabrication, in accordance with ASTM A123.

Cost of Bridge Conduit System and anchorages shall be included in price bid for railing.

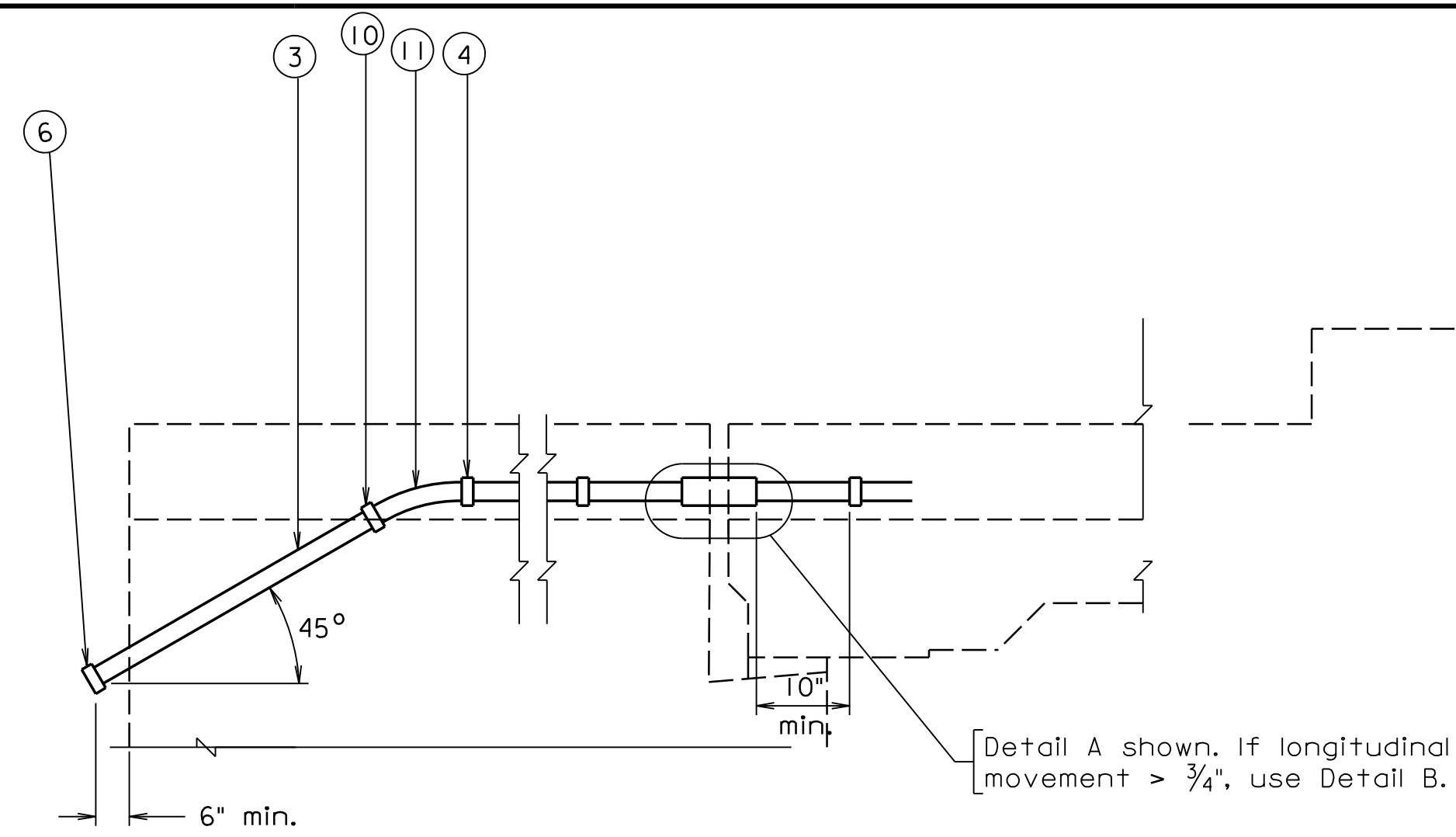
Anchor bolts shall be high-strength anchor bolts. Anchor bolts, nuts and washers shall conform to Section 226.02(c) 2, and shall be hot-dip galvanized, 4" at each end of anchor bolt shall be threaded. Each anchor bolt shall be supplied with 3 washers and 3 nuts.

Longitudinal movement is the maximum amount of movement of the expansion and deflection fitting calculated for placement at 60° F and shall be adjusted in accordance with manufacturer's requirements. The amount of movement shall be increased or decreased for every 10° F temperature drop or rise respectively by t.

The Contractor shall determine all dimensions and details necessary for installation.

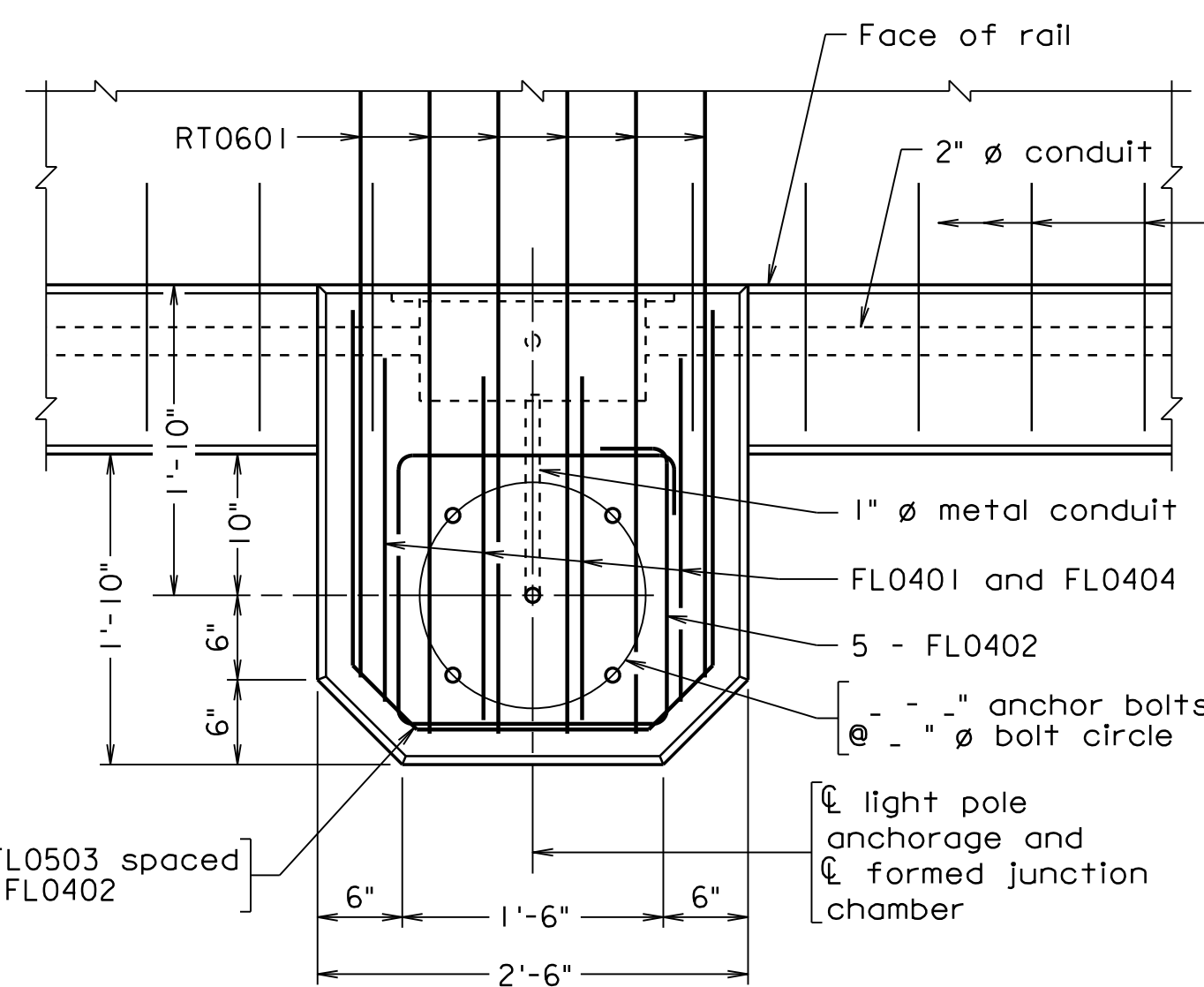
Conduit shall be grounded in conformance with Section 700 with grounding materials that conform to Section 238.

Location of light pole shall be adjusted such that anchor bolts of rail post clears the conduit system and the light pole base area.



ABUTMENTS

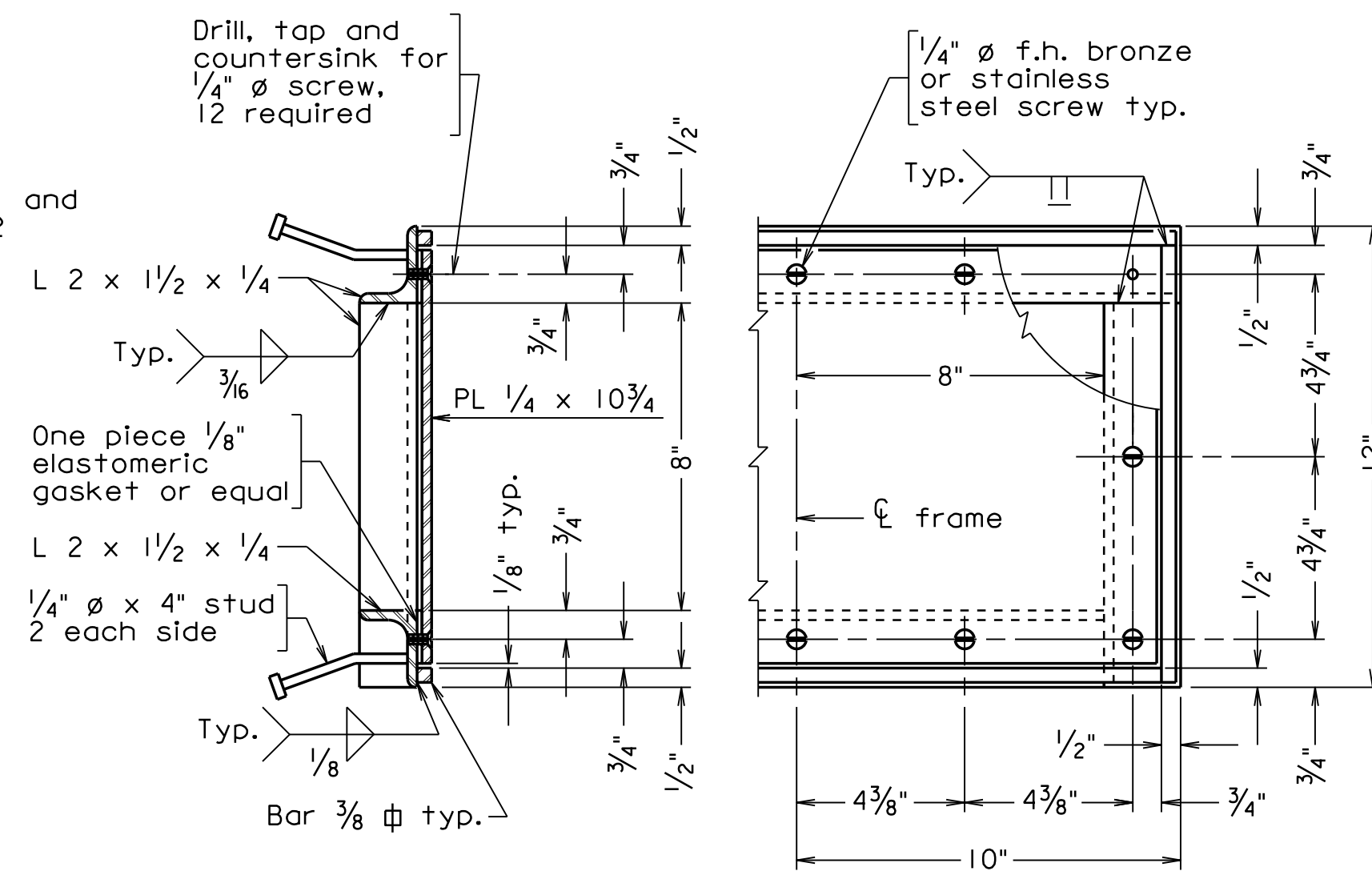
- ① 2" Ø nonmetallic conduit
- ② Nonmetallic coupling
- ③ 2" Ø metal conduit
- ④ Adapter to connect nonmetallic conduit to metal conduit
- ⑤ Metal expansion and deflection fitting
- ⑥ 2" Ø pipe cap
- ⑦ 8" x 8" x 1'-4" formed junction chamber
- ⑧ 1" Ø metal conduit - Furnish locknut and bushing to connect conduit to junction box
- ⑨ Metal expansion fitting
- ⑩ Metallic coupling
- ⑪ 2" Ø 45° 13" R steel elbow
- ⑫ 2" Ø 45° 9 1/2" R nonmetallic elbow
- ⑬ Bell fitting or bushing to connect conduit to junction box



PLAN

CONDUIT LAYOUT

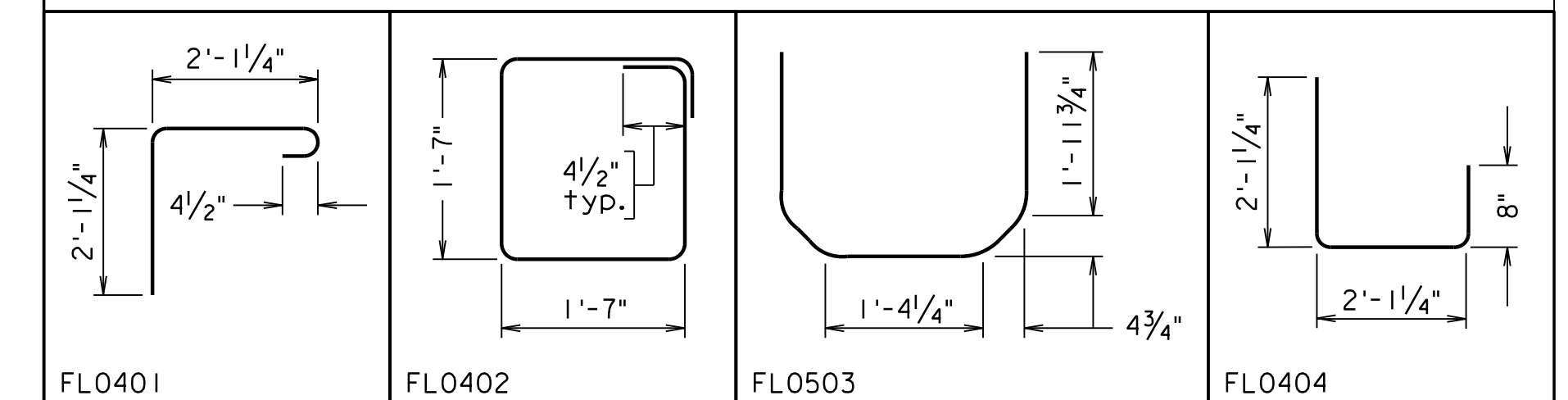
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JUNCTION CHAMBER FRAME

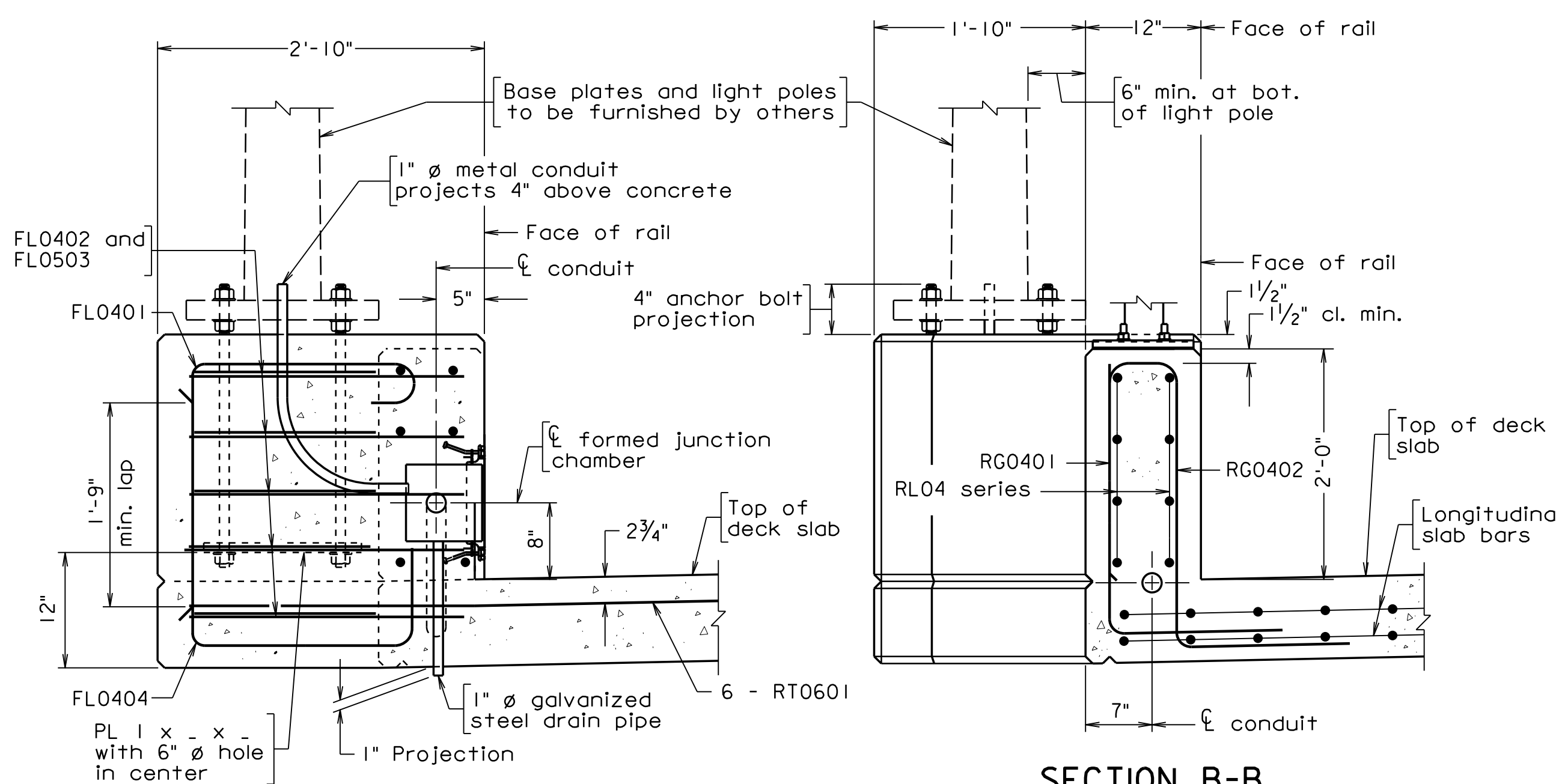
Scale: 3" = 1'-0"

REINFORCING STEEL SCHEDULE



Mark	No.	Size	Pin Ø	Length	Location
FL0401		#4	3"	4'-8"	Light base
FL0402		#4	2"	6'-8"	Light base
FL0503		#5	3 3/4"	6'-4"	Light base
FL0404		#4	2"	4'-9"	Light base
RG0401	⊙	#4			Concrete pedestal
RG0402	⊙	#4			Concrete pedestal
RT0601		#6			Top of deck slab

Dimensions in bending diagram are out-to-out of bars.
 Ⓞ Bars RG0401 and RG0402 are detailed and accounted for on the railing detail sheet (CPSR-series).



SECTION A-A

Uncut RL04 series shown.

SECTION B-B

Transverse rebars in deck slab not shown for clarity

Scale: 1" = 1'-0" unless otherwise shown.

Abutment	Pier	Longitudinal Movement	t	Detail Type

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION				
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BRIDGE CONDUIT SYSTEM 2 OF 3				
No.	Description	Date	Designed: CRR	Sheet No.
			Drawn: CRR	95 of 125
			Checked: MRD	
Revisions			Date	Plan No.
			Apr. 2022	257-38A

257-38A_095.dgn

05-03-2018

BCS-30A

WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER

Sealed and Signed by:
 Junyi Meng
 Lic. No. 07772
 On the date of 12
 May 01, 2018

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VDOT S&B DIVISION
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STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	NO.
VA.		95	96
		0095-076-299, B688	

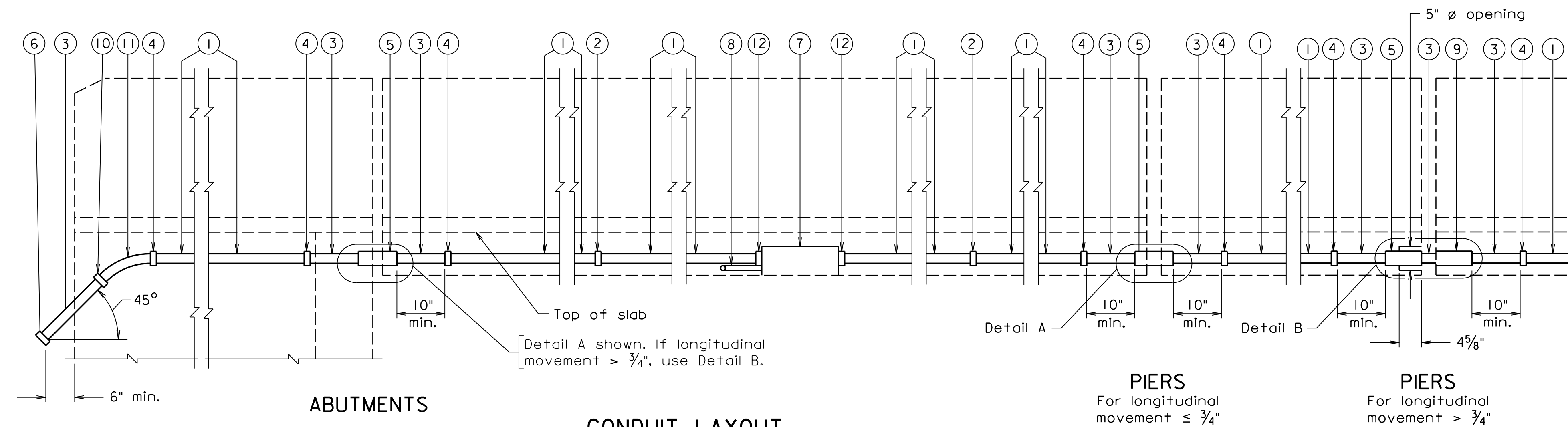
Notes:

Close adherence to the manufacturer's requirements in regard to clearances for the installation of deflection fittings shall be observed.

Longitudinal movement is the maximum amount of movement of the expansion and deflection fitting calculated for placement at 60° F and shall be adjusted in accordance with manufacturer's requirements. The amount of movement shall be increased or decreased for every 10° F temperature drop or rise respectively by t.

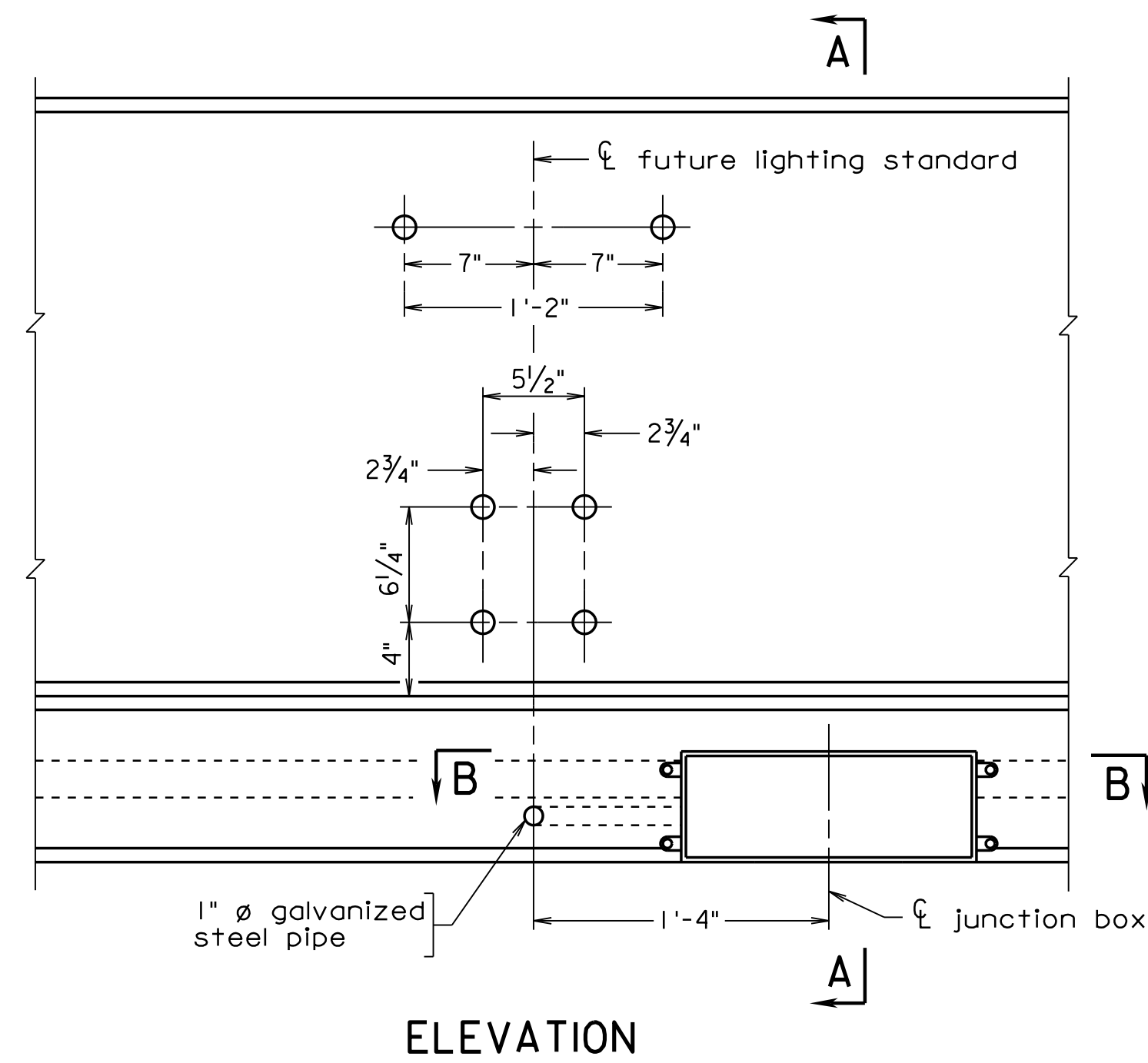
The Contractor shall determine all dimensions and details necessary for installation.

Conduit shall be grounded in conformance with Section 700 with grounding materials that conform to Section 238.

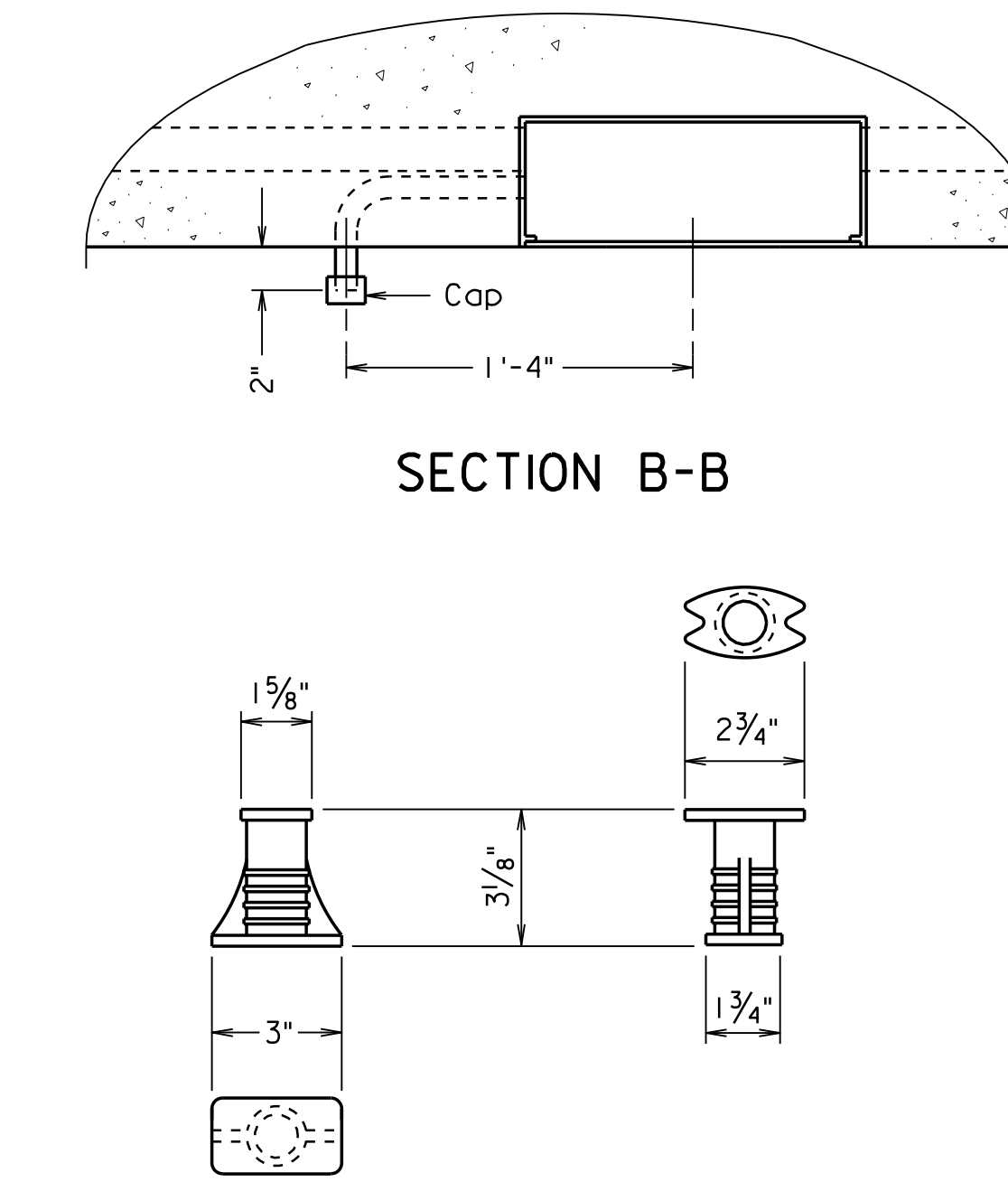


- 1 2" \varnothing nonmetallic conduit
- 2 Nonmetallic coupling
- 3 2" \varnothing metal conduit
- 4 Adapter to connect nonmetallic conduit to metal conduit
- 5 Metal expansion and deflection fitting
- 6 2" \varnothing pipe cap
- 7 8" x 6" x 1'-4" junction box
- 8 1" \varnothing galvanized steel pipe. Furnish locknut and bushing to connect conduit to junction box.
- 9 Metal expansion fitting
- 10 Pipe coupling
- 11 2" \varnothing 45° 13" R steel elbow
- 12 Bell fitting or bushing to connect conduit to junction box

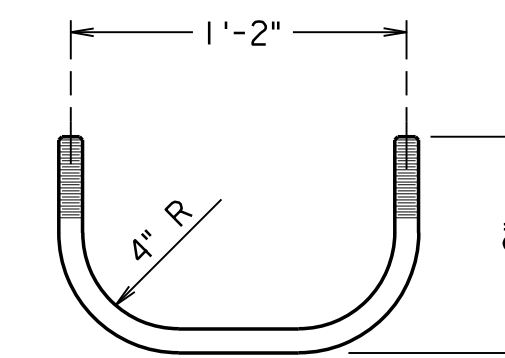
CONDUIT LAYOUT
Scale: 3/4" = 1'-0"



ELEVATION



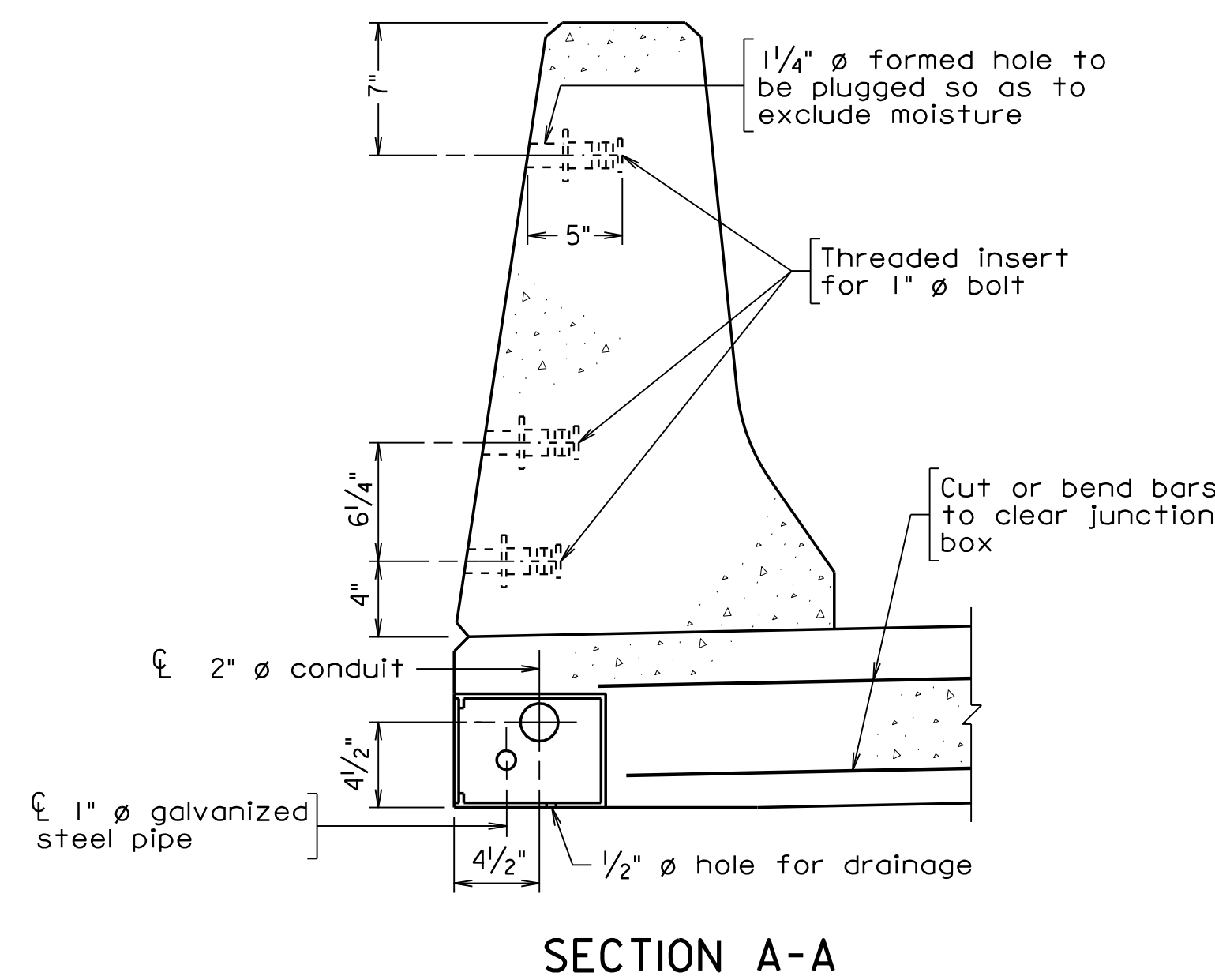
THREADED INSERT FOR 1" \varnothing BOLT
Scale: 3" = 1'-0"



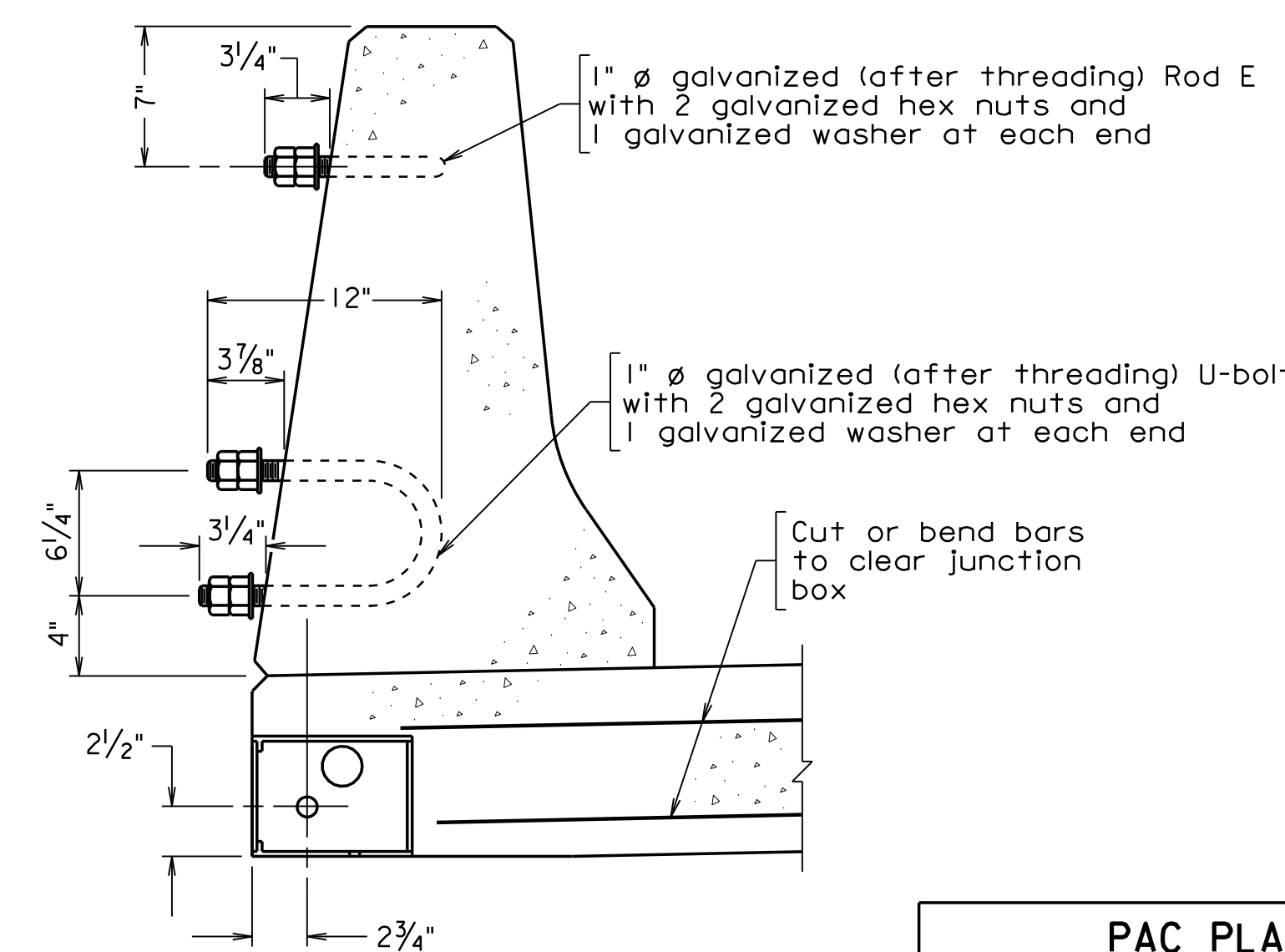
1" \varnothing GALVANIZED ROD E

Abutment	Pier	Longitudinal Movement	+	Detail Type

When deck is continuous over pier, expansion and deflection fitting detail is not required.



SECTION A-A



ALTERNATE SECTION A-A

Scale: 1/2" = 1'-0" unless otherwise shown.

PAC PLANS
PROGRESS PRINT 4/1/2022
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
BRIDGE CONDUIT SYSTEM 3 OF 3					
No.	Description	Date	Designed: CRR.....	Date	Plan No.
			Drawn: CRR.....	Apr. 2022	257-38A
			Checked: MRD.....		96 of 125
Revisions					

257-38A_096.dgn

10-31-2019

BCS-21A

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Junyi Meng
Lic. No. 0000172
On the date of
October

PROGRESS PRINT NOT TO BE USED FOR CONSTRUCTION

A copy of the original signed drawing is to be kept in the Office.

VDOT S&B DIVISION
RICHMOND, VA
STRUCTURAL ENGINEER

Notes:

All reinforcing bars shall be corrosion resistant reinforcing steel -

Cut or bend bars to clear junction chamber.

Close adherence to the manufacturer's requirements in regard to clearances for the installation of deflection fittings shall be observed.

Junction chamber frame and cover to be galvanized, after fabrication, in accordance with ASTM A123.

Anchor bolt specifications:

Nuts (Top): ASTM F467 Alloy 6262-T9 or 6061-T6.
(Bottom): ASTM A563.
Thread series for all nuts to be UNC-2B.

Washers: (Top): ASTM B209 Alloy Alclad 2024-T3 or T4, 2/4" ϕ x 0.165".
(Bottom): ASTM F844.

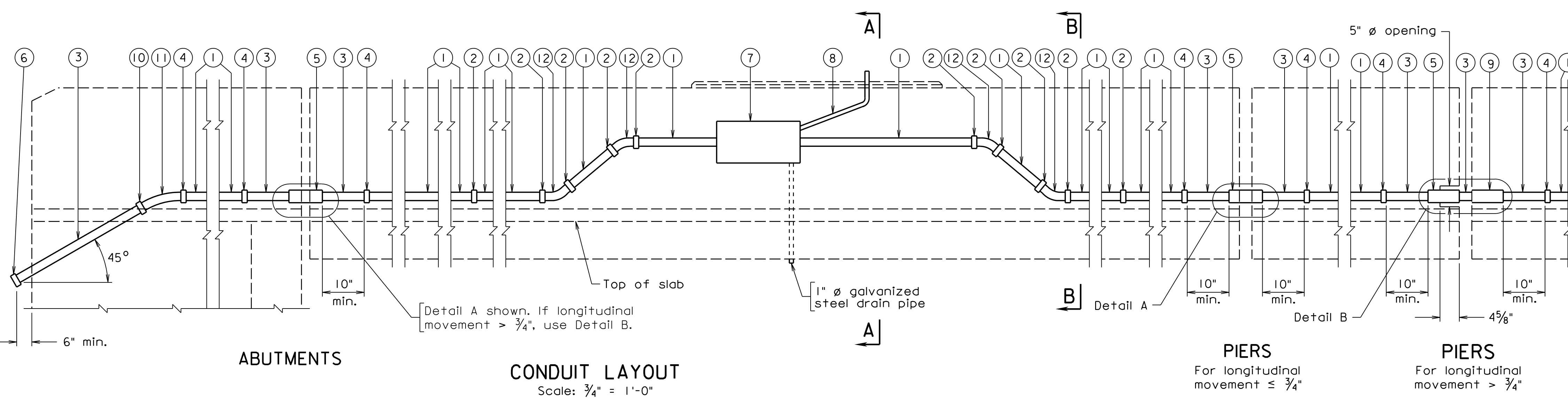
Rods: 1" diameter, ASTM A276, type 304 or 316 annealed, hot-finished. Threads on rods may be rolled or cut. 3/2" at each end of rod shall be threaded. Each rod shall be supplied with 3 washers and 3 nuts.

In the designations noted above, top refers to hardware above the top of baseplate. Bottom refers to hardware below the baseplate including embedment in concrete.

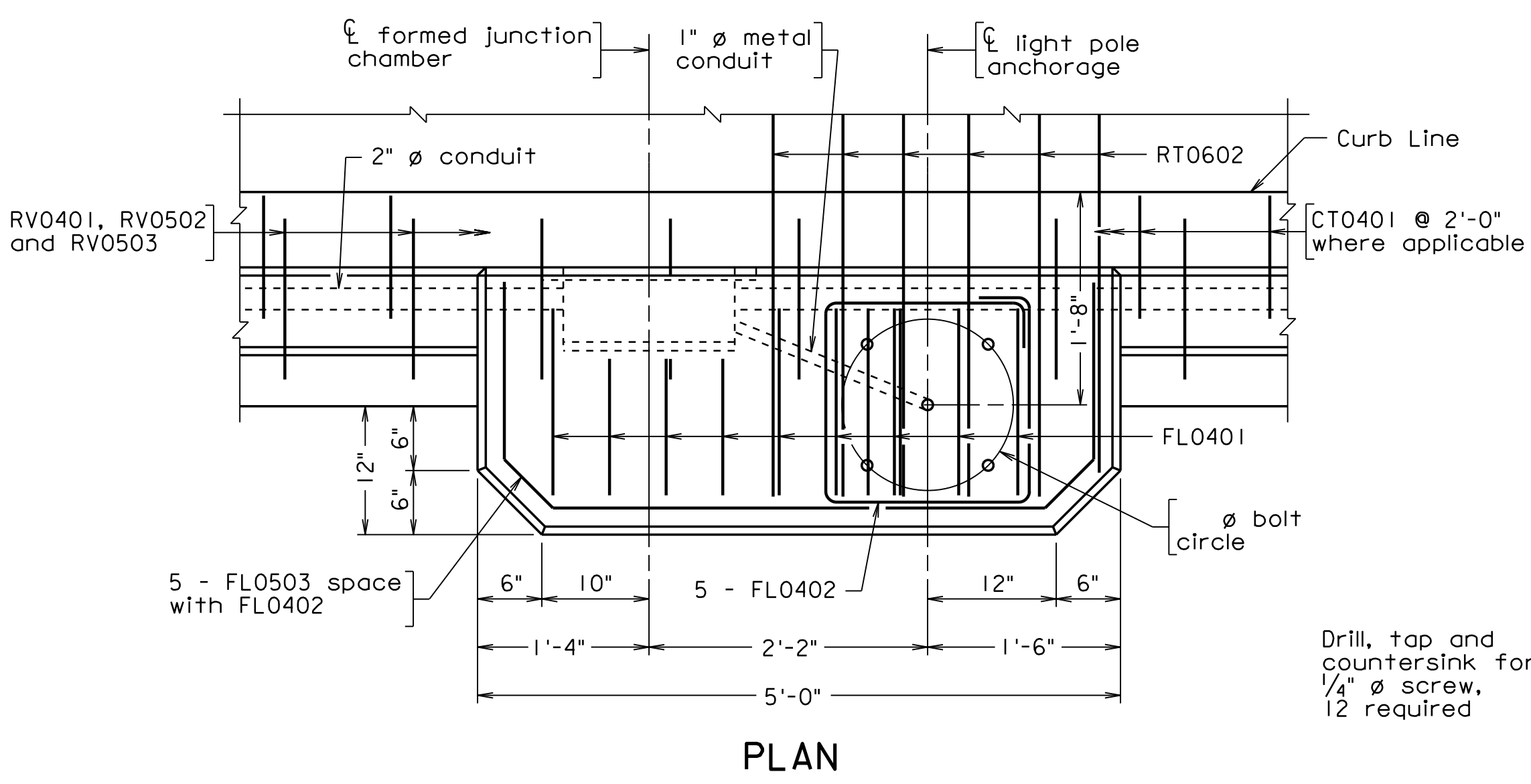
Longitudinal movement is the maximum amount of movement of the expansion and deflection fitting calculated for placement at 60° F and shall be adjusted in accordance with manufacturer's requirements. The amount of movement shall be increased or decreased for every 10° F temperature drop or rise respectively by t.

The Contractor shall determine all dimensions and details necessary for installation.

Conduit shall be grounded in conformance with Section 700 with grounding materials that conform to Section 238.



- ① 2" ϕ nonmetallic conduit
- ② Nonmetallic coupling
- ③ 2" ϕ metal conduit
- ④ Adapter to connect nonmetallic conduit to metal conduit
- ⑤ Metal expansion and deflection fitting
- ⑥ 2" ϕ pipe cap
- ⑦ 8" x 6" x 1'-4" formed junction chamber
- ⑧ 1" ϕ metal conduit.
- ⑨ Metal expansion fitting
- ⑩ Pipe coupling
- ⑪ 2" ϕ 45° 13" R steel elbow
- ⑫ 2" ϕ 45° 9/2" R nonmetallic elbow



Abutment	Pier	Longitudinal Movement	t	Detail Type

When deck is continuous over pier, expansion and deflection fitting detail is not required.

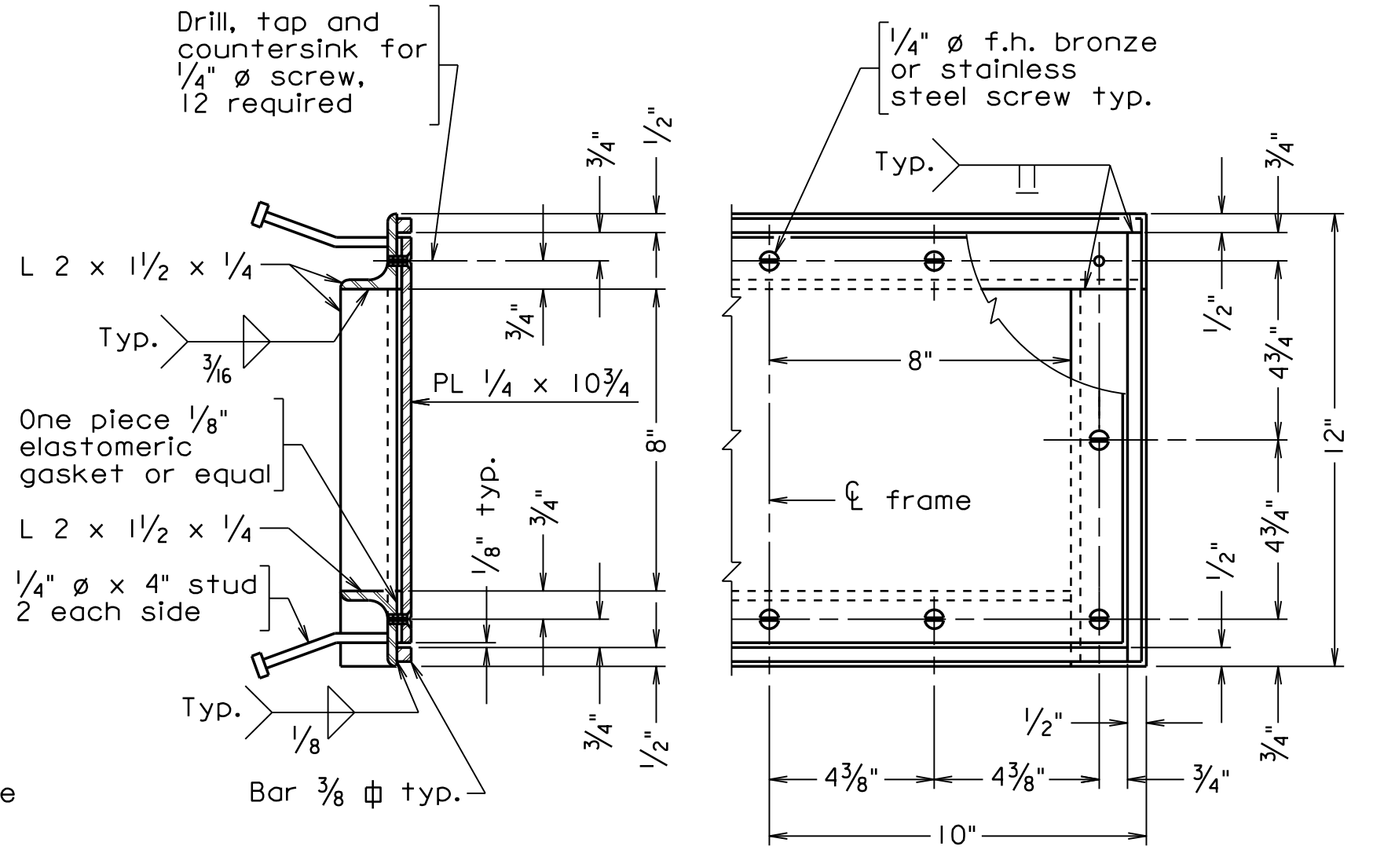
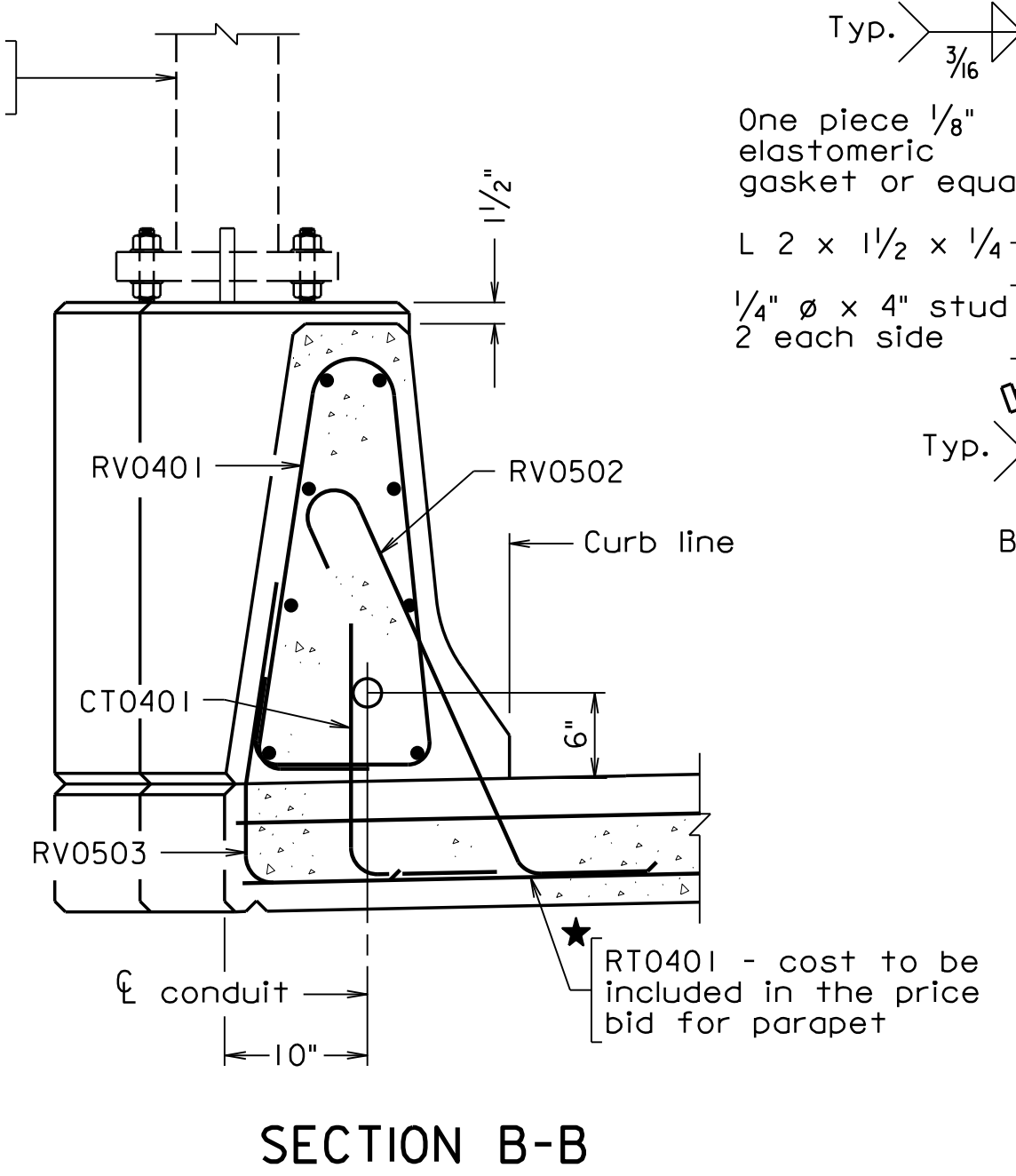
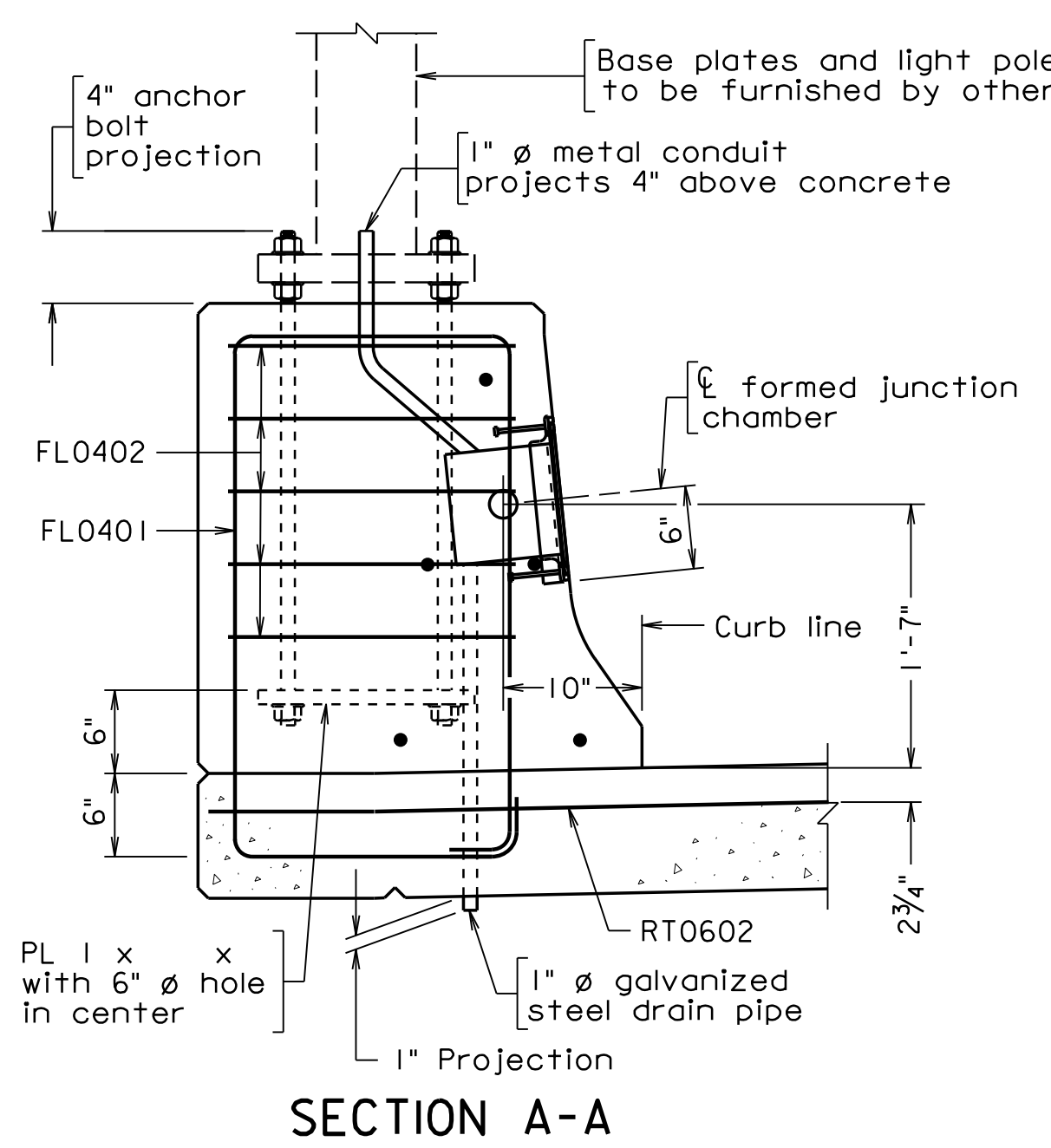
REINFORCING STEEL SCHEDULE

Mark	No.	Size	Pin ϕ	Length	Location
FL0401		#4	2"	9'-8"	Light base
FL0402		#4	2"	6'-8"	Light base
FL0503		#5	3 3/4"	7'-5"	Light base
CT0401		#4	3"	2'-5"	Conduit tie
RV0401	⊙	#4			
RV0502	⊙	#5			
RV0503	⊙	#5			
★RT0401	⊙	#4			
RT0602		#6			Top of deck slab

Dimensions in bending diagram are out-to-out of bars.

⊙ Bars RV0401, RV0502, RV0503 and RT0401 are detailed and accounted for on parapet detail sheet.

★ Used only when deck transverse reinforcement is parallel to skew of bridge



JUNCTION CHAMBER FRAME Scale: 3" = 1'-0"

Standard does not reflect 42" barrier.

PAC PLANS
PROGRESS PRINT 4/1/2022
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

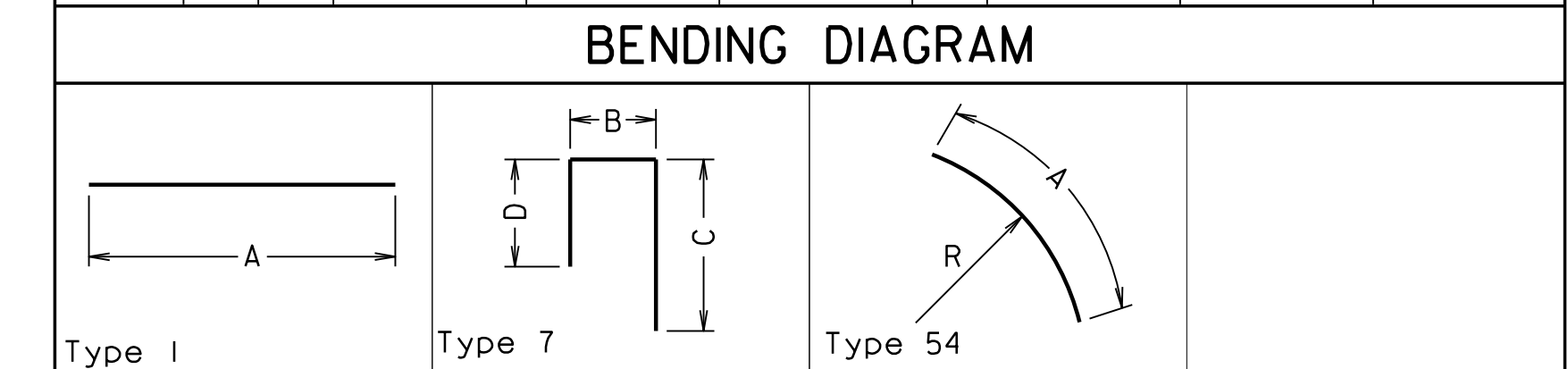
PROGRESS DRIVING FOR REFERENCE. NO RECORD IS TO BE MADE. USE AT YOUR OWN RISK OF DAMAGE.

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
TRAFFIC GATE CONDUIT SYSTEM					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
			Drawn:WRA....	Apr. 2022	257-38A
			Checked: .WRA.....		97 of 125

REINFORCING STEEL SCHEDULE							DIMENSION TABLE																		
MARK	NO.	BAR SIZE	PIN DIA. FT.-IN.	LENGTH FT.-IN. FT.-IN.	WEIGHT (LBS.)	LOCATION	MARK	TYPE	A FT.-IN.	B FT.-IN.	C FT.-IN.	D FT.-IN.	E FT.-IN.	F FT.-IN.	G FT.-IN.	H FT.-IN.	I FT.-IN.	J FT.-IN.	K FT.-IN.	L FT.-IN.	V FT.-IN.	N FT.-IN.			
Superstructure (RR Reinforcing Steel Class II)																									
SC0501	760	05		21-10	17307	Deck	SC0501	I	21-10																
SC0502	760	05		10-9	8521	Deck	SC0502	I	10-9																
SC0503	757	05		10-0	7896	Deck	SC0503	I	10-0																
SC0504	614	05		12-2	7792	Deck	SC0504	I	12-2																
SC0505	610	05		10-0	6362	Deck	SC0505	I	10-0																
SC0506	102	05		12-6 TO 53-0	3484	Deck	SC0506	I	VARY																
SC0507	120	05		52-4	6550	Deck	SC0507	I	52-4																
SC0508	72	05		12-6 TO 35-6	1802	Deck	SC0508	I	VARY																
SH0501	6	05		59-11 1/2	375	Deck	SH0501	54	60-0																
SH0502	5	05		44-11 5/8	235	Deck	SH0502	54	45-0																
SH0503	65	05		4-6	305	Deck	SH0503	I	4-6																
SL0401	896	04		60-0	35912	Deck	SL0401	I	60-0																
SL0402	128	04		48-6	4147	Deck	SL0402	I	48-6																
SL0403	128	04		16-0	1368	Deck	SL0403	I	16-0																
SL0404	2	04		60-0	80	Deck	SL0404	I	60-0																
SL0405	2	04		38-0	51	Deck	SL0405	I	38-0																
SL0501	288	05		60-0	18023	Deck	SL0501	I	60-0																
SR0501	152	05		21-0 TO 46-0	5311	Deck	SR0501	I	VARY																
SR0502	56	05		39-6	2307	Deck	SR0502	I	39-6																
SR0503	148	05		10-0	1544	Deck	SR0503	I	10-0																
ES0601	156	06	0-3 3/4	6-3 1/8	1465	Deck	ES0601	7		0-8 1/2	4-0	1-10													
ES0502	63	05	0-2 1/2	7-6 7/8	498	Deck	ES0502	7		0-9 1/2	4-6	2-6													
ET0501	4	05		36-10	154	Deck	ET0501	I	36-10																
MT0401	1	04		13-0	9	Median	MT0401	I	13-0																
MT0402	29	04		13-1 TO 16-5	286	Median	MT0402	I	VARY																
MT0403	63	04		16-6	694	Median	MT0403	I	16-6																
MT0404	14	04		15-9 TO 16-9	152	Median	MT0404	I	VARY																
MT0405	2	04		15-5	21	Median	MT0405	I	15-5																
MT0406	43	04		3-6 TO 17-5	300	Median	MT0406	I	VARY																
ML0401	26	04		54-6	947	Median	ML0401	I	54-6																
ML0402	13	04		11-0	96	Median	ML0402	I	11-0																
ML0403	13	04		10-4 TO 36-3	202	Median	ML0403	I	VARY																
ML0404	4	04		29-4 TO 54-9	112	Median	ML0404	I	VARY																
ML0405	1	04	0-3	48-11 3/8	33	Median	ML0405	2	29-11				2-3 1/4	18-10 3/4	19-0 3/8										
ML0406	1	04		60-0	40	Median	ML0406	I	60-0																
ML0407	3	04		3-4 TO 13-3	17	Median	ML0407	I	VARY																
ML0408	1	04		45-3	30	Median	ML0408	I	45-3																
MN0401	1	04	1-5	6-8 7/8	5	Median	MN0401	45	3-0	3-0	1-5														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					134433																				

DIMENSION VARIATION TABLE												
MARK	NO. EA.	LEN.	DIMEN- SION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.	DIMEN- SION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.		
SC0506	2	A		12-6	53-0	0-9 3/4						
SC0508	2	A		12-6	35-6	0-7 7/8						
SR0501	4	A		21-0	46-0	0-8 1/8						
MT0402	1	A		13-1	16-5	0-1 3/8						
MT0404	1	A		15-9	16-9	0-0 7/8						
MT0406	1	A		3-6	17-5	0-4						
MLO403	1	A		10-4	36-3	2-1 7/8						
MLO404	1	A		29-4	54-9	8-5 5/8						
MLO407	1	A		3-4	13-3	4-11 1/2						



No.	Description	Date

NOTES:
 Dimensions in Bending Diagram are out-to-out of bars.
 Weights in schedule are based on density of 490 lb/ft.³

PROGRESS DRAWING FOR REFERENCE ONLY. NO RECORD SETS FILED. IS NOT TO BE USED FOR CONSTRUCTION.

WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER

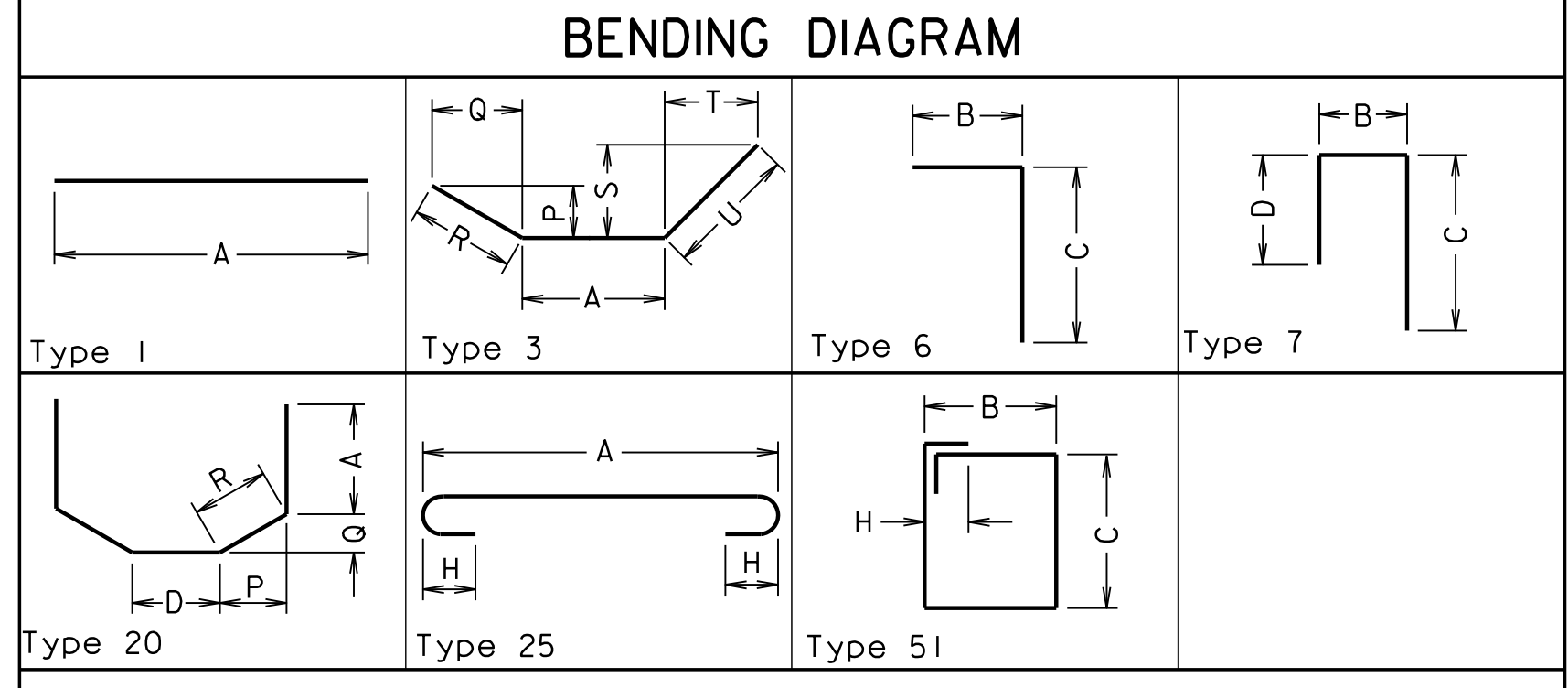
PAC PLANS
PROGRESS PRINT 4/1/2022
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
REINFORCING STEEL SCHEDULE SUPERSTRUCTURE			
No.	Description	Date	Designed: AC..... Date Drawn: MWL..... Plan No. Checked: WRA..... Apr. 2022
			257-38A 98 of 125

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			101

REINFORCING STEEL SCHEDULE						DIMENSION TABLE																	
MARK	NO.	BAR SIZE	PIN DIA. FT.-IN.	LENGTH FT.-IN. FT.-IN.	WEIGHT (LBS.)	LOCATION	MARK	TYPE	A FT.-IN.	B FT.-IN.	C FT.-IN.	D FT.-IN.	E FT.-IN.	F FT.-IN.	G FT.-IN.	H FT.-IN.	I FT.-IN.	J FT.-IN.	K FT.-IN.	L FT.-IN.	V FT.-IN.	N FT.-IN.	
PIER 1																							
Footings - Black Reinforcing Steel																							
PF0801	20	08	0-6	10-9	574	Footings	PF0801	7															
PF0802	20	08	0-6	10-4	552	Footings	PF0802	25	8-6	8-6	1-4	1-4				0-8							
PF0603	24	06		8-6	306	Footings	PF0603	1	8-6														
PF0804	24	08	0-6	9-1 1/2	585	Footings	PF0804	6		1-4	8-0												
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					2017																		
Neat - CRR, Class I																							
PC0801	6	08	0-6	12-2 1/2	196	Cap	PC0801	7		9-11 1/2	1-4	1-4											
PC0802	2	08	0-6	11-6 3/4	62	Cap	PC0802	7		9-3 3/4	1-4	1-4											
PC0803	6	08	0-6	11-8 1/2	188	Cap	PC0803	7		9-5 1/2	1-4	1-4											
PC0804	2	08	0-6	11-0 3/4	59	Cap	PC0804	7		8-9 3/4	1-4	1-4											
PC0505	12	05		9-3	116	Cap	PC0505	1	9-3														
PC0506	4	05		6-6 TO 8-9	32	Cap	PC0506	1	VARY														
PC0607	2	06	0-4 1/2	9-6 7/8	29	Cap	PC0607	3	3-10 1/4				1-2	2-7 1/2	2-10 1/2		1-2	2-7 1/2	2-10 1/2				
PC0608	6	06	0-4 1/2	10-5 3/8	94	Cap	PC0608	3	3-10 1/4				1-4	3-0 3/8	3-3 3/4		1-4	3-0 3/8	3-3 3/4				
PC0509	12	05	0-2 1/2	11-4 1/2 TO 12-4 1/2	149	Cap Stirrup	PC0509	51		2-2	VARY					0-5 5/8							
PC0510	32	05	0-2 1/2	12-7 TO 14-0 3/4	445	Cap Stirrup	PC0510	51		2-2	VARY					0-5 5/8							
PC0511	10	05	0-2 1/2	14-0 3/4	147	Cap Stirrup	PC0511	51		2-2	VARY	4-8				0-5 5/8							
PN0501	14	05	0-2 1/2	7-11 3/4	117	Cap Ends	PN0501	20	2-4			2-2 7/8	0-5 1/8	0-5	0-7 1/8								
PP0501	18	05	0-2 1/2	7-11 7/8	150	Beam Seat	PP0501	7		1-4	3-5 1/4	3-5 1/4											
PP0502	2	05	0-2 1/2	8-11 1/4	19	Beam Seat	PP0502	7		2-3 3/8	3-5 1/4	3-5 1/4											
PP0503	2	05		3-8	8	Beam Seat	PP0503	1	3-8														
PP0504	4	05		3-10 1/2	16	Beam Seat	PP0504	1	3-10 1/2														
PS0401	17	04	0-2	11-7 7/8	132	Column Stirrup	PS0401	51		2-10	2-10					0-4 1/2							
PV0801	24	08		20-7 1/2	1322	Column Vertical	PV0801	1	20-7 1/2														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					3281																		
Neat - CRR, Class I @ Beam Seat Modifications																							
PP0505	40	05	0-2 1/2	3-2	132	Beam Seat Modification	PP0505	30	1-2 1/8	1-6						0-6							
PP0506	40	05	0-2 1/2	4-4 3/4	183	Beam Seat Modification	PP0506	6	3-0	1-6													
PP0507	80	05	0-2 1/2	4-6 3/4	380	Beam Seat Modification	PP0507	6	3-0	1-8													
PP0508	5	05	0-2 1/2	13-2 3/4	69	Beam Seat Modification	PP0508	51	3-1	3-4						0-5 5/8							
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					764																		
PIER 2																							
Footings - Black Reinforcing Steel																							
PF0804	24	08	0-6	9-1 1/2	585	Footings	PF0804	6		1-4	8-0	1-4											
PF0805	20	08	0-6	13-9	734	Footings	PF0805	7		11-6	1-4	1-4											
PF0806	20	08	0-6	11-4	605	Footings	PF0806	25	9-6							0-8							
PF0607	12	06		9-6	171	Footings	PF0607	1	9-6														
PF0608	12	06		11-6	207	Footings	PF0608	1	11-6														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					2302																		
Neat - CRR, Class I																							
PC0801	6	08	0-6	12-2 1/2	196	Cap	PC0801	7		9-11 1/2	1-4	1-4											
PC0802	2	08	0-6	11-6 3/4	62	Cap	PC0802	7		9-3 3/4	1-4	1-4											
PC0803	6	08	0-6	11-8 1/2	188	Cap	PC0803	7		9-5 1/2	1-4	1-4											
PC0804	2	08	0-6	11-0 3/4	59	Cap	PC0804	7		8-9 3/4	1-4	1-4											
PC0505	12	05		9-3	116	Cap	PC0505	1	9-3														
PC0506	4	05		6-9 TO 8-10 1/2	33	Cap	PC0506	1	VARY														
PC0607	2	06	0-4 1/2	9-6 7/8	29	Cap	PC0607	3	3-10 1/4				1-2	2-7 1/2	2-10 1/2		1-2	2-7 1/2	2-10 1/2				
PC0608	6	06	0-4 1/2	10-5 3/8	94	Cap	PC0608	3	3-10 1/4				1-4	3-0 3/8	3-3 3/4		1-4	3-0 3/8	3-3 3/4				
PC0509	12	05	0-2 1/2	11-4 1/2 TO 12-4 1/2	149	Cap Stirrup	PC0509	51		2-2	VARY					0-5 5/8							
PC0510	32	05	0-2 1/2	12-7 TO 14-0 3/4	445	Cap Stirrup	PC0510	51		2-2	VARY					0-5 5/8							
PC0511	10	05	0-2 1/2	14-0 3/4	147	Cap Stirrup	PC0511	51		2-2	VARY	4-8				0-5 5/8							
PN0501	14	05	0-2 1/2	7-11 3/4	117	Cap Ends	PN0501	20	2-4			2-2 7/8	0-5 1/8	0-5	0-7 1/8								
PS0401	17	04	0-2	11-7 7/8	132	Column Stirrup	PS0401	51		2-10	2-10					0-4 1/2							
PV0802	24	08		20-7	1319	Column Vertical	PV0802	1	20-7														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					3086																		
Neat - CRR, Class I @ Beam Seat Modifications																							
PP0512	90	05	0-2 1/2	4-0 3/4	381	Beam Seat Modification	PP0512	6	3-0	1-2													
PP0513	60	05	0-2 1/2	4-3 3/4	270	Beam Seat Modification	PP0513	6	3-3	1-2													
PP0514	5	05	0-2 1/2	15-2 3/4	79	Beam Seat Modification	PP0514	51	4-1	3-4						0-5 5/8							
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					730																		

DIMENSION VARIATION TABLE											
MARK	NO. EA.	DIMENSION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.	DIMENSION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.		
PC0506	2	A	6-6	8-9	2-3						
PC0509	4	C	3-3 7/8	3-9 7/8	0-3						
PC0510	4	C	3-11 1/8	4-8	0-1 1/4						
PC0506	2	A	6-9	8-10 1/2	2-1 1/2						
PC0509	4	C	3-3 7/8	3-9 7/8	0-3						
PC0510	4	C	3-11 1/8	4-8	0-1 1/4						



257-38A_101.dgn

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NOTES:
 Dimensions in Bending Diagram are out-to-out of bars.
 Weights in schedule are based on density of 490 lb/ft.³

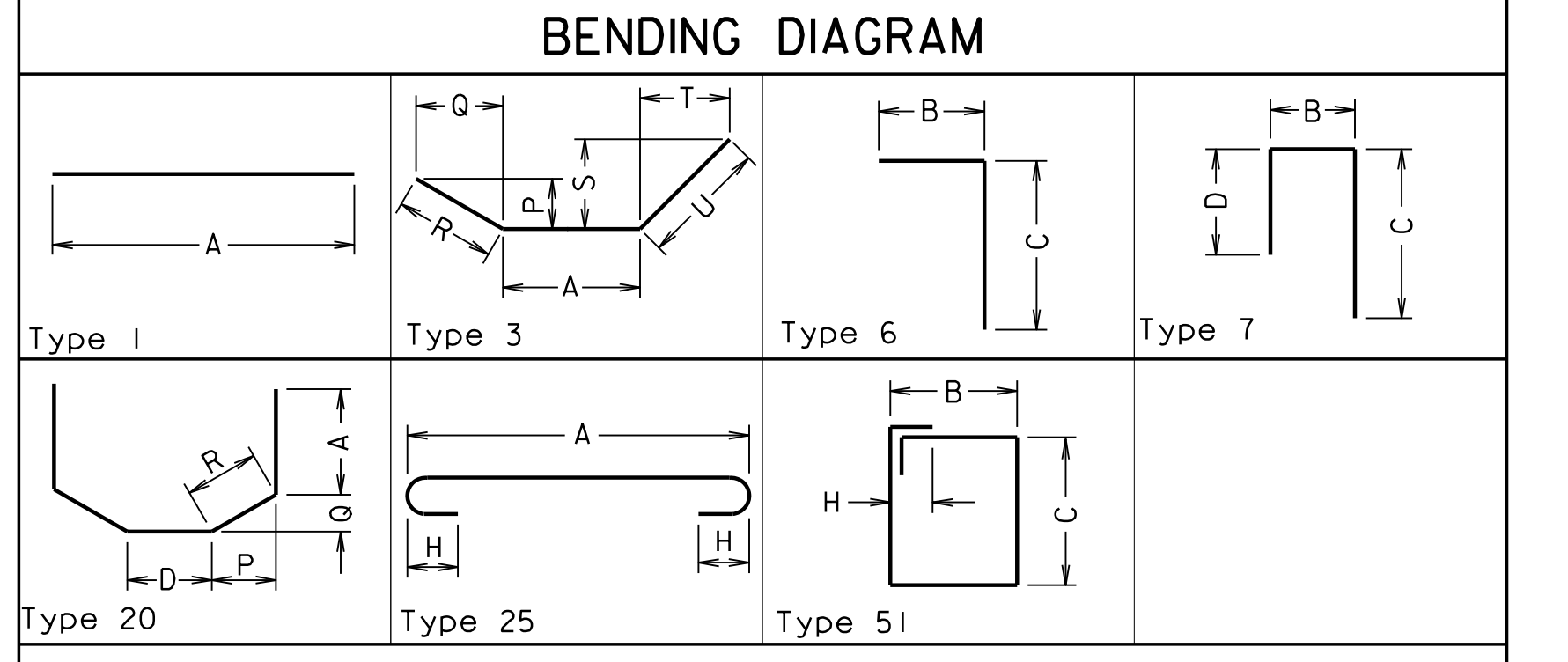
PAC PLANS
PROGRESS PRINT 4/1/2022
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
REINFORCING STEEL SCHEDULE PIER 1 AND PIER 2			
No.	Description	Date	Revisions
Designed: AC	Date	Plan No.	Sheet No.
Drawn: MWL	Apr. 2022	257-38A	101 of 125
Checked: WRA			

PROGRESS PRINT 4/1/2022

REINFORCING STEEL SCHEDULE						DIMENSION TABLE																
MARK	NO.	BAR SIZE	PIN DIA. FT.-IN.	LENGTH FT.-IN.	WEIGHT (LBS.)	LOCATION	MARK	TYPE	A FT.-IN.	B FT.-IN.	C FT.-IN.	D FT.-IN.	E FT.-IN.	F FT.-IN.	G FT.-IN.	H FT.-IN.	I FT.-IN.	J FT.-IN.	K FT.-IN.	L FT.-IN.	V FT.-IN.	N FT.-IN.
PIER 3																						
Footings - Black Reinforcing Steel																						
PF0801	20	08	0-6	10-9	574	Footings	PF0801	7														
PF0802	20	08	0-6	10-4	552	Footings	PF0802	25	8-6	8-6	1-4	1-4				0-8						
PF0603	24	06		8-6	306	Footings	PF0603	1	8-6													
PF0804	24	08	0-6	9-1 1/2	585	Footings	PF0804	6		1-4	8-0											
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					2017																	
Neat - CRR, Class I																						
PC0801	6	08	0-6	12-2 1/2	196	Cap	PC0801	7		9-11 1/2	1-4	1-4										
PC0802	2	08	0-6	11-6 3/4	62	Cap	PC0802	7		9-3 3/4	1-4	1-4										
PC0803	6	08	0-6	11-8 1/2	188	Cap	PC0803	7		9-5 1/2	1-4	1-4										
PC0804	2	08	0-6	11-0 3/4	59	Cap	PC0804	7		8-9 3/4	1-4	1-4										
PC0505	12	05		9-3	116	Cap	PC0505	1	9-3													
PC0506	4	05		6-6 TO 8-9	32	Cap	PC0506	1	VARY													
PC0607	2	06	0-4 1/2	9-6 7/8	29	Cap	PC0607	3	3-10 1/4				1-2	2-7 1/2	2-10 1/2		1-2	2-7 1/2	2-10 1/2			
PC0608	6	06	0-4 1/2	10-5 3/8	94	Cap	PC0608	3	3-10 1/4				1-4	3-0 3/8	3-3 3/4							
PC0509	12	05	0-2 1/2	11-4 1/2 TO 12-4 1/2	149	Cap Stirrup	PC0509	51		2-2	VARY					0-5 5/8						
PC0510	32	05	0-2 1/2	12-7 TO 14-0 3/4	445	Cap Stirrup	PC0510	51		2-2	VARY					0-5 5/8						
PC0511	10	05	0-2 1/2	14-0 3/4	147	Cap Stirrup	PC0511	51		2-2	VARY	4-8				0-5 5/8						
PN0501	14	05	0-2 1/2	7-11 3/4	117	Cap Ends	PN0501	20	2-4			2-2 7/8	0-5 1/8	0-5	0-7 1/8							
PP0501	18	05	0-2 1/2	7-11 7/8	150	Beam Seat	PP0501	7		1-4	3-5 1/4	3-5 1/4										
PP0502	2	05	0-2 1/2	8-11 1/4	19	Beam Seat	PP0502	7		2-3 3/8	3-5 1/4	3-5 1/4										
PP0503	2	05		3-8	8	Beam Seat	PP0503	1	3-8													
PP0504	6	05		3-10 1/2	24	Beam Seat	PP0504	1	3-10 1/2													
PS0401	17	04	0-2	11-7 7/8	132	Column Stirrup	PS0401	51		2-10	2-10					0-4 1/2						
PV0803	24	08		21-1	1351	Column Vertical	PV0803	1	21-1													
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					3318																	
Neat - CRR, Class I @ Beam Seat Modifications																						
PP0505	16	05	0-2 1/2	3-9 1/8	63	Beam Seat Modification	PP0505	30	1-9 1/4	1-6						0-6						
PP0506	16	05	0-2 1/2	4-4 3/4	73	Beam Seat Modification	PP0506	6	3-0	1-6												
PP0507	32	05	0-2 1/2	4-6 3/4	152	Beam Seat Modification	PP0507	6	3-0	1-8												
PP0508	2	05	0-2 1/2	13-0 1/2	27	Beam Seat Modification	PP0508	51	3-1	3-4						0-4 1/2						
PP0509	24	05	0-2 1/2	3-0 1/4	76	Beam Seat Modification	PP0509	6	2-7 1/2	0-6												
PP0510	24	05	0-2 1/2	3-10 1/4	96	Beam Seat Modification	PP0510	6	2-4 1/2	1-7												
PP0511	12	05		3-0	38	Beam Seat Modification	PP0511	1	3-0													
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					525																	

DIMENSION VARIATION TABLE										
MARK	NO. EA.	LEN.	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.	DIMENSION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.	
PC0506	2	A	6-6	8-9	2-3					
PC0509	4	C	3-3 7/8	3-9 7/8	0-3					
PC0510	4	C	3-11 1/8	4-8	0-1 1/4					



257-38A_102.dgn

PROGRESS DRAWING FOR REFERENCE ONLY. NO RECORD SETS TO BE MADE. IT IS THE USER'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS AND CONDITIONS.

WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER

NOTES:
 Dimensions in Bending Diagram are out-to-out of bars.
 Weights in schedule are based on density of 490 lb/ft.³

PAC PLANS
 PROGRESS PRINT 4/1/2022
 THESE PLANS NOT TO BE USED FOR CONSTRUCTION
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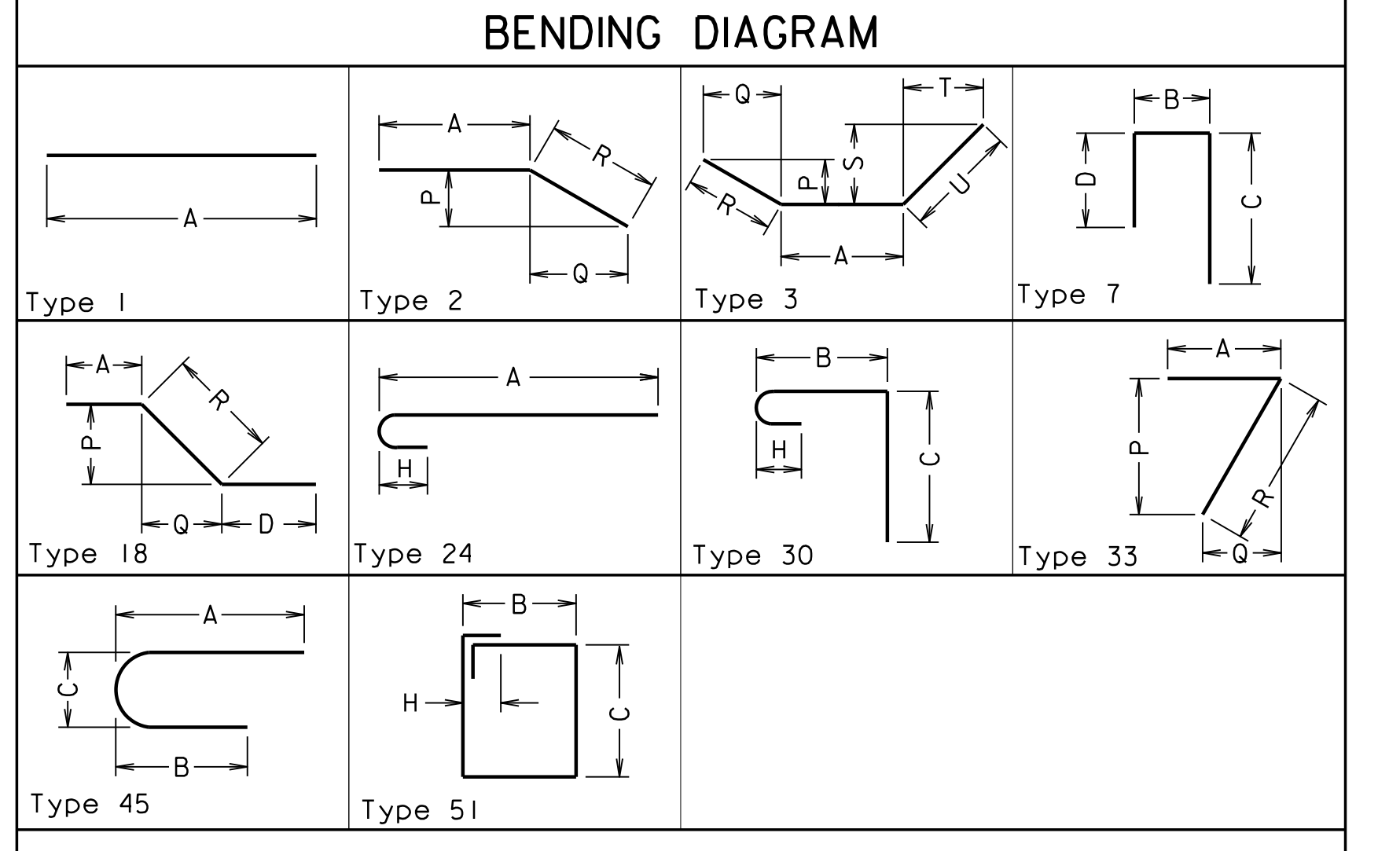
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
REINFORCING STEEL SCHEDULE PIER 3					
No.	Description	Date	Designed: AC..... Date Drawn: MWL..... Checked: WRA.....	Plan No. 257-38A	Sheet No. 102 of 125
Revisions			Apr. 2022		

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID		STATE	SHEET NO.
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688

REINFORCING STEEL SCHEDULE							DIMENSION TABLE																
MARK	NO.	BAR SIZE	PIN DIA. FT.-IN.	LENGTH FT.-IN. FT.-IN.	WEIGHT (LBS.)	LOCATION	MARK	TYPE	A FT.-IN.	B FT.-IN.	C FT.-IN.	D FT.-IN.	E FT.-IN.	F FT.-IN.	G FT.-IN.	H FT.-IN.	I FT.-IN.	J FT.-IN.	K FT.-IN.	L FT.-IN.	V FT.-IN.	N FT.-IN.	
Abutment C																							
Footings - Black Reinforcing Steel																							
AF0401	14	04	1-3	8-8 3/8	81	Footings	AF0401	45	4-0	4-0	1-4												
AF0602	91	06		6-6	888	Footings	AF0602	1	6-6														
AF0603	25	06		36-10	1382	Footings	AF0603	1	36-10														
AF0604	18	06		6-6	176	Footings	AF0604	1	6-6														
AF0605	30	06		11-0	495	Footings	AF0605	1	11-0														
AF0606	8	06		14-3	171	Footings	AF0606	1	14-3														
AF0607	32	06	0-4 1/2	7-2 1/4	345	Footings	AF0607	24	6-6							0-6							
AF0608	8	06		6-9	81	Footings	AF0608	1	6-9														
AF0509	38	05		3-6	139	Footings	AF0509	1	3-6														
AF0510	75	05	0-3 3/4	4-9 7/8	377	Footings	AF0510	24	4-3							0-5							
AF0511	22	05		5-4	122	Footings	AF0511	1	5-4														
AF0612	40	06	0-4 1/2	5-2 1/4	311	Footings	AF0612	24	4-6							0-6							
AF0513	4	05	0-3 3/4	4-5 7/8	19	Footings	AF0513	24	3-11							0-5							
AF0514	4	05		3-6	15	Footings	AF0514	1	3-6														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					4602																		
Neat - Black Reinforcing Steel																							
AH0501	6	05		36-10 1/2	231	Stem	AH0501	1	36-10 1/2														
AH0602	4	06		10-0	60	Stem	AH0602	1	10-0														
AH0603	4	06		9-0	54	Stem	AH0603	1	9-0														
AH0604	4	06		9-4	56	Stem	AH0604	1	9-4														
AH0605	4	06		8-2	49	Stem	AH0605	1	8-2														
AH0606	4	06		9-0	54	Stem	AH0606	1	9-0														
AH0507	4	05		36-10 1/2	154	Backwall	AH0507	1	36-10 1/2														
AH0508	6	05		36-10 1/2	231	Backwall	AH0508	1	36-10 1/2														
AV0501	38	05	0-3 3/4	6-2 3/4	247	Stem	AV0501	30		3-5 1/2	2-4					0-5							
AV0502	38	05	0-3 3/4	10-8 3/8	424	Stem/Backwall	AV0502	7		0-10 1/2	5-4	4-9											
AV0503	75	05	0-3 3/4	4-11 3/4	390	Backwall	AV0503	30		1-5 1/2	3-1												
AV0504	4	05		3-3	14	Wingwall	AV0504	1	3-3														
AW0501	2	05		2-3	5	Wingwall	AW0501	1	2-3														
AW0502	2	05		6-1	13	Wingwall	AW0502	1	6-1														
AW0503	3	05		12-11	40	Wingwall	AW0503	1	12-11														
AW0504	4	05		11-0	46	Wingwall	AW0504	1	11-0														
AW0505	3	05		9-4	29	Wingwall	AW0505	1	9-4														
AW0606	5	06		12-11	97	Wingwall	AW0606	1	12-11														
AW0607	7	06		11-0	116	Wingwall	AW0607	1	11-0														
AW0608	3	06		9-4	42	Wingwall	AW0608	1	9-4														
AW0509	3	05		13-2	41	Wingwall	AW0509	1	13-2														
AW0510	4	05		11-2	47	Wingwall	AW0510	1	11-2														
AW0511	3	05		9-6	30	Wingwall	AW0511	1	9-6														
AW0612	5	06		13-2	99	Wingwall	AW0612	1	13-2														
AW0613	7	06		11-2	117	Wingwall	AW0613	1	11-2														
AW0614	3	06		9-6	43	Wingwall	AW0614	1	9-6														
AW0515	12	05	0-3 3/4	6-6 1/2	82	Wingwall	AW0515	2	3-4				3-4	0-1 1/2		3-4							
AW0516	19	05	0-3 3/4	6-1 1/2	121	Wingwall	AW0516	2	4-3				2-0	0-1		2-0							
AW0517	7	05	0-3 3/4	8-2 7/8	60	Wingwall	AW0517	3	6-3 1/2				0-8 1/4	0-8 3/4		1-0			0-8 1/4	0-8 3/4		1-0	
AW0518	12	05	0-3 3/4	6-6 3/8	82	Wingwall	AW0518	33	3-4				3-4	0-1 1/2		3-4							
AW0519	19	05	0-3 3/4	6-1 3/8	121	Wingwall	AW0519	33	4-3				2-0	0-1		2-0							
AW0520	7	05	0-3 3/4	7-9 7/8	57	Wingwall	AW0520	3	5-10 1/2				0-8 1/4	0-8 1/2		1-0			0-8 1/4	0-8 1/2		1-0	
AW0521	11	05		6-6	75	Wingwall	AW0521	1	6-6														
AW0622	20	06		6-6	195	Wingwall	AW0622	1	6-6														
AW0523	11	05		6-6	75	Wingwall	AW0523	1	6-6														
AW0624	20	06		6-6	195	Wingwall	AW0624	1	6-6														
AP0401	36	04	0-3	4-10 1/4	117	Seat	AP0401	30		3-5 1/2	1-0											0-4 1/2	
AP0602	24	06		2-8	96	Seat	AP0602	1	2-8														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					4005																		
Moment Slab on RW-3																							
Corrosion Resistant Reinforcing, Class II																							
FL0401	4	04	0-3	21-6	57	Longitudinal	FL0401	2	19-0				0-5 1/4	2-5 1/2		2-6							
FL0402	1	04		1-9	1	Longitudinal	FL0402	1	1-9														
FL0403	1	04		7-6	5	Longitudinal	FL0403	1	7-6														
FL0404	2	04		13-2	18	Longitudinal	FL0404	1	13-2														
FL0405	14	04		32-0	299	Longitudinal	FL0405	1	32-0														
FL0406	28	04		25-6	477	Longitudinal	FL0406	1	25-6														
FL0407	14	04		26-6	248	Longitudinal	FL0407	1	26-6														
FT0601	224	06	0-4 1/2	3-6 3/8	1187	Transverse	FT0601	30		1-7	1-5											0-6	
FT0602	224	06	0-4 1/2	6-0	2019	Transverse	FT0602	18	1-0														
FT0603	224	06		4-0	1345	Transverse	FT0603	1	4-0				4-2 1/4	0-10 3/4		0-4 1/2					0-11 5/8		
FT0604	45	06	0-4 1/2	3-7 1/4 TO 6-9 7/8	352	Transverse	FT0604	30		VARY	1-5											0-6	
FT0605	45	06	0-4 1/2	6-2 3/8 TO 9-5	527	Transverse	FT0605	18	1-0													0-6	
FT0606	45	06		4-0 7/8 TO 7-3 1/2	384	Transverse	FT0606	1	VARY														
TOTAL WEIGHT IN PRECEDING GROUP OF BARS					6919																		

DIMENSION VARIATION TABLE											
MARK	NO. E.A. LEN.	DIMEN- SION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.	DIMEN- SION	FROM FT.-IN.	TO FT.-IN.	VARY BY FT.-IN.		
FT0604	1	B	1-7 7/8	4-10 1/2	0-0 7/8						
FT0605	1	D	4-3 1/8	7-5 3/4	0-0 7/8						
FT0606	1	A	4-0 7/8	7-3 1/2	0-0 7/8						



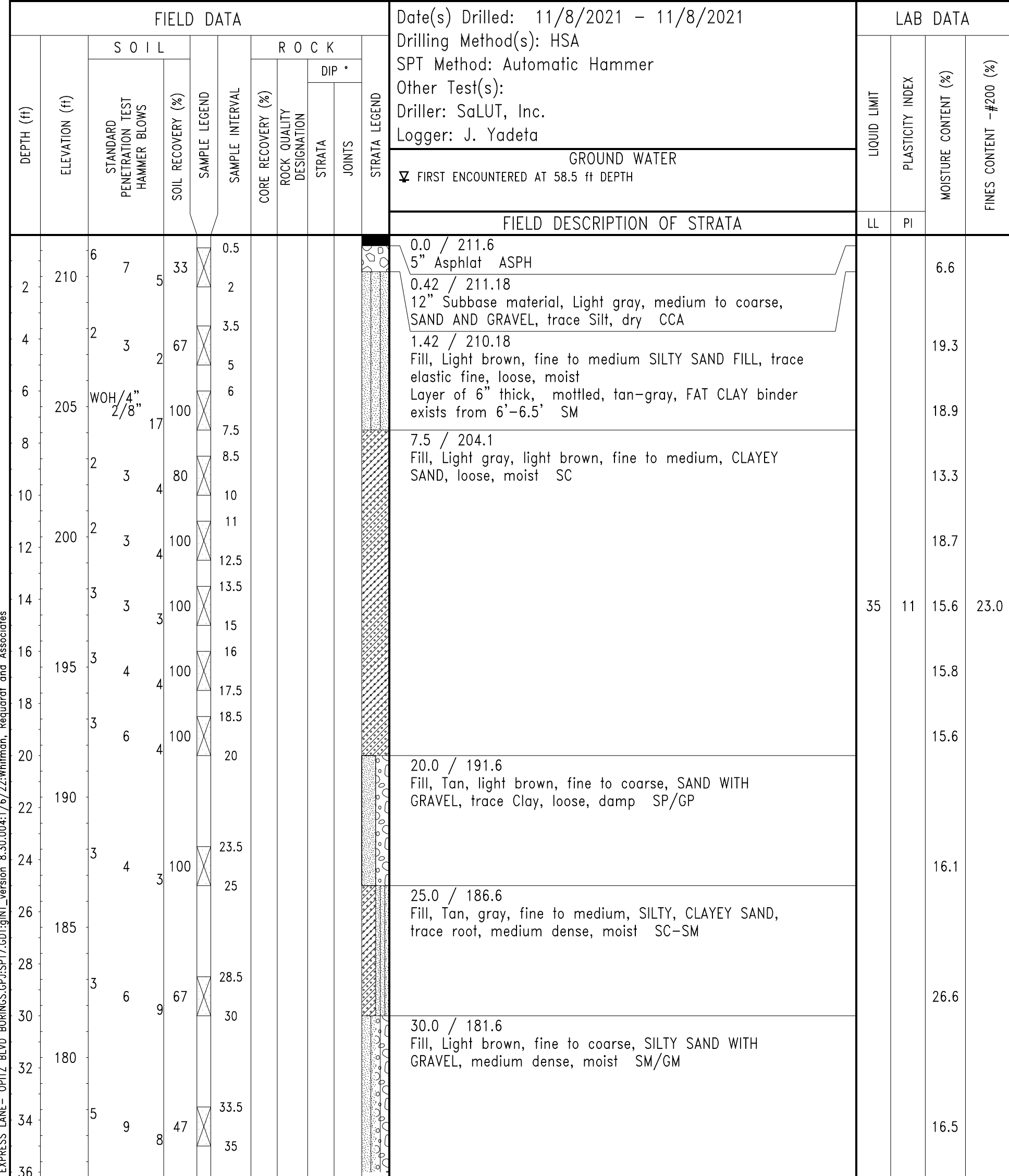
257-38A_103.dgn

PROGRESS DRAWING FOR REFERENCE USE ONLY. NOT TO



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: BRIDGE
 STATION: 70+30
 NORTHING: 355252.1568 ft
 SURFACE ELEVATION: 211.6 ft
 OFFSET: 46 RT
 Easting: 3626874.5973 ft
 COORD. DATUM: VA South

B-A1-6
 PAGE 1 OF 3



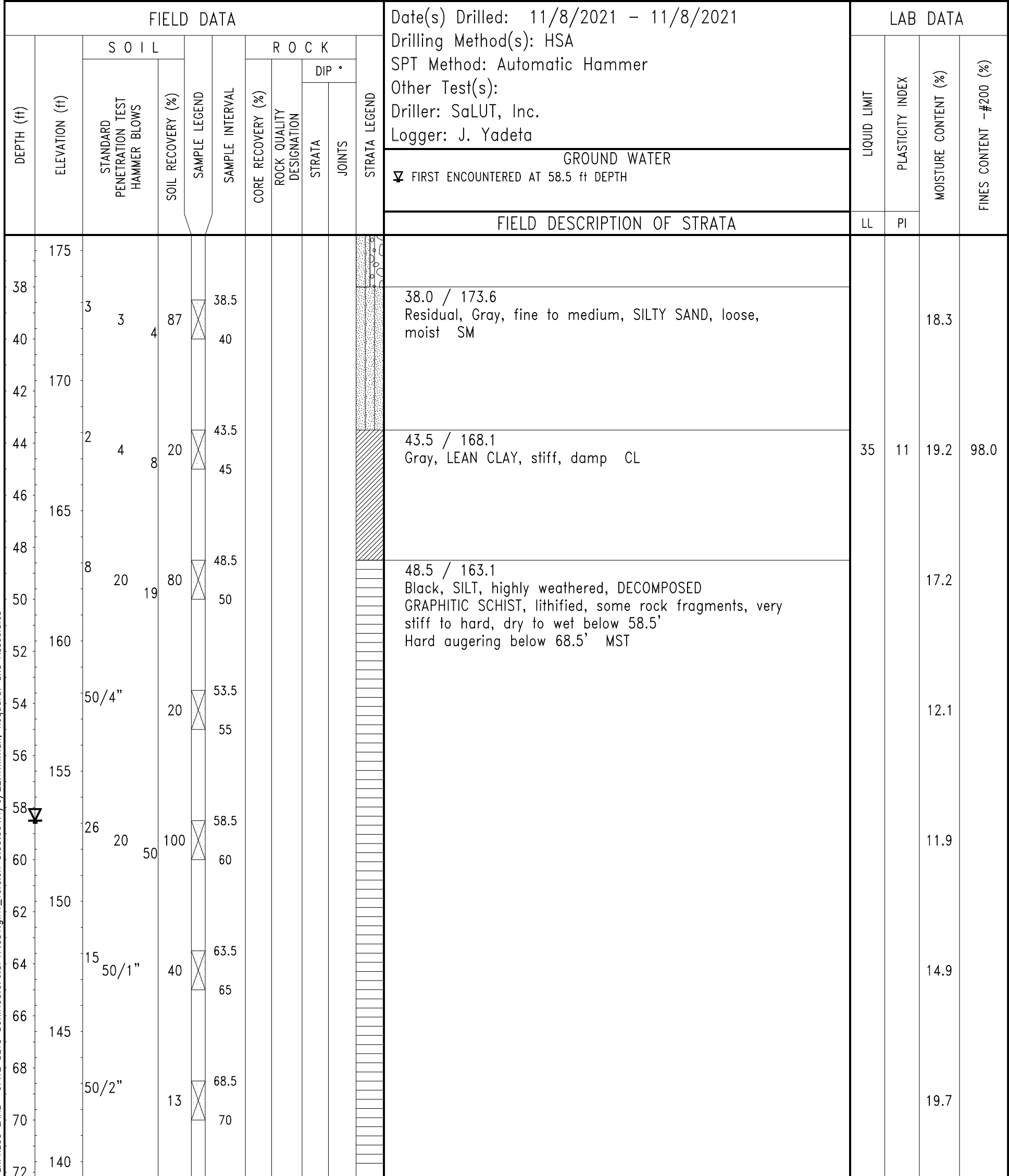
REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location.
 Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 3
 B-A1-6



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: BRIDGE
 STATION: 70+30
 NORTHING: 355252.1568 ft
 SURFACE ELEVATION: 211.6 ft
 OFFSET: 46 RT
 Easting: 3626874.5973 ft
 COORD. DATUM: VA South

B-A1-6
 PAGE 2 OF 3



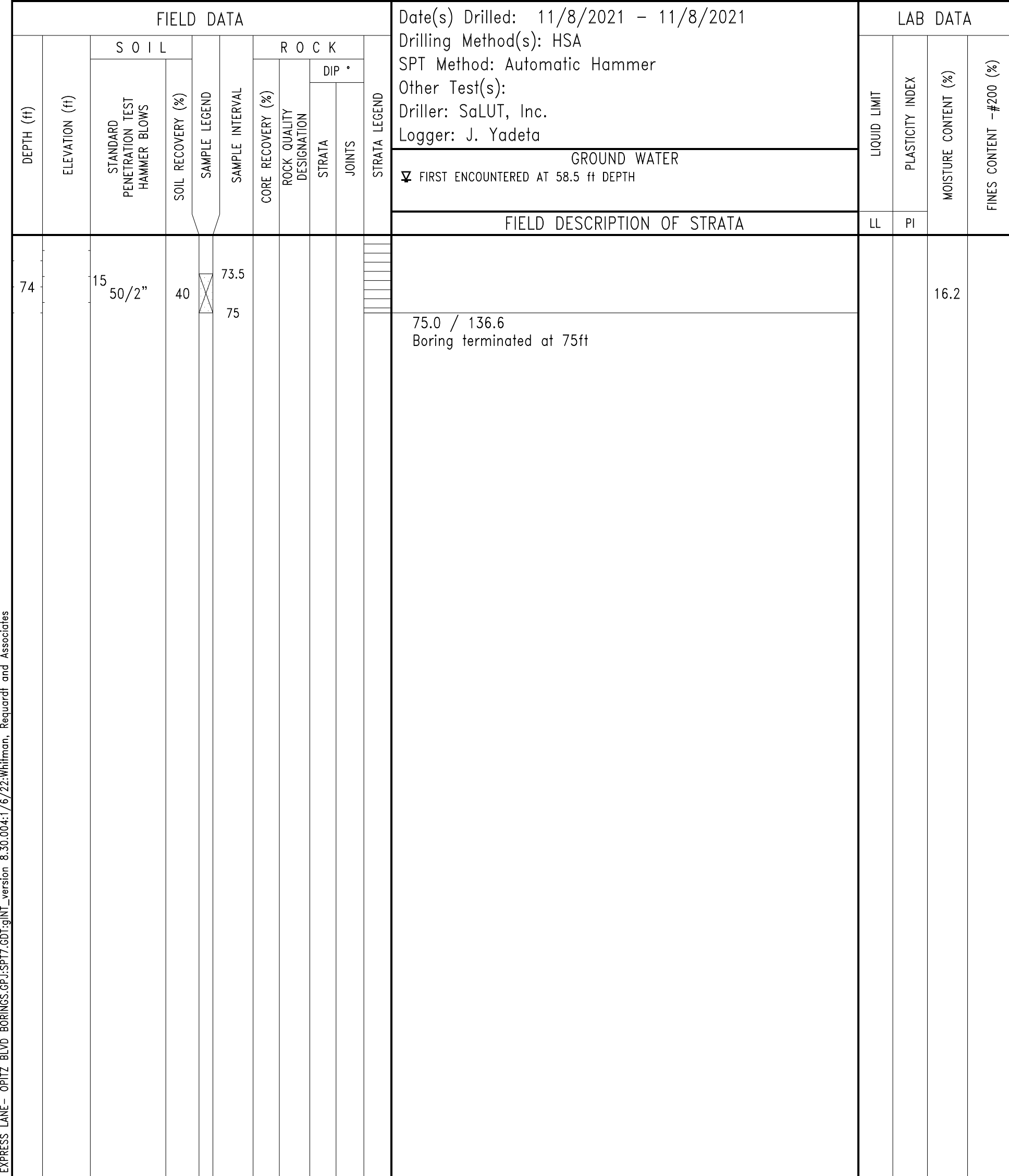
REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location.
 Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 2 OF 3
 B-A1-6



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: BRIDGE
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 Easting: 3626874.5973 ft
 COORD. DATUM: VA South

B-A1-6
 PAGE 3 OF 3



REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location.
 Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 3 OF 3
 B-A1-6

257-38A_104.dgn

PROPRIETARY DRAWING FOR REFERENCE USE ONLY. NO RECORDABLE IS AT ALL. Risk of User.

A copy of the original signed geotechnical submittal is on file in the District Office.

The subsurface information shown on the boring logs in these plans was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions at the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative of conditions beyond the limits of the borings shown; and any such projections by bidders are purely interpretive and altogether speculative. Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by the bidders.

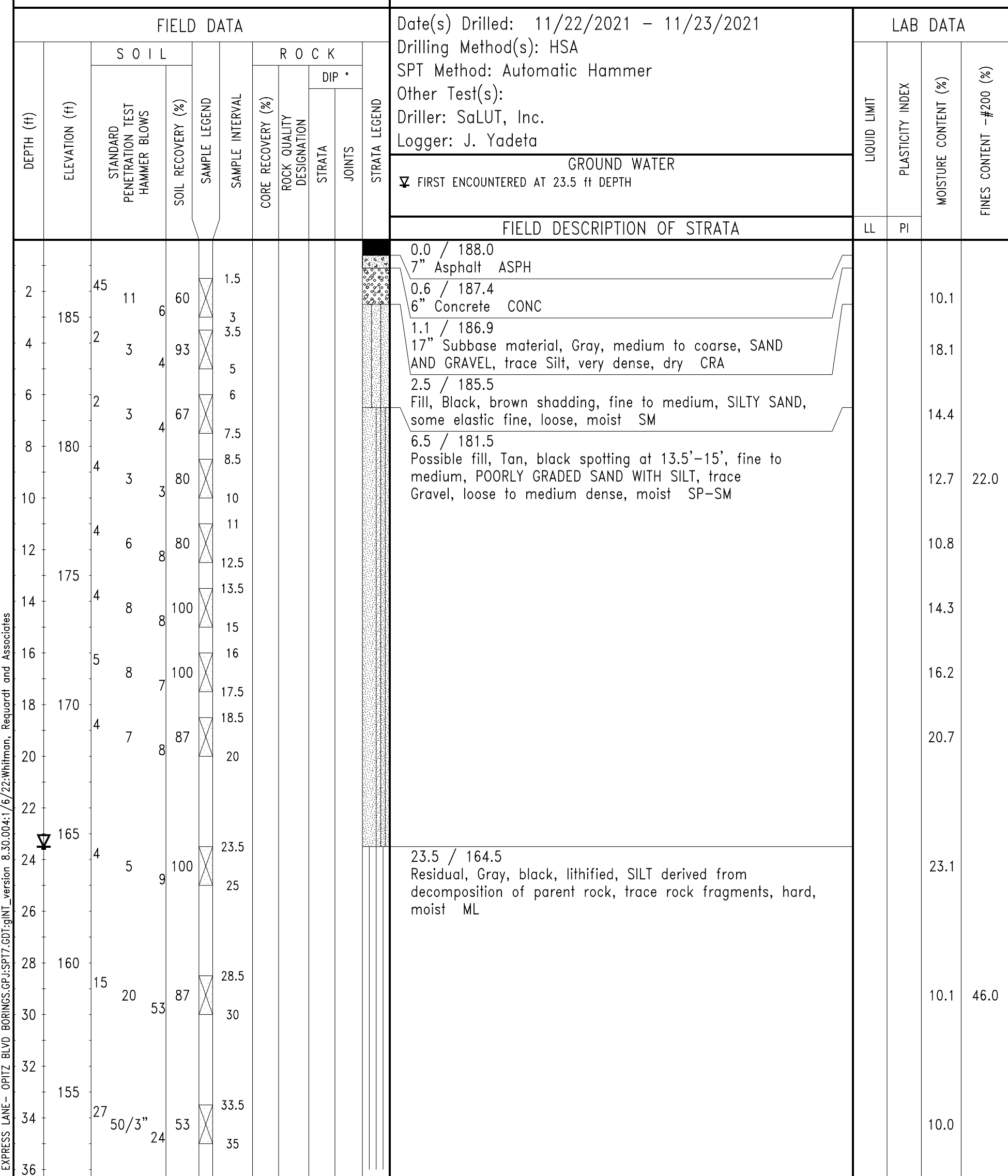
PAC PLANS
 PROGRESS PRINT 3/18/2022
 THESE PLANS NOT TO BE USED FOR CONSTRUCTION

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION				
STRUCTURE AND BRIDGE DIVISION				
ENGINEERING GEOLOGY 1 OF 5				
No.	Description	Date	Designed: J.BH.....	Date
			Drawn: J.BH.....	Plan No.
			Checked: J.BH.....	Sheet No.
Revisions			Mar. 2022	257-38A 104 of 125



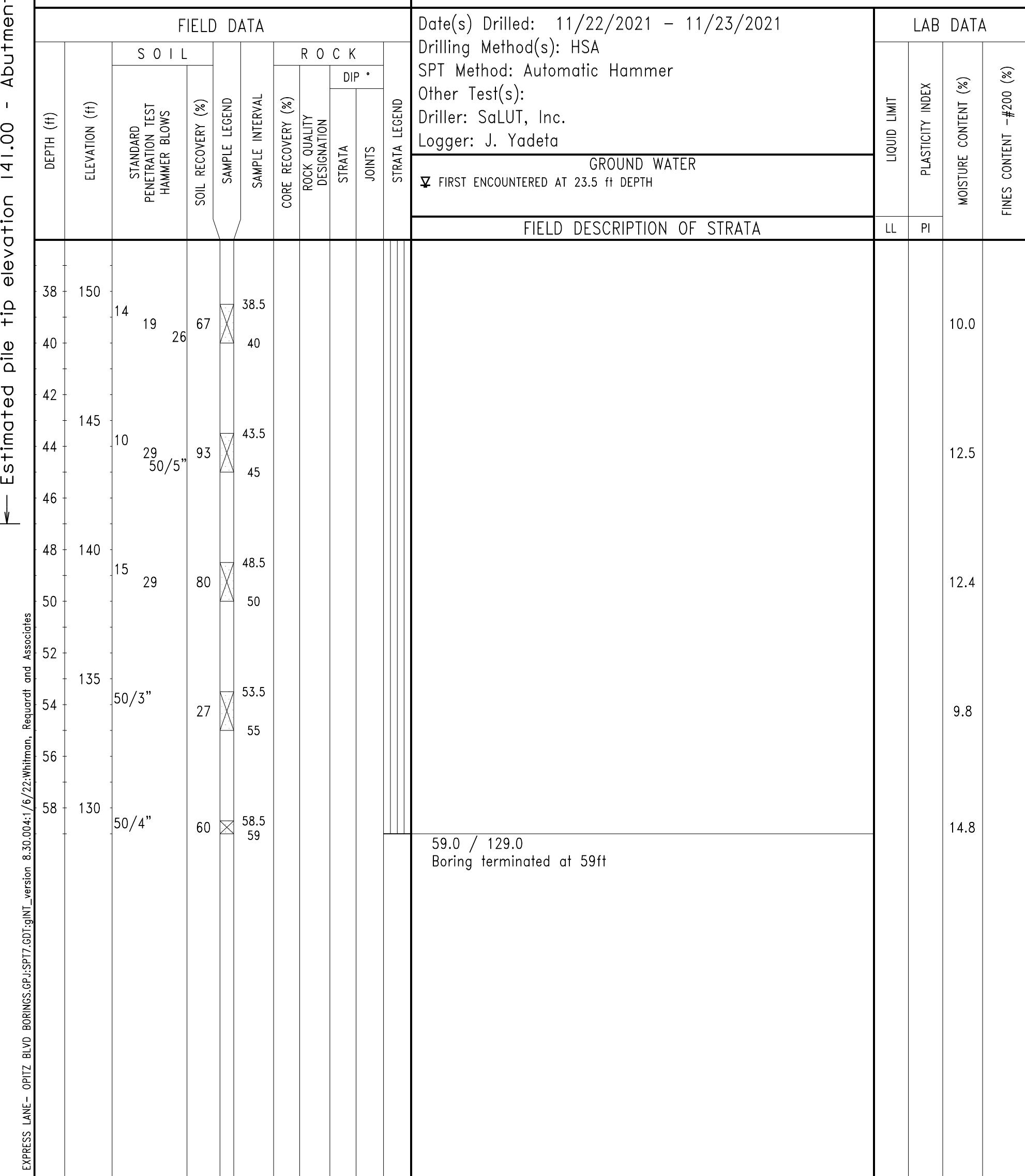
PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 27+10
 NORTHING: 355278.6864 ft
 SURFACE ELEVATION: 188.0 ft
 OFFSET: 20 RT
 Easting: 3626597.1158 ft
 COORD. DATUM: VA South

B-A2-1
 PAGE 1 OF 2



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 27+10
 NORTHING: 355278.6864 ft
 SURFACE ELEVATION: 188.0 ft
 OFFSET: 20 RT
 Easting: 3626597.1158 ft
 COORD. DATUM: VA South

B-A2-1
 PAGE 2 OF 2

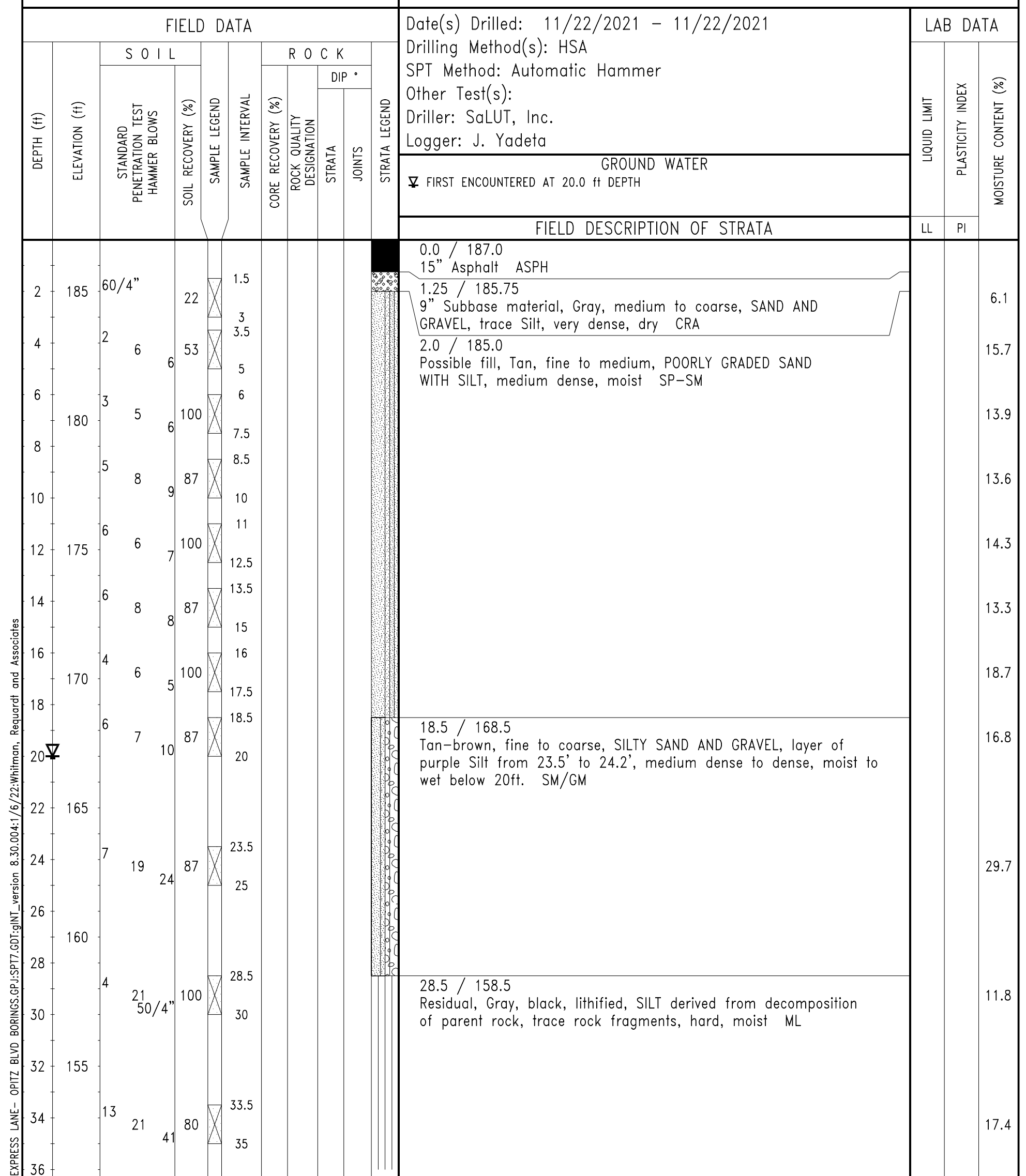


REMARKS: Rig Type: Acker XLS.
 Boring was offset 35' towards east, drilled on western shoulder of I-95 express lane. Cave-in at 55.3'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 26+00
 NORTHING: 355172.3987 ft
 SURFACE ELEVATION: 187.0 ft
 OFFSET: 20 RT
 Easting: 3626568.6573 ft
 COORD. DATUM: VA South

B-A3-1
 PAGE 1 OF 2



REMARKS: Rig Type: Acker XLS.
 Cave-in at 16.7'. Bulk sample collected from 2' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

257-38A_105.dgn

PROPRIETARY DRAWING FOR REFERENCE USE ONLY. NO RECORD OR AS-BUILT DRAWING. USE AT SOLE RISK OF USER.

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PAC PLANS
 PROGRESS PRINT 3/18/2022
 THESE PLANS NOT TO BE USED FOR CONSTRUCTION

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
ENGINEERING GEOLOGY 2 OF 5			
No.	Description	Date	Designed: J.B.H. Date Plan No. Sheet No.
	Revisions		Drawn: J.B.H. Checked: J.S.S. Mar. 2022 257-38A 105 of 125

STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE PROJECT	
		2000 0095-076-299, B688	106



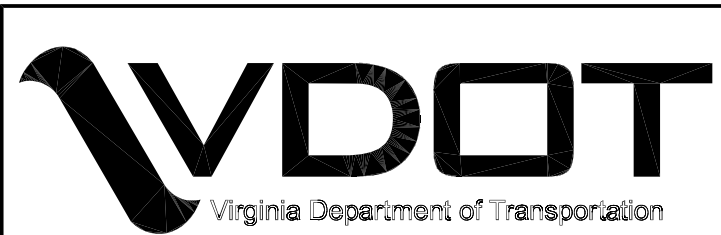
PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 26+00
 NORTHING: 355172.3987 ft
 SURFACE ELEVATION: 187.0 ft
 OFFSET: 20 RT
 Easting: 3626568.6573 ft
 COORD. DATUM: VA South

B-A3-1
 PAGE 2 OF 2

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP				STRATA LEGEND
150												
38		31	50/5"	47	38.5							
40					40						18.1	
FIELD DESCRIPTION OF STRATA											LL	PI
GROUND WATER												
FIRST ENCOUNTERED AT 20.0 ft DEPTH												
40.0 / 147.0 Boring terminated at 40ft												

REMARKS: Rig Type: Acker XLS.
 Cave-in at 16.7'. Bulk sample collected from 2' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.
 SPT LOG#-HS EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SP17.DWG:11/18/2021

PAGE 2 OF 2
 B-A3-1



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 25+00
 NORTHING: 355083.9063 ft
 SURFACE ELEVATION: 189.2 ft
 OFFSET: 12 LT
 Easting: 3626512.2718 ft
 COORD. DATUM: VA South

B-A3-2
 PAGE 1 OF 2

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP				
2	25	34	100	1.5								
4	185	2	3	100	3.5					4.3		
6	2	5	100	5						40.8		
8	2	5	100	7.5						42.4		
10	180	5	7	60	8.5					14.3		
12	4	5	87	11						14.5	21.0	
14	175	6	7	80	13.5					13.9		
16	5	8	100	15						15.3		
18	6	12	87	17.5						14.7		
20	170	12	25	20						14.7		
22												
24	165	24	50/2"	40	23.5					20.4		
26					25							
28	160	60/3"	20	28.5						15.6		
30					30							
32					33.5							
34	155	4	13	40	35					15.2		
36												
FIELD DESCRIPTION OF STRATA											LL	PI
GROUND WATER												
FIRST ENCOUNTERED AT 20.7 ft DEPTH												
0.0 / 189.2 18" Asphalt ASPH												
1.5 / 187.7 18" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry CRA												
3.0 / 186.2 Gray-brown mix, ELASTIC SILT, medium stiff to stiff, moist ML												
8.5 / 180.7 Brown, tan, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist SP-SM												
18.5 / 170.7 Gray, black, fine to coarse, POORLY GRADE SAND, trace Silt, dense, moist to wet below 20.5ft SP												
23.5 / 165.7 Residual, Gray, SILT DRIVEN FROM DECOMPOSITION OF BED ROCK, hard, dry ML												
28.5 / 160.7 Gray, fine to coarse, SILTY AND GRAVEL SIZE DECOMPOSED ROCK FRAGMENTS, little elastic fine, extremely dense to dense to extremely dense, dry to moist SM												

REMARKS: Rig Type: Acker XLS.
 Cave-in at 34.5'. Boring was offset 5' towards south due to underground utility. As drilled boring elevation is the same as the original location. Bulk sample collected from 1.5' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.
 SPT LOG#-HS EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SP17.DWG:11/18/2021

PAGE 1 OF 2
 B-A3-2



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 25+00
 NORTHING: 355083.9063 ft
 SURFACE ELEVATION: 189.2 ft
 OFFSET: 12 LT
 Easting: 3626512.2718 ft
 COORD. DATUM: VA South

B-A3-2
 PAGE 2 OF 2

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	ROCK QUALITY DESIGNATION	STRATA	JOINTS	DIP				
38		150	53/2"	13	38.5							
40					40						8.6	
FIELD DESCRIPTION OF STRATA											LL	PI
GROUND WATER												
FIRST ENCOUNTERED AT 20.7 ft DEPTH												
Gray, fine to coarse, SILTY AND GRAVEL SIZE DECOMPOSED ROCK FRAGMENTS, little elastic fine, extremely dense to dense to extremely dense, dry to moist												
40.0 / 149.2 Boring terminated at 40ft												

REMARKS: Rig Type: Acker XLS.
 Cave-in at 34.5'. Boring was offset 5' towards south due to underground utility. As drilled boring elevation is the same as the original location. Bulk sample collected from 1.5' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.
 SPT LOG#-HS EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SP17.DWG:11/18/2021

PAGE 2 OF 2
 B-A3-2

257-38A_106.dgn

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A copy of the original signed geotechnical submittal is on file in the District Office.

The subsurface information shown on the boring logs in these plans was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions at the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative of conditions beyond the limits of the borings shown; and any such projections by bidders are purely interpretive and altogether speculative. Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by the bidders.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
ENGINEERING GEOLOGY 3 OF 5			
No.	Description	Date	Designed: J.BH..... Date Drawn: J.BH..... Checked: J.BH.....
			Mar. 2022
			257-38A
			106 of 125

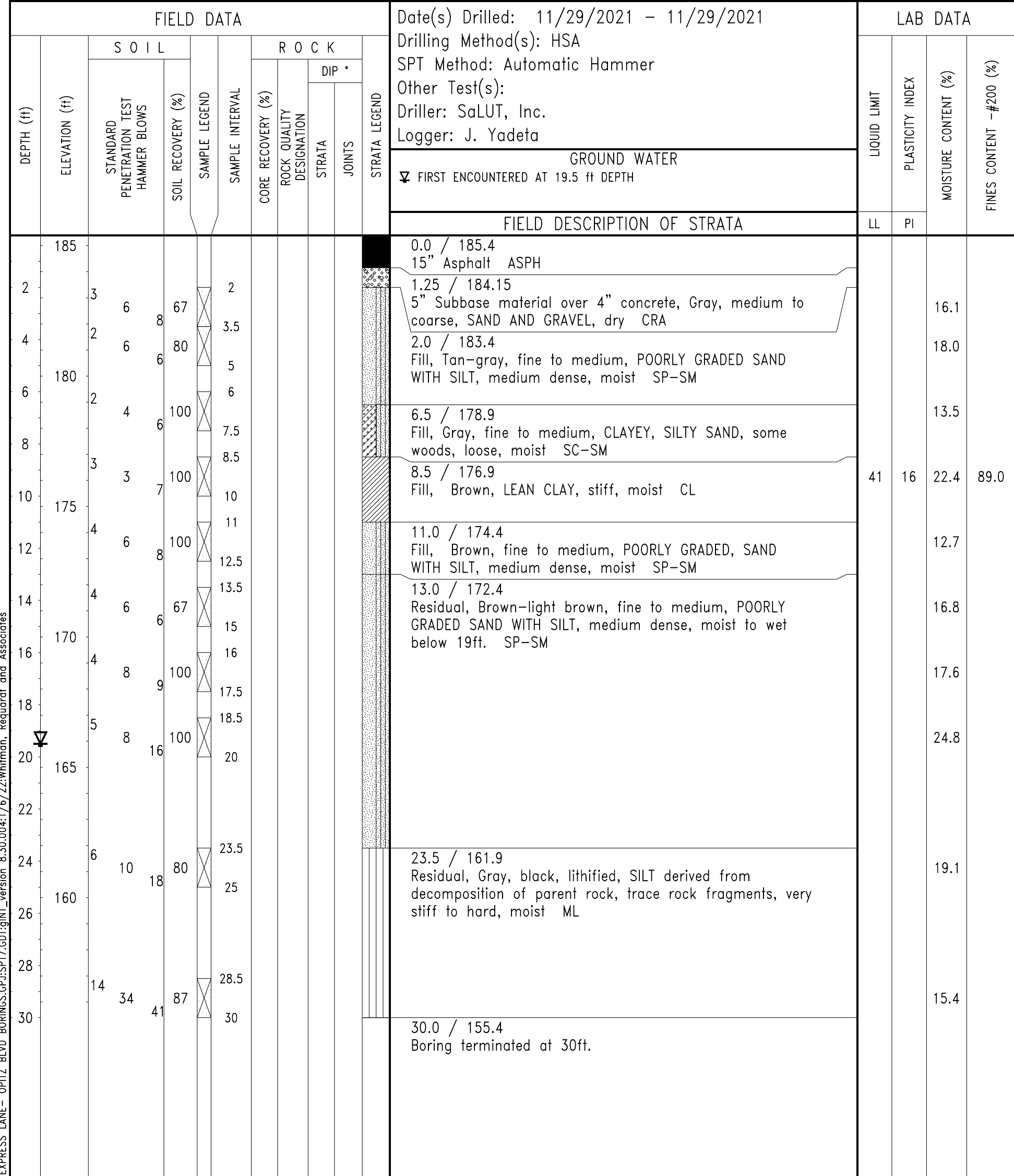
PROGRESS PRINT 3/18/2022



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

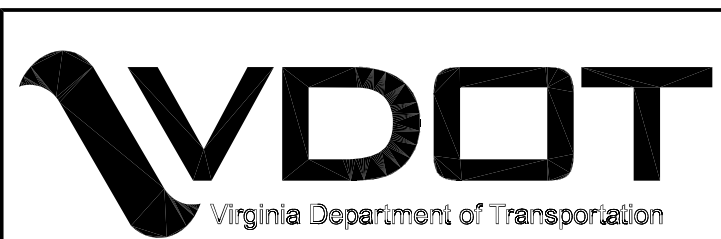
STATION: 24+00 OFFSET: 23 RT
 NORTHING: 354978.3553 ft Easting: 3626520.1235 ft
 SURFACE ELEVATION: 185.4 ft COORD. DATUM: VA South

B-A3-3
 PAGE 1 OF 1



REMARKS: Rig Type: Acker XLS.
 Boring was offset 6' towards north due to underground utility. Cave-in at 25.2'. Hole backfilled with soil cutting and patched with cold asphalt at the surface. Shelby tube sample was taken from an offset boring from 14' - 16'

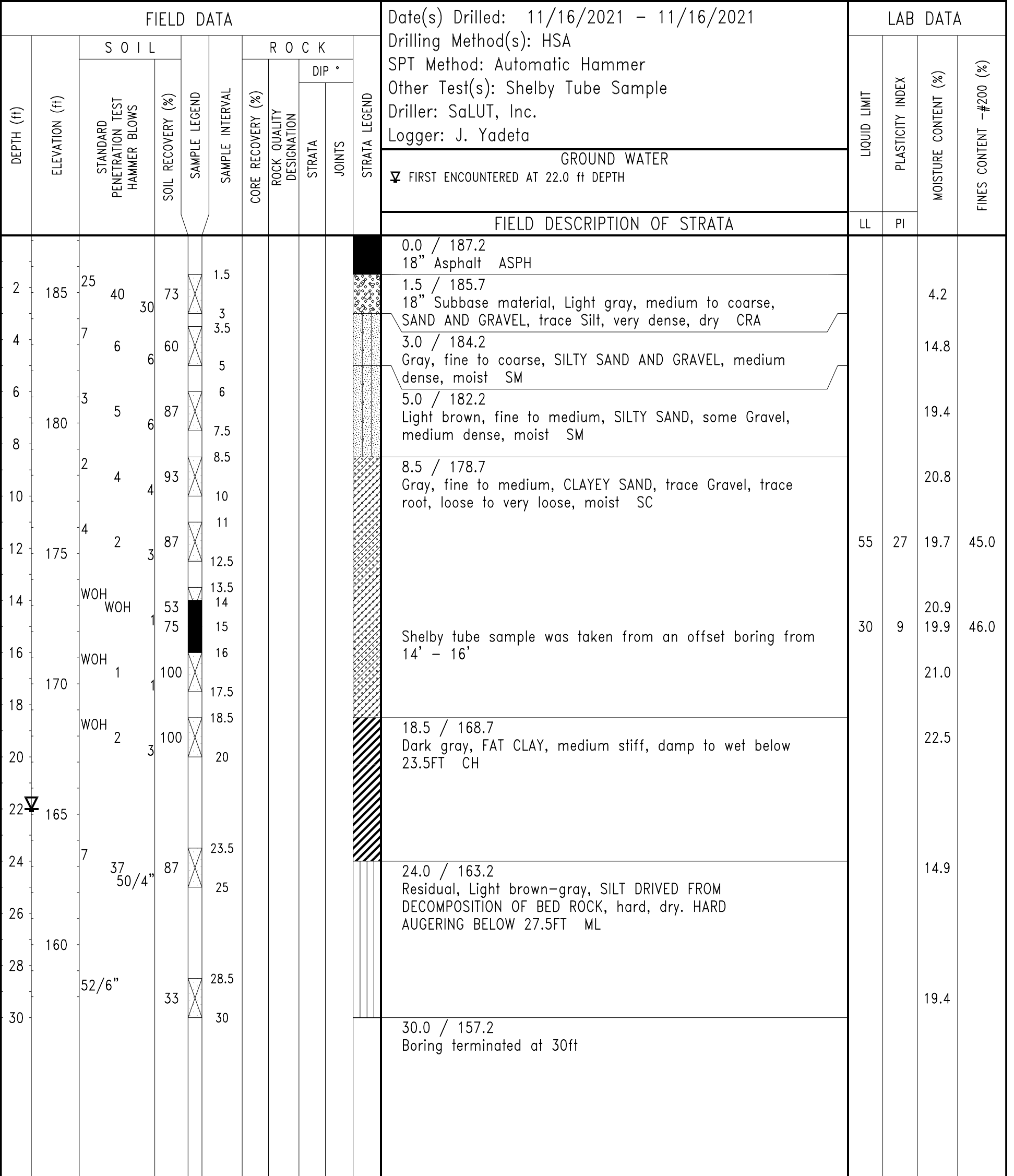
PAGE 1 OF 1
 B-A3-3



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

STATION: 23+50 OFFSET: 6 LT
 NORTHING: 354937.3133 ft Easting: 3626479.5403 ft
 SURFACE ELEVATION: 187.2 ft COORD. DATUM: VA South

B-A3-4
 PAGE 1 OF 1



REMARKS: Rig Type: Acker XLS.
 Cave-in at 23.8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

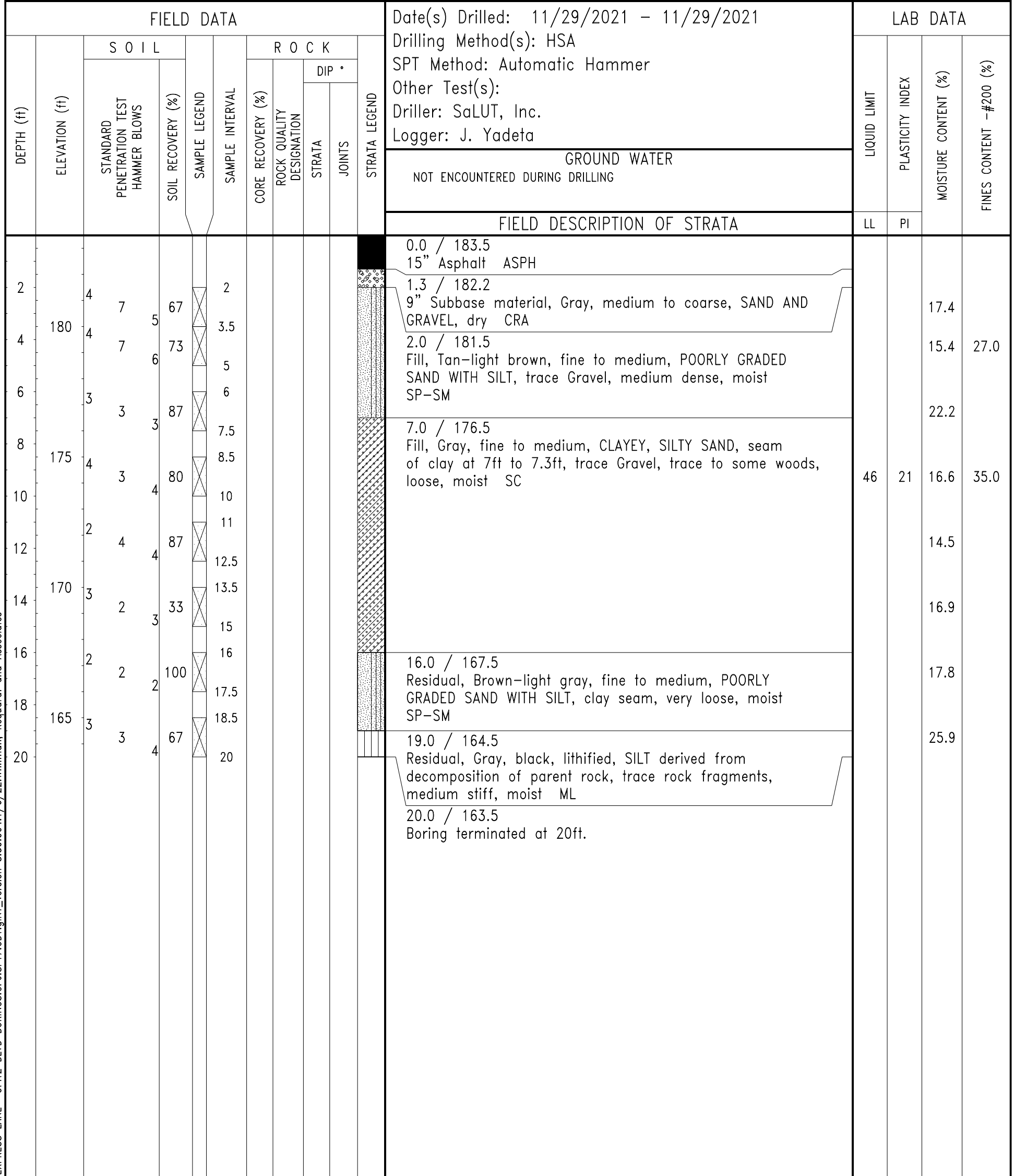
PAGE 1 OF 1
 B-A3-4



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

STATION: 22+00 OFFSET: 35 RT
 NORTHING: 354785.0818 ft Easting: 3626468.6903 ft
 SURFACE ELEVATION: 183.5 ft COORD. DATUM: VA South

B-A3-5
 PAGE 1 OF 1



REMARKS: Rig Type: Acker XLS.
 Cave-in at 15.7'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
 B-A3-5

257-38A_107.dgn

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The subsurface information shown on the boring logs in these plans was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions at the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative of conditions beyond the limits of the borings shown; and any such projections by bidders are purely interpretive and altogether speculative. Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by the bidders.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
ENGINEERING GEOLOGY 4 OF 5			
No.	Description	Date	Designed: J.BH..... Date Drawn: J.BH..... Checked: J.BH.....
			Plan No. 257-38A Sheet No. 107 of 125

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		2000	0095-076-299, B688
			108



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 21+00
 NORTHING: 354697.7435 ft
 SURFACE ELEVATION: 184.9 ft
 OFFSET: 2 LT
 Easting: 3626407.9003 ft
 COORD. DATUM: VA South

B-A3-6
 PAGE 1 OF 1

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	SAMPLE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
GROUND WATER												
NOT ENCOUNTERED DURING DRILLING												
FIELD DESCRIPTION OF STRATA										LL	PI	
0.0	184.9											
2	180	14	53	1.5								4.1
3		6	53	3								
4		5	53	5								22.4
6		2	87	6								31.6
8		4	100	8.5								16.0
10		5	93	11								15.1
12		8	100	13.5								17.1
14		6	100	15								14.8
16		5	100	17.5								17.2
18		8	100	18.5								
20		6	100	20								
20.0	164.9											
Boring terminated at 20ft												

REMARKS: Rig Type: Acker XLS.
 Cave-in at 13.9'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.
 SPT LOG#-H5 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SP77.DWG:1/5/22/Whitman, Regardal and Associates
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PAGE 1 OF 1
 B-A3-6



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL
 STATION: 19+99
 NORTHING: 354591.7507 ft
 SURFACE ELEVATION: 181.6 ft
 OFFSET: 33 RT
 Easting: 3626417.4743 ft
 COORD. DATUM: VA South

B-A3-7
 PAGE 1 OF 1

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	SAMPLE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS	STRATA LEGEND	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT -#200 (%)
GROUND WATER													
NOT ENCOUNTERED DURING DRILLING													
FIELD DESCRIPTION OF STRATA										LL	PI		
0.0	181.6												
2	180	63	11	6	67								7.8
4		2	3	4	67								29.0
6		3	5	87	7.5								14.8
8		4	5	80	8.5								20.0
10		7	100	10	11								35.3
12		4	5	100	12.5								15.5
14		4	7	87	15								
11.0	170.6												
Possible fill, Brown, fine to medium, CLAYEY, SILTY SAND, trace Gravel, loose, moist SC-SM													
13.5	168.1												
Light gray, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist SP-SM													
15.0	166.6												
Boring terminated at 15ft.													

REMARKS: Rig Type: Acker XLS.
 Cave-in at 11.8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.
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PAGE 1 OF 1
 B-A3-7

257-38A_108.dgn

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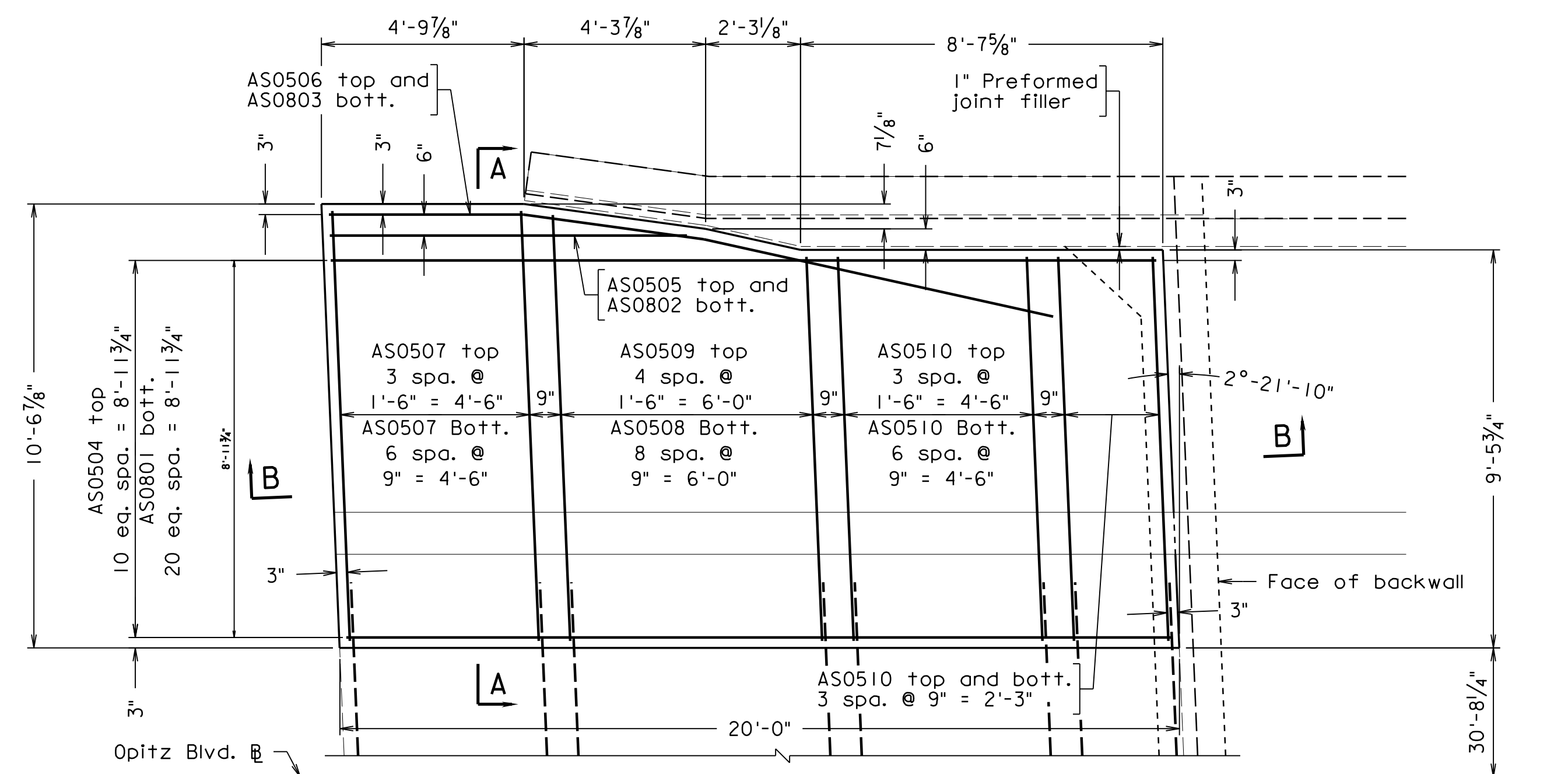
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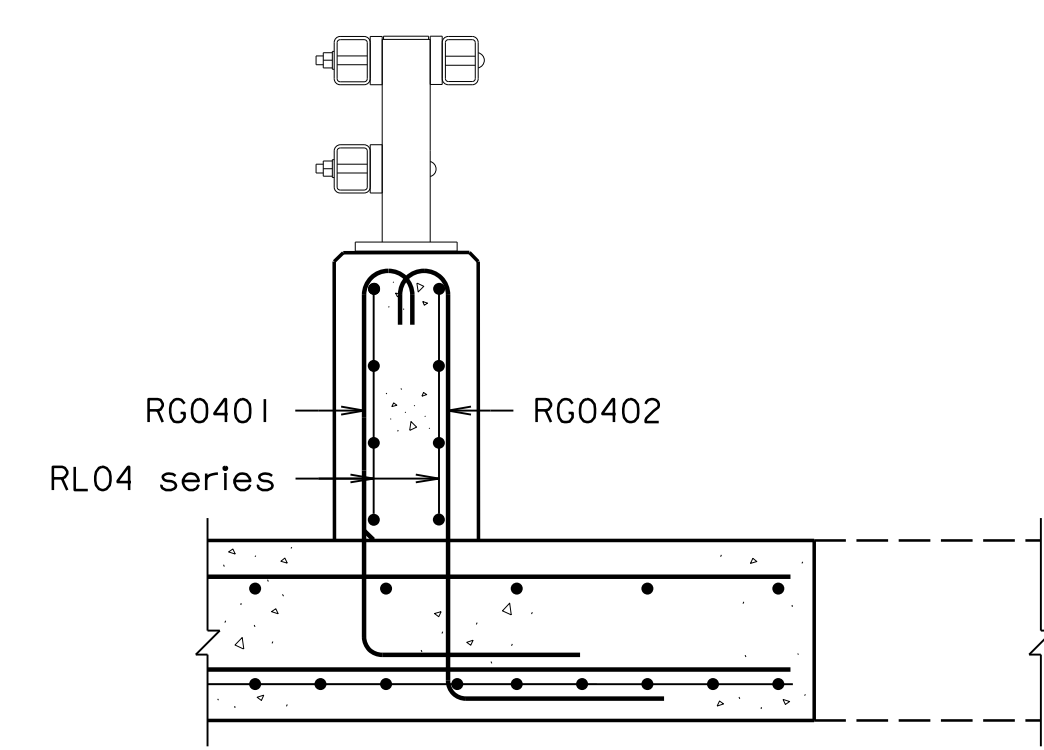
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
ENGINEERING GEOLOGY 5 OF 5					
No.	Description	Date	Designed: J.BH.....	Date	Plan No.
			Drawn: J.BH.....	Mar. 2022	257-38A
			Checked: J.B.S.....		108 of 125
Revisions					

PROGRESS PRINT 3/18/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			109

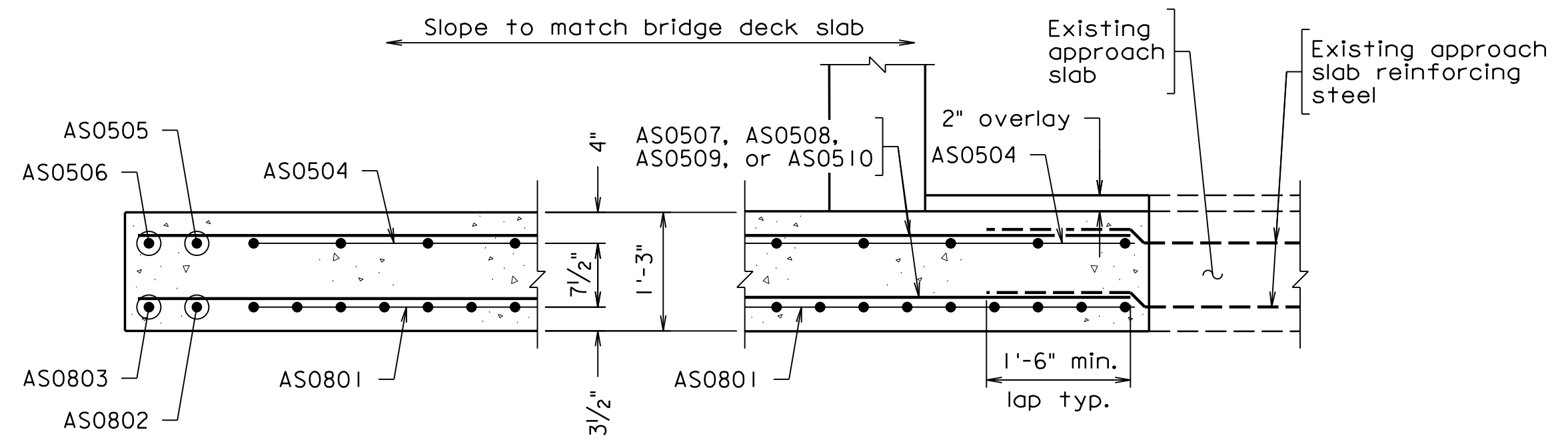


PLAN

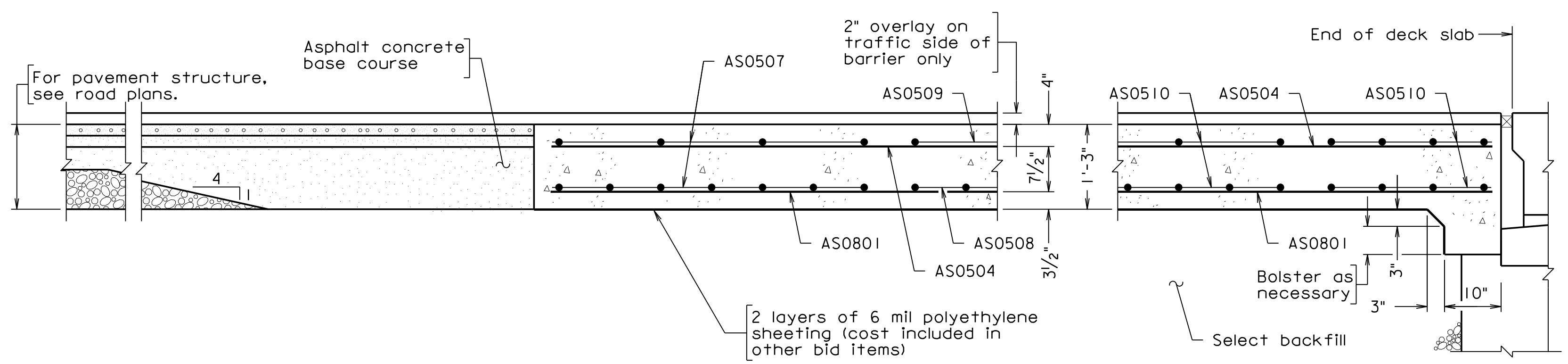


SECTION AT RAILING

See Railing Details sheet 77.
Scale: 3/4" = 1'-0"



SECTION A-A
Scale: 3/4" = 1'-0"



SECTION B-B
Scale: 3/4" = 1'-0"

Notes:

If material under approach slab will be exposed for more than two weeks, prime the material with 0.35 gal per sq. yd. liquid asphalt material type RC-70, RC-250 or MC-250. Cost included in select backfill (see sheet 8).

Approach slab shall be grooved in accordance with Section 404.07(f) of the Specifications. Payment for grooving is included in bridge deck grooving quantities.

REINFORCING STEEL SCHEDULE					
AS0506		AS0803		AS0508 from 9'-2" to 10'-2" by 1/2"	
				AS0509 from 9'-2" to 10'-2" by 3"	
				AS0508 AS0509 varies	
Mark	No.	Size	Pin ø	Length	Location
AS0801	21	#8	—	19'-6"	Bottom longitudinal
AS0802	1	#8	—	8'-3"	Bottom longitudinal
AS0803	1	#8	6"	—	Bottom longitudinal
AS0504	11	#5	—	19'-6"	Top longitudinal
AS0505	1	#5	—	8'-3"	Top longitudinal
AS0506	1	#5	3 3/4"	—	Top longitudinal
AS0507	11	#5	—	10'-2 1/4"	Top and bottom transverse
AS0508	9	#5	—	VARIES	Bottom transverse
AS0509	5	#5	—	VARIES	Top transverse
AS0510	11	#5	—	9'-2"	Top and bottom transverse

Dimensions in bending diagram are out-to-out of bars.
Number of bars shown is for one approach slab.

	ESTIMATED QUANTITIES	
	Concrete Class A4 Bridge Appr. Slab CY	Corrosion Resistant Reinforcing Steel Class II, Grade 60 min. LB
Abutment A	9.5	1,773

⊗ Denotes items to be paid for on basis of plan quantities in accordance with Road and Bridge Specifications.

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
APPROACH SLAB A					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		109 of 125
Revisions					

PAC PLANS
PROGRESS PRINT 4/1/2022
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Scale: 3/8" = 1'-0" unless otherwise noted.

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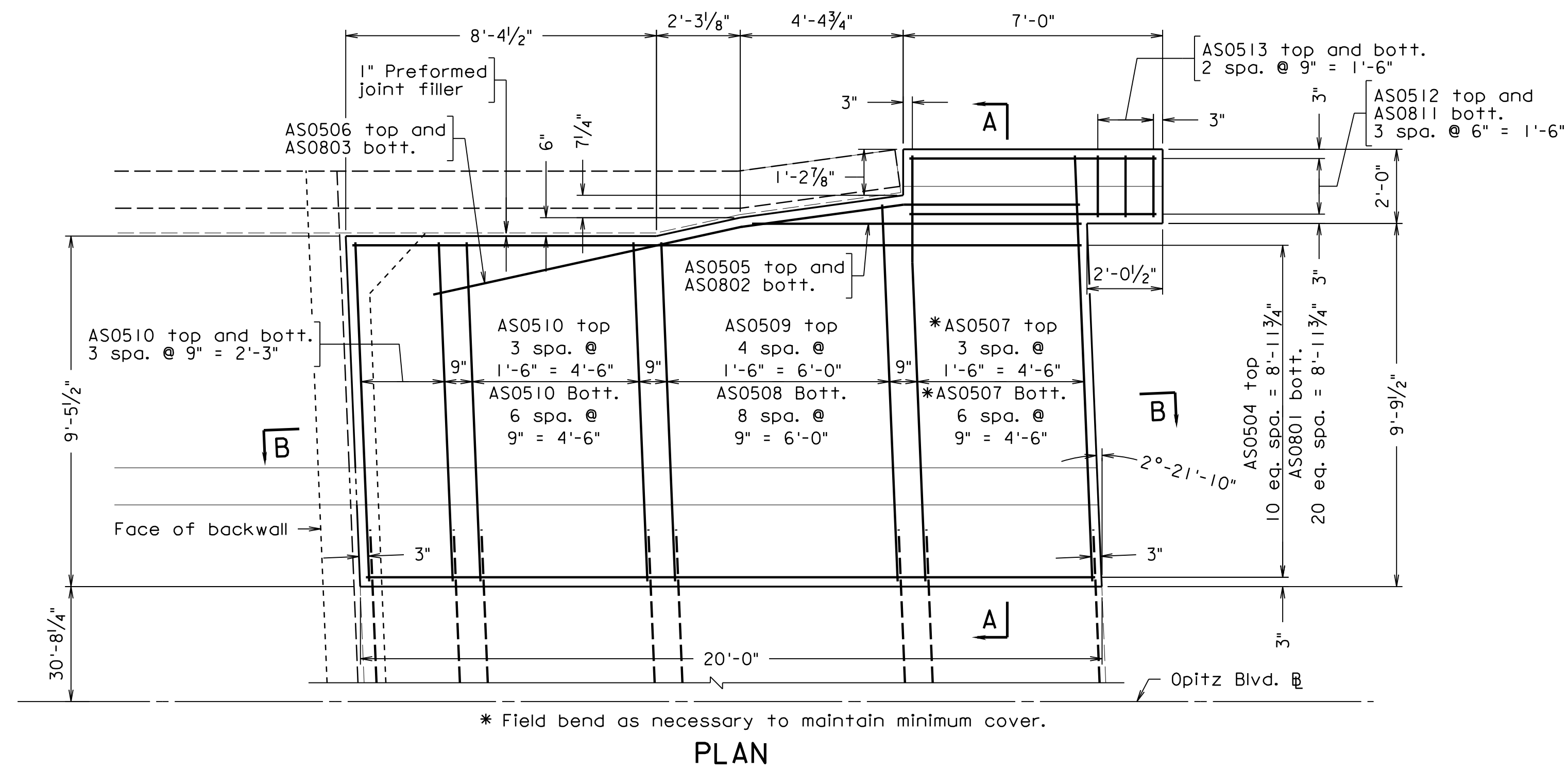
WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			95	0095-076-299, B688
				110

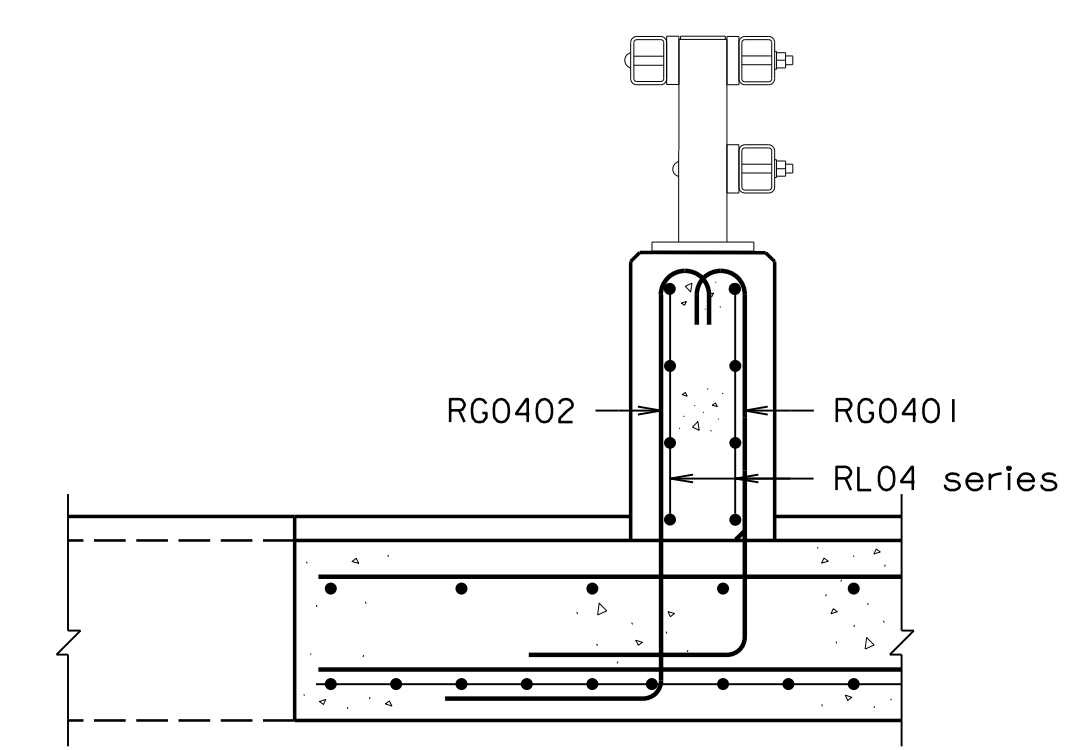
Notes:

If material under approach slab will be exposed for more than two weeks, prime the material with 0.35 gal per sq. yd. liquid asphalt material type RC-70, RC-250 or MC-250. Cost included in select backfill (see sheet 8).

Approach slab shall be grooved in accordance with Section 404.07(f) of the Specifications. Payment for grooving is included in bridge deck grooving quantities.

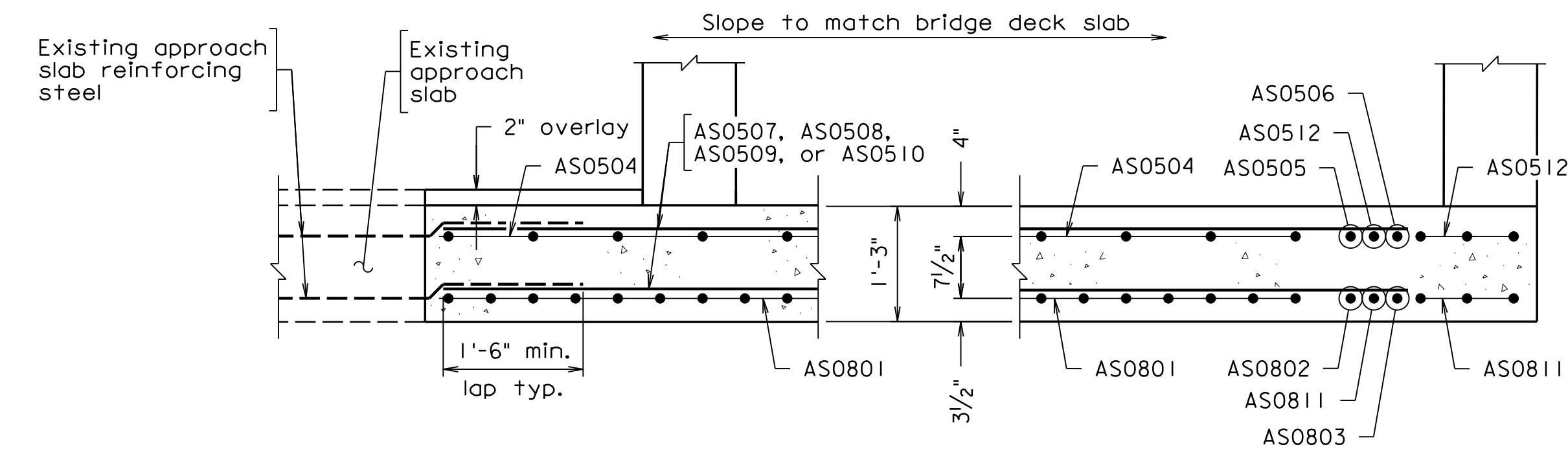


PLAN

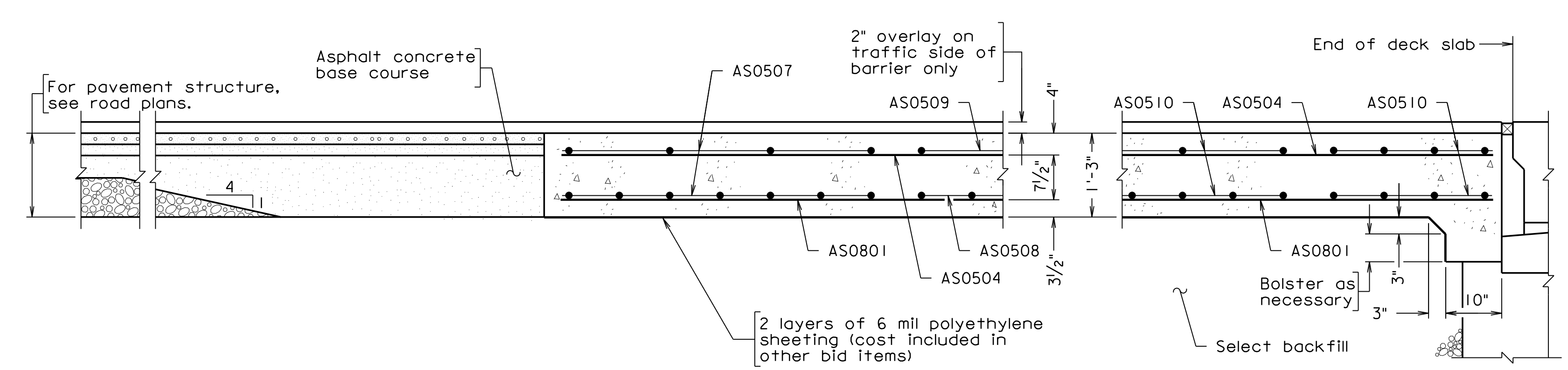


SECTION AT RAILING

See Railing Details sheet 77.
Scale: 3/4" = 1'-0"



SECTION A-A
Scale: 3/4" = 1'-0"



SECTION B-B
Scale: 3/4" = 1'-0"

REINFORCING STEEL SCHEDULE					
AS0506		AS0803			
AS0508 from 9'-2" to 10'-2" by 1/2"		AS0509 from 9'-2" to 10'-2" by 3"		AS0508 AS0509 varies	
Mark	No.	Size	Pin ϕ	Length	Location
AS0801	21	#8	—	19'-6"	Bottom longitudinal
AS0802	1	#8	—	8'-3"	Bottom longitudinal
AS0803	1	#8	6"	—	Bottom longitudinal
AS0504	11	#5	—	19'-6"	Top longitudinal
AS0505	1	#5	—	8'-3"	Top longitudinal
AS0506	1	#5	3 3/4"	—	Top longitudinal
AS0507	11	#5	—	10'-2 1/4"	Top and bottom transverse
AS0508	9	#5	—	VARIES	Bottom transverse
AS0509	5	#5	—	VARIES	Top transverse
AS0510	11	#5	—	9'-2"	Top and bottom transverse
AS0811	4	#8	—	6'-6"	Bottom longitudinal
AS0512	4	#5	—	6'-6"	Top longitudinal
AS0513	6	#5	—	1'-6"	Top and bottom transverse

Dimensions in bending diagram are out-to-out of bars.
Number of bars shown is for one approach slab.

ESTIMATED QUANTITIES		
	Concrete Class A4 Bridge Appr. Slab	Corrosion Resistant Reinforcing Steel Class II, Grade 60 min.
Abutment B	⊗ CY 10.0	⊗ LB 1,894

⊗ Denotes items to be paid for on basis of plan quantities in accordance with Road and Bridge Specifications.

COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION					
APPROACH SLAB B					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		110 of 125
Revisions					

PAC PLANS
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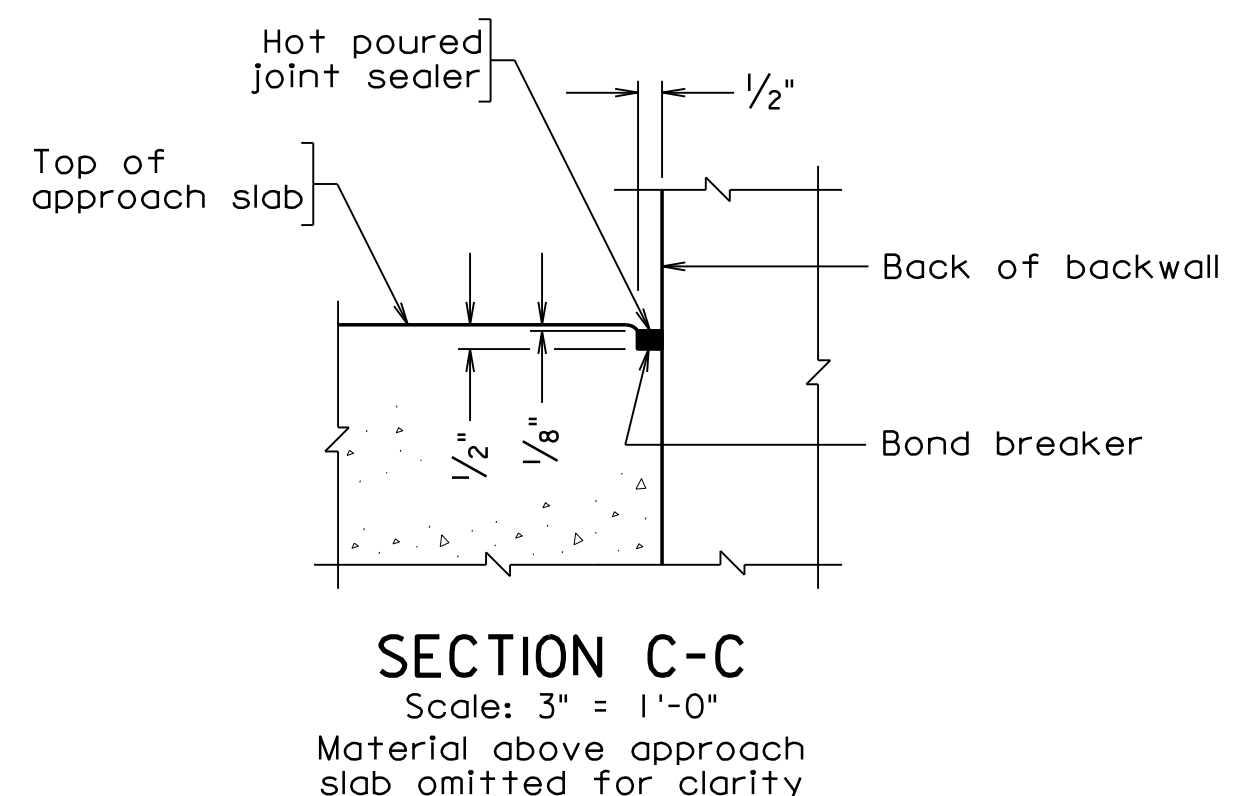
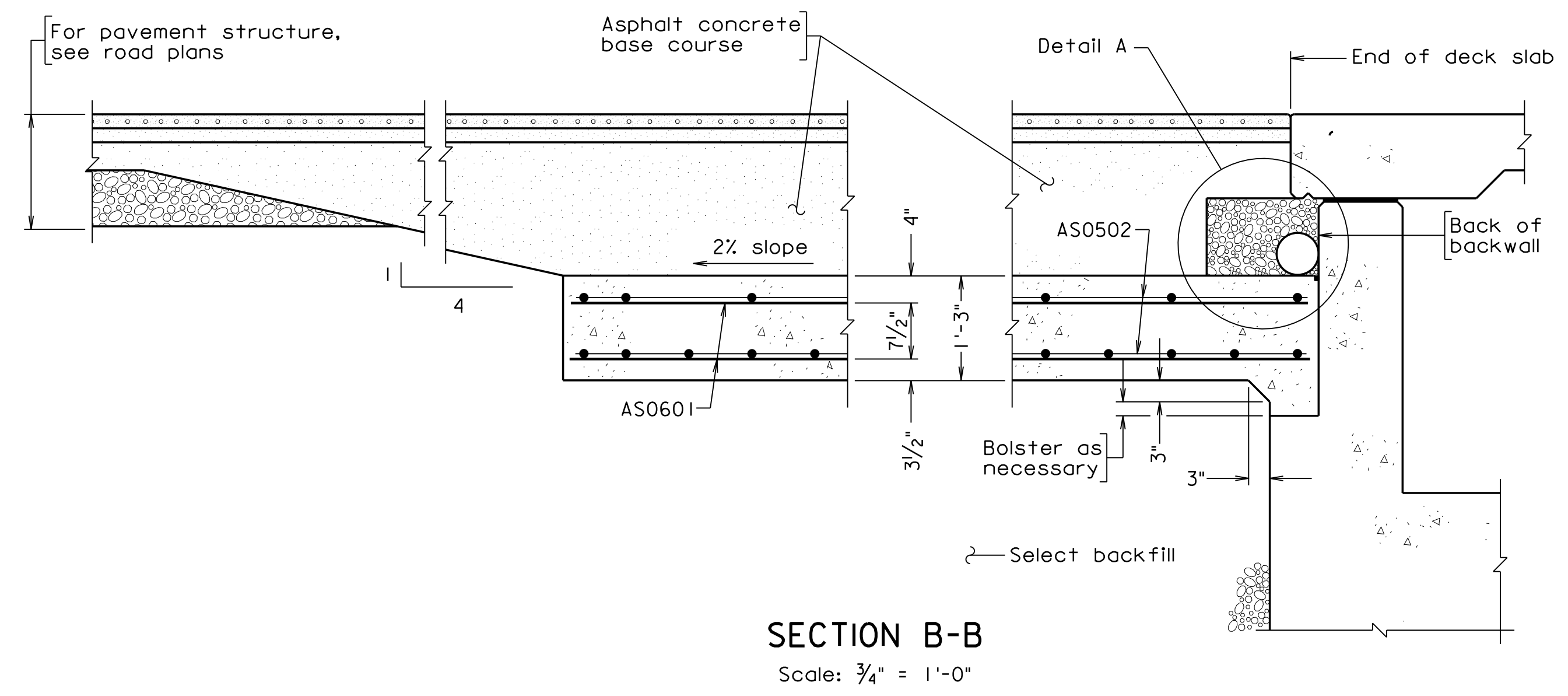
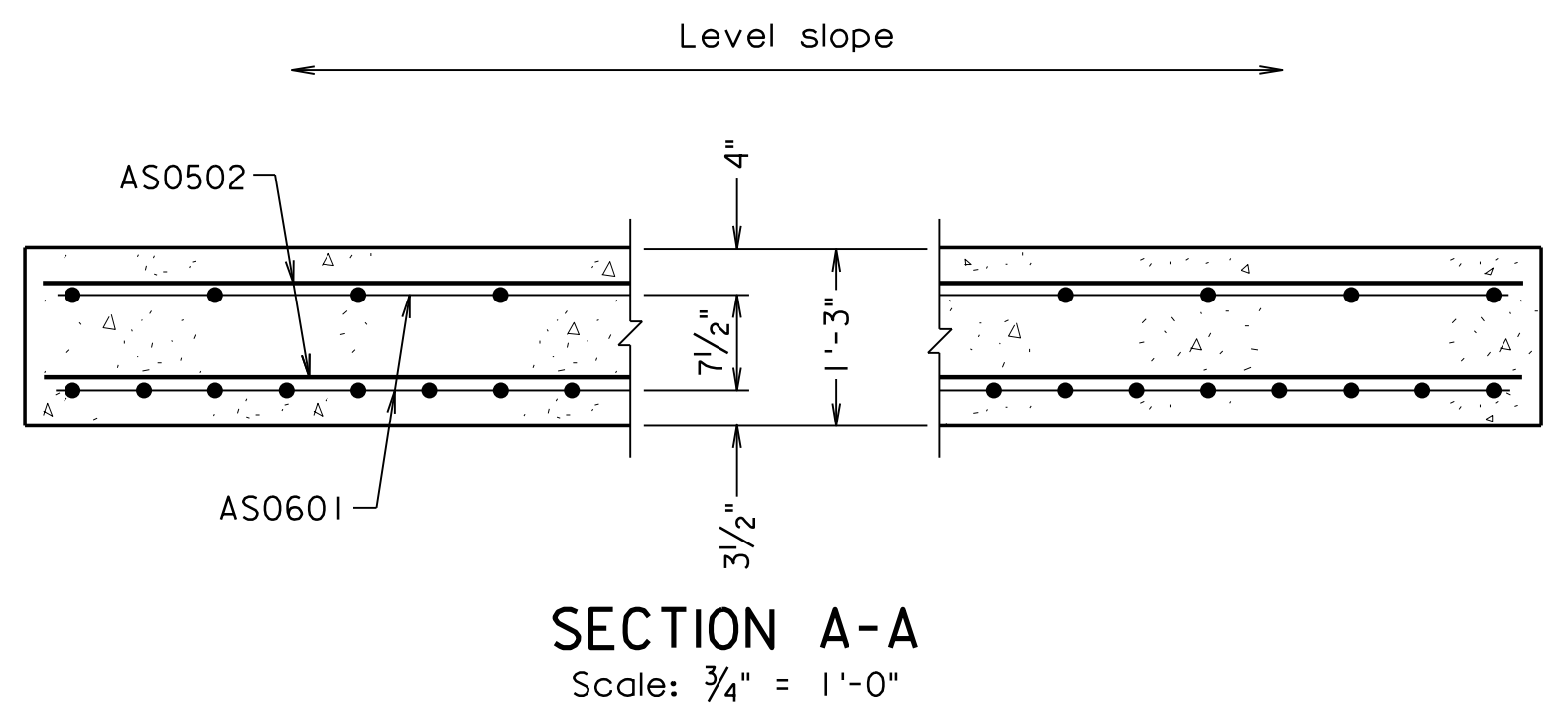
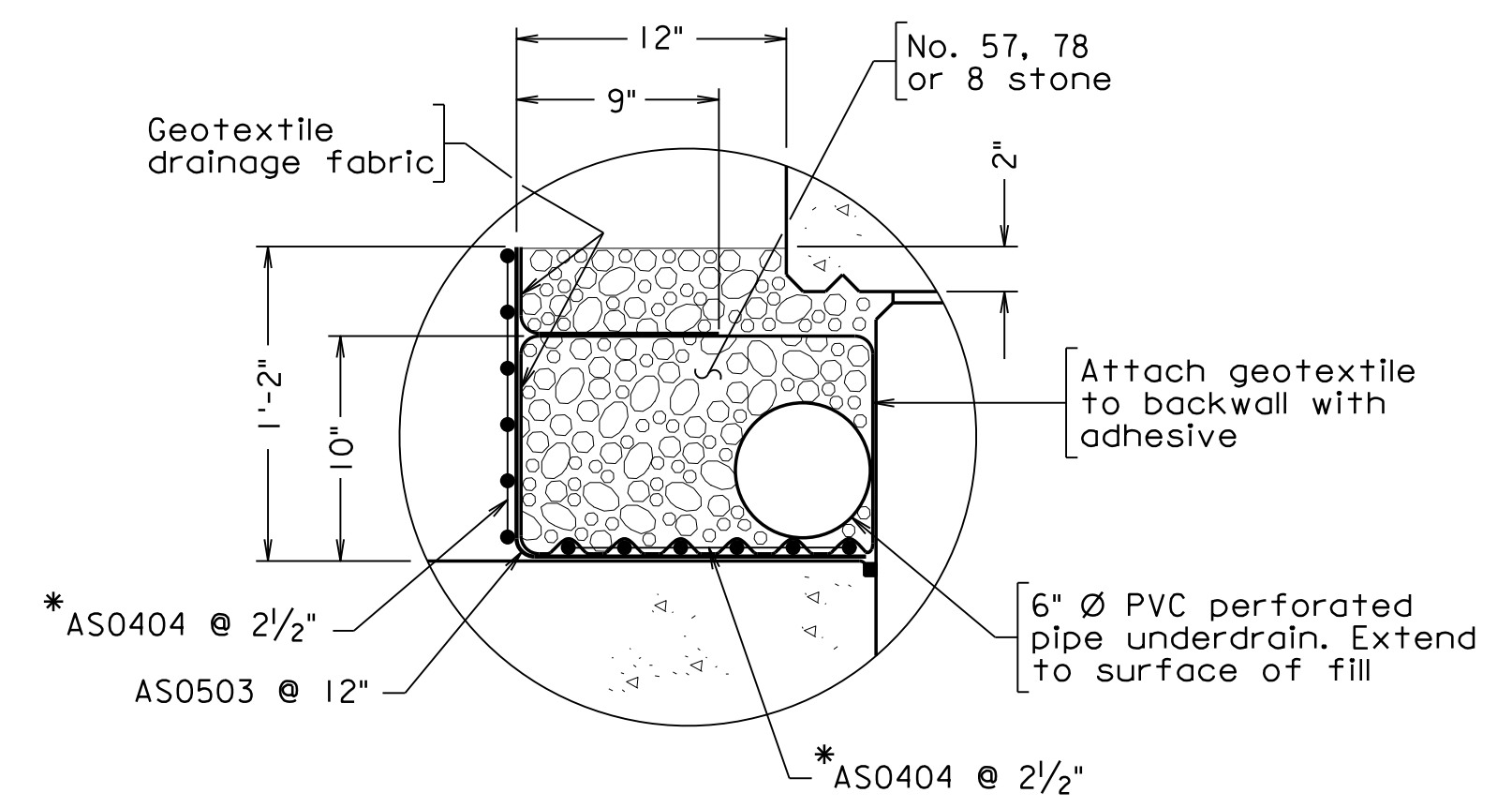
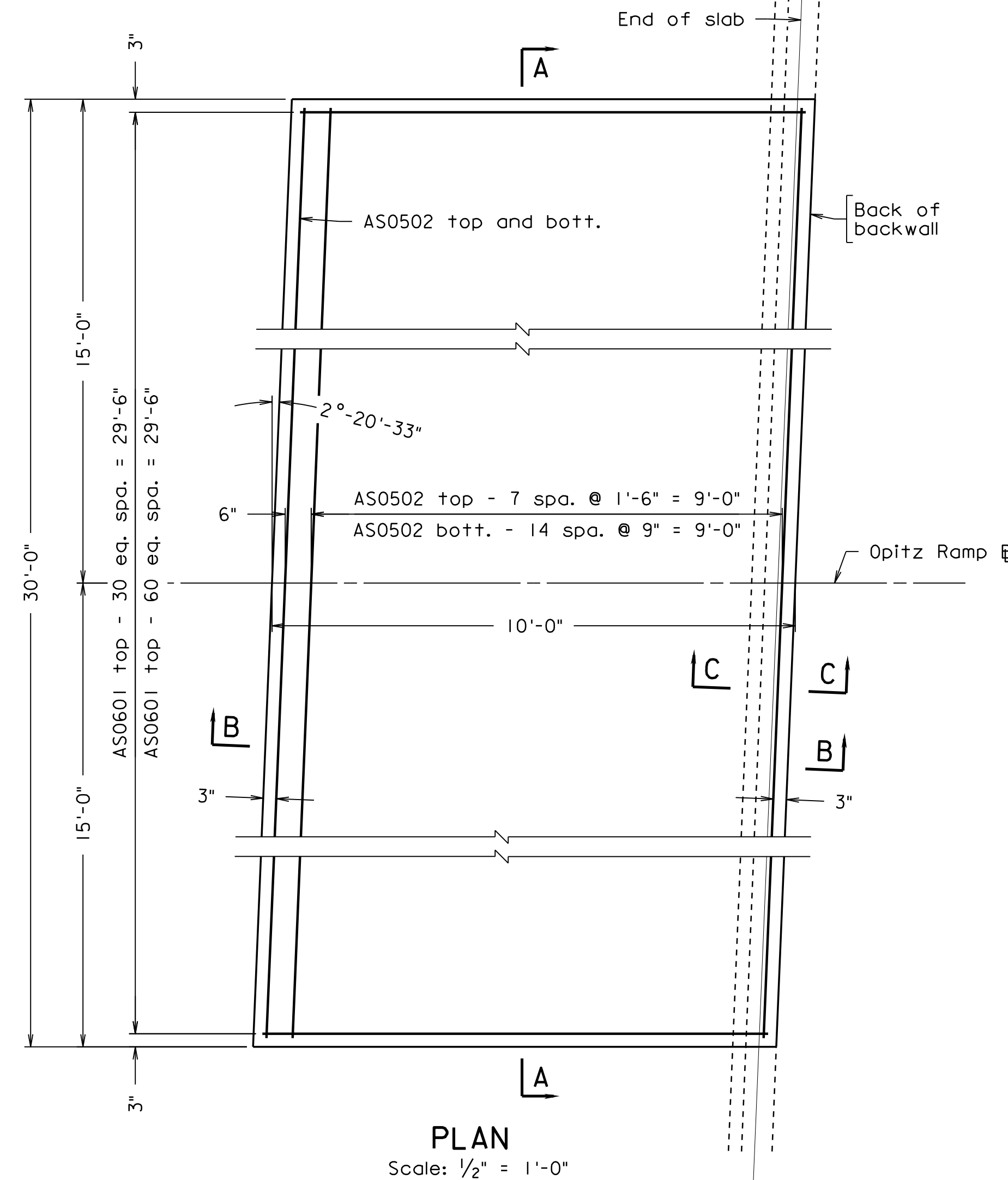
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WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

STATE	FEDERAL AID	STATE	SHEET
VA.	PROJECT	ROUTE	NO.
		95	113
		0095-076-299, B688	



Notes:

If material under approach slab will be exposed for more than two weeks, prime the material with 0.35 gal per sq. yd. liquid asphalt material type RC-70, RC-250 or MC-250. Cost included in select backfill (see sheet 8).

The cost of the pipe underdrain, the stone surrounding it, and the geotextile drainage fabric shall be included in the bid price for approach slab concrete.

After screeding, the top surface shall receive a Class I finish in accordance with Section 404.07(a) of the Specifications.

Weld AS0404 or welded wire to AS0503 to form a steel cage. The steel cage shall be secured with dowels in the approach slab. Cost of dowels shall be included in other bid items.

Payment for asphalt is included in the road plans.

REINFORCING STEEL SCHEDULE					
Mark	No.	Size	Pin ϕ	Length	Location
AS0601	92	#6	—	9'-5"	Longitudinal
AS0502	23	#5	—	29'-6"	Transverse
AS0503	31	#5	2 1/2"	2'-5"	Underdrain cage
AS0404	12	#4	—	29'-6"	Underdrain cage

Number of bars shown is for one approach slab.

Dimensions in bending diagram are out-to-out of bars.

ESTIMATED QUANTITIES		
	Concrete Class A4 Bridge Approach Slab ⊗ CY	Corrosion Resistant Reinforcing Steel, Class I, Grade 60 min. ⊗ LB
Abutment C	14.3	2,333

⊗ Denotes items to be paid for on basis of plan quantities in accordance with the Road and Bridge Specifications.

257-38A-113.dgn

BAS-BD-IR 04-30-2021

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Sealed and Signed by:
Junyi Meng
Lic. No. 0000172
On the date of
April 2022

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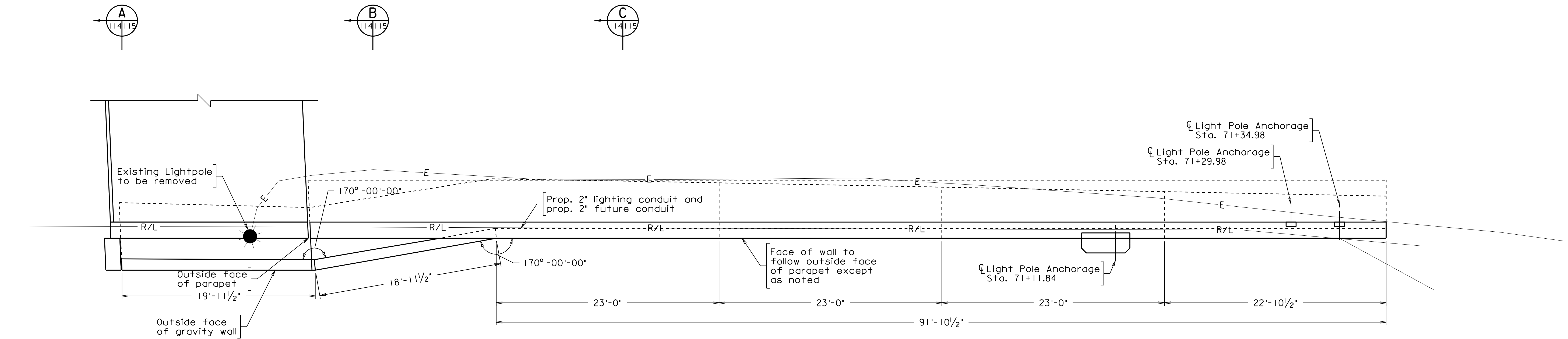
Scale as noted

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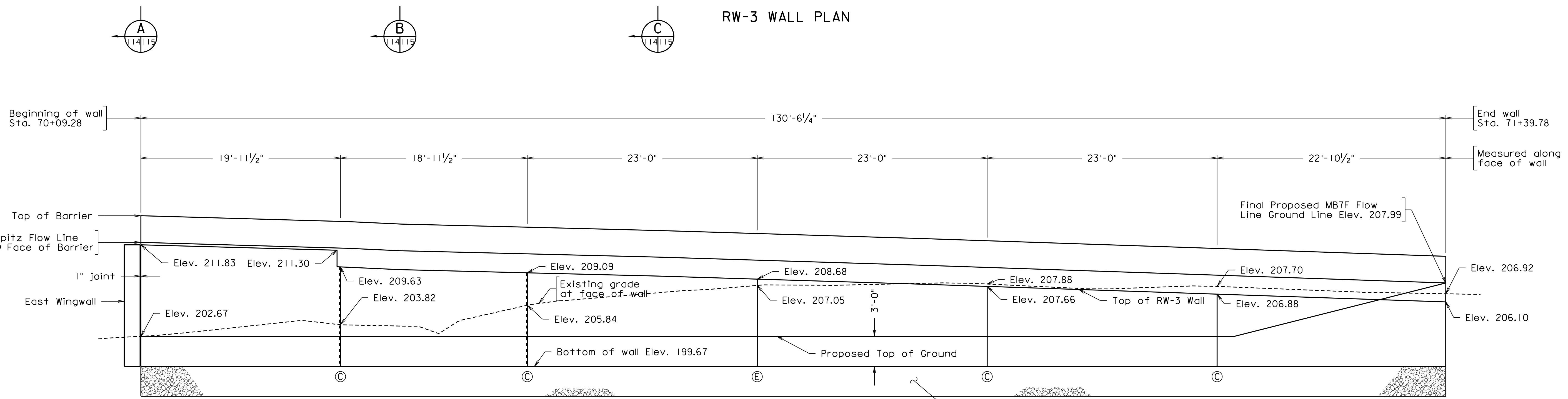
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BURIED APPROACH SLAB E					
No.	Description	Date	Designed: CRR	Date	Plan No.
			Drawn: CRR	Apr. 2022	257-38A
			Checked: MRD		113 of 125
Revisions					

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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE	PROJECT
		95	0095-076-299, B688
			114



RW-3 WALL PLAN



RW-3 WALL ELEVATION

LEGEND:

- (E) = Expansion joint
- (C) = Contraction joint

#57 stone wrapped in woven geotextile subgrade stabilization fabric

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RW WALL PLAN AND ELEVATION			
No.	Description	Date	Designed: JMC..... Drawn: JMC..... Checked: WRA.....
		Apr. 2022	Plan No. 257-38A Sheet No. 114 of 125

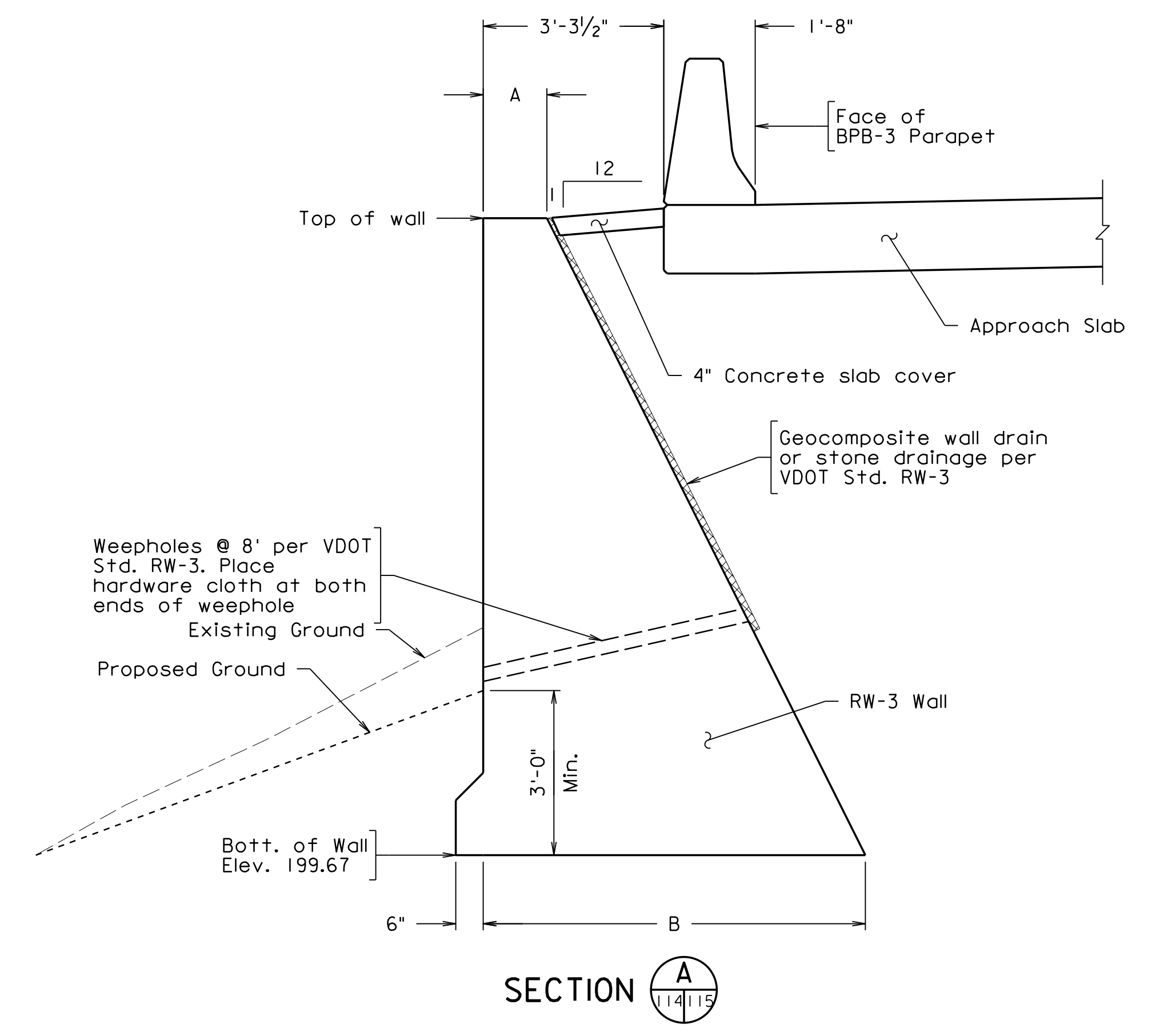
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257-38A-114.dgn

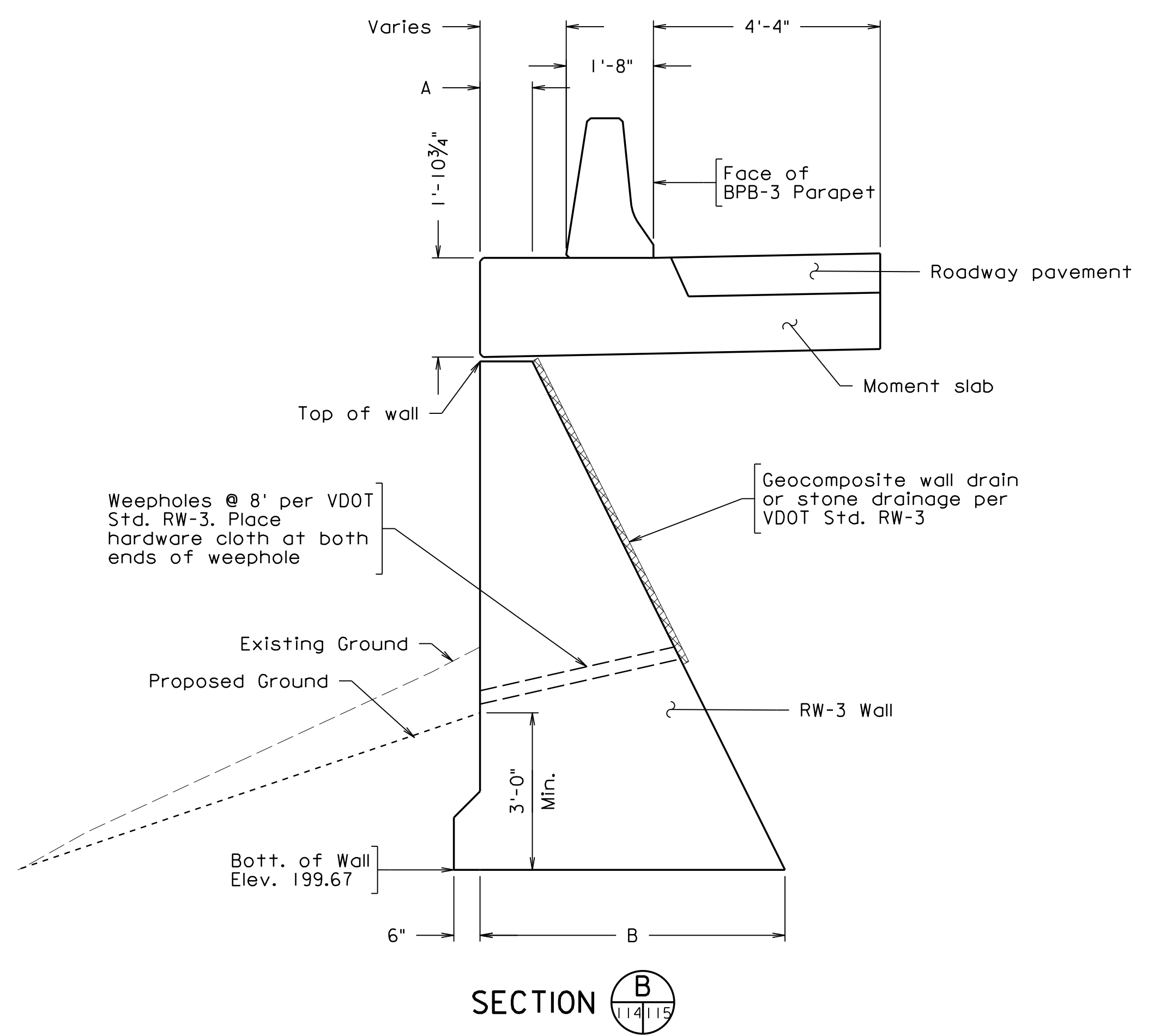
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STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE PROJECT	115
		95 0095-076-299, B688	

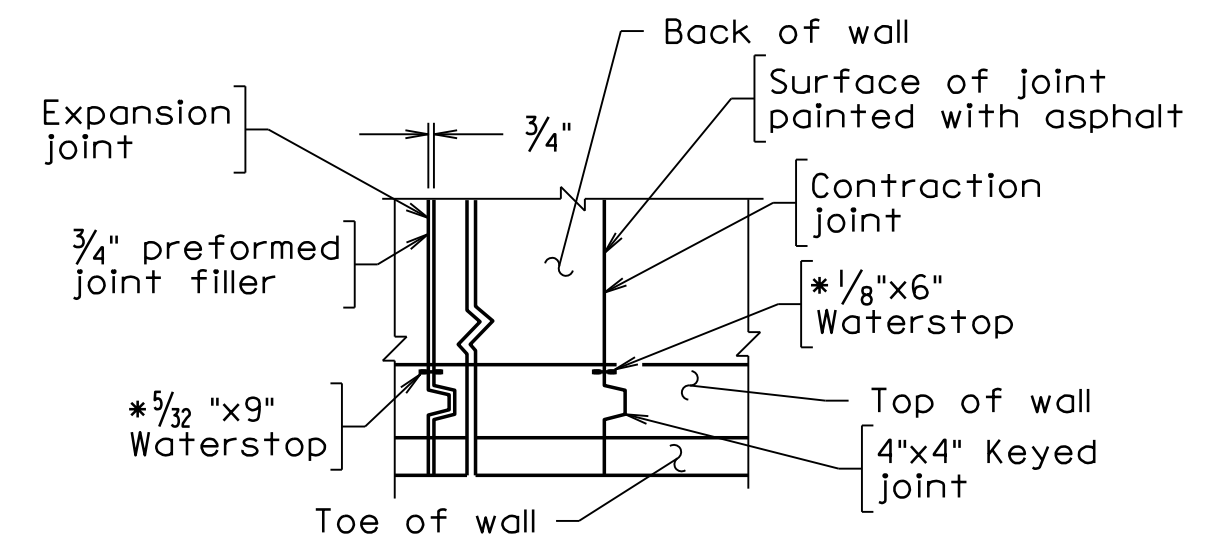


SECTION A
114115



SECTION B
114115

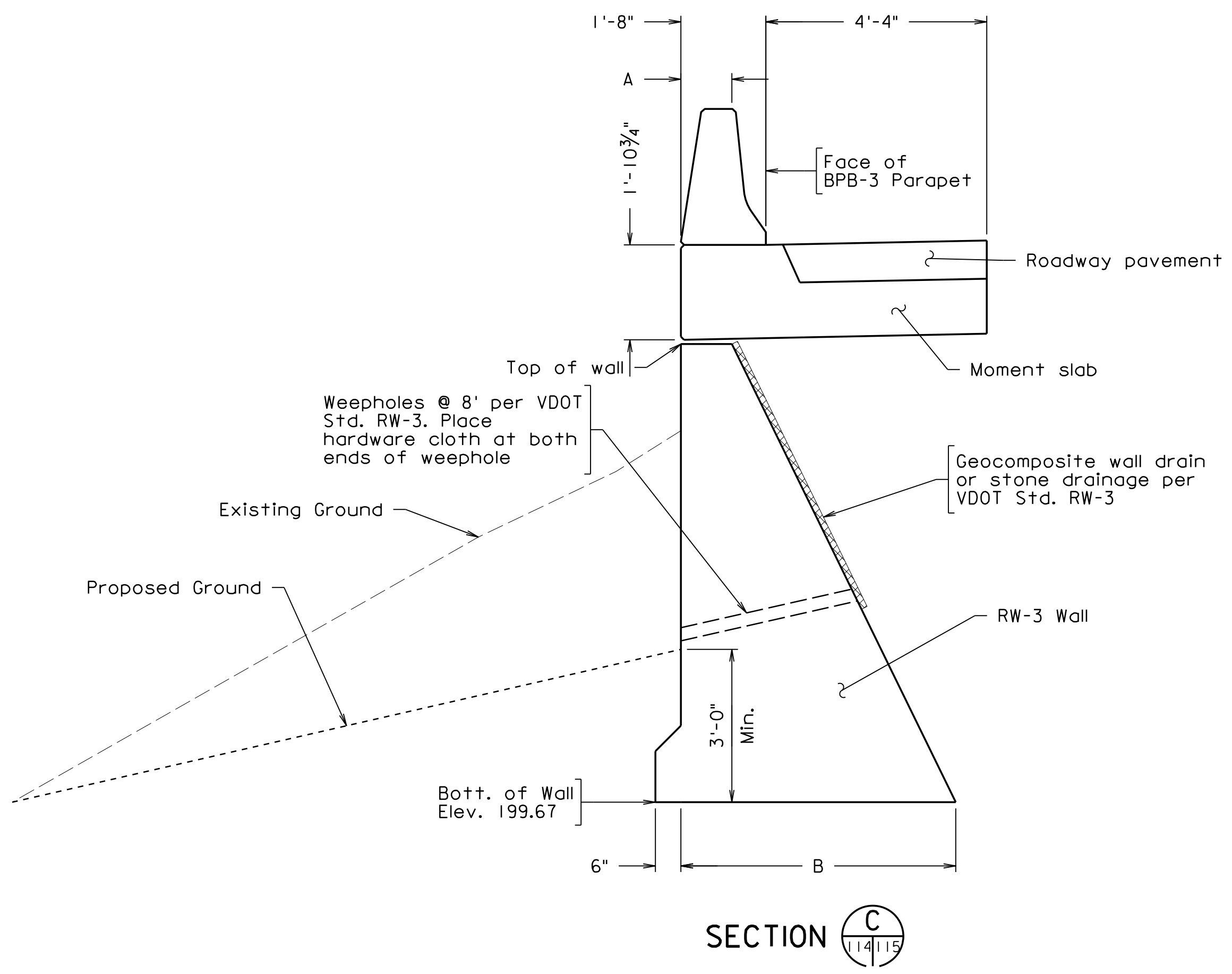
SECTION C
114115



- (C) Contraction joints at intervals not exceeding 30'.
- (E) Expansion joint at intervals not exceeding 90'.
- *Water stops to be elastomeric or other approved material. Dimensions shown are absolute minimum.

CONTRACTION AND EXPANSION JOINT DETAILS
Not to scale

Notes:
 Geocomposite wall drain shall conform to Section 245.03(f) of the Specifications.
 Geocomposite wall drain, waterproofing, #57 stone, geotextile fabric, and 3" Dia. perforated PVC drain pipe shall be incidental to RW-3 Retaining Wall.
 See VDOT Standard RW-3 for the waterproofing detail, weepholes, contraction joint, dimensions A and B, and other details not shown.
 Concrete in Modified RW-3 Wall shall be Class C1.



SECTION C
114115

257-38A_115.dgn

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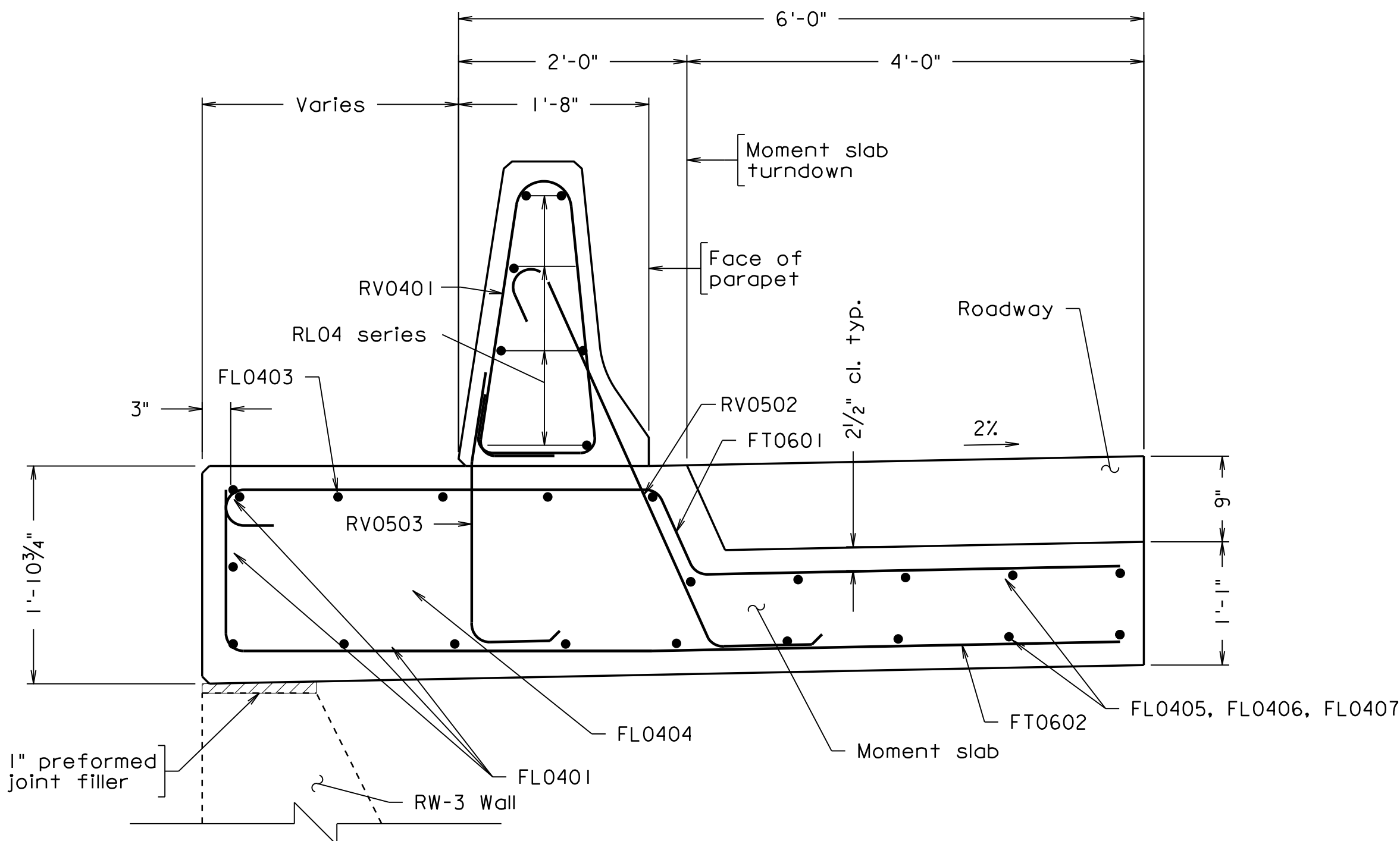
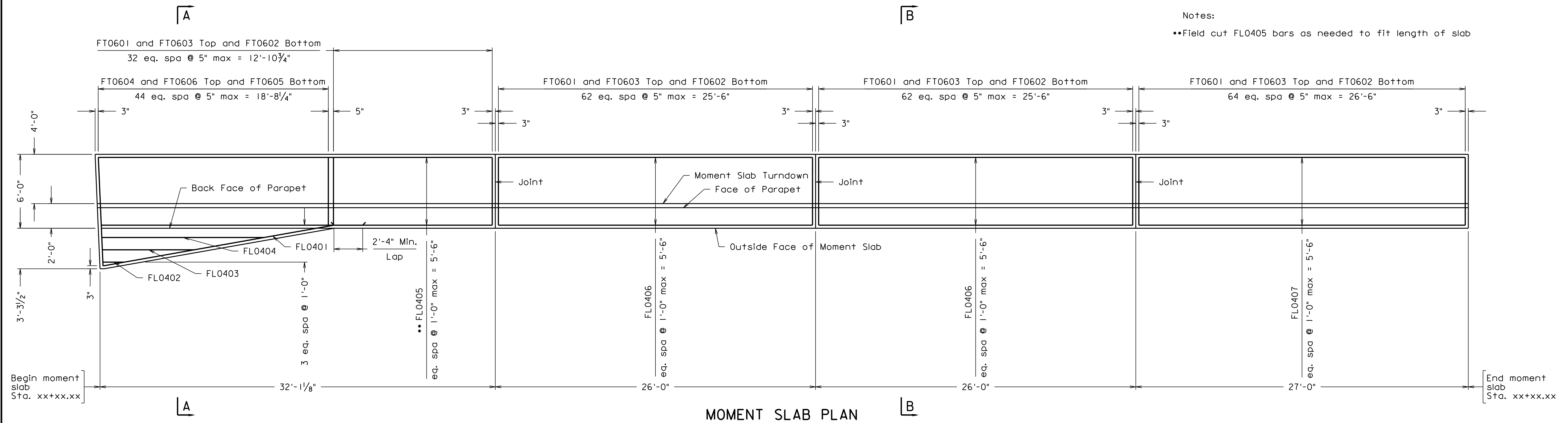
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RW WALL SECTIONS AND NOTES					
No.	Description	Date	Designed: JMC.....	Date	Plan No.
			Drawn: JMC.....	Apr. 2022	257-38A
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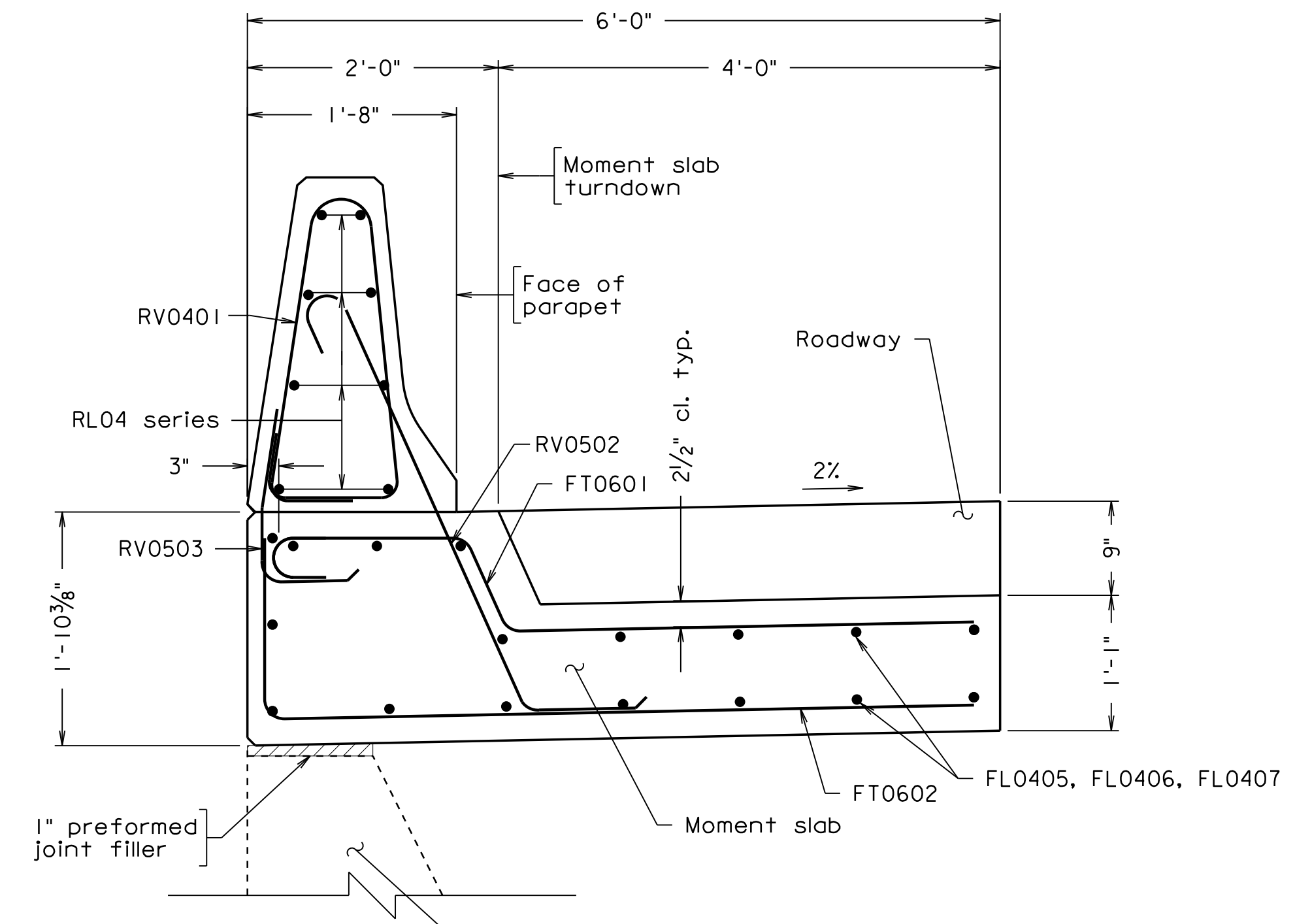
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VA.		95	0095-076-299, B688
			116

Notes:
 ••Field cut FL0405 bars as needed to fit length of slab



MOMENT SLAB SECTION A-A
 Scale: 1" = 1'-0"



MOMENT SLAB SECTION B-B
 Scale: 1" = 1'-0"

Scale: 1/4" = 1'-0" unless otherwise noted.

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MOMENT SLAB PLAN AND TYPICAL SECTIONS			
No.	Description	Date	Revisions
Designed: JMC.....	Date	Plan No.	Sheet No.
Drawn: JMC.....	Apr. 2022	257-38A	116 of 125
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VA.	PROJECT	ROUTE 95	0095-076-299, B688
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Notes:

For additional requirements, refer to the Special Provision titled "Special Provision for Soldier Pile Retaining Walls dated December 20, 2018."

All structural steel shall be ASTM A709 Grade 50 and shall be galvanized.

All concrete shall be Class A4.

All reinforcing steel shall be deformed and shall conform to ASTM A615, Grade 60 except for reinforcing steels noted as CRR (corrosion resistant reinforcement) which shall conform to the applicable specifications noted in the special provision. All reinforcing bar dimensions on the detailed drawings are to centers of bars except where otherwise noted and are subject to fabrication and construction tolerances.

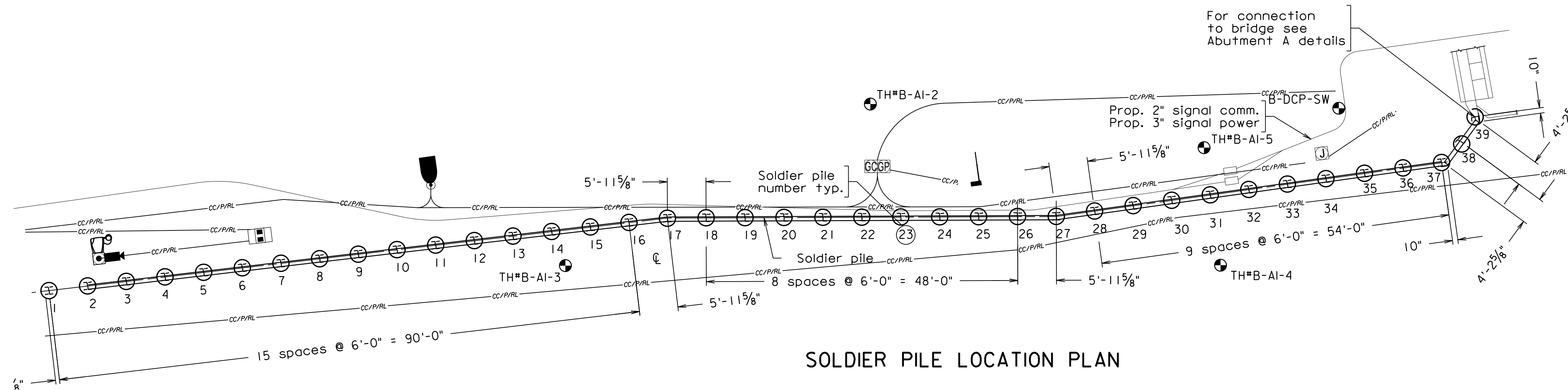
Corrosion resistant reinforcing (CRR) steels shall conform to one or more of the three types (low carbon/chromium, stainless clad and solid stainless) listed in the special provision. The minimum yield strength shall be: 100 ksi for low carbon/chromium and 60 ksi for stainless clad steel and solid stainless steel.

Chamfer exposed edges of concrete facing 3/4" x 3/4" unless otherwise noted.

For abutment details, including connection to wingwall see sheet 14.

Soldier piles shall be seated at or below the minimum tip elevation and shall be seated a minimum of five feet into rock. The embedment into rock shall be determined by the Engineer during drilling operations. Material cored as indicated in the attached boring logs is considered rock.

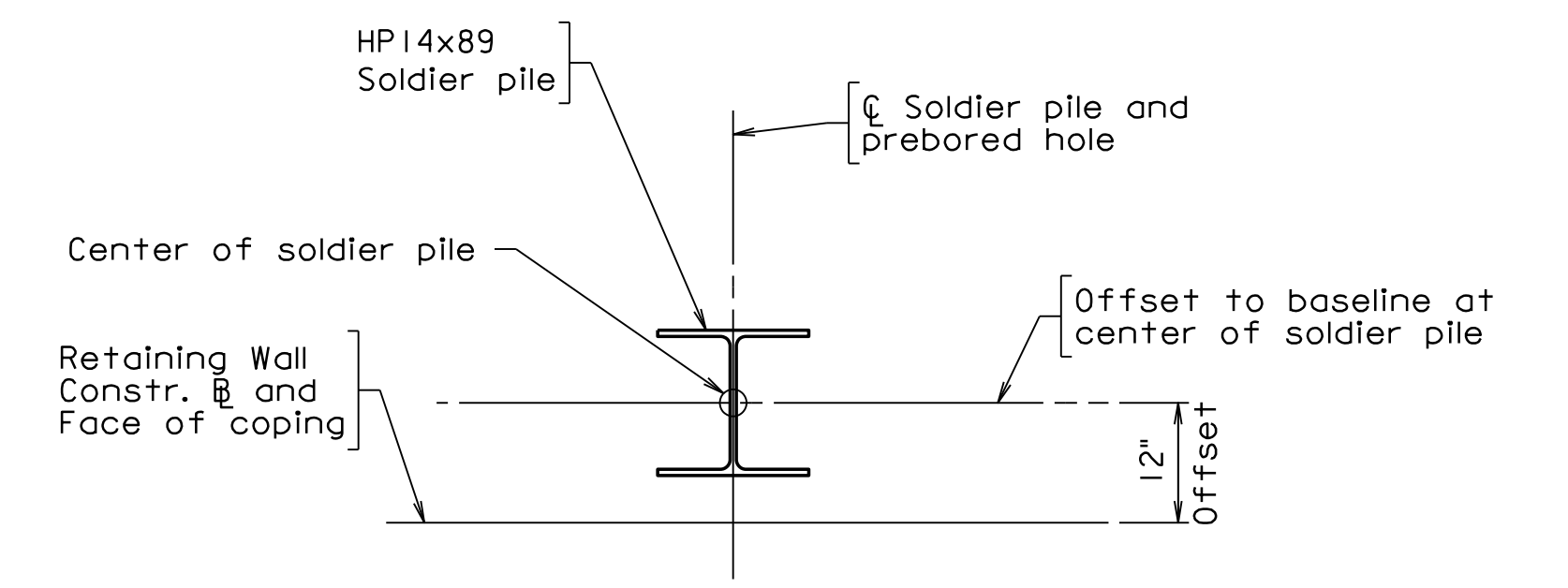
The backfill behind the wall shall consist of SM (USCS) or better, and compacted to VDOT standards.



SOLDIER PILE LOCATION PLAN

SUGGESTED SEQUENCE OF CONSTRUCTION AND GENERAL REQUIREMENTS:

1. Clear and grub the area for the wall construction.
2. Place all erosion and sediment perimeter controls in accordance with the approved erosion and sediment control plan. These controls shall remain in place and be continuously maintained during all construction.
3. Grade a bench along the proposed wall alignment wide enough to accommodate the drilling equipment required to install the drilled shafts and soldier piles for the retaining wall.
4. Once the area has been prepared for the drilling of the drilled shafts the Contractor may proceed with the drilling operation.
5. The drilled shafts shall be drilled as indicated in the plans. The Contractor shall advance the drilled shafts into rock and shall have sufficient casing on hand to case the holes as necessary to facilitate the work. Casing shall be removed during the pouring operation.
6. Once the prebored hole is drilled, the Contractor shall place the pile and reinforcement cage inside the prebored hole and prepare the hole for pouring of the concrete. Particular attention must be given to the placement of the pile to insure that the alignment of the proposed wall is maintained.
7. The concrete and flowable backfill shall be placed in one continuous operation in accordance with the plans and Specifications. Concrete shall be placed to the bottom of future concrete lagging panels and flowable backfill above that elevation.
8. Once the prebored hole and soldier pile is placed, the Contractor shall exercise extreme care so as not to damage the pile or prebored hole. Any damages shall be repaired to the satisfaction of the Engineer at the sole expense of the Contractor.
9. The flowable fill placed around piles shall be chipped out as needed to accommodate the lagging panels and wood lagging boards.
10. Once the permanent concrete lagging panels are in place the Contractor shall place the #68 stone backfill between the wood lagging and the permanent concrete lagging panels. This shall be done at the end of each working day. The stone backfill shall be protected at the surface by a geotextile fabric to prevent mud and silt from fouling the stone.
11. The top coping and pile encasement shall be placed once the lagging has been placed.
12. Once the permanent concrete lagging panels have been placed the Contractor may final grade the areas behind the top of the wall. Extreme care shall be taken so as not to damage the concrete wall construction.



SOLDIER PILE SECTION

Scale: 1" = 1'-0"

SOLDIER PILE LOCATION DATA			
Soldier pile no.	Station	Offset	Min. tip elev.
1	63+22.79	62.52	178
2	63+28.79	62.65	178
3	63+34.78	62.78	178
4	63+40.78	62.92	178
5	63+46.78	63.05	178
6	63+52.78	63.18	178
7	63+58.78	63.32	178
8	63+64.78	63.45	178
9	63+70.78	63.58	178
10	63+76.77	63.72	178
11	63+82.77	63.85	178
12	63+88.77	63.98	178
13	63+94.77	64.12	178
14	64+00.77	64.25	178
15	64+06.77	64.38	178
16	64+12.73	64.52	178
17	64+18.63	65.32	178
18	64+24.58	66.13	178
19	64+30.52	66.93	178
20	64+36.47	67.74	178
21	64+42.42	68.55	178
22	64+48.36	69.36	178
23	64+54.31	70.16	178
24	64+60.25	70.97	178
25	64+66.20	71.78	178
26	64+72.11	72.58	178
27	64+78.08	72.58	178
28	64+84.08	72.58	178
29	64+90.08	72.59	178
30	64+96.08	72.59	178
31	65+02.08	72.59	178
32	65+08.08	72.59	178
33	65+14.08	72.59	178
34	65+20.08	72.59	178
35	65+26.08	72.59	178
36	65+32.08	72.59	178
37	65+38.08	72.59	178
38	65+38.16	71.37	178
39	65+38.16	66.97	178

Minimum tip elevation shall include a minimum embedment of 24 feet with 10 feet into decomposed rock stratum.

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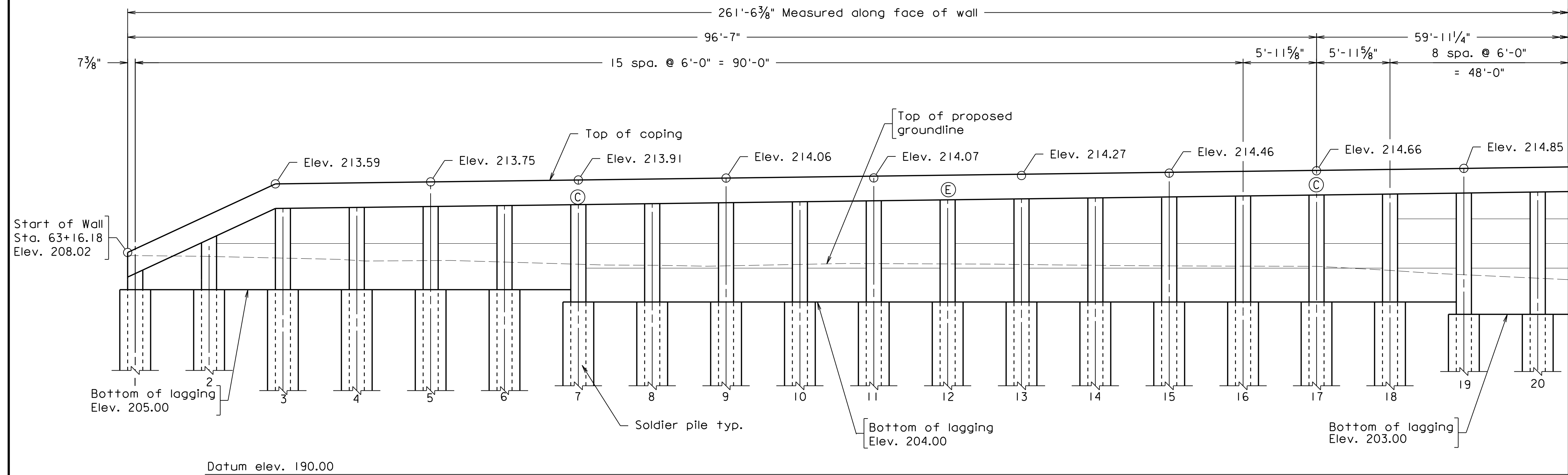
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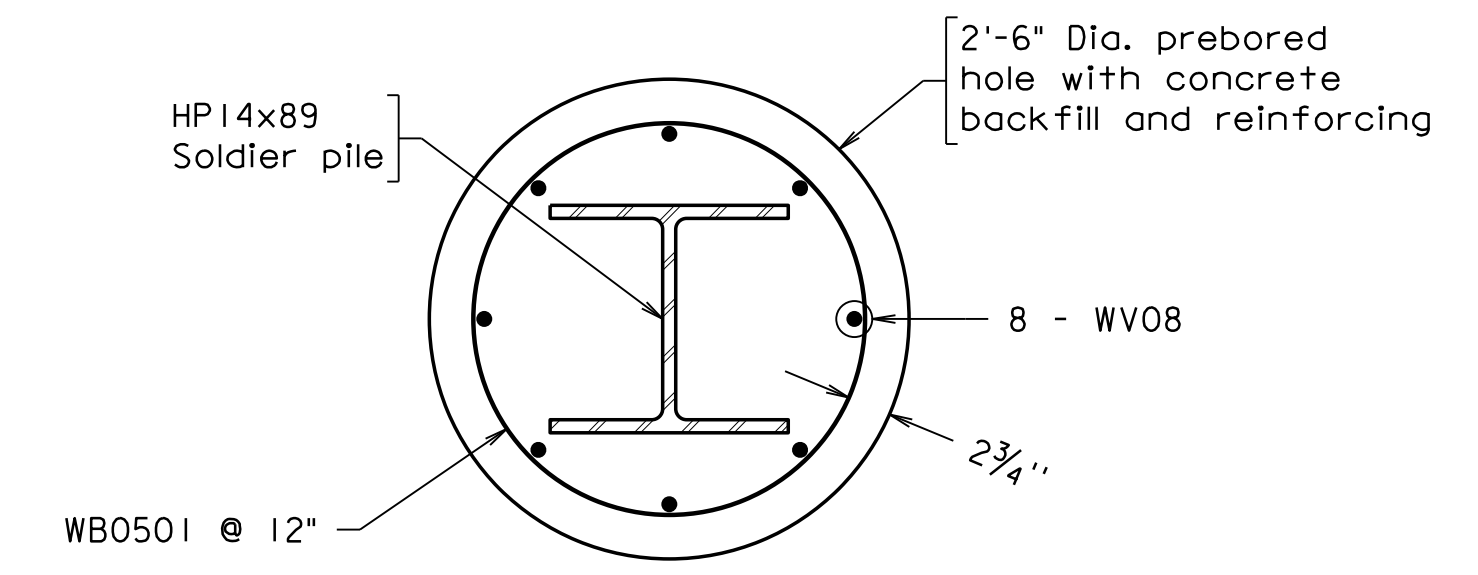
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SOLDIER PILE WALL PLAN AND NOTES					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
			Drawn: WRA.....	Apr. 2022	257-38A
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Revisions					

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
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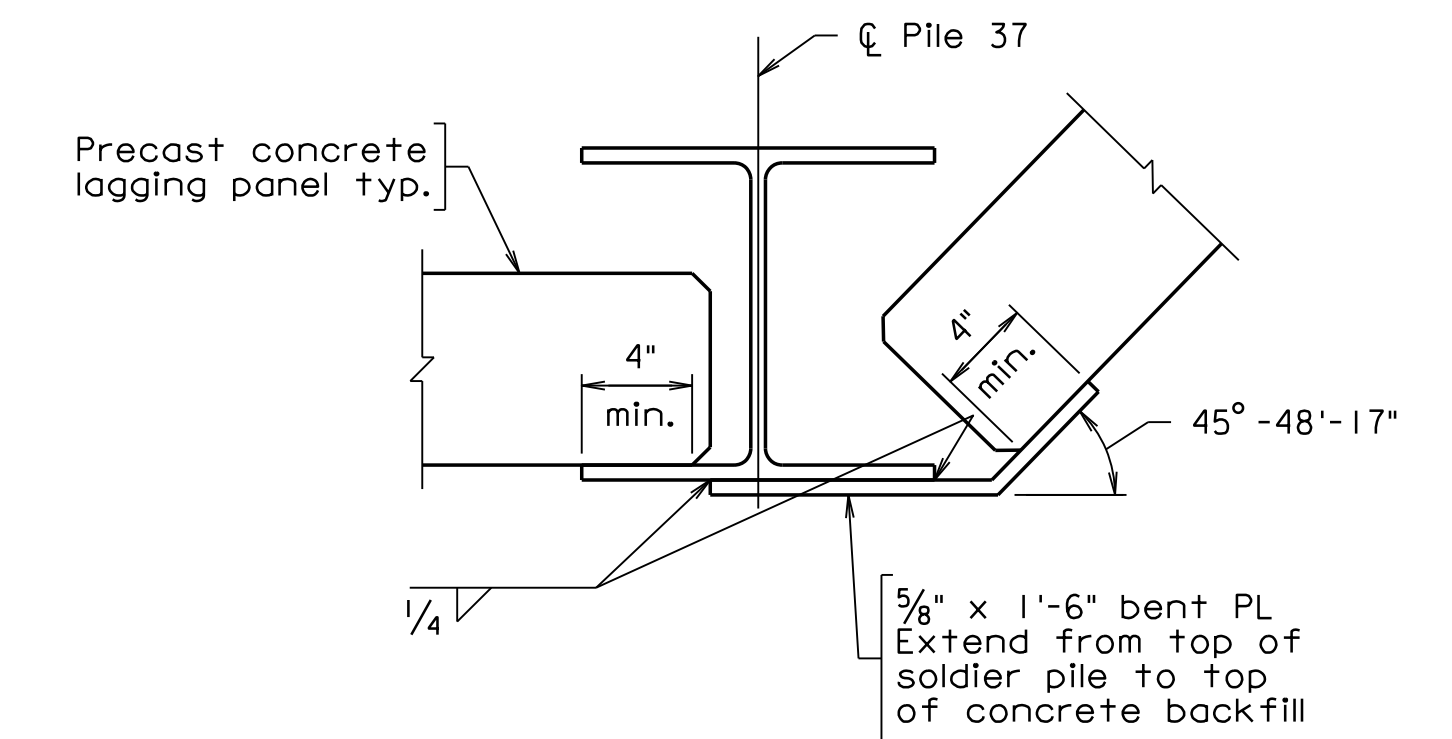
ELEVATION (FRONT FACE)

LEGEND:
 (E) = Expansion joint
 (C) = Contraction joint



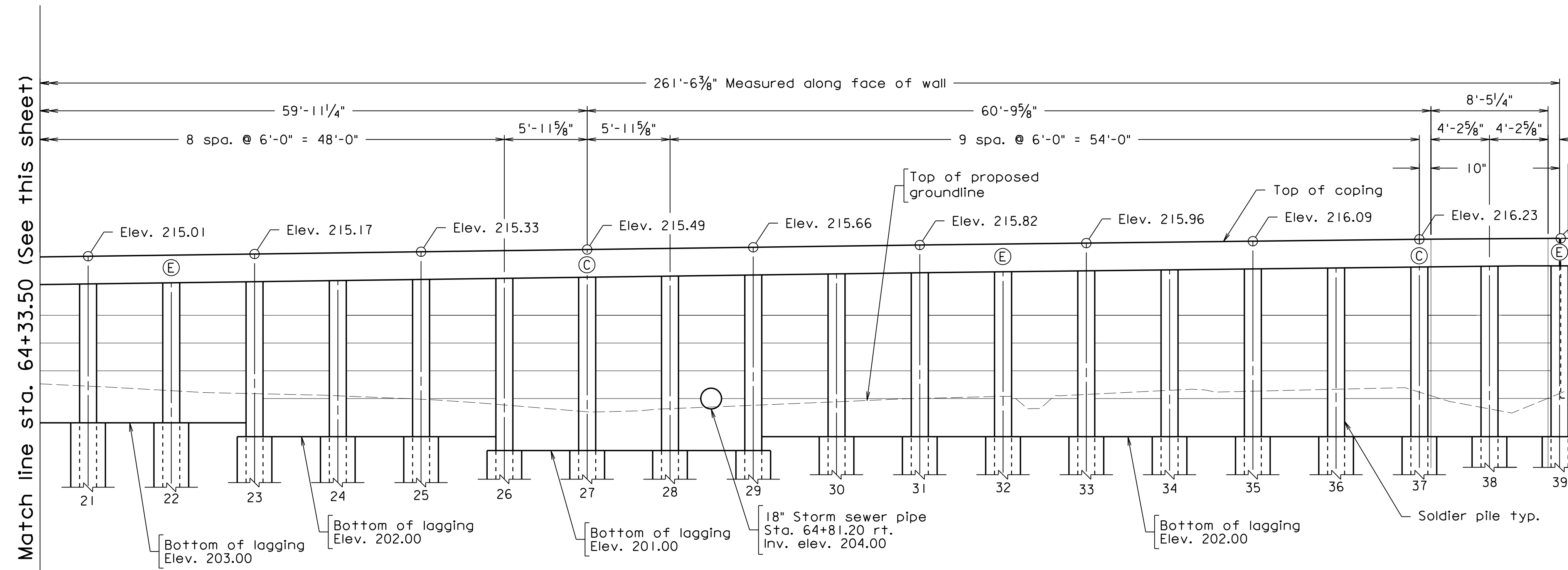
SOLDIER PILE SECTION

Scale: 1" = 1'-0"



SECTION AT PILE 37 AND 39

Pile 39 similar, opposite hand.
 Not to scale



ELEVATION (FRONT FACE)

Scale: 3/8" = 1'-0" unless otherwise noted.

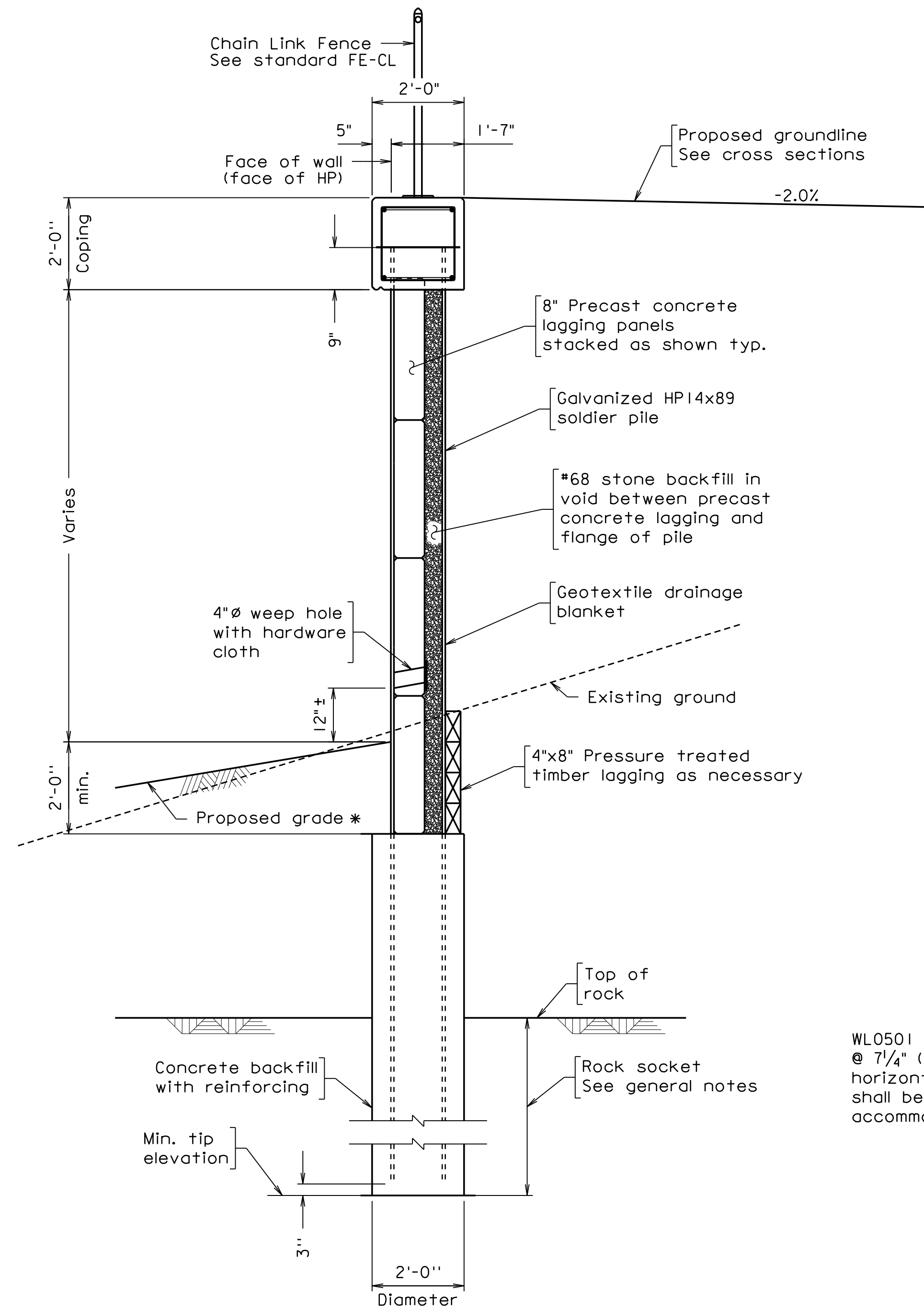
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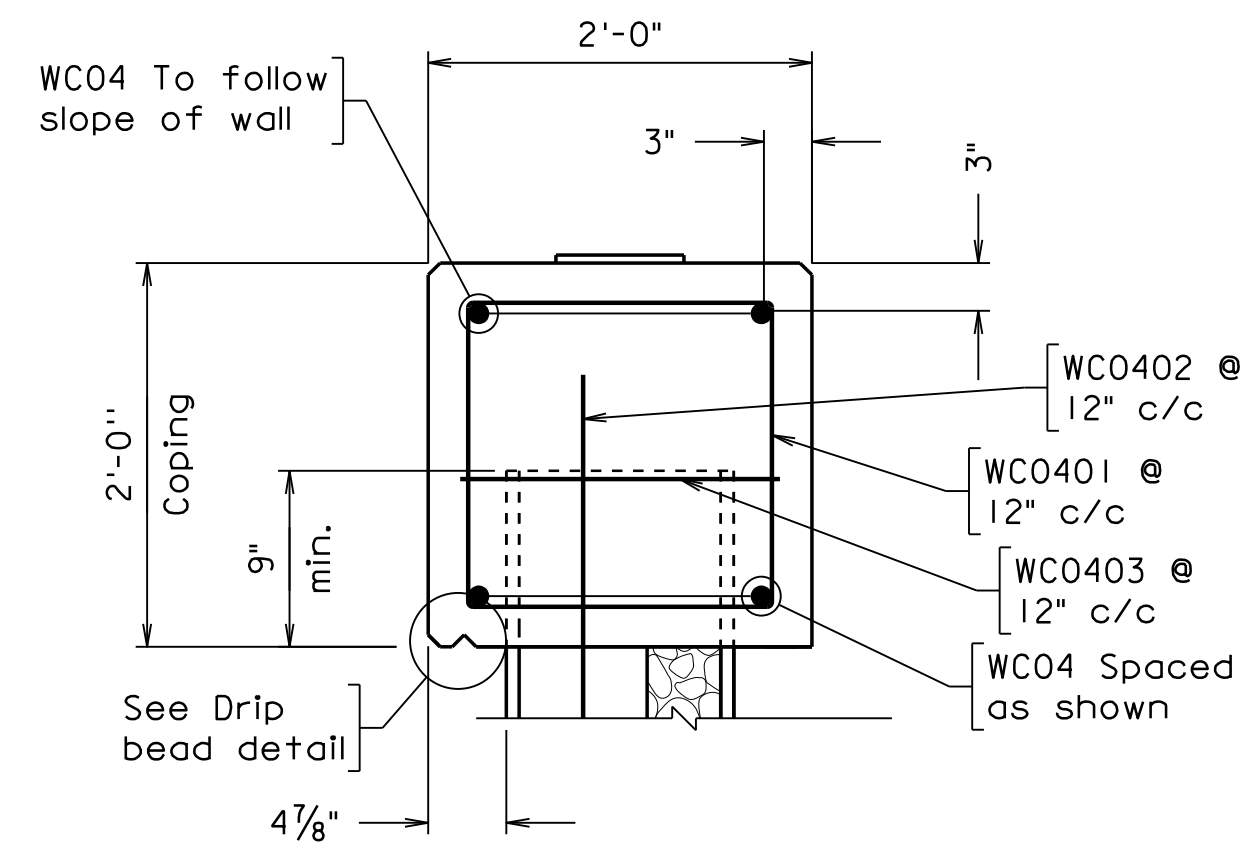
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SOLDIER PILE WALL ELEVATION			
No.	Description	Date	Revisions
Designed: WRA	Date	Plan No.	Sheet No.
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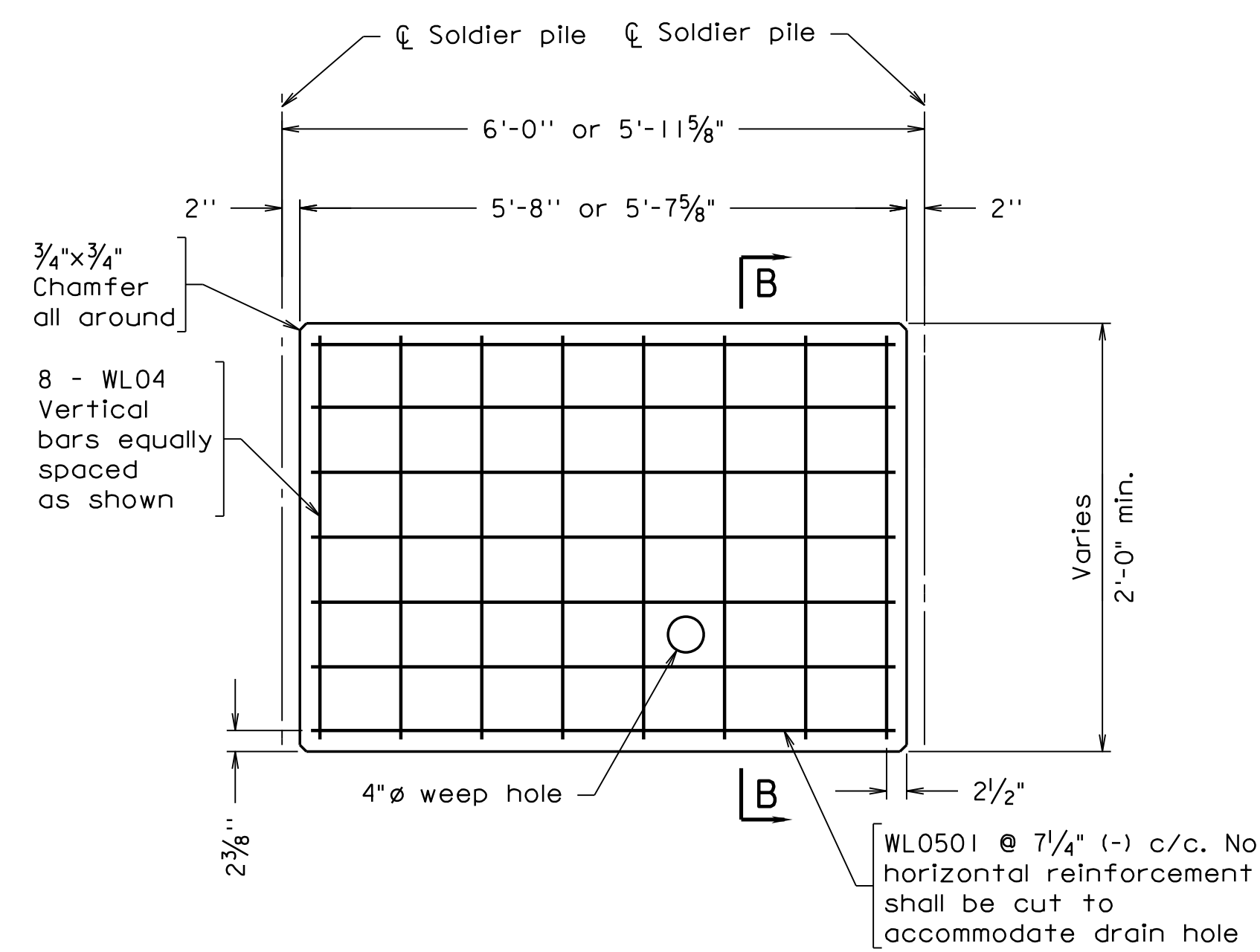


TYPICAL WALL SECTION
Scale: 1/2" = 1'-0"

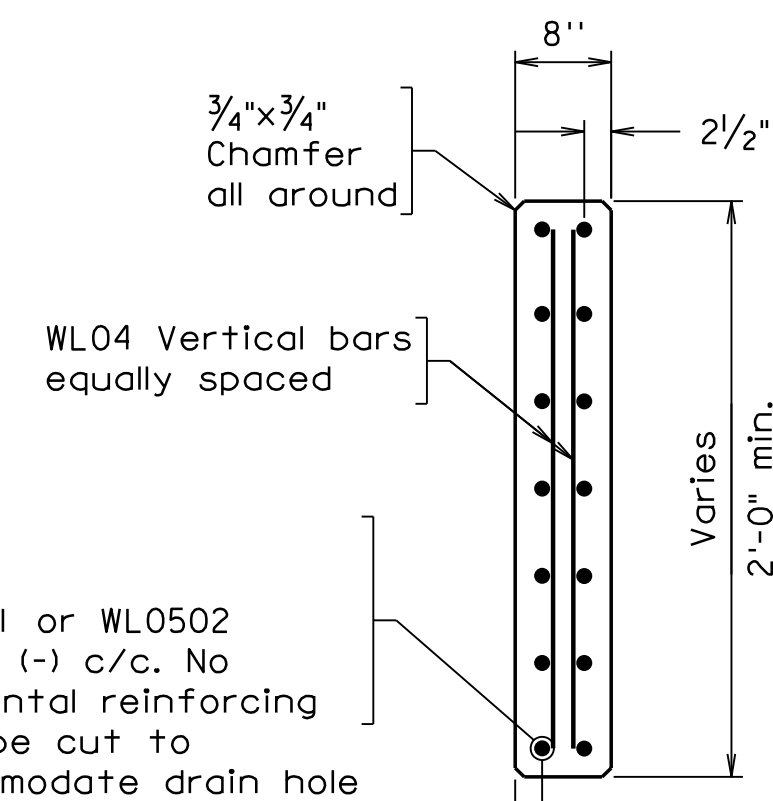
* See cross sections for details



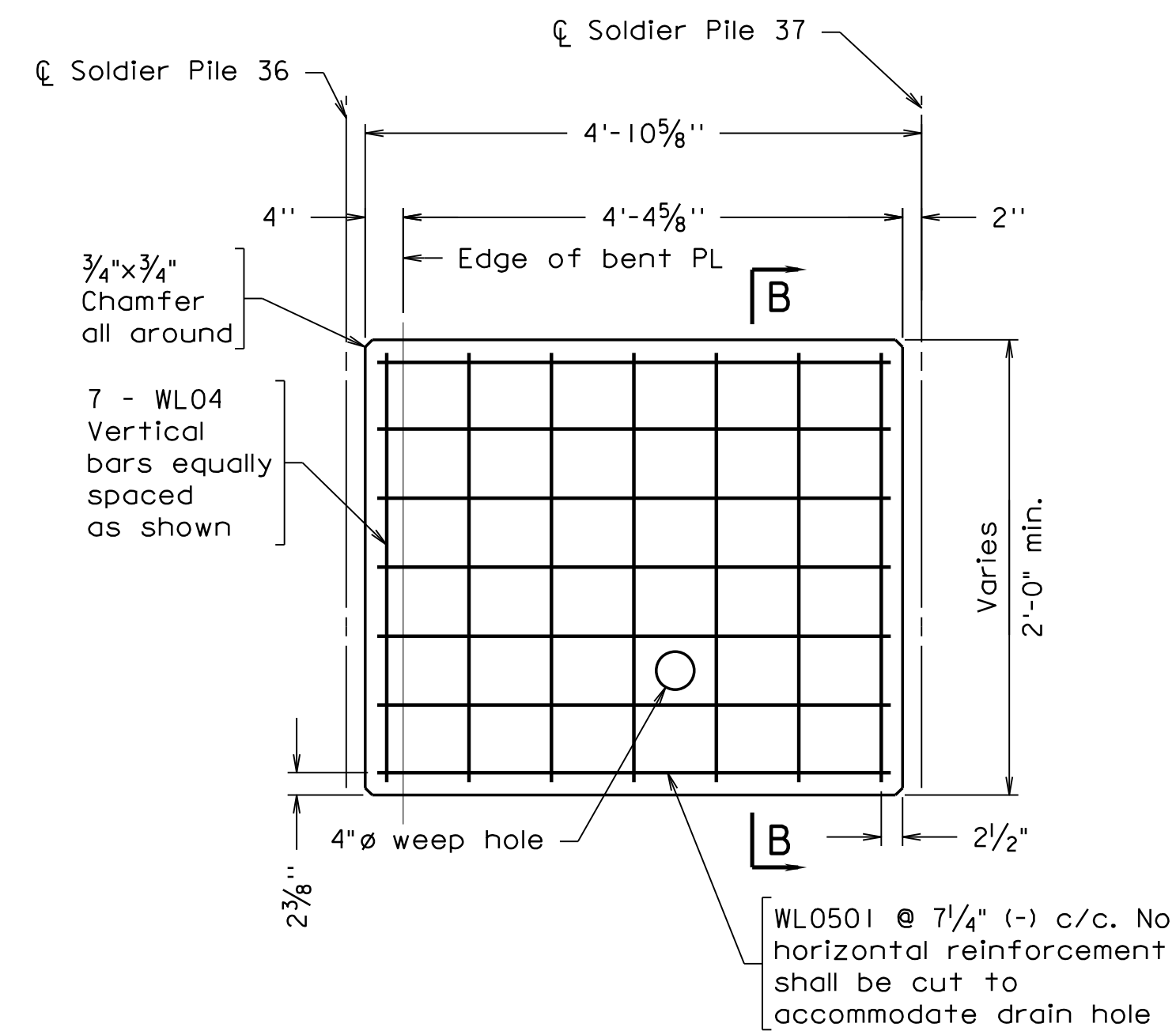
COPING REINFORCEMENT DETAIL
Scale: 1" = 1'-0"



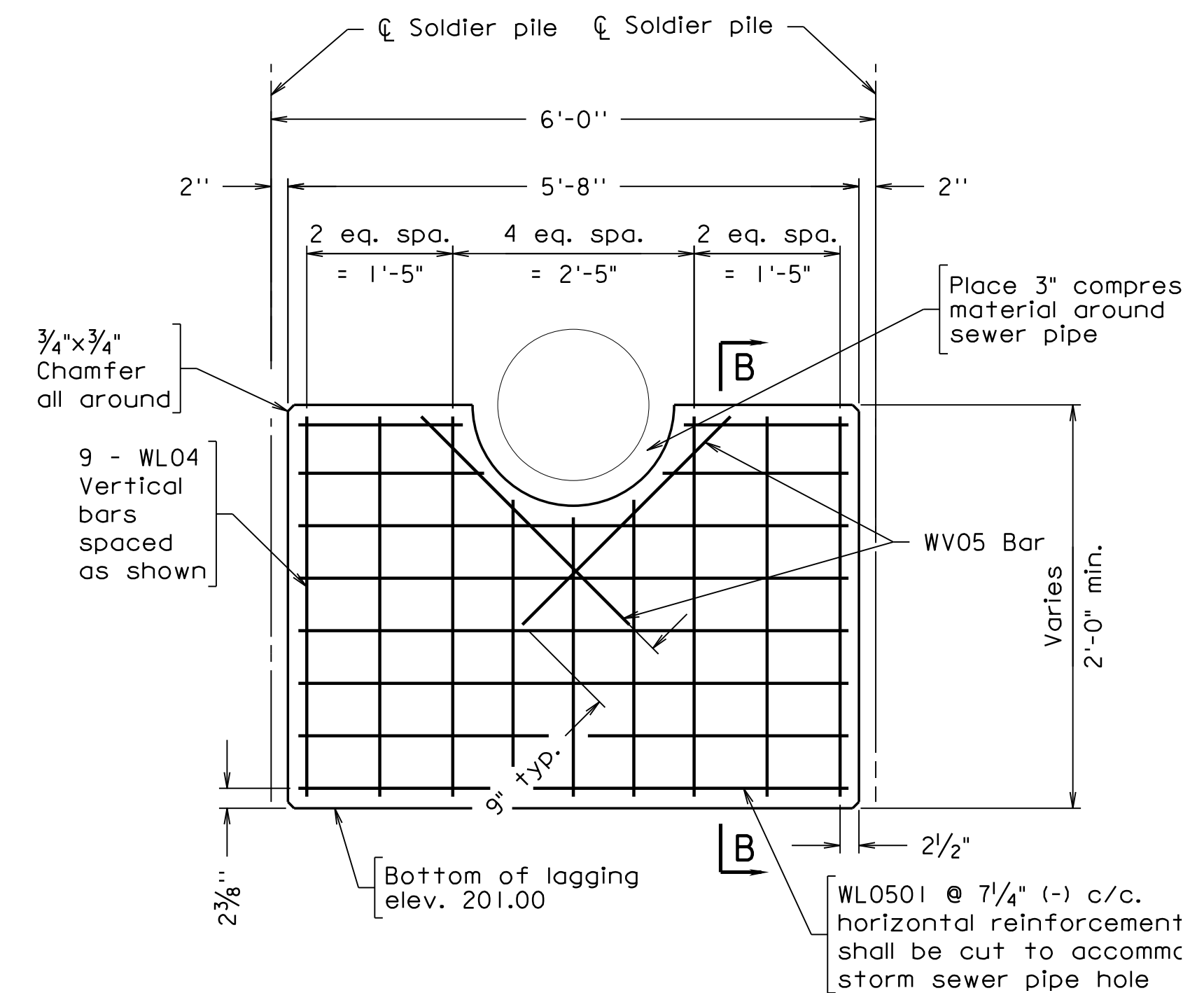
PRECAST CONCRETE LAGGING PANEL DETAILS BETWEEN PILES 1 THRU 37
Scale: 3/4" = 1'-0"



SECTION B-B
Scale: 3/4" = 1'-0"

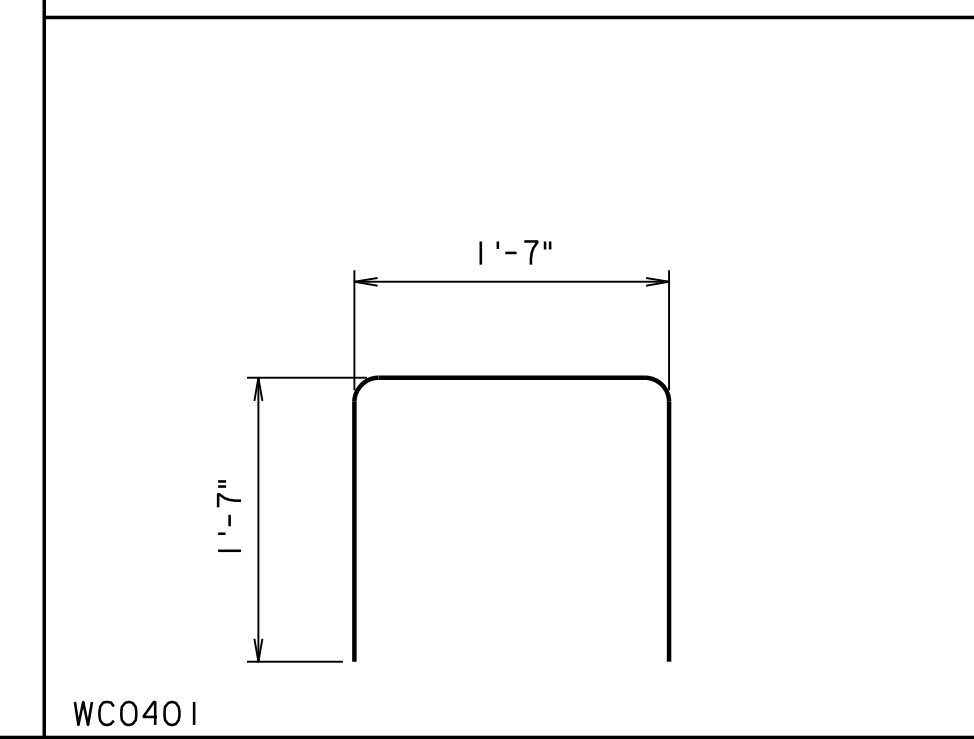


PRECAST CONCRETE LAGGING PANEL DETAILS BETWEEN PILES 37 THRU 39
Panel between Piles 37 and 38 shown. Panel between Piles 38 and 39 similar, opposite hand.
Scale: 3/4" = 1'-0"



WALL PANEL AT STORM SEWER PIPE
Scale: 3/4" = 1'-0"

REINFORCING STEEL SCHEDULE



Mark	No.	Size	Pin Ø	Length	Location
WC0401		#4	2"		Coping
WC0402		#4		2'-0"	Coping
WC0403		#4		1'-8"	Coping
WC04		#4			Lagging
WV04		#4			Lagging
WV05		#5			Lagging

Contractor shall determine all reinforcing details necessary for installation.

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SOLDIER PILE WALL TYPICAL SECTION AND DETAILS					
No.	Description	Date	Designed: WRA.....	Date	Plan No.
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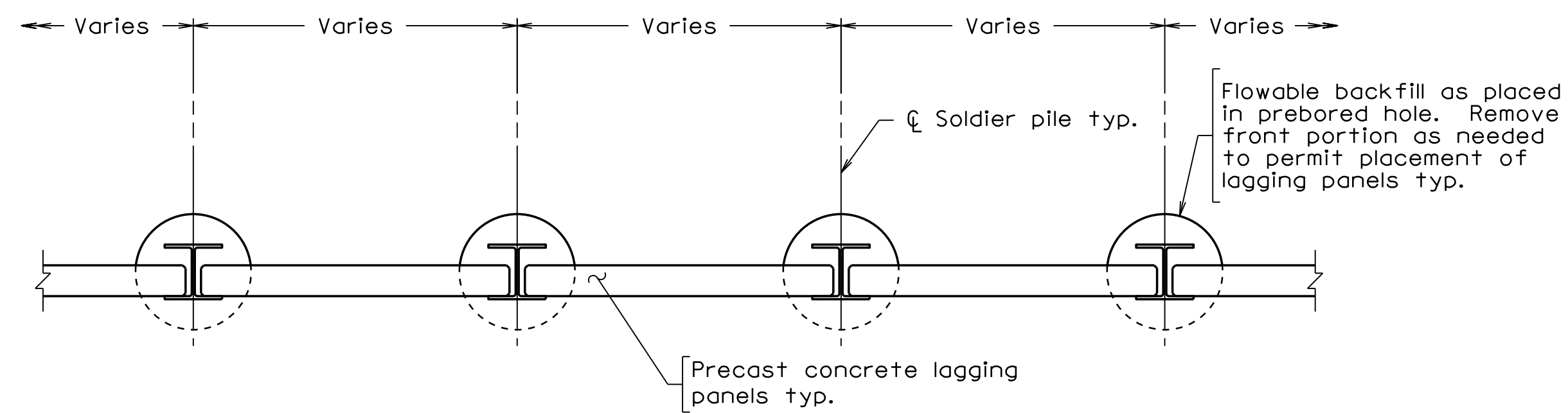
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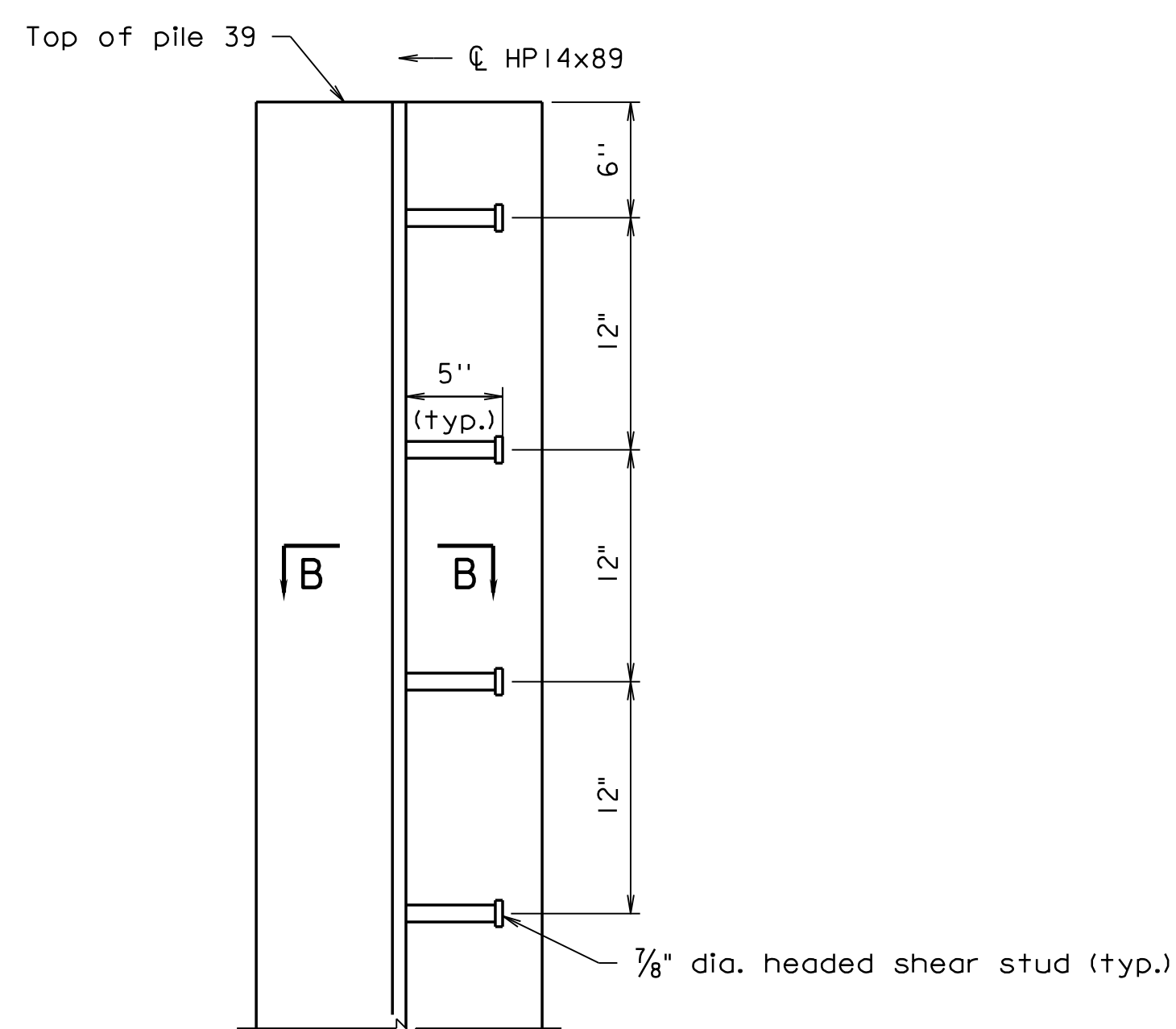
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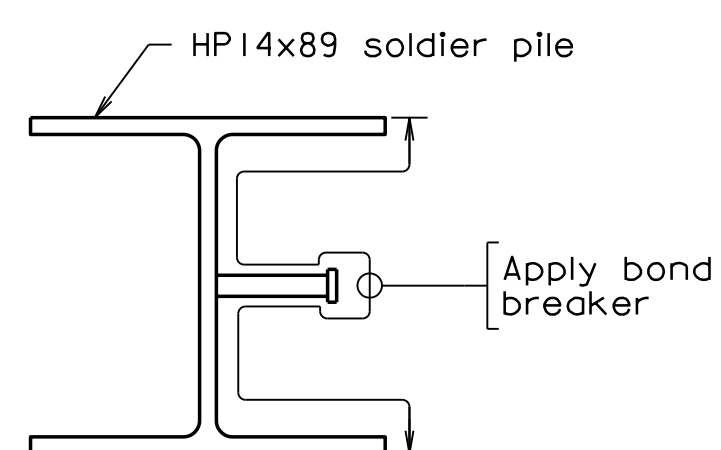
PART PLAN - LAGGING AND SOLDIER PILES
Scale: 3/8" = 1'-0"

Notes:

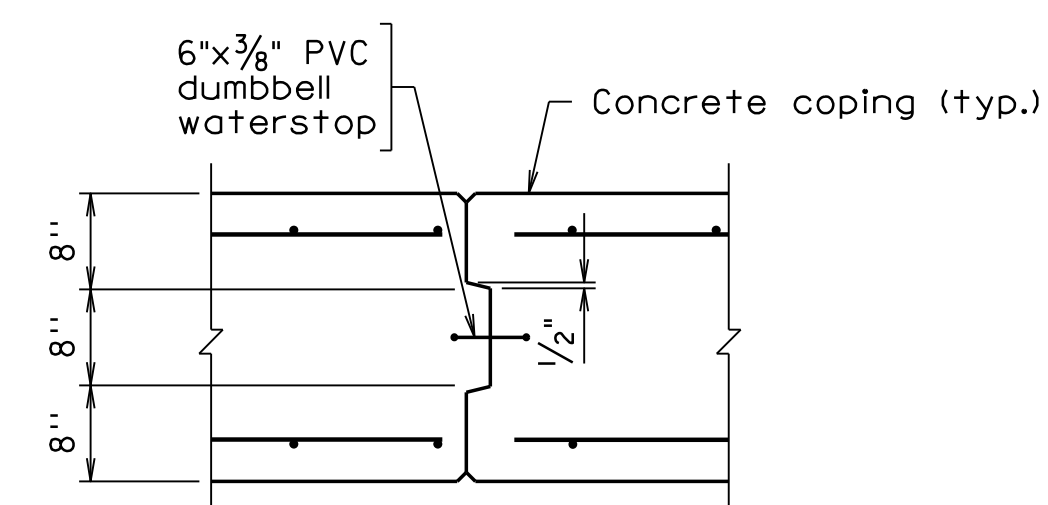
Bond breaker shall be an approved form - coating material that will prevent adherence of concrete. Material that will adhere to or discolor concrete shall not be used. Surfaces shall be treated with bond breaker immediately before concrete placement.



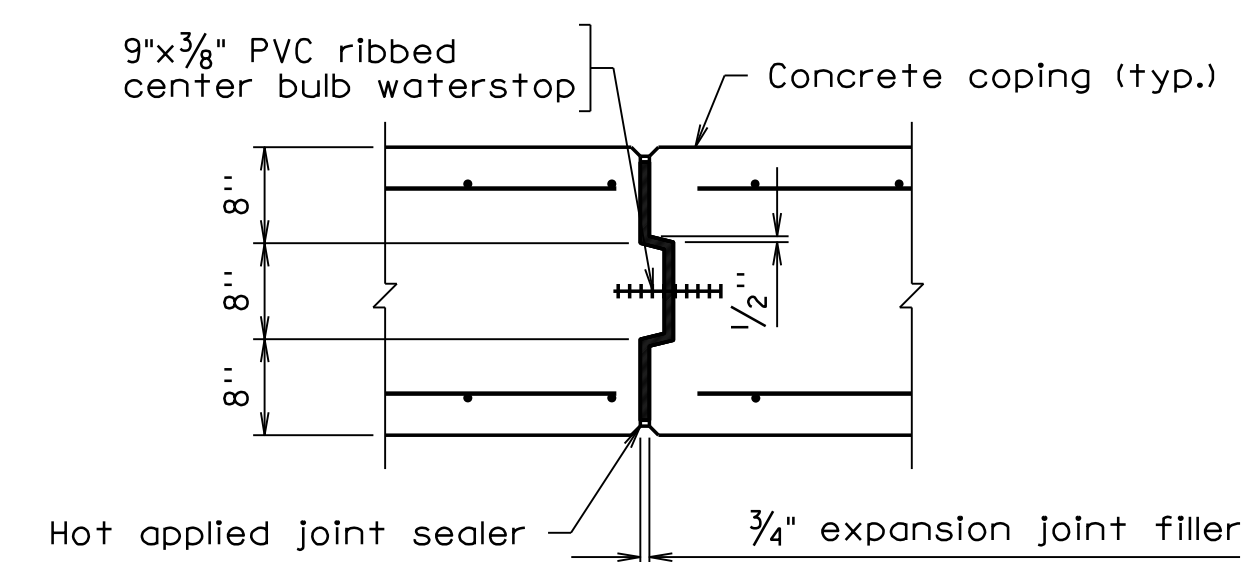
SHEAR STUD DETAILS
Scale: 1/2" = 1'-0"



SECTION B-B
Scale: 1/2" = 1'-0"



CONTRACTION JOINT DETAIL
Scale: 3/4" = 1'-0"



EXPANSION JOINT DETAIL
Scale: 3/4" = 1'-0"

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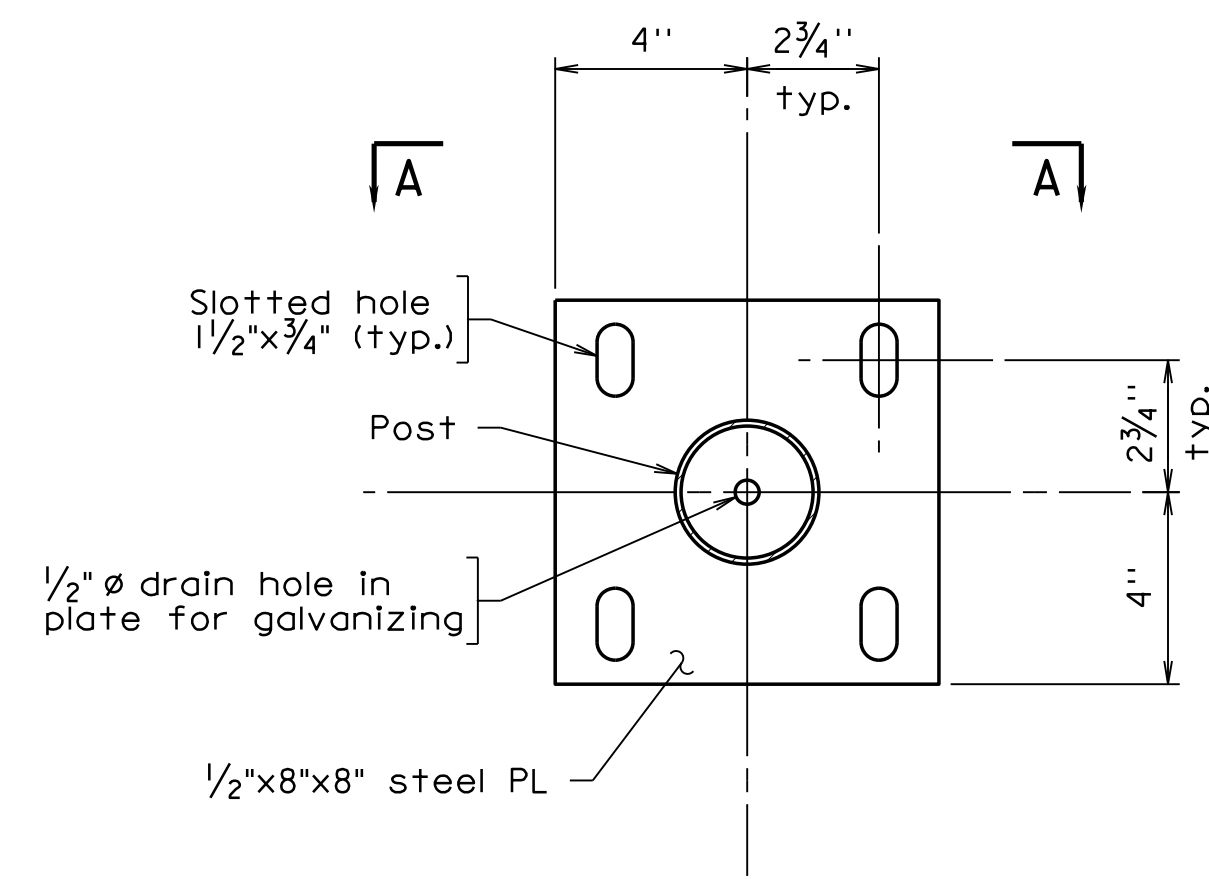
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SOLDIER PILE WALL AND LAGGING DETAILS			
No.	Description	Date	Designed: WRA..... Drawn: WRA..... Checked: WRA.....
	Revisions	Apr. 2022	Plan No. 257-38A Sheet No. 120 of 125

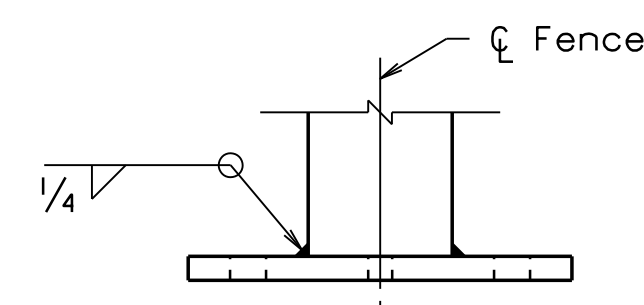
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VA.		95	0095-076-299, B688
			120a



STEEL BASE PLATE DETAIL

Scale: 3" = 1'-0"



SECTION A-A

Scale: 3" = 1'-0"

Notes:

All structural steel shall be ASTM A709 Grade 50.

Posts shall be equally spaced, not to exceed 10'-0".

Details shown are designed for the use of Simpson Strong-Tie acrylic adhesive and A193 GR B7 Threaded Rod Anchors. The use of alternate products may be allowed provided they conform to VDOT approved materials list and are approved by the Engineer.

Contractor to size length of anchor rods to ensure minimum stick-through for nut installation, and adjustments for grade.

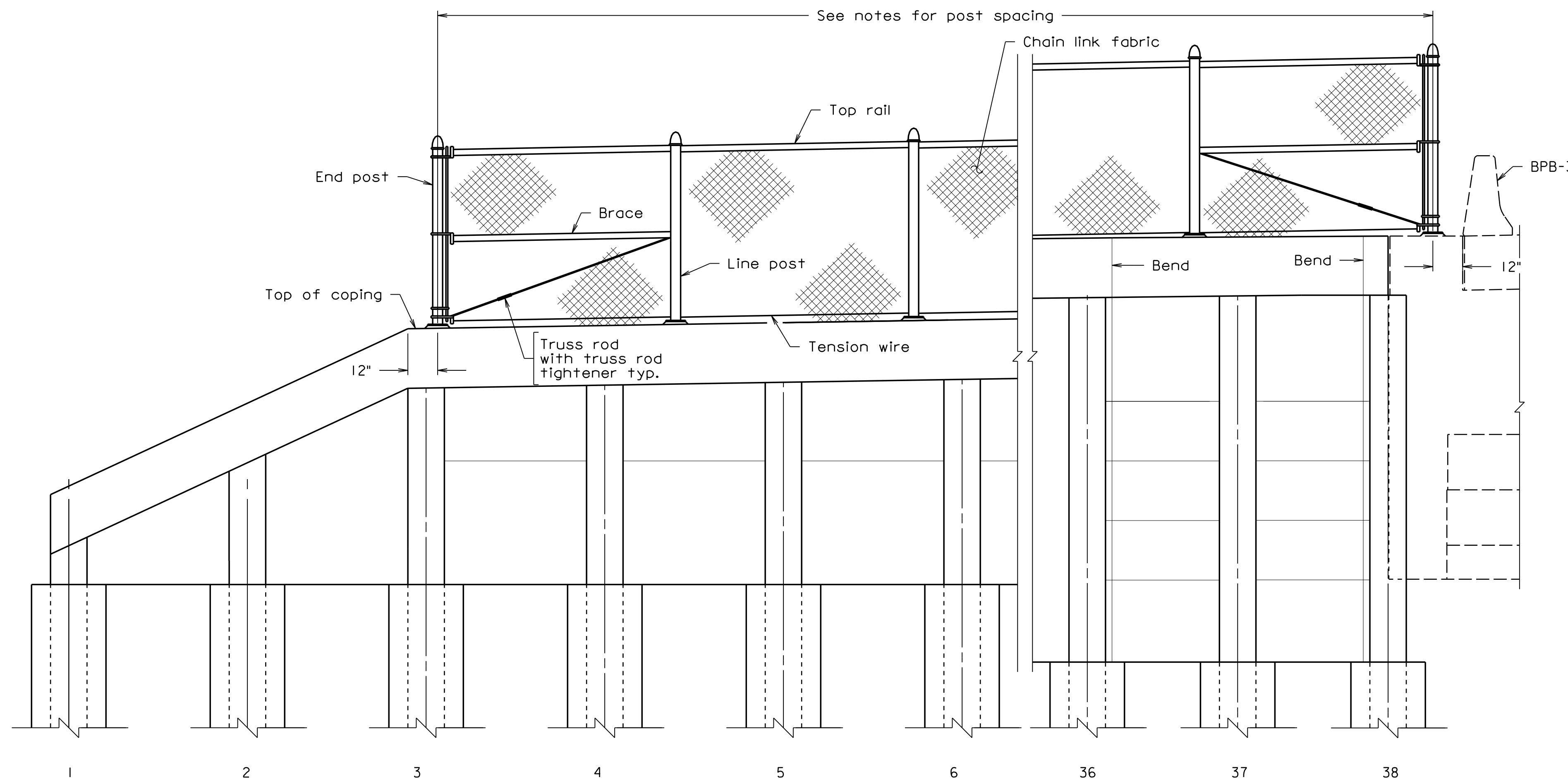
Contractor to avoid hitting coping rebar during anchor bolt installation.

Contractor may propose alternate attachment methods for the fence posts for review. Alternates shall be designed for appropriate loads and bear the seal of a professional engineer licensed in the Commonwealth of Virginia.

Chain link mesh to be placed on the inside face of fence posts.

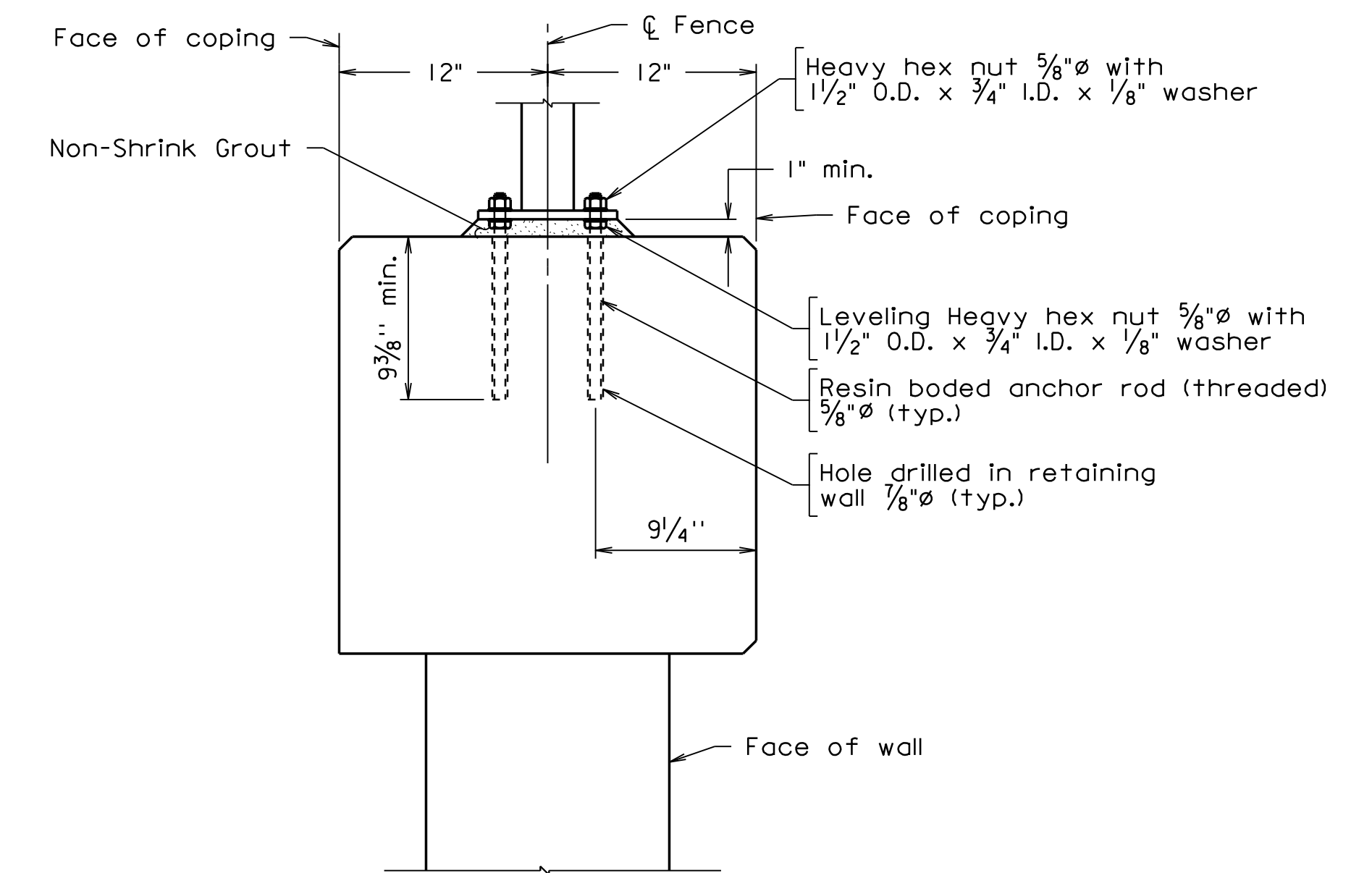
Chain link mesh, plates, posts, rails and other associated hardware shall be black vinyl coated steel.

For details not shown herein, refer to VDOT standard FE-CL.



PART ELEVATION

Scale: 3/8" = 1'-0" unless otherwise noted.



FENCE CONNECTION DETAIL

Scale: 1/2" = 1'-0"

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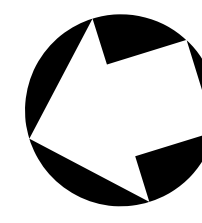
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No.	Description	Date	Designed: MRD.....	Date	Plan No.
			Drawn:MRD.....	Apr. 2022	257-38A
			Checked: .WRA.....		120a of 125
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STATE	FEDERAL AID		STATE		SHEET
VA.	ROUTE	PROJECT	ROUTE	PROJECT	NO.
			95	0095-076-299, B688	121



Notes:

The minimum design life of MSE wall shall be 100-year.

The anticipated MSE wall total settlement is 2 inches and differential settlement is 1 inch.

For bearing resistance requirements, see the MSE Wall Bearing Resistance Data Table.

For settlement requirements, see the Estimated Wall Settlement Table.

Vertical slip joints shall be placed in MSE Wall #1 and #3 at Stations 22+00 and 23+00.

Prior to wall construction, the foundation shall be compacted with a smooth wheel vibratory roller weighting 10 tons minimum. The drums of the roller should be ballasted, and each pass of the roller should overlap one half the width of the previous pass. The roller shall make at least ten passes over the proposed wall foundation zone. No density test will be required. Any foundation soils found to be unsuitable and/or unstable shall be removed and replaced with select material Type 1 minimum CBR of 30. Compact the foundation area according to the VDOT Specifications.

If encountered remove unsuitable or unstable foundation material below the bottom of the wall and replace with select material prior to wall construction. Compact the foundation area according to the VDOT Specifications.

Minimum panel design thickness is 5.5 inches. Thickness of concrete must increase to accommodate any architectural surface finish that may be specified.

MSE wall panels shall be cruciform 5'x5' panel.

Concrete in moment slabs and parapet/railing shall be Low Shrinkage Class A4 Modified.

Class II Corrosion Resistant Reinforcing (CRR) steel shall be used in moment slab.

Class I CRR steel shall be used in copings and MSE wall panels.

An impervious membrane shall be placed below the pavement and just above the first row of reinforcement. The membrane shall be sloped to drain away from the facing to an intercepting longitudinal drain outlet beyond the reinforced zone. Membrane shall be incidental to Retaining Structure MSE Wall.

If field condition requires a non-woven geotextile shall be used as a separator between the mechanically stabilized earth mass and the subbase.

The selected wall supplier shall submit a detailed design and shop drawings for approval. Design shall include a final combined global stability analysis check as part of the design submittal. The analysis check configuration shall include the reinforced zone with the designed reinforcing elements using subgrade soil friction angle of 30 degrees and unit weight of 120 pcf.

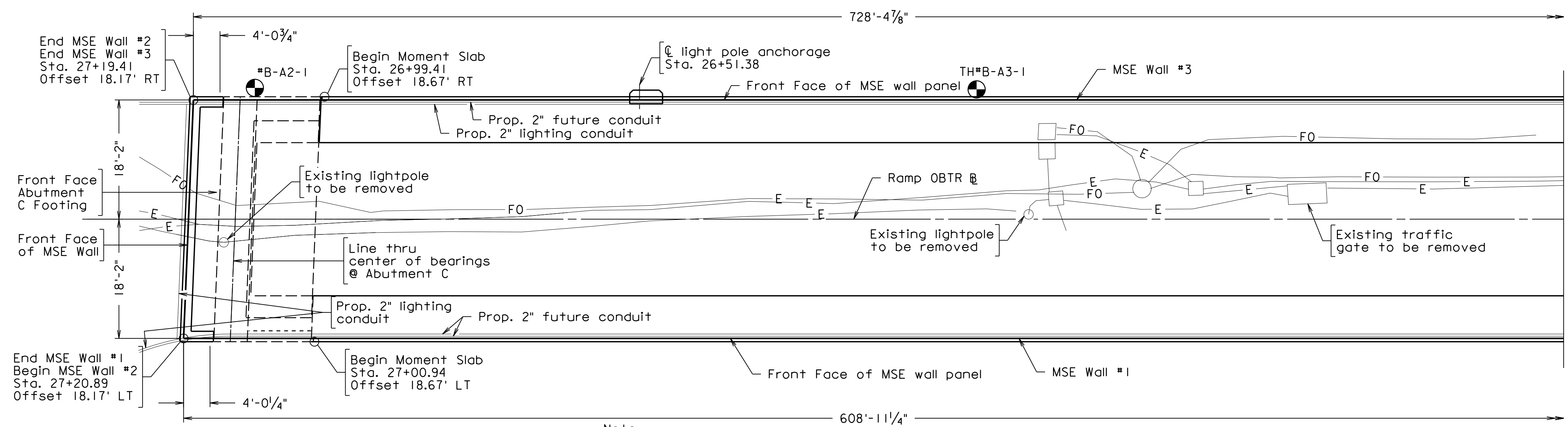
Provide drainage details such as perforated pipe underdrain and/or drainage blanket based upon field conditions.

All panel types and other related elements shall be detailed on shop drawings.

MSE wall fabricator shall adjust beginning of MSE wall and may consider using an RW wall and/or MB-7 barrier as necessary and shall be incidental to Retaining Structure MSE Wall.

The minimum required soil reinforcement shall be 8 feet or 70 percent of the wall height, whichever is greater, except for MSE Wall #2 which shall be 8 feet or 80 percent of the wall height, whichever is greater.

MSE walls shall be in accordance with VDOT Special Provision for Mechanically Stabilized Earth Walls (Concrete Panel Facing).



Legend:
 Denotes boring location.

Note:
 All existing fiber optic and electric conduit shown to be abandoned.
MSE WALL LAYOUT - ABUTMENT AND APPROACH RAMP

Monitoring Location (station)	Estimated intermediate settlement at the end of wall construction (inches)
27+00	0.3
26+00	0.6
24+50	0.35
23+50	1.85
22+50	0.53

Wall No.	Support Location	SERVICE Applied Base Pressure (Settlement = X ") (ksf)	STRENGTH Factored Bearing Resistance (ksf)
2	Sta. 24+50 to Abut. C	4.1	6.5
1,3	Sta. 22+50 to Sta. 24+50	2.6	4.2
1,3	Beg. of Wall to Sta. 22+50	1.5	2.5

The wall design shall be based on the lower of the values (either Service Limit or Strength Limit States) given for each Support Location in the table above. The Nominal Bearing Resistance will be verified by the engineer prior to construction of wall.

257-38A-121.dgn

PROGRESS DRAWING FOR REFERENCE. NO RECORD FILE IS TO BE USED FOR RISK OF USE.
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 RICHMOND, VA
 STRUCTURAL ENGINEER

PAC PLANS
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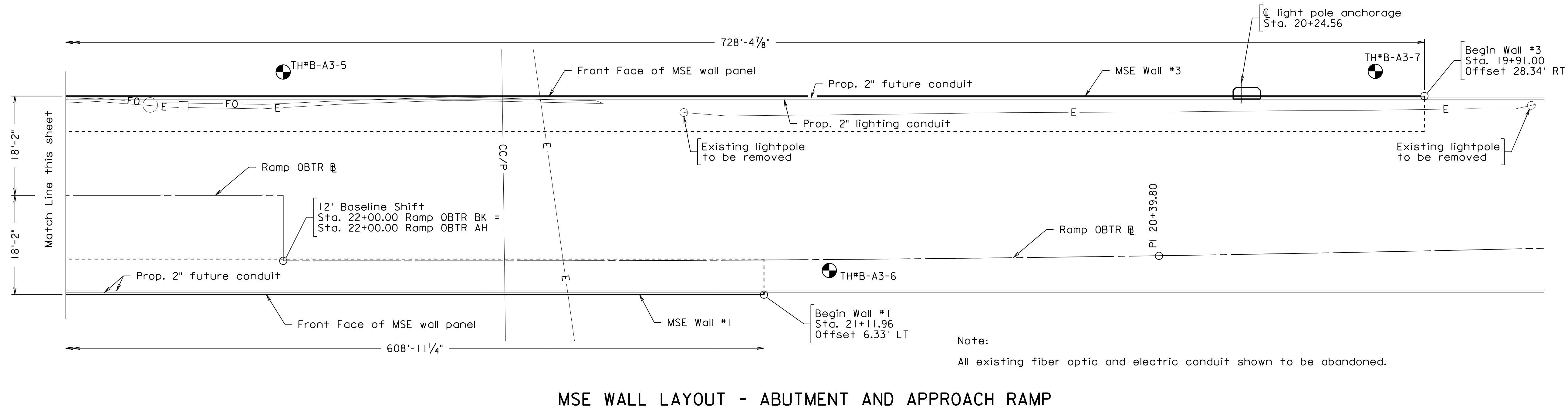
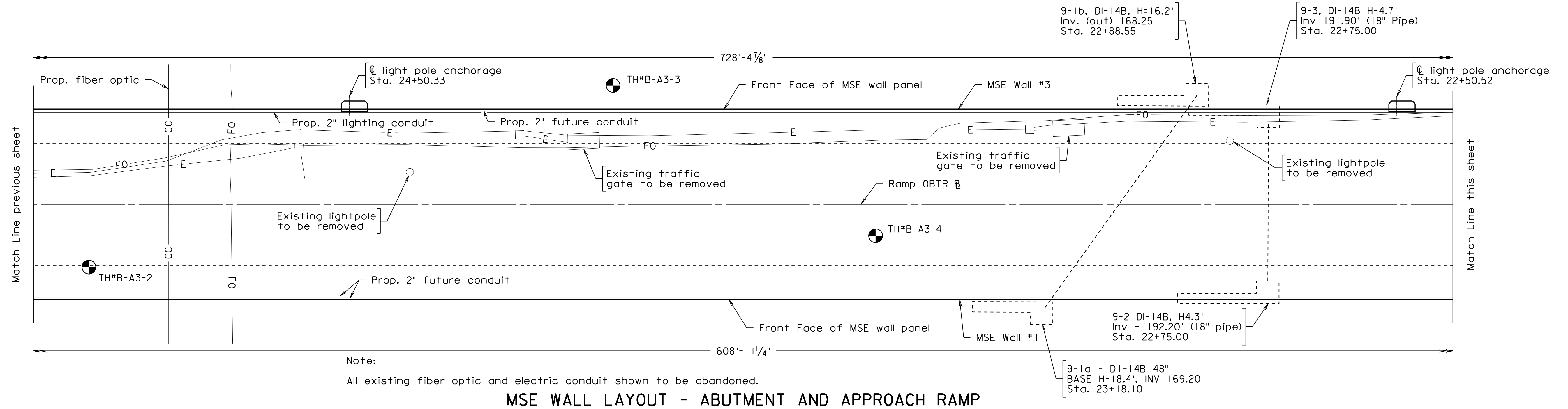
Scale: 3/32" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION				
MSE WALL LAYOUT 1 OF 2				
No.	Description	Date	Designed: WRA..... Drawn:WRA..... Checked: WRA.....	Sheet No.
	Revisions	Apr. 2022	257-38A	121 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			122



257-38A_122.dgn

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Scale: 3/32" = 1'-0" unless otherwise noted.

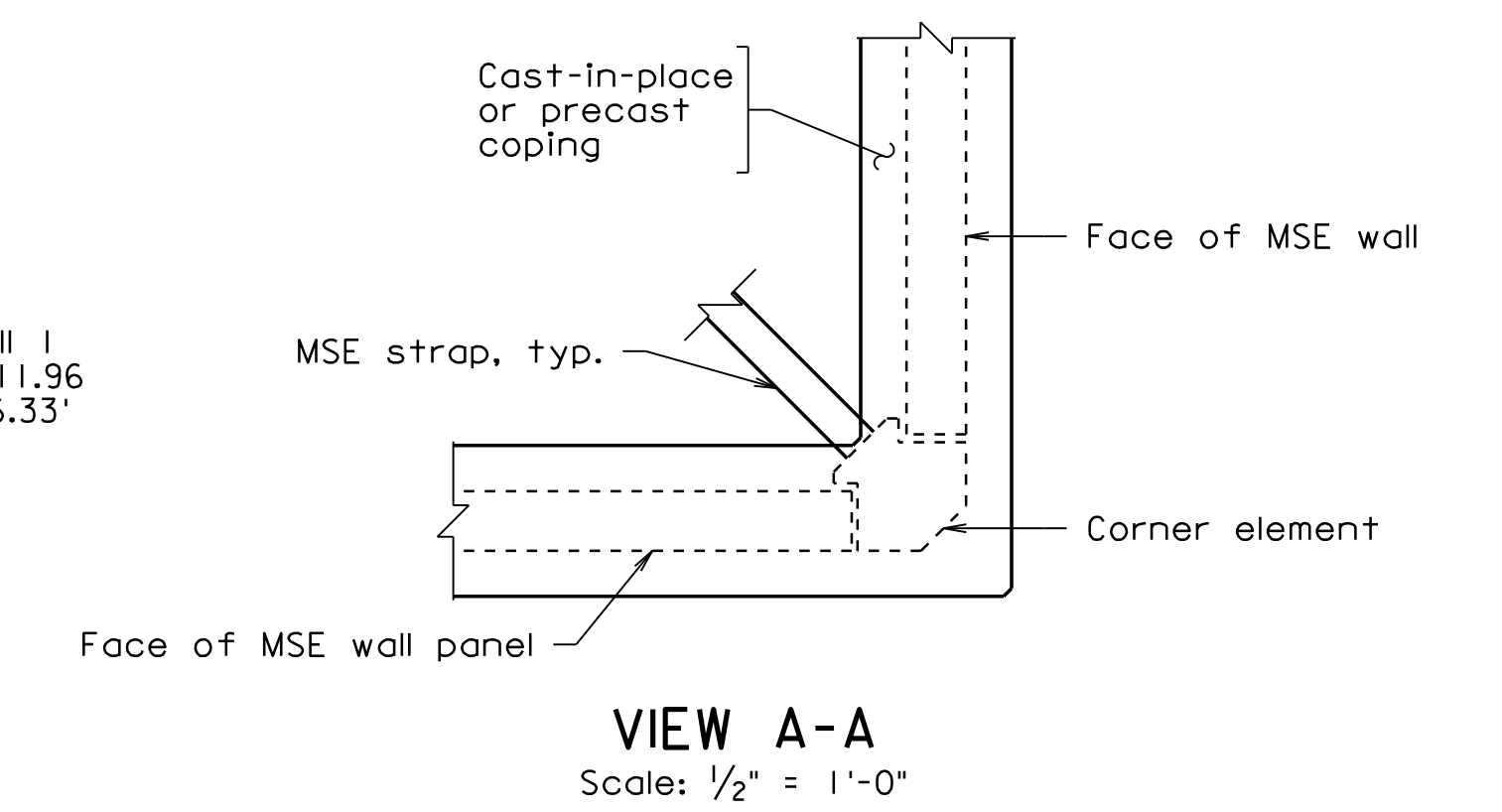
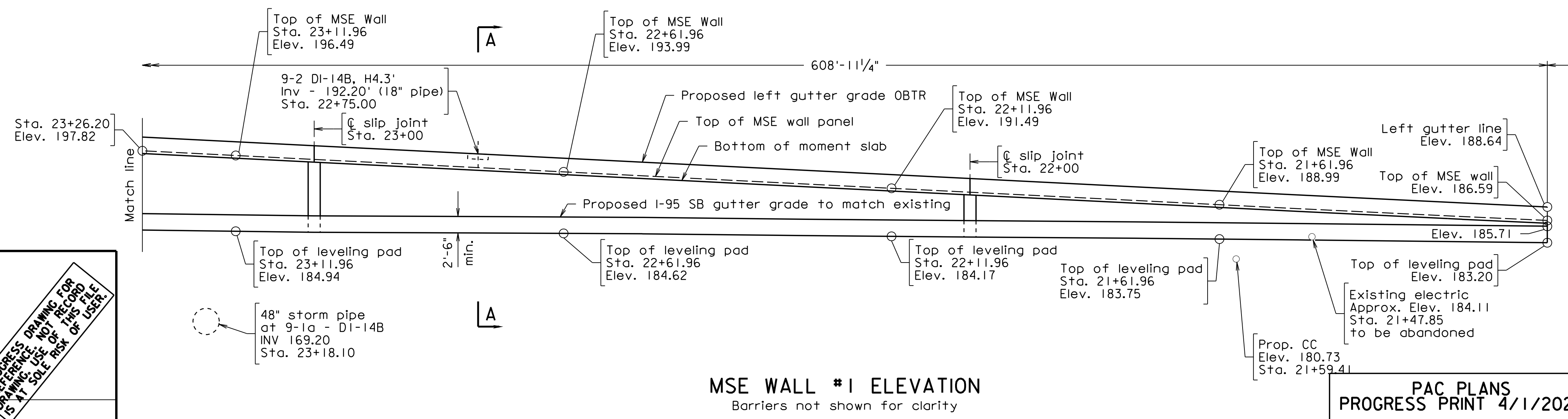
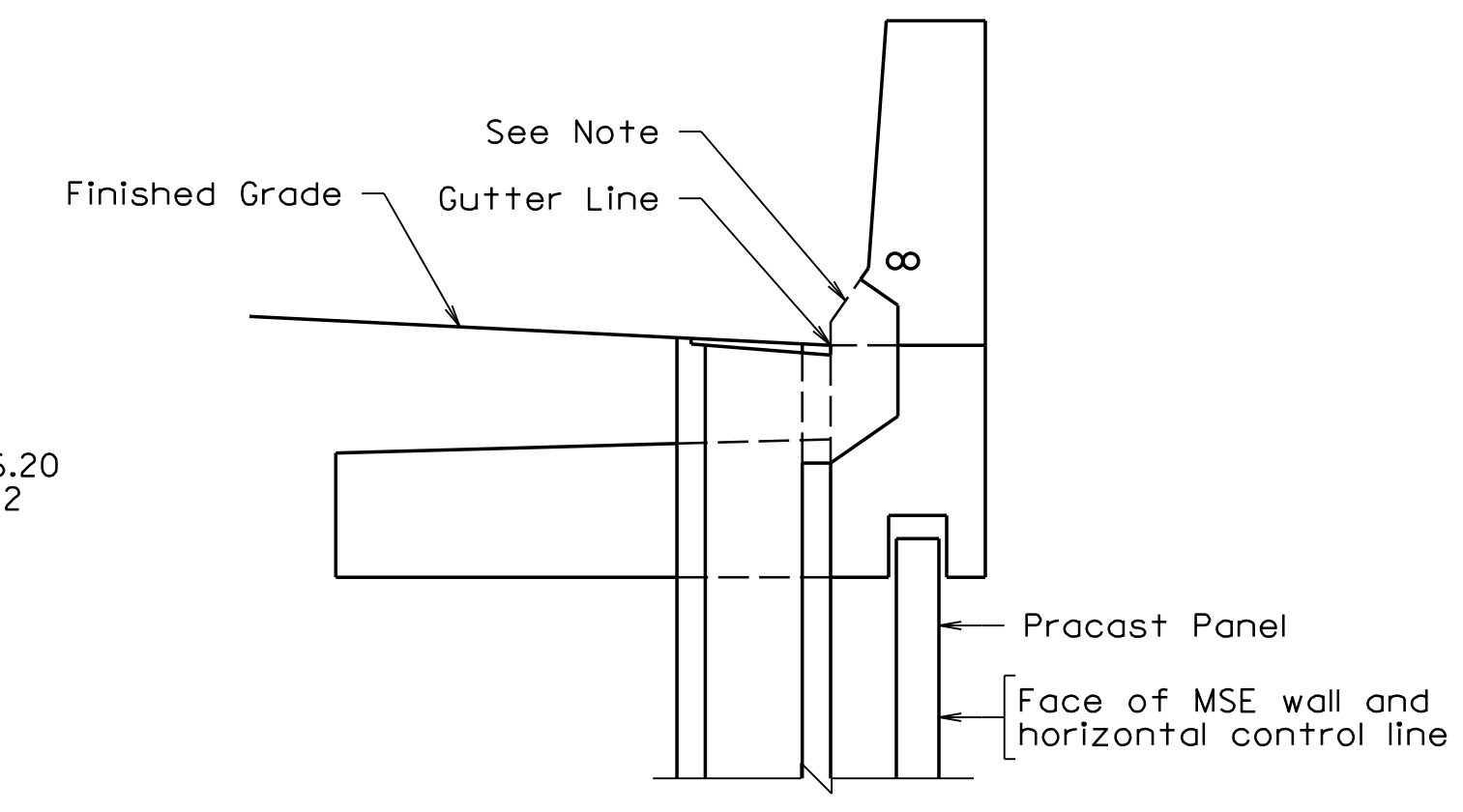
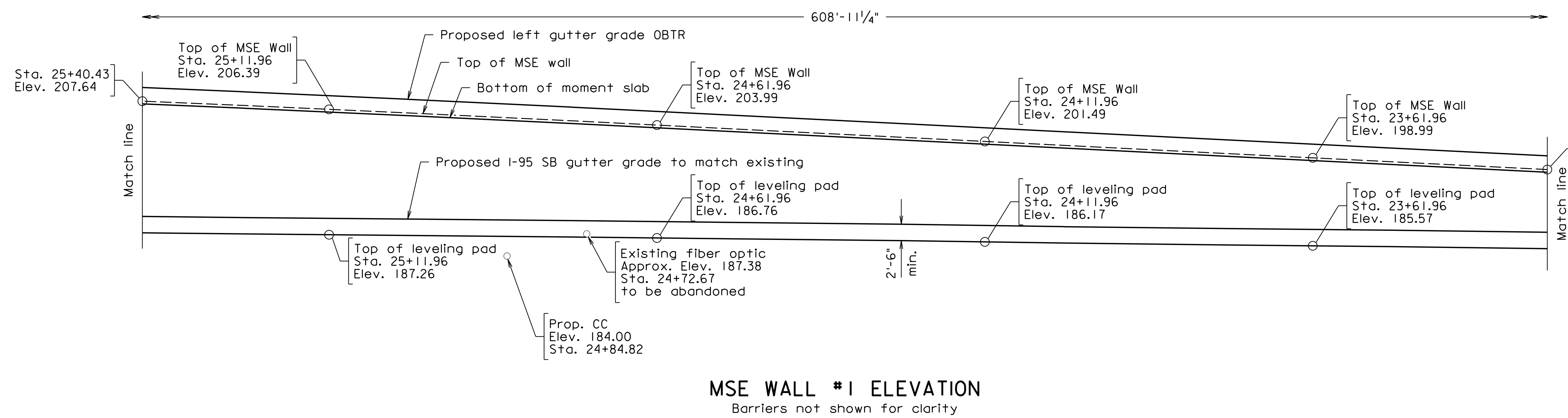
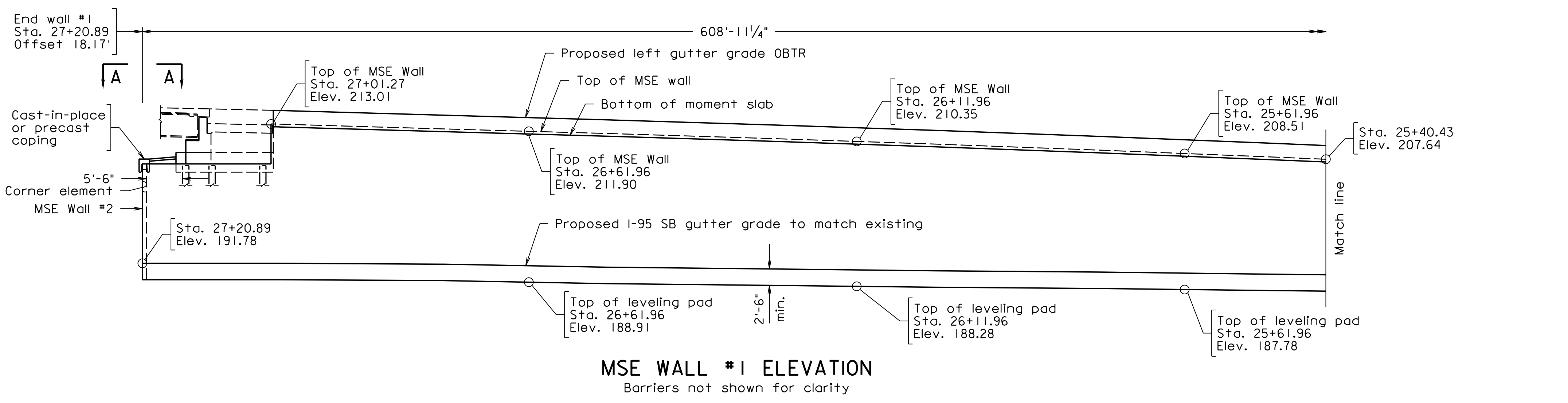
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STRUCTURE AND BRIDGE DIVISION	
MSE WALL LAYOUT 2 OF 2	
No.	Description
Revisions	
Designed: WRA.....	Date
Drawn: WRA.....	Apr. 2022
Checked: WRA.....	Plan No. 257-38A
	Sheet No. 122 of 125

PROGRESS PRINT 4/1/2022

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			123

Notes:
MSE wall fabricator shall design moment slab with drainage opening.
For drainage opening throat and length dimensions see roadway plans.



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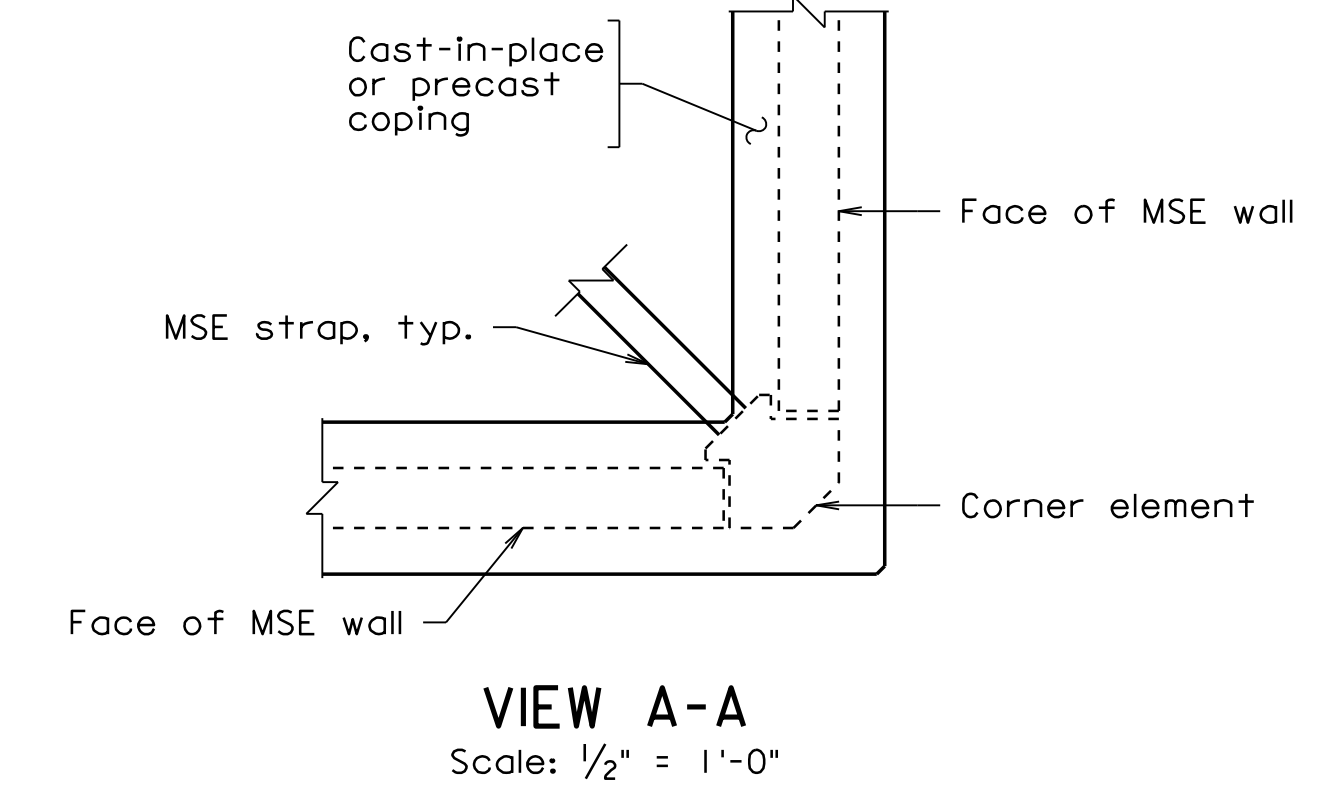
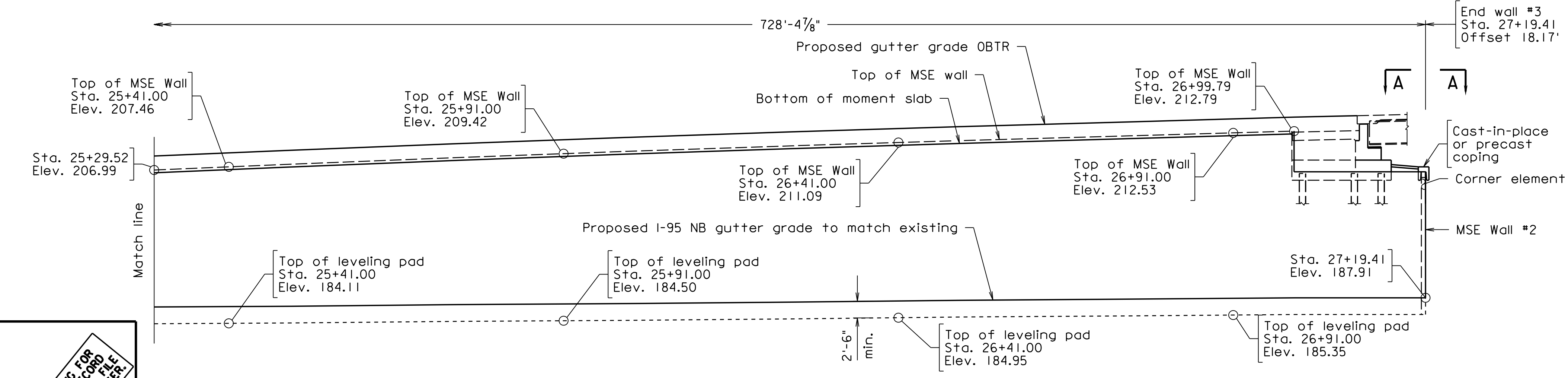
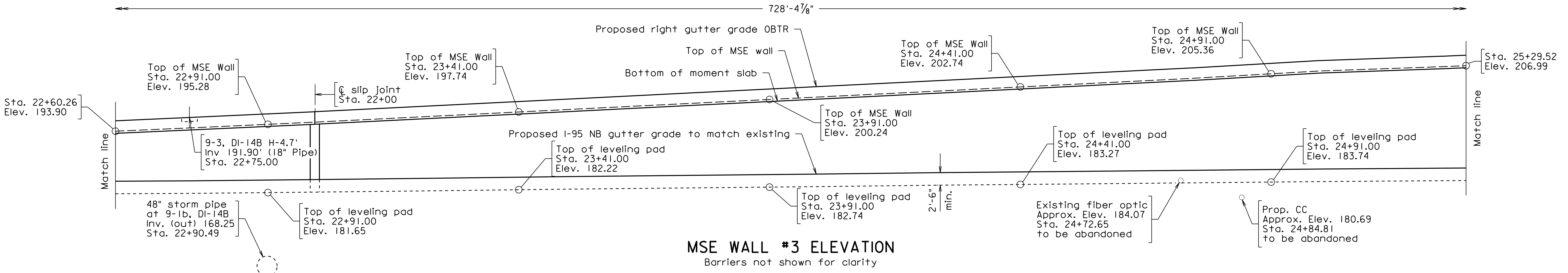
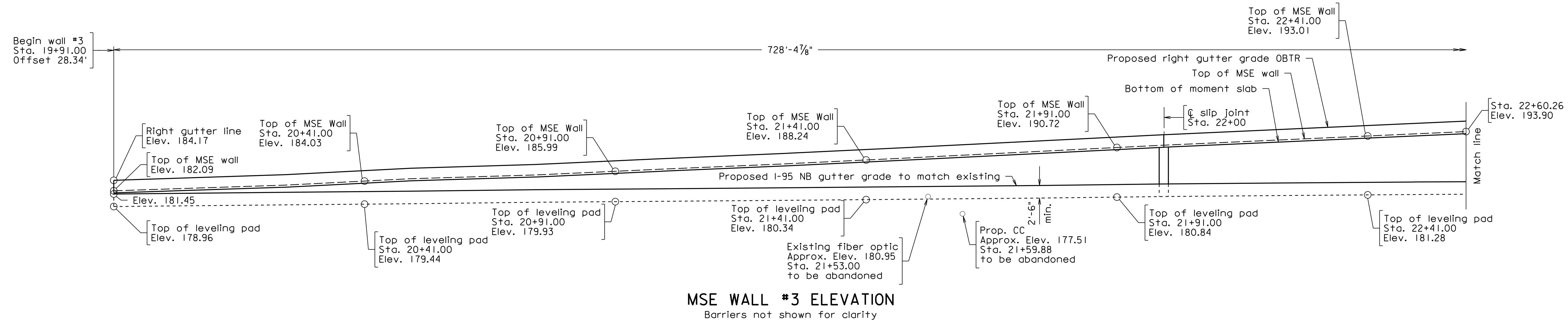
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION			
MSE WALL ELEVATIONS WALL 1			
No.	Description	Date	
Designed: WRA.....		Date	Plan No.
Drawn: WRA.....		Apr. 2022	257-38A
Checked: WRA.....			123 of 125

Scale: 3/32" = 1'-0" unless otherwise noted.

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VA.	PROJECT	ROUTE	NO.
		95	124
		0095-076-299, B688	



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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION	
MSE WALL ELEVATIONS WALL 3	
No.	Description
Revisions	
Designed: WRA.....	Date
Drawn: WRA.....	Apr. 2022
Checked: WRA.....	Plan No. 257-38A
	Sheet No. 124 of 125

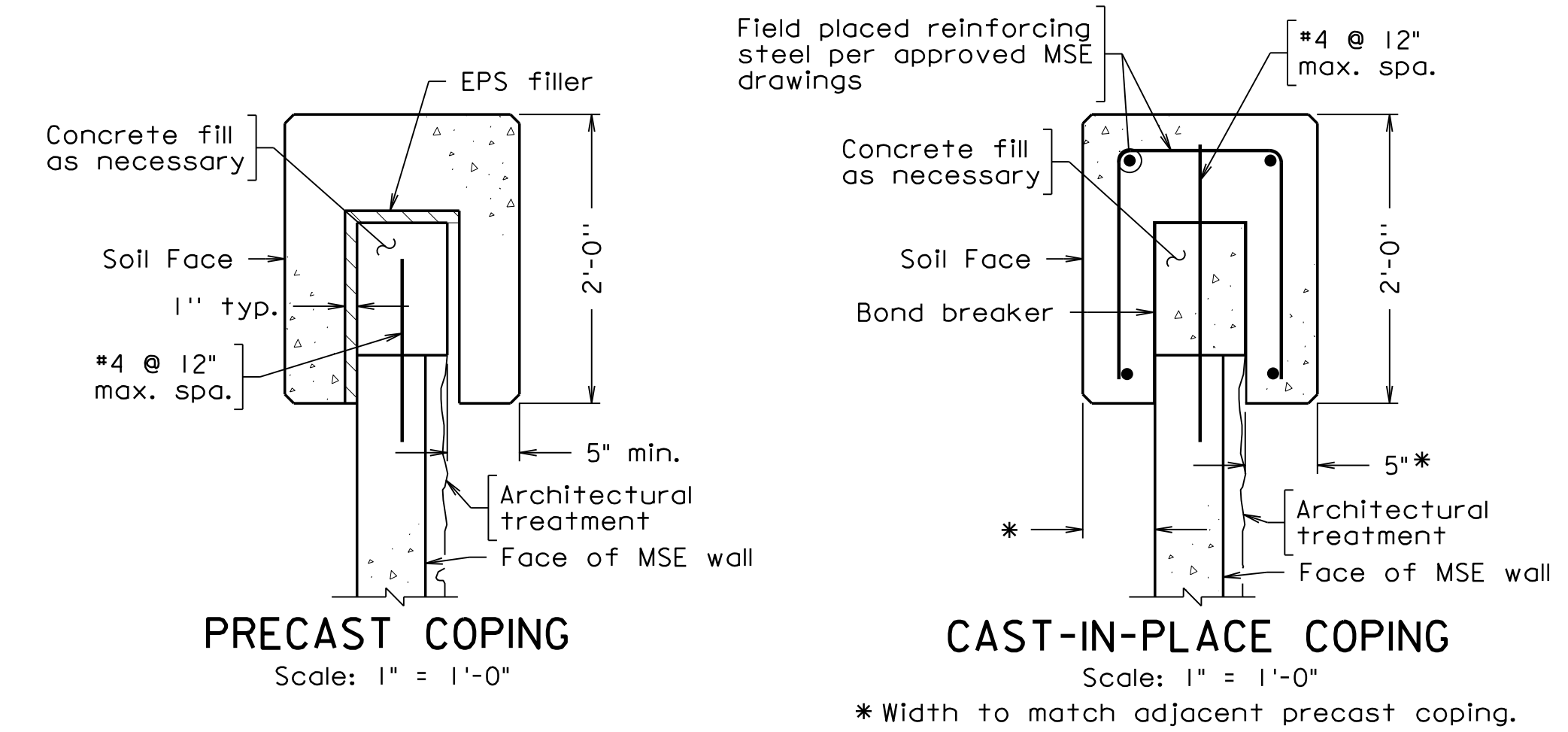
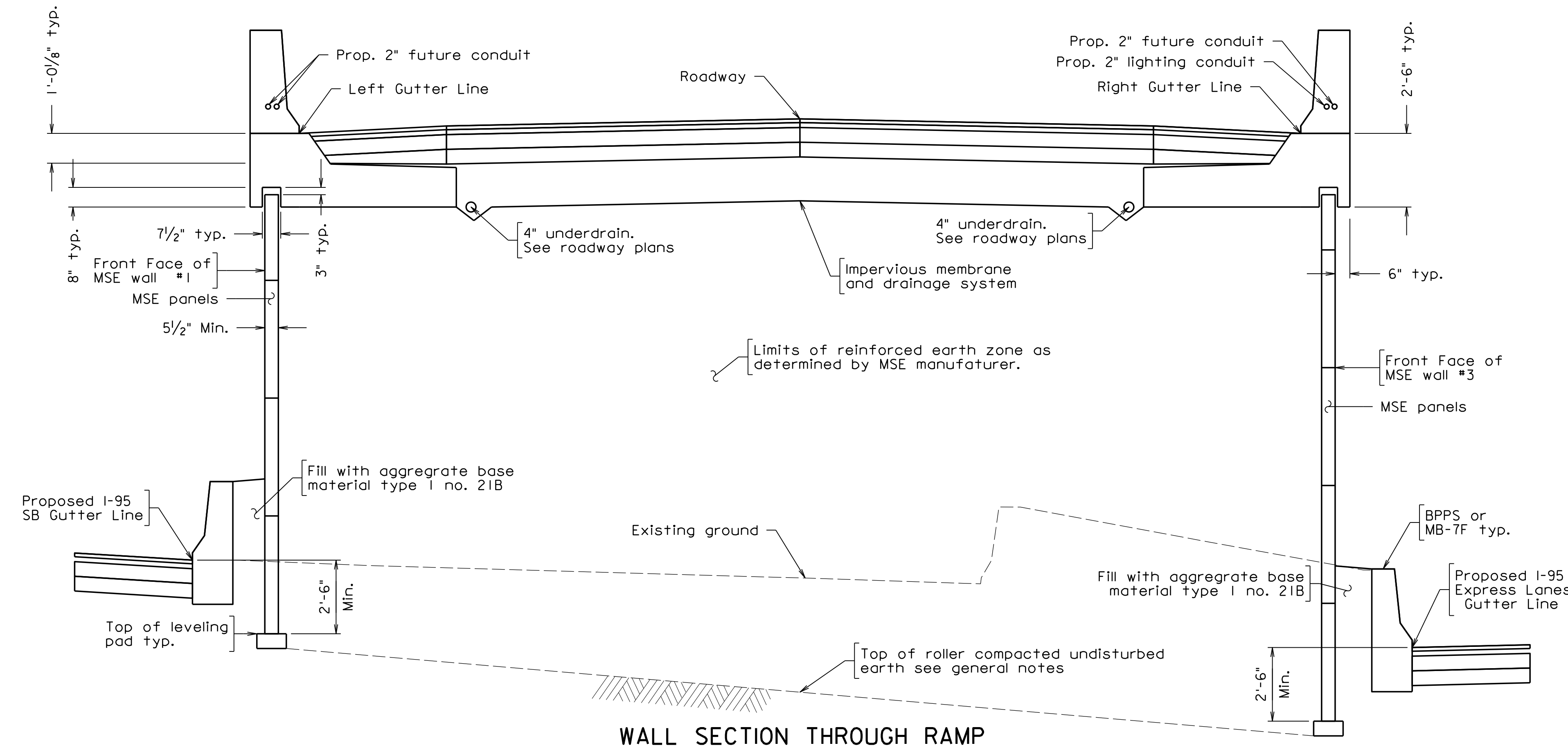
Scale: 3/32" = 1'-0" unless otherwise noted.

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ROUTE	PROJECT	ROUTE	PROJECT
VA.		95	0095-076-299, B688
			125

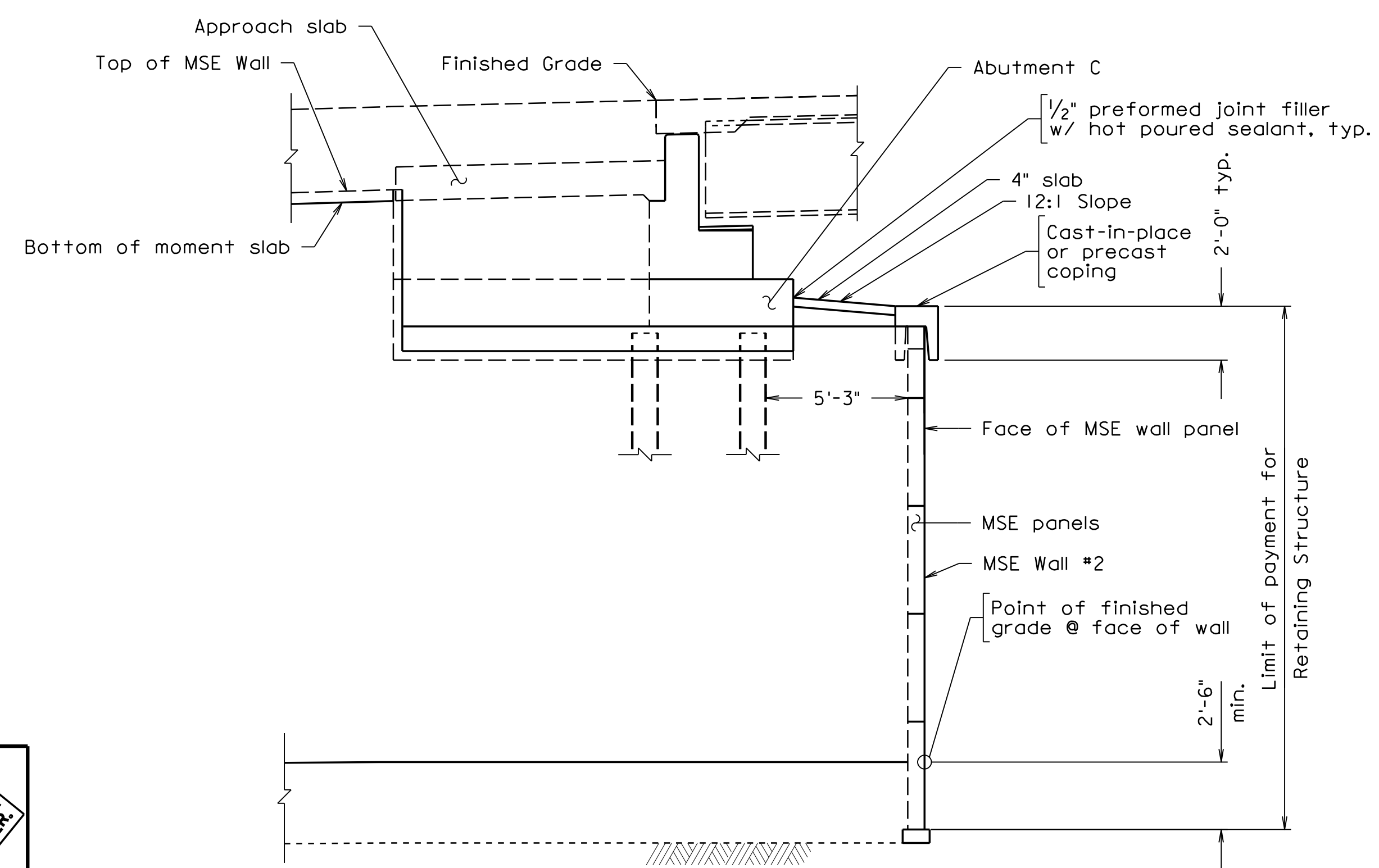
Notes:
For BPB-4 details, see sheet 85.



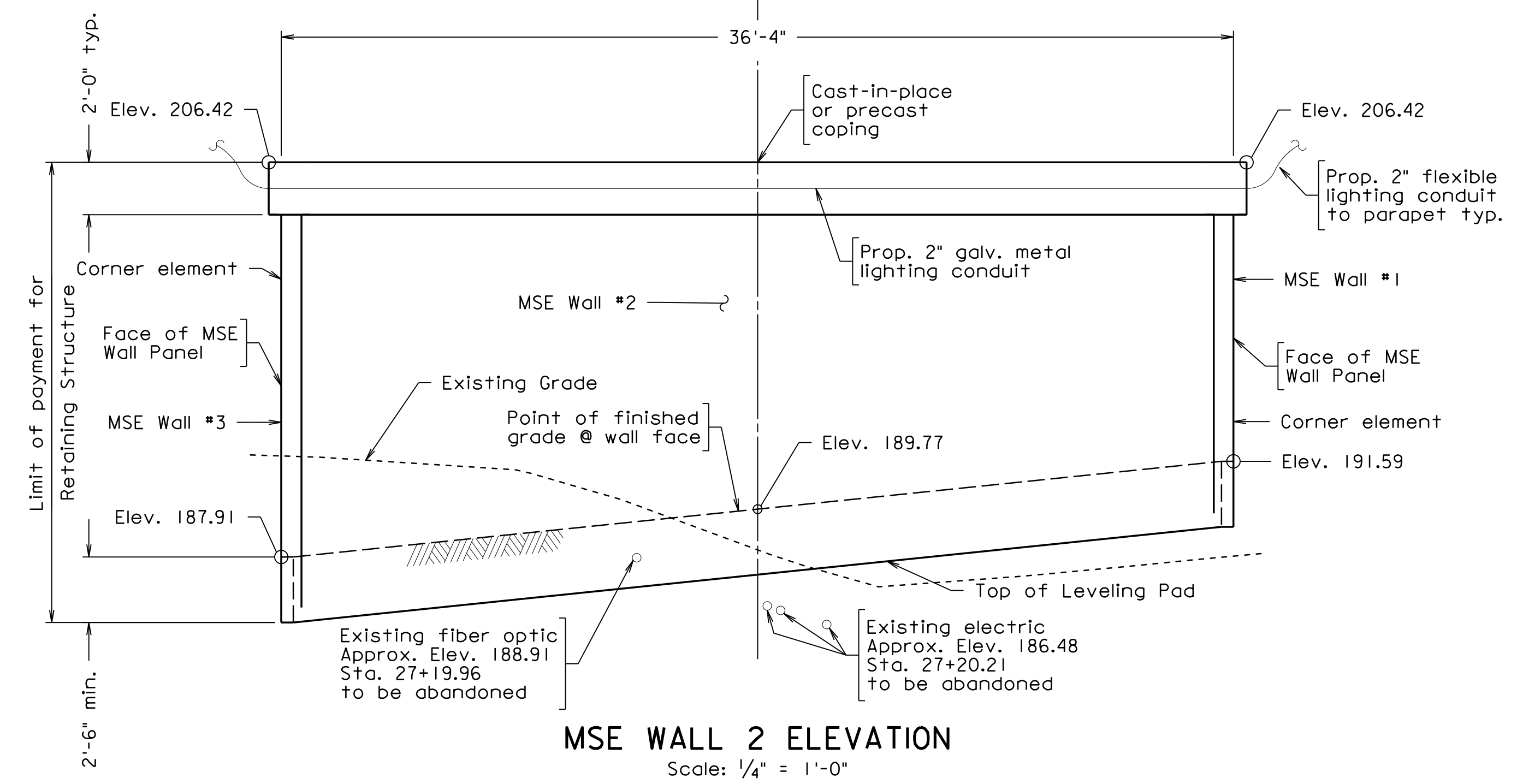
WALL SECTION THROUGH RAMP

PRECAST COPING
Scale: 1" = 1'-0"

CAST-IN-PLACE COPING
Scale: 1" = 1'-0"
* Width to match adjacent precast coping.



ABUTMENT WALL SECTION
Scale: 1/4" = 1'-0"



MSE WALL 2 ELEVATION
Scale: 1/4" = 1'-0"

257-38A_125.dgn

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Scale: 3/8" = 1'-0" unless otherwise noted.

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION STRUCTURE AND BRIDGE DIVISION			
MSE WALL ELEVATIONS WALL 2 AND SECTIONS			
No.	Description	Date	Designed: WRA..... Drawn: WRA..... Checked: WRA.....
	Revisions	Apr. 2022	Plan No. 257-38A Sheet No. 125 of 125

PROGRESS PRINT 4/1/2022

EXHIBIT B-3

GEOTECHNICAL REPORTS

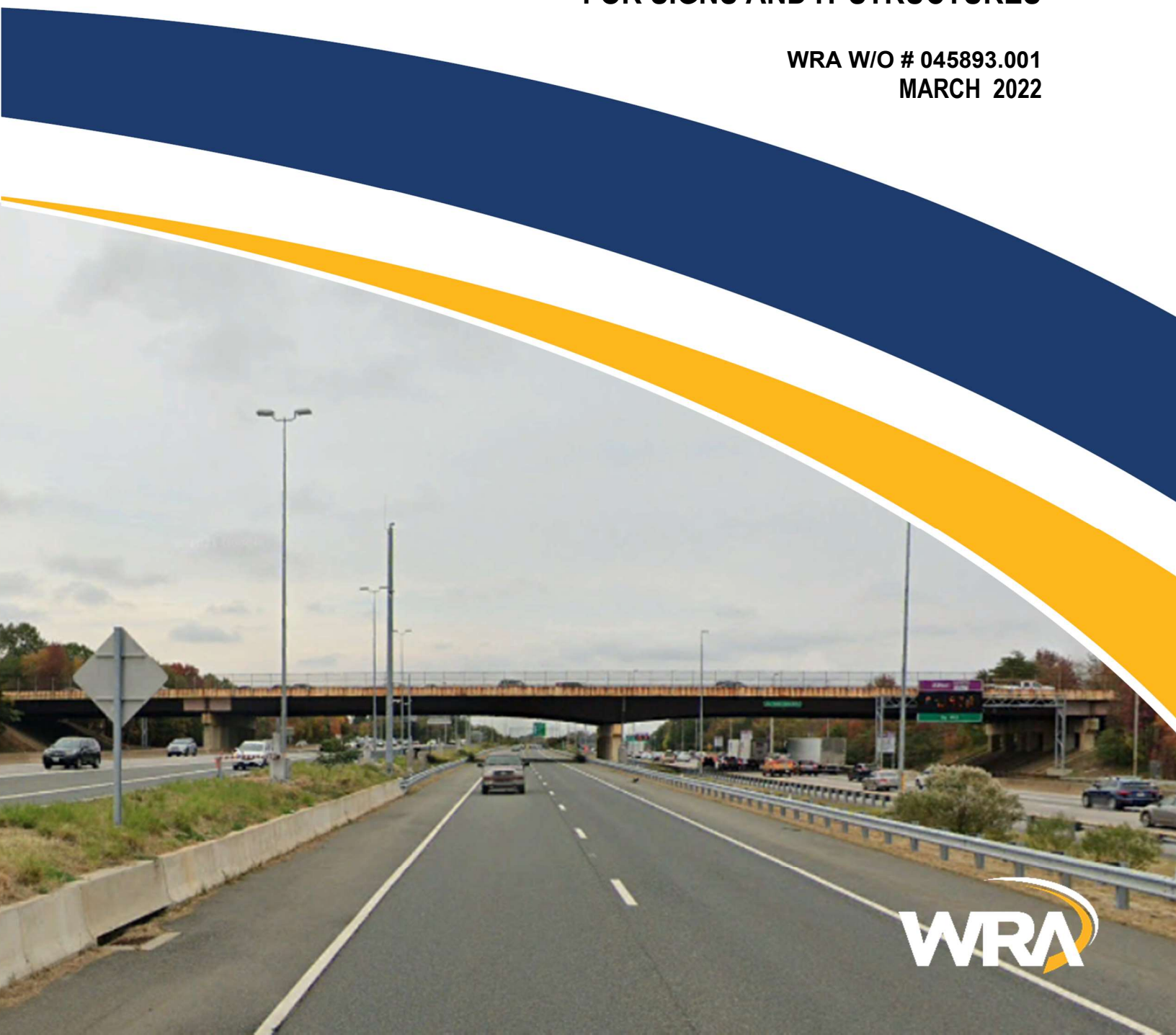


Interstate-95 Express Lanes
OPITZ BOULEVARD SIGNS & ITS
PRINCE WILLIAMS COUNTY, VIRGINIA
STATE PROJECT # 0095-076-299, P101, C501
UPC# 116663

GEOTECHNICAL DATA REPORT

FOR SIGNS AND IT STRUCTURES

WRA W/O # 045893.001
MARCH 2022



1. Introduction

The Interstate 95 reversible High Occupancy-Toll (HOT) facility is maintained and operated by Transurban in the median of interstate I-95. The facility stretches from south of Garrisonville Road in Stafford County to north of Edsall Road in Fairfax County.

Whitman, Requardt, and Associate, LLP. (WRA) was tasked to conduct a geotechnical investigation in the area of proposed Signs and IT structures located at various location along Opitz Blvd., I-95 Northbound and I-95 Southbound general-purpose lanes, and I-95 express lanes. The project area stretches from Cardinal Drive to north of Opitz Boulevard. The project is located in Woodbridge, Prince Williams County, Virginia. A site vicinity map is included in Appendix A.

2. Purpose and Scope

The purpose of this study was to determine the subsurface conditions in the vicinity of the proposed Signs and IT Structures to help in the design of foundations of the proposed signs and ITS. The scope of this study included drilling one soil test boring (per structure) to a depth of 25-feet or refusal in the vicinity of the proposed structures. Following completion of the field work, the scope of this task included conducting laboratory tests and prepare data report containing result of the field exploration and laboratory test results. Evaluations of those conditions and preparing recommendations with respect to the geotechnical aspect of the proposed structures were not within our authorized scope of services.

3. Field Investigation

A total of twenty-five (29) Standard Penetration Test (SPT) borings were drilled in the vicinity of the proposed Signs and ITS structure locations. At the locations where structures are in a proximity to each other, borings were combined, and one representative test boring was drilled at a median location. Boring I-11, proposed at the area of ITS structure on Opitz Blouvard was cancelled and substituted by boring B-A1-1 recently drilled during geotechnical investigation program for the proposed spot improvement project at Opitz Boulevard. Boring log of B-A1-1 is included in appendix B. The test boring location plan is included in Appendix A.

The test boring locations were staked by H&B Surveyors. The borings were drilled by Soil and Land Use Technology (SaLUT), Inc., from Glenburnie, Maryland, from December 2021 to February of 2022 using a truck mounted B57 Mobile drill rig equipped with automatic hammer with standard penetration testing (SPT). Full time inspection and logging of the soil borings soil borings was provided by WRA. Table 1 included in appendix B provides a summary of the boring designations, stations, ground surface elevations, depths, and groundwater observations. A description of the soils and conditions encountered at each test boring location is presented on the Boring Logs included in the Appendix B

The borings were advanced using hollow-stem augers and soil samples were recovered from the borings at 2.5 feet interval for the top 20 feet and at 5 feet intervals thereafter. The soil samples were recovered by driving a Standard Penetration Test 1 3/8-inch ID (2-inch OD) split-spoon sampler in accordance with ASTM D-1586 specifications. The sampler was first seated about 6 inches to penetrate through the loose cuttings and then driven an additional 1 foot with blows of a 140-pound automatic hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is typically designated as the Standard Penetration Resistance (N) value.

4. Laboratory Testing

Soil obtained from the sampling device were inspected and identified by the WRA Geotechnical Engineer per Unified Soil Classification System (USCS). A representative portion of each soil obtained from the sampling device were sealed in glass sample jars and transported to SaLUT soils testing laboratory. All the jar samples were assigned for their natural water contents testing, and selected soil samples were subjected to Atterberg limits and Grain size analysis to determine additional engineering properties of the existing on-site soils. These tests were performed in general accordance with applicable AASHTO procedures. The results of these tests are included in Appendix C.



APPENDIX A

Figures

APPENDIX A.1
Site Vicinity Map



APPENDIX A.2

Test Boring Location Plan

PROJECT MANAGER: Bimal Shab, P.E., (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP, (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc., (804) 550-7140, 07/07/2021

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	4

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

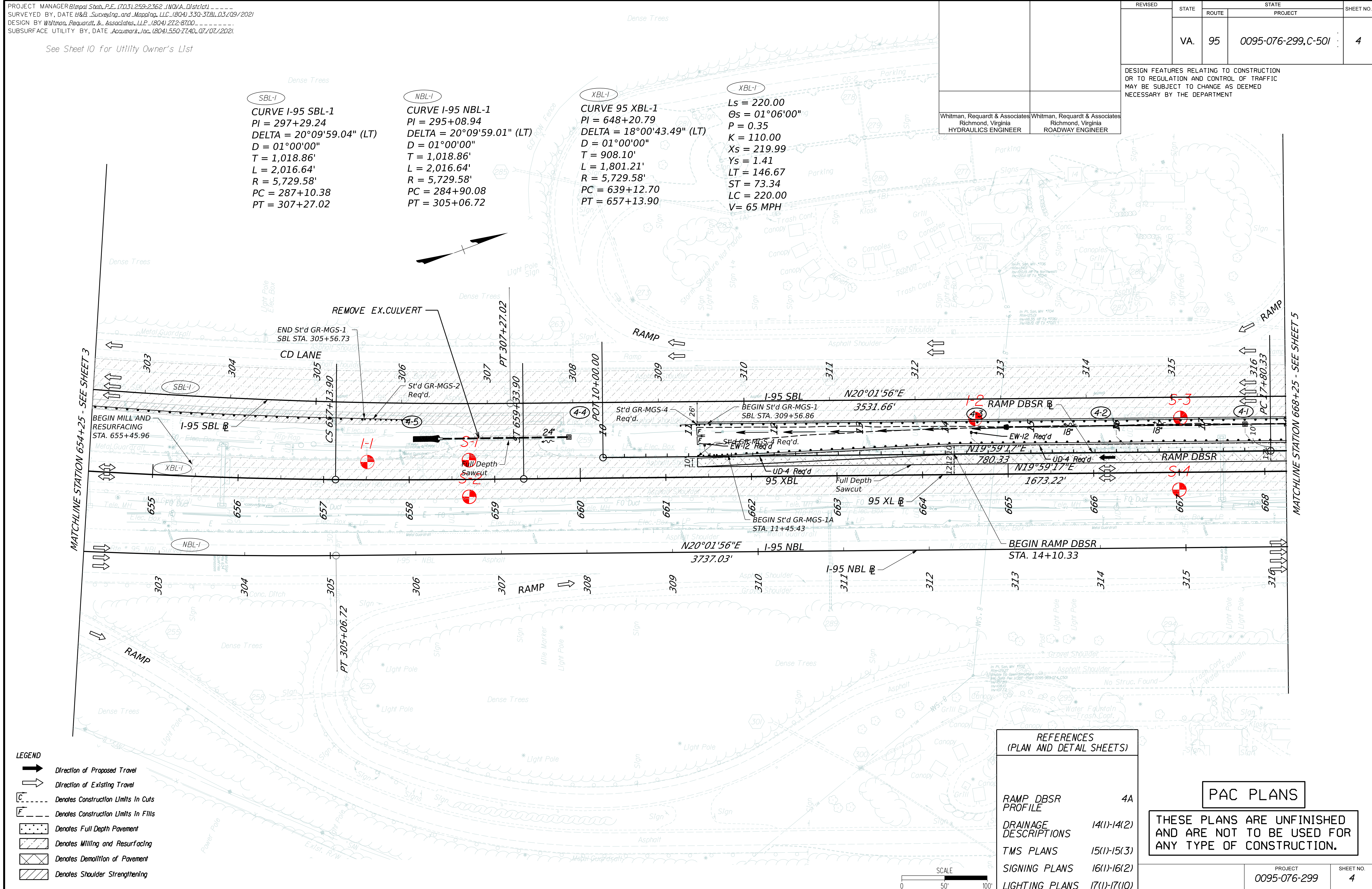
Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

SBL-1
 CURVE I-95 SBL-1
 PI = 297+29.24
 DELTA = 20°09'59.04" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 287+10.38
 PT = 307+27.02

NBL-1
 CURVE I-95 NBL-1
 PI = 295+08.94
 DELTA = 20°09'59.01" (LT)
 D = 01°00'00"
 T = 1,018.86'
 L = 2,016.64'
 R = 5,729.58'
 PC = 284+90.08
 PT = 305+06.72

XBL-1
 CURVE 95 XBL-1
 PI = 648+20.79
 DELTA = 18°00'43.49" (LT)
 D = 01°00'00"
 T = 908.10'
 L = 1,801.21'
 R = 5,729.58'
 PC = 639+12.70
 PT = 657+13.90

XBL-1
 Ls = 220.00
 Os = 01°06'00"
 P = 0.35
 K = 110.00
 Xs = 219.99
 Ys = 1.41
 LT = 146.67
 ST = 73.34
 LC = 220.00
 V = 65 MPH



MATCHLINE STATION 654+25 - SEE SHEET 3

MATCHLINE STATION 668+25 - SEE SHEET 5

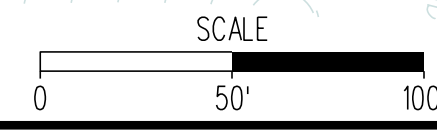
- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes Shoulder Strengthening

REFERENCES (PLAN AND DETAIL SHEETS)

RAMP DBSR PROFILE	4A
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(3)
SIGNING PLANS	16(1)-16(2)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

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PROJECT	SHEET NO.
0095-076-299	4

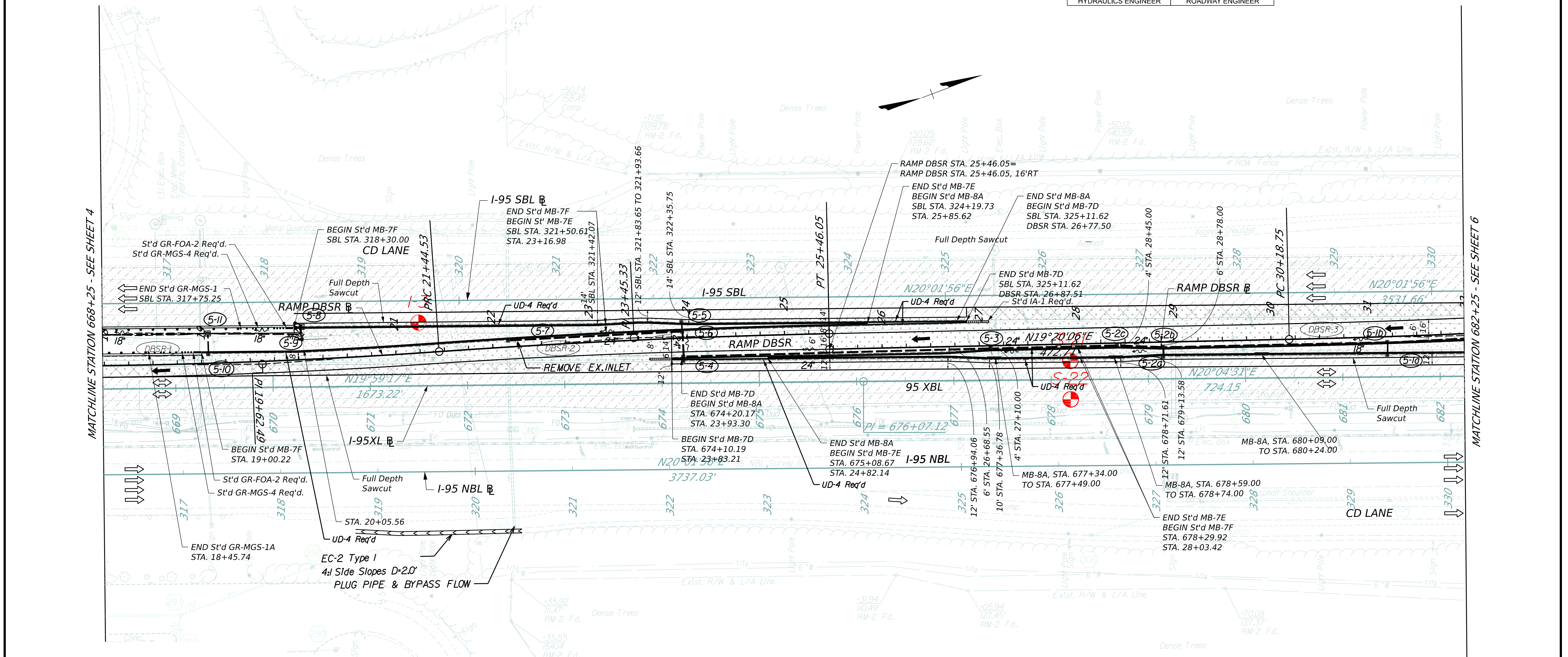
PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

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REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299,C-501	5

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Whitman, Requardt & Associates Richmond, Virginia HYDRAULICS ENGINEER	Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER
---	--



LEGEND	DBSR-1	DBSR-2	DBSR-3
Direction of Proposed Travel			
Direction of Existing Travel			
Denotes Construction Limits In Cuts			
Denotes Construction Limits In Fills			
Denotes Full Depth Pavement			
Denotes Milling and Resurfacing			
Denotes Demolition of Pavement			
Denotes 4" Concrete Cap			
	CURVE DBSR-1 PI = 19+62.49 DELTA = 03°28'13.10" (LT) D = 00°57'10" T = 182.15' L = 364.20' R = 6,013.00' PC = 17+80.33 PT = 21+44.53 e = 2.0% V = 50 MPH	CURVE DBSR-2 PI = 23+45.33 DELTA = 02°49'01.91" (RT) D = 00°42'06" T = 200.80' L = 401.52' R = 8,166.00' PC = 21+44.53 PT = 25+46.05 e = NC V = 50 MPH	CURVE DBSR-3 PI = 32+09.50 DELTA = 02°40'34.53" (LT) D = 00°42'06" T = 190.75' L = 381.43' R = 8,166.00' PC = 30+18.75 PT = 34+00.18 e = NC V = 50 MPH

REFERENCES (PLAN AND DETAIL SHEETS)	
RAMP DBSR PROFILE	5A
E&S PLAN	5B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(3)
SIGNING PLANS	16(1)-16(2)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



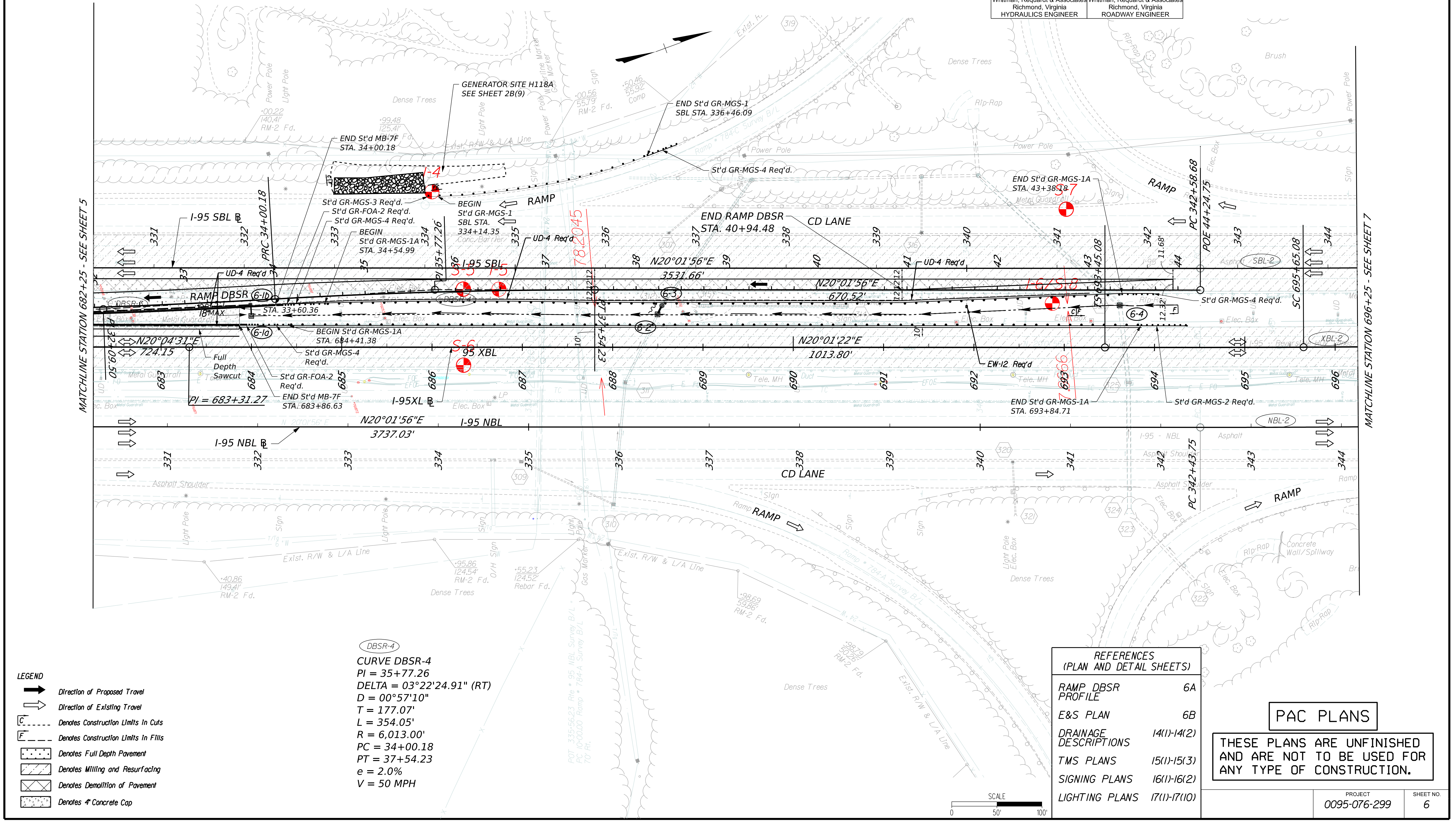
PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 (03/09/2021)
DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
SUBSURFACE UTILITY BY, DATE: Accumark, Inc. (804) 550-7140 (07/07/2021)

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299-C-501	6

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Whitman, Requardt & Associates Richmond, Virginia HYDRAULICS ENGINEER	Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER
---	--



LEGEND

- ➔ Direction of Proposed Travel
- ➔ Direction of Existing Travel
- Denotes Construction Limits in Cuts
- Denotes Construction Limits in Fills
- ▨ Denotes Full Depth Pavement
- ▨ Denotes Milling and Resurfacing
- ▨ Denotes Demolition of Pavement
- ▨ Denotes 4" Concrete Cap

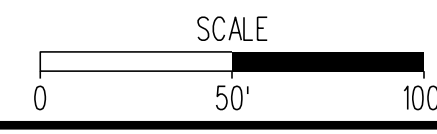
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 T = 177.07'
 L = 354.05'
 R = 6,013.00'
 PC = 34+00.18
 PT = 37+54.23
 e = 2.0%
 V = 50 MPH

REFERENCES (PLAN AND DETAIL SHEETS)

RAMP DBSR PROFILE	6A
E&S PLAN	6B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(3)
SIGNING PLANS	16(1)-16(2)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: *Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021*
 DESIGN BY: *Whitman, Requardt & Associates, LLP (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc. (804) 550-7740 07/07/2021*

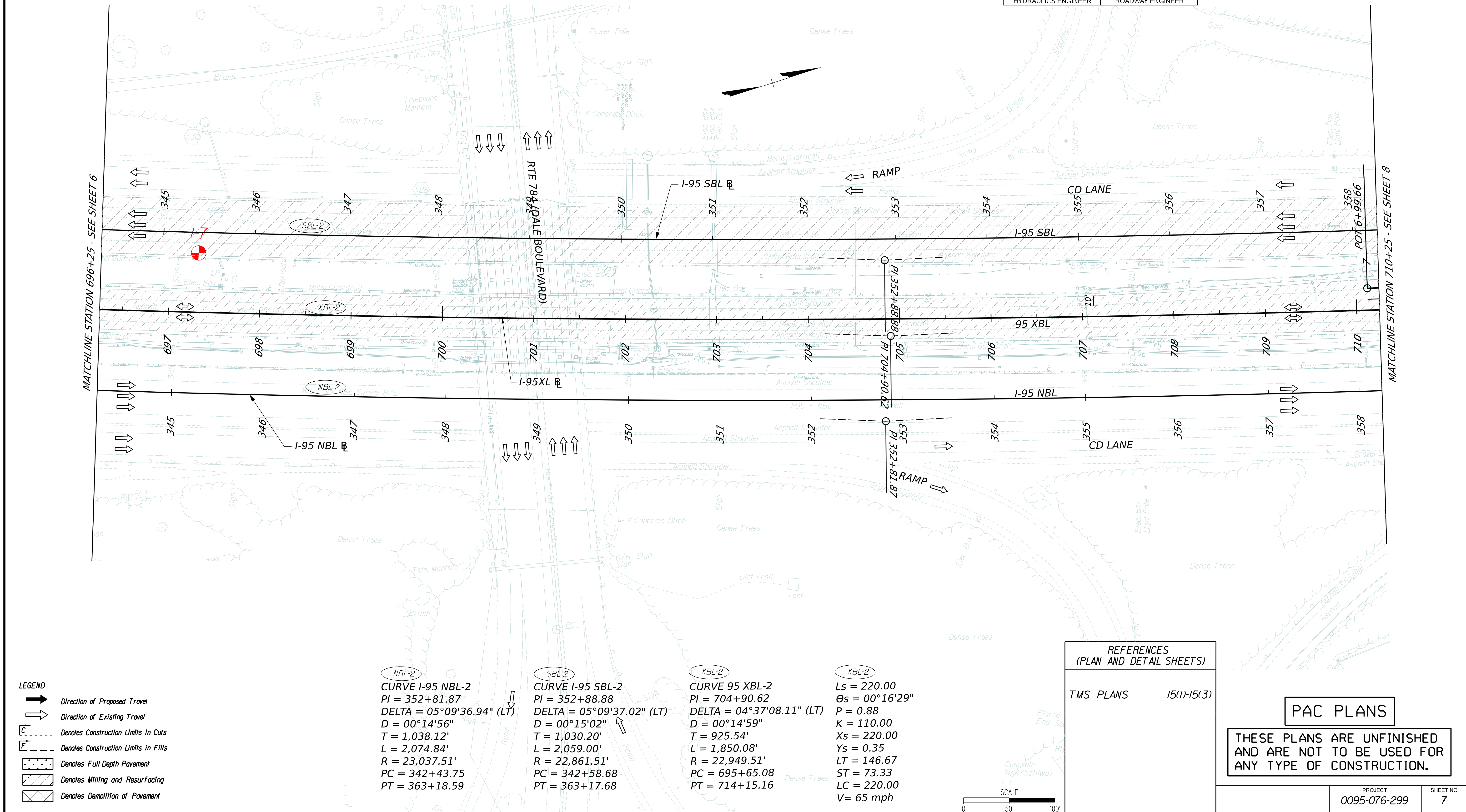
See Sheet 10 For Utility Owner's List

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	7

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

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Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement

NBL-2
 CURVE I-95 NBL-2
 PI = 352+81.87
 DELTA = 05°09'36.94" (LT)
 D = 00°14'56"
 T = 1,038.12'
 L = 2,074.84'
 R = 23,037.51'
 PC = 342+43.75
 PT = 363+18.59

SBL-2
 CURVE I-95 SBL-2
 PI = 352+88.88
 DELTA = 05°09'37.02" (LT)
 D = 00°15'02"
 T = 1,030.20'
 L = 2,059.00'
 R = 22,861.51'
 PC = 342+58.68
 PT = 363+17.68

XBL-2
 CURVE 95 XBL-2
 PI = 704+90.62
 DELTA = 04°37'08.11" (LT)
 D = 00°14'59"
 T = 925.54'
 L = 1,850.08'
 R = 22,949.51'
 PC = 695+65.08
 PT = 714+15.16

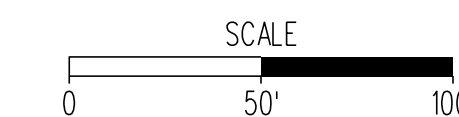
XBL-2
 Ls = 220.00
 Os = 00°16'29"
 P = 0.88
 K = 110.00
 Xs = 220.00
 Ys = 0.35
 LT = 146.67
 ST = 73.33
 LC = 220.00
 V = 65 mph

**REFERENCES
 (PLAN AND DETAIL SHEETS)**

TMS PLANS 15(1)-15(3)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: Bimol Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Reardon & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140 07/07/2021

See Sheet 10 for Utility Owner's List

003
 COMMONWEALTH OF VIRGINIA
 DEPARTMENT OF HIGHWAY
 DB 395 PG 225
 R/W FILE *819(PLAT)
 GPIN 8291-76-9471
 3,745 AC (CALC)

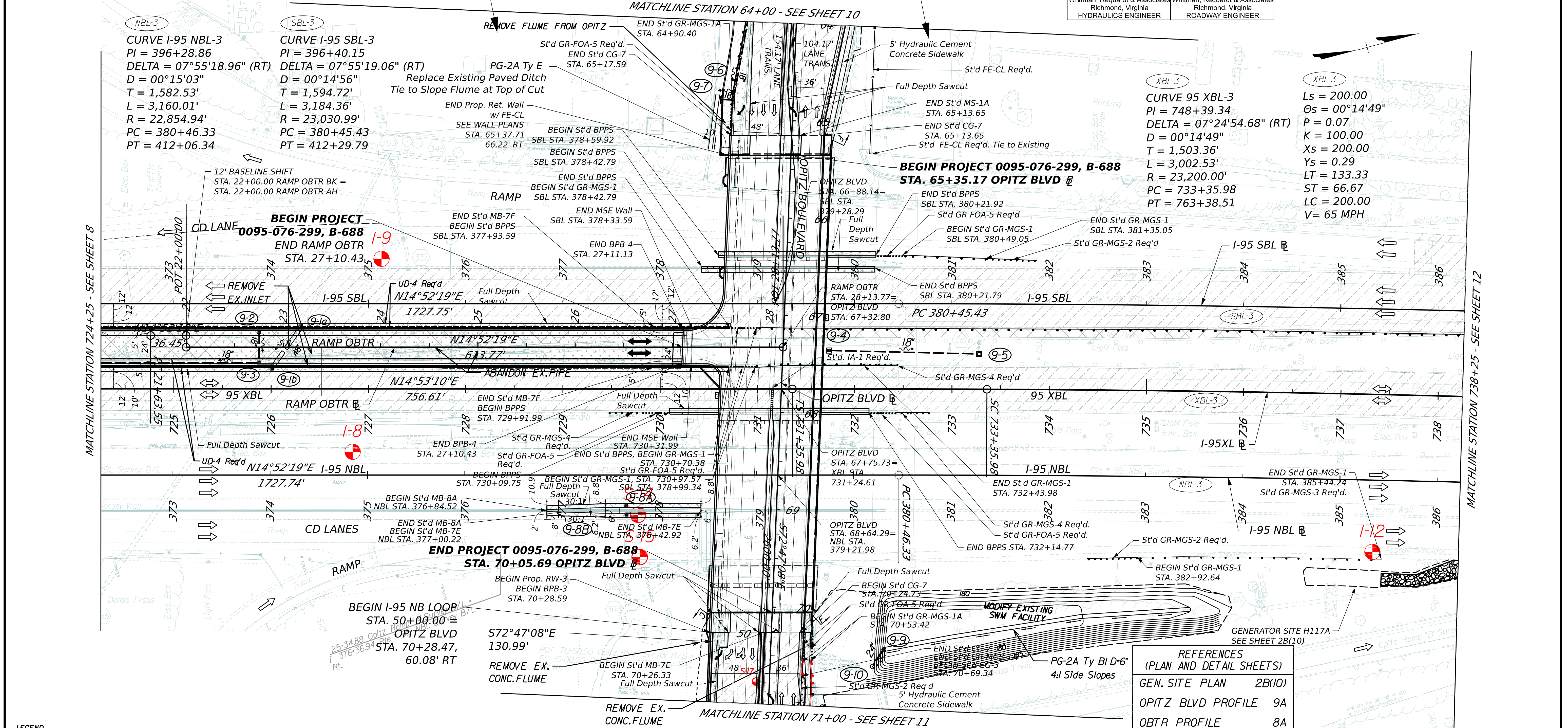
002
 COMMONWEALTH OF VIRGINIA
 DB 1250 PG 506
 HWY PB 9 PG 314
 NO GPIN ASSIGNED
 0.654 +/- AC (CALC)

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	9

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Reardon & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Reardon & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



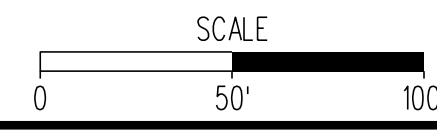
- LEGEND
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits in Cuts
 - Denotes Construction Limits in Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement
 - Denotes Shoulder Strengthening

REFERENCES (PLAN AND DETAIL SHEETS)

GEN. SITE PLAN	2B(10)
OPITZ BLVD PROFILE	9A
OBTR PROFILE	8A
E&S PLAN	9B
DETENTION BASIN MOD. DETAILS	9C
DRAINAGE DESC.	14(1)-14(2)
TMS PLANS	15(1)-15(3)
SIGNING PLANS	16(1)-16(2)
LIGHTING PLANS	17(1)-17(10)
SIGNAL PLANS	18(1)-18(4)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: Bimbal Shabb, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY: DATE H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY: DATE Accumark, Inc. (804) 550-7140 07/07/2021

See Sheet 10 for Utility Owner's List

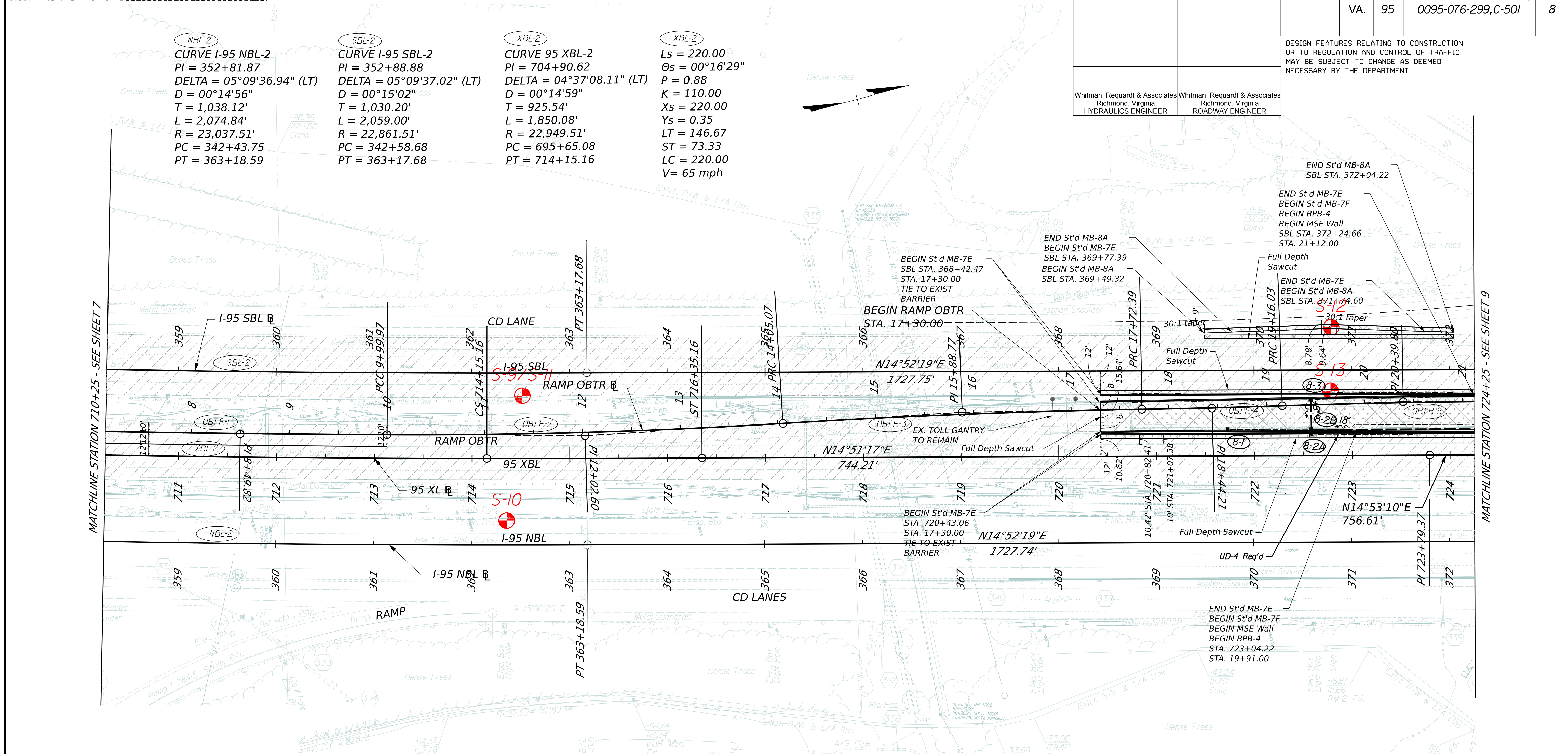
REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	8

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

<p>NBL-2 CURVE I-95 NBL-2 PI = 352+81.87 DELTA = 05°09'36.94" (LT) D = 00°14'56" T = 1,038.12' L = 2,074.84' R = 23,037.51' PC = 342+43.75 PT = 363+18.59</p>	<p>SBL-2 CURVE I-95 SBL-2 PI = 352+88.88 DELTA = 05°09'37.02" (LT) D = 00°15'02" T = 1,030.20' L = 2,059.00' R = 22,861.51' PC = 342+58.68 PT = 363+17.68</p>	<p>XBL-2 CURVE 95 XBL-2 PI = 704+90.62 DELTA = 04°37'08.11" (LT) D = 00°14'59" T = 925.54' L = 1,850.08' R = 22,949.51' PC = 695+65.08 PT = 714+15.16</p>	<p>XBL-2 Ls = 220.00' Os = 00°16'29" P = 0.88 K = 110.00 Xs = 220.00 Ys = 0.35 LT = 146.67 ST = 73.33 LC = 220.00 V = 65 mph</p>
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MATCHLINE STATION 710+25 - SEE SHEET 7

MATCHLINE STATION 724+25 - SEE SHEET 9

LEGEND

- Direction of Proposed Travel
- Direction of Existing Travel
- Denotes Construction Limits in Cuts
- Denotes Construction Limits in Fills
- Denotes Full Depth Pavement
- Denotes Milling and Resurfacing
- Denotes Demolition of Pavement

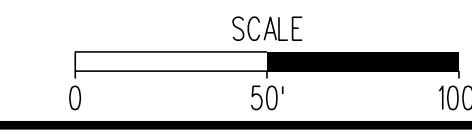
<p>OBTR-1 CURVE OBTR-1 PI = 8+49.82 DELTA = 00°45'01.98" (LT) D = 00°15'00" T = 150.16' L = 300.31' R = 22,925.51' PC = 6+99.66 PT = 9+99.97 e = NC V = 50 MPH</p>	<p>OBTR-2 CURVE OBTR-2 PI = 12+02.60 DELTA = 03°52'06.35" (LT) D = 00°57'18" T = 202.63' L = 405.10' R = 6,000.00' PC = 9+99.97 PT = 14+05.07 e = 2.00% V = 50 MPH</p>	<p>OBTR-3 CURVE OBTR-3 PI = 15+88.77 DELTA = 02°37'50.62" (RT) D = 00°42'59" T = 183.69' L = 367.32' R = 8,000.00' PC = 14+05.07 PT = 17+72.39 e = NC V = 50 MPH</p>	<p>OBTR-4 CURVE OBTR-4 PI = 18+44.21 DELTA = 01°00'35.16" (LT) D = 00°42'11" T = 71.82' L = 143.63' R = 8,150.00' PC = 17+72.39 PT = 19+16.03 e = NC V = 50 MPH</p>	<p>OBTR-5 CURVE OBTR-5 PI = 20+39.80 DELTA = 01°44'05.24" (RT) D = 00°42'03" T = 123.77' L = 247.52' R = 8,175.00' PC = 19+16.03 PT = 21+63.55 e = NC V = 50 MPH</p>
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REFERENCES (PLAN AND DETAIL SHEETS)

RAMP OBTR PROFILE	8A
E&S PLAN	8B
DRAINAGE DESCRIPTIONS	14(1)-14(2)
TMS PLANS	15(1)-15(3)
SIGNING PLANS	16(1)-16(2)
LIGHTING PLANS	17(1)-17(10)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	95	0095-076-299, C-501	12

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 HYDRAULICS ENGINEER

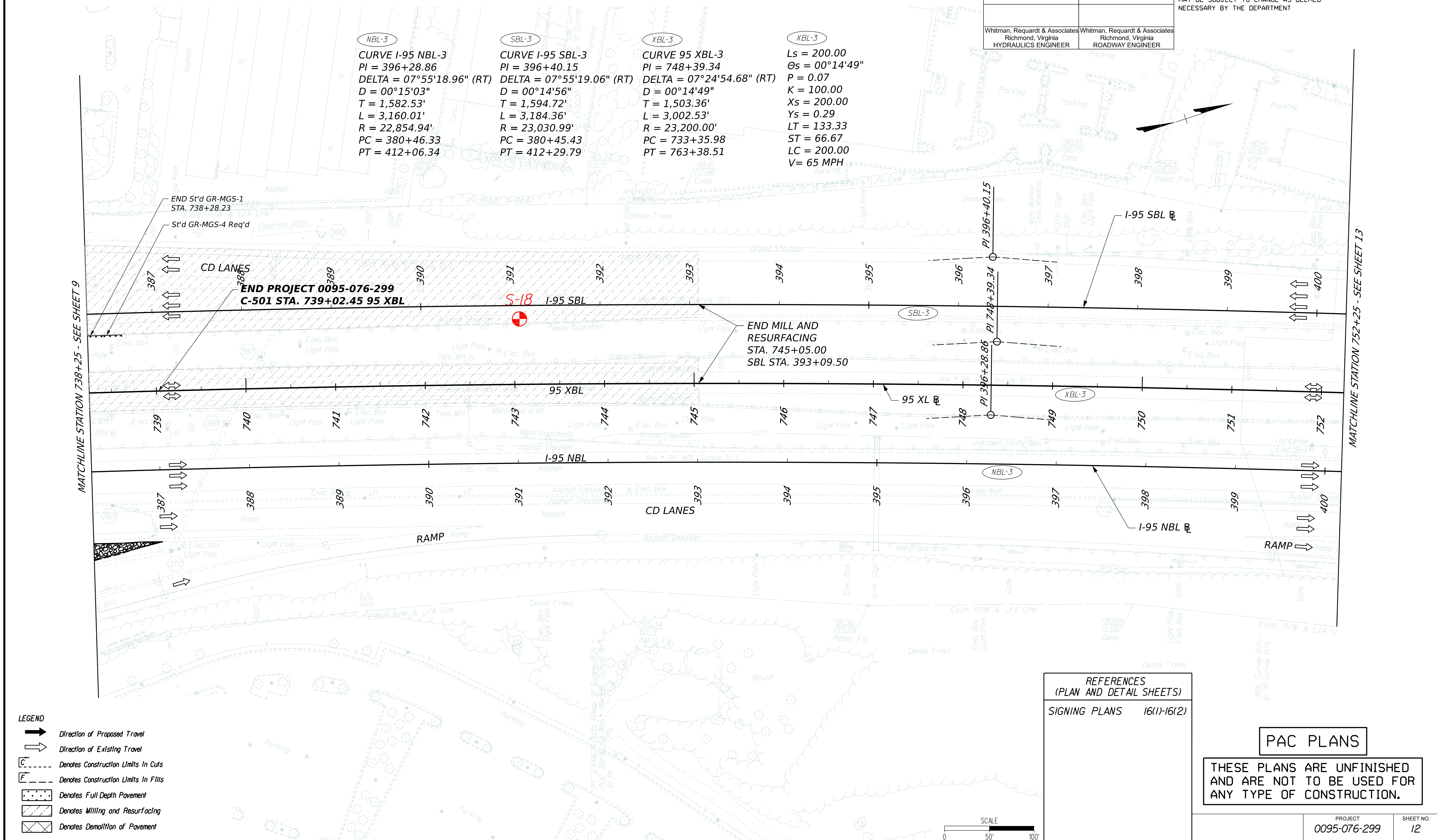
Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

NBL-3
 CURVE I-95 NBL-3
 PI = 396+28.86
 DELTA = 07°55'18.96" (RT)
 D = 00°15'03"
 T = 1,582.53'
 L = 3,160.01'
 R = 22,854.94'
 PC = 380+46.33
 PT = 412+06.34

SBL-3
 CURVE I-95 SBL-3
 PI = 396+40.15
 DELTA = 07°55'19.06" (RT)
 D = 00°14'56"
 T = 1,594.72'
 L = 3,184.36'
 R = 23,030.99'
 PC = 380+45.43
 PT = 412+29.79

XBL-3
 CURVE 95 XBL-3
 PI = 748+39.34
 DELTA = 07°24'54.68" (RT)
 D = 00°14'49"
 T = 1,503.36'
 L = 3,002.53'
 R = 23,200.00'
 PC = 733+35.98
 PT = 763+38.51

XBL-3
 Ls = 200.00
 Os = 00°14'49"
 P = 0.07
 K = 100.00
 Xs = 200.00
 Ys = 0.29
 LT = 133.33
 ST = 66.67
 LC = 200.00
 V = 65 MPH

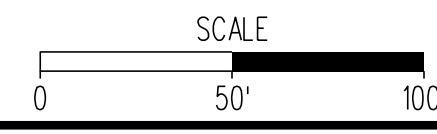


- LEGEND**
- Direction of Proposed Travel
 - Direction of Existing Travel
 - Denotes Construction Limits In Cuts
 - Denotes Construction Limits In Fills
 - Denotes Full Depth Pavement
 - Denotes Milling and Resurfacing
 - Denotes Demolition of Pavement

REFERENCES
 (PLAN AND DETAIL SHEETS)
 SIGNING PLANS 16(1)-16(2)

PAC PLANS

THESE PLANS ARE UNFINISHED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION.



PROJECT	SHEET NO.
0095-076-299	12

APPENDIX B

Subsurface Investigation Record

APPENDIX B-1

Test Boring Summary

Table 1: Summary of Test Borings

Boring ID	Coordinates		Roadway	Ground EL (ft.)	Drilled Depth (ft.)	Groundwater Depth		Cave-in Depth (ft.)	Date Drilled
	Northing (ft.)	Easing (ft.)				During drilling (ft.)	At Completion (ft.)		
S-1	348484.1	3624371.3	Express Lane	110	28.7	NE	DRY	19.8	2/16/2022
S-2	348471.9	3624412.9	Express Lane	110	28.7	12.5	23.5	28.0	2/16/2022
S-3	349283.1	3624619.1	I-95 GP	129	16.1	13.5	9.5	13.2	2/2/2022
S-4	349252.6	3624697.1	Express Lane	133	20.1	16.0	DRY	17.5	2/16/2022
S-5	351101.3	3625275.0	I-95 GP	167	30.0	18.5	18.5	21.3	1/31/2022
S-6	351074.3	3625351.7	Express Lane	169	30.0	26.0	24.0	26.2	2/15/2022
S-7	351756.8	3625425.4	I-95 GP	173	29.3	NE	26.4	27.2	2/7/2022
S-8/I-6	351706.9	3625517.6	Express Lane	173	30.0	17.0	23.8	27.2	2/14/2022
S-9/S-11	353768.4	3626160.8	I-95 GP	181	30.0	24.0	21.8	23.1	1/30/2022
S-10	353719.7	3626280.0	I-95 GP	177	30.0	19.0	17.8	21.5	2/10/2022
S-12	354583.1	3626310.1	I-95 GP	181	24.7	24.0	DRY	21.7	2/13/2022
S-13	354568.6	3626364.5	I-95 GP	182	30.0	NE	DRY	27.1	1/30/2022
S-14	355167.7	3626734.1	I-95 GP	181	29.3	17.6	14.3	14.3	2/9/2022
S-15	355156.9	3626774.2	I-95 GP	180	29.3	14.5	17.4	24.6	2/8/2022
S-16	355430.6	3626149.0	VDOT Yard	203	29.2	23.5	26.0	27.2	1/24/2022
S-17	355266.7	3626936.4	Opitz Blvd.	208	30.0	NE	DRY	27.3	1/25/2022
S-18	356525.7	3626909.5	I-95 GP	200	30.0	16.0	DRY	10.2	1/26/2022
S-21	350321.8	3625036.4	Express Lane	160	30.0	18.0	19.5	21.9	2/14/2022
S-22	350308.5	3625072.6	Express Lane	160	30.0	22.0	12.7	23.4	2/15/2022
I-1	348375.5	3624333.5	Express Lane	106	28.7	NE	DRY	28.2	2/17/2022
I-2	349058.3	3624536.0	I-95 GP	122	16.2	9.0	13.2	15.1	2/2/2022
I-3	349705.1	3624770.8	I-95 GP	140	30.0	19.5	19.7	23.8	2/1/2022
I-4	351103.4	3625167.0	I-95 GP	166	30.0	17.0	18.3	25.9	2/9/2022
I-5	351136.3	3625293.8	I-95 GP	168	30.0	16.0	16.6	24.4	1/31/2022
I-7	352130.0	3625653.3	I-95 GP	178	30.0	15.5	17.2	21.8	2/1/2022
I-8	354926.4	3626601.7	I-95 GP	179	30.0	14.0	25.5	27.5	2/10/2022
I-9	355008.4	3626410.6	I-95 GP	185	30.0	17.5	21.5	24.7	2/6/2022
I-10	355473.7	3626074.4	VDOT Yard	205	30.0	18.5	Dry	27.1	1/24/2022
I-12	355913.5	3626970.2	I-95 GP	186	30.0	17.0	Dry	24.6	2/13/2022
B-A1-1	355465.6	3626202.7	Opitz Blvd	110	15.0	NE	Dry		11/9/2022

APPENDIX B-2

Test Boring logs



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

S-1
 PAGE 1 OF 1

STATION: NORTHING: 348484.0748 ft SURFACE ELEVATION: 110.0 ft
 OFFSET: Easting: 3624371.2574 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/16/2022 - 2/16/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2	105	33	73	3.5				
4	105	40	73	5				
6	105	49	47	6				
8	105	50/2"	47	7.5				
10	100	50/5"	27	8.5				
12	100	33	53	10				
14	100	50/3"	53	11				
16	95	50/5"	333	12.5				
18	95	50/4"	27	13.5				
20	90	50/5"	27	15				
22	90	50/5"	27	16				
24	85	2	47	17.5				
26	85	50/4"	47	18.5				
28	85	50/2"	100	20				
				23.5				
				25				
				28.5				
				28.7				

0.0 / 110.0
 17" Asphalt **ASPH**
 1.4 / 108.6
 12" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**
 2.4 / 107.6
Residual, Gray, black, SILT derived from highly weathered Graphitic Schist, hard, moist to dry below 13.5ft. **ML**

Auger refusal at 28.7ft.
 Boring terminated at 28.7ft.

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 19.8ft. Dry at completion.

PAGE 1 OF 1

S-1

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT.gINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

S-2
PAGE 1 OF 1

STATION: NORTHING: 348471.9265 ft SURFACE ELEVATION: 110.0 ft
 OFFSET: EASTING: 3624412.8929 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/16/2022 - 2/16/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 12.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	110.0							
2	105	40	50/5"	60	3.5			
4	105	23	35	100	5			
6	105	36	36	100	6			
8	105	8	18	100	7.5			
10	100	27	27	100	8.5			
12	100	41	50/5"	60	10			
14	95	28	50/5"	60	11			
16	95	50/6"		33	12.5			
18	95	33		33	13.5			
20	90	50/5"		27	15			
22	90	27		27	16			
24	85	50/4"		20	17.5			
26	85	20		20	18.5			
28	85	50/2"		100	20			
					23.5			
					25			
					28.5			
					28.7			

0.0 / 110.0
 17" Asphalt **ASPH**
 1.4 / 108.6
 14" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**
 2.6 / 107.4
Residual, Gray, black, SILT derived from highly weathered Graphitic Schist, some lithified rock fragments, hard, dry to moist to wet below 23.5ft. **ML**

Auger refusal at 28.7ft.
 Boring terminated at 28.7ft.

SPT LOG: I-95 EXPRESS LANE - OPITZ BLVD SIGN AND IT BORINGS.GP-J-SPT7.GDT.gINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 28.0ft. Groundwater at completion 23.5ft.

PAGE 1 OF 1

S-2



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

S-3
 PAGE 1 OF 1

STATION: NORTHING: 349283.1224 ft SURFACE ELEVATION: 129.0 ft
 OFFSET: EASTING: 3624619.0786 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/2/2022 - 2/2/2022
 Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	129.0							
0.0 - 1.3								15" Asphalt ASPH
1.3 - 2.4								14" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
2.4 - 6.5								FILL, Brown, fine to medium CLAYEY SAND, trace Gravel, medium dense, moist SC
6.5 - 14.0								6.5 / 122.5 Brown, gray, fine to medium SILTY SAND, dense to medium dense, moist SM
14.0 - 16.1								14.0 / 115.0 Residual, Gray, black, highly weathered GRAPHITIC SCHIST ROCK FRAGMENTS, extremely dense, dry MST
16.1 - 16.1								Auger refusal at 16.1ft. Boring terminated at 16.1ft.

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 13.2ft. Groundwater at completion 9.5ft.

PAGE 1 OF 1

S-3



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

S-5
 PAGE 1 OF 1

STATION: OFFSET:
 NORTHING: 351101.2832 ft Easting: 3625275.036 ft
 SURFACE ELEVATION: 167.0 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/31/2022 - 1/31/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 18.5 ft DEPTH

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	167.0							0.0 / 167.0
2	165							15" Asphalt ASPH
4	164	4	87	3.5				1.3 / 165.7
6	163	4	87	5				16" <i>Subbase material</i> , Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
8	162	5	87	6				2.6 / 164.4
10	161	6	100	7.5				<i>FILL</i> , Brown, brown/gray, fine to medium CLAYEY SAND, loose to medium dense, moist SC
12	160	5	100	8.5				
14	159	6	100	10				
16	158	8	100	11				
18	157	12	100	12.5				13.5 / 153.5
20	156	10	100	13.5				Brown, gray, fine to medium SILTY SAND, medium dense, moist. Red coloring noted in sample #6, at 16-17.5'. SM
22	155	12	100	15				
24	154	13	100	16				
26	153	12	100	17.5				
28	152	44	100	20				
30	151	47	100	23.5				28.5 / 138.5
				25				<i>Residual</i> , Dark gray, hard SANDY SILT derived from decomposition of GRAPHITIC SCHIST ROCK, moist ML
				30				Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 21.3ft. Groundwater at completion 18.5ft.

PAGE 1 OF 1

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 351074.2587 ft SURFACE ELEVATION: 169.0 ft
OFFSET: Easting: 3625351.6978 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/15/2022 - 2/15/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 26.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	169.0							
2.0	167.6	3	87	X	3.5			
4.0	166.6	4	40	X	5			
6.0		7	7	X	6			
8.0	160.5	6	100	X	7.5			
10.0		6	10	X	8.5			
12.0	155.8	9	15	X	10			
14.0		8	10	X	11			
16.0	150.2	1	100	X	12.5			
18.0		3	100	X	13.5			
20.0	145.25	19	21	X	15			
22.0		50/2"	100	X	16			
24.0	140.15	25	36	X	17.5			
26.0		37	100	X	18.5			
28.0	130.24	15	24	X	20			
30.0		19	100	X	23.5			

0.0 / 169.0
 17" Asphalt **ASPH**

1.4 / 167.6
 12" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.4 / 166.6
 Brown, gray, fine to medium SILTY SAND, loose to medium dense, moist **SM**

11.0 / 158.0
 Brown, gray, fine to medium SILTY SAND, clay seam at multiple locations, none to trace Gravel, medium dense, moist **SM**

15.0 / 154.0
 Gray, brown, fine to medium SILTY SAND, trace Gravel, very loose, moist **SM**

18.5 / 150.5
Residual, Dark gray, fine to medium SILTY SAND, seam of white and dark gray sandy Silt at multiple locations, very dense to dense, moist. **SM**

Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 26.2ft. Groundwater at completion 24.0ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 351756.8326 ft SURFACE ELEVATION: 173.0 ft
OFFSET: Easting: 3625425.3792 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/7/2022 - 2/7/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	173.0							7" Asphalt ASPH
0.6	172.4	6	87	1.5				9" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
1.3	171.7	3	73	4				Brown, gray, fine to medium CLAYEY SAND, trace Gravel,, medium dense to loose, moist SC
7.0	166.0	3	100	8				Red, brown, fine to medium, SILTY SAND, loose, moist SM
9.0	164.0	3	87	9				Gray, SANDY CLAY, trace Gravel, medium stiff, moist CL
12.0	161.0	2	100	13				Red/brown, gray, fine to medium, CLAYEY SAND, trace Gravel, loose to very loose to medium dense, moist. SC
23.5	150	2	73	15.5				
29.0	144.0	4	67	23.5				Residual, Dark gray, SILT derived from decomposition of GRAPHITIC SCHIST, hard, moist ML
29.3	145	4	50/3"	28.5				Boring terminated at 29.3ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.2ft. Groundwater at completion 26.4ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

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STATION: NORTHING: 353768.3611 ft SURFACE ELEVATION: 181.0 ft
 OFFSET: EASTING: 3626160.827 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/30/2022 - 1/30/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta/D. Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	181.0							
2								
4	3	5	33		3.5			
6	175	3	67		6			
8								
10								
12	170	4	87		11			
14								
16	165	2	20		16			
18								
20								
22	160							
24		1	100		23.5			
26	155							
28								
30								

0.0 / 181.0
 17" Asphalt **ASPH**

1.4 / 179.6
 15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.7 / 178.3
 Gray, brown, SANDY LEAN CLAY, stiff to medium stiff, moist **CL**

9.0 / 172.0
 Brown, gray, fine to medium CLAYEY SAND, trace Gravel, loose, moist **SC**

23.5 / 157.5
 Gray, brown, fine to medium POORLY GRADED SAND, trace Clay, trace to none Gravel, very loose to loose, wet **SP**

Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 23.1ft. Groundwater at completion 21.8ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT.gINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 353719.7384 ft SURFACE ELEVATION: 177.0 ft
OFFSET: Easting: 3626280.0489 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 2/10/2022 - 2/10/2022	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: Daniel Case	GROUND WATER ▼ FIRST ENCOUNTERED AT 19.0 ft DEPTH	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION											
FIELD DESCRIPTION OF STRATA															LL	PI		
0.0	177.0																	
2	175																	
4	174	4	55		3.5													
6	173	5	55		5													
8	171	5	55		6													
10	170	6	80		7.5													
12	168	3	73		8.5													
14	167	3	73		10													
16	166	3	73		11													
18	165	3	73		12.5													
20	164	4	73		13.5													
22	163	3	73		15													
24	162	3	73		16													
26	161	5	100		17.5													
28	160	6	100		19.5													
30	159	3	20		21													
32	158	3	20		23.5													
34	157	4	20		25													
36	156	5	87		28.5													
38	155	13	100		30													
40	154	22	100															

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 21.5ft. Groundwater at completion 17.8ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 354583.0754 ft SURFACE ELEVATION: 181.0 ft
OFFSET: Easting: 3626310.0966 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 2/13/2022 - 2/13/2022	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: Daniel Case	GROUND WATER ▼ FIRST ENCOUNTERED AT 24.0 ft DEPTH	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION											
FIELD DESCRIPTION OF STRATA															LL	PI		
0.0	181.0																	
2	180.6	6	67	1.5														
4	179.6	6	87	4														
6	179.6	6	100	5.5														
8	175.0	7	100	6.5														
10	174.0	7	100	8														
12	172.0	7	100	9														
14	170.0	9	100	10.5														
16	168.9	9	100	11.5														
18	166.5	13	100	13														
20	165.5	9	100	14														
22	160.0	8	100	15.5														
24	160.0	15	100	16.5														
24.7	157.5	100	100	18														
24.9	157.5	100	100	19														

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT.gINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 21.7ft. Dry at completion.

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PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: OFFSET:
 NORTHING: 354568.6342 ft Easting: 3626364.4812 ft
 SURFACE ELEVATION: 182.0 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/30/2022 - 1/30/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta/D. Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2	180							
4	3	2	53	3.5				
6	3			5				
8	175	5	93	6				
10	4	5	100	7.5				
12	170	3	100	8.5				
14	WOH	4	100	10				
16	3	5	100	11				
18	165	7	100	12.5				
20	2	4	100	13.5				
22	160	7	100	15				
24	7	12	100	16				
26	155	7	100	17.5				
28	8	14	100	18.5				
30	22	22	100	20				
				23.5				
				25				
				28.5				
				30				

0.0 / 182.0
 17" Asphalt **ASPH**

1.4 / 180.6
 15" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.7 / 179.3
 FILL, Gray, brown, fine to medium SILTY SAND, very loose to medium dense to loose, moist **SM**

11.5 / 170.5
 Brown, fine to medium POORLY GRADED SAND WITH SILT, loose moist **SP-SM**

13.5 / 168.5
 Gray, LEAN CLAY, Sand seam, STIFF, moist **CL**

15.0 / 167.0
 Gray, brown, fine to medium POORLY GRADED SAND, trace Silt, medium dense, moist. layer of 3" thick SILT was noted between 24'-24.3' **SP**

28.5 / 153.5
 Brown, gray, CLAYEY SILT, trace Sand, lithified, hard, moist **ML**

Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.1ft. Dry at completion

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

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 PAGE 1 OF 1

STATION: NORTHING: 355167.6741 ft SURFACE ELEVATION: 181.0 ft
 OFFSET: EASTING: 3626734.0987 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/9/2022 - 2/9/2022
 Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 17.6 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
180	2	2	87	1.5				
2	3	3		3				
4	4	4	100	4				
6	175	2		5.5				
8	3	3	93	6.5				
10	2	3	100	8				
12	170	7		9				
14	2	7	60	10.5				
16	165	22		11.5				
18	2	6	87	13				
20	8	7	20	14				
22	160	7		15.5				
24	26	9	87	16.5				
26	155	7		18				
28	27	50/3"	87	19				
			100	20.5				
				23.5				
				25				
				28.5				
				29.3				

0.0 / 181.0
 6" Asphalt **ASPH**

0.5 / 180.5
 11" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

1.4 / 179.6
 FILL, Gray. brown, fine to medium CLAYEY SAND, loose, moist **SC**

4.5 / 176.5
 Red, brown, fine to medium SILTY SAND, Seam of gray clay with gravel at 7ft, loose, moist **SM**

11.5 / 169.5
 Brown to gray, fine SILTY SAND, seam of rock fragments at 15.5ft., medium dense, moist. **SM**

19.0 / 162.0
 Residual, Dark gray, SANDY SILT, stiff, moist **ML**

24.5 / 156.5
 Residual, Dark gray, SANDY SILT, some decomposed rock fragments, stiff, wet **ML**

28.5 / 152.5
 Residual, Dark gray, SANDY SILT, some decomposed rock fragments, hard, wet **ML**
 Boring terminated at 29.3ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 14.3ft. Dry at completion

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 355156.8782 ft SURFACE ELEVATION: 180.0 ft
OFFSET: Easting: 3626774.1596 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/8/2022 - 2/8/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 14.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0	180							
2	178	4	60	X	1.5			0.0 / 180.0 5" Asphalt ASPH
4	175	1	53	X	3			0.4 / 179.6 12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
6		2	87	X	4			1.4 / 178.6 Brown/gray, fine to medium CLAYEY SAND, loose, moist SC
8		2	100	X	5.5			5.0 / 175.0 Gray, SANDY SILT, soft, moist ML
10	170	2	87	X	6.5			6.7 / 173.3 Red, brown, fine to medium, SILTY SAND, loose to very loose to loose, moist SM
12		3	73	X	8			
14	165	2	67	X	9			
16		3	73	X	10.5			15.0 / 165.0 Brown, fine to medium, CLAYEY SAND, trace dark gray silt, loose, moist SC
18		5	100	X	11.5			16.5 / 163.5 Brown, gray, SANDY SILT, stiff, moist ML
20	160	4	87	X	13			20.0 / 160.0 Brown, fine to medium SILTY SAND, trace Gravel, loose, wet SM
22		3	100	X	14			
24	155	45	87	X	15.5			23.5 / 156.5 Residual, Gray, red/brown, SANDY SILT derived from decomposition of GRAPHITIC SCHIST, very hard, moist ML
26		15	100	X	16.5			
28	150	15	100	X	18			
30	150				19			Boring terminated at 29.3ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 24.6ft. Groundwater at completion 17.4ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J-SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 355430.6134 ft SURFACE ELEVATION: 203.0 ft
OFFSET: Easting: 3626149.0411 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/24/2022 - 1/24/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta/R. Bowls

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	203.0							
2.0	200.0	2	53	X				
4.0	198.0	2	93	X				
6.0	196.0	4	93	X				
8.0	194.0	2	100	X				
10.0	192.0	3	100	X				
12.0	190.0	9	100	X				
14.0	188.0	12	100	X				
16.0	186.0	10	100	X				
18.0	184.0	26	100	X				
20.0	182.0	16	100	X				
22.0	180.0	39	50/2"	X				
24.0	178.0	47	50/1"	X				
26.0	176.0							
28.0	174.0	50	50/1"	X				
29.2								

0.0 / 203.0
 4" Asphalt **ASPH**

0.3 / 202.7
 15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, loose, moist **CRA**

2.2 / 200.8
 FILL, Orange brown, LEAN CLAY, medium stiff, trace Sand, moist **CL**

6.0 / 197.0
 Gray, fine SILTY SAND, trace Gravel, trace elastic fine, loose, moist **SM**

7.0 / 196.0
 Possible fill, Brown, tan, SANDY LEAN CLAY, medium stiff, moist **CL**

11.0 / 192.0
 Red, brown, fine to medium SILTY SAND, medium dense to very dense, moist **SM**

14.5 / 188.5
 Residual, Light gray-black, SILT, trace decomposed rock fragments, moist to wet at 23.5ft. Seam of wet Clayey Silt was noted from 18' - 18.5'. **ML**

24.0 / 179.0
 Residual, Gray, black, highly weathered GRAPHITIC SCHIST ROCK FRAGMENTS, extremely dense, dry. **MST**

Boring terminated at 29.2ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.2ft. Groundwater at completion 26ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT.gINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 355266.7467 ft
 SURFACE ELEVATION: 208.0 ft
OFFSET: Easting: 3626936.4088 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/25/2022 - 1/25/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: R. Bowls

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	208.0							12" Asphalt ASPH
1.0	207.0	47	47	1.0				10" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, loose, moist CRA
1.9	206.1	33	33	1.9				FILL, Orange brown, fine to coarse, CLAYEY SAND, some Silt and gravel size rock fragments, loose, moist SC
7.5	200.5	100	100	7.5				Possible fill, Brown, SANDY LEAN CLAY, medium stiff, moist CL
10.0	198.0	100	100	10.0				Possible fill, Tan-brown, fine to coarse SILTY SAND, trace to some rock fragments, loose to medium dense, moist SM
12.0	195.0	100	100	12.0				encountered wood at 12ft.
18.5	190.0	100	100	18.5				
28.5	180.0	47	47	28.5				3" spoon was pushed to get a sample at 28.5'-30'. 2" split spoon didn't recovery sample
30.0								Boring terminated at 30ft.

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.3ft. Dry at completion

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT.gINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 356525.7328 ft SURFACE ELEVATION: 200.0 ft
OFFSET: Easting: 3626909.5415 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/26/2022 - 1/26/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: R. Bowls

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 16.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	200.0							0.0 / 200.0
0.0 - 1.2	198.8							15" Asphalt ASPH
1.2 - 2.5	197.5	6	80	2.5				15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, loose, moist CRA
2.5 - 16.0	195.0	7	100	6.5				Tan, brown, fine to medium SILTY SAND, medium dense, moist to wet below 16ft. SM
16.0 - 25.0	185.0	8	100	7.5				
25.0 - 28.0	175.0	19	100	25				25.0 / 175.0 Brown, orange, fine to coarse CLAYEY SAND, trace Silt, trace rock fragments, dense, wet SC
28.0 - 30.0	170.0	10	100	30				28.0 / 172.0 Brown-Gray, LEAN CLAY, hard, moist CL
30.0								Boring terminated at 30ft.

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT.gINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 10.2ft. Dry at completion

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PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: SIGN

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 PAGE 1 OF 1

STATION: NORTHING: 350321.785 ft
 SURFACE ELEVATION: 160.0 ft
 OFFSET: Easting: 3625036.384 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/14/2022 - 2/14/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 18.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
2	155	4	67	X	3.5			
4		5			5			
6		4	87	X	6			
8		4			7.5			
10	150	5	100	X	8.5			
12		7			10			
14		9	100	X	11			
16	145	10			12.5			
18		10	100	X	13.5			
20	140	11			15			
22		10	100	X	16			
24		14	100	X	17.5			
26	135	18			18.5			
28		11	100	X	20			
30	130	16			23.5			
					25			
					28.5			
					30			

0.0 / 160.0 17" Asphalt ASPH		
1.4 / 158.6 12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA		
2.4 / 157.6 Brown, fine to medium SILTY SAND, trace Gravel, loose, moist SM		
7.0 / 153.0 Gray, brown, fine CLAYEY SAND, loose moist SC		
8.5 / 151.5 Brown, gray, SANDY ELASTIC SILT, stiff, moist ML		
11.5 / 148.5 Gray, brown, fine to medium SILTY SAND, none to trace Gravel below 16ft., medium dense, moist. SM		
23.5 / 136.5 Residual, Gray, brown, SANDY SILT, hard to very stiff, moist ML		
Boring terminated at 30ft		

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 21.9ft. Groundwater at completion 19.5ft.

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PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: SIGN

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PAGE 1 OF 1

STATION: NORTHING: 350308.5313 ft SURFACE ELEVATION: 160.0 ft
OFFSET: Easting: 3625072.5539 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/15/2022 - 2/15/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 22.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	160.0							
2	158.6	6	100	X	3.5			17" Asphalt ASPH
4	155	5	100	X	5			13" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
6	153	6	100	X	6			2.5 / 157.5 Brown, gray, fine to medium SILTY SAND, trace Gravel, medium dense, moist SM
8	150	3	100	X	7.5			6.7 / 153.3 Gray, SANDY LEAN CLAY, stiff, moist CL
10	145	3	100	X	8.5			8.7 / 151.3 Gray, brown, fine to medium SILTY SAND, trace Gravel, loose, moist SM
12	140	4	100	X	10			11.1 / 148.9 Gray, brown, SANDY SILT, stiff, moist. ML
14	135	6	100	X	11			13.5 / 146.5 Gray-brown, fine to medium SILTY SAND, medium dense, moist SM
16	130	7	100	X	12.5			
18		8	100	X	15			
20		10	100	X	16			
22		7	100	X	17.5			
24		5	100	X	18.5			
26		4	100	X	20			
28		3	100	X	23.5			
30		4	100	X	25			23.5 / 136.5 Residual, Gray-brown to dark gray, SANDY SILT, stiff to very stiff, moist ML
30		12	100	X	28.5			Boring terminated at 30ft
30		13	100	X	30			

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 23.4ft. Groundwater at completion 12.7ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: IT

STATION: OFFSET:
 NORTHING: 348375.5208 ft Easting: 3624333.4883 ft
 SURFACE ELEVATION: 106.0 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/17/2022 - 1/17/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	105							
2	104.5							
4	103.5	8	87		3.5			
6	103.0	9	100		5			
8	102.5	10	100		6			
10	102.0	15	100		7.5			
12	101.5	22	100		8.5			
14	101.0	28	100		10			
16	100.5	31	87		11			
18	100.0	32	87		12.5			
20	99.5	20	60		13.5			
22	99.0	50/4"	27		15			
24	98.5	50/5"	20		16			
26	98.0	50/4"	20		17.5			
28	97.5	50/4"	20		18.5			
30	97.0	50/4"	20		20			
32	96.5	50/4"	23		23.5			
34	96.0	50/4"	53		25			
36	95.5	50/4"	100		28.5			
38	95.0	50/2"	100		28.7			

0.0 / 106.0
 18" Asphalt **ASPH**

1.5 / 104.5
 12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.5 / 103.5
 Dark gray, SANDY SILT, very stiff, dry **ML**

6.0 / 100.0
 Residual, Gray, black, SILT derived from highly weathered Graphitic Schist, trace Sand, very stiff to hard, moist. **ML**

Auger refusal at 28.7ft.
 Boring terminated at 28.7ft.

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 28.2ft. Dry at completion

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT.gINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: IT

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 PAGE 1 OF 1

STATION: NORTHING: 349058.3417 ft
 SURFACE ELEVATION: 122.0 ft
 OFFSET: Easting: 3624535.9808 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/2/2022 - 2/2/2022
 Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 9.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2	120							
4	118	12	100	3.5				
6	117	13	100	6				
8	115	27	100	7.5				
10	113	43	100	8.5				
11	112	33	100	10				
12	110	9	100	11				
14	108	16	100	12.5				
16	106	17	100	13.5				
18	104	9	100	15				
20	102	17	100	16.2				
22	100	44	100					
24	98	50/2"	100					

0.0 / 122.0
 17" Asphalt **ASPH**

1.4 / 120.6
 13" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.5 / 119.5
FILL, Brown, gray, fine to medium SILTY SAND, trace Gravel, medium dense, moist **SM**

6.0 / 116.0
Residual, Gray, fine SILTY SAND, trace decomposed rock fragments, very dense to dense to very dense, moist **SM**

Auger refusal at 16.2ft.
 Boring terminated at 16.2ft.

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 15.1ft. Groundwater at completion 13.2ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT.gINT_ version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: IT

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 PAGE 1 OF 1

STATION: NORTHING: 349705.1095 ft SURFACE ELEVATION: 140.0 ft
 OFFSET: EASTING: 3624770.7962 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/2/2022 - 2/2/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
2								
4	135	4	5	100	3.5			
6		3	5	100	6			
8			5	100	7.5			
10	130	3	5	100	8.5			
12			4	100	11			
14	125	2	4	100	12.5			
16			4	100	13.5			
18			6	100	15			
20	120	3	6	100	16			
22			7	100	17.5			
24		9	21	100	18.5			
26	115		16	100	20			
28				100	23.5			
30	110	20	21	100	25			
			29	100	28.5			
					30			

0.0 / 140.0
 15" Asphalt **ASPH**

1.4 / 138.6
 15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.5 / 137.5
 FILL, Brown, gray, fine to medium SILTY SAND, loose, moist **SM**

8.5 / 131.5
 Brown, gray, fine to medium, SILTY SAND, medium dense to loose to medium dense, moist to wet below 19.5' **SM**

23.5 / 116.5
 Red, dark brown, fine to medium, CLAYEY SAND, dense, moist **SC**

Boring terminated at 30ft

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT.gINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 23.8ft. Groundwater at completion 19.7ft.

PAGE 1 OF 1
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PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: IT

I-5
PAGE 1 OF 1

STATION: NORTHING: 351136.2611 ft
 SURFACE ELEVATION: 168.0 ft
OFFSET: Easting: 3625293.8104 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/31/2022 - 1/31/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 16.0 ft DEPTH

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	
0.0	168.0							
1.4	166.6							
2.5	165.5							
5.5	162.5							
16.0	160.0							
16.5	155.5							
16.6	151.5							
24.2	143.8							
28.5	140.0							
30.0	138.0							

0.0 / 168.0
 15" Asphalt **ASPH**

1.4 / 166.6
 15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.5 / 165.5
 FILL, Brown, fine to medium SAND, medium dense, moist **SP**

5.5 / 162.5
 Brown, fine to medium, SILTY SAND, seam of gray Clay seam at 11ft., loose to medium dense, moist. **SM**

16.5 / 151.5
 Dark brown, mottled, medium stiff, SANDY CLAY, wet **SC**

24.2 / 143.8
 Residual, Dark gray, SANDY SILT, hard, moist **ML**

Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 24.4ft. Groundwater at completion 16.6ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: IT

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PAGE 1 OF 1

STATION: NORTHING: 352129.9655 ft
 SURFACE ELEVATION: 178.0 ft
OFFSET: Easting: 3625653.3351 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/2/2022 - 2/2/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.5 ft DEPTH

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	178.0							0.0 / 178.0
2.0								12" Asphalt ASPH
4.0	175.0	3	100	3.5				1.0 / 177.0
6.0		2	87	5				15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist CRA
8.0	170.0	2	100	6				2.2 / 175.8
10.0		3	100	7.5				FILL, Brown, fine to medium CLAYEY SAND, loose to very loose to loose, moist SC
12.0		2	100	8.5				
14.0	165.0	1	100	10				
16.0		2	100	11				
18.0	160.0	1	100	12.5				
20.0		1	100	13.5				
22.0	155.0	2	100	15				14.0 / 164.0
24.0		2	100	16				Brown, gray, fine to medium, SILTY SAND, loose, moist SM
26.0		2	100	17.5				
28.0	150.0	3	100	18.5				
30.0		6	100	20				18.5 / 159.5
				22				Brown, red, very soft, SANDY CLAY, wet CL
				23.5				
				25				
				28.5				22.0 / 156.0
				30				Brown, gray, fine to medium POORLY GRADED SAND, trace Clay, very loose, wet SP-SC
								28.5 / 149.5
								Brown, gray, fine to medium CLAYEY SAND, loose, wet SC
								Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 21.8ft. Groundwater at completion 17.2ft.

PAGE 1 OF 1

SPT_LOG-I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: IT

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 PAGE 1 OF 1

STATION: NORTHING: 354926.3632 ft SURFACE ELEVATION: 179.0 ft
 OFFSET: EASTING: 3626601.6726 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/10/2022 - 2/10/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 14.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2								
4	175	6	27	3.5				
6	3	6	100	5				
8		8	100	6				
10	170	8	100	7.5				
12		6	87	8.5				
14	165	14	100	10				
16	7	17	73	11				
18		22	73	12.5				
20	160	7	100	13.5				
22		22	50/1"	15				
24	155	50/3"	73	16				
26				17.5				
28	150	15	73	19.5				
30		17	19	21				

0.0 / 179.0
 17" Asphalt **ASPH**

1.4 / 177.6
 15" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

2.6 / 176.4
 Possible fill, Brown, fine to medium SILTY SAND, medium dense, moist **SM**

8.5 / 170.5
 Brown, fine to medium SILTY SAND, trace gravel, medium dense to loose to medium dense, moist **SM**

16.5 / 162.5
 Residual, Dark gray, SILT, hard, moist to wet below 20ft. Some decomposed rock fragments is noted below 25ft. **ML**

Boring terminated at 30ft

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.5ft. Groundwater at completion 25.5ft.

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PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: IT

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PAGE 1 OF 1

STATION: NORTHING: 355008.3844 ft SURFACE ELEVATION: 185.0 ft
OFFSET: Easting: 3626410.6391 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/6/2022 - 2/6/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 17.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	185.0							
0.4	184.6							
1.4	183.6							
6.5	178.5							
12.0	173.0							
16.5	168.5							
24.0	161.0							
28.5								
30.0	155.0							

0.0 / 185.0
 5" Asphalt **ASPH**

0.4 / 184.6
 12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, moist **CRA**

1.4 / 183.6
 FILL, Brown, gray, fine to medium CLAYEY SAND, medium dense to loose, moist **SC**

6.5 / 178.5
 Gray, brown, fine to medium, CLAYEY SAND, loose, moist **SC**

12.0 / 173.0
 Dark brown, SANDY CLAY, medium stiff to stiff, moist **CL**

16.5 / 168.5
 Dark brown, brown, fine to medium, CLAYEY SAND, trace gravel, loose to medium dense, moist to wet below 17.5ft. **SC**

24.0 / 161.0
 Residual, Gray, SILT, hard, moist **ML**

Boring terminated at 30ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 24.7ft. Groundwater at completion 21.5ft.

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SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: IT

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PAGE 1 OF 1

STATION: NORTHING: 355473.7156 ft
OFFSET: Easting: 3626074.3805 ft
SURFACE ELEVATION: 205.0 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 1/24/2022 - 1/24/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta/R. Bowls

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 18.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
1	204.8	6	100	1.5				
2	204.8							
4	200	WOH WOH	40	3.5				
6	2	2	40	6				
8		WOH WOH	100	8.5				
10	195	2	100	10				
12	15	3	100	11.5				
14	8	18	100	13				
16	190	12	100	15				
18	20	49 50/5"	93	16				
20	185	35 50/4"	93	17.5				
22				18.5				
24	15	28	100	20				
26	180	50		23.5				
28				25				
30	175	13 29 50/4"	93	28.5				
30				30				

0.0 / 205.0
 2" Topsoil **TOPS**

0.2 / 204.8
 FILL, Brown, orange, SANDY CLAY, some gravel aggregate base material, medium stiff, moist **CL**

0.8 / 204.2
 FILL, Gray, fine to coarse CLAYEY, SILTY SAND, medium dense to very loose, moist **SC-SM**

6.0 / 199.0
 POSSIBLE FILL, Brown, orange, LEAN CLAY, trace to some Sand, soft to very soft to stiff, moist **CL**

12.0 / 193.0
 Brown, gray, red, SILT, trace Sand, hard, dry **ML**

16.0 / 189.0
 Residual, Light gray, black, SILT derived from highly weathered Graphitic Schist, some lithified rock fragments, dry. Water noted in sample #9 at 18.5ft **ML**

Boring terminated at 30ft

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GP-J.SPT7.GDT.gINT_version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 27.1ft. Dry at completion

PAGE 1 OF 1

I-10



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A1-1
 PAGE 1 OF 1

STATION: 63+25
 NORTHING: 355465.6391 ft
 SURFACE ELEVATION: 212.5 ft
 OFFSET: 41 RT
 Easting: 3626202.7403 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	LAB DATA				
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)	
								Date(s) Drilled: 11/9/2021 - 11/9/2021					
								Drilling Method(s): HSA					
								SPT Method: Automatic Hammer					
								Other Test(s):					
								Driller: SaLUT, Inc.					
								Logger: J. Yadeta					
								GROUND WATER					
								NOT ENCOUNTERED DURING DRILLING					
								FIELD DESCRIPTION OF STRATA					
2	210	8	4	33	1.5			0.0 / 212.5 12" Asphalt ASPH					
4		2	3	0	3.5			1.0 / 211.5 4" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CRA			8.3		
6		2	2	100	6			1.33 / 211.17 Fill, Tan-gray, FAT CLAY WITH SAND, trace wood, medium stiff, moist. Wood stuck at spoon tip and there were no sample recovered. sample was later retrieved with 3" spoon CH	68	41	30.0	76.0	
8	205	3	6	67	8.5			8.5 / 204.0 Fill, Tan, fine to medium, SILTY SAND, medium dense, moist SM			24.1		
10		5	6	100	11						21.3		
12	200	6	8	87	12.5						13.8		
14		5	11	11	13.5								
15					15			15.0 / 197.5 Boring terminated at 15ft					

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 5' towards east due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A1-1



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: IT

I-12
PAGE 1 OF 1

STATION: NORTHING: 355913.4916 ft SURFACE ELEVATION: 186.0 ft
OFFSET: Easting: 3626970.194 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 2/13/2022 - 2/13/2022

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: Daniel Case

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 17.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	186.0							8" Topsoil TOPS
0.7	185.3							Brown, Sandy FAT CLAY, stiff, moist CH
9.5	176.5							Brown, gray, SANDY SILT, trace decomposed rock fragments, very hard to stiff, moist ML
17.5	168.5							Residual, Gray, brown, highly weathered, lithified, GRAPHITIC SCHIST ROCK FRAGMENTS, dense, moist MST
24.0	162.0							Gray, brown, SANDY SILT, seam of rusty Sand, very hard, dry to moist ML
30.0								Boring terminated at 30.0ft

REMARKS: Rig Type: B57 Mobile.
 Cave-in depth 24.6ft. Dry at completion.

PAGE 1 OF 1

I-12

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD SIGN AND IT BORINGS.GPJ-SPT7.GDT:GINT _version 10.02.00.04:3/8/22:Whitman, Raquardt, and Associates

APPENDIX C

Laboratory Test Results

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
I-02	S-1	3.5 - 5.0				86	24			14.6
I-02	S-2	6.0 - 7.6								23.1
I-02	S-3	8.5 - 10.0								21.9
I-02	S-4	11.0 - 12.5								22.6
I-02	S-5	13.5 - 15.0								17.1
I-03	S-1	3.5 - 5.0								21.4
I-03	S-2	6.0 - 7.6				99	23			16.5
I-03	S-3	8.5 - 10.0								25.9
I-03	S-4	11.0 - 12.5								27.6
I-03	S-5	13.5 - 15.0								28.9
I-03	S-6	16.0 - 17.5								25.3
I-03	S-7	18.5 - 20.0								25.6
I-03	S-8	23.5 - 25.0								22.8
I-03	S-9	28.5 - 30.0								16.9
I-04	S-1	1.5 - 3.0								12.6
I-04	S-2	4.0 - 5.5								16.7
I-04	S-3	6.5 - 8.0	51	27	24	100	25	SC	A-2-7	15.8
I-04	S-4	9.0 - 10.5								18.4
I-04	S-5	11.5 - 13.0	82	34	48	100	88	CH	A-7-5	36.3
I-04	S-6	14.0 - 15.5								17.6
I-04	S-7	16.5 - 18.0								22.6
I-04	S-8	19.0 - 20.5								22.5
I-04	S-9	23.5 - 25.0								25.2
I-04	S-10	28.5 - 30.0								9.3
I-05	S-1	3.5 - 5.0								10.7
I-05	S-2	6.0 - 7.6								18.4
I-05	S-3	8.5 - 10.0				100	23			18.6

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGHT.GPJ - PROJECT.GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
I-05	S-4	11.0 - 12.5								24.2
I-05	S-5	13.5 - 15.0								19.7
I-05	S-6	16.0 - 17.5								16.4
I-05	S-7	18.5 - 20.0								33.8
I-05	S-8	23.5 - 25.0								20.4
I-05	S-9	28.5 - 30.0								22.4
I-07	S-1	3.5 - 5.0								19.1
I-07	S-2	6.0 - 7.6	54	30	24	100	29	SM	A-2-7	16.8
I-07	S-3	8.5 - 10.0								19.3
I-07	S-4	11.0 - 12.5								31.0
I-07	S-5	13.5 - 15.0				99	27			20.7
I-07	S-6	16.0 - 17.5								22.8
I-07	S-7	18.5 - 20.0								38.2
I-07	S-8	22.0 - 23.5								27.8
I-07	S-9	28.5 - 30.0								26.2
I-08	S-1	3.5 - 5.0								16.3
I-08	S-2	6.0 - 7.6				100	22			17.2
I-08	S-3	8.5 - 10.0								19.4
I-08	S-4	11.0 - 12.5								16.8
I-08	S-5	13.5 - 15.0								17.8
I-08	S-6	16.0 - 17.5								21.5
I-08	S-7	19.5 - 21.0								18.2
I-08	S-8	23.5 - 25.0								31.4
I-08	S-9	28.5 - 30.0								14.2
I-09	S-1	1.5 - 3.0								16.7
I-09	S-2	4.0 - 5.5								20.7
I-09	S-3	6.5 - 8.0	49	27	22	100	48	SC	A-7-6	28.9

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGNMENT - PROJECT GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
I-09	S-4	9.0 - 10.5								24.5
I-09	S-5	11.5 - 13.0								19.3
I-09	S-6	14.0 - 15.5	63	28	35	100	56	CH	A-7-6	21.9
I-09	S-7	16.5 - 18.0								19.1
I-09	S-8	19.0 - 20.5								24.0
I-09	S-9	23.5 - 25.0								28.4
I-09	S-10	28.5 - 30.0								14.8
I-10	S-1	0.0 - 1.5								9.9
I-10	S-2	3.5 - 5.0								19.5
I-10	S-3	5.0 - 6.5								21.4
I-10	S-4	8.5 - 10.0	39	19	20	90	60	CL	A-6	20.4
I-10	S-5	10.0 - 11.5								20.0
I-10	S-6	11.5 - 13.0								17.2
I-10	S-7	13.5 - 15.0								17.0
I-10	S-8	16.0 - 17.5								14.1
I-10	S-9	18.5 - 20.0								15.6
I-10	S-10	23.5 - 25.0								9.1
S-03	S-1	3.5 - 5.0	29	20	9	75	21	SC	A-2-4	10.9
S-03	S-2	6.0 - 7.6								18.4
S-03	S-3	8.5 - 10.0								22.3
S-03	S-4	11.0 - 12.5								18.4
S-03	S-5	13.5 - 15.0								21.2
S-03	S-6	16.0 - 17.5								19.0
S-05	S-1	3.5 - 5.0								18.2
S-05	S-2	6.0 - 7.6								18.8
S-05	S-3	8.5 - 10.0	55	27	28	99	27	SC	A-2-7	19.1
S-05	S-4	11.0 - 12.5								19.1

TLB LAB SUMMARY - BASIC - OPITZ BLVD. ASSIGNMENT: GFI PROJECT: GDT 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-05	S-5	13.5 - 15.0								20.1
S-05	S-6	16.0 - 17.5								21.6
S-05	S-7	18.5 - 20.0								21.9
S-05	S-8	23.5 - 25.0								20.2
S-05	S-9	28.5 - 30.0								21.0
S-07	S-1	1.5 - 3.0								14.6
S-07	S-2	4.0 - 5.5	50	24	26	85	44	SC	A-7-6	16.2
S-07	S-3	6.5 - 8.0								20.8
S-07	S-4	9.0 - 10.5	47	25	22	97	46	SC	A-7-6	20.7
S-07	S-5	11.5 - 13.0								18.5
S-07	S-6	14.0 - 15.5								17.5
S-07	S-7	16.5 - 18.0								18.6
S-07	S-8	19.0 - 20.5								17.8
S-07	S-9	23.5 - 25.0								17.3
S-07	S-10	28.5 - 30.0								22.0
S-09	S-1	3.5 - 5.0								20.3
S-09	S-2	6.0 - 7.6	47	23	24	90	49	SC	A-7-6	17.9
S-09	S-3	8.5 - 10.0								24.7
S-09	S-4	11.0 - 12.5								25.2
S-09	S-5	13.5 - 15.0								21.5
S-09	S-6	16.0 - 17.5								18.5
S-09	S-7	18.5 - 20.0								18.7
S-09	S-8	23.5 - 25.0								26.1
S-09	S-9	28.5 - 30.0								25.5
S-10	S-1	3.5 - 5.0								23.6
S-10	S-2	6.0 - 7.6								26.6
S-10	S-3	8.5 - 10.0								14.9

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGHT.GPJ - PROJECT.GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-10	S-4	11.0 - 12.5	39	25	14	80	48	SC	A-6	16.8
S-10	S-5	13.5 - 15.0								16.5
S-10	S-6	16.0 - 17.5								16.8
S-10	S-7	18.5 - 20.0								19.9
S-10	S-8	23.5 - 25.0								28.6
S-10	S-9	28.5 - 30.0								22.7
S-13	S-1	3.5 - 5.0								16.9
S-13	S-2	6.0 - 7.6								20.1
S-13	S-3	8.5 - 10.0				100	23			17.3
S-13	S-4	11.0 - 12.5								18.7
S-13	S-5	13.5 - 15.0								37.5
S-13	S-6	16.0 - 17.5								15.4
S-13	S-7	18.5 - 20.0								17.2
S-13	S-8	23.5 - 25.0								20.8
S-13	S-9	28.5 - 30.0								26.4
S-14	S-1	1.5 - 3.0								17.6
S-14	S-2	4.0 - 5.5				97	29			15.3
S-14	S-3	6.5 - 8.0								10.6
S-14	S-4	9.0 - 10.5								11.2
S-14	S-5	11.5 - 13.0								20.2
S-14	S-6	14.0 - 15.5								31.4
S-14	S-7	16.5 - 18.0								24.4
S-14	S-8	19.0 - 20.5								30.1
S-14	S-9	23.5 - 25.0								17.0
S-14	S-10	28.5 - 30.0								25.6
S-15	S-1	1.5 - 3.0								16.3
S-15	S-2	4.0 - 5.5								22.0

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGHT.GPJ - PROJECT.GDT - 3/2/22



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-15	S-3	6.5 - 8.0								13.4
S-15	S-4	9.0 - 10.5				96	20			12.6
S-15	S-5	11.5 - 13.0								15.1
S-15	S-6	14.0 - 15.5								23.4
S-15	S-7	16.5 - 18.0								28.3
S-15	S-8	19.0 - 20.5								20.0
S-15	S-9	23.5 - 25.0								20.0
S-15	S-10	28.5 - 30.0								18.1
S-16	S-1	1.0 - 2.5								15.1
S-16	S-2	3.5 - 5.0								22.1
S-16	S-3	6.0 - 7.5								17.0
S-16	S-4	8.5 - 10.0	47	27	20	95	46	SC	A-7-6	19.0
S-16	S-5	11.0 - 12.5								16.8
S-16	S-6	13.5 - 15.0								15.1
S-16	S-7	16.0 - 17.5								20.8
S-16	S-8	18.5 - 20.0								12.5
S-16	S-9	23.5 - 25.0								9.7
S-16	S-10	28.5 - 30.0								13.4
S-17	S-1	1.0 - 2.5								18.3
S-17	S-2	3.5 - 5.0								21.4
S-17	S-3	6.0 - 7.5	45	29	16	99	32	SM	A-2-7	19.4
S-17	S-4	8.5 - 10.0								14.2
S-17	S-5	11.0 - 12.5								17.1
S-17	S-6	13.5 - 15.0								14.6
S-17	S-7	16.0 - 17.5								13.6
S-17	S-8	18.5 - 20.0								15.7
S-17	S-9	23.5 - 25.0								23.1

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGHT.GPJ - PROJECT.GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

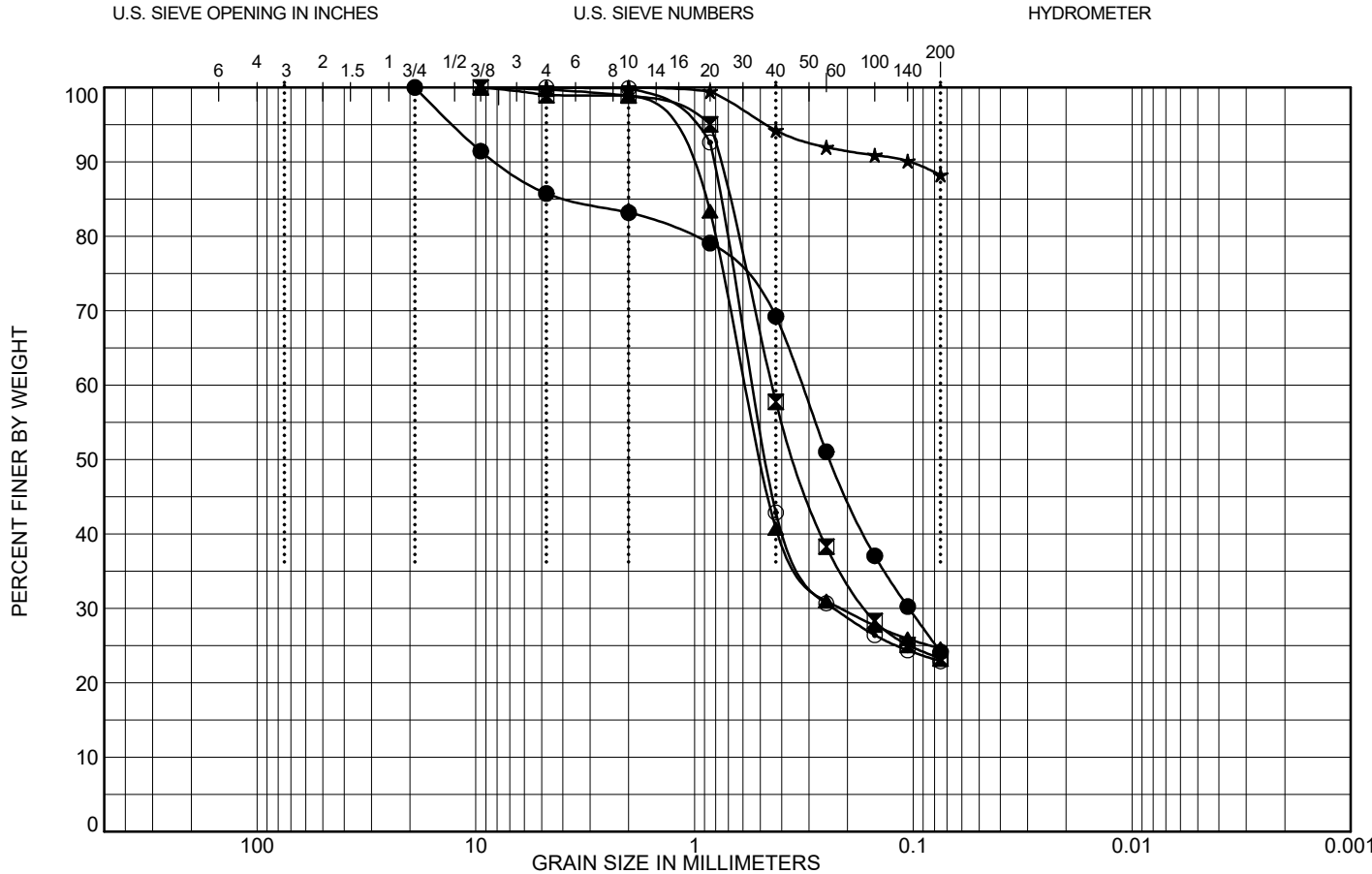
Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-17	S-10	28.5 - 30.0								16.0
S-18	S-1	2.5 - 4.0								14.5
S-18	S-2	5.0 - 6.5								12.8
S-18	S-3	7.5 - 9.0				100	22			16.4
S-18	S-4	10.0 - 11.5								17.3
S-18	S-5	12.5 - 14.0								19.6
S-18	S-6	15.0 - 16.5								25.2
S-18	S-7	17.5 - 19.0								24.1
S-18	S-8	20.0 - 21.5								23.5
S-18	S-9	25.0 - 26.5								20.1
S-18	S-10	28.5 - 30.0								23.5

T.B. LAB SUMMARY - BASIC - OPITZ BLVD - ASSESSMENT - PROJECT GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038



	D10	D30	D60	D100
●		0.105	0.325	19
☒		0.164	0.443	9.5
▲		0.214	0.581	9.5
★				4.76
⊙	0.231	0.54		4.76

Test Method: VTM-25

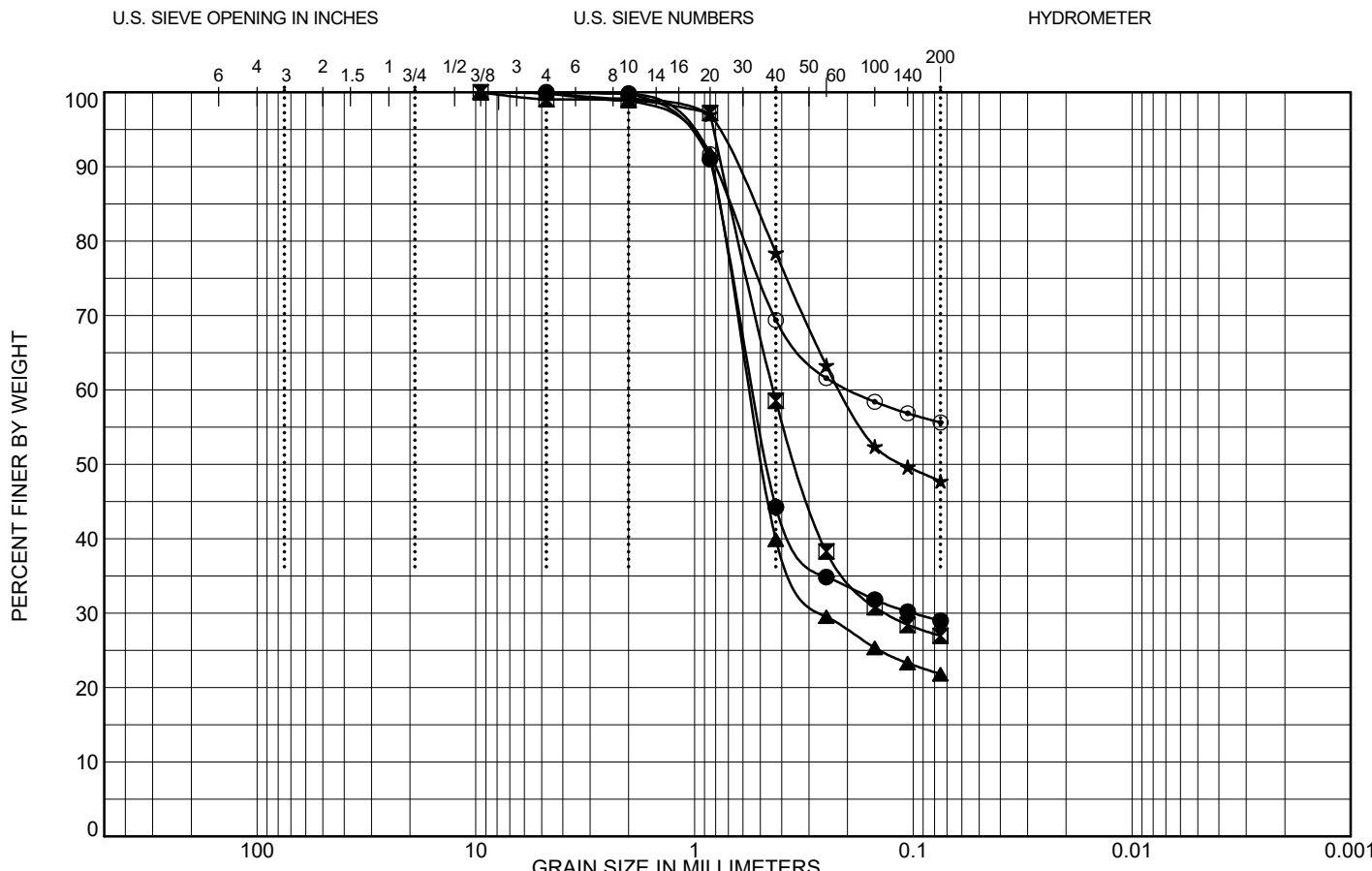
Tested By: CL Date: 2/23/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	I-02	S-1	3.5 - 5.0	14.3	61.6	24.1				14.6		
☒	I-03	S-2	6.0 - 7.6	1.1	75.7	23.3				16.5		
▲	I-04	S-3	6.5 - 8.0	0.3	75.1	24.6	51	24	15.8		CLAYEY SAND(SC)	A-2-7
★	I-04	S-5	11.5 - 13.0	0.0	11.8	88.2	82	48	36.3		FAT CLAY(CH)	A-7-5
⊙	I-05	S-3	8.5 - 10.0	0.0	77.1	22.9				18.6		

	GRAIN SIZE DISTRIBUTION Opitz Blvd.	Woodbridge, VA Project Number: 21-0038	Sheet 1 of 5
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T&E GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD ASHIGM1 GPR SALUT2014 LGDT 3/3/22



	D10	D30	D60	D100
●		0.1	0.537	4.76
☒		0.133	0.436	9.5
▲		0.256	0.556	9.5
★			0.214	4.76
⊙			0.194	4.76

Test Method: VTM-25

Tested By: CL Date: 2/23/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

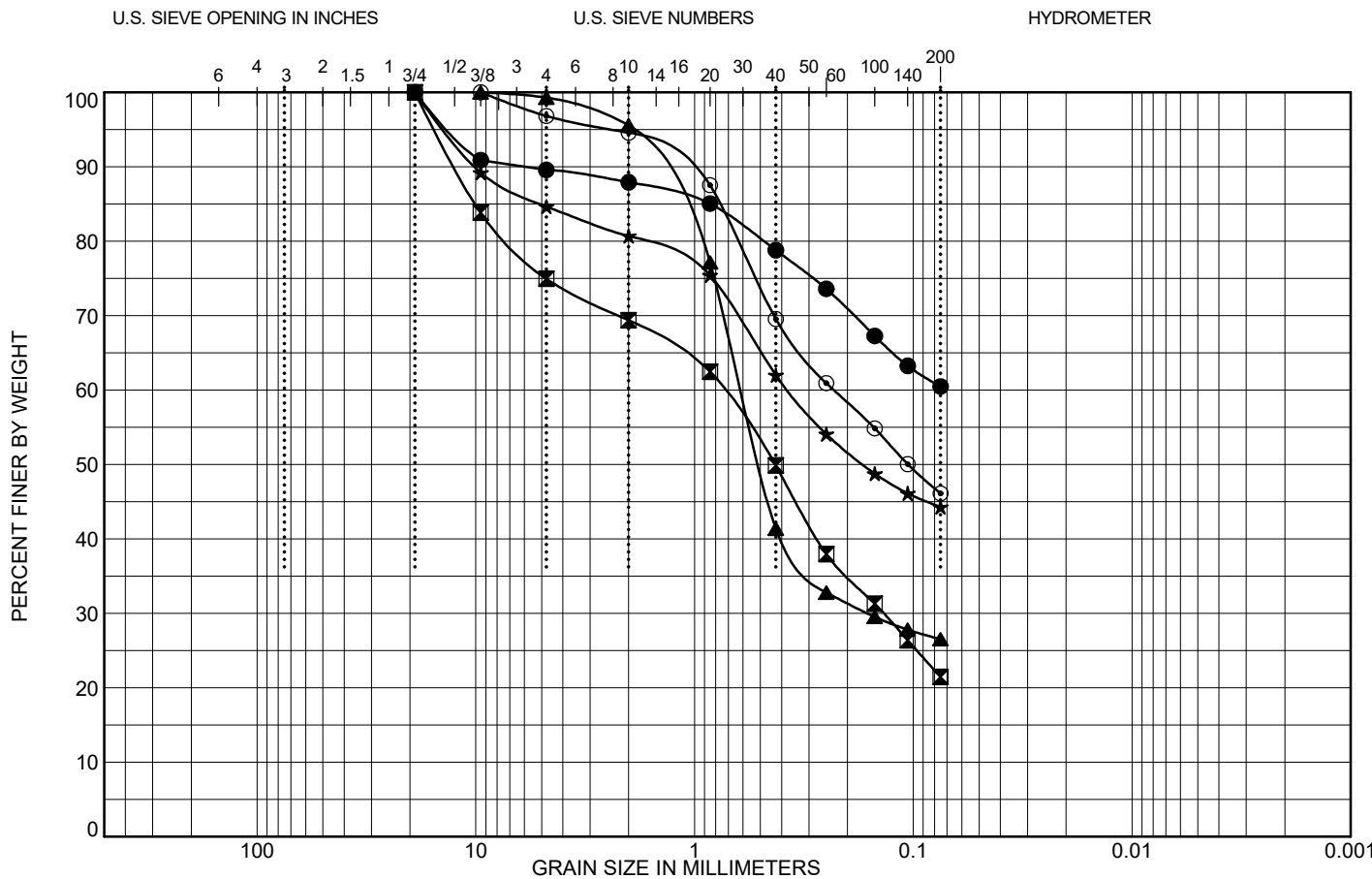
	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	I-07	S-2	6.0 - 7.6	0.0	71.0	29.0	54	24	16.8		SILTY SAND(SM)	A-2-7
☒	I-07	S-5	13.5 - 15.0	0.9	72.1	27.0			20.7			
▲	I-08	S-2	6.0 - 7.6	0.2	78.0	21.8			17.2			
★	I-09	S-3	6.5 - 8.0	0.0	52.3	47.7	49	22	28.9		CLAYEY SAND(SC)	A-7-6
⊙	I-09	S-6	14.0 - 15.5	0.0	44.4	55.6	63	35	21.9		SANDY FAT CLAY(CH)	A-7-6



GRAIN SIZE DISTRIBUTION
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038
Sheet 2 of 5

T&E GRAIN SIZE LANDSCAPE USCS OPITZ BLVD ASHIGNI GRI SALUTZ014 LGDT 3/3/22



	D10	D30	D60	D100
●				19
☒		0.137	0.742	19
▲		0.162	0.61	9.5
★			0.372	19
⊙			0.231	9.5

Test Method: VTM-25

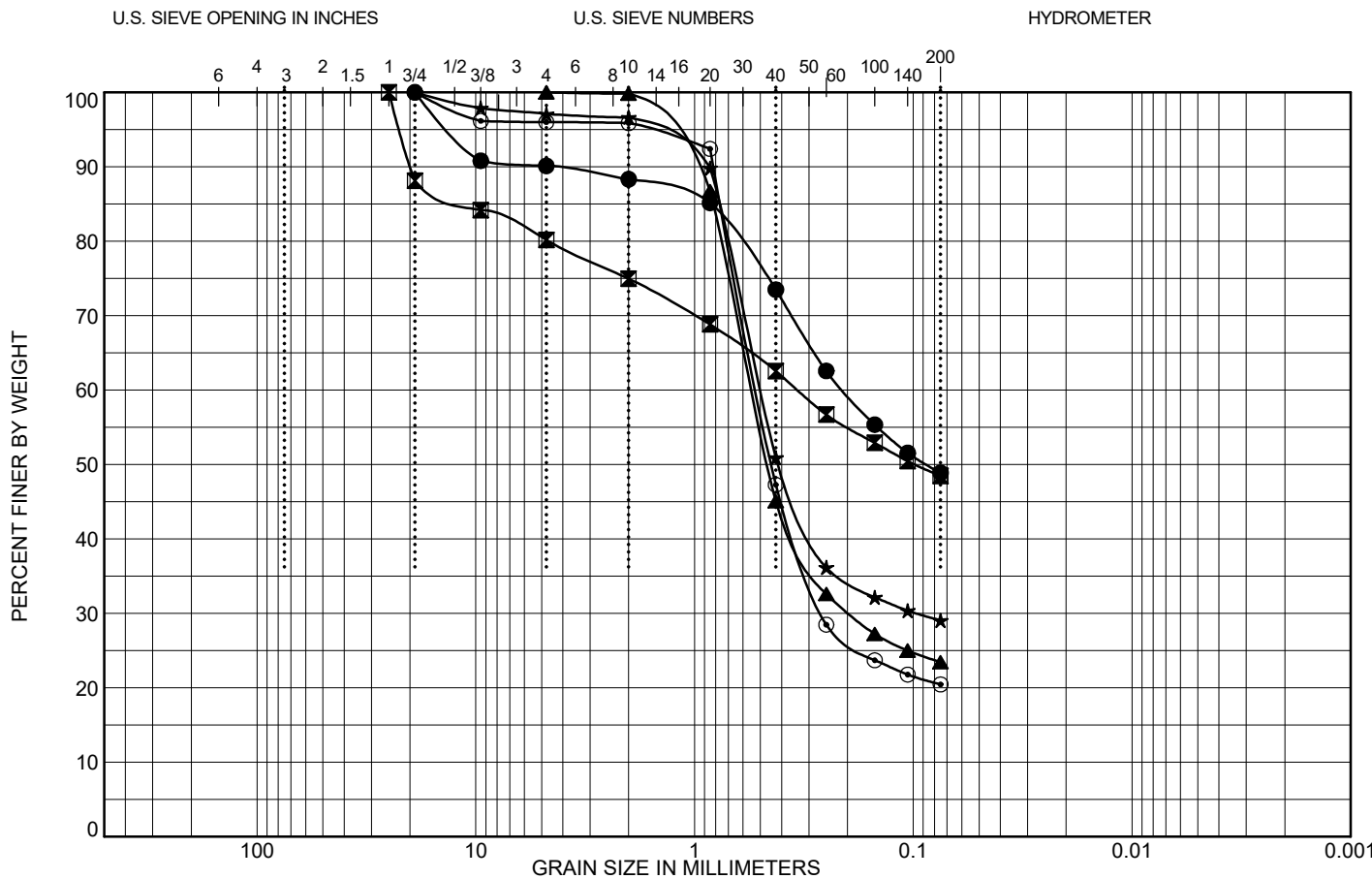
Tested By: CL Date: 2/23/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	I-10	S-4	8.5 - 10.0	10.4	29.1	60.5	39	20	20.4		SANDY LEAN CLAY(CL)	A-6
☒	S-03	S-1	3.5 - 5.0	25.1	53.5	21.5	29	9	10.9		CLAYEY SAND with GRAVEL(SC)	A-2-4
▲	S-05	S-3	8.5 - 10.0	0.7	72.8	26.5	55	28	19.1		CLAYEY SAND(SC)	A-2-7
★	S-07	S-2	4.0 - 5.5	15.4	40.4	44.3	50	26	16.2		CLAYEY SAND with GRAVEL(SC)	A-7-6
⊙	S-07	S-4	9.0 - 10.5	3.2	50.7	46.1	47	22	20.7		CLAYEY SAND(SC)	A-7-6

	GRAIN SIZE DISTRIBUTION Opitz Blvd.	Woodbridge, VA Project Number: 21-0038	Sheet 3 of 5
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T&E GRAIN SIZE LANDSCAPE USGS OPITZ BLVD. ASHIGNI GPR SALUT2014.GDT 3/3/22



	D10	D30	D60	D100
●			0.208	19
☒			0.337	25
▲		0.195	0.545	4.76
★		0.096	0.5	19
⊙		0.261	0.517	19

Test Method: VTM-25

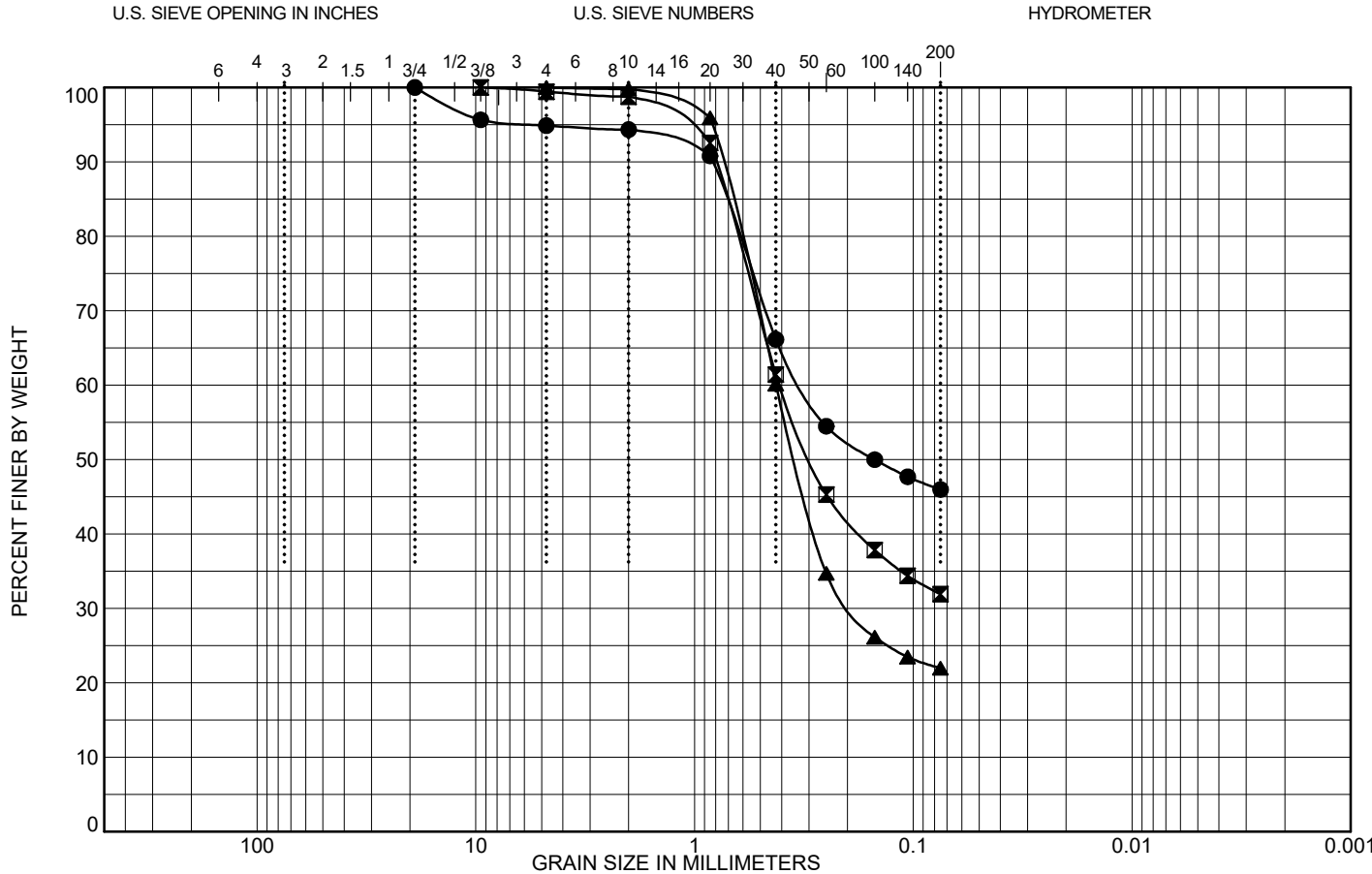
Tested By: CL Date: 2/23/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	S-09	S-2	6.0 - 7.6	9.9	41.2	48.9	47	24	17.9		CLAYEY SAND(SC)	A-7-6
☒	S-10	S-4	11.0 - 12.5	19.8	31.7	48.5	39	14	16.8		CLAYEY SAND with GRAVEL(SC)	A-6
▲	S-13	S-3	8.5 - 10.0	0.0	76.6	23.4				17.3		
★	S-14	S-2	4.0 - 5.5	2.9	68.0	29.0				15.3		
⊙	S-15	S-4	9.0 - 10.5	4.0	75.5	20.4				12.6		

	GRAIN SIZE DISTRIBUTION Opitz Blvd.	Woodbridge, VA Project Number: 21-0038	Sheet 4 of 5
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TLB GRAIN SIZE LANDSCAPE USCS OPTZBLVD ASHIGNI GRI SALUT2014.GDT 3/3/22



	D10	D30	D60	D100
●			0.321	19
☒			0.406	9.5
▲		0.189	0.424	4.76

Test Method: VTM-25

Tested By: CL Date: 2/23/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

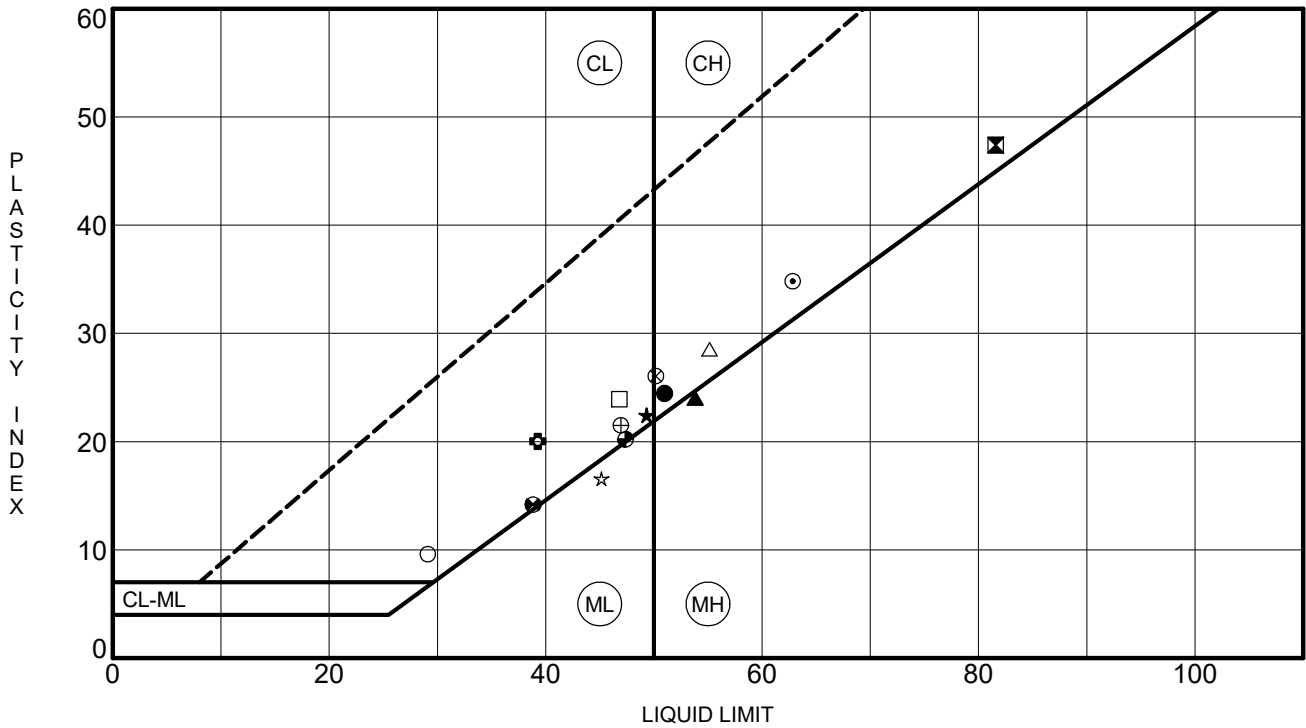
	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	S-16	S-4	8.5 - 10.0	5.1	48.9	46.0	47	20	19.0		CLAYEY SAND(SC)	A-7-6
☒	S-17	S-3	6.0 - 7.5	0.6	67.5	31.9	45	16	19.4		SILTY SAND(SM)	A-2-7
▲	S-18	S-3	7.5 - 9.0	0.0	78.0	22.0				16.4		



GRAIN SIZE DISTRIBUTION
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Woodbridge, VA
Project Number: 21-0038

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Boring	Depth	LL	PL	PI	Fines	Classification	AASHTO
● I-04	6.5 - 8.0	51	27	24	25	CLAYEY SAND(SC)	A-2-7
⊠ I-04	11.5 - 13.0	82	34	48	88	FAT CLAY(CH)	A-7-5
▲ I-07	6.0 - 7.6	54	30	24	29	SILTY SAND(SM)	A-2-7
★ I-09	6.5 - 8.0	49	27	22	48	CLAYEY SAND(SC)	A-7-6
⊙ I-09	14.0 - 15.5	63	28	35	56	SANDY FAT CLAY(CH)	A-7-6
⊕ I-10	8.5 - 10.0	39	19	20	60	SANDY LEAN CLAY(CL)	A-6
○ S-03	3.5 - 5.0	29	20	9	21	CLAYEY SAND with GRAVEL(SC)	A-2-4
△ S-05	8.5 - 10.0	55	27	28	27	CLAYEY SAND(SC)	A-2-7
⊗ S-07	4.0 - 5.5	50	24	26	44	CLAYEY SAND with GRAVEL(SC)	A-7-6
⊕ S-07	9.0 - 10.5	47	25	22	46	CLAYEY SAND(SC)	A-7-6
□ S-09	6.0 - 7.6	47	23	24	49	CLAYEY SAND(SC)	A-7-6
⊕ S-10	11.0 - 12.5	39	25	14	48	CLAYEY SAND with GRAVEL(SC)	A-6
⊕ S-16	8.5 - 10.0	47	27	20	46	CLAYEY SAND(SC)	A-7-6
☆ S-17	6.0 - 7.5	45	29	16	32	SILTY SAND(SM)	A-2-7

Test Method: VTM-7

Tested By: SM

Date: 2/23/2022



ATTERBERG LIMITS' RESULTS

Project: Opitz Blvd.

Location: Woodbridge, VA

Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
I-01	S-1	3.5 - 5.0								11.2
I-01	S-2	6.0 - 7.6	35	29	6	100	81	ML	A-4	13.8
I-01	S-3	8.5 - 10.0								12.9
I-01	S-4	11.0 - 12.5								11.0
I-01	S-5	13.5 - 15.0								9.6
I-01	S-6	16.0 - 17.5								10.1
I-01	S-7	19.5 - 21.0								10.7
I-01	S-8	23.5 - 25.0								8.8
I-01	S-9	28.5 - 30.0								12.1
I-12	S-1	1.5 - 3.0								15.7
I-12	S-2	4.0 - 5.5	60	28	32	100	69	CH	A-7-6	23.7
I-12	S-3	6.5 - 8.0								21.4
I-12	S-4	9.0 - 10.5								19.4
I-12	S-5	11.5 - 13.0								15.3
I-12	S-6	14.0 - 15.5								18.7
I-12	S-7	16.5 - 18.0								23.5
I-12	S-8	19.0 - 20.5								17.1
I-12	S-9	23.5 - 25.0								7.4
I-12	S-10	28.5 - 30.0								20.9
S-01	S-1	3.5 - 5.0								14.2
S-01	S-2	6.0 - 7.6	40	32	8	99	77	ML	A-4	11.7
S-01	S-3	8.5 - 10.0								11.4
S-01	S-4	11.0 - 12.5								12.7
S-01	S-5	13.5 - 15.0								10.9
S-01	S-6	16.0 - 17.5								8.2
S-01	S-7	18.5 - 21.0								7.0
S-01	S-8	23.5 - 25.0								5.9

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGN#2.GPJ - PROJECT.GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-01	S-9	28.5 - 30.0								5.2
S-02	S-1	3.5 - 5.0								9.1
S-02	S-2	6.0 - 7.6								8.9
S-02	S-3	8.5 - 10.0				97	48			10.0
S-02	S-4	11.0 - 12.5								7.3
S-02	S-5	13.5 - 15.0								4.7
S-02	S-6	16.0 - 17.5								8.5
S-02	S-7	18.5 - 21.0								11.7
S-02	S-8	23.5 - 25.0								13.0
S-02	S-9	28.5 - 30.0								12.8
S-04	S-1	3.5 - 5.0								16.8
S-04	S-2	6.0 - 7.6				79	25			11.7
S-04	S-3	8.5 - 10.0								17.1
S-04	S-4	11.0 - 12.5								33.7
S-04	S-5	13.5 - 15.0								29.9
S-04	S-6	16.0 - 17.5								19.4
S-04	S-7	18.5 - 21.0								6.5
S-06	S-1	3.5 - 5.0								17.1
S-06	S-2	6.0 - 7.6								14.1
S-06	S-3	8.5 - 10.0				100	22			18.6
S-06	S-4	11.0 - 12.5								25.2
S-06	S-5	13.5 - 15.0								30.0
S-06	S-6	16.0 - 17.5								20.2
S-06	S-7	18.5 - 21.0								19.1
S-06	S-8	23.5 - 25.0								8.4
S-06	S-9	28.5 - 30.0								21.4
S-08	S-1	1.5 - 3.0								18.9

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGNMENT - PROJECT - GDT - 3/2022



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-08	S-2	4.0 - 5.5								15.4
S-08	S-3	6.5 - 8.0	51	27	24	97	36	SC	A-7-6	19.8
S-08	S-4	9.0 - 10.5								22.7
S-08	S-5	11.5 - 13.0								34.1
S-08	S-6	14.0 - 15.5	36	27	9	95	50	ML	A-4	27.4
S-08	S-7	16.5 - 18.0								18.0
S-08	S-8	21.0 - 22.5								24.3
S-08	S-9	23.5 - 25.0								26.5
S-08	S-10	28.5 - 30.0								18.1
S-12	S-1	1.5 - 3.0								14.4
S-12	S-2	4.0 - 5.5				97	22			16.4
S-12	S-3	6.5 - 8.0								36.5
S-12	S-4	9.0 - 10.5	77	41	36	100	98	MH	A-7-5	42.3
S-12	S-5	11.5 - 13.0								35.6
S-12	S-6	14.0 - 15.5								24.2
S-12	S-7	16.5 - 18.0								15.3
S-12	S-8	21.0 - 22.5								19.6
S-12	S-9	23.5 - 25.0								17.4
S-12	S-10	28.5 - 30.0								15.2
S-21	S-1	3.5 - 5.0								16.8
S-21	S-2	6.0 - 7.6								36.9
S-21	S-3	8.5 - 10.0	68	37	31	100	90	MH	A-7-5	41.7
S-21	S-4	11.0 - 12.5								16.2
S-21	S-5	13.5 - 15.0								16.9
S-21	S-6	16.0 - 17.5								17.2
S-21	S-7	18.5 - 21.0								27.1
S-21	S-8	23.5 - 25.0								22.8

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGN02.GPJ - PROJECT.GDT - 3/2/22



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

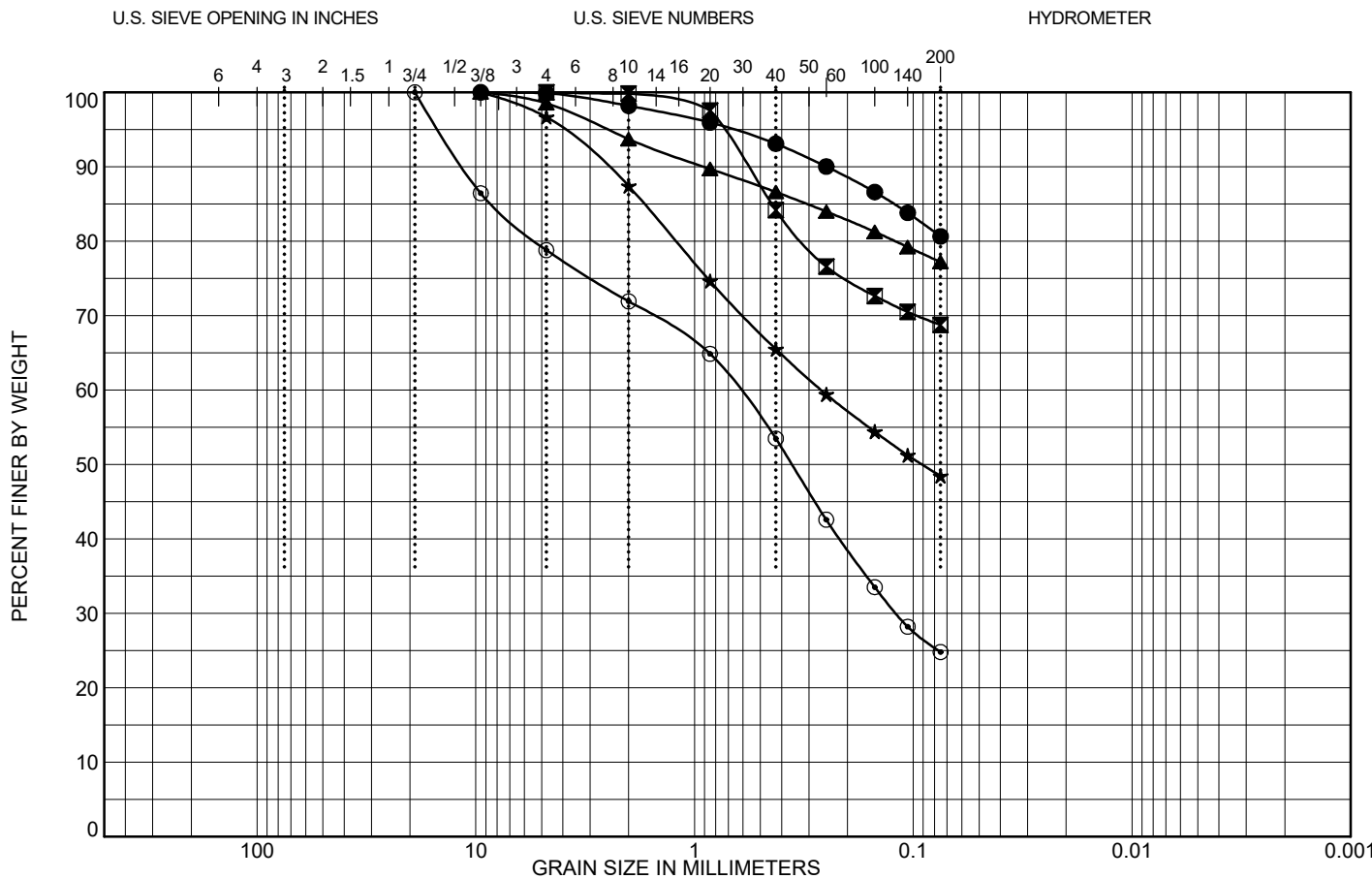
Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
S-21	S-9	28.5 - 30.0								21.0
S-22	S-1	3.5 - 5.0								14.5
S-22	S-2	6.0 - 7.6								34.5
S-22	S-3	8.5 - 10.0								25.4
S-22	S-4	11.0 - 12.5	59	30	29	100	76	CH	A-7-5	36.5
S-22	S-5	13.5 - 15.0								17.1
S-22	S-6	16.0 - 17.5								21.3
S-22	S-7	18.5 - 21.0								26.4
S-22	S-8	23.5 - 25.0								37.7
S-22	S-9	28.5 - 30.0								20.3

TLB LAB SUMMARY - BASIC - OPITZ BLVD - ASSIGN2.GPJ - PROJECT.GDT - 3/2/22



Summary of Laboratory Results
Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038



	D10	D30	D60	D100
●				9.5
☒				4.76
▲				9.5
★			0.263	9.5
⊙		0.119	0.632	19

Test Method: VTM-25

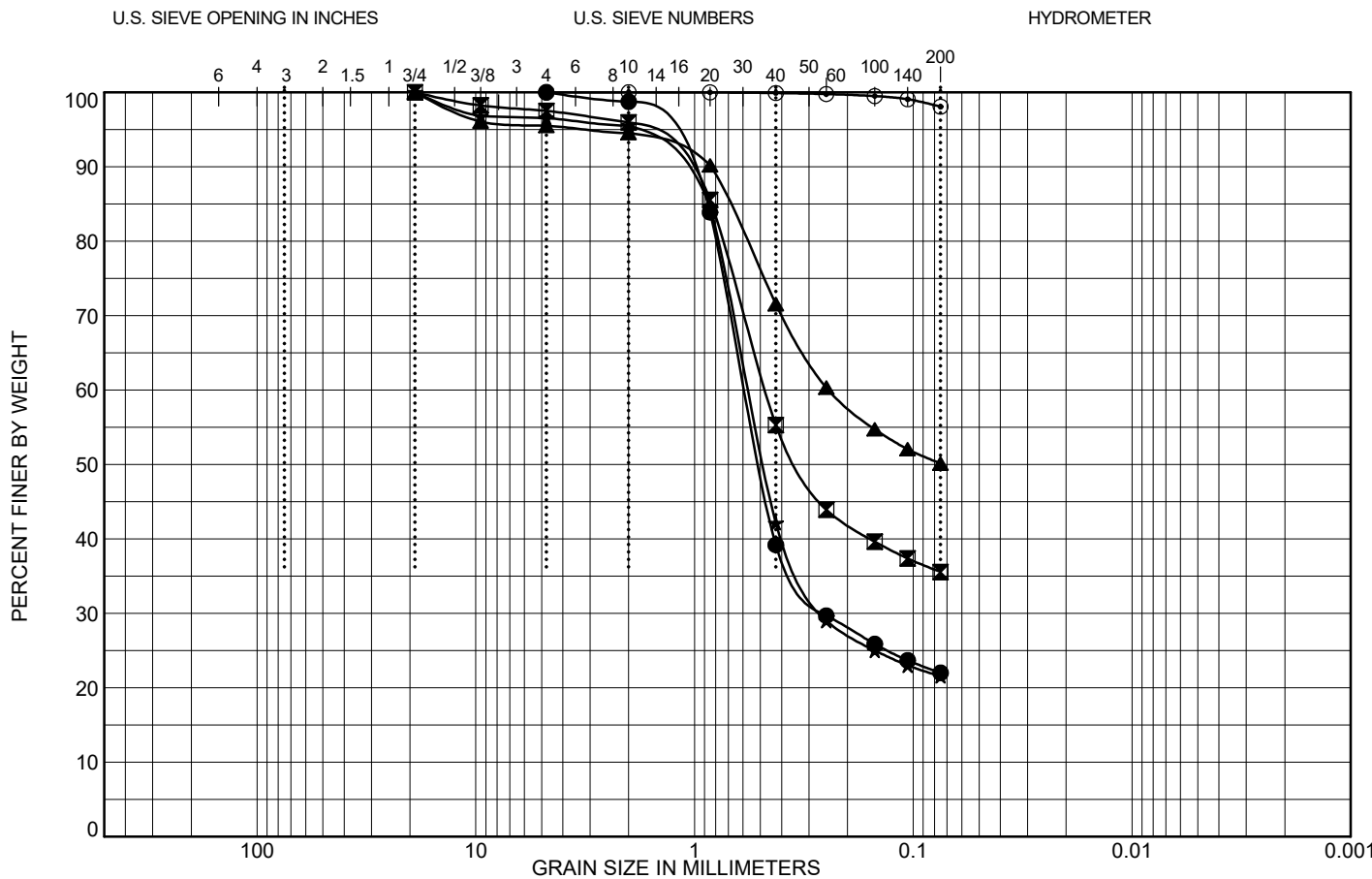
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	I-01	S-2	6.0 - 7.6	0.1	19.3	80.6	35	6	13.8		SILT with SAND(ML)	A-4
☒	I-12	S-2	4.0 - 5.5	0.0	31.2	68.8	60	32	23.7		SANDY FAT CLAY(CH)	A-7-6
▲	S-01	S-2	6.0 - 7.6	1.5	21.3	77.2	40	8	11.7		SILT with SAND(ML)	A-4
★	S-02	S-3	8.5 - 10.0	3.3	48.2	48.5			10.0			
⊙	S-04	S-2	6.0 - 7.6	21.2	54.0	24.8			11.7			

	GRAIN SIZE DISTRIBUTION Opitz Blvd.	Woodbridge, VA Project Number: 21-0038	Sheet 1 of 3
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TB GRN SIZE LANDSCAPE USCS OPTZ BLVD ASIGR2.GPJ SAL172014.GDT 3/3/22



	D10	D30	D60	D100
●		0.255	0.587	4.76
☒			0.473	19
▲			0.243	19
★		0.26	0.569	19
⊙				4.76

Test Method: VTM-25

Tested By: CL, SR Date: 3/1/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	S-06	S-3	8.5 - 10.0	0.0	78.0	22.0				18.6		
☒	S-08	S-3	6.5 - 8.0	2.5	61.9	35.6	51	24	19.8		CLAYEY SAND(SC)	A-7-6
▲	S-08	S-6	14.0 - 15.5	4.5	45.4	50.1	36	9	27.4		SANDY SILT(ML)	A-4
★	S-12	S-2	4.0 - 5.5	3.5	75.0	21.6			16.4			
⊙	S-12	S-4	9.0 - 10.5	0.0	1.9	98.1	77	36	42.3		ELASTIC SILT(MH)	A-7-5

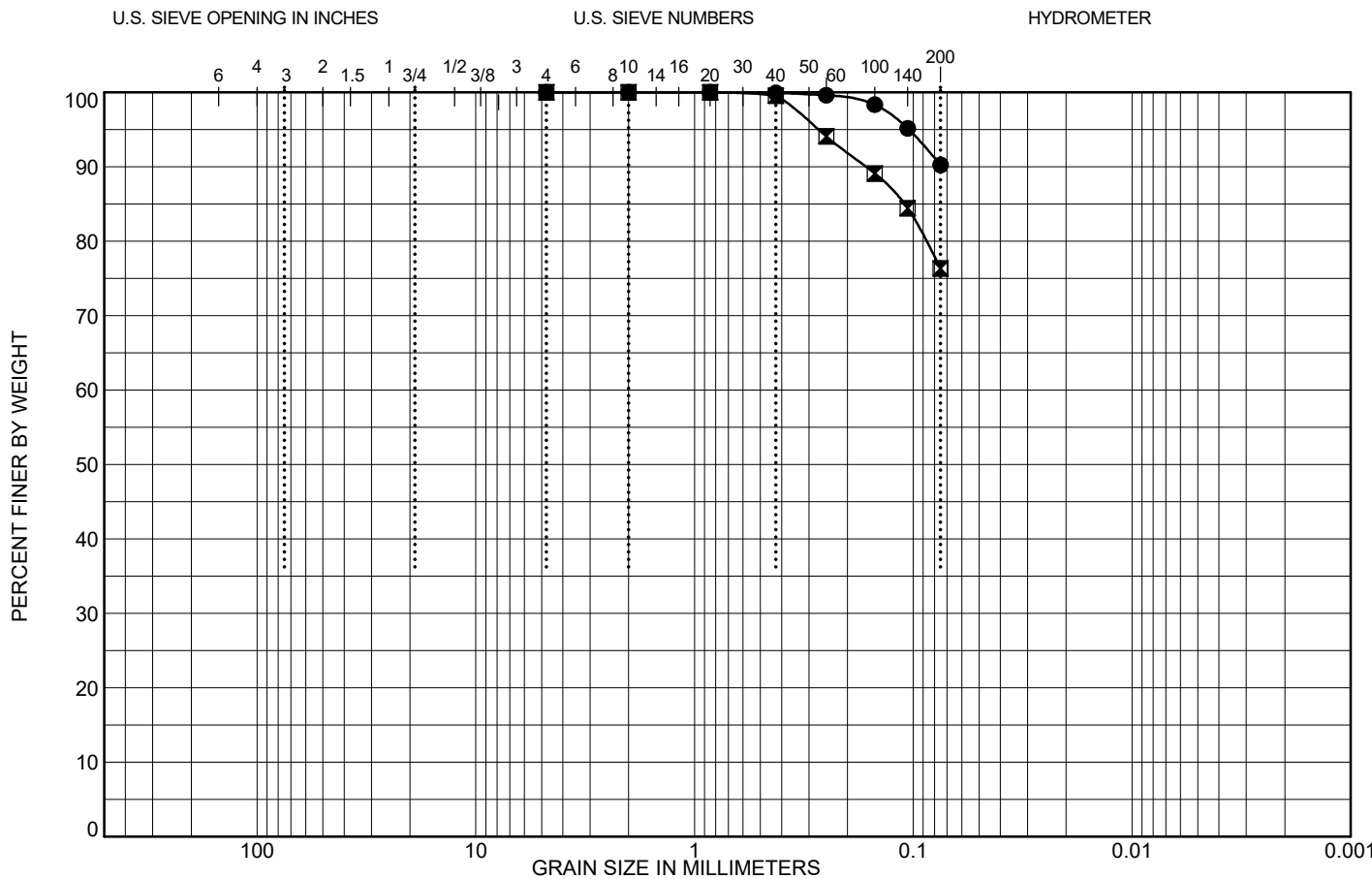


GRAIN SIZE DISTRIBUTION

Opitz Blvd.

Woodbridge, VA
Project Number: 21-0038

T&E GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD ASIGR2.GPJ SALUT2014.GDT 3/3/22



	D10	D30	D60	D100
●				4.76
■				4.76

Test Method: VTM-25

Tested By: CL, SR Date: 3/1/2022

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	S-21	S-3	8.5 - 10.0	0.0	9.8	90.2	68	31	41.7		ELASTIC SILT(MH)	A-7-5
■	S-22	S-4	11.0 - 12.5	0.0	23.7	76.3	59	29	36.5		FAT CLAY with SAND(CH)	A-7-5

TLB GRAIN SIZE LANDSCAPE USCS OPTZ BLVD ASIGM2.GPJ SALLT2014.GDT 3/3/22



Interstate-95 Express Lanes
OPITZ BOULEVARD CONNECTION
PRINCE WILLIAMS COUNTY, VIRGINIA
STATE PROJECT # 0095-076-299, P101, C501
UPC# 116663

GEOTECHNICAL REPORT

WRA W/O # 045893.001
REVISION 3
MARCH 25, 2022

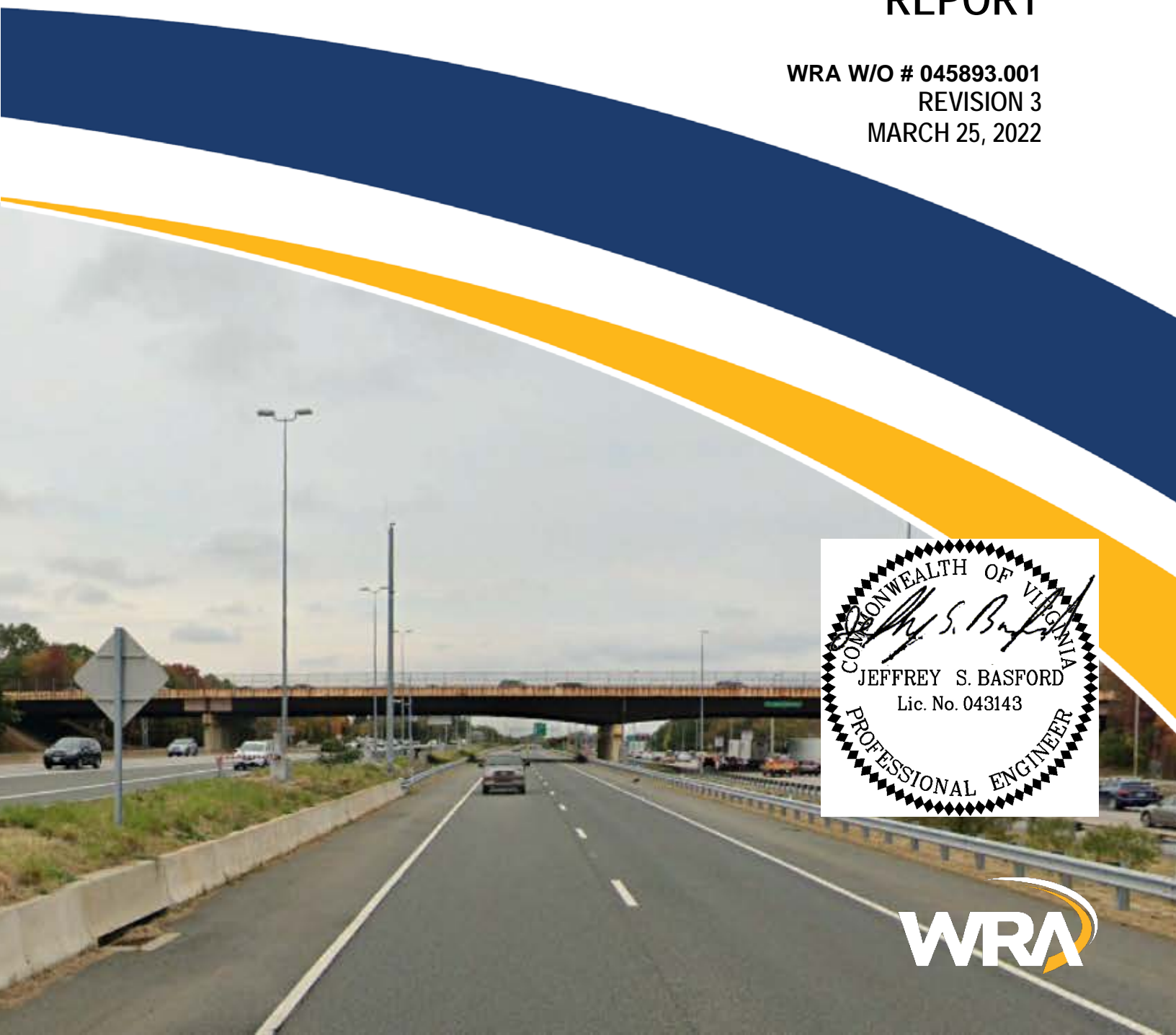
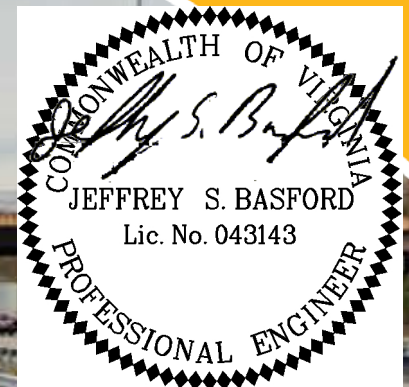


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- A.1 Site Vicinity Map
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- A.3 Selected Plans - Bridge Elements
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Appendix B – Historic Data Review Memo

Appendix C – Subsurface Investigation Records

- C.1 Test Borings Summary
- C.2 Test Boring Logs
- C.3 DCP Logs
- C.4 Pavement Core Records

Appendix D – Laboratory Test Results

Appendix E – Calculations

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- E.2 MSE Wall Calculations: Wall 1, Wall 2 and Wall 3
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 - E.2.4 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.24+50 (19' Wall)
 - E.2.5 Walls 1 & 3 – Settlements @ Sta.24+50 (19' Wall)
 - E.2.6 Walls 1 & 3 – Slope Stability @ Sta.24+50 (19' Wall)
 - E.2.7 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.22+50 (10' Wall)
 - E.2.8 Walls 1 & 3 – Settlements @ Sta.22+50 (10' Wall)
 - E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
 - E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50
- E.3 RW-3 Gravity Retaining Wall
 - E.3.1 VDOT RW-3 Specifications
 - E.3.2 DCP Friction Angle and Compactness
 - E.3.3 AASHTO Bearing Capacity
 - E.3.4 AASHTO Reduction Factor for Footing on Slope
- E.4 Soldier Pile and Lagging (SPL) Wall
 - E.4.1 Section and Embedment Design
 - E.4.2 Top Deflection Estimations
- E.5 Abutment and Pier Piles
 - E.5.1 DRIVEN Analysis
 - E.5.2 Typical LPILE Analysis
 - E.5.3 Typical WEAP Analysis Results
- E.6 MOT Pavement Sections
 - E.6.1 Pavement Analyses
 - E.6.2 Record Drawings

1. Introduction

The Interstate 95 reversible High Occupancy-Toll (HOT) facility is maintained and operated by Transurban in the median of interstate I-95. The facility stretches from south of Garrisonville Road in Stafford County to north of Edsall Road in Fairfax County. The proposed improvements consist of adding an access ramp to create direct access to the Express Lanes from Opitz Blvd. The project is in Woodbridge, Prince Williams County, Virginia. A site vicinity map is included in Appendix A.

Whitman, Requardt, and Associate, LLP. (WRA) was tasked to provide a geotechnical investigation program for the proposed spot improvement project. The project elements include: a retaining wall supporting T Ramp to I-95 Express Lanes from Opitz Boulevard, a new abutment at the bridge to connect to the new T-ramp and associated widening to the existing Opitz Boulevard bridge abutments and piers. This report provides a summary of the geotechnical investigation, subsequent study, and design recommendations.

The study includes the following: review and summary of available existing geotechnical data; summary and review of the subsurface investigation and laboratory test results; and geotechnical analysis and recommendations for the project, which elements include: back-to-back Mechanically Stabilized Earth (MSE) wall for the T-Ramp, deep foundations of abutment and pier expansions, a post and panel retaining wall, gravity retaining wall, and widened embankment to support the expansion along Opitz Blvd. As part of the recommendation development, a memo was developed earlier for review of available historic geotechnical data and as-built foundation elements of the existing bridge. This memo is included in Appendix B of this report.

2. Project Site and Proposed Construction

Improvements on Opitz Boulevard include a new eastbound right turn lane (requiring bridge widening) and new westbound left turn lane (to be built within the existing median), both of which would only be open during southbound operations, with access managed by gates. This new reversible ramp will be controlled by a new traffic signal on Opitz Boulevard between the existing signals at Telegraph Road and at River Rock Way. During northbound operations, the ramp will provide northbound 95 Express Lane users the opportunity to exit onto Opitz Boulevard near Potomac Mills mall and Sentara Northern Virginia Medical Center. During southbound operations, the ramp will provide a new entrance from Opitz Boulevard onto the southbound 95 Express Lanes. The proposed ramp will be located in the existing median between the southbound 95 General Purpose (GP) lanes and the 95 Express Lanes.

The following main elements were identified for the Geotechnical investigation.

Widening of the Opitz Boulevard Bridge on East Bound: Both Abutments and three piers will be expanded. Selected bridge drawings are attached in Appendix A.

Widening of East and West Approach to the Bridge: Two retaining walls are proposed for the widening: a soldier pile and lagging wall at the west approach; and a RW-3 type gravity wall on the east approach. Selected drawings and cross-sections are provided in Appendix A.

New T-Ramp and Associated MSE Walls: New abutment, Abutment C is proposed on the east side of the bridge to receive the T-Ramp to the south. Drawings detailing the ramp grade separation MSE walls; Wall-1, Wall 2, and Wall 3, are included in Appendix A.

Pavement Improvements: Pavement improvements include new pavement for the T-Ramp, slip ramp modifications, and Maintenance of Traffic (MOT) pavement sections during construction.

Attached drawings in Appendix A include the proposed construction and the and associated soil test boring locations.

3. Geology

WRA obtained information about the geologic setting of the Opitz Boulevard project from the Geologic Map of the Washington West 30- by 60-minute Quadrangle, Maryland, Virginia, and Washington D.C., which is U.S. Geological Survey Open-File Report OF-2017-1142 by P. T. Lyttle and several other authors.

The project is in the region of Virginia where layers of mostly non-lithified sediments of the coastal plain sequence rest on top of Piedmont crystalline bedrock. The surficial coastal plain material in the area belongs to the Potomac Formation. The Potomac Formation contains interbedded units of sand and clay that were originally deposited by streams in the Cretaceous Period of earth history. Underneath the Potomac Formation is bedrock and decomposed bedrock. The rock is obscured at the site by coastal plain sediment, however the bedrock mapped by the USGS nearest to the Opitz Boulevard project is metamorphic rock of Ordovician age. Data from several borings that penetrated decomposed graphitic schist in the project area. The reported occurrence of schist is generally consistent with the USGS map.

4. Review of Historic Data

We have reviewed the historic data available on existing Opitz Blvd as part of the study. A total of nine test boring results and as-built records of deep foundation consisted of driven HP 10x42 steel beam piles for bridge structures were available for the review from the following Virginia Department of Transportation (VDOT) reference.

- As Built Plans, Titled "Proposed Bridge on Opitz Blvd. over Tte.95, Ramp G & N.B.C.C RD., Prince William Co.-0.4 Mi N. Int. Rte 642, Proj. 0095-076-112, B636," Commonwealth of Virginia, Department of Highway and Transportation, dated October 24, 1979

A total of nine (9) historic Standard Penetration Test (SPT) test borings were provided in the as-built plans. A summary of the borings is provided in the following table.

Table 4.1: Summary of Historic Test Borings							
Structure	Traffic Lane ⁽¹⁾	Boring No.	Station & Offset	Boring Grades		Ground water EL (ft.)	Decomposed Rock ⁽²⁾ EL (ft.)
				Top EL (ft.)	Bottom EL (ft.)		
Abutment A	W.B.L.	1	Sta.65+44; 15' LT	194.5	174.0	181.7	184.0
	E.B.L.	2	Sta.65+44; 15' RT	193.1	172.2	179.9	182.6
Pier 1	W.B.L.	4	Sta.66+52; 10' LT	193.1	172.9	180.0	178.1

Table 4.1: Summary of Historic Test Borings

Structure	Traffic Lane ⁽¹⁾	Boring No.	Station & Offset	Boring Grades		Ground water EL (ft.)	Decomposed Rock ⁽²⁾ EL (ft.)
				Top EL (ft.)	Bottom EL (ft.)		
Pier 2	W.B.L.	6	Sta.68+10; 10' LT	178.4	157.7	170.0	167.9
	E.B.L.	5	Sta.68+10; 10' RT	179.5	148.7	168.6	169.0
Pier 3	W.B.L.	8	Sta.69+78; 10' LT	172.7	147.3	166.7	162.7
	E.B.L.	7	Sta.69+77; 20' RT	172.7	151.7	166.7	163.7
Abutment B	W.B.L.	10	Sta.70+18; 13' LT	169.8	144.7	167.0	165.3
	E.B.L.	9	Sta.70+18; 20' RT	169.6	153.4	166.0	165.1

Notes: (1) Abbreviations: W.B.L. – West Bound Lane; E.B.L.– East Bound Lane.
 (2) Decomposed rock identified in the boring logs generally indicates an SPT blow-count (blows per foot) greater than 50.

The test boring logs and the review results are provided in a WRA memo dated September 22, 2021, and which is included as Appendix B.

5. Subsurface Investigation

A total of twenty-five (25) Standard Penetration Test (SPT) borings were performed for the current project, to supplement the historic geotechnical data. The borings were drilled for the design of bridge structures, retaining walls and pavements. The drilling was performed by Soil and Land Use Technology (SaLUT), Inc., from Glenburnie, Maryland, from September 2021 to November of 2021. Full time inspection and logging of the soil borings soil borings was provided by WRA.

The test boring locations were staked by H&B Surveyors. The borings were advanced using hollow-stem augers and soil samples were recovered from the borings at 2.5 feet interval for the top 20 feet and at 5 feet intervals thereafter. The soil samples were recovered by driving a Standard Penetration Test 1 3/8-inch ID (2-inch OD) split-spoon sampler in accordance with ASTM D-1586 specifications. The sampler was first seated about 6 inches to penetrate through the loose cuttings and then driven an additional 1 foot with blows of a 140-pound automatic hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is typically designated as the Standard Penetration Resistance (N) value. The penetration resistance is an index of the soil’s strength, density, and behavior under applied loads. Soils obtained from the sampling device were sealed in glass sample jars and transported to our soils testing laboratory. The recovered soil samples were inspected and identified by the WRA Geotechnical Engineer per Unified Soil Classification System (USCS). Bulk samples were taken at selected boring locations. For borings taken in roadways, pavement cores were obtained in selected borings. One undisturbed sample was obtained via a Shelby tube at selected at Boring B-A3-4. In addition to test borings, four (4) Dynamic Cone Penetrometer (DCP) testing WRA personnel performed and logged DCP testing using Corp of Engineers DCP equipment.

Test holes were in two general areas: along Opitz boulevard and along High Occupancy-Toll (HOT) lane facility. Following are the boring numbers with boring identification (name) for each area of the site.

- 9 borings along Eastbound Opitz Boulevard, along the area to be widened. These borings are numbered as B-A1-1 to BA-A1-4, B-A1-6, and B-PE-1 to B-PE-2. The PE borings were to obtain pavement cores along with one SPT sample at the east end of the existing bridge. It is noted that a planned boring B-A1-5 was cancelled due to utility conflict and replaced with a DCP-SW hole. A summary of these borings is provided in Table 5.1.
- 16 borings were drilled within the Transurban managed High Occupancy-Toll (HOT) lane facility. The boring numbers are B-A2-1, B-A3-1 to B-A3-9, and B-A4-1 to B-A4-8. These borings were drilled for widening of Opitz Blvd, and Maintenance of Traffic (MOT) within HOT facility. Table 5.2 summarizes these borings.

The test location plans for test borings and DCP are included in Appendix A. SPT boring logs, DCP logs, and pictures of pavement core are included in Appendix C.

5.1. SPT Borings for Structures

The following is a summary of test borings drilled for the design and recommendations of bridge structures and retaining walls.

Table 5.1: Summary of Structural Test Borings								
Structure	Boring ID	Boring Location ⁽³⁾			Ground EL ⁽³⁾ (ft.)	Boring Depth (ft.)	Ground water Depth (ft.)	Notes
		Ref.	Station	Offset				
SPL Wall ⁽²⁾	B-A1-3	Opitz Blvd	63+75	59 RT	209.4	30.0	N/E	---
	B-A1-4	Opitz Blvd	64+75	73 RT	203.9	28.8	23.5	---
Abut. A	B-A1-5	Opitz Blvd	64+75	55 RT	214.0	Note (1).		
Abut. B	B-A1-6	Opitz Blvd	70+30	46 RT	211.6	75.0	56.0	---
Abut. C	B-A2-1	T-Ramp	27+10	20 RT	188.0	59.0	23.5	---
T-Ramp	B-A3-1	T-Ramp	26+00	20 RT	187.0	40.0	20.0	---
MSE	B-A3-2	T-Ramp	25+00	12 LT	189.2	40.0	20.7	---
Wall	B-A3-3	T-Ramp	24+00	23 RT	185.4	30.0	19.5	---
&	B-A3-4	T-Ramp	23+50	6 LT	187.2	30.0	22.0	Shelby @14'
Roadway	B-A3-5	T-Ramp	22+00	35 RT	183.5	20.0	N/E	---
	B-A3-6	T-Ramp	21+00	2 LT	184.9	20.0	N/E	---
	B-A3-7	T-Ramp	19+99	33 RT	181.6	15.0	N/E	---
	B-A3-8	T-Ramp	19+00	4 LT	181.1	10.0	N/E	---
	B-A3-9	T-Ramp	17+99	29 RT	179.9	10.0	N/E	---
Notes	(1) Boring B-A1-5 was cancelled due to utility conflict. Results from Boring B-A1-4 and DCP-SW are utilized to verify existing historic boring results. (2) SPL – Soldier Pile and Lagging wall at the south slope of the west approach behind Abutment A. (3) Stationing and elevations are interpolated from the drawings. Borings were staked per drawing coordinates.							

5.2. Pavement Area Test Borings

Summary of pavement borings are provided in the following table, Table 5.2. These borings are drilled for Opitz Boulevard widening and for Maintenance of Traffic (MOT). These borings include and pavement cores at each hole with at least one SPT sample. It is noted that the pavement thickness information included in the structural borings were also used for pavement recommendations.

Table 5.2: Summary of Pavement Test Borings									
Area	Boring ID	Boring Location ⁽¹⁾			Ground EL ⁽²⁾	Boring Depth (ft.)	Pavement Core		
		Lane	Station (ft.)	Offset (ft.)			HMA Depth (inch)	Subbase	
								Depth (inch)	Material
Opitz Blvd	B-A1-1	EB Decel Lane	63+25	41 RT	212.5	15.0	12.0	4	CRA
	B-A1-2		64+25	41 RT	214.2	20.0	11.0	7	CRA
	B-PE-1	EB Outside Shoulder	70+75	50 RT	209.8	3.2	4.5	10.5	CRA
	B-PE-2		71+25	52 RT	208.1	3.2	3.0	11	CRA
I-95 HOT Facility	B-A4-1	I-95 XBL East Shoulder	727+80	17 RT	186.1	8.0	14.0	10	CRA
	B-A4-2		724+55	17 LT	183.0	8.0	17.0	8	CRA
	B-A4-3	I-95 XBL	721+55	18 RT	180.2	8.0	17.0	8	CRA
	B-A4-4	I-95 XBL West Shoulder/ Gore to Gates	718+64	18 LT	179.0	8.0	15.0	9	CRA
	B-A4-5	I-95 XBL East Shoulder	686+81	18 LT	172.1	8.0	16.0	9	CRA
	B-A4-6		682+81	18 RT	168.3	8.0	15.0	10	CRA
	B-A4-7	I-95 XBL West Shoulder	672+06	18 LT	149.8	8.0	16.0	9	CRA
	B-A4-8		668+56	18 LT	140.3	8.0	15.0	33	CRA
Notes	(1)	Stationing and elevations are interpolated from the drawings. Borings were staked per drawing coordinates							
	(2)	Groundwater was not encountered in pavement test borings listed herein... CRA- Crushed Aggregate							

Photographic logs of the pavement are included in Appendix C.

6. Soil Laboratory Testing

Soil samples recovered from the field explorations were transported to our soil laboratory and select soil samples were subjected to various testing to determine additional engineering characteristics of the existing on-site soils. Laboratory tests that were conducted on selected soil samples included natural moisture content tests, Atterberg Limits, consolidation, pH and resistivity, and sieve analysis tests. All tests were

performed at SaLUT's AASHTO certified laboratory or a certified laboratory subcontracted by SaLUT. The results of the classification tests are summarized in the following table.

Table 6.1: Summary of Soil Classification Test Results							
Boring ID	Sample No	Depth (ft.)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Fines (%)	USCS
B-A1-1	S3	6.0 - 7.5	30.0	68	41	76	CH
B-A1-2	S5	11.0 - 12.5	26.6			76	
B-A1-3	Bulk	1.5 - 8.0	1.4	44	22	38	SC
B-A1-3	S3	5.0 - 6.5	13.9			25	
B-A1-6	Bulk	1.5 - 8.0	7.0	77	58	26	SC
B-A1-6	S6	13.5 - 15.0	15.6	35	11	23	SC
B-A1-6	S13	43.5 - 45.0	19.2	35	11	98	CL
B-A2-1	S4	8.5 - 10.0	12.7			22	
B-A2-1	S10	28.5 - 30.0	10.1			46	
B-A3-1	Bulk	1.5 - 8.0	13.1	41	18	28	SC
B-A3-2	Bulk	1.5 - 8.0	23.9	52	21	66	MH
B-A3-2	S5	11.0 - 12.5	14.5			21	
B-A3-3	S4	8.5 - 10.0	22.4	41	16	89	CL
B-A3-4	S5	11.0 - 12.5	19.7	55	27	45	SC
B-A3-4	ST-1	14.0 - 16.0	19.9	30	9	46	SC
B-A3-5	S-2	3.5 - 5.0	15.4			27	
B-A3-5	S-4	8.5 - 10.0	16.6	46	21	35	SC
B-A3-7	S3	6.0 - 7.5	14.8			20	
B-A3-8	S3	6.0 - 7.5	29.3			56	
B-A3-9	S2	3.5 - 5.0	19.1			24	
B-A4-2	S1	2.0 - 4.0	15.6			27	
B-A4-4	S1	2.0 - 4.0	12.9			32	
B-A4-6	S1	2.0 - 4.0	24.2			55	
B-A4-8	S1	2.0 - 4.0	16.2			59	
Note: NP – Non-plastic; USCS – Unified Soil Classification System							

Moisture density relationship (Proctor) test and CBR results are included in the following table.

Table 6.2: Summary of Proctor and CBR Test Results							
Boring ID	Sample No	Natural Moisture Content (%)	USCS Classification	Max. Dry Density (pcf) ⁽²⁾	Optimum Moisture (%)	CBR (%)	Swelling (%)
B-A1-3	Bulk	1.4	SC	120.4	11.7	13.0	0.5
B-A1-6	Bulk	7.0	SC	120.1	11.8	10.9	0.2
B-A3-1	Bulk	13.1	SC	121.1	11.2	12.3	0.1
B-A3-2	Bulk	23.9	MH	105.2	17.9	4.0	3.8
Notes:		(1) Proctor Method per VDOT procedures (equivalent to ASTM Standard Proctor) (2) Abbreviation: pcf – pounds per cubic foot.					

A single one-dimensional consolidation test was performed on a Shelby Tube sample obtained from SPT boring B-A3-4. The results are summarized in the following table.

Table 6.3: Consolidation Test Results Summary							
Boring ID	Sample No	Sample Depth (ft.)	USCS	Pre-Consolidation Pressure (tsf)	Virgin Compression Index (pcf)	Recompression Index (%)	Notes (%)
B-A1-4	ST-1	14.0-16.0	SC	0.893	0.124	0.017	Note (1)
Notes:		1. Specific gravity of the soil estimated at 2.65					

In addition to samples listed in Tables 6.1 to 6.3, all other SPT samples were tested for natural moisture test per VDOT protocol. Complete results of the soil laboratory tests are included in Appendix D.

7. Description of Subsurface Conditions

7.1. General Stratigraphy

Based on the review finding of historic test borings, and the results of current subsurface investigations, findings of the subsurface investigations, project limit subsoils are generalized to following stratigraphy.

Topsoil

One test boring, which was drilled in an unpaved area, a 4-inch-thick layer of topsoil was encountered.

Stratum F: Existing Fill

Fill is visually identified during drilling. It is composed of material placed during previous site development. The encountered fill materials generally consisted of brown, loose to medium dense silty sands with gravel (SM/SP-SM). Uncorrected SPT blow counts ranged from 6 blows per foot to 9 blows per foot (bpf), with an average blow count of 6 bpf.

Stratum P: Possible Fill/Potomac

Below the fill stratum, soils identified as possible fill or Potomac formation soil generally consisted of gray and brown, medium to coarse, silty sand with a varying percentage of gravel. Occasional fine grain soil

layers were also encountered within this layer. Uncorrected SPT N values ranged between 6 and 16 bpf, with an average blow count of 14 bpf.

Stratum R: Residual Soils

Upper residual soils generally consisted of gray and brown, medium to coarse, silty sand with varying percentage of gravel. Uncorrected SPT N values ranged between 10 and 44 bpf, with an average blow count of 30 bpf.

Stratum D: Decomposed Rock

Lithified weathered graphitic schist was encountered below the residual soil layer in most of the borings. Uncorrected SPT N values ranged between 55 bpf to 50 blows per 3” penetration. This layer extends to the maximum depth explored.

Core-able bedrock was not encountered in the depth drilled.

7.2. Groundwater Conditions

During the subsurface investigation programs, the deep borings encountered groundwater during drilling. The test borings were backfilled after completion and no long-term groundwater readings were taken. The following table summarizes the encountered groundwater levels during the investigations.

Table 7.1: Summary of Groundwater Readings				
Boring ID	Location	Boring Ground Elevation (ft.)	Groundwater Depth	
			Depth (ft.)	Elevations (ft.)
B-A1-4	SPL Wall @ Abutment A Approach	203.9	23.5	180.4
B-A1-6	Abutment B Approach	211.6	58.5	153.1
B-A2-1	T-Ramp @ Bridge	188.0	23.5	164.5
B-A3-1	T Ramp MSE Wall	187.0	20.0	167.0
B-A3-2	T Ramp MSE Wall	189.2	20.7	168.5
B-A3-3	T Ramp MSE Wall	185.4	19.5	165.9
B-A3-4	T Ramp MSE Wall	187.2	22.0	165.2
Note: Readings listed corresponds to groundwater depths encountered during drilling.				

Average groundwater elevation is estimated to be 167± ft. Fluctuations in groundwater depths should be anticipated along the project site since the depth to groundwater is influenced by water infiltration from rainfall and/or surface runoff, changes in surface topography, drainage systems and drought or wet time periods during the year. The groundwater depths and elevations are intended to provide a reference of measured groundwater levels during the subsurface explorations.

7.3. Design Soil Parameters

Design soil parameters were generally developed based on empirical relationships between corrected SPT blow counts (N60), the angle of internal friction, and unit weight of granular soils. A typical calculation of the friction angle is presented Appendix E, Section E1.2. Table 7.2 provides a summary of the design soil parameters used in analysis.

Table 7.2: Summary of Design Soil Parameters			
Stratum	Unit Weight, γ (pcf)	Internal Friction Angle, ϕ (degree)	Cohesion, Intercept c (psf)
Existing Fill (Stratum-F)	120 pcf	30°	0
Possible Fill/Potomac (Stratum-P)	120 pcf	32°	0
Residual Soils (Stratum-RS)	125 pcf	34°	0
Decomposed Rock (Stratum-D)	130 pcf	38°	0

7.4. Seismic Site Classifications

Based on subsurface conditions defined by the preliminary engineering subsurface investigation borings, Seismic Site Class D may be utilized for seismic design considerations. This estimation is based on average SPT N values from the test borings and the methods described in Table 3.10.3.1-1 of AASHTO LRFD Bridge Design Specifications. Detailed calculations are included in Appendix E.

8. Recommendations for Retaining Walls and Modified Slopes

The grade separation for the proposed T-Ramp is achieved by three MSE walls, namely Wall-1, Wall-2 and Wall-3. Wall 2 is at the northern end at Abutment C, providing grade separation normal to the T-Ramp axis. Grade separation on the east and west side of the ramp is provided by MSE Walls 1 and 3.

The T-ramp will be constructed to a width of 36'-4" using back-to-back retaining walls. The top of the ramp wall will be at EL 212± ft at Abutment C. The wall extends from Station 20+00 at the south end to 27+09 at the bridge (Abutment C). At abutment C, the effective wall heights for design varies from 26 feet to 30 feet, end to end. Noted that the effective heights are estimated by adding 2 feet of embedment to the exposed height.

Table 8.1: Design Parameters for Retaining Walls		
Item	Unit Weight, γ	Internal Friction Angle, ϕ
MSE Wall Reinforced Granular Backfill ⁽¹⁾	105 pcf	34°
SPL Wall Backfill (VDOT Select Type I, CBR 30) ⁽²⁾	120 pcf	34°
Foundation Soils	120 pcf	30°
Notes: (1) External stability calculations are based on parameters provided herein. (2) Select fill should be per VDOT Select Type I, CBR=30 per VDOT Spec Section 207.02		

We recommend that for reinforced fill for the MSE consist of #57 stone.

8.1. MSE Wall 2 at Abutment C

The internal stability analysis, bearing check, and settlement estimations were performed for the wall using the average effective wall height of 28 feet. Due to expected additional horizontal loads, and overlapping of walls 1 and 3, the design strap length for wall 2 is set at 80% of the wall height, i.e. 23 feet. The external stability analyses bearing capacity checks are based on Load and Resistance Factor Design (LRFD) methods and AASHTO recommended load and resistance factors are used for the analyses. The LRFD analyses results indicate the Capacity Demand Ratio (CDR) is greater than one for Wall 2. The required maximum factored bearing pressure (demand) is 6.5 ksf (kips/sq.ft. Available factored bearing resistance (Capacity) is estimated at 13.6 ksf. Calculation details are included in Appendix E (Section E.2.1).

The settlement analysis was performed using the Modified Hough Method (FHWA, 2006a) with elastic stress distribution estimations. A uniform infinite loading settlement pressure due to exposed average wall height of 28 feet was considered in the analyses and the settlement is estimated at 0.3 inches. The details of the calculations are included in Appendix E. It is noted that the piles are not expected to develop negative skin frictions at this settlement levels and the piles may be installed prior to the construction of the MSE wall for the T-Ramp and friction isolating cans are not required.

8.2. MSE Walls for T-Ramp

The T-ramp will be constructed to a width of 36'-4". The wall extends from Station 20+00 (south end) at the south end to Station 27+09 at Abutment C (north end). The effective height of the wall will be less than 10 feet beyond Sta.22+50 towards the south. The strap length in these stations should be the project recommended minimum of 8 feet. For back-to-back wall check, the reinforcement strap lengths are set at 70% of the wall height. A check for the wall classifications of Wall1 and Wall 3 was performed to verify whether they are of Back-to Back MSE (BBMSE) walls or standalone MSE walls. The check was performed in accordance with FHWA (2009) guidelines. The summary of the results is provided in the following table.

Table 8.2: Summary of Wall Conditions and Estimated Strap Lengths						
Station	Effective Design Height (ft.)		Gap D ⁽¹⁾ (ft.)	Wall Type ⁽²⁾	Estimated Strap Length (ft.)	
	West Wall	East Wall			West Wall	East Wall
27+00	26.0	30.0	-2.9	BBMSE	20.7	23.5
26+50	24.0	28.0	-0.1	BBMSE	20.4	23.2
26+00	24.0	27.0	0.6	BBMSE	20.7	22.8
25+50	22.0	26.0	2.7	MSE	15.4	18.2
25+00	21.0	23.0	5.5	MSE	14.7	16.1
24+50	19.0	19.0	9.7	MSE	13.3	13.3
24+00	17.0	17.0	12.5	MSE	11.9	11.9
23+50	15.0	15.0	15.3	MSE	10.5	10.5
23+00	13.0	13.0	18.1	MSE	9.1	9.1
22+50	10.0	10.0	20.3	MSE	8.0	8.0

Notes: (1) BBMSE is designated - when distance between the walls, D < 2 ft.
 (2) BBMSE – Back-to-Back Mechanically Stabilized Earth wall

For constructability, we recommend that # 57 stone should be used behind the reinforced zone.

Back-to-Back Wall Configurations

The MSE walls from Sta.27+00 to Sta. 25+00 are classified as BBMSE walls and the straps lengths provided in the Table 8.2 include an overlap length per FHWA recommendations (30% of short wall height, $0.3H_2$). No external stability analyses are warranted for the walls, as both walls will act as a single gravity unit. For bearing capacity concern, the BBMSE configuration is compared to the Wall 2. The BBMSE configuration has lower loading and larger foundation width than Wall 2, therefore, Wall 2 recommendations can be conservatively used for this section. Assuming an infinite loading conditions similar to Wall 2 with 26 feet of fill the wall settlement in the middle station (Sta.26+00) of the configuration will be 0.6 inches.

Stand Alone MSE Wall Configurations

The MSE walls from Sta.25+00 to Sta. 20+00 are classified to be standalone MSE wall configurations with a maximum height of 19 feet. A strap length of 70% of the wall height is recommended. The effective wall heights south of Sta.22+50 (Sta.22+50 to Sta.20+00) are less than 10 feet and a minimum strap length of 8 feet should be used in these stations. The rest of wall strap length estimations (Sta. 22+50 to Sta. 25+00) are provided in the Table 8.2. Internal stability analyses and bearing resistance checks were performed at Sta.24+50 and Sta.22+50 for completeness.

Table 8.3: Summary of Global Stability and Bearing				
Station	Maximum Wall Height	Factor of Safety against Deep Seated Failure	Factored Bearing Pressure	
			Demand	Capacity
STA 24+50 to 22+50	19 feet	1.62	4.13 ksf	8.29 ksf
STA 22+50 to End	10 feet	1.65	2.54 ksf	5.14 ksf

It is noted that a layer of soft fine soil was encountered in Boring B-A3-4, at Sta.23+50 (Wall height 15 feet). Additional settlement analyses were performed for this area, which include a consolidation settlement analysis for the soft layer, and elastic settlement estimations for granular layers (See Appendix D).

Settlement Review

The summary of settlements is included in the following Table. It is noted the wall settlement gradient is less than 2.0 inches per 100 feet.

Table 8.4: Summary of Settlement Calculations			
Station	Effective T-Ramp Height (ft.)		Estimated Settlements
	At West Wall	At East Wall	
27+00	26.0	30.0	0.30 inch ⁽¹⁾
26+00	24.0	28.0	0.60 inch
24+50	19.0	19.0	0.35 inch
23+50	13.0	13.0	1.85 inch ⁽²⁾
22+50	10.0	10.0	0.53 inch

Notes: (1) Settlement estimations corresponds to Abutment C, located at the edge of RT-Ramp fill.
 (2) Value includes consolidated settlement due to 9 ft soft layer, encountered 9 feet below the subgrade.

The settlement calculation details for walls are included in Appendix E. Total settlement and differential settlement of the MSE walls are within VDOT acceptable tolerances (within 100 feet of the bridge and beyond). However, due to estimated inconsistent differential settlements, we recommend slip joints for both walls (Wall 1 and Wall 3) at Stations 23+00 and 22+00.

Preliminary Global Slope Stability Analysis

A global slope stability analysis was performed for a typical stand-alone MSE wall system. The results of the analysis are given in Appendix E.2. The retaining wall will be designed by the contractor’s wall designer, with reinforcements strength and placement determined for internal stability concern. For this preliminary global stability analysis, the MSE wall is assumed to be a coherent gravity structure. A cohesion value of 3000 psf is assigned to the reinforced zone to ensure that the trial slip surfaces in a limit equilibrium slope stability analysis will not go through the reinforced zone (zone behave as a coherent gravity structure). Once the strength and vertical placement of the reinforcements are available a “final combined failure check – global stability analysis with reinforced #57 stone” can be performed by contractor’s wall designer. A note will be added to the MSE wall drawing requiring this check be performed by the wall designer.

8.3. RW-3 Retaining Wall at Abutment B Approach (Southeast Quadrant)

The south end of the approach embankment slope behind Abutment B is proposed to be widened by approximately 4 feet. A VDOT RW-3 retaining wall is proposed from Sta.70+25 to Sta.71+50. The effective wall height (for bottom of the wall to top of retained soil/pavement) varies from 8 feet (Sta.70+25) to 4 feet (Sta.71+50). The effective wall height includes 3 feet (drawings indicated 2.5 ft approximated to 3 feet) of embedment at the toe. It is noted that the maximum effective height includes the exposed height plus the embedment.

The existing approach slope consist of structurally compacted granular soil, sloped approximately at 2H:1V. The soil conditions at this location are estimated using data from nearest test borings DCP test hole DCP-SE. The compactness of the soil at proposed foundation subgrade appears to be medium dense based on SPT (N1)₆₀ values (SPT N value corrected for overburden and hammer efficiency). The conversion calculations of DCP index values to SPT N are included in Appendix E. Allowable bearing pressures with wall height are based on VDOT RW-3 standard sheet. The values are listed in the following table.

Table 8.5: Compression Loads and Bearing Resistances for RW-3 Walls			
Wall Height (ft.)	Foundation width (ft.)	Maximum Compression at Toe ⁽¹⁾ (Demand, psf)	Allowable Bearing Capacity ⁽²⁾ (Capacity, psf)
4	2.4	1141	1200
5	3.0	1427	1500
6	3.6	1712	1800
7	4.2	1997	2000
8	4.8	2283	2300
Notes: (1) The values are based on VDOT Standard detail			
(2) Allowable bearing capacity to exceed max compression for conservativeness.			

The allowable bearing capacity calculations for the tallest wall (8’) are provided based on the deduced friction angle of subgrade material. As part of subgrade preparation, we recommend that the foundation

subgrade should be densified by 10 passes of ride on vibratory compaction equipment. Details of the bearing capacity calculations with AASHTO slope reduction are included in Appendix E.

It is noted that the retained wall height listed in the above table includes a wall embedment of 3 feet. a (retained soil height is 1 foot to 5 feet). The resulting average additional soil load (a soil prism of 3 feet height and 6 feet base) is estimated at 1 kip per linear foot of wall (equivalent or less than a vehicle load). For this light additional loads, no additional slope stability analyses are warranted for this well performing, heavily vegetated 2H:1V slope.

8.4. Soldier Pile and Lagging (SPL) Wall at West Approach (Southwest Quadrant)

A soldier pile and lagging wall is proposed along the south side slope of the Abutment A approach embankment. The wall is designed to retain soil up to 12 feet. Proposed wall spans from Sta.63+22 to Sta.65+38. Cross sections of the wall are included in Appendix A.9

Design of the soldier pile and spacing is for the entire wall which is based on section at Sta.64+50, where the wall retention is at its maximum. The wall is analyzed per LRFD Simplified Cantilever Method (Teng Method) for the required section, spacing and embedment. Top deflection (Service conditions) is estimated using the DeepEx software. The results are summarized as follows:

- Pile spacing 6 feet, Required $Z_x = 126 \text{ inch}^3$; Selected Pile HP 14x 89 with $Z_x = 145 \text{ inch}^3$
- Embedment Tip Elevation EL 178. This includes a minimum embedment 24 feet with 10 feet into decomposed rock stratum.
- Anticipated top deflection: 1.0 inch upon initial backfilling.

The calculation details are included in Appendix E, Section E4. Granular backfill compacted to VDOT specifications is recommended for the new fill behind the SPL wall. The soldier piles can be installed within a drilled shaft or be driven using an impact hammer. For the Impact driving installation of the soldier piles, a hammer capable of driving these piles to the design tip should be selected by the contractor. In addition, we recommend location templates and a fixed lead rig should be utilized for the driven pile installation option for accuracy.

8.5. Sliver Fill at East Approach (Northeast Quadrant)

The approach embankment to Abutment B is proposed to be extended along the north face of the slope from Sta.70+25± ft to Sta. 70+75 as part of the current improvements. The finished grade after the fill will make the slope to 2H:1V, shallower than the existing configuration. For example, at Sta.70+25, where the embankment height is 35 ft, the sliver fill widths are 3 feet at the top and 15 feet at the bottom, making the slope to 2H:1V from an existing configuration of 1.65H: 1V. Since the existing slope performed well and current additional fill provides extra toe loading by shallowing the slope, it is determined that the proposed configuration will be more stable than the existing and is acceptable from a stability standpoint.

The sliver fill slope area is covered with vegetation. A few small, isolated pockets of soil erosion caused by overtopping of pavement surface water flow, were observed at the top of the slope. Existing soil conditions along the slope area were evaluated with two DCP test holes, DCP-NE-Upper and DCP-NE-Mid. Based on the test results and visual observations, the existing slope is in good condition with no visible stability issues and found to be suitable for the slope expansion. We recommend that the eroded areas be excavated as part of the benching requires as specified in Section 303.04 of the Standard Specifications

as the fill is placed. Roadway drainage should be directed away from the slope or channelized using an armored flume.

The additional fill for the embankment expansion should be placed on a properly benched subgrade and compacted in lifts per VDOT standards. The fill soil should have a CBR of 5 or better, placed in 8-inch-thick loose lifts, and compacted in place to VDOT standards.

9. Foundation Recommendations

New foundations are required at six (6) locations for the widening of existing Opitz Boulevard along the south edge of the east bound right lane. New foundations are required for the widening of the two abutments (Abutment A at west end & Abutment B at east end) and three piers (Piers 1, 2, & 3). The new Abutment C will be added to the new bridge to receive the T-Ramp to the Express Lanes.

A steel HP 10x57 piles driven in to decomposed rock stratum are proposed for the support of new bridge elements. The geotechnical foundation recommendations are based on the results of historic borings drilled within the footprint of the bridge foundation elements, and adjacent test borings recently drilled as part of this effort. For proposed new Abutment C, the current boring (B-A2-1) was drilled within the footprint of Abutment C.

9.1. Validation of Historic Borings

The historic boring results are validated by comparing their results to the two adjacent boring logged by a WRA geotechnical engineer. The historic borings are within the footprint of the existing bridge elements. The key comparison is made on top grade of high blow count decomposed rock layer. The pile tip estimations are mainly based on the embedment into the decomposed rock stratum.

It is noted the current boring blow-counts corresponds to high-efficient (90%±) auto hammer testing (SPT blow count N_{90}) whereas, based on the year drilled and the results, the historic borings would have been performed using the donut or standard safety hammer with efficiency at 60%± (SPT blow count N_{60}). The decomposed rock stratum classification is, therefore, based on residual soils with SPT blow counts of $N_{60} > 50 ±$ for historic borings, and $N_{90} > 33 ±$ current borings. The validation summary is provided in the following table.

Table 9.1: Validation of Historic Borings for Foundation Design							
Bridge Element	Pile Cap Subgrade EL (ft.)	Boring Type	Boring ID	Opitz Blvd Station (ft.)	Boring Top EL (ft.)	Top of DR Stratum ⁽¹⁾ (ft.)	Notes
Abutment A	204.8	Current	B-A1-4	64+75	203.9	184.9	Compared well
		Historic	1	65+44	194.5	183.5	
		Historic	2	65+44	193.1	180.6	
Pier 1	189± ⁽²⁾	Current	B-A1-4	64+75	203.9	184.9	Compared OK to the interpolated DR stratum to EL 170.2
		Historic	4	66+52	193.1	178.1	
		Current	B-A2-1	67+50 ⁽¹⁾	188.0	162.0	

Table 9.1: Validation of Historic Borings for Foundation Design							
Bridge Element	Pile Cap Subgrade EL (ft.)	Boring Type	Boring ID	Opitz Blvd Station (ft.)	Boring Top EL (ft.)	Top of DR Stratum ⁽¹⁾ (ft.)	Notes
Pier 2.	170± ⁽²⁾	Current	B-A2-1	67+50 ⁽¹⁾	188.0	162.0	Compared OK. Variation noticed in Historic borings.
		Historic	5	68+10	179.5	169.0	
		Historic	6	68+10	178.4	167.2	
Pier 3	167± ⁽²⁾	Historic	7	68+77	172.7	162.2	Compared OK Variation noticed in Historic borings.
		Historic	8	69+78	172.7	157.2	
		Current	B-A1-6	70+30	211.6	163.1	
Abutment B	201.1	Historic	9	70+10	169.9	165.1	Compared well
		Historic	10	70+18	169.8	165.3	
		Current	B-A1-6	70+30	211.6	163.1	
Notes: (1) Approximate value interpolated from drawings. (2) Approximate values of existing pier pile cap subgrades.							

A reasonable agreement / comparison of current borings and historic borings is achieved.

9.2. Design Recommendations for Driven Piles

Steel HP 10x57 beam piles are recommended for the support of expanding existing bridge elements and the new Abutment C for the T-Ramp connection to the bridge. The piles will be driven into Stratum D, the decomposed rock layer to a nominal (ultimate) resistance of 385 kips. This nominal value yields a factored geotechnical resistance of 250 kips when performing dynamic testing at each substructure and applying 0.65 as the appropriate resistance factor. The axial resistance is estimated using the DRIVEN program, and the complete results are included in Appendix E. A summary of estimated pile tip elevations and lengths are included in the following table.

Table 9.2: Summary of Estimated Pile Tips for Proposed Bridge Elements								
Bridge Element	Pile Cap Subgrade EL (ft.)	Assumed Existing Grade EL (ft.)	Boring Type	Boring ID	Opitz Blvd Station (ft.)	Ground Water EL (ft.)	Top EL of DR Stratum ⁽¹⁾ (ft.)	Estimated Pile Tip EL (ft.)
Abut A	205	205	Historic	1 & 2	65+44	182	180	150
Pier 1	189	191	Historic	4	66+52	182	178	144
Pier 2.	186	191	Historic	5 & 6	68+10	167	168	146
Pier 3	185	191	Historic	7 & 8	69+78	166	160	145
Abut B	201	191	Historic	9 & 10	70+15	167	165	151
Abut C	191	192	Current	B-A2-1	67+50 ⁽³⁾	185	162	141
Notes: (1) Bearing stratum of pile foundation, tip elevations for HP 10x57 driven to 385 kips nominal.								

Based on the axial capacity results, we estimate that the piles can resist the anticipated a factored uplift load of 7 kips per pile. The DRIVEN results are included in Appendix E.

A lateral load analysis is performed for a pile in the typical group configuration. Based on the results, piles have the required lateral load resistance of 5 kips/pile (factored) in the weak axis direction with three rows of piles. LPILE results are included in Appendix E.

One of the 4 soil samples subject to corrosivity testing indicated potentially slightly aggressive soils within the existing abutment approach fill embankments according to Chapter 23 of the Structure and Bridge Manual by having a resistivity value of 2540 ohm-cm. Although not necessarily considered aggressive by FHWA guidelines the long-term axial structural capacity of the pile section was checked after a reduction of 0.05-inch loss of section at the flanges and web according to Chapter 23.

9.3. Pile Drivability and Dynamic Testing

The Wave Equation Analysis of Pile (WEAP) was performed for a pile in typical configuration in order to determine pile drivability and preliminary hammer energy range for pile installation. Based on the analyses, a pile hammer within the energy range of 40 ft-kips to 60 ft-kips is expected to install the piles to the required nominal resistance, without overstressing the pile. Contractor shall submit a preliminary WEAP analysis for the selected installation equipment, with driving resistance at the required nominal resistance range from 36 blow/ft to 96 blows/ft.

The pile nominal resistance should be verified by Pile Driving Analyzer (PDA) testing at each substructure location during construction (totaling 6 locations). The PDA testing should be performed during initial drive, or during a restrrike on a test pile at each location. The test pile should be at least 10 feet longer than the production piles of the location. The pile installation criteria for the production pile should be developed based on the PDA results.

10. Pavement Recommendations

10.1. Opitz Boulevard Widening

The eastbound Opitz Boulevard will be widened to accommodate an additional traffic lane associated with the T ramp. Following are the summary of existing pavement sections encountered in the Opitz Boulevard test borings. Pavement widening should be in accordance with VDOT Standard WP-2.

Table 10.1: Existing Pavement Section at Opitz Boulevard					
Location	Boring ID	Asphalt (inch)	Agg. Base (inch)	Concrete (inch)	Notes
East Bound Travel Lane West Approach	B-A1-1	12.0	4.0	---	---
	B-A1-2	11.0	7.0	---	---
East Bound Shoulder, East Approach	B-A1-6	5.0	12.0	---	---
	B-PE-1	4.5	10.5	---	---
	B-PE-2	3.0	11.0	---	---

We recommend that the new pavements for the widening area match the thickness of the existing pavements. In addition, new prepared subgrade and the aggregate base layer should ensure positive

drainage towards the south edge of the pavement. Following are the recommended thickness for the new pavement.

Table 10.2: Opitz Boulevard – Recommended New Pavement				
Layer Name	Layer Type	Thickness	Summary	
Asphalt Surface	SM-9.5 D	2.0 inch	Total HMA	12.0 inch
Asphalt Intermediate	IM-19.0A	2.0 inch		
Asphalt Base	BM-25 A	8.0 inch		
Aggregate Base	21B	6.0 inch	Aggregate Base	6.0 inch
Notes: (1) Standard UD-4 edge drains along all new pavement sections (2) Standard Combination Underdrain (CD-2) shall be provided at grade sags, bridge approaches, and at the lower end of undercut areas.				

. Aggregate base should extend 6 inches beyond the sides of the base.

10.2. Pavements for T-Ramp and Express Lanes

The eastbound Opitz Boulevard will be widened to accommodate an additional traffic lane associated with the T ramp. Following are the summary of existing pavement sections encountered in the Express Lane test borings.

Table 10.3: Existing Pavement Section - I-95 Express Lanes						
Boring ID	Location	Existing Pavement Section				Notes
		Pavement Core	Asphalt (ASPH) (inch)	Agg. Base (BASE) (inch)	Concrete (CONC) (inch)	
B-A2-1	I-95 HOT T-Ramp		7.0	17.0	6.0	Note (1)
B-A3-1	I-95 HOT T-Ramp	---	15.0	4.0	---	
B-A3-2	I-95 HOT T-Ramp	---	18.0	18.0	---	
B-A3-3	I-95 HOT T-Ramp	---	15.0	5.0	4.0	Note (2)
B-A3-4	I-95 HOT T-Ramp	---	18.0	18.0	---	---
B-A3-5	I-95 HOT T-Ramp	---	19.0	9.0	---	---
B-A3-6	I-95 HOT T-Ramp	---	19.0	18.0	---	---
B-A3-7	I-95 HOT T-Ramp	---	15.0	9.0	---	---
B-A3-8	I-95 HOT T-Ramp	---	19.0	23.0	---	---
B-A3-9	Road south of T ramp	---	12.0	9.0	3.0	Note (3)
B-A4-1	I-95 XBL MOT	1	14.0	10.0	---	---
B-A4-2	I-95 XBL MOT	1	17.0	8.0	---	---

Table 10.3: Existing Pavement Section - I-95 Express Lanes						
Boring ID	Location	Existing Pavement Section				Notes
		Pavement Core	Asphalt (ASPH) (inch)	Agg. Base (BASE) (inch)	Concrete (CONC) (inch)	
B-A4-3	I-95 XBL MOT	1	17.0	8.0	---	---
B-A4-4	I-95 XBL MOT	1	15.0	9.0	---	---
B-A4-5	I-95 XBL Slip Ramp	1	16.0	9.0	---	---
B-A4-6	I-95 XBL Slip Ramp	1	15.0	10.0	---	---
B-A4-7	I-95 XBL Slip Ramp	1	16.0	9.0	---	---
B-A4-8	I-95 XBL Slip Ramp	1	15.0	33.0	---	---
Notes: (1) 7.0" ASPH + 6.0" CONC + 17.0" Base (2) 15.0" ASPH + 5.0" Base + 4.0" CONC (3) 9.0" ASPH + 3.0" CONC + 3.0" ASPH + 9.0" Base						

The test borings drilled for the T-Ramp wall foundation (B-A3 – xx borings) encountered a small portion of concrete within the pavement section. The borings were drilled for the T-Ramp foundation design and located at the edge of the travel lanes. Cores were not obtained in these sections. The auger took several minutes to penetrate the concrete. The B-A4 borings were drilled for pavement design. Pavement cores were recovered from these borings. These borings were drilled within the full depth shoulder and considered to reflect the existing conditions of the pavements.

The areas where the pavement sections with concrete will be excavated for the preparation of the MSE wall foundations. It is noted that the section depicted by Notes (2) is acceptable to be left in place, (15" HMA and 5" Base section above concrete) as it is adequate for the Express Lane traffic levels.

We recommend that the new pavements for the widening area match the thickness of existing pavement in the area to maintain a consistent section within the project limits. In addition, new prepared subgrade and the aggregate base layer should ensure positive drainage towards the south edge of the pavement. Following are the recommended thickness for the new pavement.

Table 10.4: I-95 Express HOT Lanes – Recommended New Pavement				
Layer Name	Layer Type	Thickness	Summary	
Asphalt Surface	SM-12.5E	2.0 inch	Total HMA	15 inches
Asphalt Intermediate	IM-19.0 D	2.0 inch		
Asphalt Base	BM-25.0 A	11.0 inch		
Aggregate Base	21B	15.0 inch	Aggregate Base	15 inches
Notes: (1) Standard UD-4 edge drains along all new pavement sections (2) Standard Combination Underdrain (CD-2) shall be provided at grade sags, bridge approaches, and at the lower end of undercut areas.				

Table provided pavement section is recommended for new expressway pavements including the T-Ramp. A validation pavement thickness evaluation is performed for this section and the results are included in Appendix E.6. For the analysis I-95 traffic count is conservatively assumed with a subgrade resilient modulus (M_r) value of 5000 psi. As expressway does not carry trucks, 1% truck traffic volumes is assumed to account for occasional heavy load traffic.

During construction, the aggregate base should extend 6 inches beyond the sides of the base.

10.3. MOT Use of Shoulder Pavements

Current construction sequence requires use of existing shoulders for Maintenance of traffic during construction. Following are the recommendations for the pavement section requirements for MOT.

HOT Lanes East Shoulder

Based on the results of current investigation, the shoulders have at least 14 inches of asphalt which is a sufficient section to support Express Lane traffic during construction.

Southbound I-95 Outside Shoulder

According to available record drawings the I-95 southbound outside shoulder has already been reconstructed to support Mainline traffic during the Express Lane work. Reviewed drawing indicating 10 inches of HMA thickness are included in Appendix E.6. A pavement thickness analysis performed to validate the existing thickness to support the MOT on a subgrade with $M_r=5000$ psi. The results of the analysis are included in the same appendix.

Opitz Blvd Northeast Quadrant

A new MOT section is required in a very short stretch along Opitz Blvd on the Northwest quadrant approaching the bridge. We recommend this portion should be fortified with the following section:

HMA: 2"- IM-19.0D
4" BM-25.0A
Subbase: 6" Aggregate Base 21B

Mill and Overlay

Area where the lines are eradicated, a 2-inch depth mill and overlay with SM-12.5E HMA mix layer is recommended. For Opitz Boulevard, mill and overlay with SM-9.5D HMA mix layer is recommended.

10.4. Subgrade Preparation and Construction Considerations

The new pavement and retaining wall subgrades should be observed by the geotechnical engineer during construction. Any unsuitable soils such as wet, loose, or fine soils with high plasticity should be undercut to a maximum of 3 feet and replaced with controlled compacted fill. Additional measures such as use of a separation fabric on undercut subgrade before placing the fill may be employed as recommended by the geotechnical engineer.

Unsuitable subgrade materials consisting of CH and MH materials are anticipated to be encountered at subgrade levels in the vicinity of borings B-A1-1, B-A1-2 and B-A3-2 which is in the vicinity of the start of the soldier pile wall. These areas are identified on the cross sections as areas to be undercut (3 ft. max) and replaced with CBR 5 material. The undercut will be approximately 10 feet wide, and approximately span from Sta 62+50 to Sta.64+75.

10.5. Subgrade Preparation for Storm Drain at T-Ramp Sta. 23+10

A 48-inch diameter concrete storm drain is proposed across the T-Ramp at approximately Sta 23+10. The invert of the pipe is at EL168 feet while under the embankment footprint. Based on the results of boring B-A3-4 at Sta.23+50, pipe subgrades consist of competent natural soils. Following are noted:

The materials below pipe subgrades are anticipated to be medium stiff clays to very dense residual soils. An acceptable bedding material and thickness would be the Standard Detail (PB-1) for subgrade condition identified as "Normal Earth Foundation", however the groundwater levels in this area expected vary between EL 165 and EL 169 which will result in pipe subgrades being wet during construction. To facilitate construction, we recommend 18 inches of undercut and backfill. The undercut should be backfilled with 12 inches of No.57 stone wrapped in separation fabric for groundwater control and subgrade preservation. The wrapped stone should be capped with a minimum 6" crusher run (Chapter 4 – Installation of Pipe Backfill and Testing, Page 10, VDOT Soils and Aggregate Compaction) or 6" of bedding material. Separation fabric is recommended to prevent fine particle migration through #57 stone and subsequent erosion/piping on surrounding native soils.

The calculated settlement due to embankment loading listed in Table 10.4 for this area is mainly due to the soft soils above the proposed storm drain. The materials below pipe subgrades are stiff clays and very dense residual soils, therefore, the settlement of the pipe due to embankment load are not a concern for the proposed concrete pipe.

11. References

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APPENDIX A

Figures

APPENDIX A.1
Site Vicinity Map

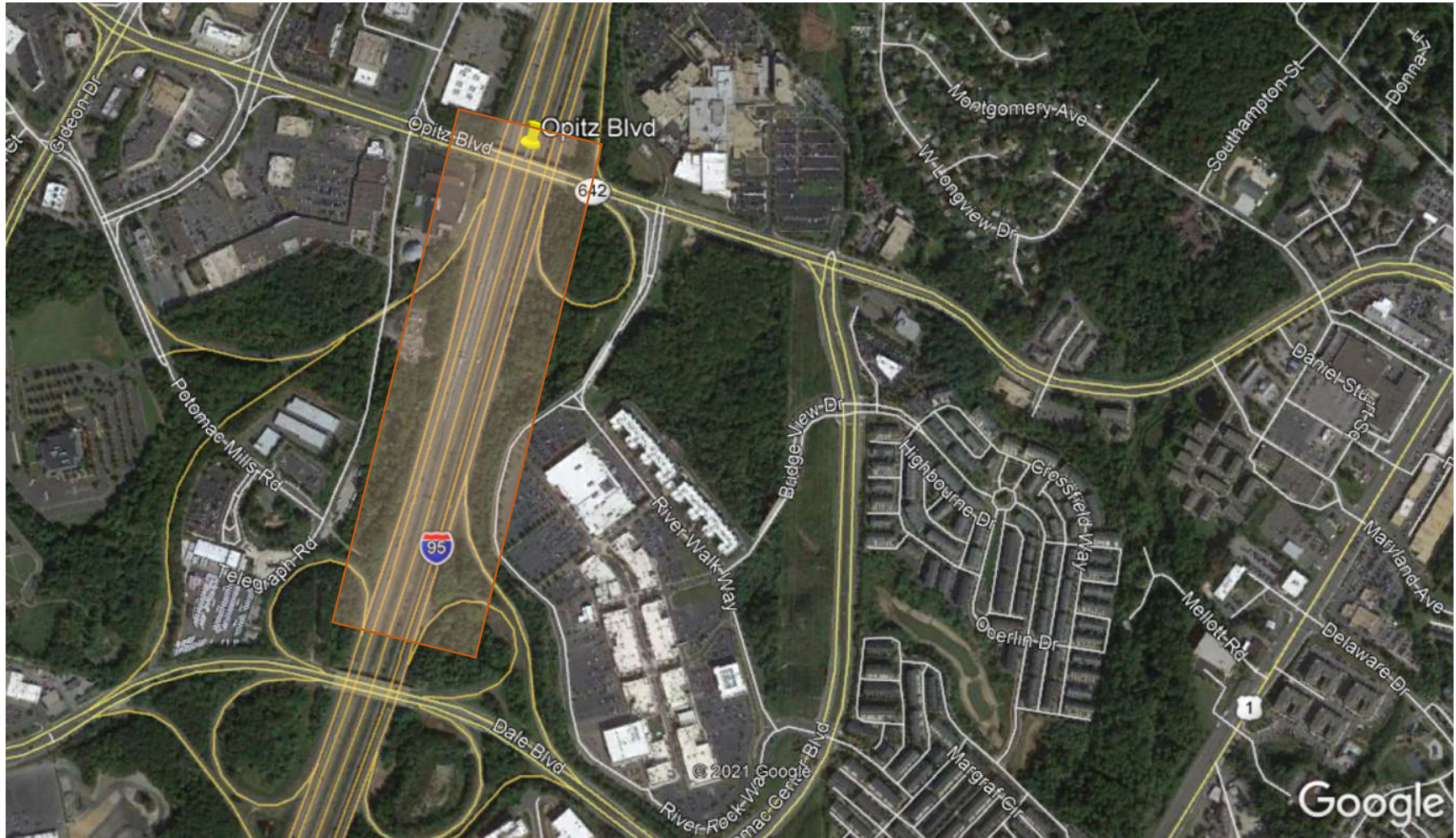
SITE VICINITY MAP

I-95 Expressway Spot Improvements at Opitz Blvd,
Prince Williams, County, Virginia



Project No. 0095-076-299, P101, C501, UPC 116663
Reference: Google

WRA W/O No. 45893.001



APPENDIX A.2

Test Hole Location Plan

PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140 07/07/2021

Test Hole Location Plan

Sheet 1 of 6

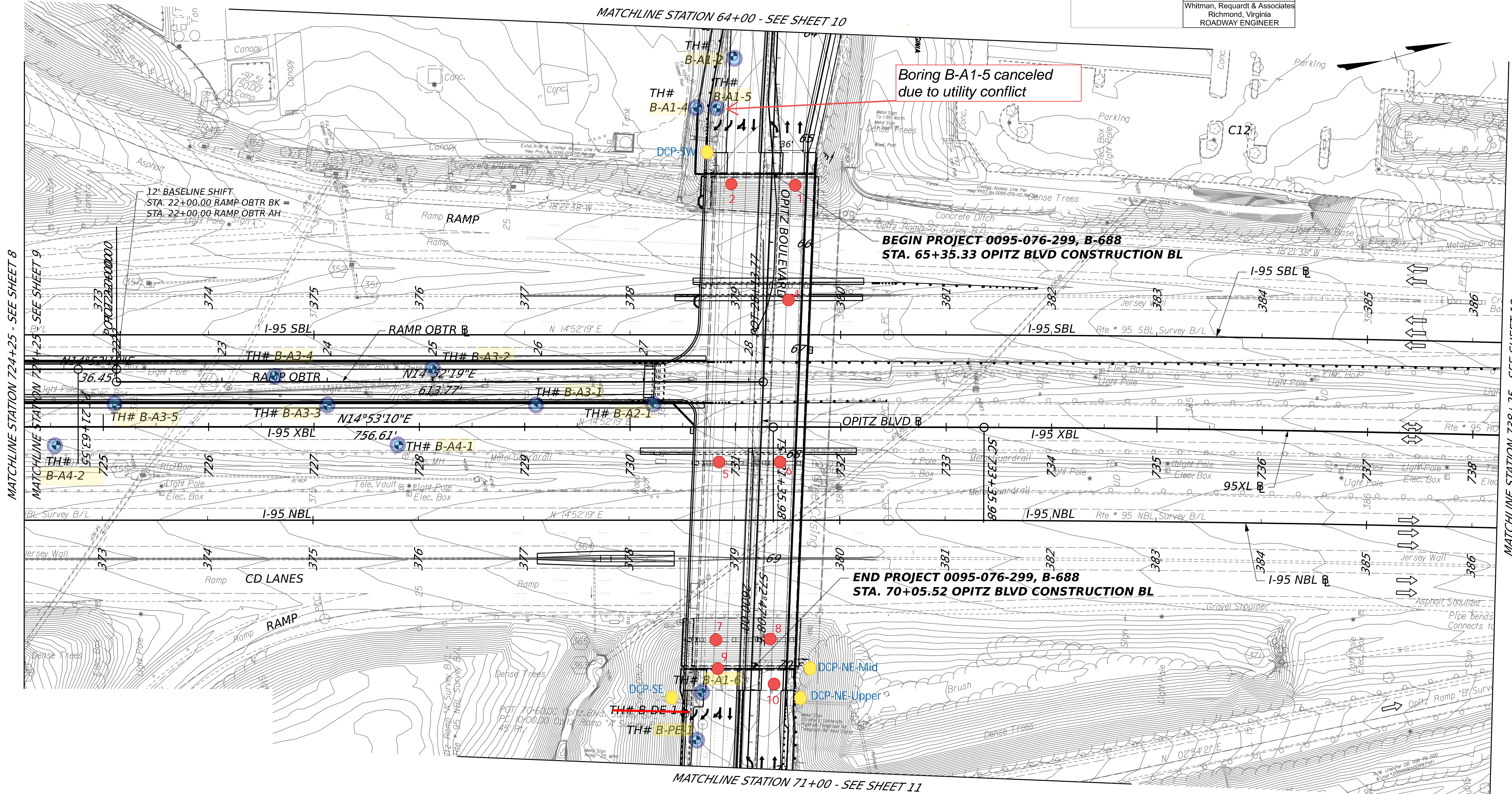
See Sheet 10 for Utility Owner's List

- Current Borings
- Historic Borings
- DCP Locations

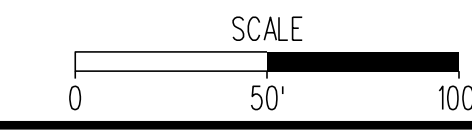
REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-299, C-501	

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER



REFERENCES (PLAN AND DETAIL SHEETS)



PROJECT	SHEET NO.
0095-076-299	

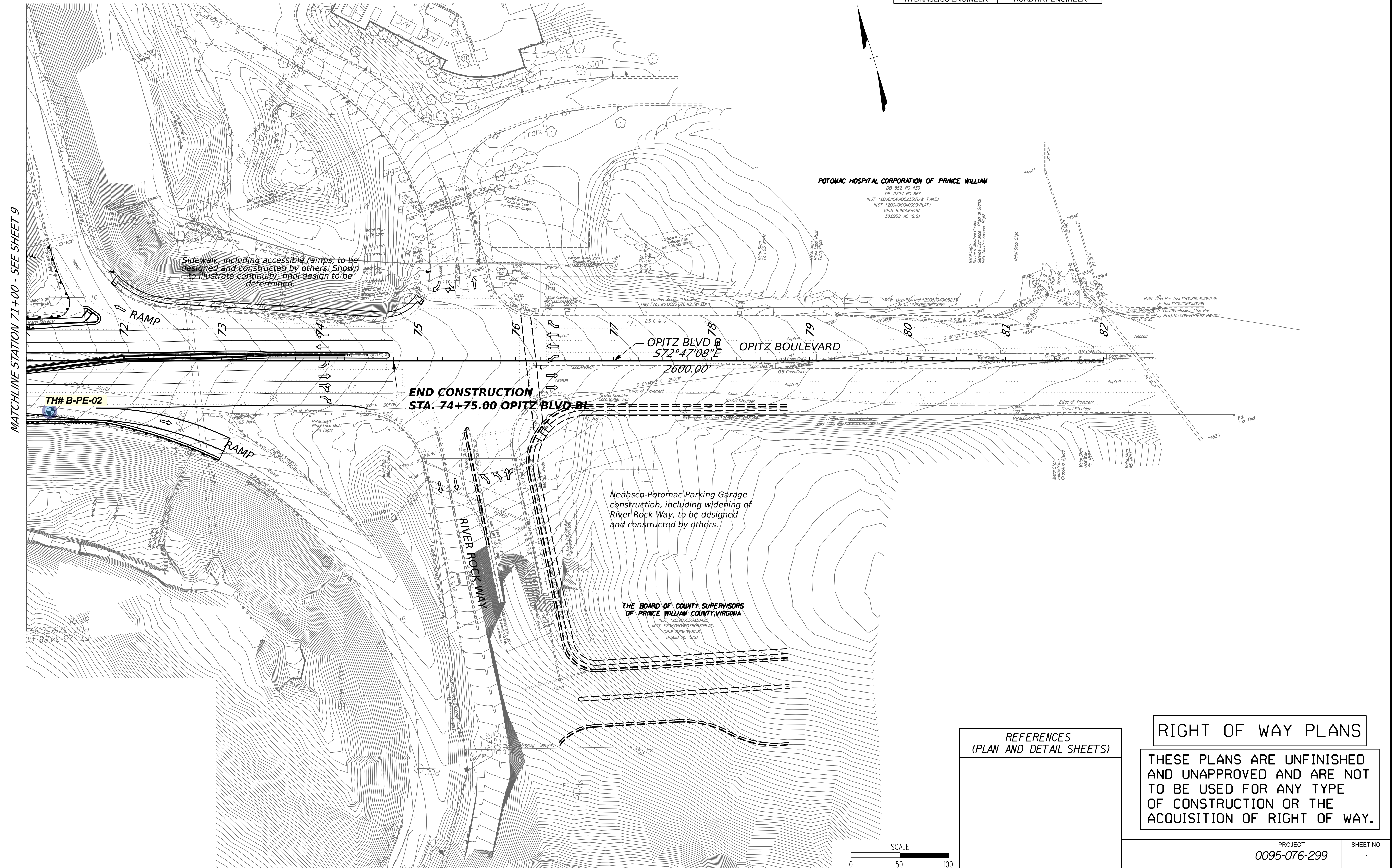
PROJECT MANAGER: *Bimal Shab, P.E., (703) 259-2362 (NOVA District)*
 SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC, (804) 330-3781, 03/09/2021*
 DESIGN BY: *Whitman, Requardt, & Associates, LLP, (804) 272-8700*
 SUBSURFACE UTILITY BY, DATE: *AccuMark, Inc., (804) 550-7140, 07/07/2021*

Test Hole Location Plan

Sheet 3 of 6

See Sheet 10 for Utility Owner's List

REVISED	STATE	ROUTE	STATE		SHEET NO.
			PROJECT		
	VA.	95	0095-076-299, C-501		
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT					
Whitman, Requardt & Associates Richmond, Virginia HYDRAULICS ENGINEER			Whitman, Requardt & Associates Richmond, Virginia ROADWAY ENGINEER		



REFERENCES
 (PLAN AND DETAIL SHEETS)

RIGHT OF WAY PLANS
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PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

Test Hole Location Plan

Sheet 4
 of 6

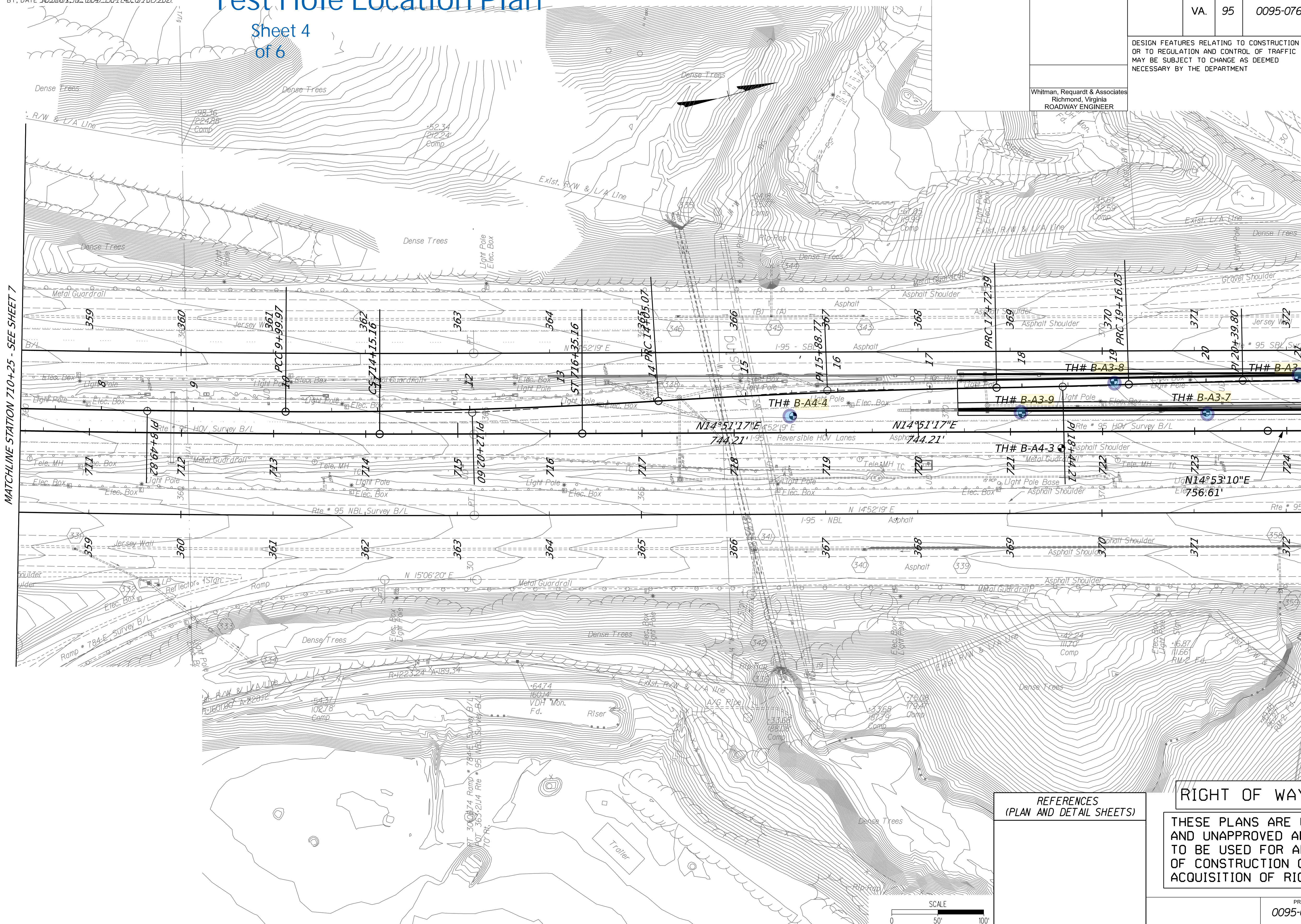
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	VA.	95		0095-076-299, C-501	

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Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

MATCHLINE STATION 710+25 - SEE SHEET 7

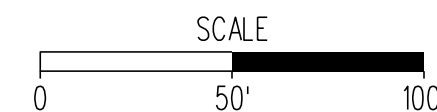
MATCHLINE STATION 724+25 - SEE SHEET 9



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PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: AccuMark, Inc. (804) 550-7140, 07/07/2021

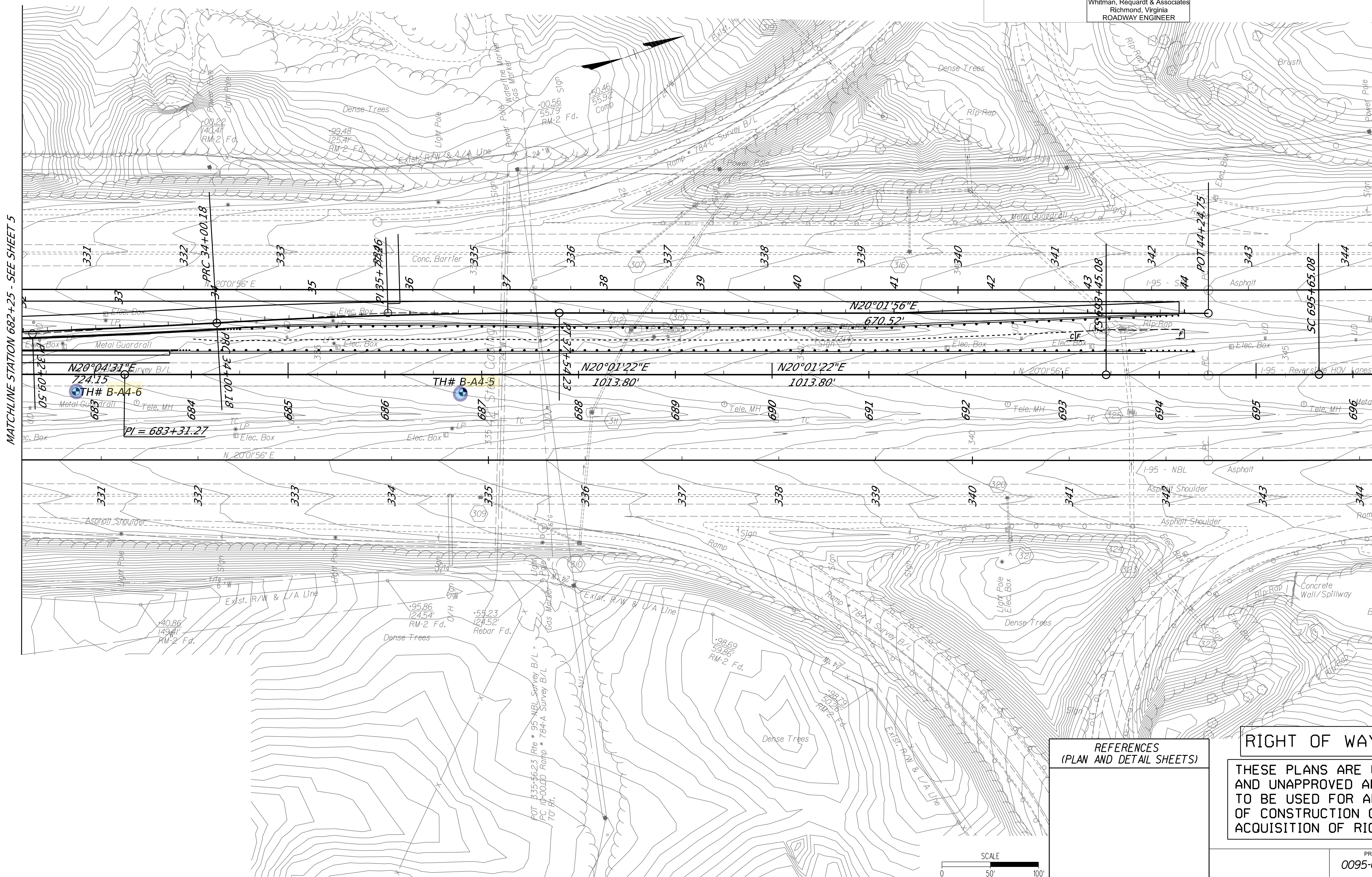
Test Hole Location Plan

Sheet 5 of 6

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	95	0095-076-299-C-501	

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

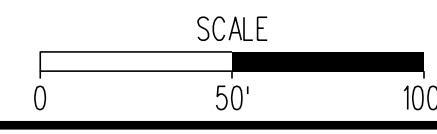


MATCHLINE STATION 682+25 - SEE SHEET 5

MATCHLINE STATION 696+25 - SEE SHEET 7

REFERENCES
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PROJECT MANAGER: Bimal Shab, P.E. (703) 259-2362 (NOVA District)
 SURVEYED BY, DATE: H&B Surveying and Mapping, LLC (804) 330-3781 03/09/2021
 DESIGN BY: Whitman, Requardt & Associates, LLP (804) 272-8700
 SUBSURFACE UTILITY BY, DATE: Accurmark, Inc. (804) 550-7140 07/07/2021

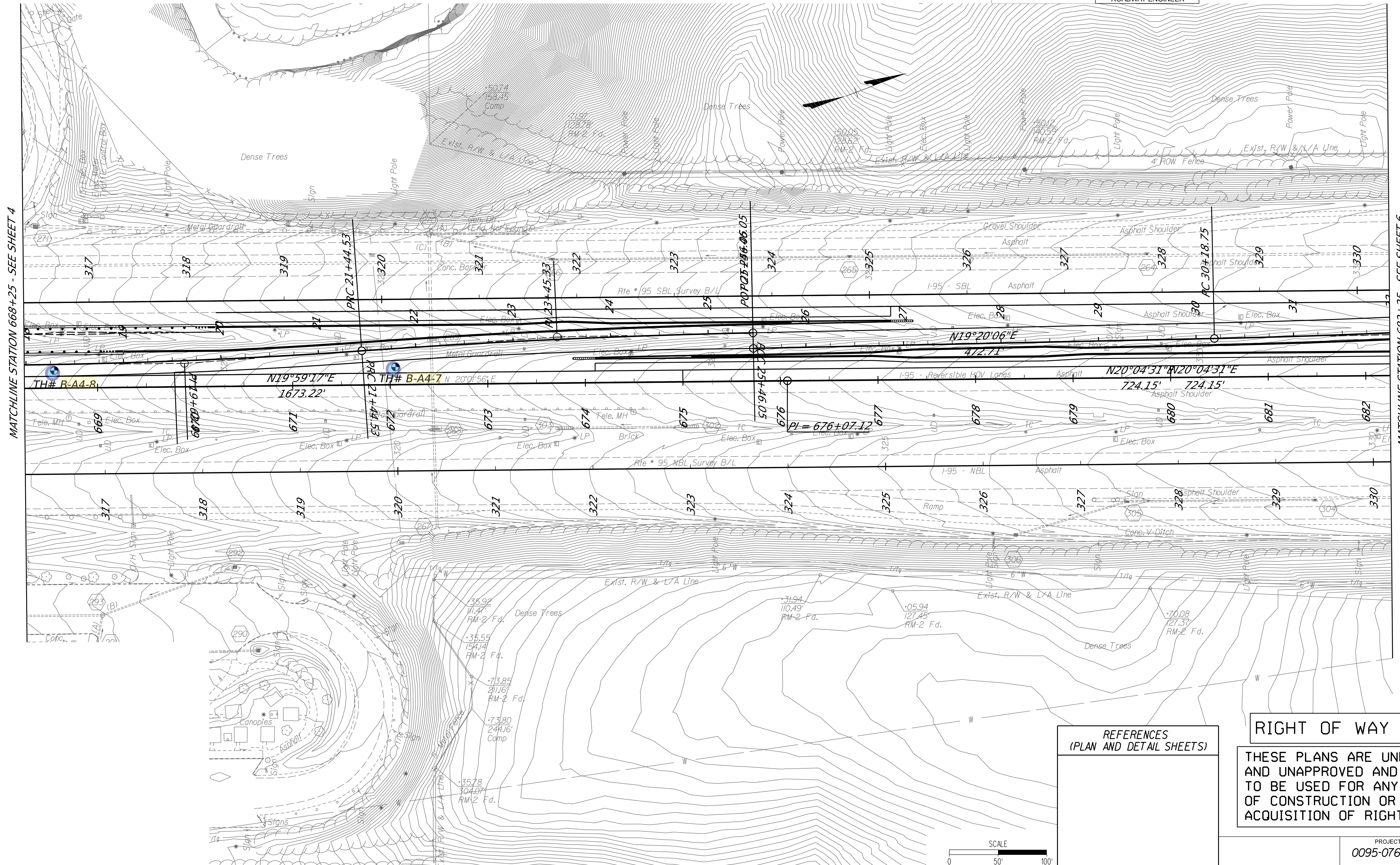
Test Hole Location Plan

Sheet 6 of 6

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
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DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
 Richmond, Virginia
 ROADWAY ENGINEER

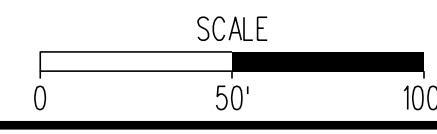


MATCHLINE STATION 668+25 - SEE SHEET 4

MATCHLINE STATION 682+25 - SEE SHEET 6

REFERENCES
 (PLAN AND DETAIL SHEETS)

RIGHT OF WAY PLANS
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PROJECT
 0095-076-299

SHEET NO.
 6

APPENDIX A.3

Selected Plans – Bridge Elements

STATE	FEDERAL AID		STATE	SHEET
VA.	ROUTE	PROJECT	ROUTE	NO.
			2000	0095-076-299, B688
Federal Structure No. 000000000014334			FHWA Construction and Scour Code:	X771-SN
Federal Stewardship and Oversight Code: NFO			UPC No. 116663	

DESIGN EXCEPTION(S):
None.

GENERAL NOTES:

The original approved sheet, including original signatures, is filed in the VDOT Central Office. Any misuse of electronic files, including scanned signatures is illegal. Violators will be prosecuted to the full extent of the applicable laws.

Width: Opitz Blvd. - 7'-0" sidewalk, 12" rail, 39'-0" WBL roadway, variable median, 51'-0" EBL roadway. Overall width 103'-0" face-to-face of rails.
Ramp - Varies face-to-face of curbs

Span layout: Opitz Blvd. - 105'-2", 168'-0" - 167'-10 1/2" continuous, and one 25'-11 3/4" steel plate girder spans
Ramp - 39'-0 3/8" steel plate girder span

Capacity: HS20-44 loading and alternate military loading (original); HL-93 loading (new)

Specifications:
Construction: Virginia Department of Transportation Road and Bridge Specifications, 2020.
Design: AASHTO Standard Specifications for Highway Bridges, 16th Edition, 1996; 1997 and 1998 Interim Specifications; and VDOT Modifications.
AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017; and VDOT Modifications.
Standards: Virginia Department of Transportation Road and Bridge Standards, 2016; including all current revisions.

These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.

This project is to be constructed in accordance with the Virginia Department of Transportation Work Area Protection Manual, August 2011 and latest revisions.

Design loading includes 20 psf allowance for construction tolerances and construction methods for new deck, beams and substructure.

Design loading includes 15 psf allowance for future wearing surface for new deck, beams and substructure.

Stay-in-place forms to be supported by existing girders shall have their corrugations filled with foam inserts.

All structural steel, including bearings, shall be ASTM A709 Grade 50W and shall be painted.

Finish paint color shall be brown, 595-30045

Zone coating of beams from end of beam including bearings and end crossframes and diaphragms shall be in accordance with Section 411.05 (c5) of the Specifications.

Concrete in superstructure shall be Low Shrinkage Class A4 Modified and in rails, parapets, terminal walls and medians shall be Low Shrinkage Class A4 Modified (Lightweight) in accordance with Section 217.12(a); in substructure, Class A3.



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
PROPOSED WIDENING ON
OPITZ BLVD OVER I-95, I-95 EXPRESS LANES
PRINCE WILLIAM CO.
PROJ. 0095-076-299, B688

VDOT to verify

Progress Print /
provided to
address Stage I
comments for
Stage I approval

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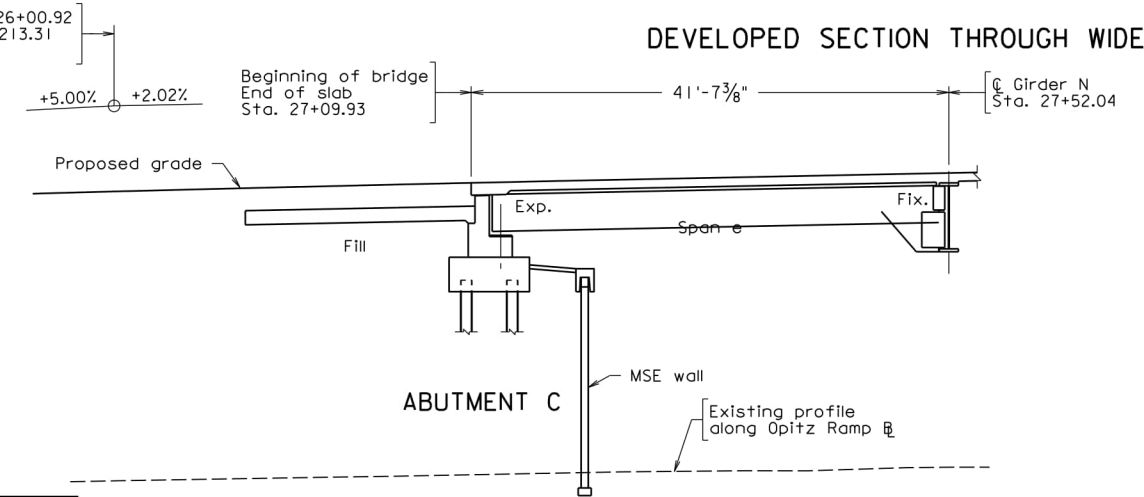
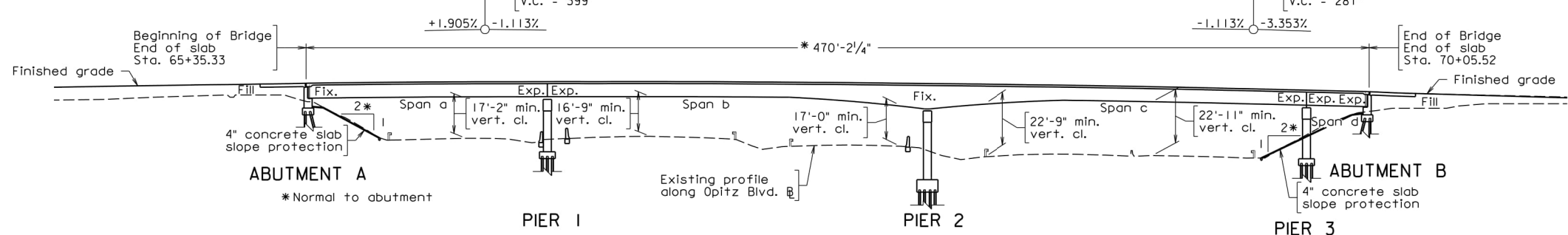
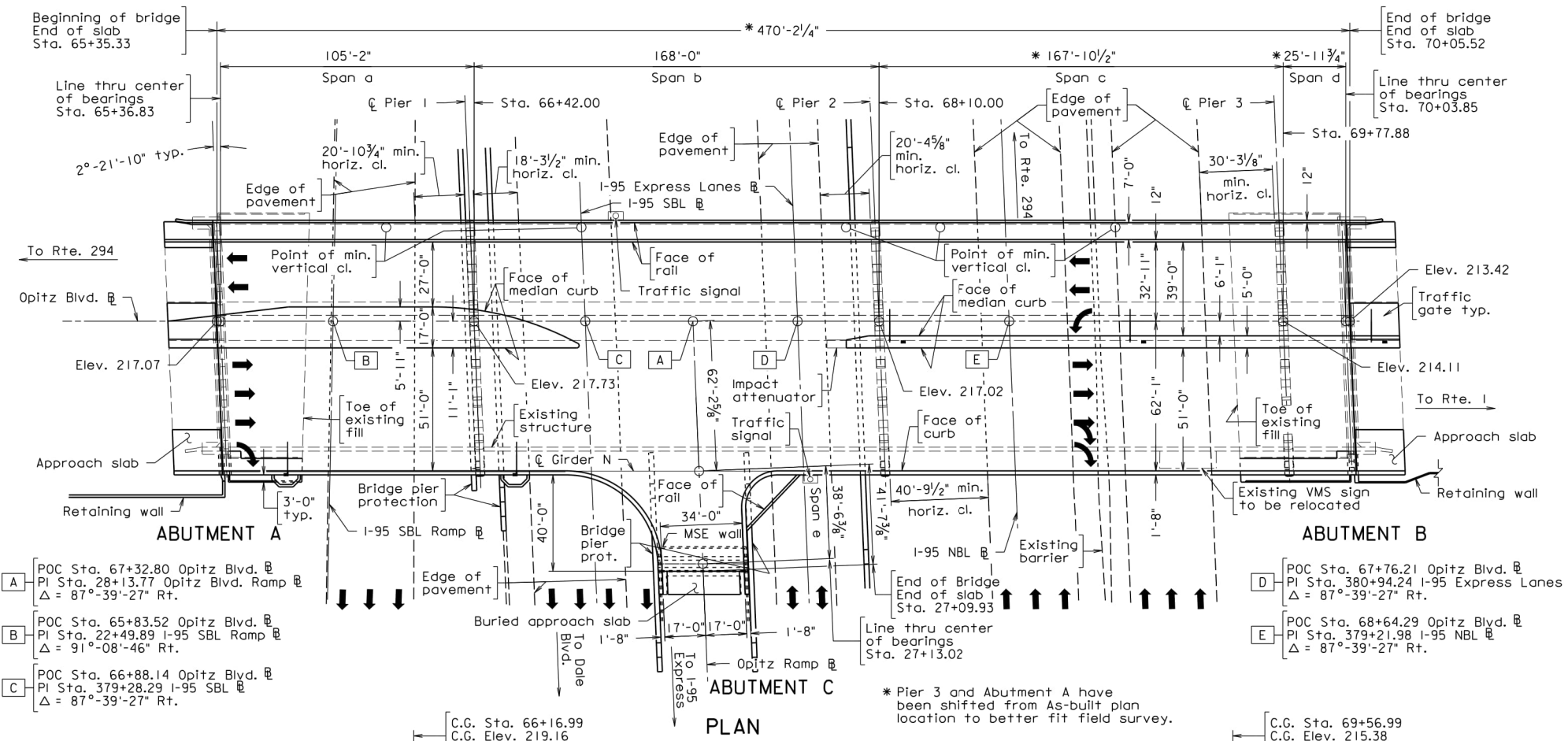
No.	Description	Date
REVISIONS		
For Table of Revisions, see Sheet 3.		

Recommended for Approval: _____
District Project Development Engineer Date

Approved: _____
District Administrator Date

Date: November 17, 2021 © 2021, Commonwealth of Virginia Sheet 1 of 93

257-38A



Scale: 1" = 30', unless otherwise noted.

WHITMAN REQUARDT & ASSOCIATES RICHMOND, VA STRUCTURAL ENGINEER	
PLANS BY:	Consultant
COORDINATED:	Brian Morrison
SUPERVISED:	Jeremy Schlusless
DESIGNED:	Michelle Defreese
DRAWN:	Charlie Reagle
CHECKED:	Gary Shelor

A POC Sta. 67+32.80 Opitz Blvd. $\Delta = 87^\circ-39'-27''$ Rt.
 PI Sta. 28+13.77 Opitz Blvd. Ramp $\Delta = 87^\circ-39'-27''$ Rt.

B POC Sta. 65+83.52 Opitz Blvd. $\Delta = 91^\circ-08'-46''$ Rt.
 PI Sta. 22+49.89 I-95 SBL Ramp $\Delta = 91^\circ-08'-46''$ Rt.

C POC Sta. 66+88.14 Opitz Blvd. $\Delta = 87^\circ-39'-27''$ Rt.
 PI Sta. 379+28.29 I-95 SBL $\Delta = 87^\circ-39'-27''$ Rt.

D POC Sta. 67+76.21 Opitz Blvd. $\Delta = 87^\circ-39'-27''$ Rt.
 PI Sta. 380+94.24 I-95 Express Lanes $\Delta = 87^\circ-39'-27''$ Rt.

E POC Sta. 68+64.29 Opitz Blvd. $\Delta = 87^\circ-39'-27''$ Rt.
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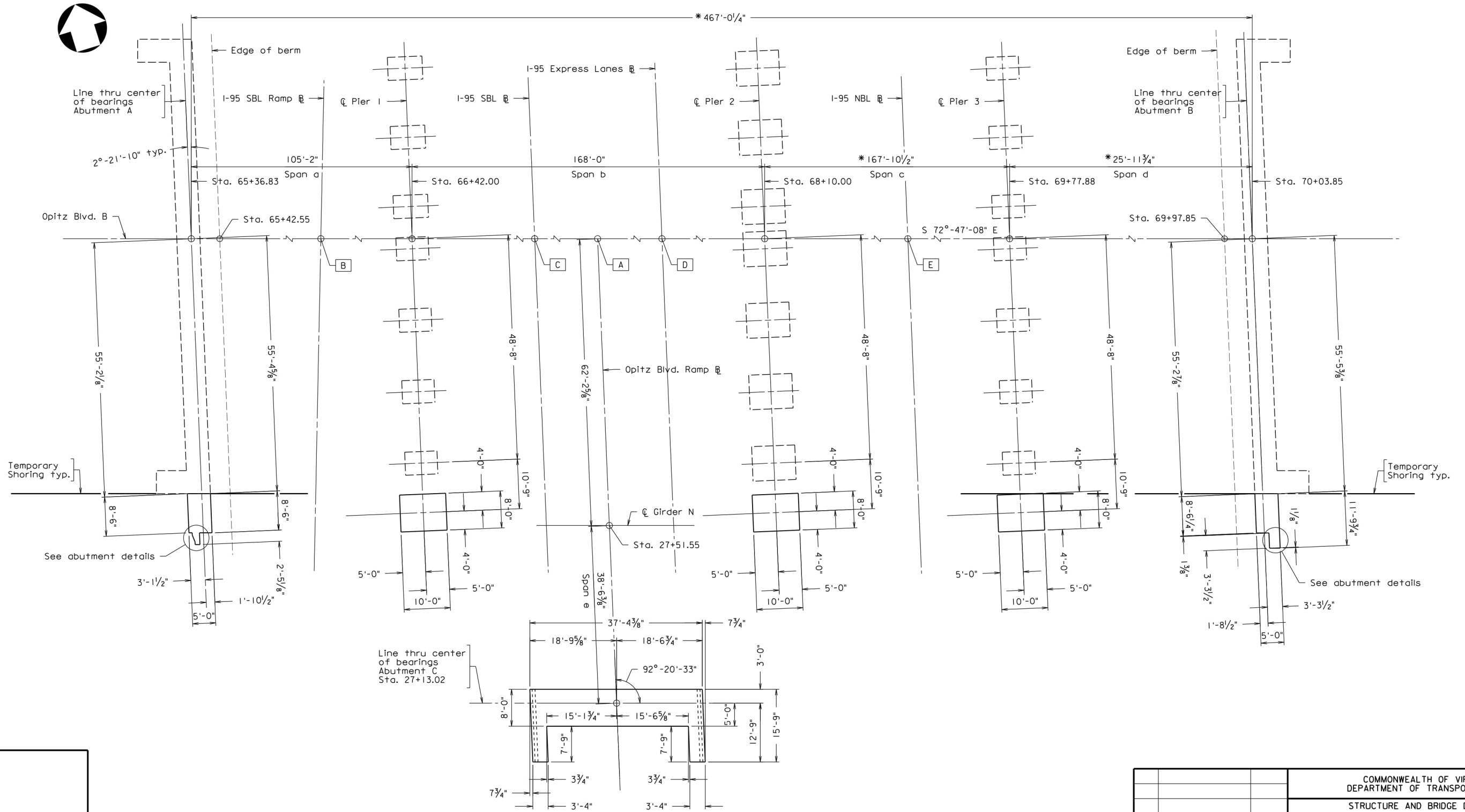
STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE	PROJECT
		2000	0095-076-299, B688
			4

* Pier 3 and Abutment A have been shifted from As-built plan location to better fit field survey.

⊙ = Boring locations, for details, see sheets X thru X.

Notes:

This layout is to be used only for the purpose of locating fill slopes and footings. For details not shown see abutment and pier details.



SUBSTRUCTURE LAYOUT

Scale: 1/32" = 1'-0" unless otherwise noted.

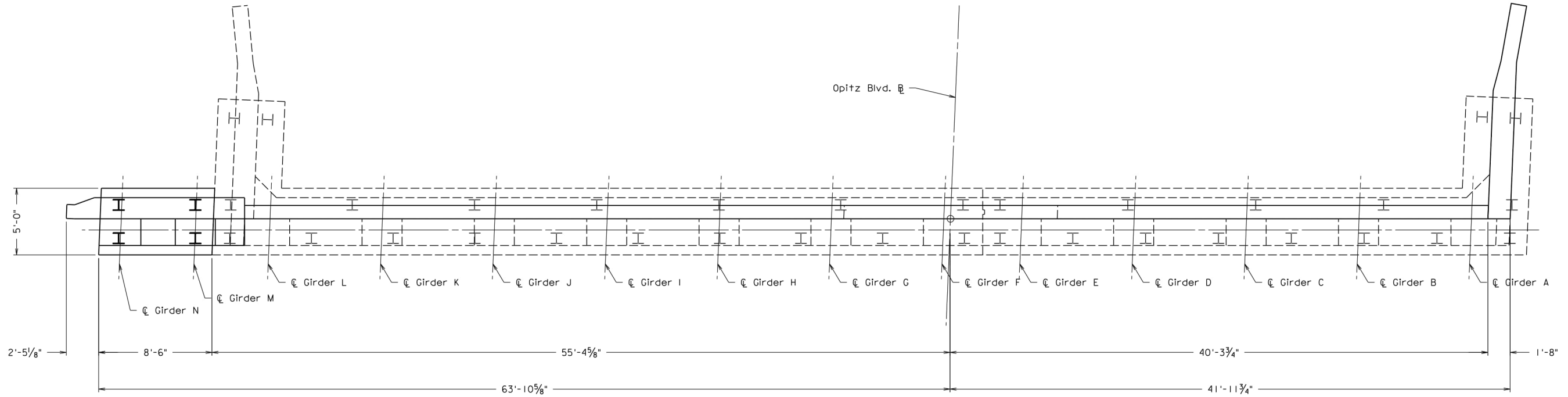
PRELIMINARY PLANS
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STRUCTURE AND BRIDGE DIVISION			
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No.	Description	Date	Designed: WRA Drawn: WRA Checked: WRA
		Nov. 2021	Plan No. 257-38A Sheet No. 4 of 93

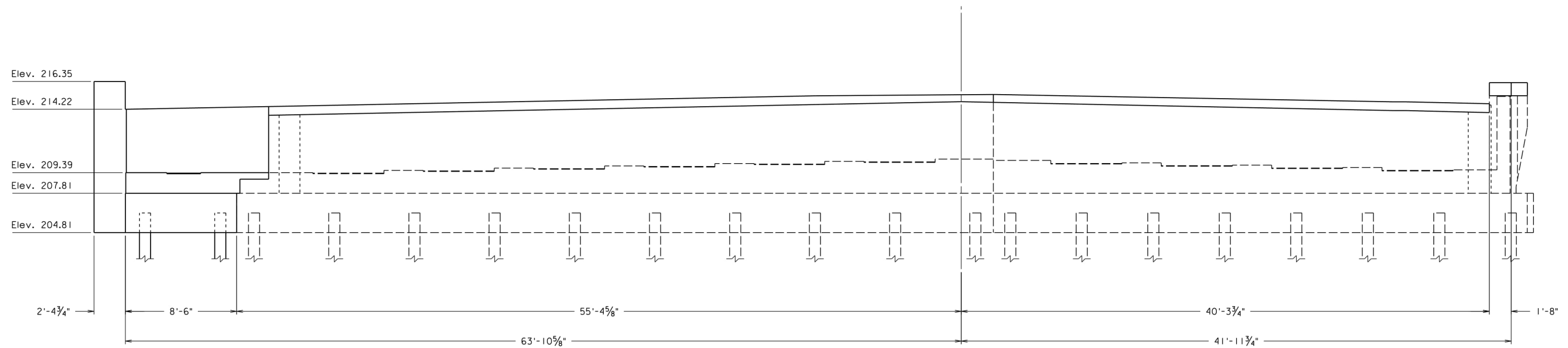
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 RICHMOND, VA
 STRUCTURAL ENGINEER

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STATE	FEDERAL AID		STATE	SHEET
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VA.			2000	0095-076-299, B688
				10



PLAN



ELEVATION

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RICHMOND, VA
STRUCTURAL ENGINEER

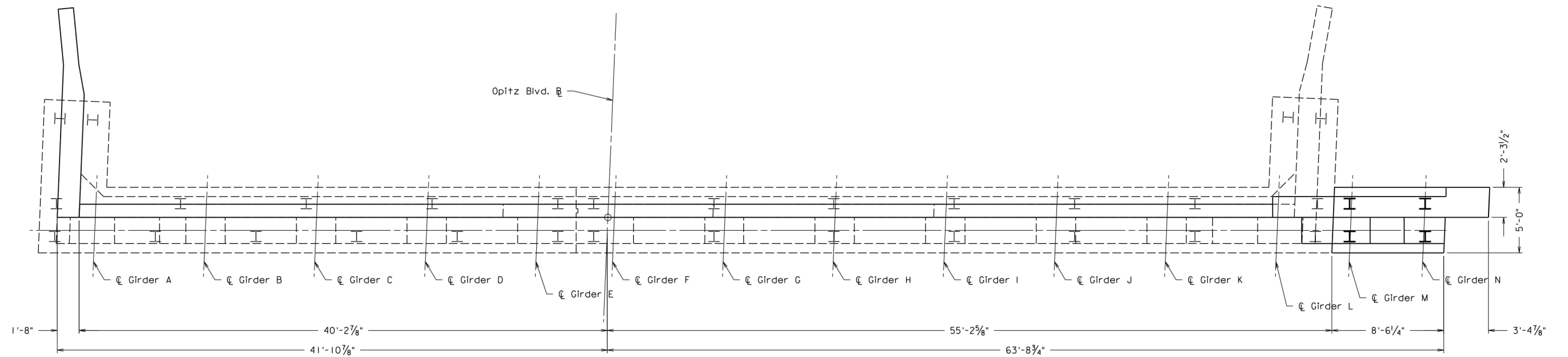
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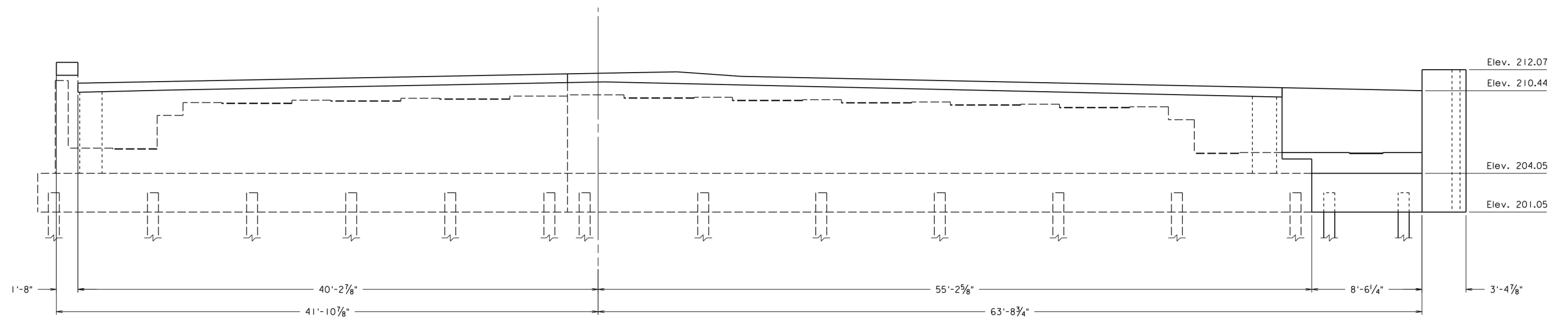
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	Revisions		Date: Nov. 2021 Plan No.: 257-38A Sheet No.: 10 of 93

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			2000	0095-076-299, B688
				16



PLAN



ELEVATION

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

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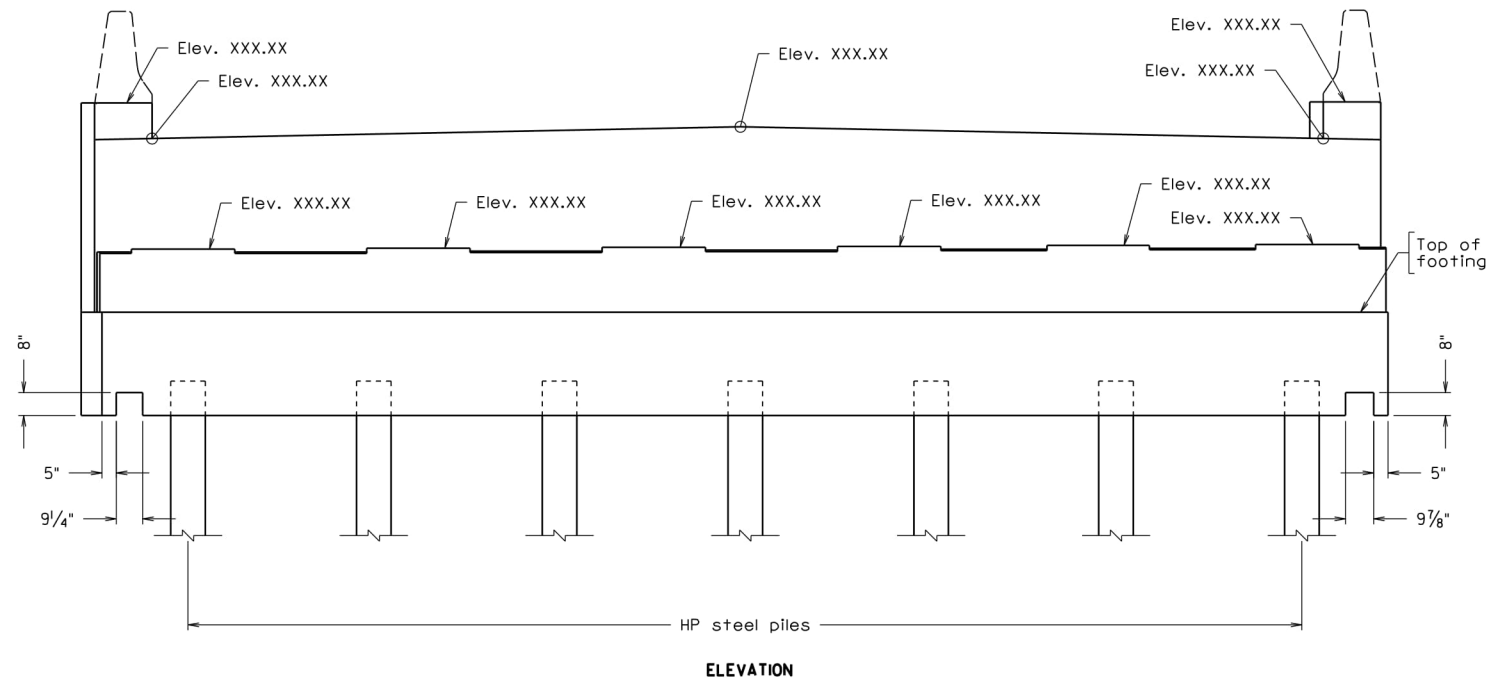
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ABUTMENT B PLAN & ELEVATION			
No.	Description	Date	Revisions
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Drawn: WRA	Nov. 2021	257-38A	16 of 93
Checked: WRA			

PROGRESS PRINT 2021-11-17

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	ROUTE	PROJECT	ROUTE	PROJECT	NO.
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 RICHMOND, VA
 STRUCTURAL ENGINEER

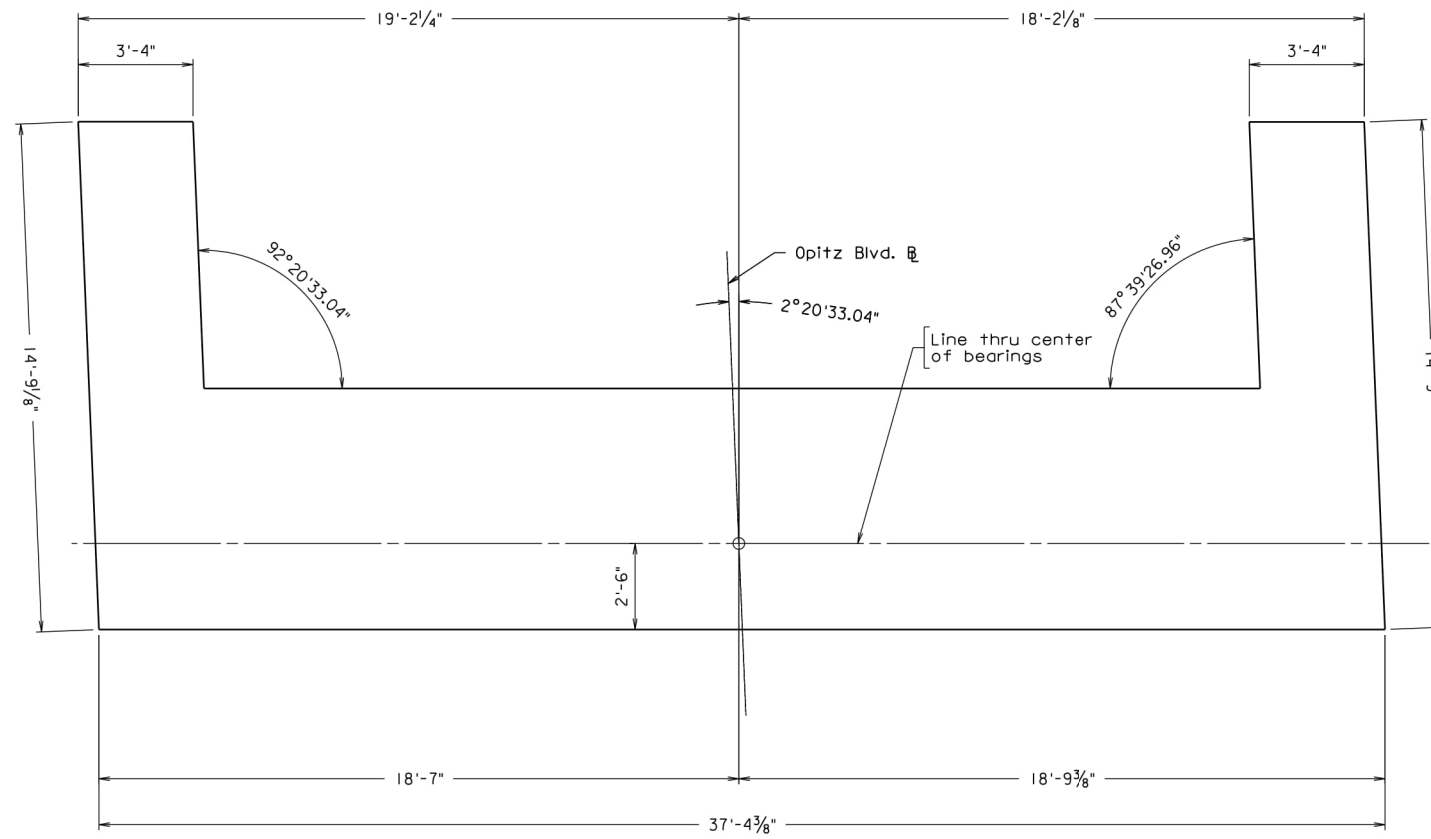
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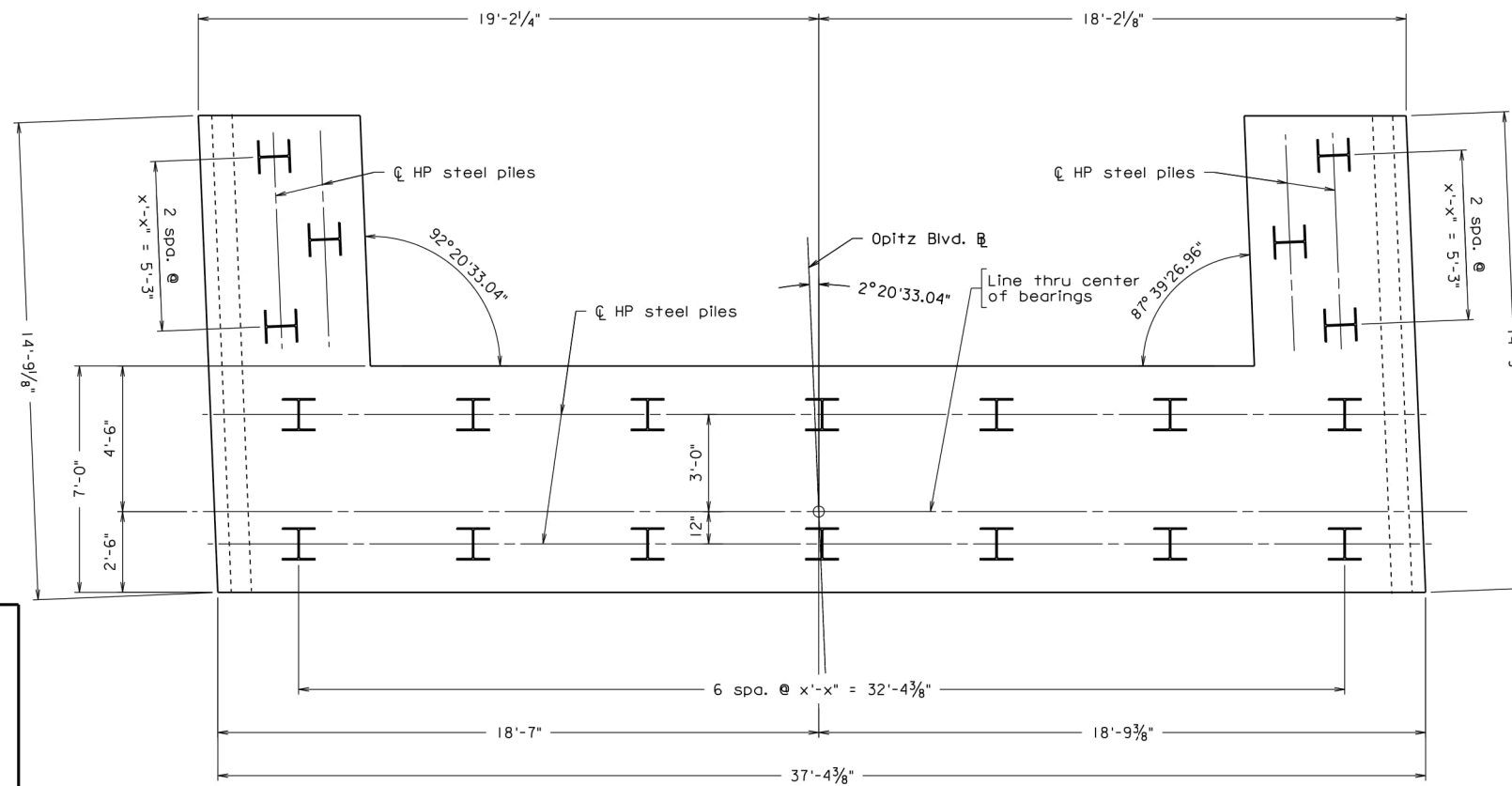
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STRUCTURE AND BRIDGE DIVISION			
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No.	Description	Date	Designed: WRA..... Drawn: WRA..... Checked: WRA.....
	Revisions	Nov. 2021	Plan No. 257-38A Sheet No. 22 of 93

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			2000	0095-076-299, B688	23



FOOTING PLAN



PILE LAYOUT

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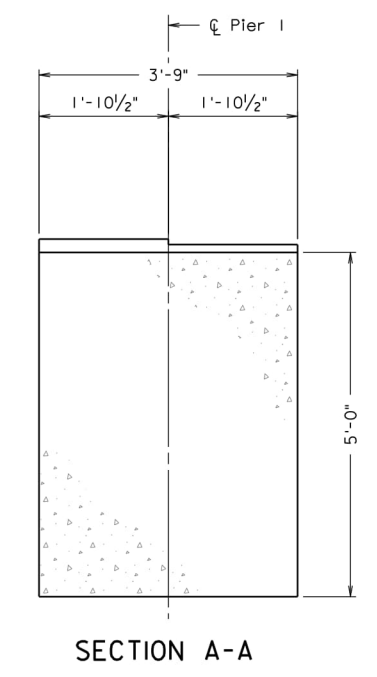
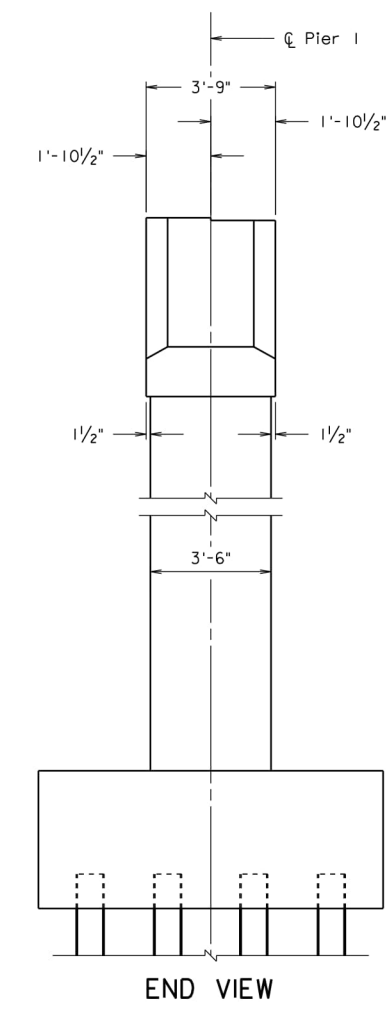
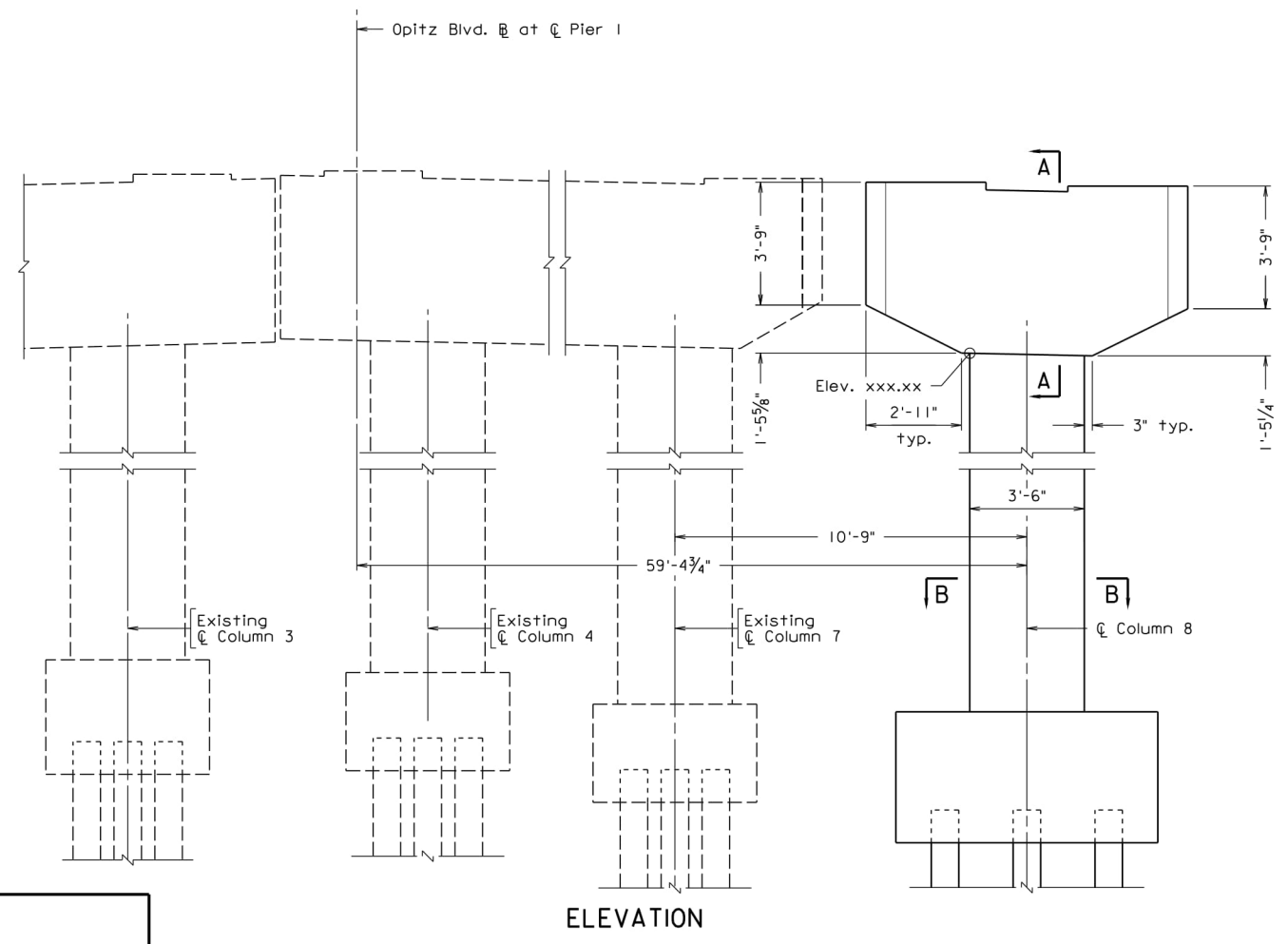
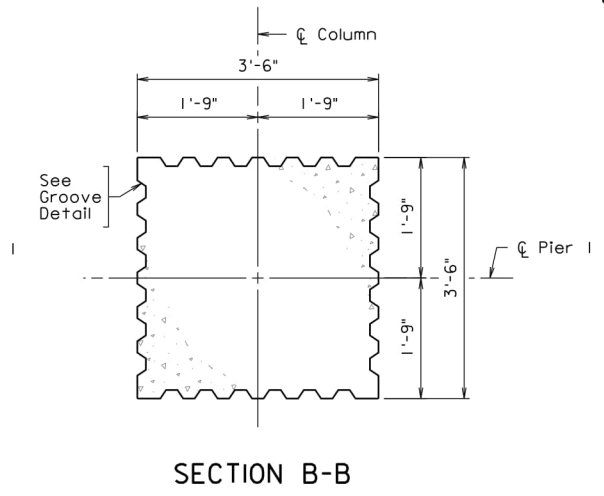
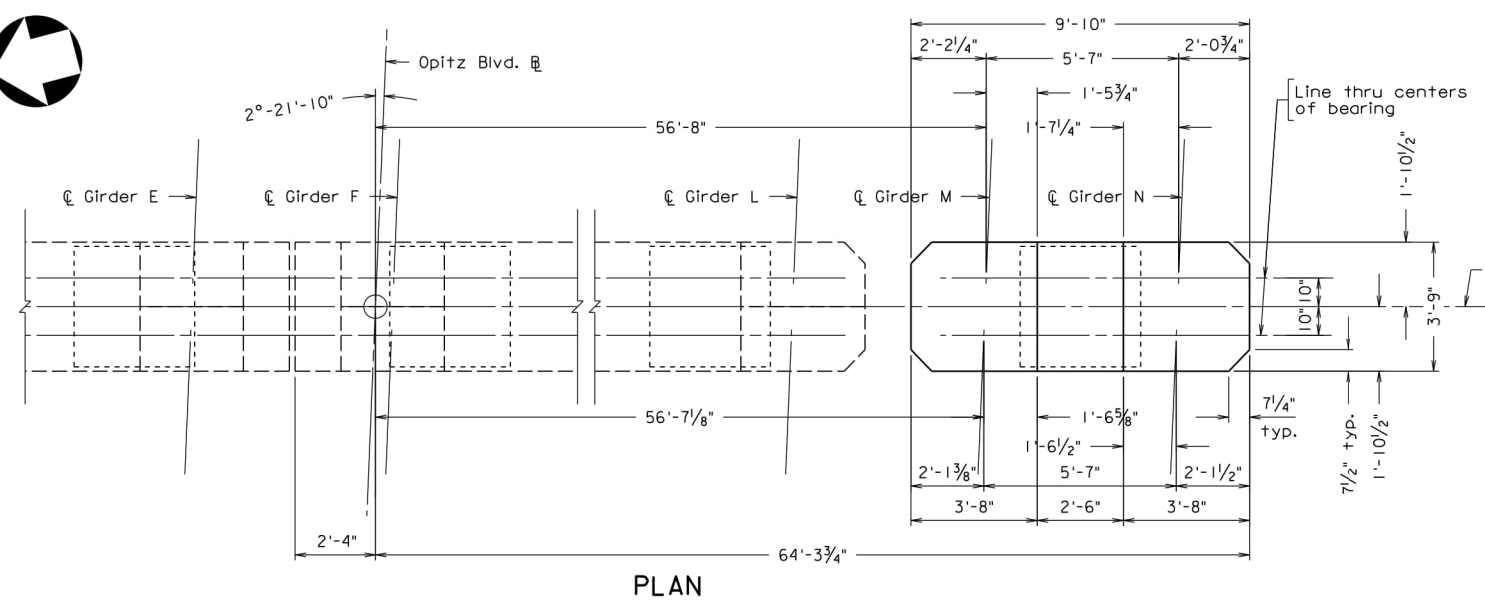
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			26



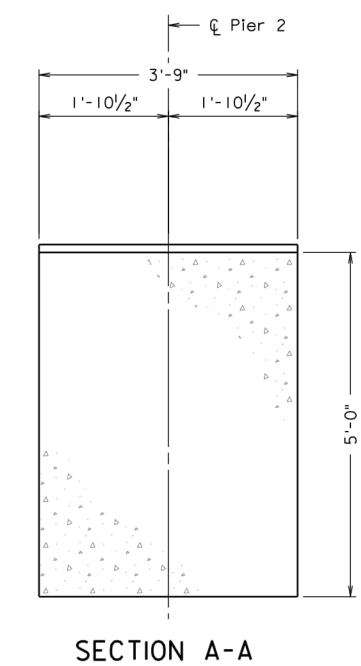
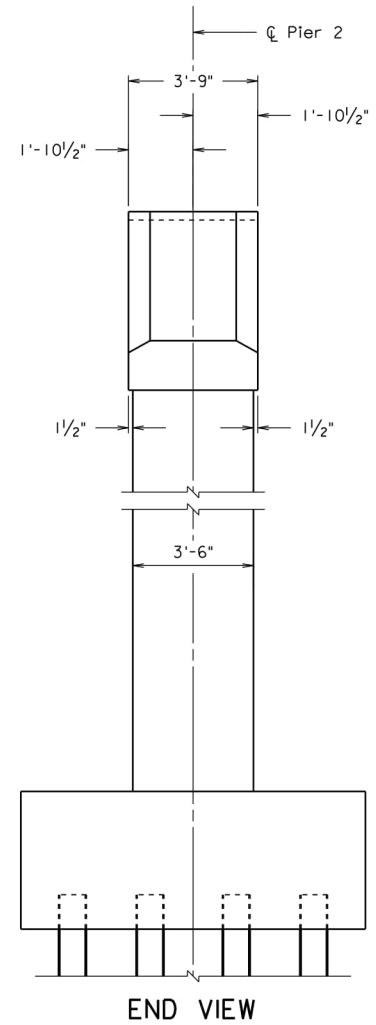
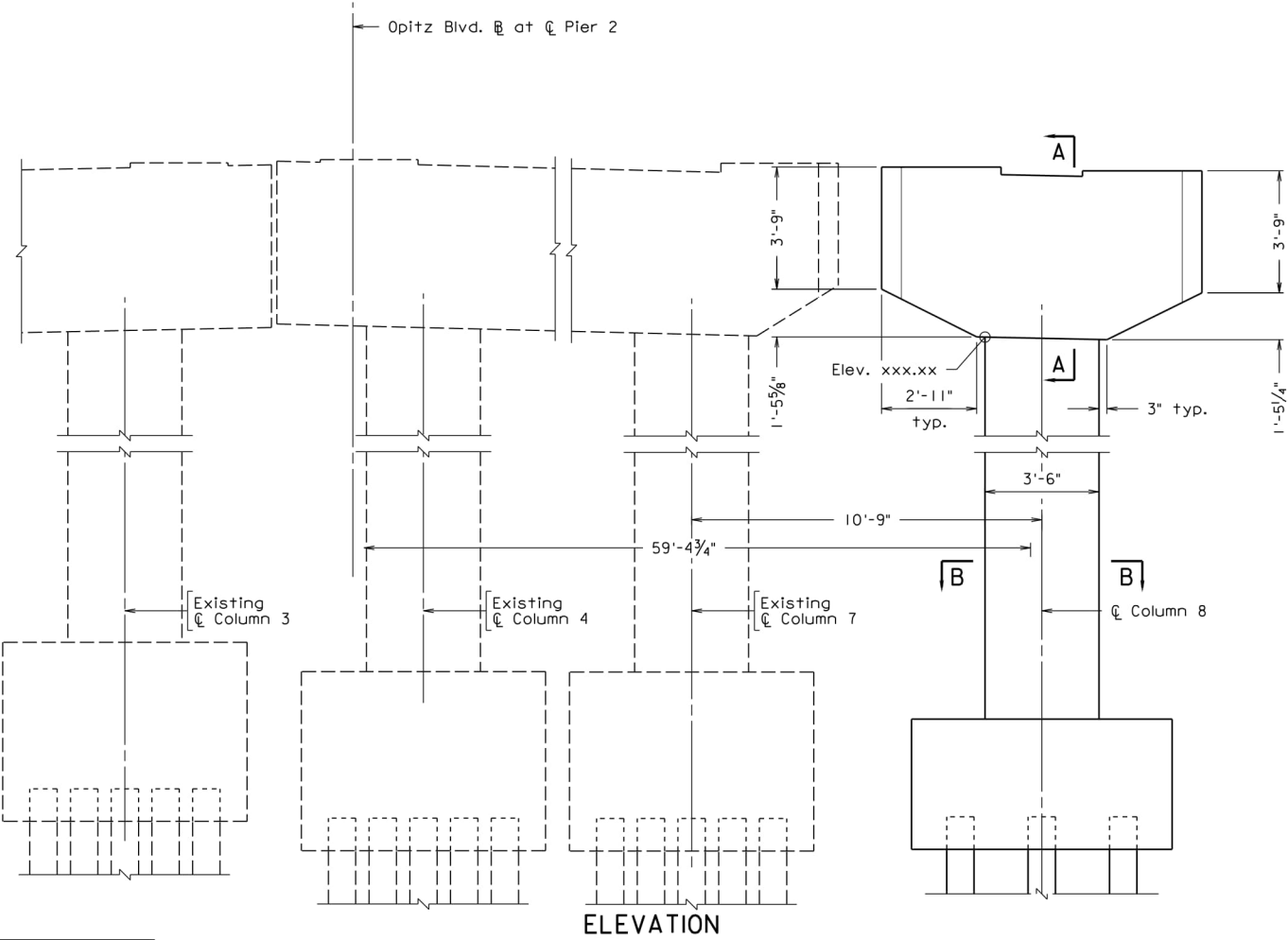
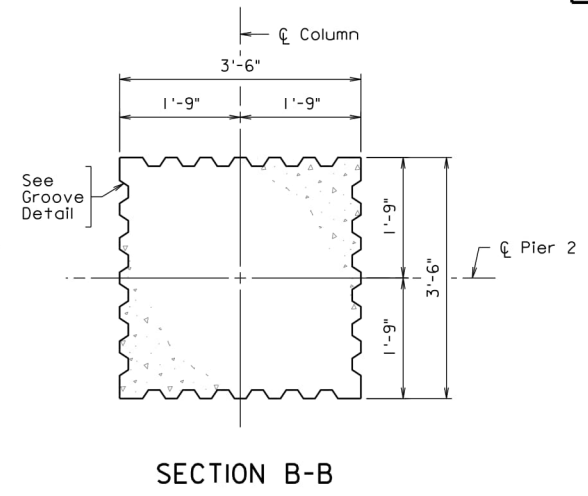
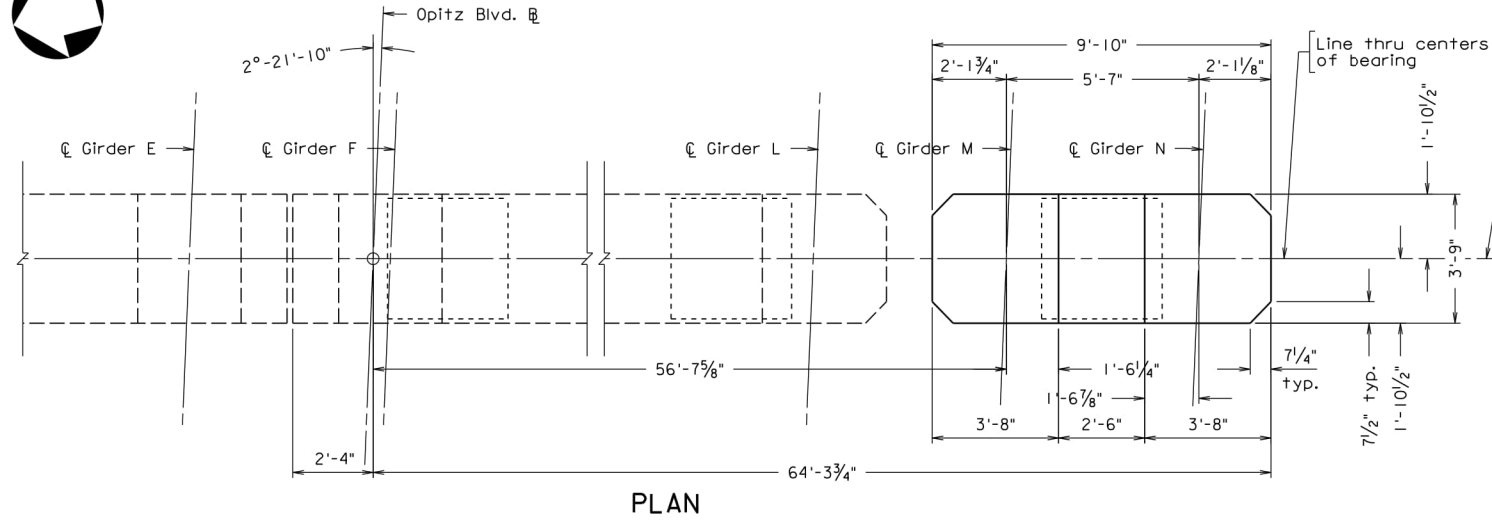
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Designed: WRA	Date	Plan No.	Sheet No.
Drawn: WRA	Nov. 2021	257-38A	26 of 93
Checked: WRA			

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ROUTE	PROJECT	ROUTE	PROJECT
VA.		2000	0095-076-299, B688
			27



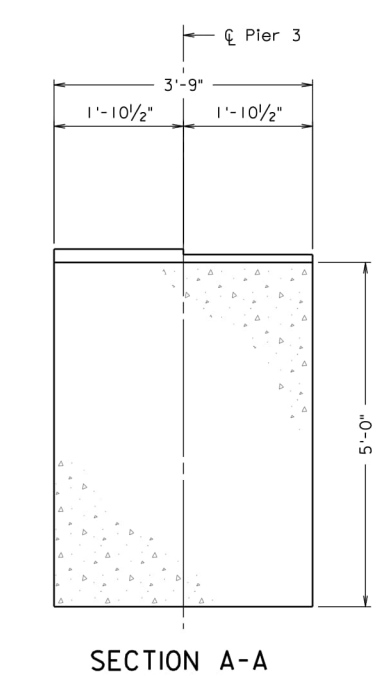
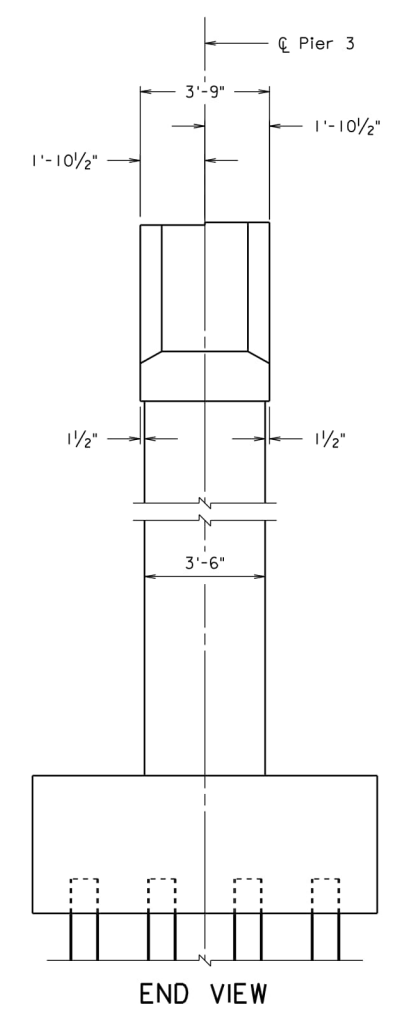
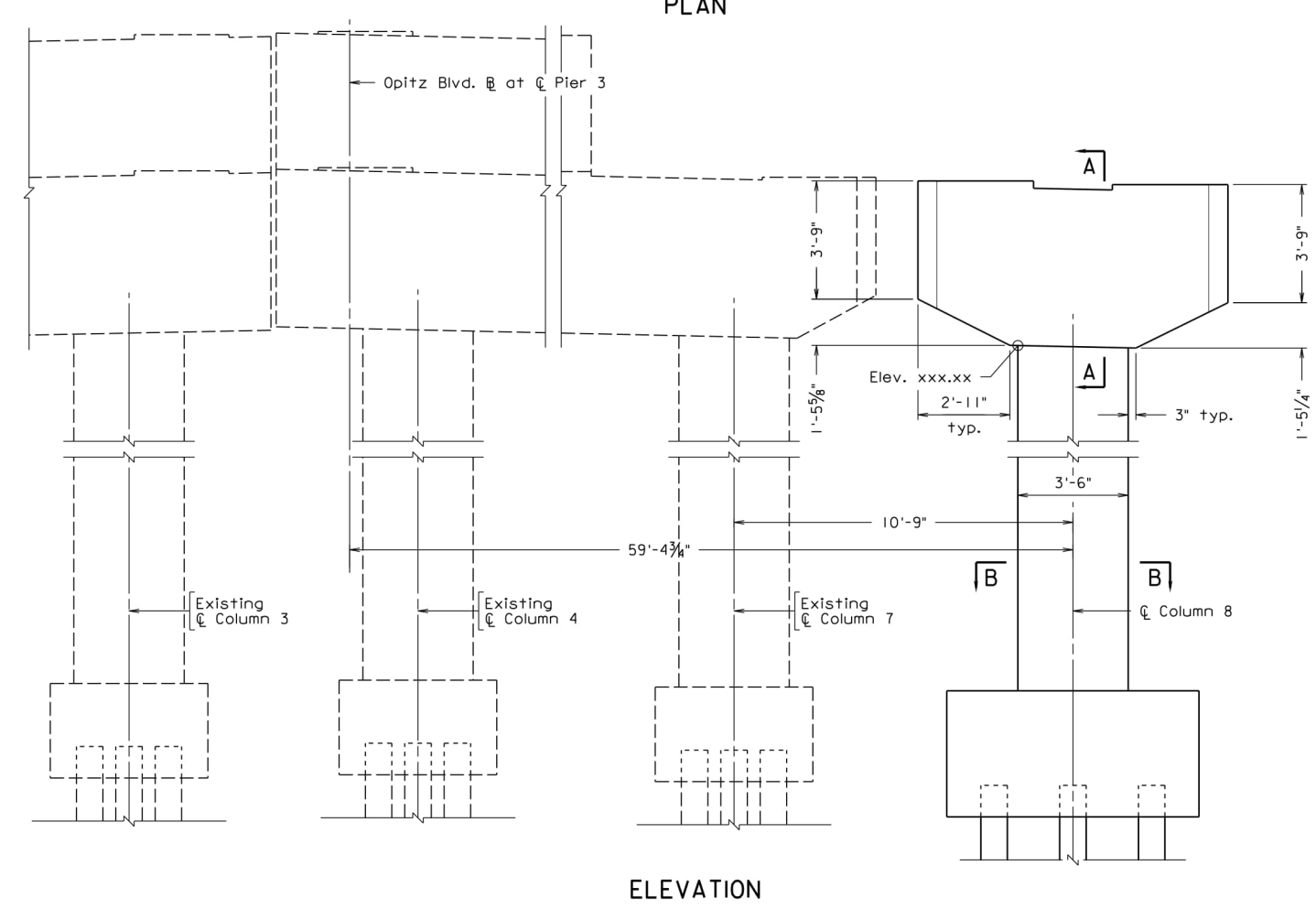
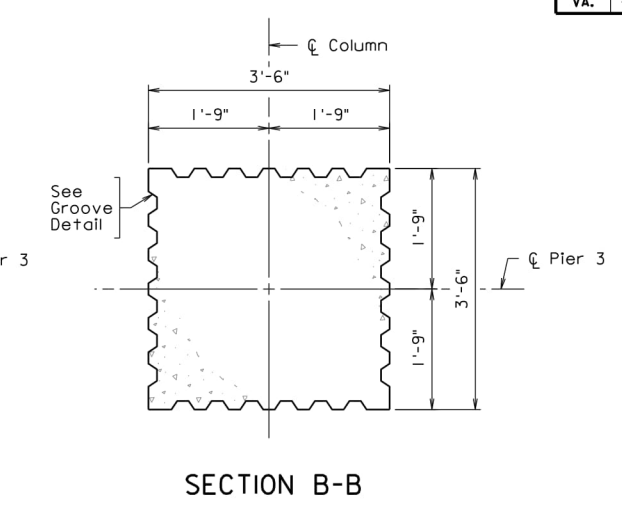
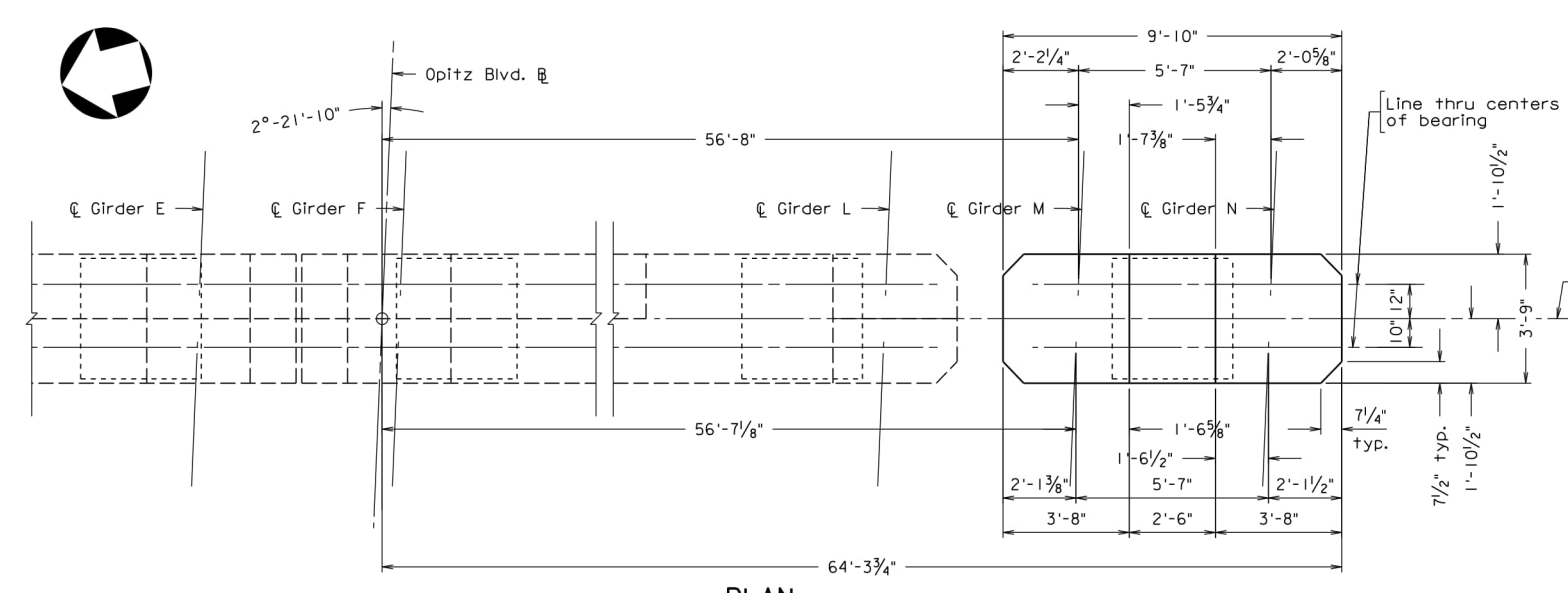
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No.	Description	Date	Revisions
	Designed: WRA	Date	Plan No.
	Drawn: WRA	Nov. 2021	257-38A
	Checked: WRA		27 of 93

STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		2000	0095-076-299, B688
			28



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RICHMOND, VA
STRUCTURAL ENGINEER

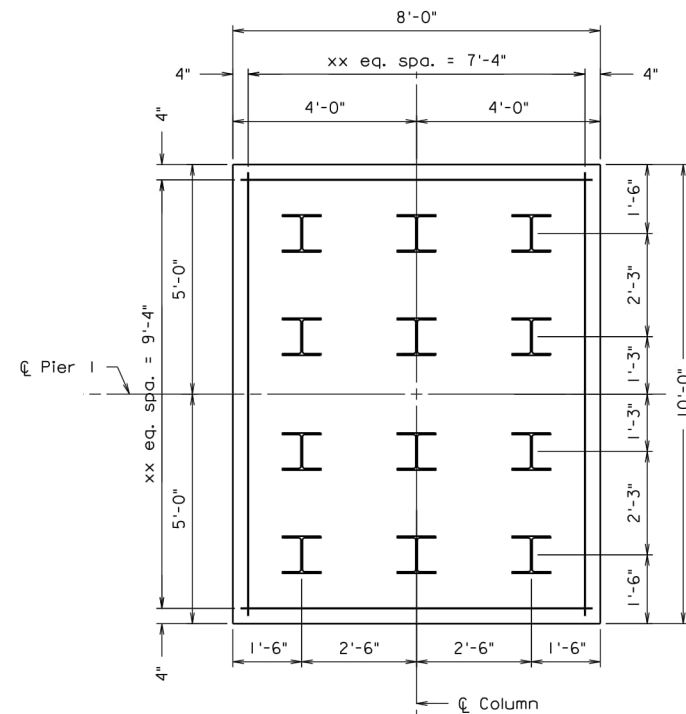
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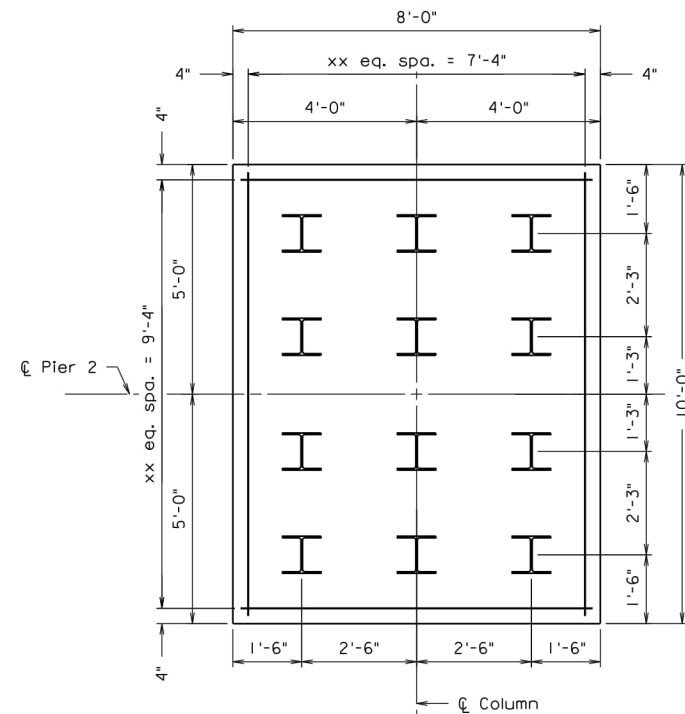
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Drawn: WRA	Nov. 2021	257-38A	28 of 93
Checked: WRA			

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	NO.
VA.			2000	29
			0095-076-299, B688	

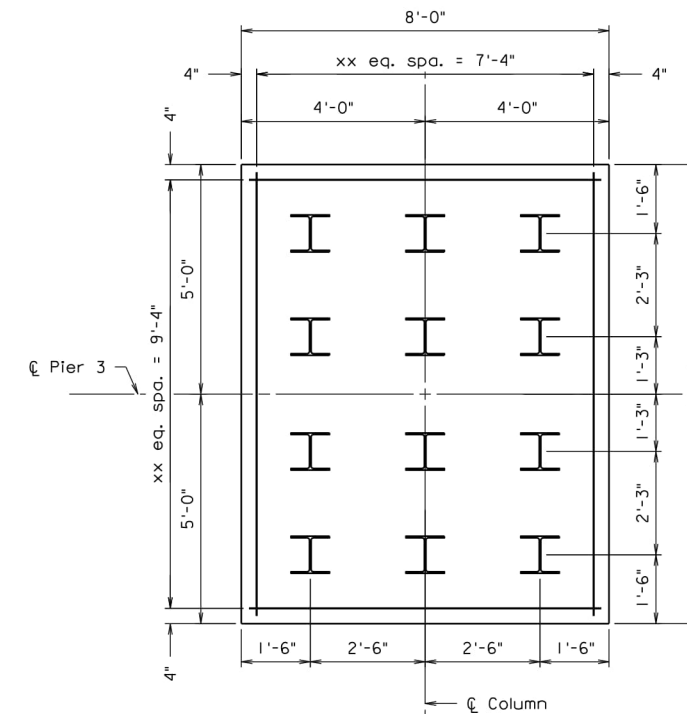
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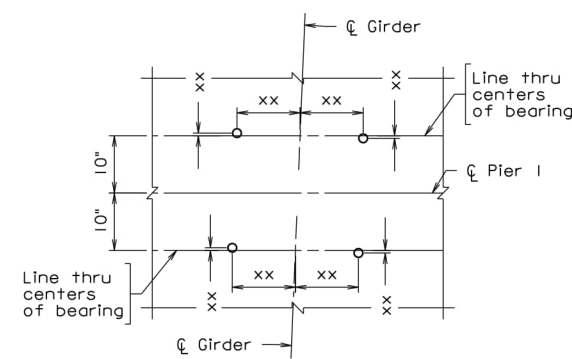
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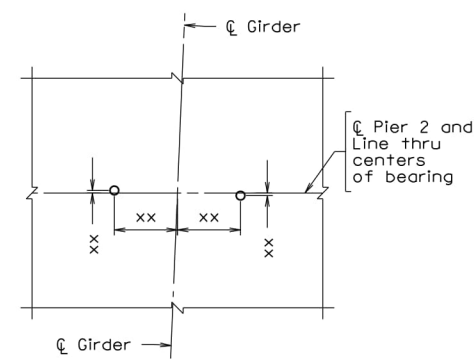
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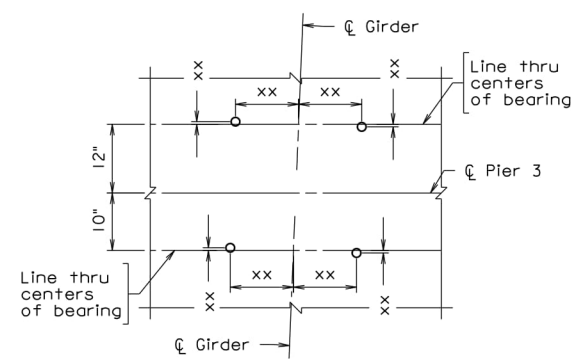
PIER 3
FOOTING PLAN



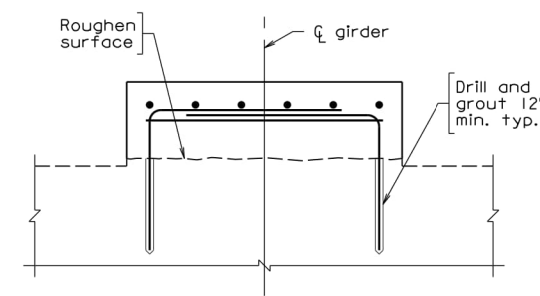
PIER 1 ANCHOR BOLT LAYOUT
Scale: 3/4" = 1'-0"



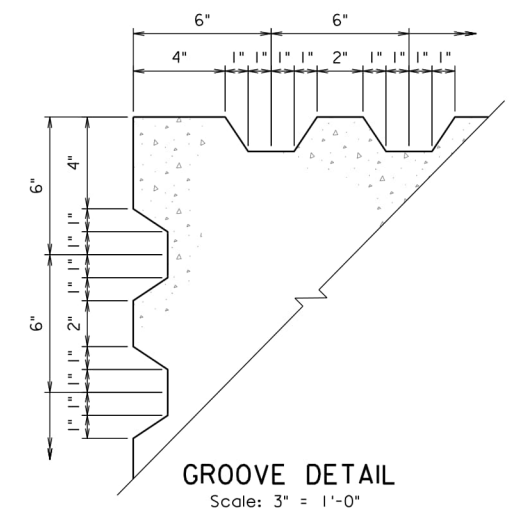
PIER 2 ANCHOR BOLT LAYOUT
Scale: 3/4" = 1'-0"



PIER 3 ANCHOR BOLT LAYOUT
Scale: 3/4" = 1'-0"



TYPICAL SEAT BUILDUP DETAIL
Not to scale



GROOVE DETAIL
Scale: 3" = 1'-0"

Scale: 1/2" = 1'-0" unless otherwise noted.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

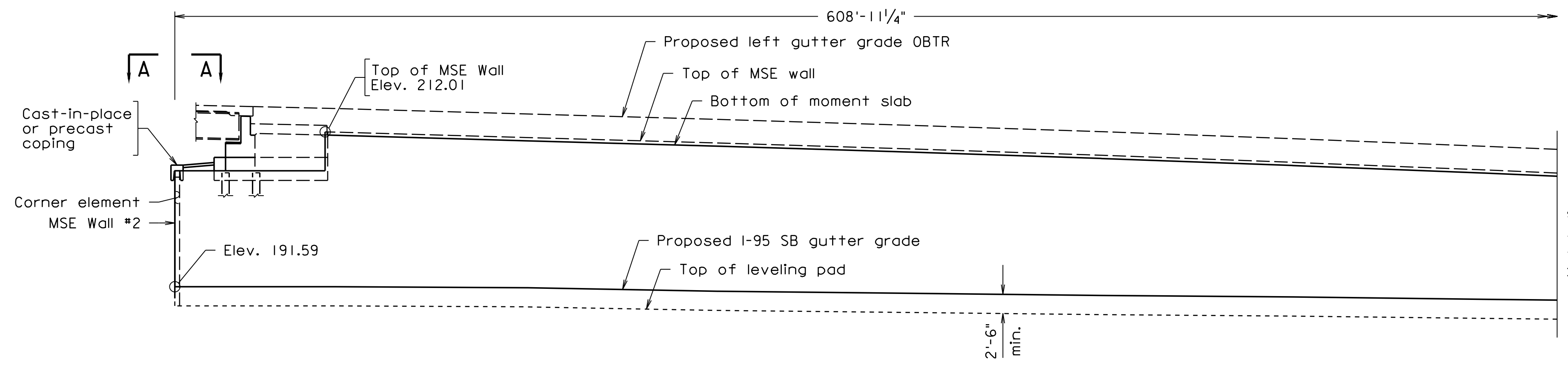
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION			
STRUCTURE AND BRIDGE DIVISION			
MISCELLANEOUS PIER DETAILS			
No.	Description	Date	Revisions
Designed: WRA	Date	Plan No.	Sheet No.
Drawn: WRA	Nov. 2021	257-38A	29 of 93
Checked: WRA			

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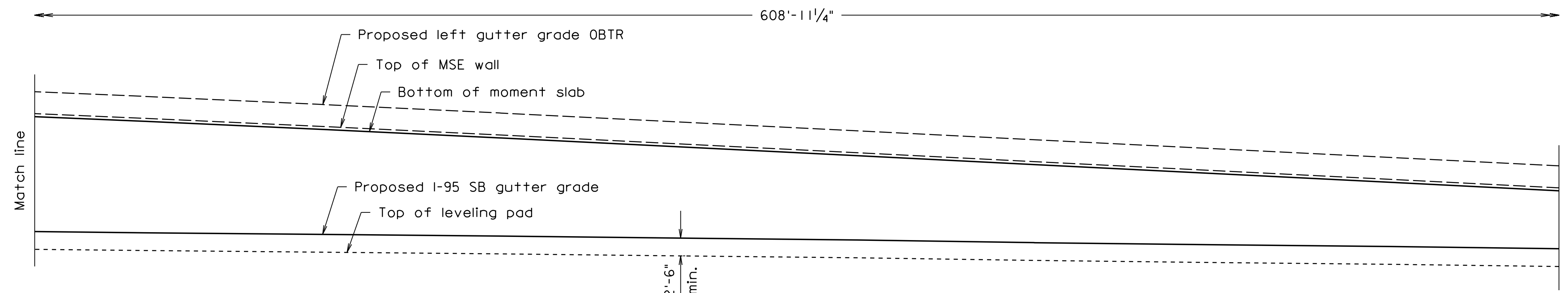
APPENDIX A.4

Selected Plans – MSE & SPL Walls

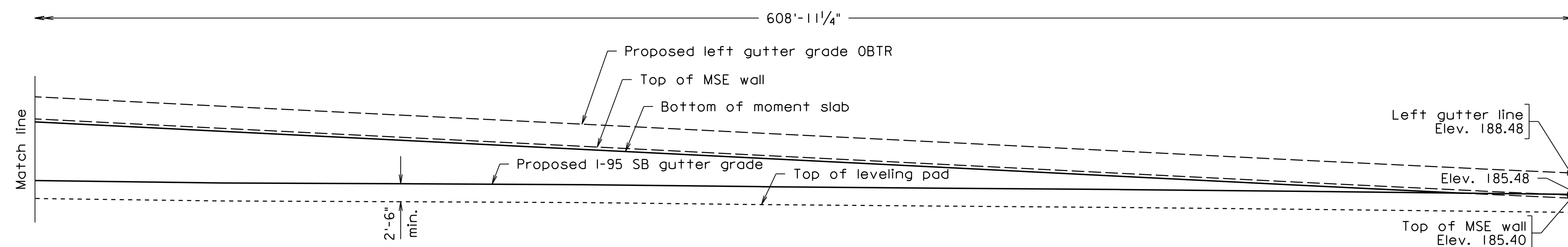
STATE	FEDERAL AID	STATE	SHEET
ROUTE	PROJECT	ROUTE	PROJECT
VA.		2000	0095-076-299, B688
			00



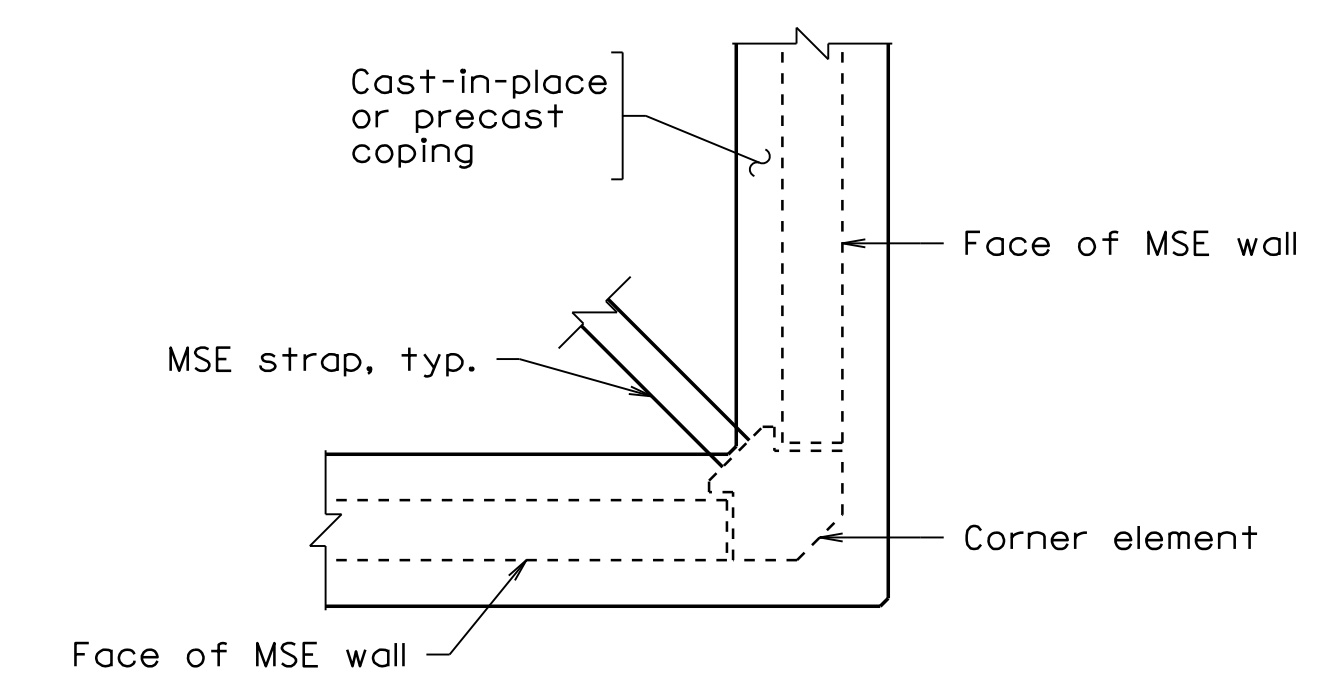
MSE WALL #1 ELEVATION
Barriers not shown for clarity



MSE WALL #1 ELEVATION
Barriers not shown for clarity



MSE WALL #1 ELEVATION
Barriers not shown for clarity



VIEW A-A
Scale: 1/2" = 1'-0"

MSE Wall Detail 1 of 2.dgn

PRELIMINARY PLANS
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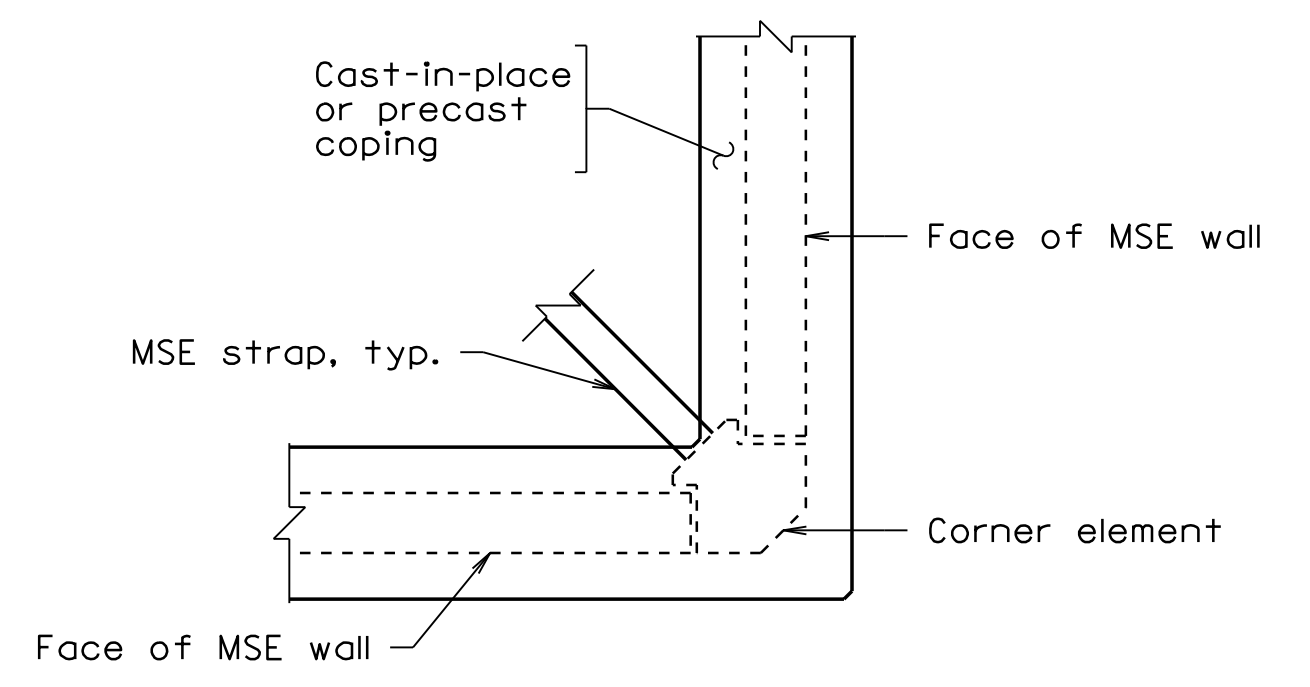
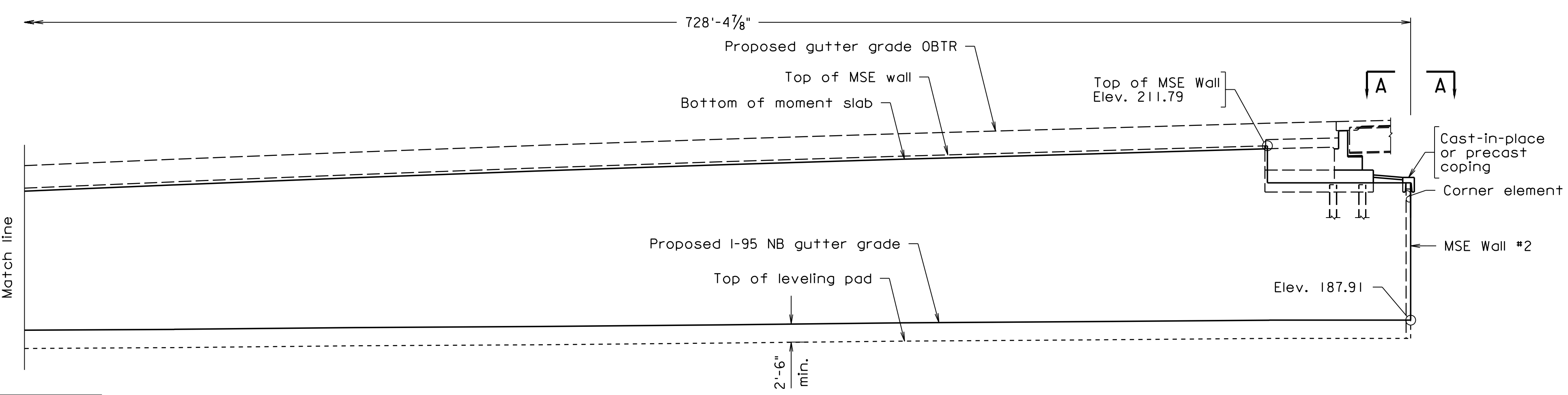
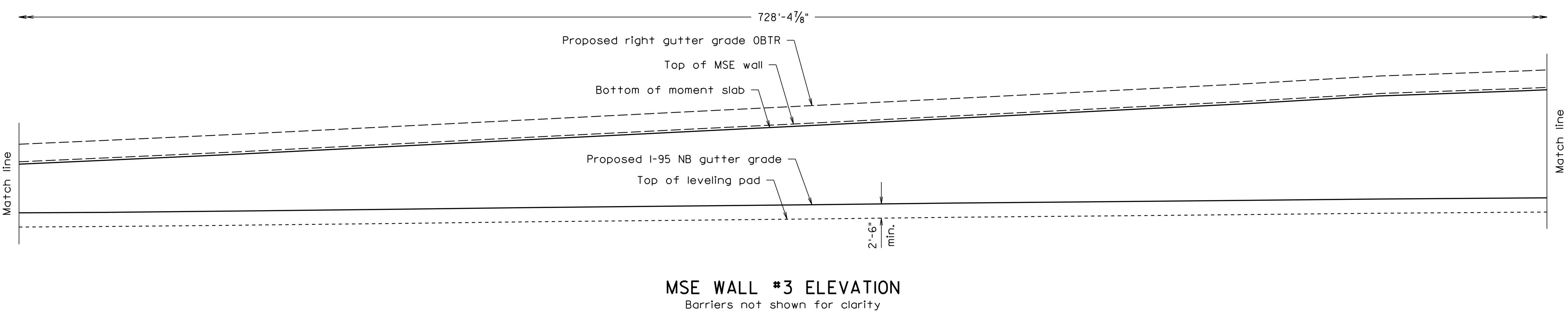
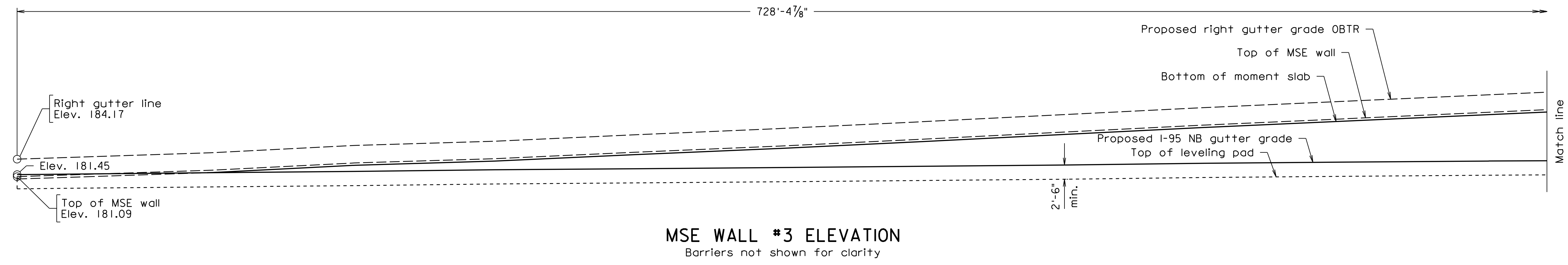
Scale: 3/32" = 1'-0" unless otherwise noted.

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STRUCTURE AND BRIDGE DIVISION					
MSE WALL ELEVATIONS WALL #1					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		00 of 93
Revisions					

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VA.		2000	0095-076-299, B688
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MSE Wall Detail 2 of 2.dgn

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PRELIMINARY PLANS
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Scale: 3/32" = 1'-0" unless otherwise noted.

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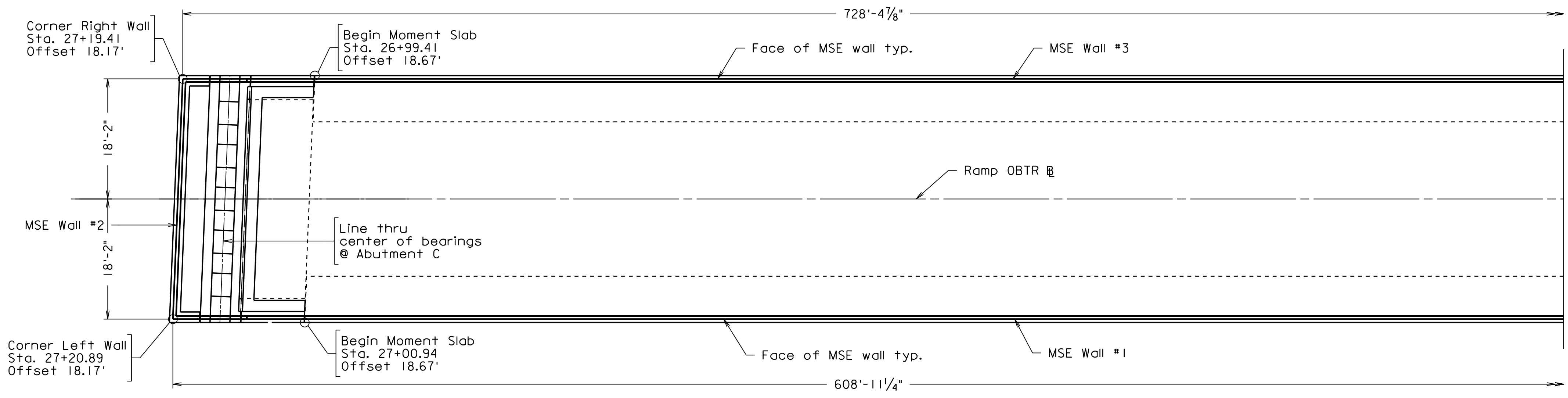
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STRUCTURE AND BRIDGE DIVISION					
MSE WALL ELEVATIONS WALL #3					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		00 of 93
Revisions					

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			2000	0095-076-299, B688	00

Notes:

- The minimum design life of MSE wall shall be (100-year).
- The anticipated MSE wall total settlement is .X. inches and differential settlement is .X..
- For bearing resistance requirements, see the MSE Wall Bearing Resistance Data Table.
- For settlement requirements, see the Estimated Wall Settlement Table.
- Vertical slip joints shall be placed in the wall at intervals not to exceed .X. ft. between Sta XX+XX.XX and Sta XX+XX.XX
- Prior to wall construction, the foundation shall be compacted with a smooth wheel vibratory roller weighting 10 tons minimum. The drums of the roller should be ballasted, and each pass of the roller should overlap one half the width of the previous pass. The roller shall make at least ten passes over the proposed wall foundation zone. No density test will be required. Any foundation soils found to be unsuitable and/or unstable shall be removed and replaced with select material Type 1 minimum CBR of 30. Compact the foundation area according to the VDOT Specifications.
- Remove unsuitable or unstable foundation material below the bottom of the wall and replace with select material prior to wall construction. Compact the foundation area according to the VDOT Specifications.
- The minimum required depth of undercut shall be .X. ft. between Sta XX+XX.XX and Sta XX+XX.XX
- The estimated required depth of unsuitable material to be removed is shown on the plans. The lateral limits of excavation are dependent on the depth at a particular location below the wall. Additional localized excavation may be required depending on the site conditions at the time of construction.
- Minimum panel design thickness is 5.5 inches. Thickness of concrete must increase to accommodate any architectural surface finish that may be specified.
- Concrete in moment slabs and parapet/railing shall be Low Shrinkage Class A4 Modified.
- Corrosion Resistant Reinforcing (CRR) steel shall be used in moment slab and shall be the same type of corrosion resistant reinforcing steel specified for parapet/railing.
- Class I CRR steel shall be used in copings.
- Class I CRR steel shall be used in portions of MSE Wall panels within splash zone as shown on plans.
- An impervious membrane shall be placed below the pavement and just above the first row of reinforcement. The membrane shall be sloped to drain away from the facing to an intercepting longitudinal drain outlet beyond the reinforced zone.
- A non-woven geotextile shall be used as a separator between the mechanically stabilized earth mass and the subbase.
- (Coping) (parapet) (moment slab) shall not be placed until .X. days after wall completion have elapsed.
- The selected wall supplier will submit a detailed design and shop drawings for approval.
- Provide drainage details such as perforated pipe underdrain and/or drainage blanket based upon field conditions. For wall installation at stream crossing, provide adequate drainage so the difference between streambed and saturated backfill is not greater than what is considered in the design.
- All panel types and other related elements shall be detailed on shop drawings.

Match Line next sheet



MSE WALL LAYOUT - ABUTMENT AND APPROACH RAMP

MSE Wall Layout 1 of 2.dgn

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STRUCTURAL ENGINEER

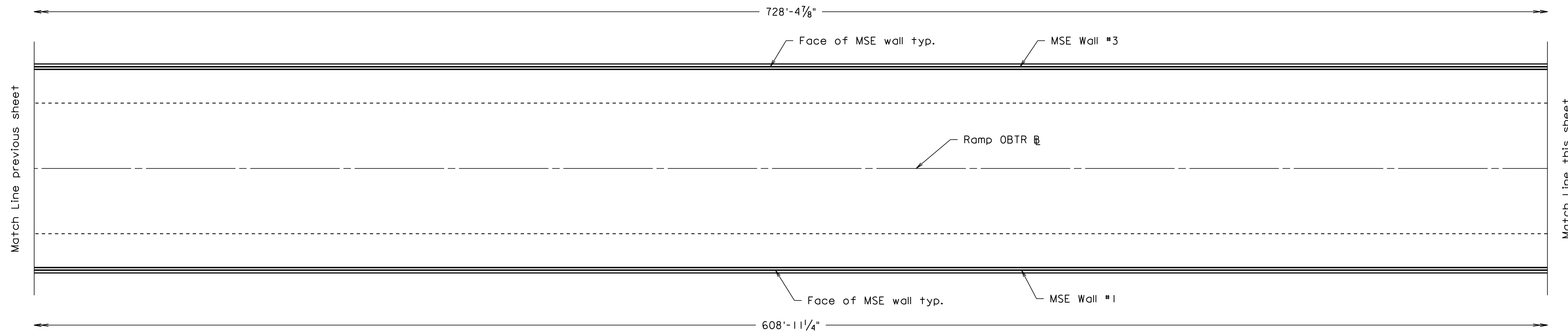
PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

Scale: 3/32" = 1'-0" unless otherwise noted.

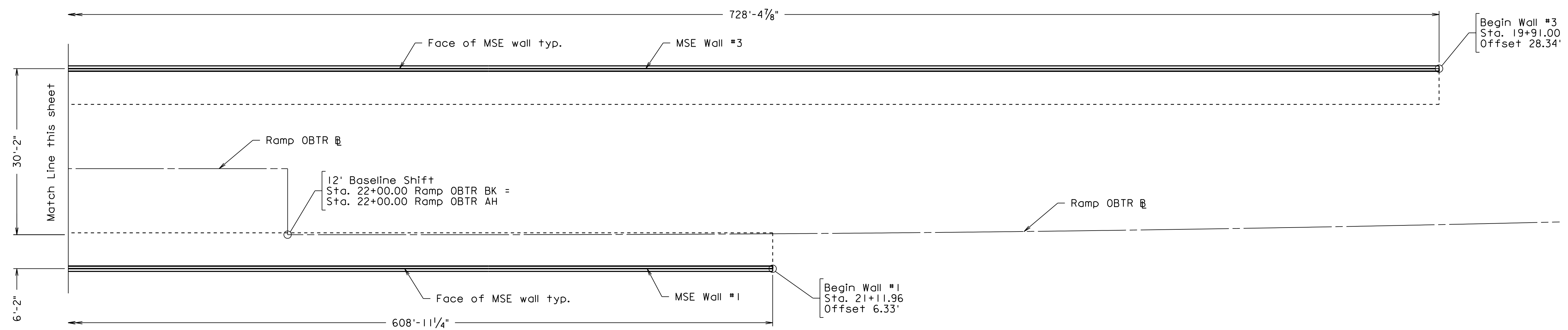
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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
MSE WALL LAYOUT (1 OF 2) ABUTMENT C AND APPROACH					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
Revisions			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		00 of 93

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			2000	0095-076-299, B688
				00



MSE WALL LAYOUT - ABUTMENT AND APPROACH RAMP



MSE WALL LAYOUT - ABUTMENT AND APPROACH RAMP

MSE Wall Layout 2 of 2.dgn

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Scale: 3/32" = 1'-0" unless otherwise noted.

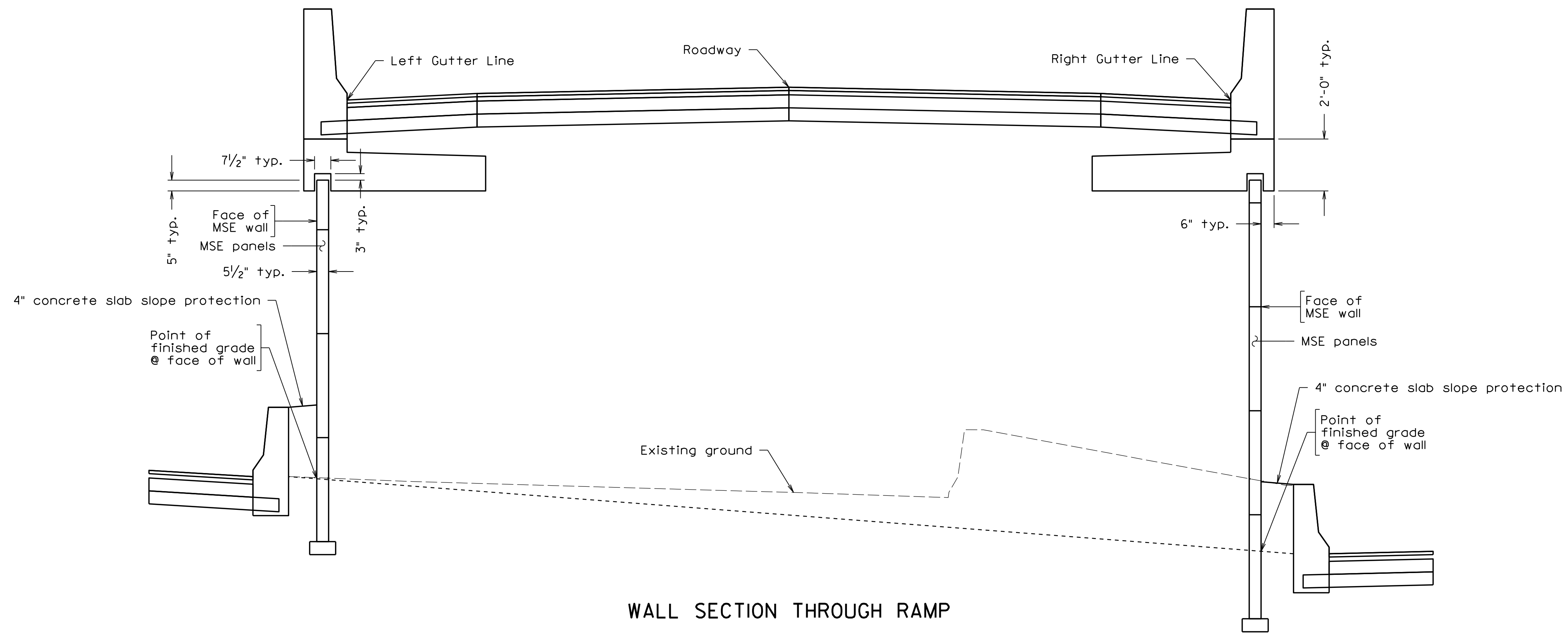
PRELIMINARY PLANS
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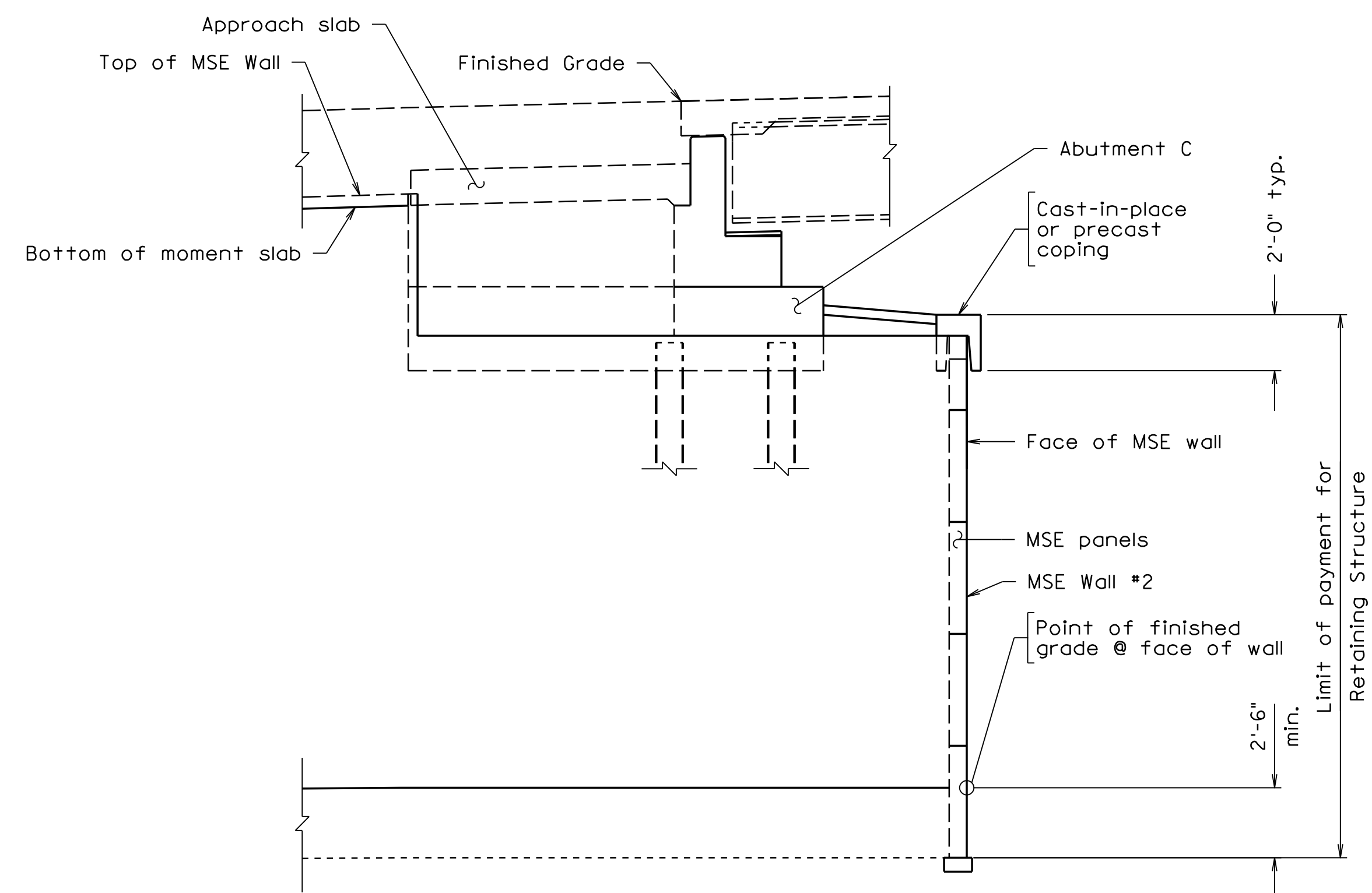
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STRUCTURE AND BRIDGE DIVISION			
MSE WALL LAYOUT (2 OF 2) ABUTMENT C AND APPROACH			
No.	Description	Date	Designed: X.X.X. Date Drawn: X.X.X. Checked: X.X.X.
	Revisions		Nov. 2021
			Plan No. 257-38A
			Sheet No. 00 of 93

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ROUTE	PROJECT	ROUTE	PROJECT
VA.		2000	0095-076-299, B688
			00



WALL SECTION THROUGH RAMP



ABUTMENT WALL SECTION

Scale: 1/4" = 1'-0"

Scale: 3/8" = 1'-0" unless otherwise noted.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

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COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
MSE WALL SECTIONS					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		00 of 93
Revisions					

MSE Wall Sections.dgn

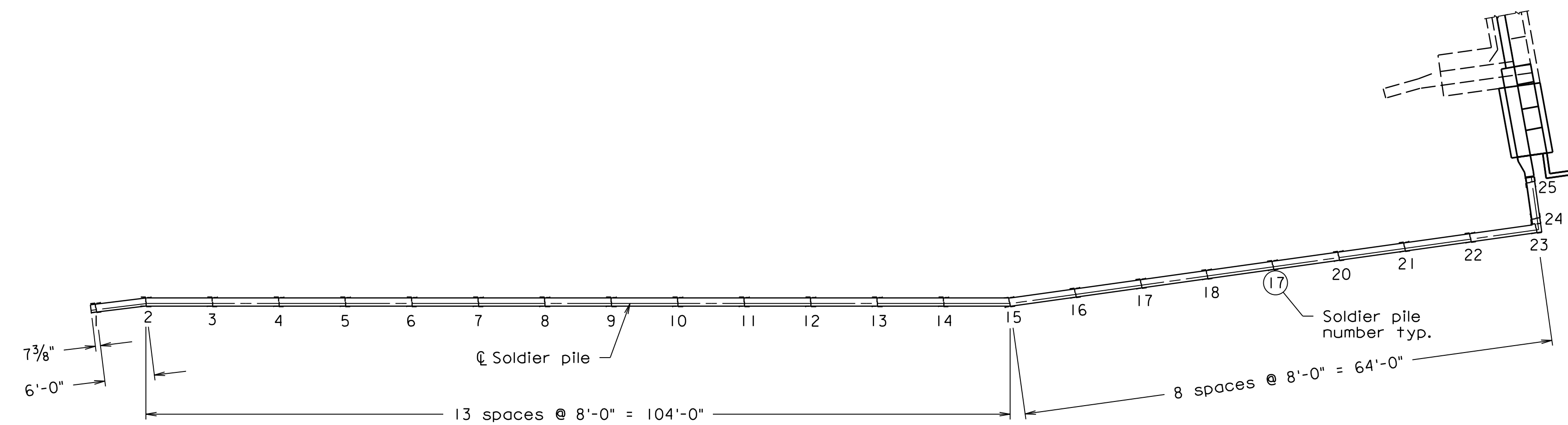
WHITMAN REQUARDT & ASSOCIATES
 RICHMOND, VA
 STRUCTURAL ENGINEER

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			2000	0095-076-299, B688	XXb

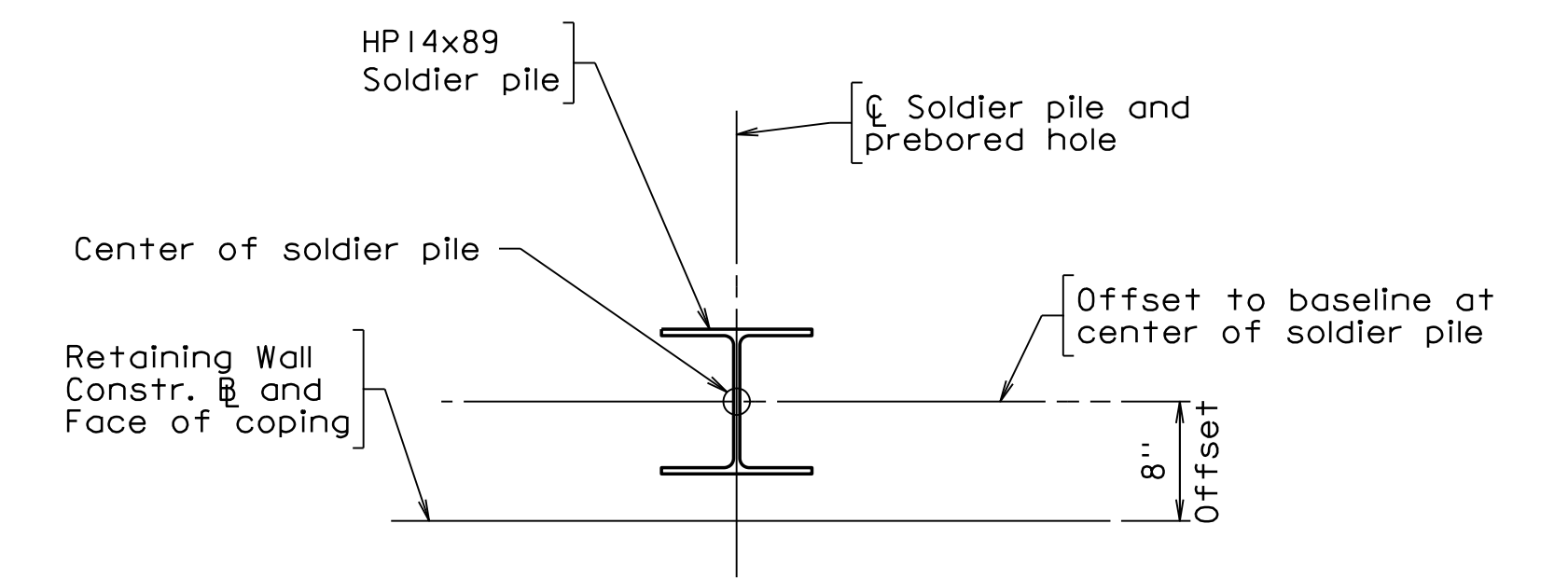
Notes:

For abutment details, including connection to wingwall see bridge plans.

Soldier piles shall be driven to or below the minimum tip elevation. A template and pile driving equipment with a fixed lead shall be used for the installation accuracy. The driving hammer shall be powerful enough to drive HP14x89 piles to the required depths into stiff residual soils and decomposed rock.



SOLDIER PILE LOCATION PLAN



SOLDIER PILE SECTION

Scale: 1" = 1'-0"

SOLDIER PILE LOCATION DATA			
Soldier pile no.	Station	Offset	Min. tip elev.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

SUGGESTED SEQUENCE OF CONSTRUCTION AND GENERAL REQUIREMENTS:

1. Clear and grub the area for the wall construction.
2. Place all erosion and sediment perimeter controls in accordance with the approved erosion and sediment control plan. These controls shall remain in place and be continuously maintained during all construction.
3. Grade a bench along the proposed wall alignment wide enough to accommodate the pile driving equipment required to install the soldier piles for the retaining wall.
4. The wall shall be constructed in a top down manner to continually support the earth and roadway adjacent to the wall. For no reason shall an open unsupported excavation face be left unprotected.
5. Once the permanent concrete lagging panels are in place the Contractor shall place the #68 stone backfill between the temporary wood lagging and the permanent concrete lagging panels. This shall be done at the end of each working day. The stone backfill shall be protected at the surface by a geotextile fabric to prevent mud and silt from fouling the stone.
6. All excavation material shall be removed to an approved stockpile or disposal site.
7. The top coping and pile encasement shall be placed once the precast panels have been placed.
8. Once the precast panels have been placed the Contractor may grade the areas behind the top of the wall. Extreme care shall be taken so as not to damage the concrete wall construction.

Soldier_Pile_Layout-Plan.dgn

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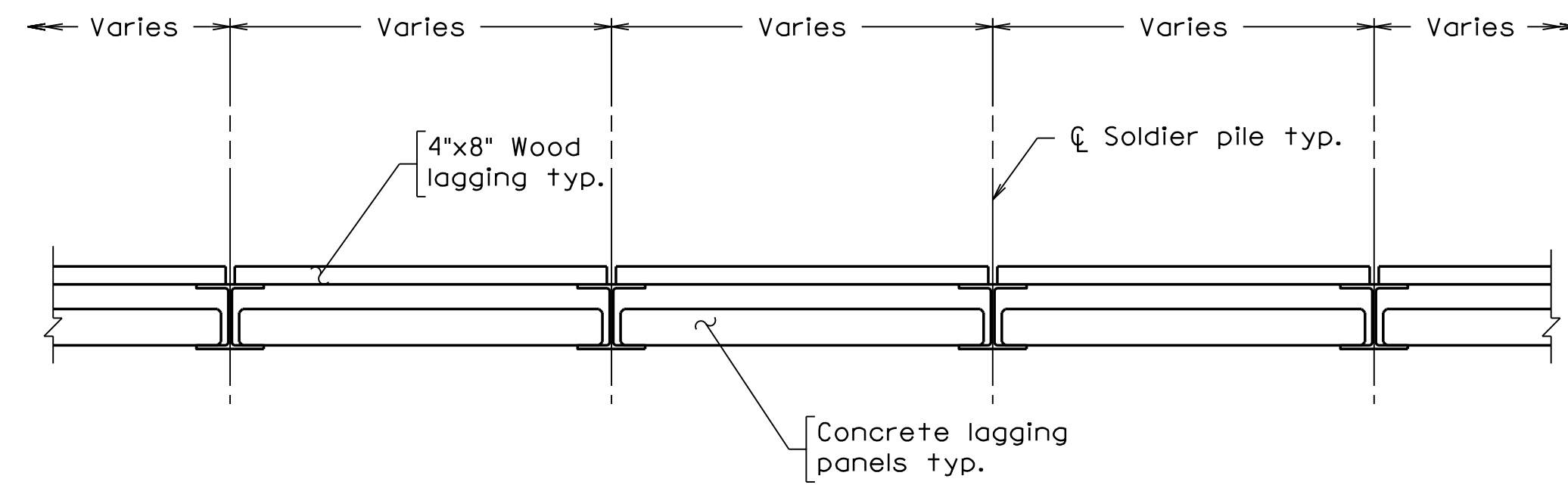
PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

Scale: 3/32" = 1'-0" unless otherwise noted.

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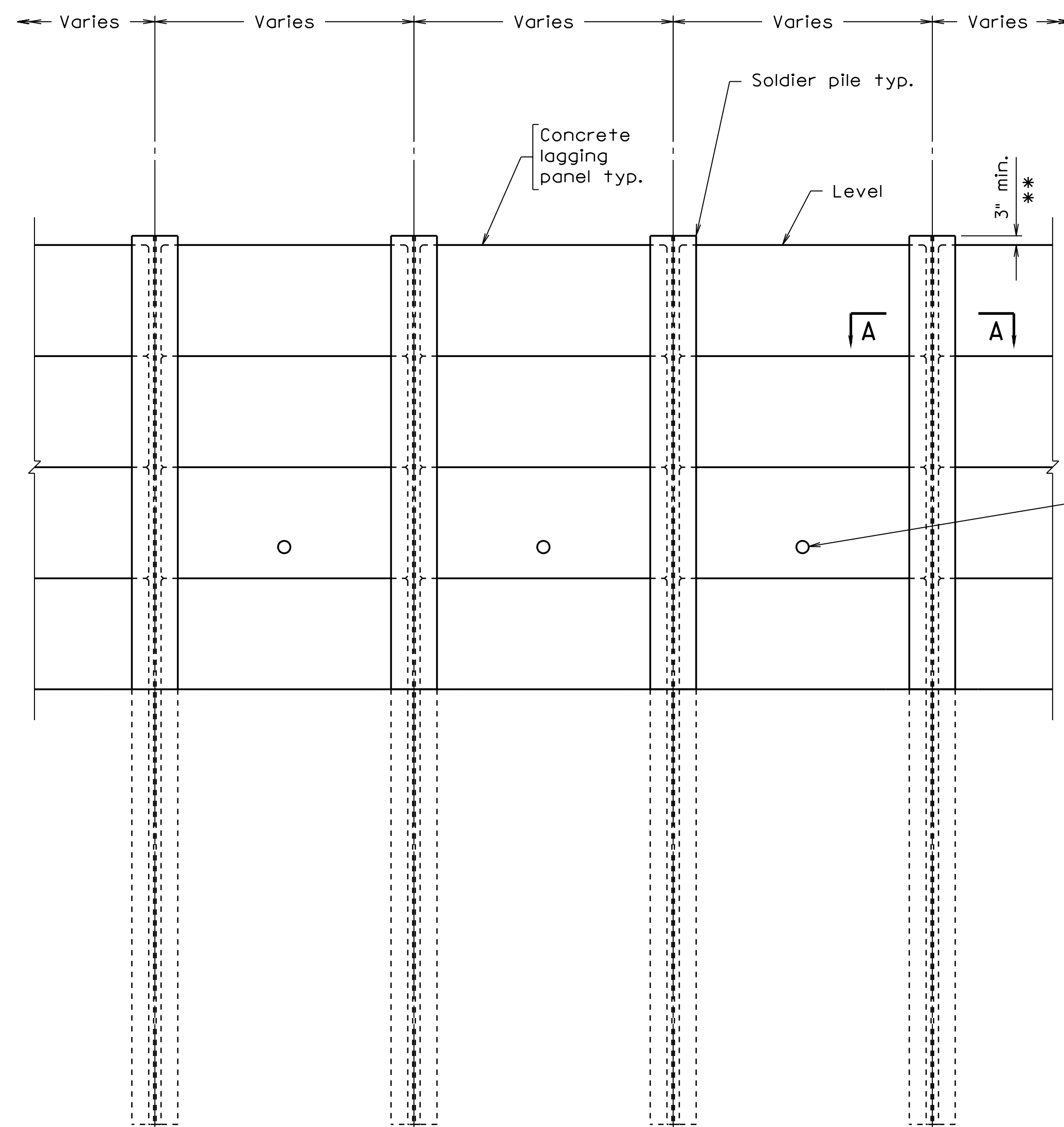
COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION					
STRUCTURE AND BRIDGE DIVISION					
SOLDIER PILE WALL PLAN AND PILE SECTION					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
Revisions			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		of 93

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			2000	0095-076-299, B688
				288



PART PLAN - LAGGING AND SOLDIER PILES

Scale: 3/8" = 1'-0"



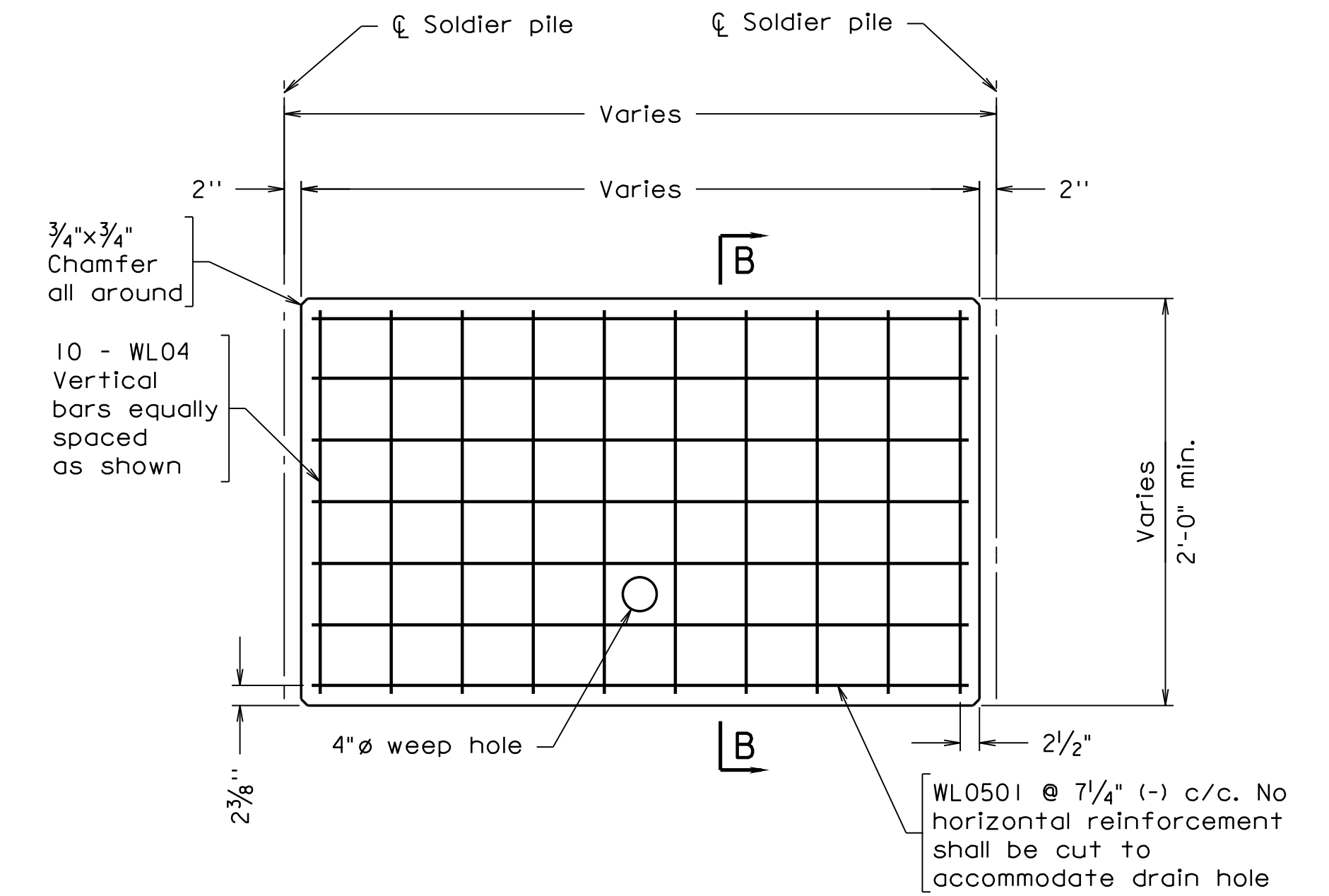
PART ELEVATION - LAGGING AND SOLDIER PILES

Scale: 3/8" = 1'-0"

**Contractor may vary this dimension to accommodate top of level lagging panel

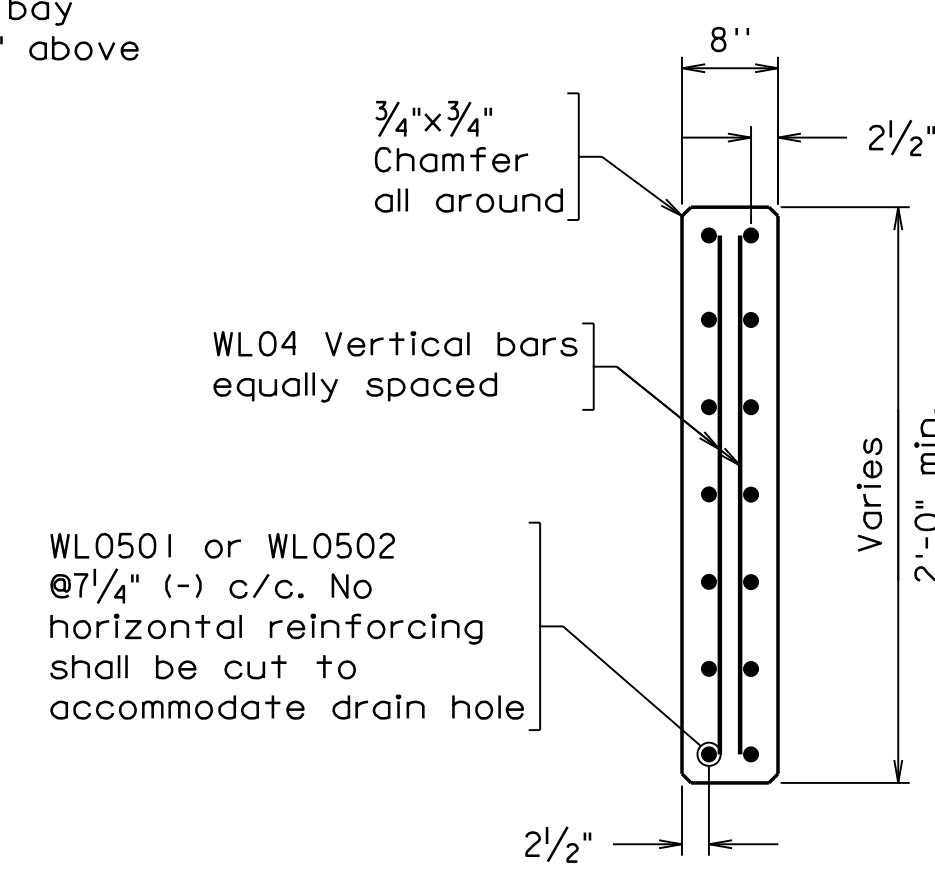
Note:
Concrete coping not shown for clarity

4" Ø weep holes, one per bay located approximated 12" above finished grade



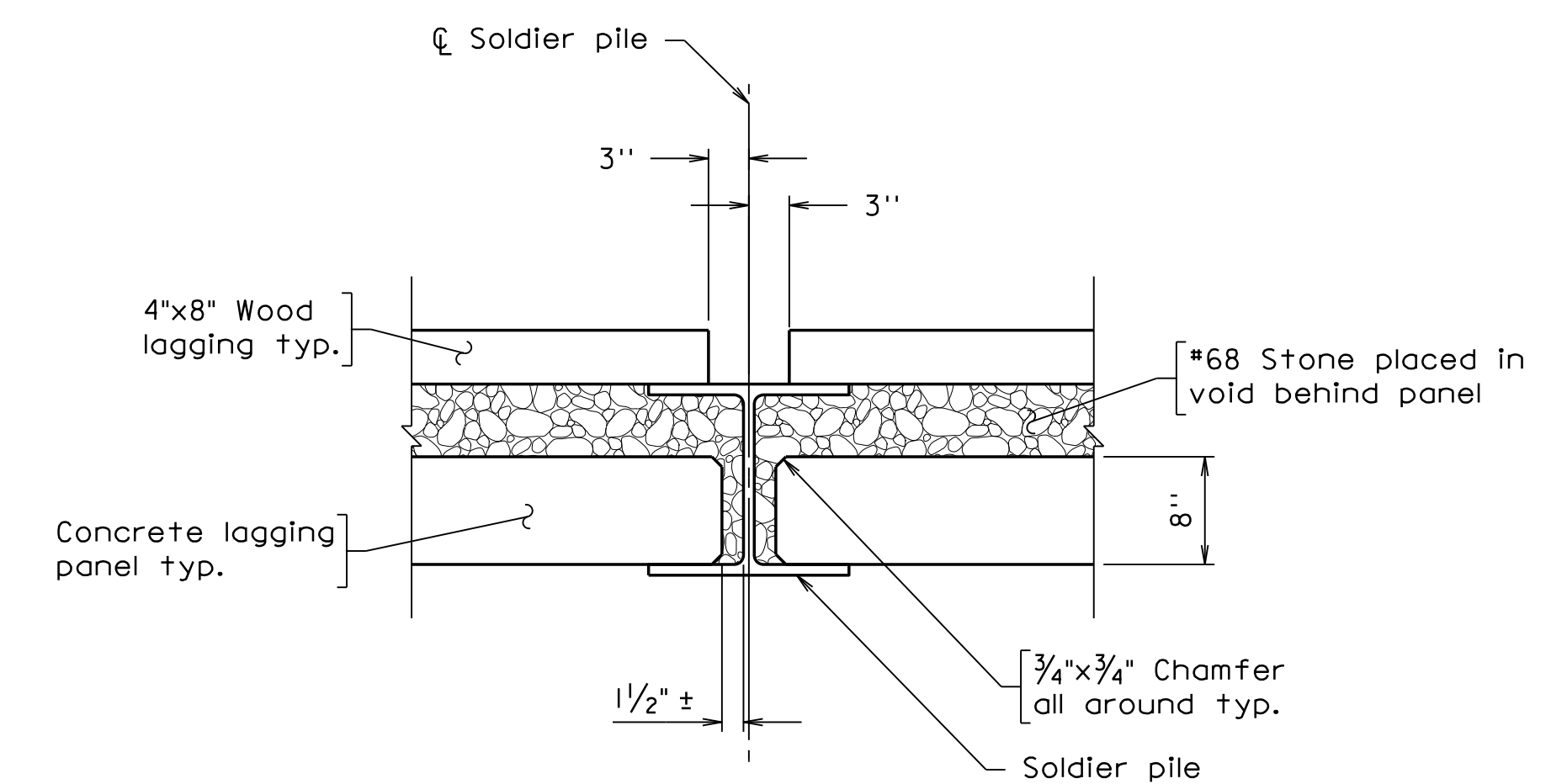
PRECAST CONCRETE LAGGING PANEL DETAILS

Scale: 3/4" = 1'-0"



SECTION B-B

Scale: 3/4" = 1'-0"



SECTION A-A

Scale: 1" = 1'-0"

Soldier_Pile_Wall_Details.dgn

PRELIMINARY PLANS
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STRUCTURE AND BRIDGE DIVISION					
SOLDIER PILE AND LAGGING DETAILS					
No.	Description	Date	Designed: J.R.M.	Date	Plan No.
			Drawn: J.R.M.	Nov. 2021	2891-38A
			Checked: J.R.M.		26c off 928
Revisions					

STATE	FEDERAL AID		STATE		SHEET
ROUTE	PROJECT		ROUTE	PROJECT	NO.
VA.			2000	0095-076-299, B688	XXa

GENERAL NOTES:

Specifications:

Construction: Virginia Department of Transportation Road and Bridge Specifications, 2020

Design: AASHTO LRFD Bridge Design Specification, 8th Edition, 2017 and VDOT Modifications

Standards: Virginia Department of Transportation Road and Bridge Standards, 2016, including all current revisions

These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.

For additional requirements, refer to the Special Provision titled "Soldier Pile Precast Panel Retaining Wall."

All structural steel shall be ASTM A709 Grade 50 and shall be galvanized in accordance with the Special Provision.

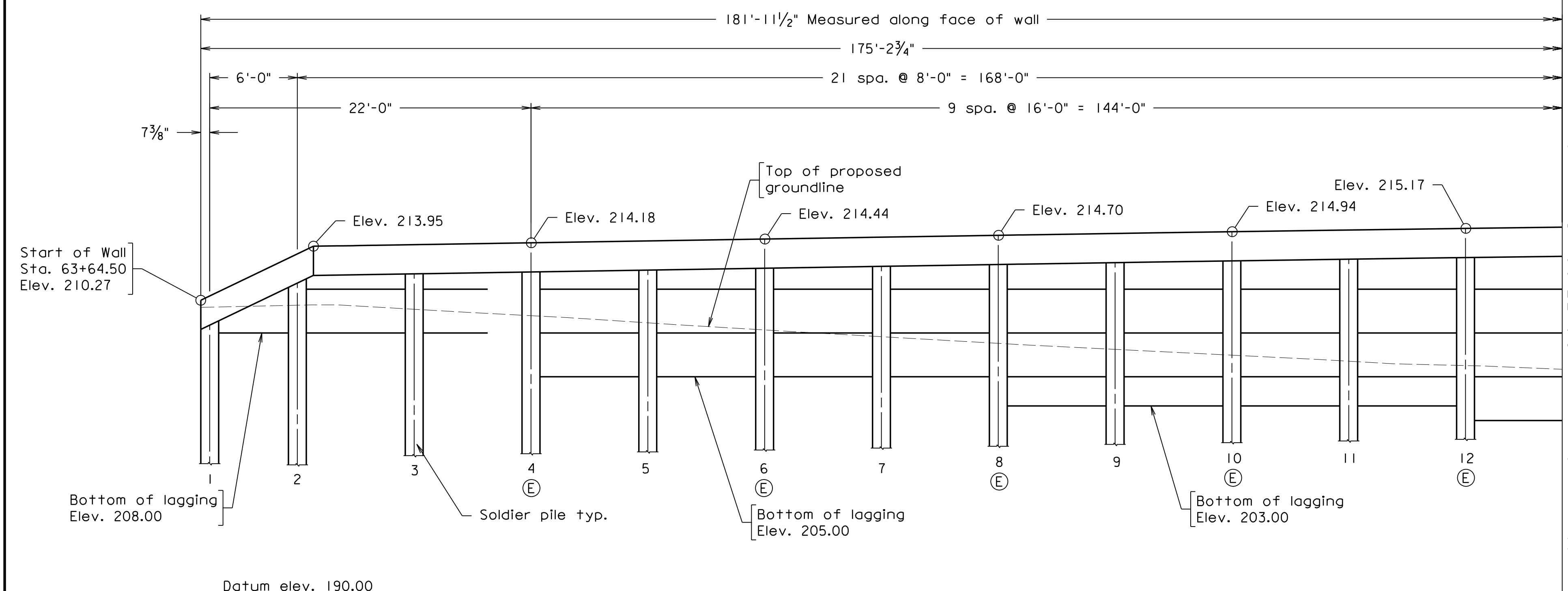
All concrete shall be Class A4.

All reinforcing steel shall be deformed and shall conform to ASTM A615, Grade 60 except for reinforcing steels noted as CRR (corrosion resistant reinforcement) which shall conform to the applicable specifications noted in the special provision. All reinforcing bar dimensions on the detailed drawings are to centers of bars except where otherwise noted and are subject to fabrication and construction tolerances.

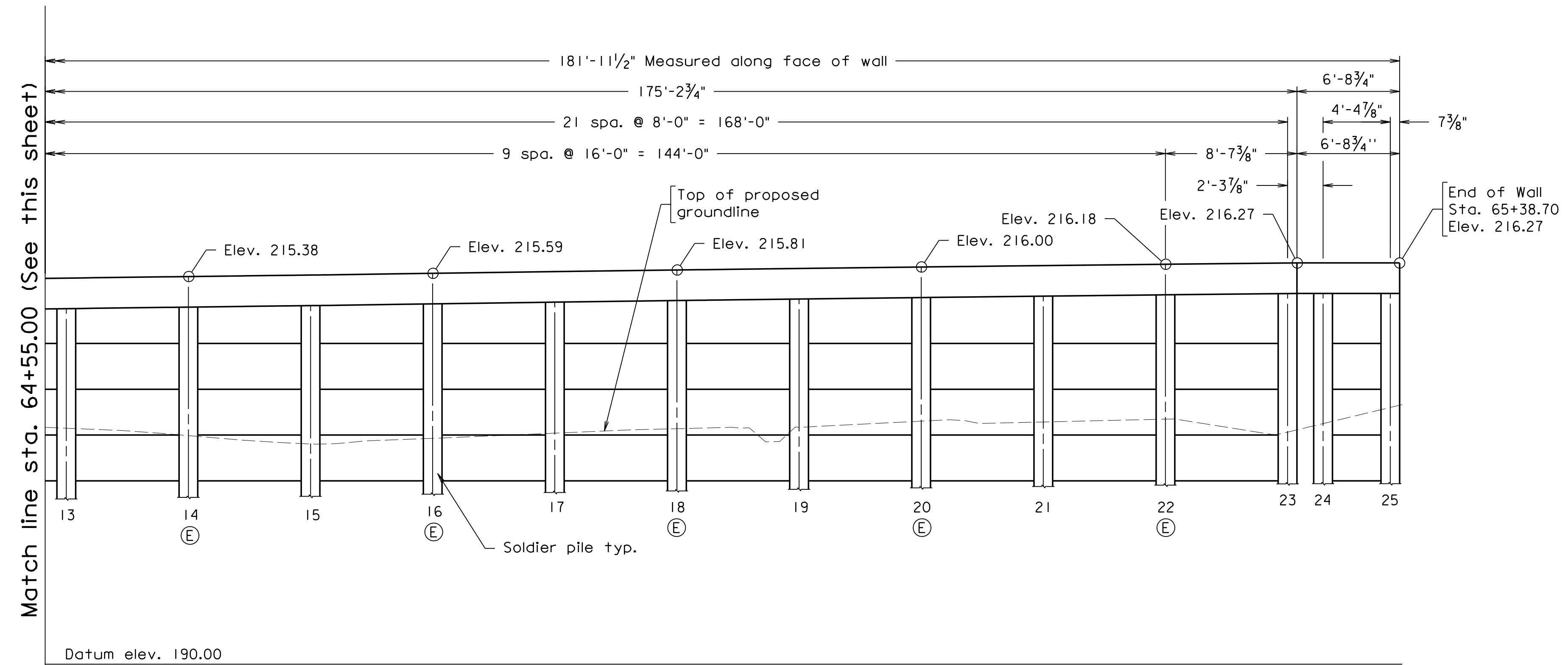
Corrosion resistant reinforcing (CRR) steels shall conform to one or more of the three types (low carbon/chromium, stainless clad and solid stainless) listed in the special provision. The minimum yield strength shall be: 100 ksi for low carbon/chromium and 60 ksi for stainless clad steel and solid stainless steel.

LEGEND:

ⓔ = Expansion joint



ELEVATION (FRONT FACE)



ELEVATION (FRONT FACE)

Soldier_Pile_Wall_Elevation.dgn

PRELIMINARY PLANS
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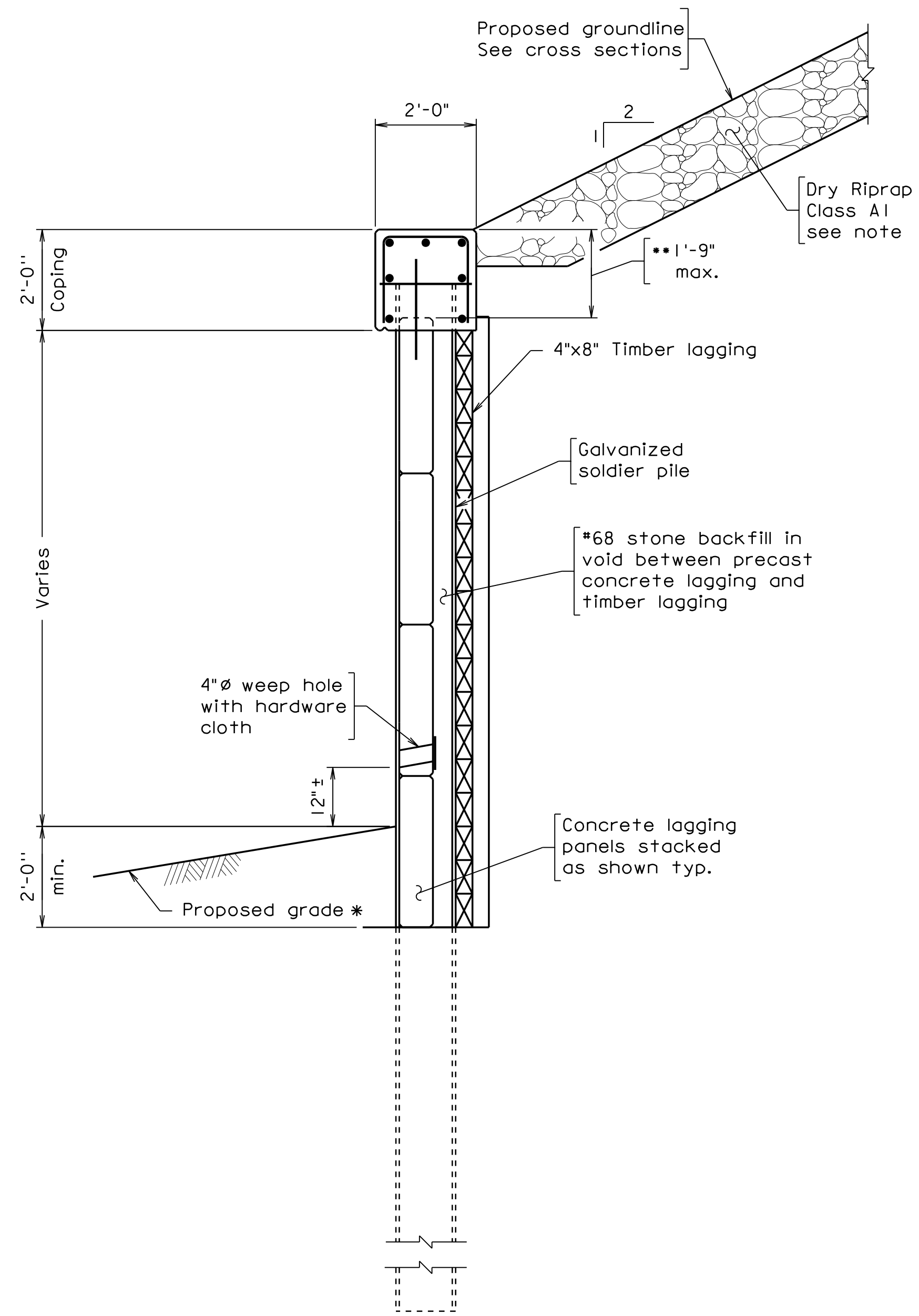
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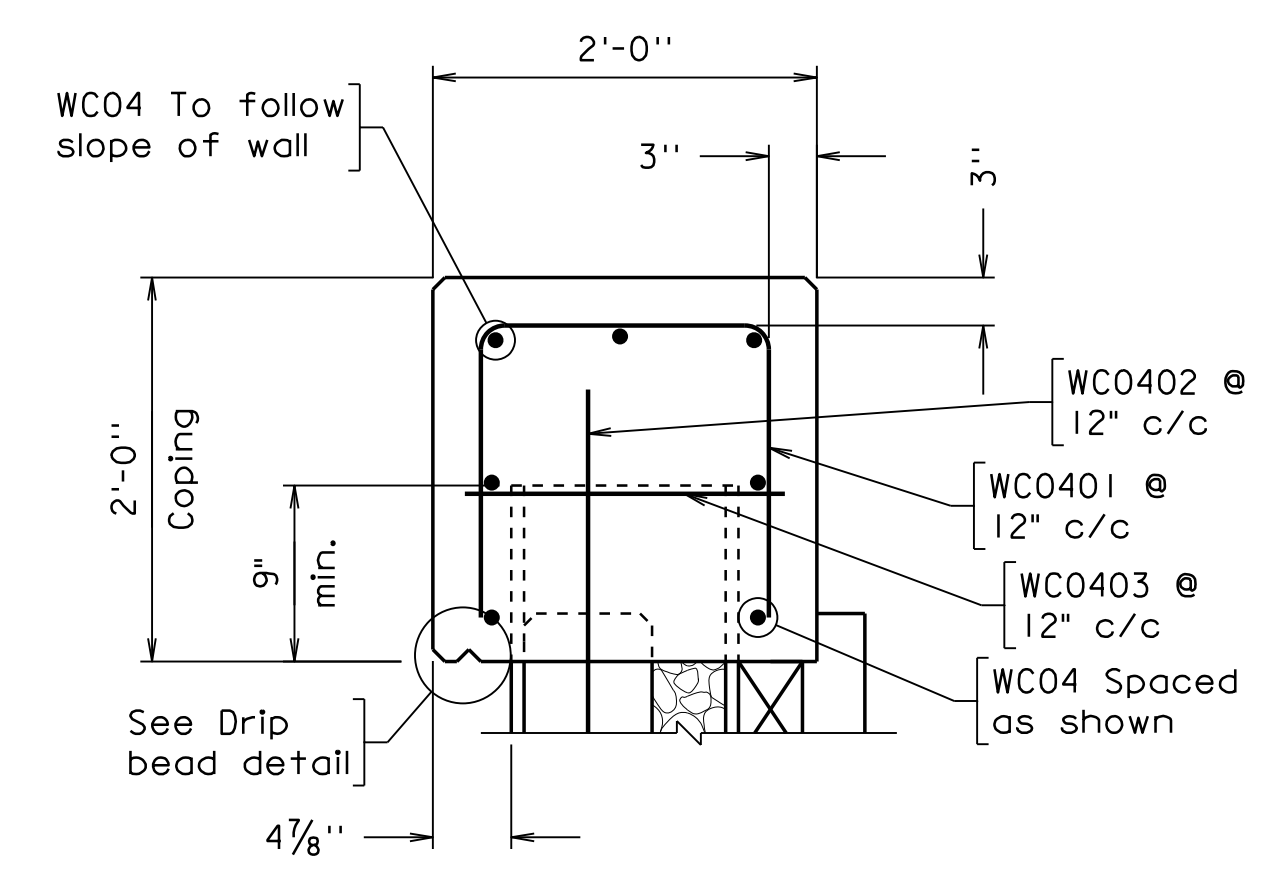
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STRUCTURE AND BRIDGE DIVISION					
SOLDIER PILE WALL ELEVATION AND GENERAL NOTES					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		of 93

STATE	FEDERAL AID		STATE	SHEET
ROUTE	PROJECT		ROUTE	PROJECT
VA.			2000	0095-076-299, B688
				XXx

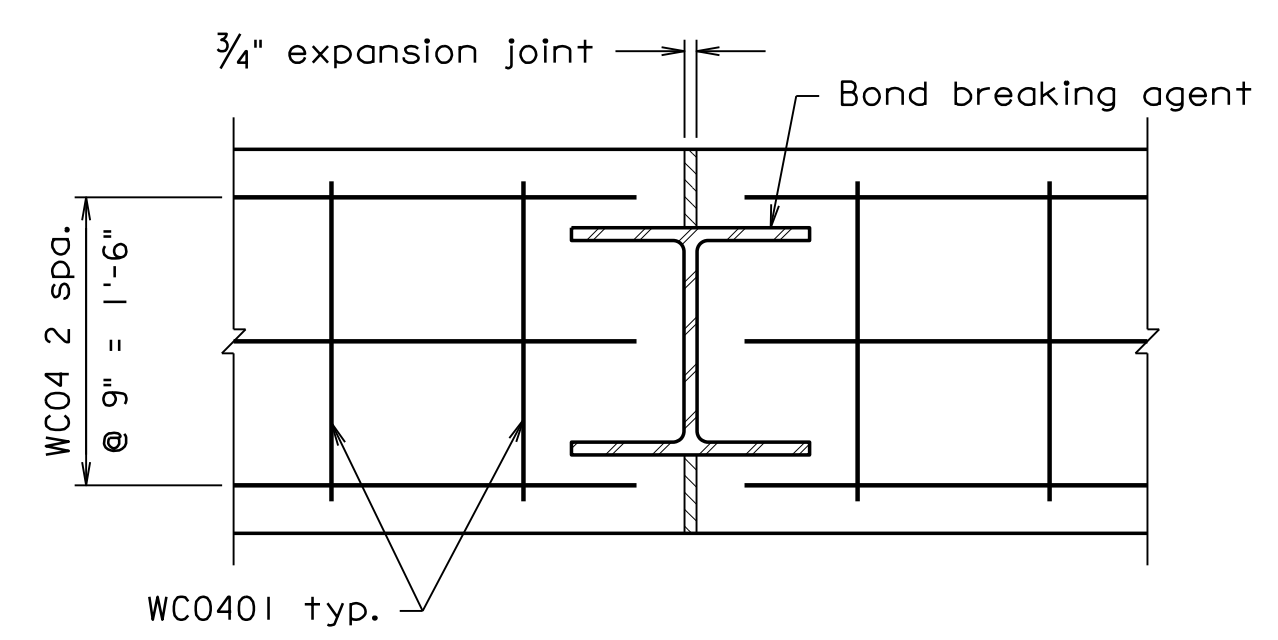


TYPICAL WALL SECTION
Scale: 1/2" = 1'-0"

* See sheet X for details

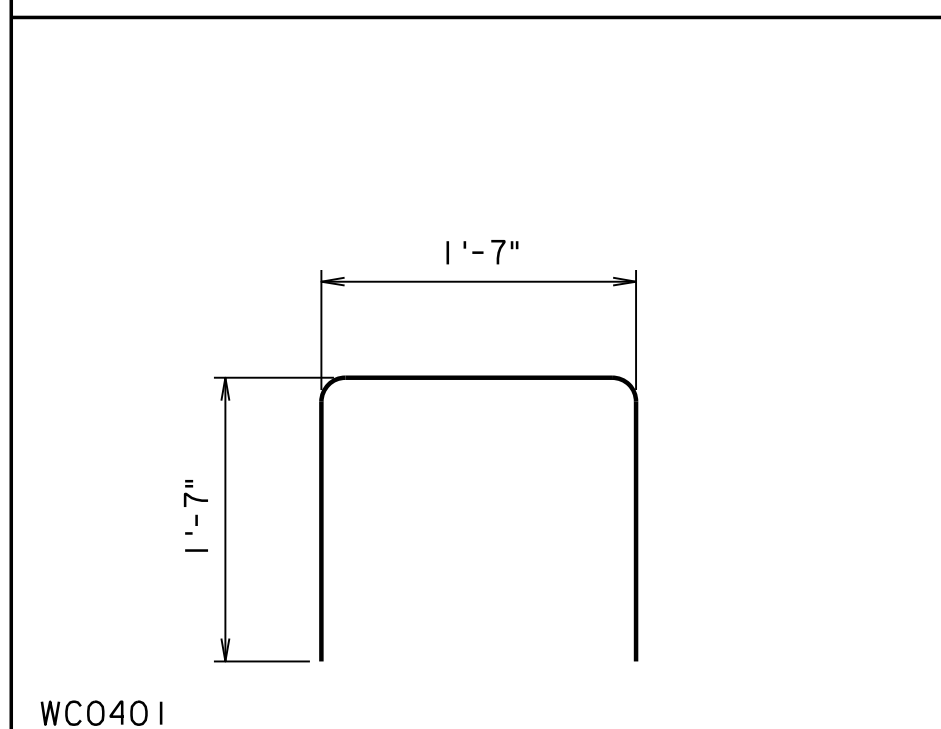


COPING REINFORCEMENT DETAIL
Scale: 1" = 1'-0"



EXPANSION JOINT DETAIL
Scale: 1" = 1'-0"

REINFORCING STEEL SCHEDULE



Mark	No.	Size	Pin ϕ	Length	Location
WC0401		#4	2"		Cap
WC0402		#4	---	2'-0"	Cap
WC0403		#4	---	1'-8"	Cap
WC04		#4	---		Cap
WL0501		#5	---	6'-3/2"	Lagging
WL04		#4	---		Lagging

WC0401

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STRUCTURE AND BRIDGE DIVISION					
SOLDIER PILE WALL TYPICAL SECTION AND COPING DETAILS					
No.	Description	Date	Designed: X.X.X...	Date	Plan No.
			Drawn: X.X.X...	Nov. 2021	257-38A
			Checked: X.X.X...		of 93

Soldier_Pile_Wall_Typ_Section.dgn

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STRUCTURAL ENGINEER

APPENDIX A.5

Cross Sections – MSE Walls

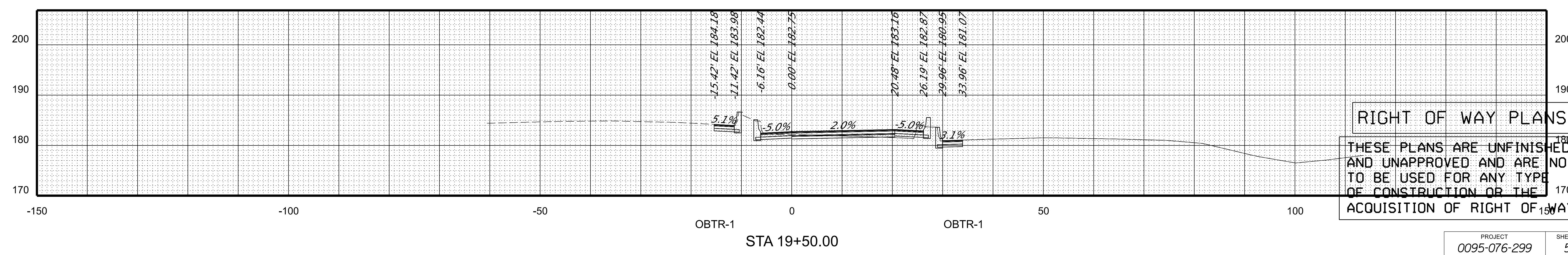
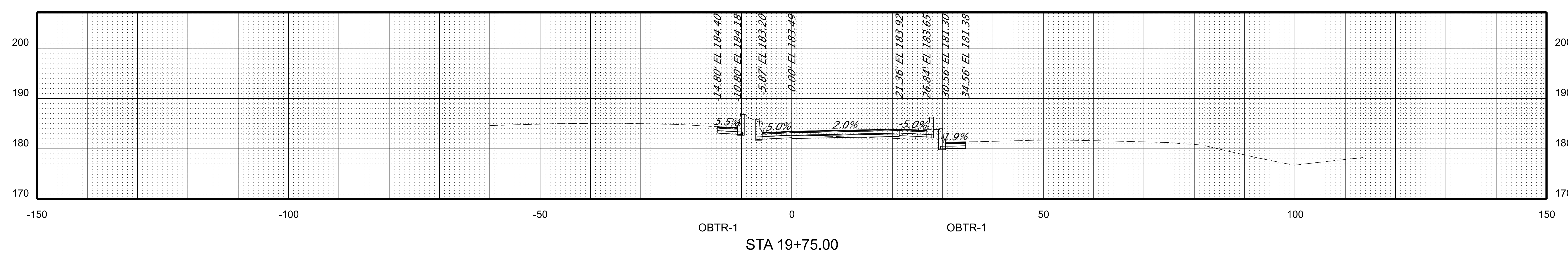
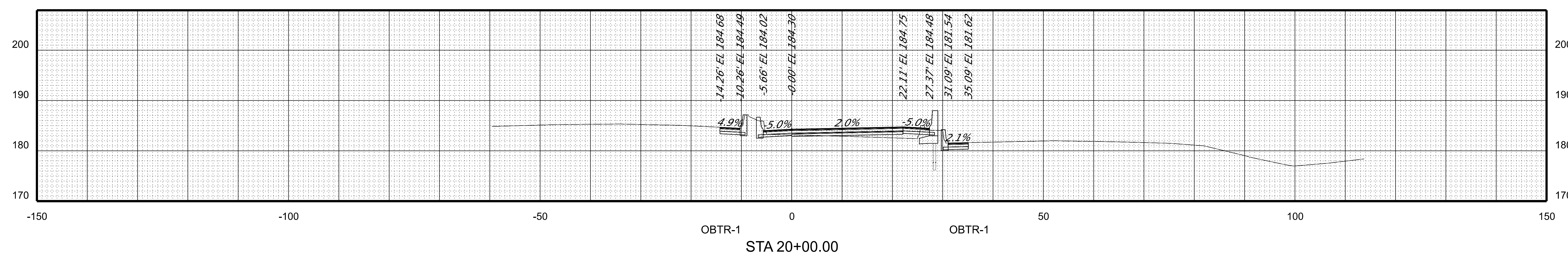
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	53

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



RIGHT OF WAY PLANS
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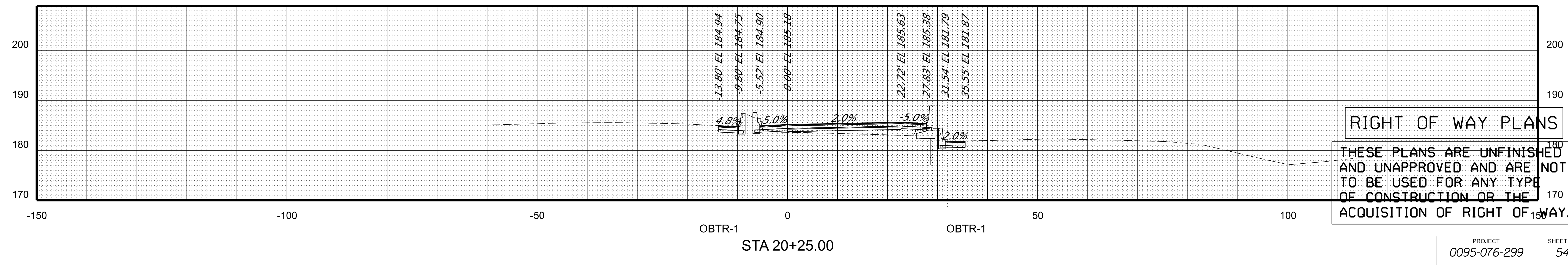
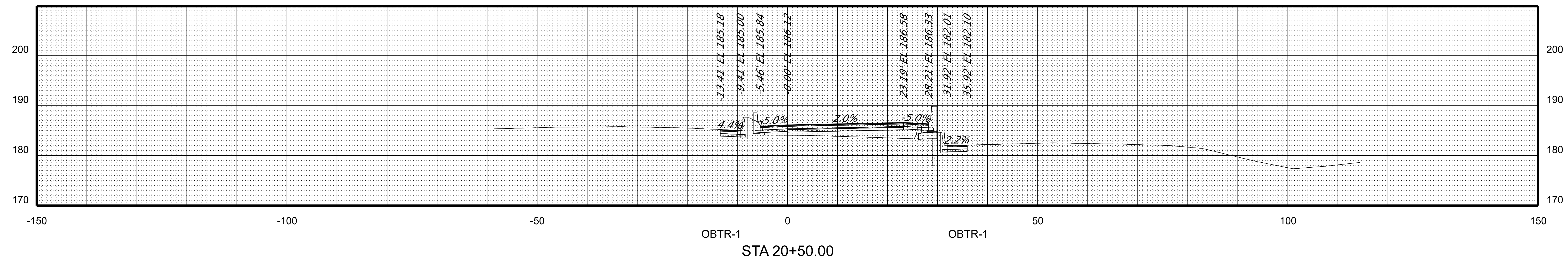
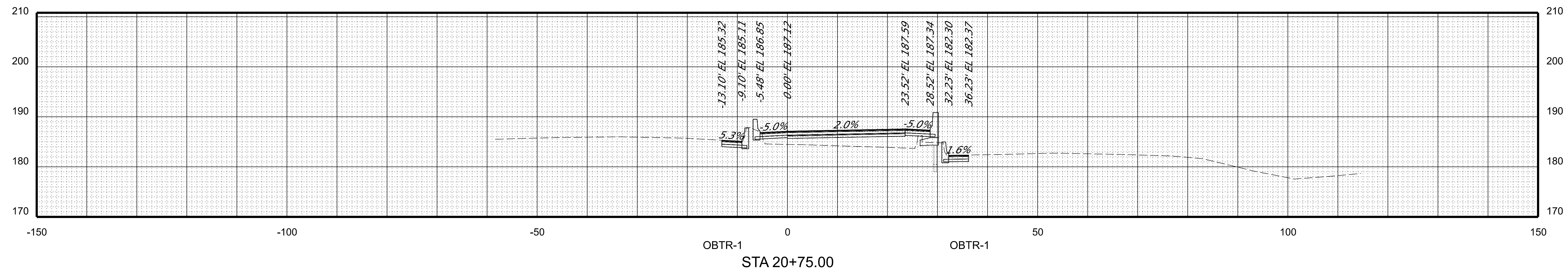
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	54

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RIGHT OF WAY PLANS
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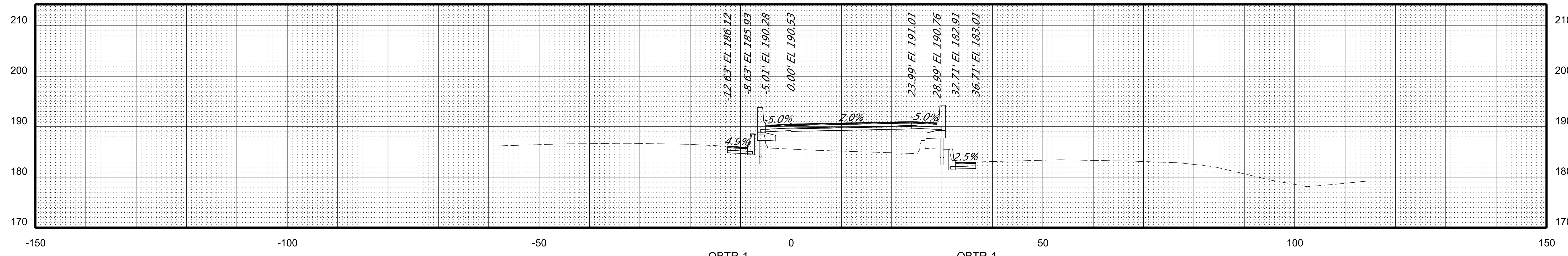
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

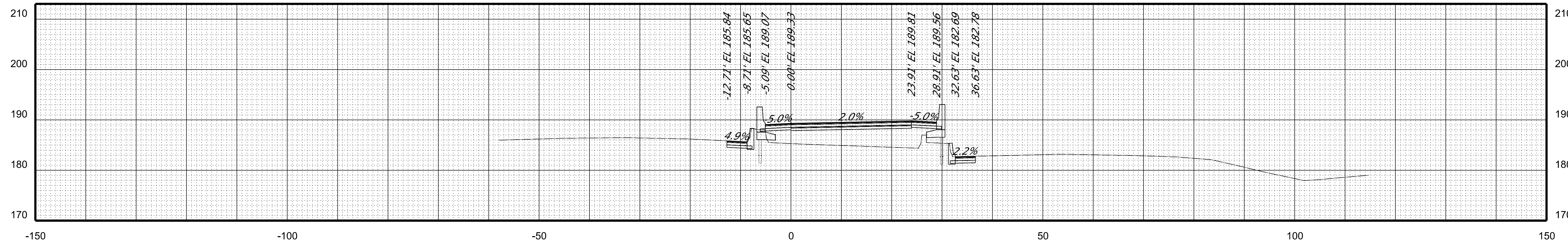
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	55

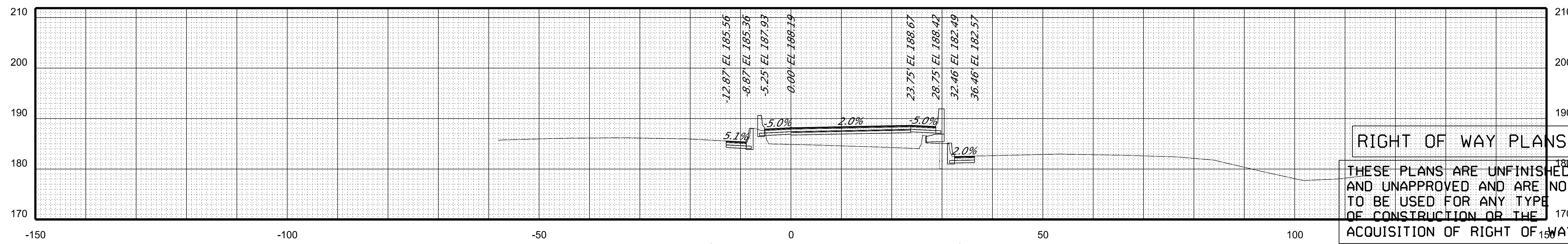
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



OBTR-1
STA 21+50.00



OBTR-1
STA 21+25.00



OBTR-1
STA 21+00.00

RIGHT OF WAY PLANS
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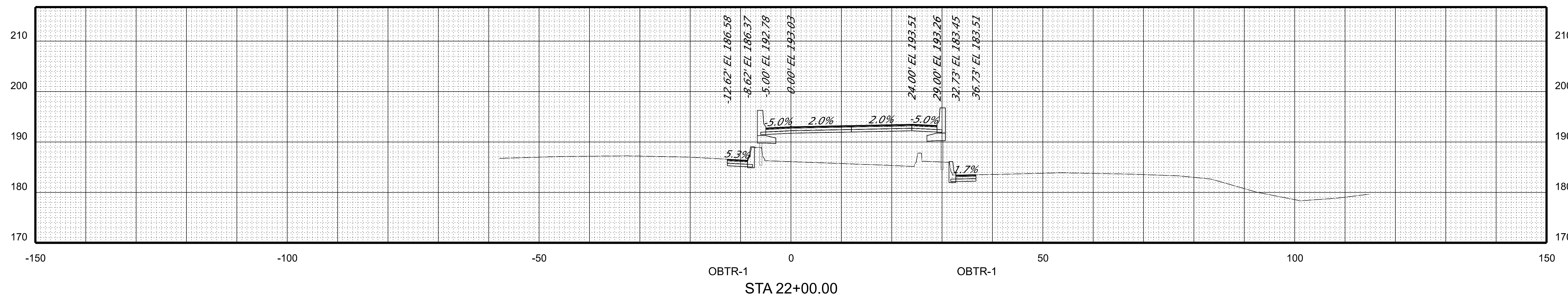
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

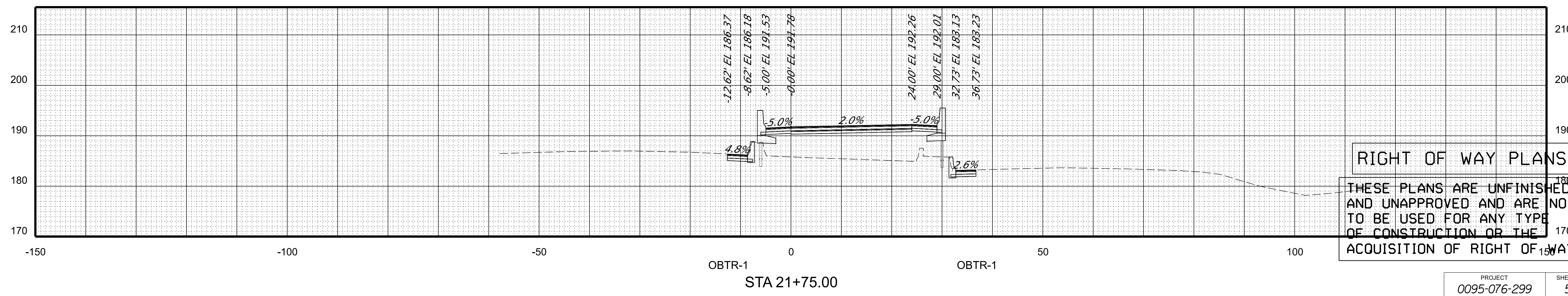
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	56

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 22+00.00



STA 21+75.00

RIGHT OF WAY PLANS
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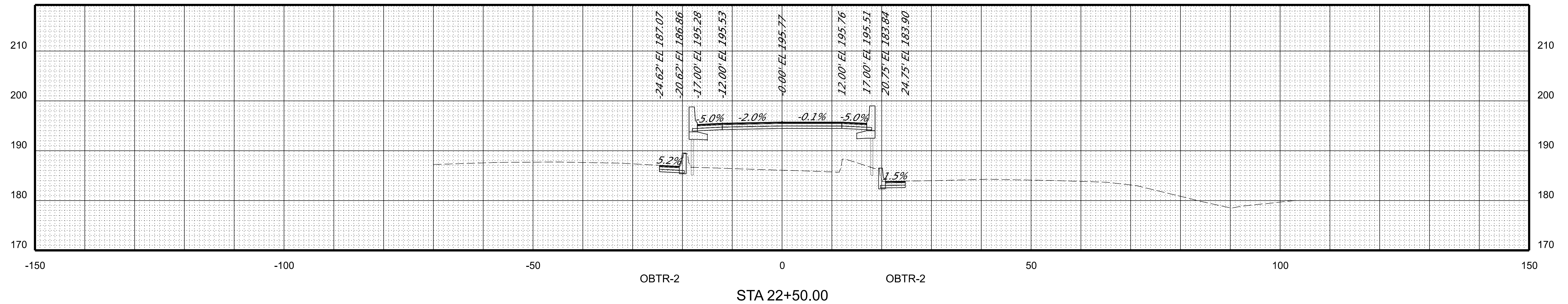
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

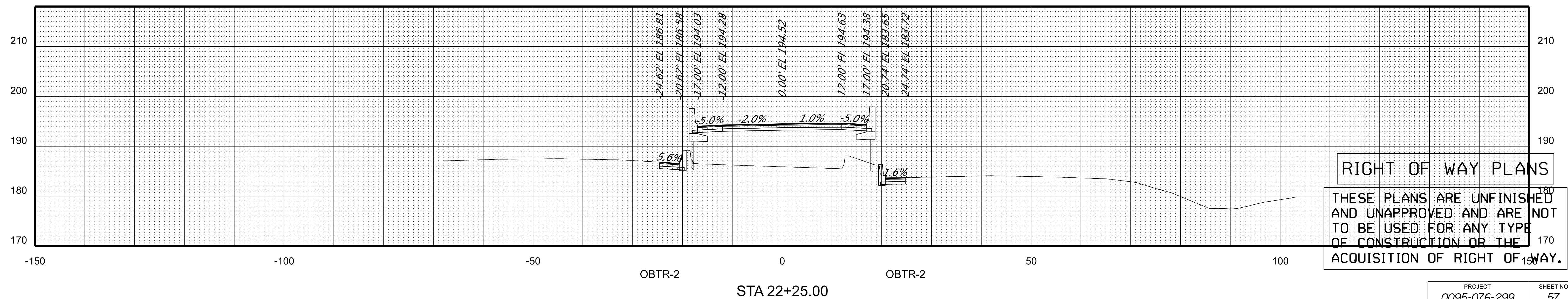
SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	57

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 22+50.00



STA 22+25.00

RIGHT OF WAY PLANS
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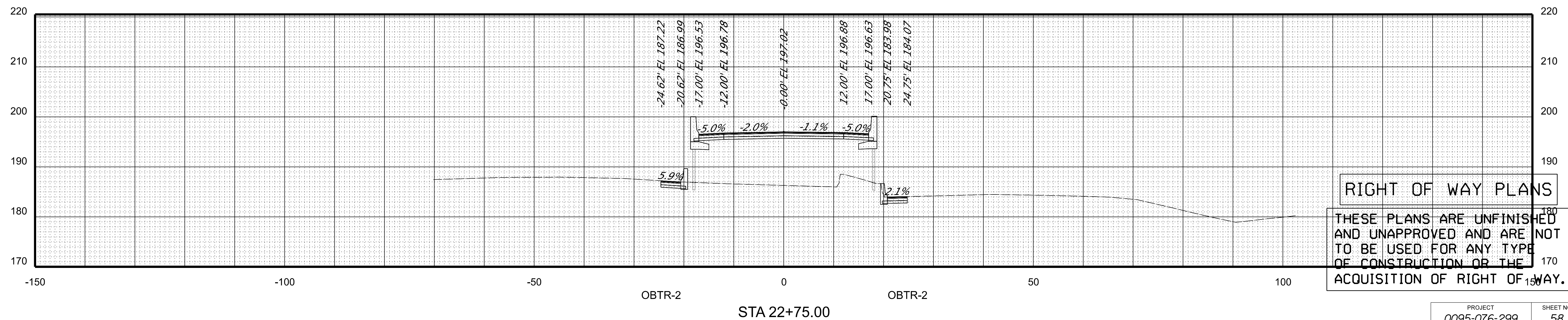
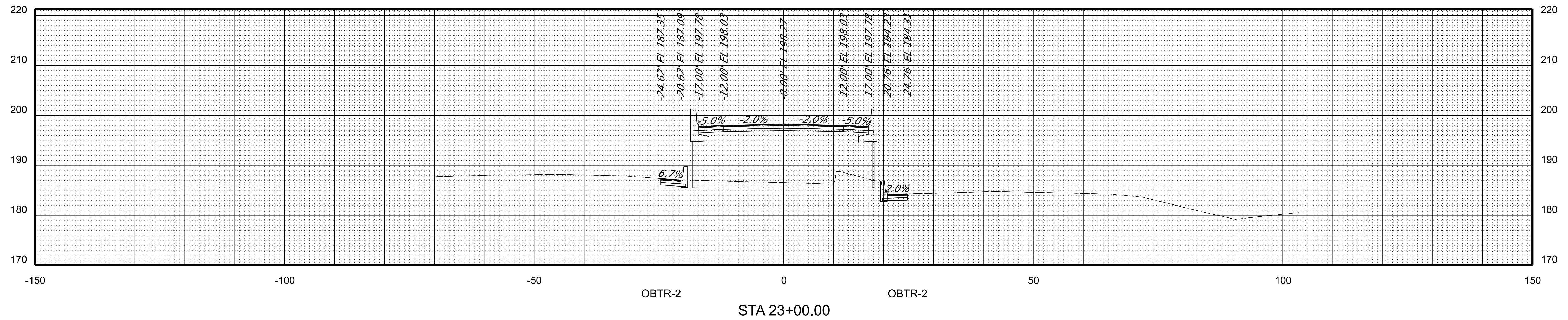
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	58

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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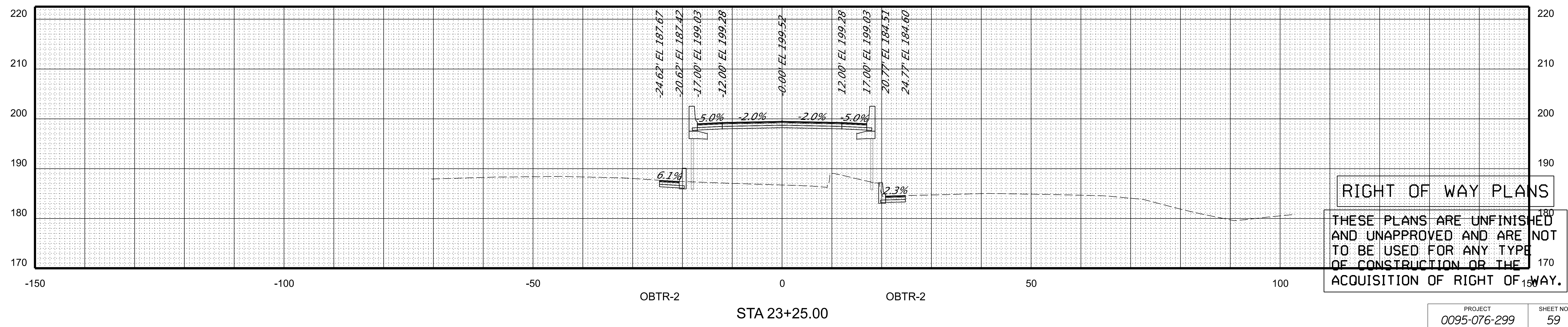
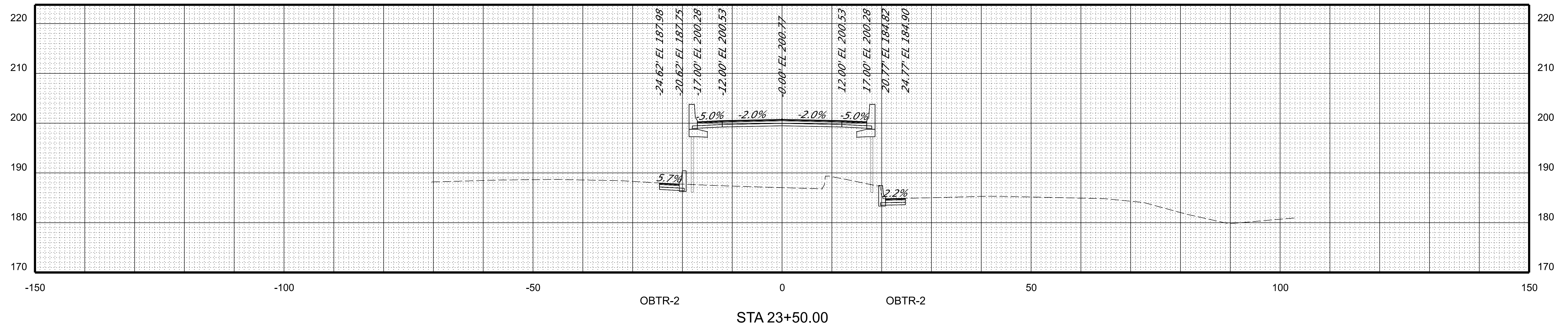
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	59

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



RIGHT OF WAY PLANS
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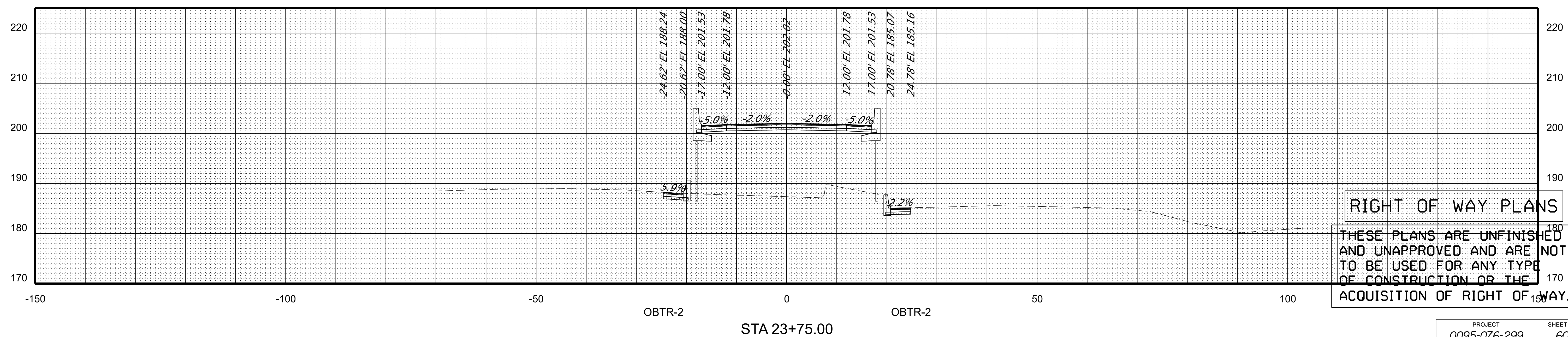
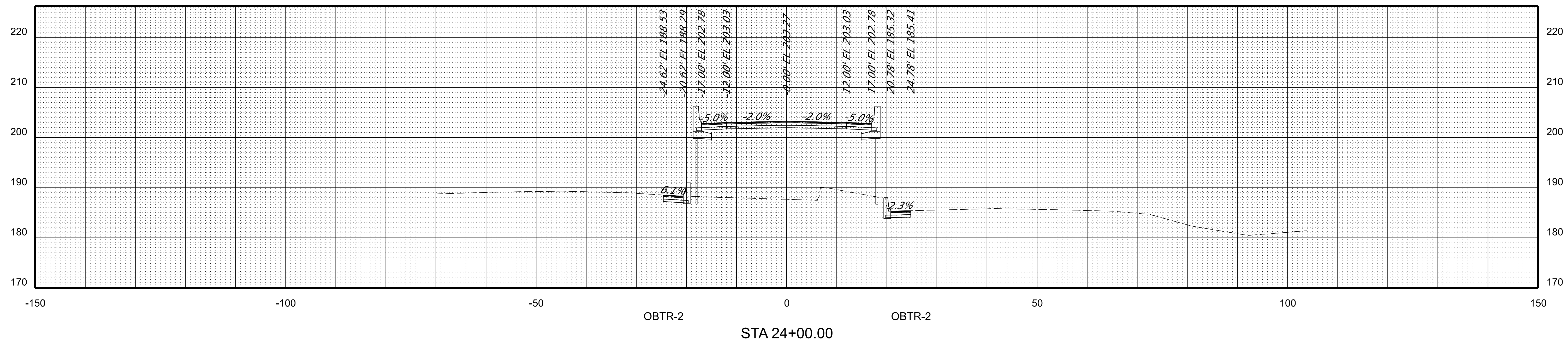
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	60

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



RIGHT OF WAY PLANS
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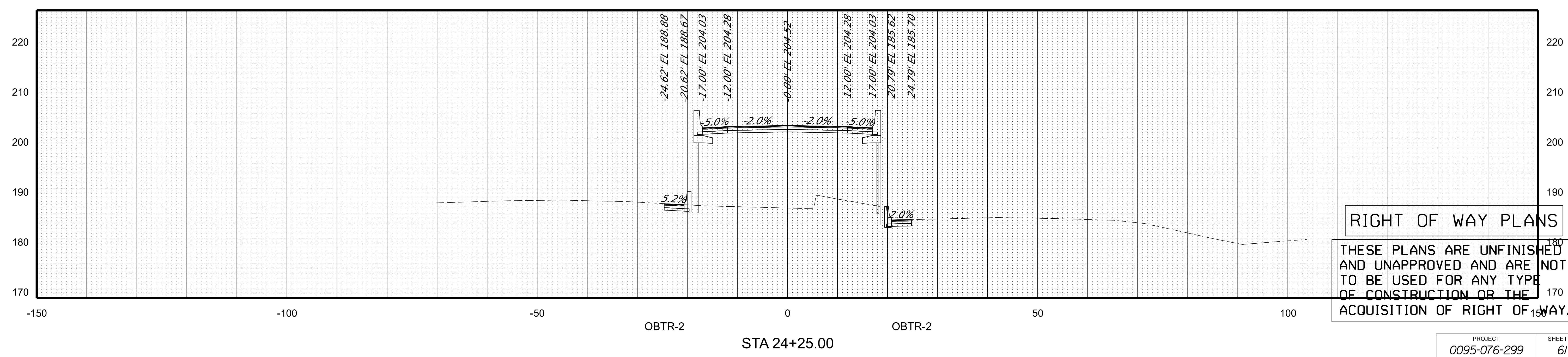
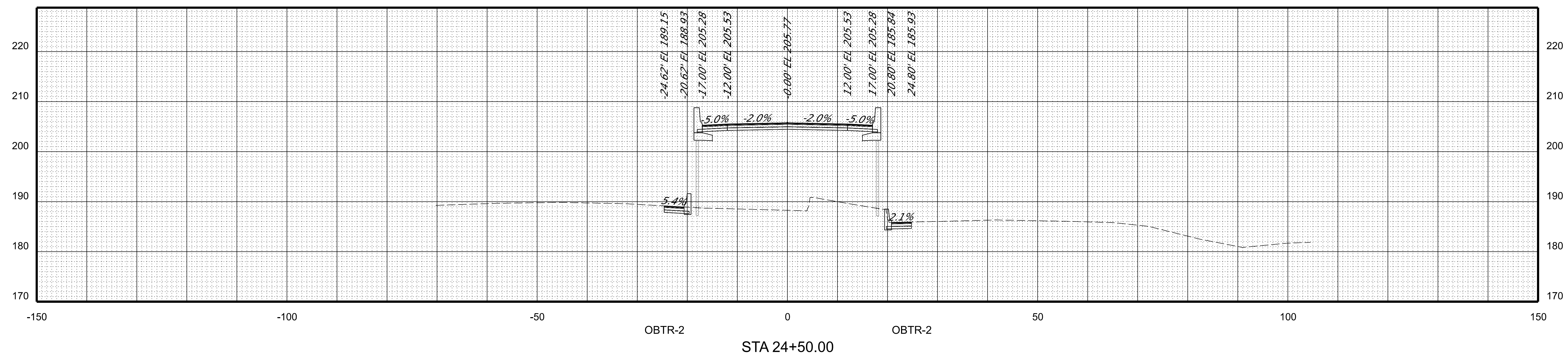
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	61

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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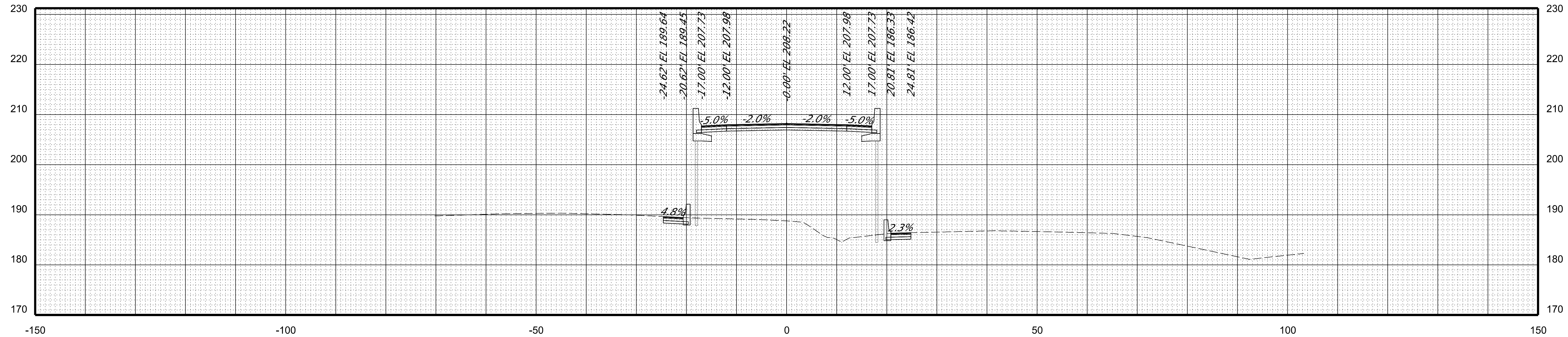
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SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

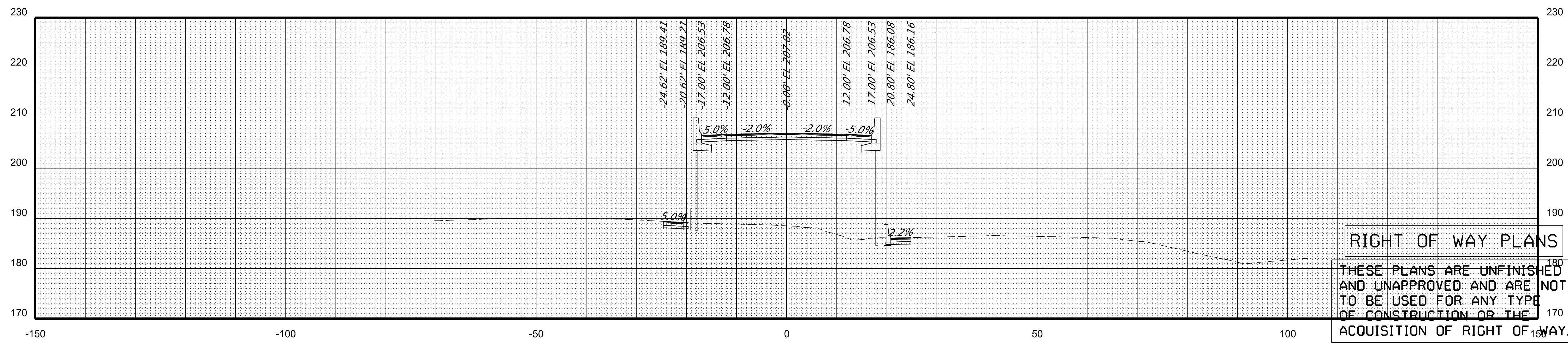
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	62

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 25+00.00



STA 24+75.00

RIGHT OF WAY PLANS
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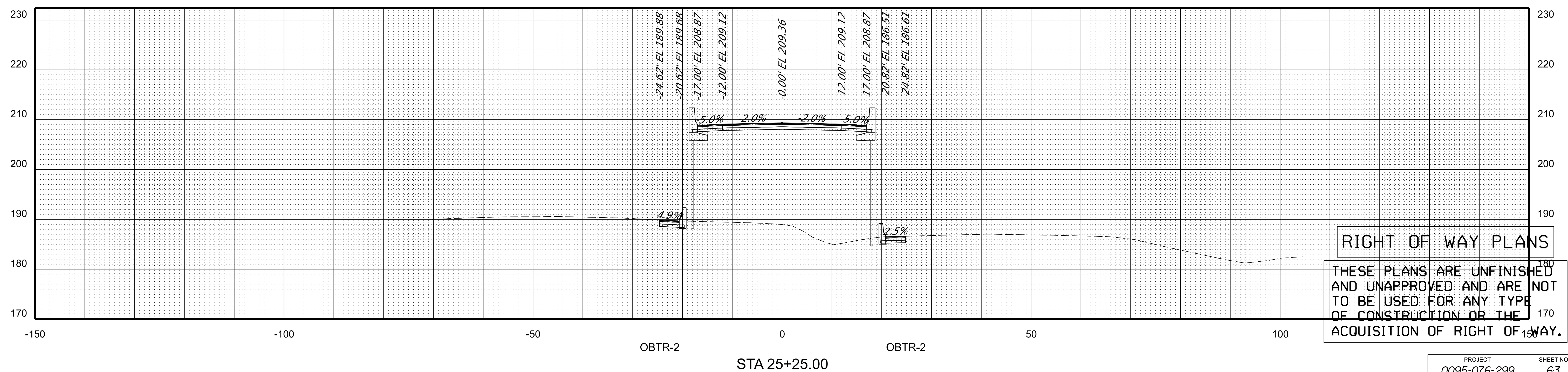
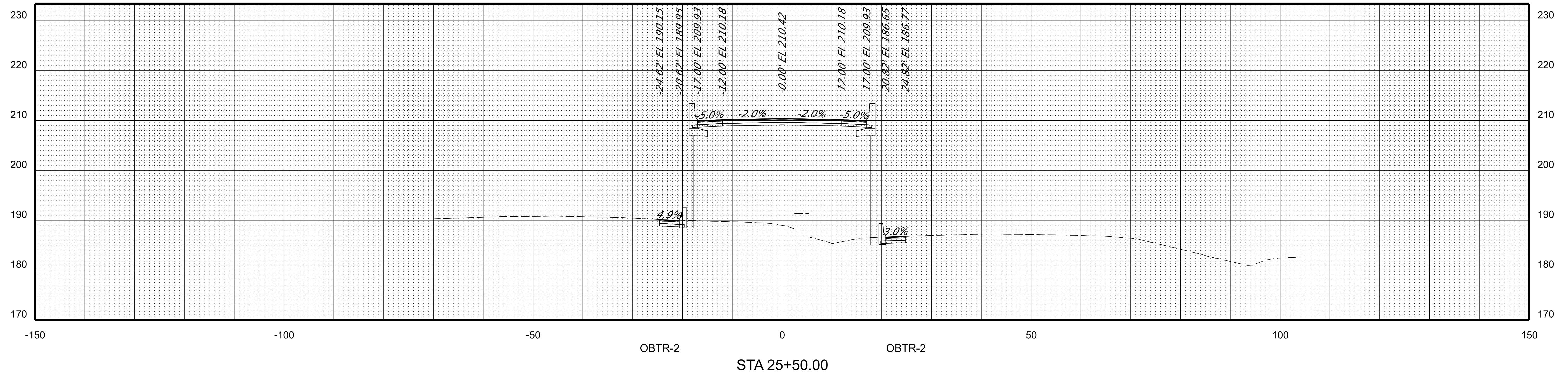
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	63

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



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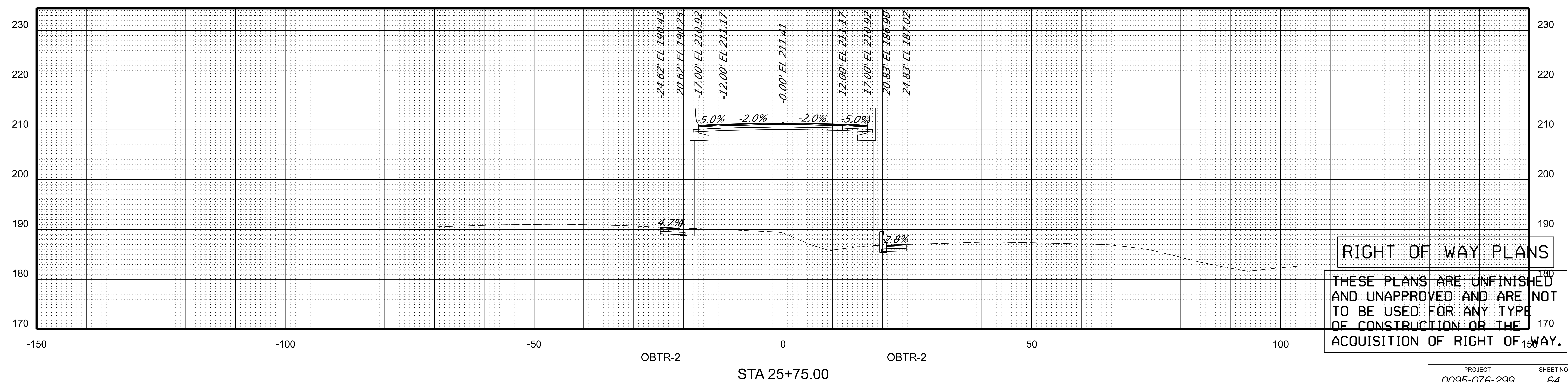
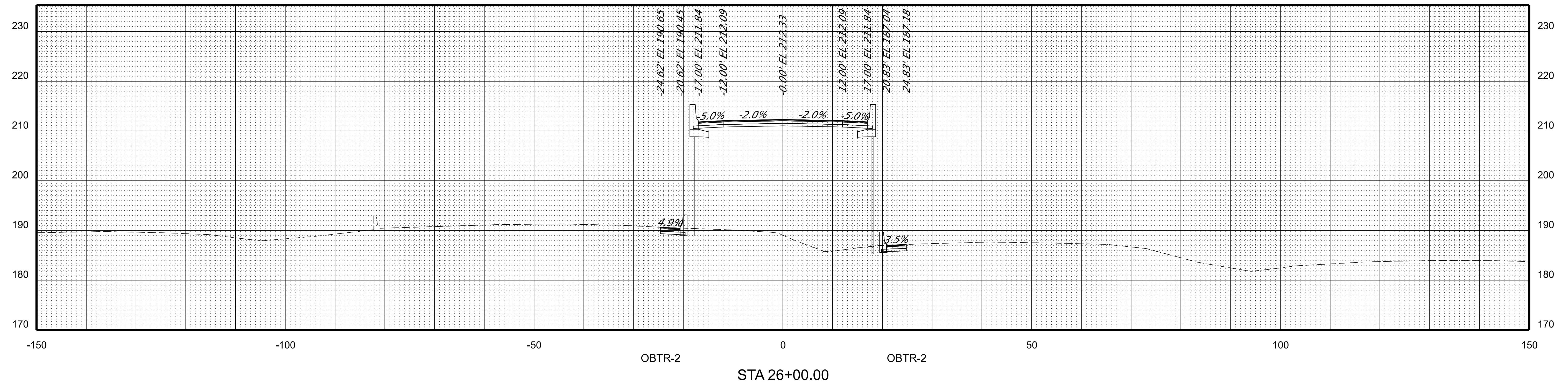
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 (NOVA District)*
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CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	64

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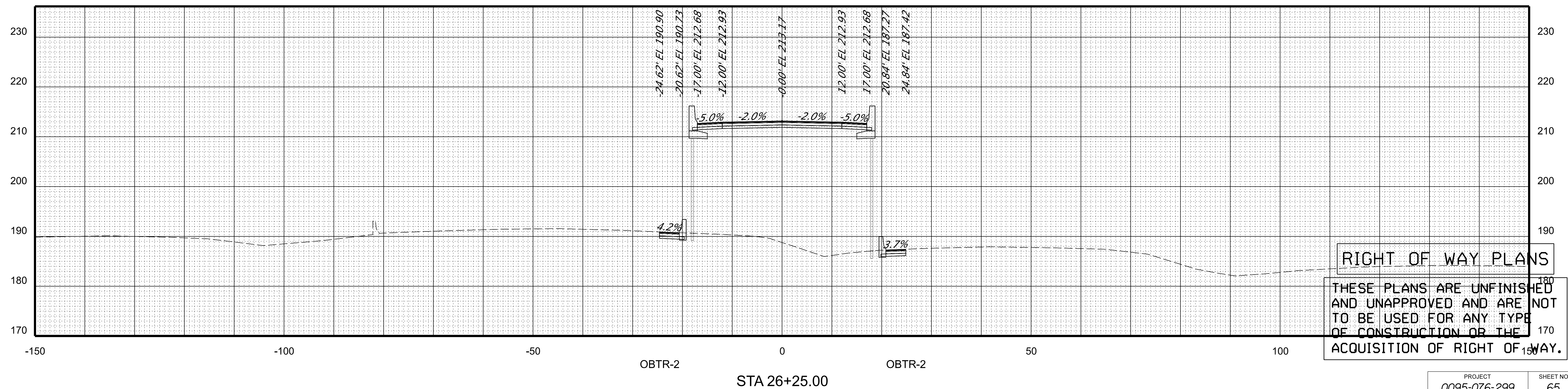
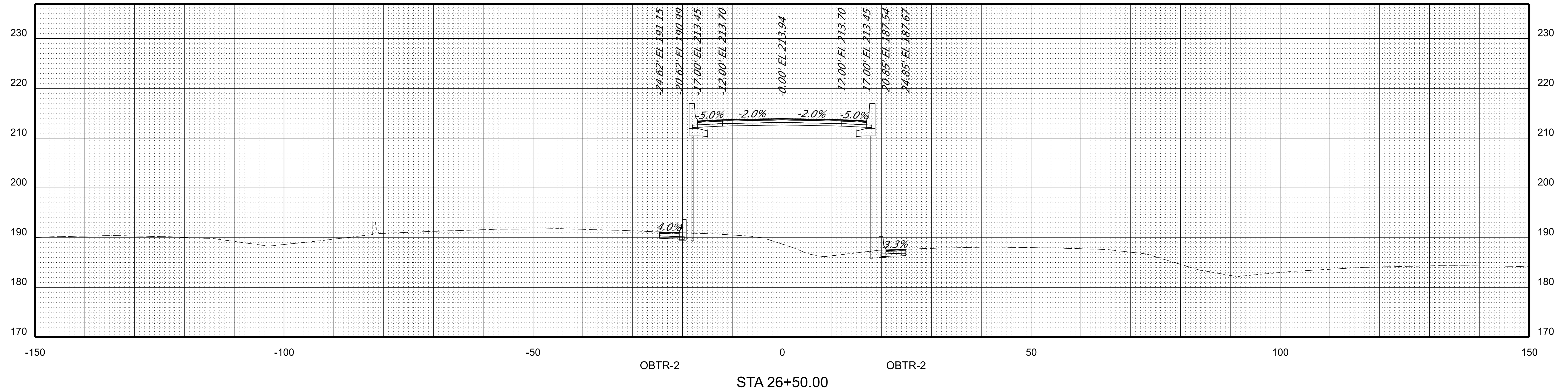
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INQA District*
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SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	65

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DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

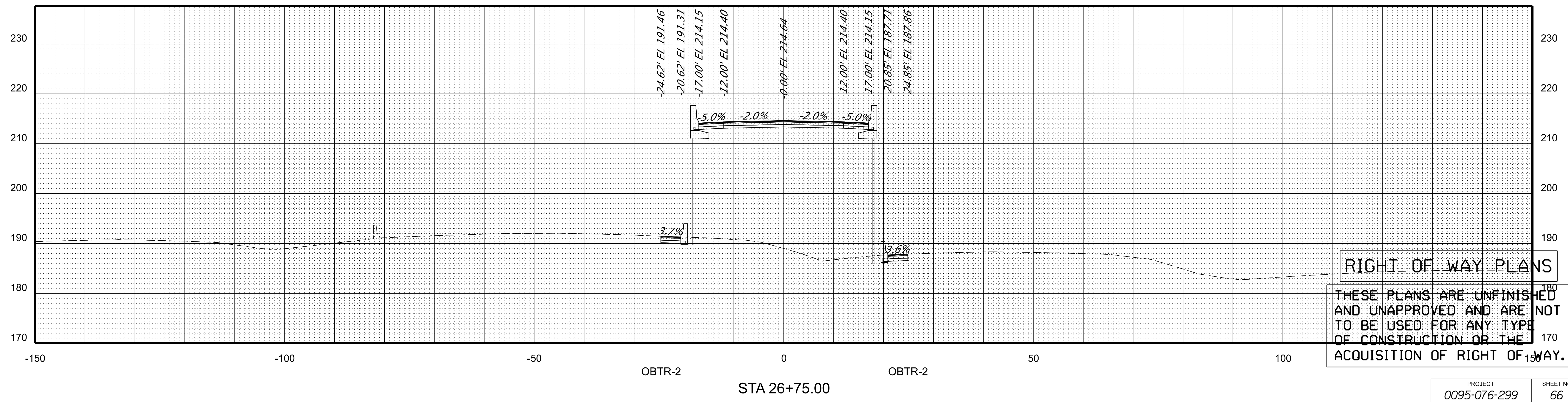
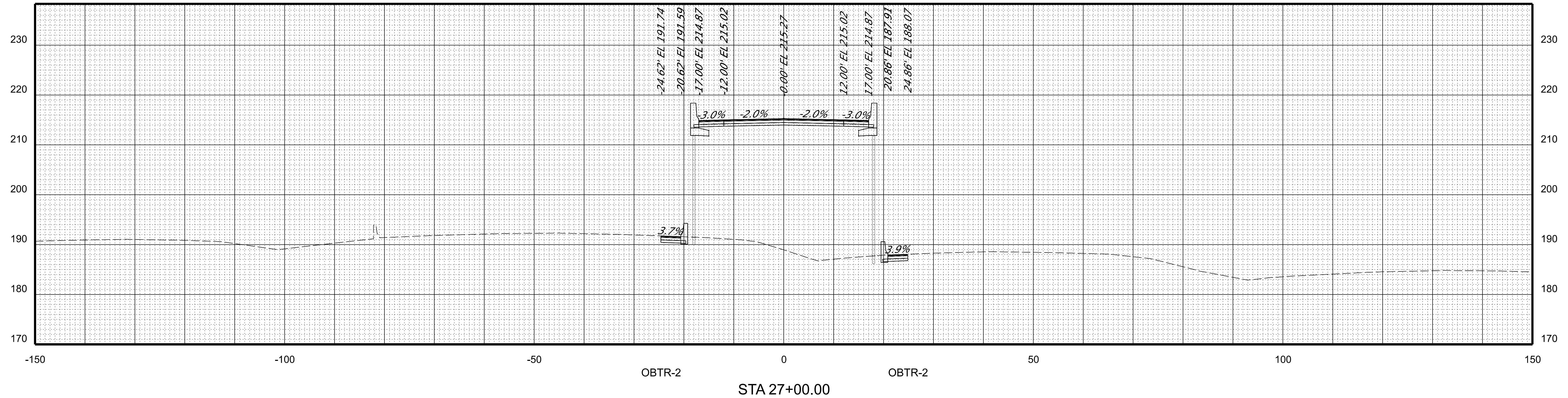
CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	66

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

END RAMP OBTR STA. 27+09.31



RIGHT OF WAY PLANS
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APPENDIX A.6

Cross Sections – Slivcer Fill & RW3 Wall

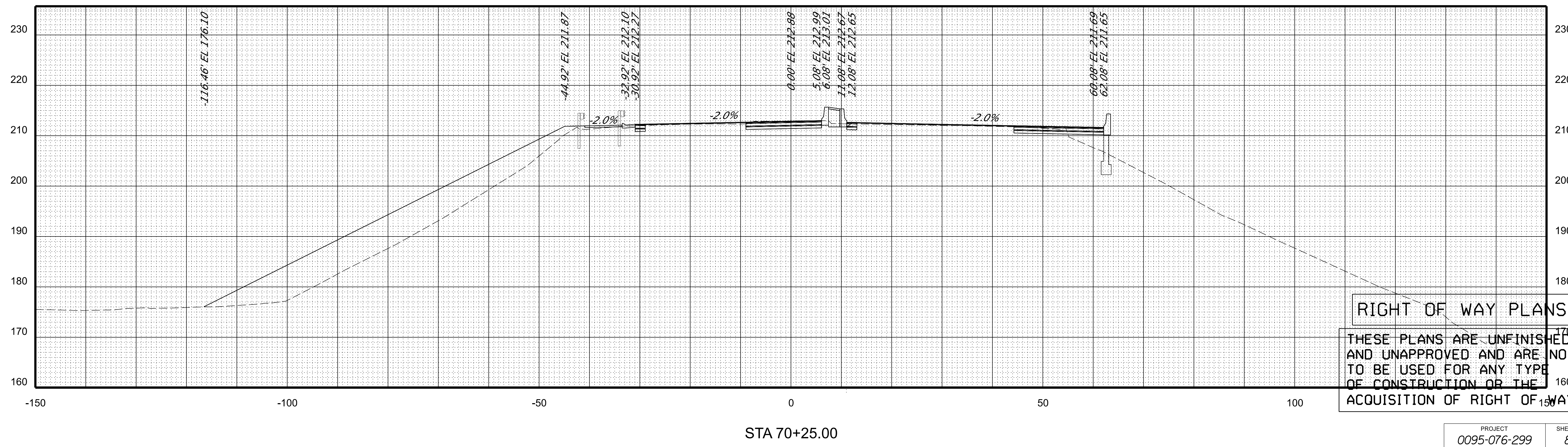
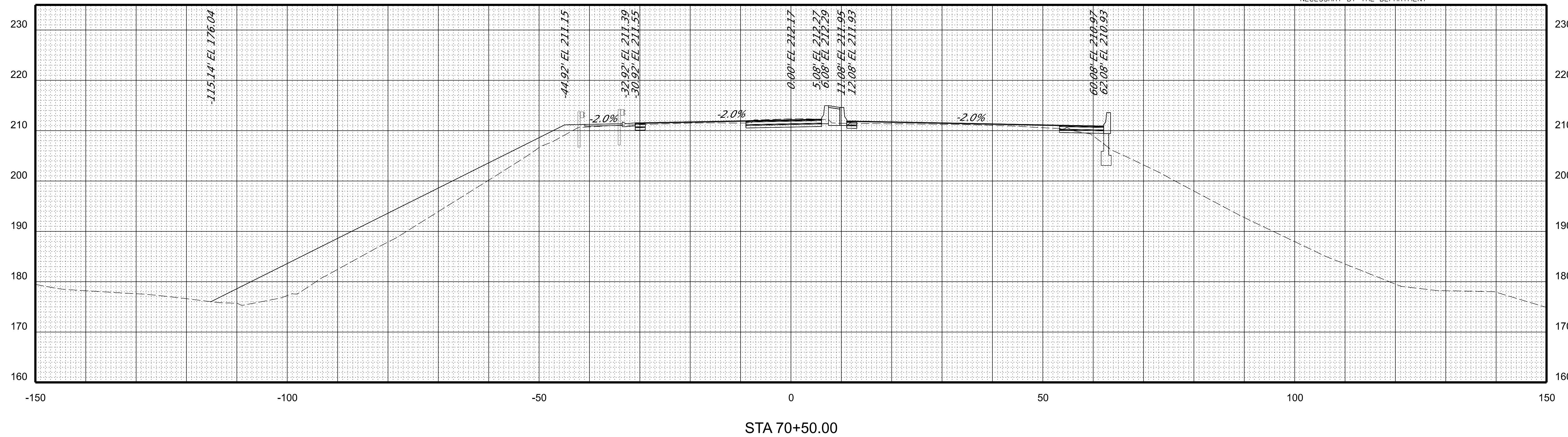
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 IN/VA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	86

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



RIGHT OF WAY PLANS
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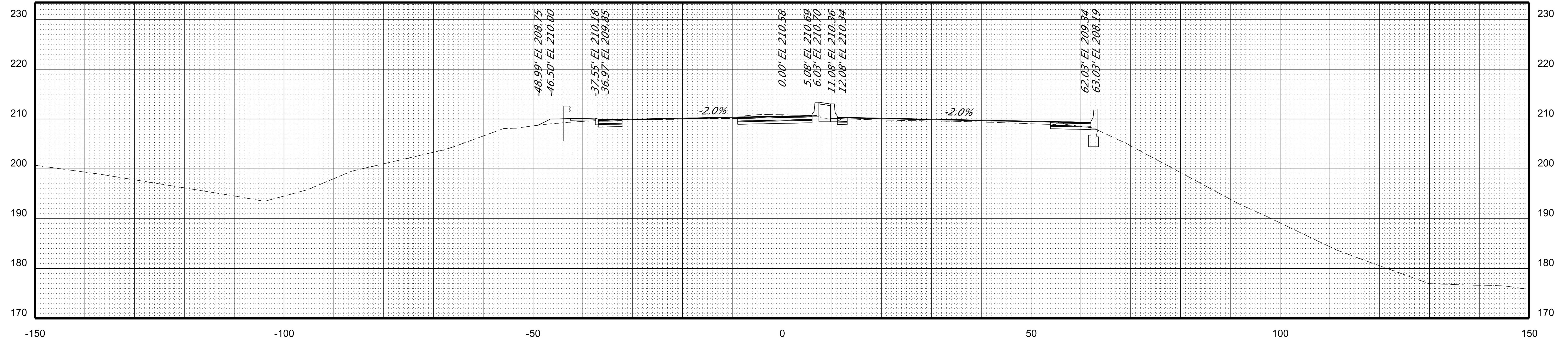
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accurmark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

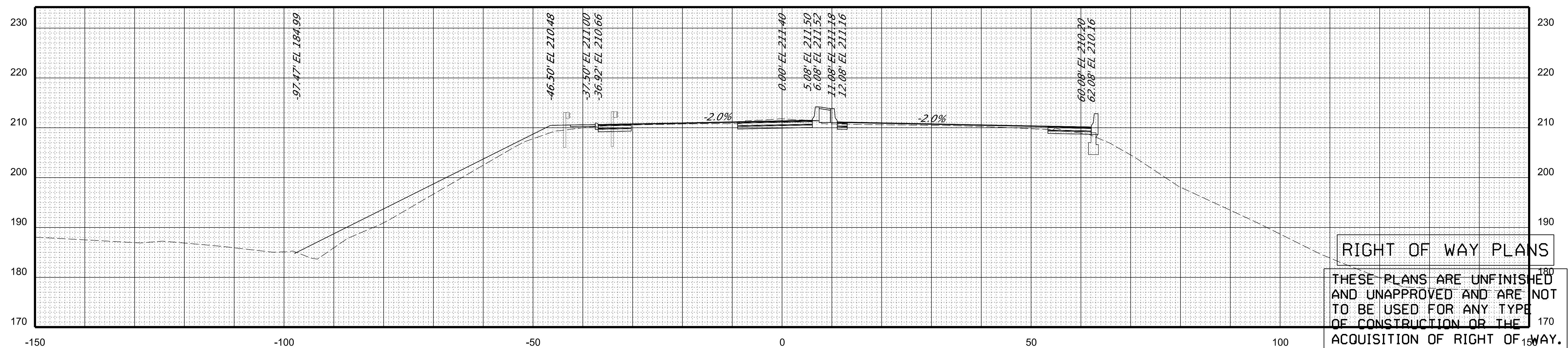
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REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	87

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 71+00.00



STA 70+75.00

RIGHT OF WAY PLANS
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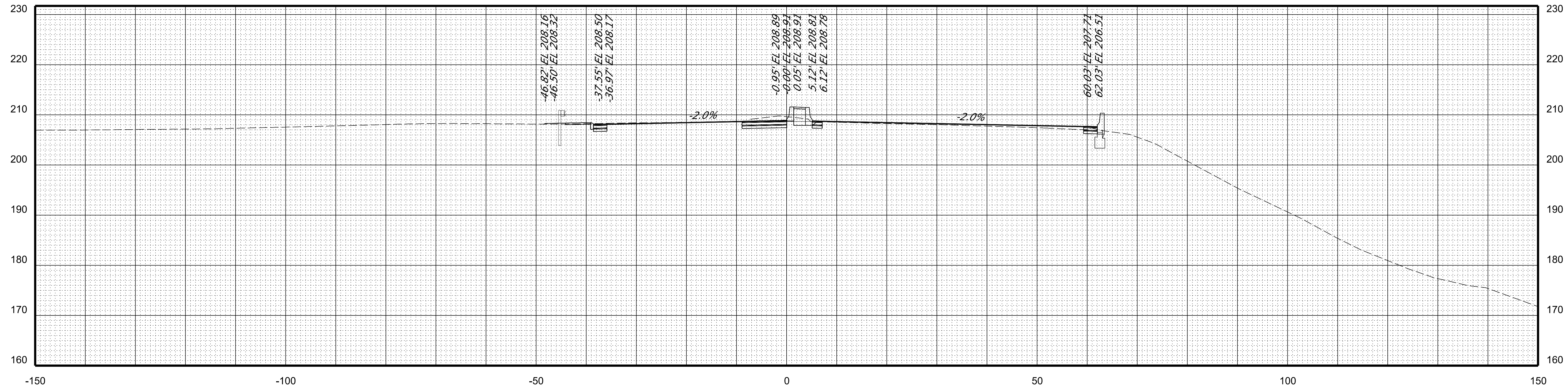
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
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CROSS SECTIONS

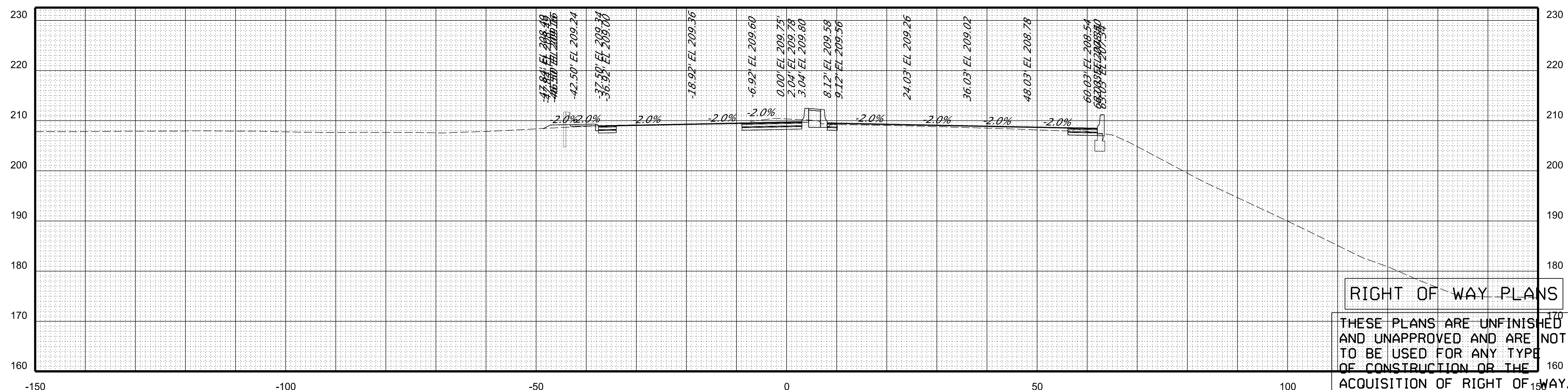
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	ROUTE	STATE	SHEET NO.
			PROJECT	
	VA.	95	0095-076-299, C-501	88

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 71+50.00



STA 71+25.00

RIGHT OF WAY PLANS

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APPENDIX A.7

Cross Sections – SPL Walls

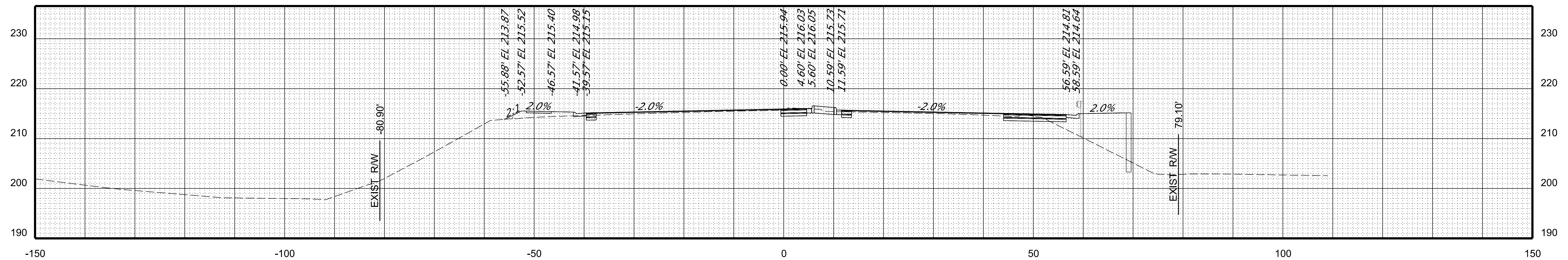
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY, DATE: *H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY, DATE: *Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

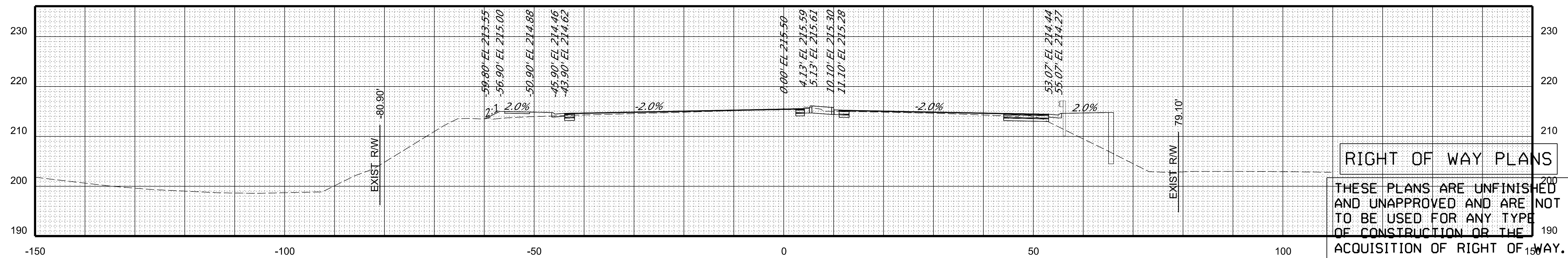
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
		ROUTE	PROJECT	
	VA.	95	0095-076-299, C-501	74

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 64+50.00



STA 64+25.00

RIGHT OF WAY PLANS

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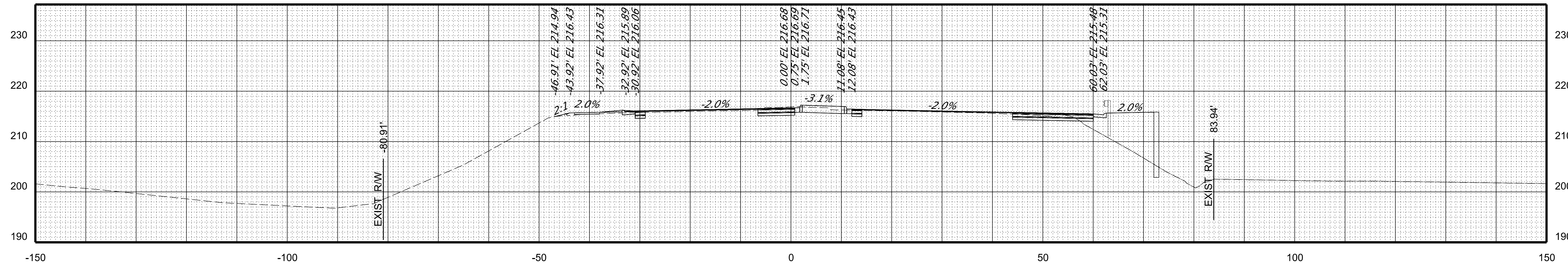
PROJECT MANAGER: *Bimal Shah, P.E. (703) 259-2362 IN/VA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accurark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

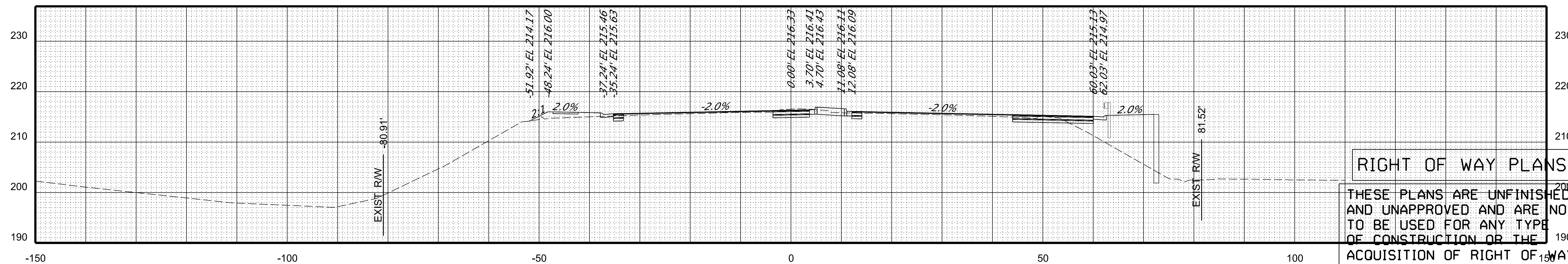
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	75

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



STA 65+00.00



STA 64+75.00

RIGHT OF WAY PLANS
 THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

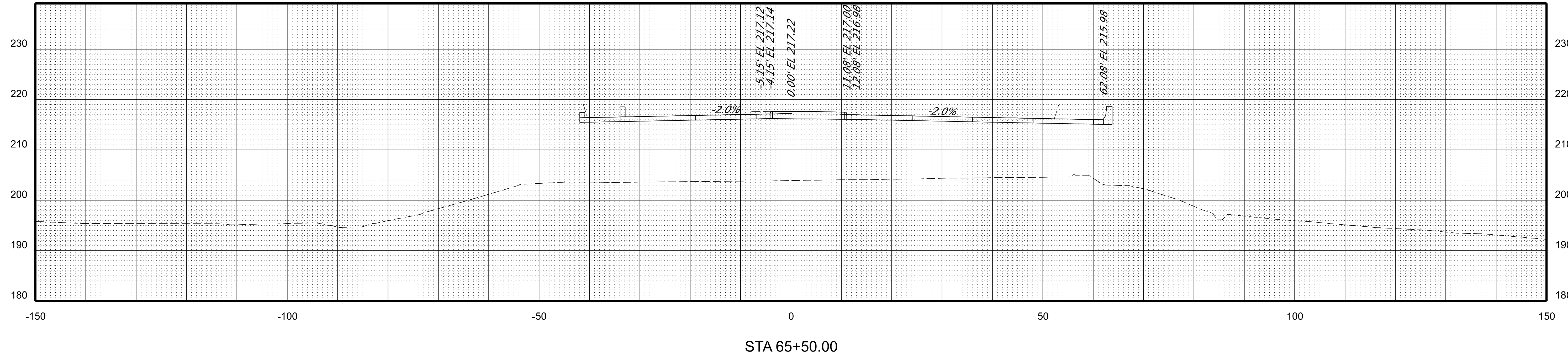
PROJECT MANAGER: *Bimbal Stah, P.E. (703) 259-2362 INOVA District*
SURVEYED BY: *DATE H&B Surveying and Mapping, LLC (804) 330-3781, 03/09/2021*
DESIGN BY: *Whitman, Requardt, & Associates, LLP (804) 272-8700*
SUBSURFACE UTILITY BY: *DATE Accumark, Inc. (804) 550-7740, 07/07/2021*

CROSS SECTIONS

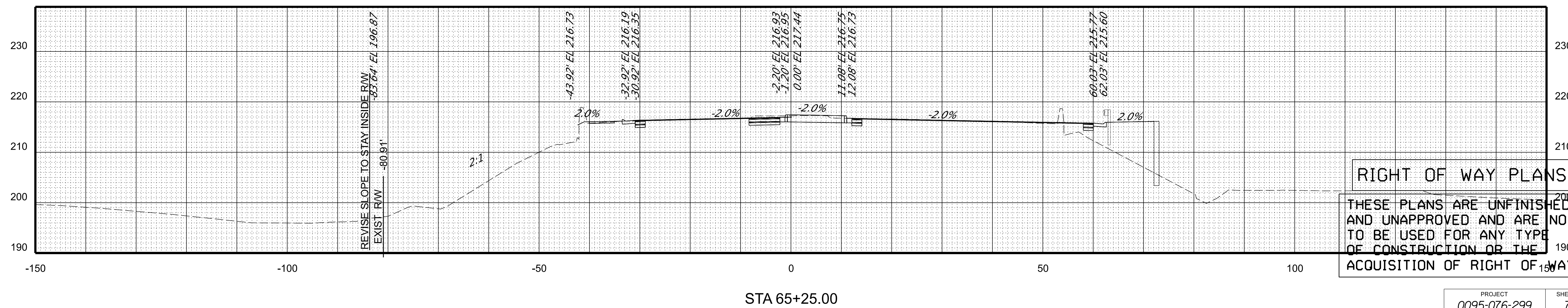
SCALE 1 IN. = 10 FT (H)
1 IN. = 10 FT (V)

REVISED	STATE	STATE		SHEET NO.
	ROUTE	PROJECT		
	VA.	95	0095-076-299, C-501	76

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



BEGIN PROJECT 0095-076-299, B-688
STA. 65+35.00 OPITZ BLVD



APPENDIX B

Historic Data Review Memo



MEMORANDUM

Date: September 22, 2021

To: David Shiells

From: Siva Kesavan / Jeff Basford

Subject: Review of Existing Borings and Proposed Validation Borings

CC: Mitch Johnson

Work Order Number: 45893-001

Contract Number:

Project: I-95 Express Spot Improvement at Opitz Blvd., Prince William Co, VA

Introduction

This memo presents our review of available historic test borings in the vicinity of Opitz Boulevard. The review was performed during the development of a subsurface investigation program for the proposed project of ramp down from existing Opitz Blvd bridge. We reviewed the following as-built plans:

- VDOT(1979), As Built Plans, Titled “Proposed Bridge on Opitz Blvd. over I-95, Ramp G & N.B.C.C RD., Prince William Co.-0.4 Mi N. Int. Rte 642, Proj. 0095-076-112, B636,” Commonwealth of Virginia, Department of Highway and Transportation, dated October 24, 1979.

The plan view and elevations are enclosed as Figure 1 and Figure 2 in the enclosure. The structural elements of the bridge include the following: Abutment A, Pier 1, Pier 2, Pier 3, and Abutment B, from west to east. Figure 4 shows a Google street view looking north, where the express lanes are located between Pier 1 and Pier 2.

Historic Borings

A total of nine (9) SPT test borings were depicted in the as-built plans. A summary of the borings is provided in the following table.

Table 1. Summary of Historic Test Borings							
Structure	Traffic Lane ⁽¹⁾	Boring No.	Station & Offset	Boring Grades		Ground water EL (ft.)	Decomposed ⁽²⁾ Rock EL (ft.)
				Top EL (ft.)	Bottom EL (ft.)		
Abutment A	W.B.L	1	Sta.65+44; 15' LT	194.5	174.0	181.7	184.0
	E.B.L	2	Sta.65+44; 15' RT	193.1	172.2	179.9	182.6
Pier 1	W.B.L	4	Sta.66+52; 10' LT	193.1	172.9	180.0	178.1
Pier 2	W.B.L	6	Sta.68+10; 10' LT	178.4	157.7	170.0	167.9
	E.B.L	5	Sta.68+10; 10' RT	179.5	148.7	168.6	169.0
Pier 3	W.B.L	8	Sta.69+78; 10' LT	172.7	147.3	166.7	162.7
	E.B.L	7	Sta.69+77; 20' RT	172.7	151.7	166.7	163.7
Abutment B	W.B.L	10	Sta.70+18; 13' LT	169.8	144.7	167.0	165.3
	E.B.L	9	Sta.70+18; 20' RT	169.6	153.4	166.0	165.1

Table 1. Summary of Historic Test Borings							
Structure	Traffic Lane ⁽¹⁾	Boring No.	Station & Offset	Boring Grades		Ground water EL (ft.)	Decomposed Rock EL (ft.) ⁽²⁾
				Top EL (ft.)	Bottom EL (ft.)		
Notes: (1) Abbreviations: W.B.L – West Bound Lane; E.B.L – East Bound Lane.							
(2) Decomposed rock identified in the boring logs generally indicates an SPT blow-count (blows per foot) greater than 50.							

The test boring logs from the as-built plans are enclosed with this memorandum. The depth of borings ranged from 16.2 feet to 30.8 feet from the existing ground before the construction of the bridge. The top of decomposed rock sloped eastward from EL 184 feet at the west end (Abutment A) to EL 165 feet to the east (Abutment B).

Existing Bridge Foundation

The bridge structural elements are supported on HP10x42 piles, driven into the decomposed layer. The as-built plans list each driven pile length for the piers, and averaged pile lengths for the east bound lane and west bound lane abutments. Details about pile tip estimations for the bridge elements are enclosed. Only average pile driven lengths are provided for the abutment locations. Table 2 is a summary of pile data.

Table 2. Summary of Pile Tip Elevations and Pile Penetration in Decomposed Rock								
Structure	Traffic Lane	Boring No. ⁽¹⁾	Boring Bottom EL (ft.)	Estimated Pile Tip EL (ft.)			Average Penetration into Decomposed Rock	
				Max. (Shallow)	Min. (Deep)	Ave.	DR Top EL (ft.)	Average Pile Penetration (ft.)
Abutment A	W.B.L	1	174.0	---	---	179.6	184.0	4.4
	E.B.L	2	172.2	---	---	176.9	182.6	5.7
Pier 1	W.B.L	4	172.9	176.5	160.0	170.8	178.1	7.3
	E.B.L		172.9	175.0	170.0	172.5	178.1	5.6
Pier 2	W.B.L	6	157.7	159.7	149.1	153.4	167.9	14.5
	E.B.L	5	148.7	160.0	150.8	156.3	169.0	12.7
Pier 3	W.B.L	8	147.3	158.4	151.3	155.3	162.7	7.4
	E.B.L	7	151.7	163.2	152.0	158.5	163.7	5.2
Abutment B	W.B.L	10	144.7	---	---	160.5	165.3	4.8
	E.B.L	9	153.4	---	---	159.6	165.1	5.5

Notes: (1) Boring No. 4 is located at Pier-2 W.B.L area and assumed for Pier-2 E. B.L calculations.



Based on review of the as-built plans, the test borings terminated at auger refusal, and the piles were driven to a refusal penetration criterion. The average depth of pile penetration into the bearing layer (decomposed rock) ranged from 4.4 feet to 14.5 feet. *The historic borings consistently encountered a layer of decomposed rock, the top of which became deeper from west to east.*

Proposed Validation Borings

Following are noted during the development of current test boring plans.

- a) The modification to the foundation elements proposed for the current project is expected to be similar to the existing foundation type - a deep foundation consist of driven HP 10x42 piles, bearing in the decomposed rock layer .
- b) The design will be based on the results of existing borings and proposed deep verification borings. The . verification borings will be for the validation of the subsurface profile in historic borings.
- c) The borings will be drilled on the south side of existing bridge at the following locations: Abutment A (Boring B-A1-5), middle of the bridge (Boring B-A2-1 in the vicinity of proposed T-Ramp location closer to Pier-1), and Abutment B (Boring B-A1-6).

The locations of three borings are included in the in the attached test boring plan. The validation soil borings will be extended to EL 140 or to auger refusal, whichever occurs first. If the auger refusal occurs first, a 10 feet of rock coring will be performed, with coring depth extending beyond the soil auger refusal depth.



Siva K. Kesavan

Enclosures : Figure 1: Existing Bridge Plan
Figure 2: Existing Bridge Elevation
Figure 3: Historic Boring Location Plan
Picture 1: View of Existing Bridge – Looking North
Historic Boring Logs (1 sheet)
Existing Pile tip Estimations (4 sheets)
Project (current) Boring Locations (5 Sheets)



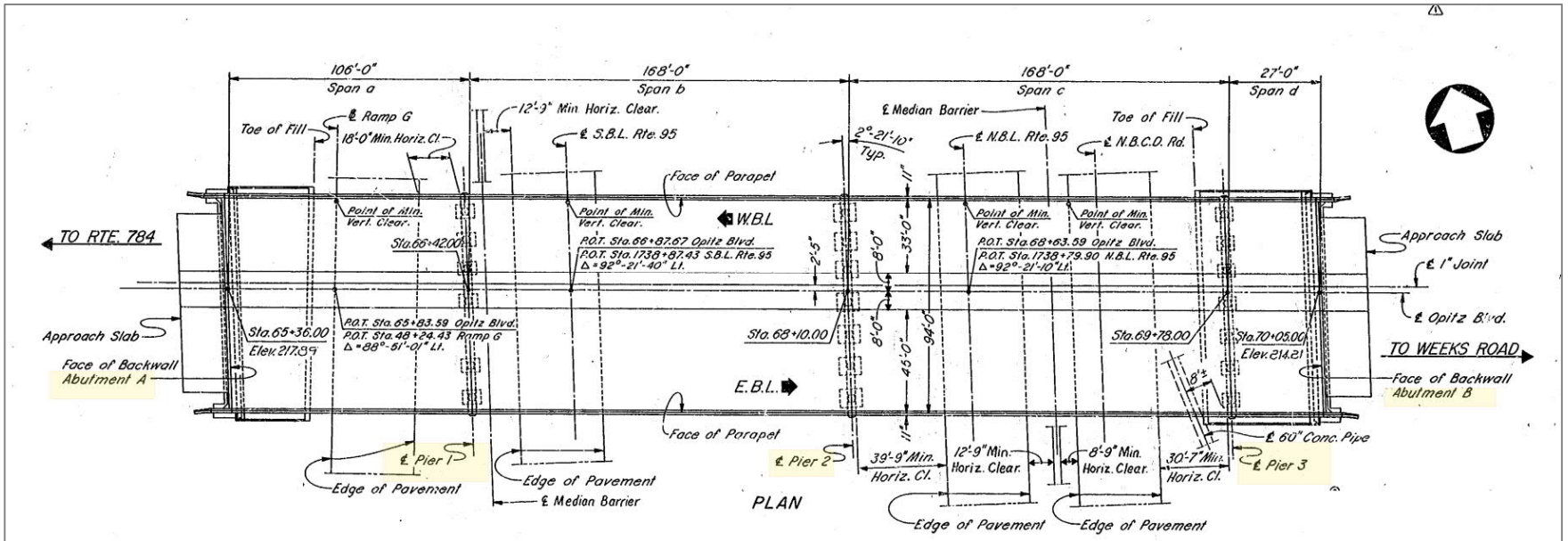


Figure 1: Existing Bridge Plan (Reference: VDOT, 1979, Sheet 1 of 47)

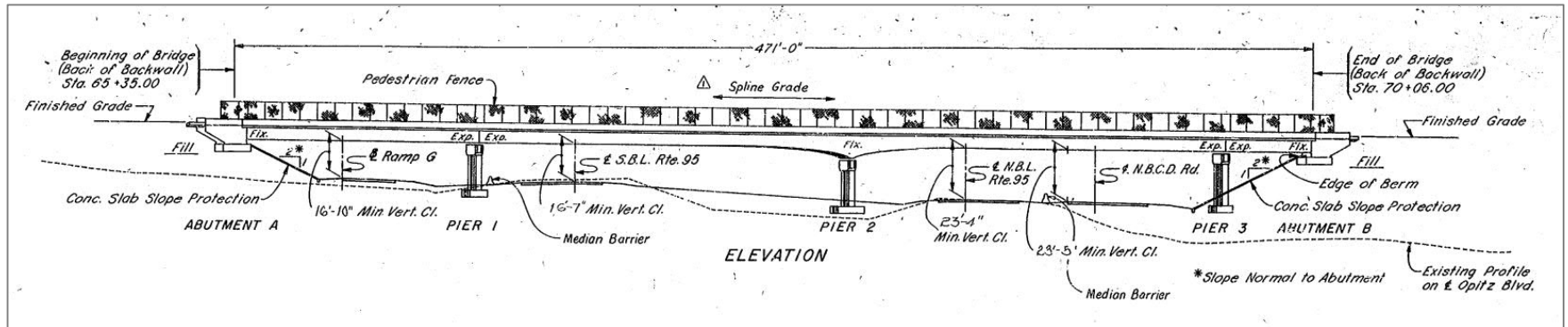


Figure 2: Existing Bridge Elevation (Reference: VDOT, 1979, Sheet 2 of 47)

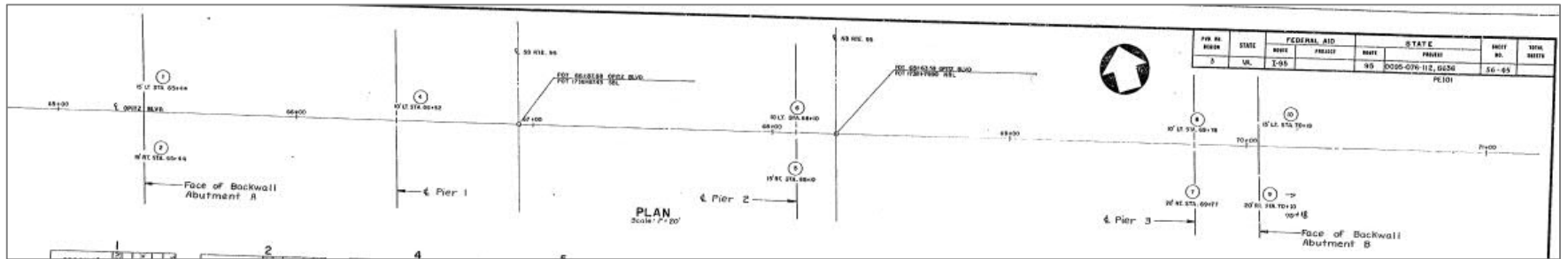
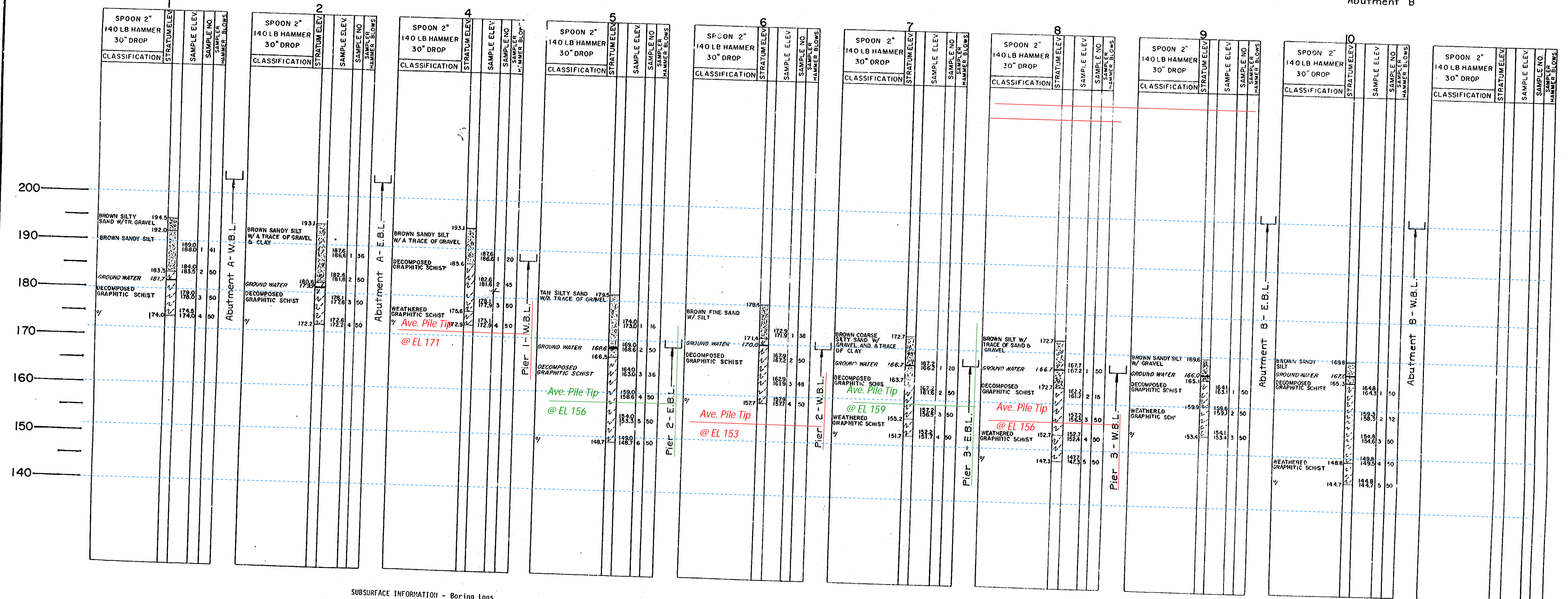
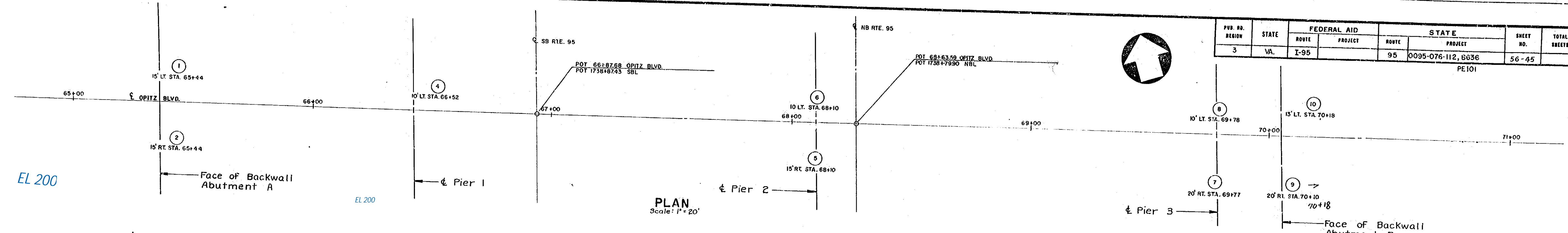


Figure 3: Historic Borings – Location Plan (Reference: VDOT, 1979, Sheet 45 of 47)



Picture 1: View of Existing Bridge -Looking North, Express Lanes Between Pier-1 and Pier 2 (Photo: Google Earth -Street View)

FED. RD. DIST. NO.	STATE	FEDERAL AID		STATE		SHEET NO.	TOTAL SHEETS
		ROUTE	PROJECT	ROUTE	PROJECT		
3	VA.	I-95		95	0095-076-112, B636	56-45	



SUBSURFACE INFORMATION - Boring Logs

This subsurface information shown on the boring logs in these plans was obtained with reasonable care and recorded in good faith solely for use by the Department in establishing design controls for the project. The Department has no reason to suspect that such information is not reasonably accurate as an approximate indication of the subsurface conditions at the sites where the borings were taken. The Department does not in any way warrant or guarantee that such data can be projected as indicative of conditions beyond the limits of the borings shown; and any such projections by bidders are purely interpretive and altogether speculative. Further, the Department does not in any way guarantee, either expressly or by implication, the sufficiency of the information for bid purposes.

The boring logs are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Department, and are not intended as a substitute for personal investigation, interpretation and judgment by the bidders.

GEOLOGIC SECTION
SCALE: 1" = 10'

NOTE

☞ ELEVATION AT BOTTOM OF DRILL HOLE EQUIPMENT - NO. 10 STEM AUGER

VIRGINIA DEPARTMENT OF HIGHWAYS
ROUTE NO. 95 STA. 1738+80
PROJ. NO. 0095-076-112, B636
ENGINEERING GEOLOGY
MATERIALS DIVISION
OPITZ BLVD. OVER RTF. 95
PRINCE WILLIAM COUNTY
DECEMBER 13, 1978

78-57-15
SHEET 1 OF 1

257-38-45

FIELD LOG: EGA
Drawn by: RS
Traced by:
Checked by: RCR



Estimation of Pile Tip Elevations

Project: I-95 Express Spot Improvement at Opitz Blvd. Prince Williams Co. VA
 WRA # 45893-001
 Prep by: skk
 Chk by:

Sheet No. 1 of 4
 Date: 9/20/2021

Pier 1 -W.B.S														
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)						Ref. EL (ft)	Calculated Pile Tip Elevation (ft)					
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6
I	186.5	11.0	12.6	16.0	13.0	16.0	14.8	187.51	176.5	174.9	171.5	174.5	171.5	172.7
II	186.9	15.0	15.1	16.0	15.1	12.7	13.0	187.85	172.9	172.8	171.9	172.8	175.2	174.9
III	187.1	24.3	21.3	20.3	23.2	18.2	28.1	188.12	163.8	166.8	167.8	164.9	169.9	160.0
													Stastical Results: Pile Tip EL (ft.)	
													Max	176.5
													Min	160.0
													Mean, μ	170.8
													Std.Dev σ	4.3
													$\mu - \beta\sigma$	160.9
													$\beta = 2.33$	

Pier 1 -E.B.S														
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)					Ref. EL (ft)	Calculated Pile Tip Elevation (ft)					Stastical Results: Pile Tip Elev.	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Max	Min
IV	187.3	16.3	18.3	14.3	13.3	15.3	188.33	172.0	170.0	174.0	175.0	173.0	175.0	170.0
V	187.0	15.2	15.2	16.5	14.3	17.1	187.95	172.8	172.8	171.5	173.7	170.9	172.5	172.5
VI	186.6	14.1	14.0	14.1	13.1	16.1	187.60	173.5	173.6	173.5	174.5	171.5	6.0	6.0
VII	186.3	14.4	16.3	16.3	16.4	16.3	187.30	172.9	171.0	171.0	170.9	171.0	158.5	158.5
													$\beta = 2.33$	



Estimation of Pile Tip Elevations

Project: I-95 Express Spot Improvement at Opitz Blvd.
 Prince Williams Co. VA
 WRA # 45893-001

Prep by: skk
 Chk by:

Sheet No. 2 of 4
 Date: 9/20/2021

Pier 2 -W.B.S												Stastical Results:	
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)										Pile Tip EL (ft.)	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6	Raw - 7	Raw - 8	Raw - 9	Raw - 10	Max	
I	168.99	15.5	10.5	11.2	11.0	10.3	13.3	12.6	20.9	16.5	15.5	Min	149.1
II	169.29	20.7	16.6	15.7	19.4	15.7	20.6	17.5	18.6	17.6	18.7	Mean, μ	153.4
III	170.66	20.6	18.4	19.6	19.2	18.4	20.5	19.5	21.2	22.5	20.6	Std.Dev σ	3.1
Cap No.	Ref. EL (ft)	Calculated Pile Tip Elevation (ft)										$\mu - \beta\sigma$	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6	Raw - 7	Raw - 8	Raw - 9	Raw - 10	$\beta = 2.33$	
I	169.99	154.5	159.5	158.8	159.0	159.7	156.7	157.4	149.1	153.5	154.5		
II	170.29	149.6	153.7	154.6	150.9	154.6	149.7	152.8	151.7	152.7	151.6		
III	171.66	151.1	153.3	152.1	152.5	153.3	151.2	152.2	150.5	149.2	151.1		

Pier 2 -E.B.S												Stastical Results	
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)										Pile Tip EL (ft.)	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6	Raw - 7	Raw - 8	Raw - 9	Raw - 10	Max	
IV	169.70	18.6	18.7	18.8	18.8	13.2	18.8	19.9	17.8	18.7	17.7	Max	160.0
V	169.39	10.9	10.4	11.6	10.6	11.0	10.7	10.8	13.9	13.7	11.6	Mean, μ	156.3
VI	169.05	10.7	10.9	10.7	12.1	11.8	12.0	11.8	15.8	14.3	14.8	Std.Dev σ	2.8
VII	168.73	11.8	12.0	12.0	13.5	12.8	13.8	14.3	14.9	15.9	14.7	$\mu - \beta\sigma$	149.7
Cap No.	Ref. EL (ft)	Calculated Pile Tip Elevations										$\beta = 2.33$	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Raw - 6	Raw - 7	Raw - 8	Raw - 9	Raw - 10		
IV	170.7	152.1	152.0	151.9	151.9	157.5	151.9	150.8	152.9	152.0	153.0		
V	170.4	159.5	160.0	158.8	159.8	159.4	159.7	159.6	156.5	156.7	158.8		
VI	170.1	159.4	159.2	159.4	158.0	158.3	158.1	158.3	154.3	155.8	155.3		
VII	169.7	157.9	157.7	157.7	156.2	156.9	155.9	155.4	154.8	153.8	155.0		



Estimation of Pile Tip Elevations

Project: I-95 Express Spot Improvement at Opitz Blvd. Prince Williams Co. VA
 WRA # 45893-001
 Prep by: skk
 Chk by:

Sheet No. 3 of 4
 Date: 9/20/2021

Pier 3 -W.B.S													Stastical Results:	
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)					Ref. EL (ft)	Calculated Pile Tip Elevation (ft)					Pile Tip EL (ft.)	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Max	Min
I	180.9	28.1	28.1	26.8	30.6	30.5	181.92	153.8	153.8	155.1	151.3	151.4	158.4	151.3
II	181.9	24.4	24.6	24.5	24.7	24.5	182.92	158.5	158.3	158.4	158.2	158.4	155.3	155.3
III	181.5	21.0	28.2	27.8	27.0	28.0	182.52	161.5	154.3	154.7	155.5	154.5	2.9	2.9
												$\mu - \beta\sigma$	148.6	
												$\beta = 2.33$		

Pier 3 -E.B.S													Stastical Results:	
Cap No.	Bottom EL (ft)	Data: Pile Depth (ft)					Ref. EL (ft)	Calculated Pile Tip Elevation (ft)					Pile Tip EL (ft.)	
		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5		Raw - 1	Raw - 2	Raw - 3	Raw - 4	Raw - 5	Max	Min
IV	181.3	29.9	28.0	20.0	30.3	30.3	182.26	152.4	154.3	162.3	152.0	152.0	163.2	152.0
V	181.3	20.0	22.1	20.3	21.8	25.3	182.28	162.3	160.2	162.0	160.5	157.0	158.5	158.5
VI	180.9	21.0	22.0	21.1	21.4	23.2	181.94	160.9	159.9	160.8	160.5	158.7	3.8	3.8
VII	180.6	20.7	27.9	20.6	18.4	26.3	181.61	160.9	153.7	161.0	163.2	155.3	149.6	149.6
												$\mu - \beta\sigma$	149.6	
												$\beta = 2.33$		



**Estimation of
Pile Tip Elevations**

Project: I-95 Express Spot Improvement at Opitz Blvd.
Prince Williams Co. VA
WRA # 45893-001

Prep by: skk
Chk by:

Sheet No. 4 of 4
Date: 9/20/2021

		Pile Cap Bottom EL (ft)	Ref. EL (ft)	Pile Length L (ft.)	Pile Tip EL (ft.)
Abutment A	<i>WBL</i>	<i>205.64</i>	206.64	<i>27.0</i>	179.6
	<i>EBL</i>	<i>205.64</i>	206.64	<i>29.7</i>	176.9
Abutment B	<i>WBL</i>	<i>201.88</i>	202.88	<i>42.4</i>	160.5
	<i>EBL</i>	<i>201.88</i>	202.88	<i>43.3</i>	159.6

Stur.	Traffic Lane	Boring No.	Boring Bott. EL (ft.)	Pile Tip EL (ft.)			Elev. Of DR Top (ft.)	Pile Penet. (ft.)
				Max. (Shallow)	Min. (Deep)	Ave.		
Abut.A	W.B.L	1	174.0	---	---	179.6	184.0	4.4
	E.B.L	2	172.2	---	---	176.9	182.6	5.7
Pier 1	W.B.L	4	172.9	176.5	160.0	170.8	178.1	7.3
	E.B.L		172.9	175.0	170.0	172.5	178.1	5.6
Pier 2	W.B.L	6	157.7	159.7	149.1	153.4	167.9	14.5
	E.B.L	5	148.7	160.0	150.8	156.3	169.0	12.7
Pier 3	W.B.L	8	147.3	158.4	151.3	155.3	162.7	7.4
	E.B.L	7	151.7	163.2	152.0	158.5	163.7	5.2
Abut.B	W.B.L	10	144.7	---	---	160.5	165.3	4.8
	E.B.L	9	153.4	---	---	159.6	165.1	5.5

PROJECT MANAGER _____
SURVEYED BY, DATE _____
DESIGN BY _____
SUBSURFACE UTILITY BY, DATE _____

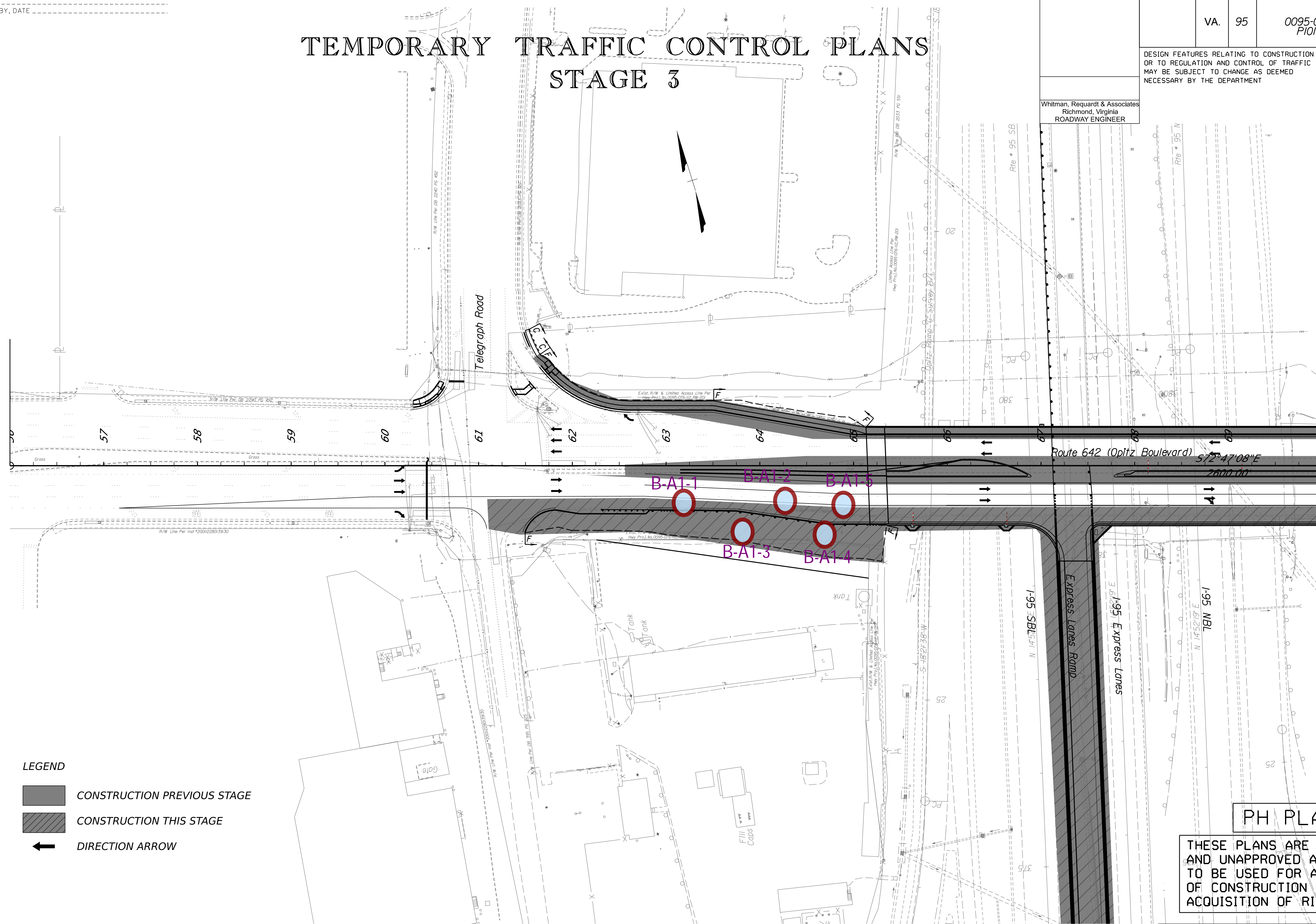
REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95	1L(5)
0095-076-299 P101, C501			

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER

TEMPORARY TRAFFIC CONTROL PLANS

STAGE 3



LEGEND

- CONSTRUCTION PREVIOUS STAGE
- CONSTRUCTION THIS STAGE
- DIRECTION ARROW

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

MATCH LINE STATION 70+00 - SEE SHEET 1L(6)

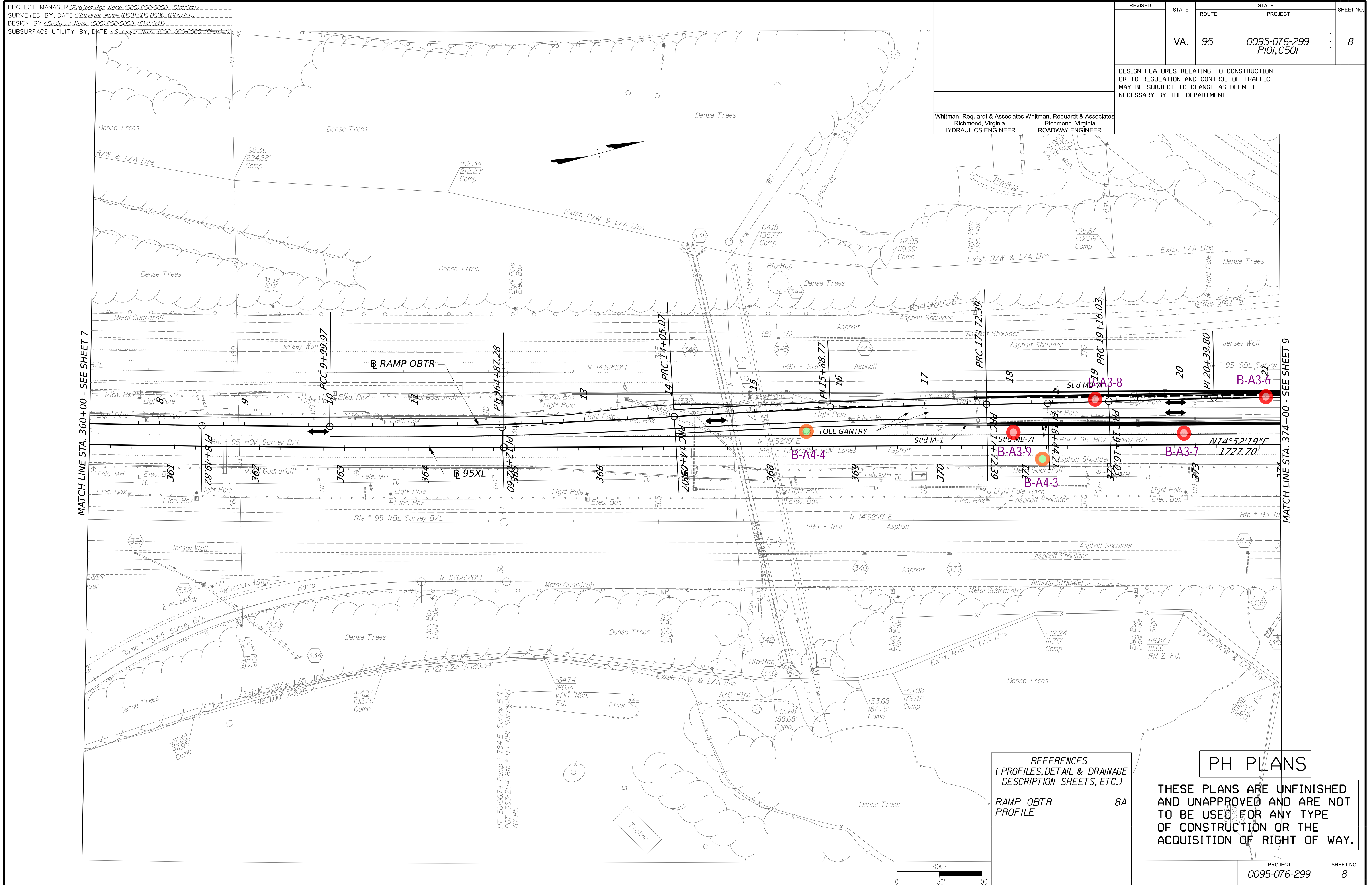
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SURVEYED BY, DATE <Surveyor_Name (000)000-0000 (District)>
DESIGN BY <Designer_Name (000)000-0000 (District)>
SUBSURFACE UTILITY BY, DATE <Surveyor_Name (000)000-0000 (District)>

REVISED	STATE		SHEET NO.
	ROUTE	PROJECT	
	VA.	95 0095-076-299 PI01, C501	8

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
HYDRAULICS ENGINEER

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER



MATCH LINE STA. 360+00 - SEE SHEET 7

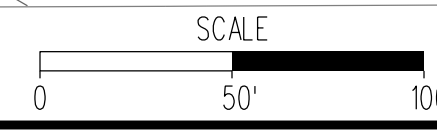
MATCH LINE STA. 374+00 - SEE SHEET 9

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

RAMP OBTR 8A
PROFILE

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT MANAGER <Project_Mgr_Name (000).000-0000 (District)>
 SURVEYED BY, DATE <Surveyor_Name (000).000-0000 (District)>
 DESIGN BY <Designer_Name (000).000-0000 (District)>
 SUBSURFACE UTILITY BY, DATE <Surveyor_Name (000).000-0000 (District)>

REVISED	STATE	STATE		SHEET NO.
	VA.	ROUTE	PROJECT	
	95	0095-076-299 PE-101, C-501		6

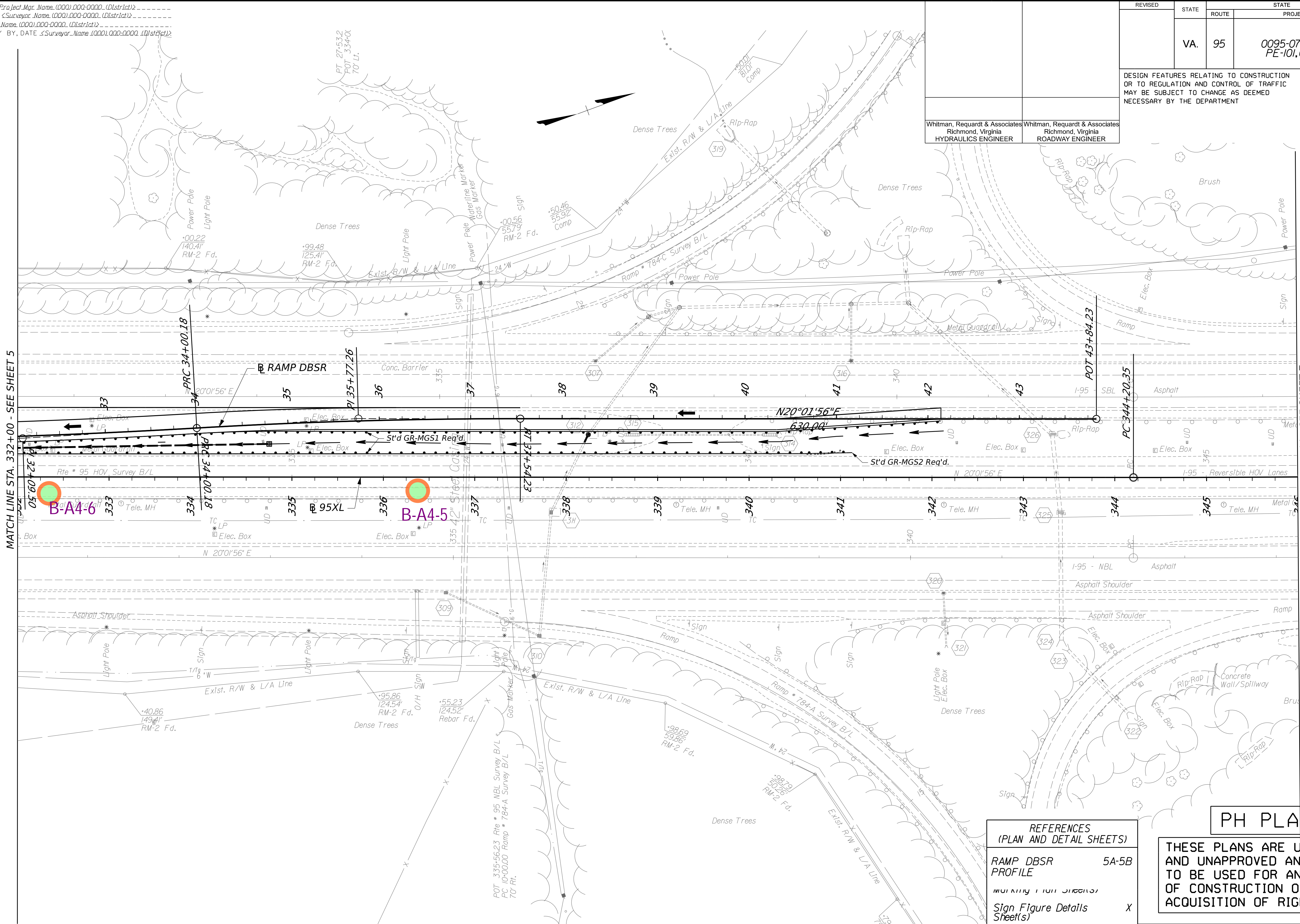
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
HYDRAULICS ENGINEER

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER

MATCH LINE STA. 332+00 - SEE SHEET 5

MATCH LINE STA. 346+00 - SEE SHEET 7

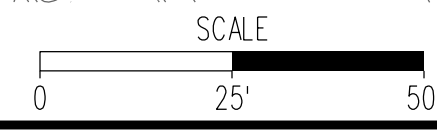


REFERENCES
(PLAN AND DETAIL SHEETS)

RAMP DBSR PROFILE	5A-5B
Sign Figure Details Sheet(s)	X

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



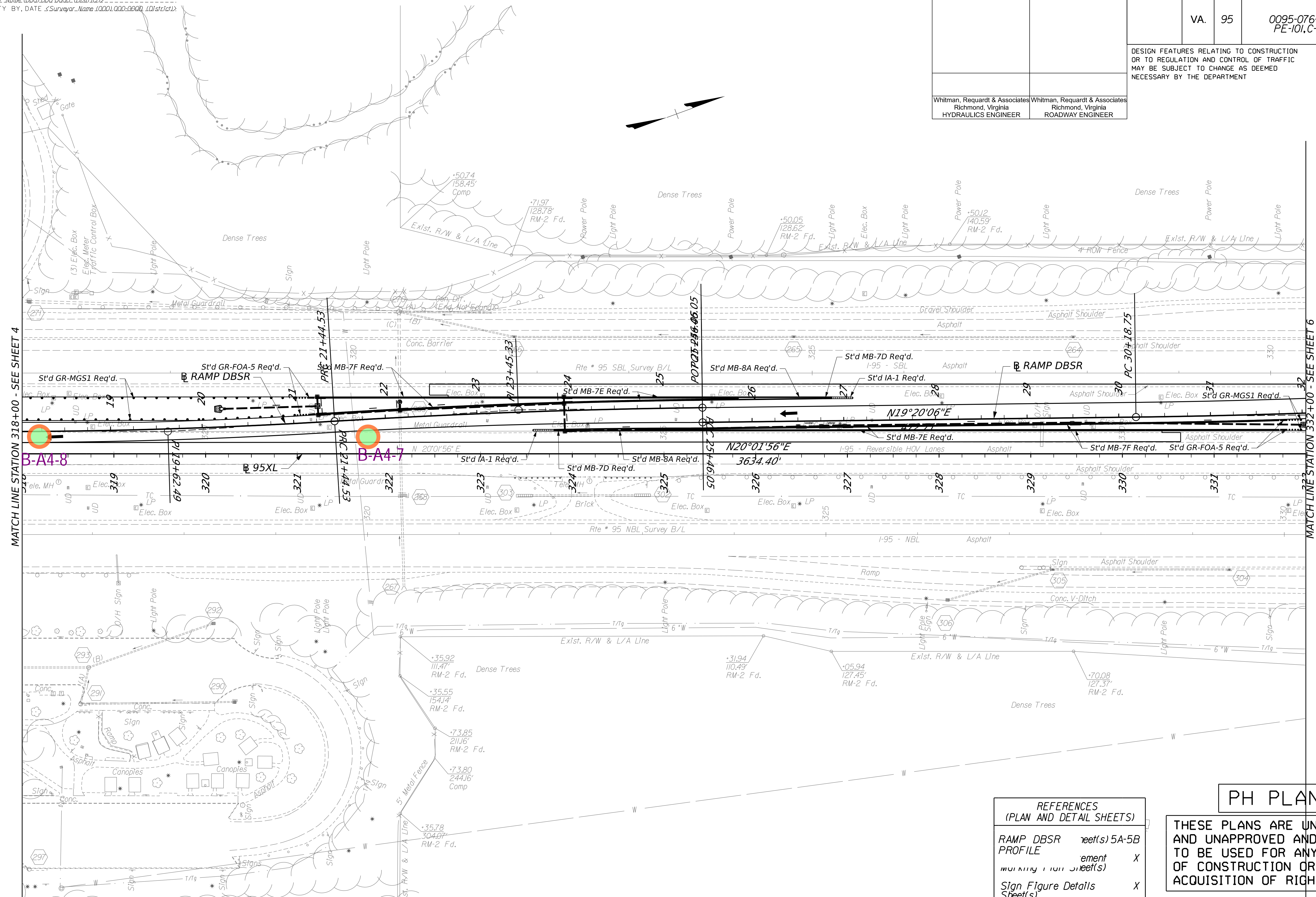
PROJECT MANAGER <Project_Mgr_Name (000)000-0000 (District)>
 SURVEYED BY, DATE <Surveyor_Name (000)000-0000 (District)>
 DESIGN BY <Designer_Name (000)000-0000 (District)>
 SUBSURFACE UTILITY BY, DATE <Surveyor_Name (000)000-0000 (District)>

REVISED	STATE	STATE		SHEET NO.
	VA.	ROUTE	PROJECT	
		95	0095-076-299 PE-101, C-501	5

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Whitman, Requardt & Associates
Richmond, Virginia
HYDRAULICS ENGINEER

Whitman, Requardt & Associates
Richmond, Virginia
ROADWAY ENGINEER



MATCH LINE STATION 318+00 - SEE SHEET 4

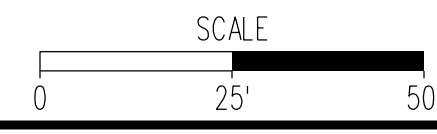
MATCH LINE STATION 332+00 - SEE SHEET 6

**REFERENCES
(PLAN AND DETAIL SHEETS)**

RAMP DBSR	Sheet(s) 5A-5B
PROFILE	Sheet(s) X
MARKING PLAN	Sheet(s) X
Sign Figure Details	Sheet(s) X

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



APPENDIX C

Subsurface Investigation Records

APPENDIX C.1

Test Boring Summary

Test Boring - Complete Summary

Ref.	Test Hole ID	Purpose & Location	Coordinates		Boring Stations				Boring Depth (ft.)	Ground Water Depth (ft.)	Ground Water EL (inch)	Pavement				
			Northing (ft.)	Easting (ft.)	Ref (ft.)	Sta (ft.)	Offset (ft.)	Ground EL (ft.)				Pavement Core	Asphalt (inch)	Base (inch)	Concrete (inch)	Notes
1	B-A1-1	East Bound Opitz Blvd	355465.6391	3626202.7403	Opitz Blvd	63+25	41 RT	212.5	15.0	N/E	---	1	12.0	4.0	---	---
2	B-A1-2	East Bound Opitz Blvd	355436.0442	3626298.2607	Opitz Blvd	64+25	41 RT	214.2	20.0	N/E	---	1	11.0	7.0	---	---
3	B-A1-3	Retaining wall design	355433.4805	3626245.1215	Opitz Blvd	63+75	59 RT	209.4	30.0	N/E	---	---	---	---	---	---
4	B-A1-4	Retaining wall design	355390.5715	3626336.5168	Opitz Blvd	64+75	73 RT	203.9	28.8	23.5	180.4	---	---	---	---	---
	B-A1-5	Abut A Opitz Br.	355408.0699	3626341.9383	Opitz Blvd	64+75	55 RT	214.0								Not drilled
5	B-A1-6	Abut B Opitz Vr.	355252.1568	3626874.5973	Opitz Blvd	70+30	46 RT	211.6	75.0	56.0	155.6	---	5.0	12.0	---	
6	B-PE-1	Opitz Blvd shoulders	355235.5276	3626916.6181	Opitz Blvd	70+75	50 RT	209.8	3.2	N/E	---	1	4.5	10.5	---	
7	B-PE-2	Opitz Blvd shoulders	355218.8102	3626963.7834	Opitz Blvd	71+25	52 RT	208.1	3.2	N/E	---	1	3.0	11.0	---	
8	B-A2-1	Abut.C for T-Ramp	355278.6864	3626597.1158	T-Ramp	27+10	20 RT	188.0	59.0	23.5	164.5		7.0	17.0	6.0	Note (1)
9	B-A3-1	T-Ramp MSE Wall	355172.3987	3626568.6573	T-Ramp	26+00	20 RT	187.0	40.0	20.0	167.0	---	15.0	4.0	---	
10	B-A3-2	T-Ramp MSE Wall	355083.9063	3626512.2718	T-Ramp	25+00	12 LT	189.2	40.0	20.7	168.5	---	18.0	18.0	---	
11	B-A3-3	T-Ramp MSE Wall	354978.3553	3626520.1235	T-Ramp	24+00	23 RT	185.4	30.0	19.5	165.9	---	15.0	5.0	4.0	Note (2)
12	B-A3-4	T-Ramp MSE Wall	354937.3133	3626479.5403	T-Ramp	23+50	6 LT	187.2	30.0	22.0	165.2	---	18.0	18.0	---	---
13	B-A3-5	T-Ramp MSE Wall	354785.0818	3626468.6903	T-Ramp	22+00	35 RT	183.5	20.0	N/E	---	---	19.0	9.0	---	---
14	B-A3-6	T-Ramp MSE Wall	354697.7435	3626407.9003	T-Ramp	21+00	2 LT	184.9	20.0	N/E	---	---	19.0	18.0	---	---
15	B-A3-7	T-Ramp MSE Wall	354591.7507	3626417.4743	T-Ramp	19+99	33 RT	181.6	15.0	N/E	---	---	15.0	9.0	---	---
16	B-A3-8	T-Ramp MSE Wall	354503.8875	3626358.4498	T-Ramp	19+00	4 LT	181.1	10.0	N/E	---	---	19.0	23.0	---	---
17	B-A3-9	Roadway south of T ramp	354398.3209	3626366.6296	T-Ramp	17+99	29 RT	179.9	10.0	N/E	---	---	12.0	9.0	3.0	Note (3)
18	B-A4-1	I-95 XBL MOT	355034.2590	3626573.5922	I-95 XBL	727+80	17 RT	186.1	8.0	N/E	---	1	14.0	10.0	---	---
19	B-A4-2	I-95 XBL MOT	354720.1225	3626490.2662	I-95 XBL	724+55	17 LT	183.0	8.0	N/E	---	1	17.0	8.0	---	---
20	B-A4-3	I-95 XBL MOT	354430.0292	3626413.7890	I-95 XBL	721+55	18 RT	180.2	8.0	N/E	---	1	17.0	8.0	---	---
21	B-A4-4	I-95 XBL MOT	354157.6633	3626304.2854	I-95 XBL	718+64	18 LT	179.0	8.0	N/E	---	1	15.0	9.0	---	---
22	B-A4-5	I-95 XBL Slip Ramp	351117.2654	3625366.6140	I-95 XBL	686+81	18 LT	172.1	8.0	N/E	---	1	16.0	9.0	---	---
23	B-A4-6	I-95 XBL Slip Ramp	350741.8477	3625229.2087	I-95 XBL	682+81	18 RT	168.3	8.0	N/E	---	1	15.0	10.0	---	---
24	B-A4-7	I-95 XBL Slip Ramp	349743.9644	3624827.1230	I-95 XBL	672+06	18 LT	149.8	8.0	N/E	---	1	16.0	9.0	---	---
25	B-A4-8	I-95 XBL Slip Ramp	349415.1818	3624707.6334	I-95 XBL	668+56	18 LT	140.3	8.0	N/E	---	1	15.0	33.0	---	---

Note(1) 7.0"ASPH + 6.0"CONC + 17.0"Base
 Note(2) 15.0"ASPH + 5.0" Base + 4.0" CONC
 Note(3) 9.0"ASPH + 3.0"CONC + 3.0"ASPH + 9.0"Base

APPENDIX C.2
Test Boring Logs



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A1-1
 PAGE 1 OF 1

STATION: 63+25
 NORTHING: 355465.6391 ft
 SURFACE ELEVATION: 212.5 ft
 OFFSET: 41 RT
 Easting: 3626202.7403 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 11/9/2021 - 11/9/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION											
										GROUND WATER								
										NOT ENCOUNTERED DURING DRILLING								
										FIELD DESCRIPTION OF STRATA								
										LL	PI							
0.0	212.5																	
2	210	8	4	33	1.5			0.0 / 212.5 12" Asphalt ASPH										
4		2	3	0	3.5			1.0 / 211.5 4" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CRA								8.3		
6		2	2	100	6			1.33 / 211.17 Fill, Tan-gray, FAT CLAY WITH SAND, trace wood, medium stiff, moist. Wood stuck at spoon tip and there were no sample recovered. sample was later retrieved with 3" spoon CH						68	41	30.0	76.0	
8	205	3	6	67	8.5			8.5 / 204.0 Fill, Tan, fine to medium, SILTY SAND, medium dense, moist SM								24.1		
10		5	6	100	11											21.3		
12	200	6	8	100	12.5													
14		5	11	87	13.5											13.8		
15		11	11		15			15.0 / 197.5 Boring terminated at 15ft										

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 5' towards east due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A1-1



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A1-2
 PAGE 1 OF 1

STATION: 64+25
 NORTHING: 355436.0442 ft
 SURFACE ELEVATION: 214.2 ft
 OFFSET: 41 RT
 Easting: 3626298.2607 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/9/2021 - 11/9/2021

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
0.0	214.2							0.0 / 214.2 11" Asphalt ASPH					
0.92	213.28							0.92 / 213.28 7" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CRA			21.7		
1.5	212.7							1.5 / 212.7 Fill, Tan-gray, FAT CLAY WITH SAND, trace to some Gravel, medium stiff, moist. CH			33.7		
11.0	203.2							11.0 / 203.2 Fill, Red, tan, multi color, SANDY LEAN CLAY, very stiff, moist CL			26.6	76.0	
14.0	200.2							14.0 / 200.2 Possible Fill, Tan, fine to medium, SILTY SAND, trace elastic fine, medium dense, moist SM			16.4		
17.5	196.7							17.5 / 196.7 Brown, tan, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist SP-SM			14.8		
20.0	194.2							20.0 / 194.2 Boring terminated at 20ft			13.0		

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP.J: SPT7.GDT: gINT_ version 10.02.00.04: 1/20/22: WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 5' towards west due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A1-2



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: RETAINING WALL

B-A1-3
PAGE 1 OF 1

STATION: 63+75
NORTHING: 355433.4805 ft
SURFACE ELEVATION: 209.4 ft
OFFSET: 59 RT
Easting: 3626245.1215 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 10/11/2021 - 10/11/2021

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
1		3	33					0.0 / 209.4 4" Topsoil TOPS			18.7		
2	205	4	93					0.2 / 209.2 Fill, Light brown, fine to medium, SILTY SAND FILL, trace roots, loose, moist SM			15.2		
4	205	3	80					3.0 / 206.4 Possible fill, Tan, fine to medium, SILTY SAND, medium dense, moist SM			13.9	25.0	
6		6	80								17.5		
8	200	8	100								16.0		
10		7	100								17.8		
12		7	100								16.0		
14	195	16	100					13.0 / 196.4 Residual, Light gray, fine to medium, POORLY GRADED SAND WITH SILT, dense, moist SP-SM			17.8		
16		20	100					15.0 / 194.4 Decomposed Rock, Gray, black, medium to coarse, highly weathered, DECOMPOSED GRAPHITIC SCHIST, lithified, very dense, dry MST			19.6		
18		26	100								11.5		
20	190	39											
22													
24	185	11	80								11.7		
26		27											
28													
30	180	39	60					30.0 / 179.4 Boring terminated at 30ft			9.1		

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP.J: SPT7.GDT: gINT _version 10.02.00.04: 1/20/22: WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' west and 5' south. As drilled boring elevatoin is 3' lower than the original location. Bulk sample collected from 0'-8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A1-3



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: RETAINING WALL

B-A1-4
PAGE 1 OF 1

STATION: 64+75 **OFFSET:** 73 RT
NORTHING: 355390.5715 ft **Easting:** 3626336.5168 ft
SURFACE ELEVATION: 203.9 ft **COORD. DATUM:** VA South

FIELD DATA

Date(s) Drilled: 10/12/2021 - 10/12/2021

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.5 ft DEPTH

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
LL	PI	

FIELD DESCRIPTION OF STRATA

LL	PI	MOISTURE CONTENT (%)
		19.9
		20.8
		13.6
		18.6
		16.6
		15.6
		15.7
		24.4
		11.1
		11.1
		13.5

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	203.9			1				12" Asphalt ASPH
1.0	202.9			2.5				12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CRA
2.0	201.9			5				Possible fill, Tan-brown, fine to medium, SILTY SAND, some elastic fine, loose, moist SM
6.5	197.4			7.5				Brown-tan, medium to coarse, SILTY SAND WITH FINE GRAVEL, medium dense, moist SM/GM
9.0	194.9			10				Light brown-light gray, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist SP-SM
16.0	187.9			17.5				Brown-red, medium to coarse, SILTY SAND, trace fine gravel, dense, moist SM
19.0	184.9			20				Residual, Gray, black, highly weathered, DECOMPOSED GRAPHITIC SCHIST, lithified, very stiff, damp MST
21.0	182.9			21.3				Decomposed Rock, Gray, DECOMPOSED GRAPHITIC SCHIST, very dense, dry. Water was noted between rock layers near 25ft. MST
28.8	175.1			28.8				Boring terminated at 28.8ft

REMARKS: Rig Type: Acker XLS.
 Boring was offset 15' south. As drilled boring elevatin is 1' lower than the original location. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A1-4

SPT_LOG-I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPIT7.GDT:gINT_versioN 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: BRIDGE

B-A1-6
PAGE 1 OF 3

STATION: 70+30
NORTHING: 355252.1568 ft
SURFACE ELEVATION: 211.6 ft
OFFSET: 46 RT
Easting: 3626874.5973 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/8/2021 - 11/8/2021

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 58.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
6	210	7	33	0.5				
2		5		2				
4	2	3	67	3.5				
6	205	2	100	6				
8		17		7.5				
10		2	80	8.5				
12	200	3	100	10				
14		3	100	11				
16	195	3	100	12.5				
18		4	100	13.5				
20		3	100	15				
22	190	4	100	16				
24		3	100	17.5				
26	185	6	100	18.5				
28		4	100	20				
30		3	100	23.5				
32	180	6	100	25				
34		9	100	28.5				
36		5	100	30				
		9	47	33.5				
		8		35				

0.0 / 211.6 5" Asphalt ASPH			6.6	
0.42 / 211.18 12" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CCA			19.3	
1.42 / 210.18 Fill, Light brown, fine to medium SILTY SAND FILL, trace elastic fine, loose, moist Layer of 6" thick, mottled, tan-gray, FAT CLAY binder exists from 6'-6.5' SM			18.9	
7.5 / 204.1 Fill, Light gray, light brown, fine to medium, CLAYEY SAND, loose, moist SC			13.3	
	35	11	15.6	23.0
20.0 / 191.6 Fill, Tan, light brown, fine to coarse, SAND WITH GRAVEL, trace Clay, loose, damp SP/GP			15.8	
25.0 / 186.6 Fill, Tan, gray, fine to medium, SILTY, CLAYEY SAND, trace root, medium dense, moist SC-SM			15.6	
30.0 / 181.6 Fill, Light brown, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist SM/GM			26.6	
			16.5	

SPT_LOG: I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP1: SPT7.GDT.gINT _version 10.02.00.04: 1/20/22: WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location. Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 3
B-A1-6



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: BRIDGE

B-A1-6
 PAGE 2 OF 3

STATION: 70+30
 NORTHING: 355252.1568 ft
 SURFACE ELEVATION: 211.6 ft
 OFFSET: 46 RT
 Easting: 3626874.5973 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 11/8/2021 - 11/8/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	GROUND WATER ▽ FIRST ENCOUNTERED AT 58.5 ft DEPTH	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION												
FIELD DESCRIPTION OF STRATA															LL	PI			
175																			
38	3	3	87	38.5															
40	4	4		40															
170																			
42																			
44	2	4	20	43.5															
46			8	45															
165																			
48																			
50	8	20	80	48.5															
52			19	50															
160																			
54		50/4"	20	53.5															
56				55															
155																			
58																			
60	26	20	50	58.5															
62				60															
150																			
64	15	50/1"	40	63.5															
66				65															
145																			
68																			
70		50/2"	13	68.5															
72				70															

REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location. Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 2 OF 3
B-A1-6

SPT_LOG-B-I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP-1-SPT7.GDT.gINT _version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: BRIDGE

B-A1-6
 PAGE 3 OF 3

STATION: 70+30
 NORTHING: 355252.1568 ft
 SURFACE ELEVATION: 211.6 ft
 OFFSET: 46 RT
 Easting: 3626874.5973 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)						
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS					STRATA LEGEND					
74	15	50/2"	40	X	73.5														
					75														
<p>Date(s) Drilled: 11/8/2021 - 11/8/2021 Drilling Method(s): HSA SPT Method: Automatic Hammer Other Test(s): Driller: SaLUT, Inc. Logger: J. Yadeta</p> <p>GROUND WATER FIRST ENCOUNTERED AT 58.5 ft DEPTH</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>75.0 / 136.6 Boring terminated at 75ft</p>										LL	PI								

REMARKS: Rig Type: Acker XLS.
 Boring was offset 20' towards east due to underground utility. As drilled boring elevatoin is the same as the original location. Bulk sample collected from 0' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 3 OF 3
B-A1-6

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: MSE WALL

B-A2-1
PAGE 1 OF 2

STATION: 27+10 **OFFSET:** 20 RT
NORTHING: 355278.6864 ft **Easting:** 3626597.1158 ft
SURFACE ELEVATION: 188.0 ft **COORD. DATUM:** VA South

FIELD DATA

Date(s) Drilled: 11/22/2021 - 11/23/2021

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

DEPTH (ft)	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
2			10.1	
4			18.1	
6			14.4	
8			12.7	22.0
10			10.8	
12			14.3	
14			16.2	
16			20.7	
18			23.1	
20			10.1	46.0
22			10.0	

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

DEPTH (ft)	ELEVATION (ft)	STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA	JOINTS	STRATA LEGEND	FIELD DESCRIPTION	LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
0.0	188.0											0.0 / 188.0				
0.6	187.4											7" Asphalt ASPH				
0.6	187.4											6" Concrete CONC			10.1	
1.1	186.9											17" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry CRA			18.1	
2.5	185.5											Fill, Black, brown shading, fine to medium, SILTY SAND, some elastic fine, loose, moist SM			14.4	
6.5	181.5											Possible fill, Tan, black spotting at 13.5'-15', fine to medium, POORLY GRADED SAND WITH SILT, trace Gravel, loose to medium dense, moist SP-SM			12.7	22.0
23.5	164.5											Residual, Gray, black, lithified, SILT derived from decomposition of parent rock, trace rock fragments, hard, moist ML			23.1	
28.5	160														10.1	46.0
33.5	155														10.0	

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP1: SPT7.GDT.gINT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 35' towards east, drilled on western shoulder of I-95 express lane. Cave-in at 55.3'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 2
B-A2-1



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A2-1
 PAGE 2 OF 2

STATION: 27+10
 NORTHING: 355278.6864 ft
 SURFACE ELEVATION: 188.0 ft
 OFFSET: 20 RT
 Easting: 3626597.1158 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	STRATA				
Date(s) Drilled: 11/22/2021 - 11/23/2021										LAB DATA			
Drilling Method(s): HSA										LAB DATA			
SPT Method: Automatic Hammer										LAB DATA			
Other Test(s):										LAB DATA			
Driller: SaLUT, Inc.										LAB DATA			
Logger: J. Yadeta										LAB DATA			
GROUND WATER										LAB DATA			
▼ FIRST ENCOUNTERED AT 23.5 ft DEPTH										LAB DATA			
FIELD DESCRIPTION OF STRATA										LAB DATA			
38	150	14	19	67	38.5								
40		26			40						10.0		
42													
44	145	10	29	93	43.5								
46		50/5"			45						12.5		
48	140	15	29	80	48.5								
50					50						12.4		
52													
54	135	50/3"		27	53.5								
56					55						9.8		
58	130	50/4"		60	58.5								
					59						14.8		
59.0 / 129.0 Boring terminated at 59ft													

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnit_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 35' towards east, drilled on western shoulder of I-95 express lane. Cave-in at 55.3'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 2 OF 2
B-A2-1



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A3-1
 PAGE 1 OF 2

STATION: 26+00
 NORTHING: 355172.3987 ft
 SURFACE ELEVATION: 187.0 ft
 OFFSET: 20 RT
 Easting: 3626568.6573 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/22/2021 - 11/22/2021

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 20.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
2	185	60/4"	22	1.5				
4	182	6	53	3.5				
6	180	3	100	6				
8	178	5	87	8.5				
10	176	6	100	11				
12	175	6	100	12.5				
14	174	6	87	13.5				
16	172	4	100	16				
18	170	6	87	18.5				
20	168	7	10	20				
22	166	7	87	23.5				
24	165	19	24	25				
26	163	4	100	28.5				
28	161	4	100	30				
30	160	50/4"	80	33.5				
32	158	13	41	35				

0.0 / 187.0
 15" Asphalt **ASPH**

1.25 / 185.75
 9" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry **CRA**

2.0 / 185.0
 Possible fill, Tan, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist **SP-SM**

18.5 / 168.5
 Tan-brown, fine to coarse, SILTY SAND AND GRAVEL, layer of purple Silt from 23.5' to 24.2', medium dense to dense, moist to wet below 20ft. **SM/GM**

28.5 / 158.5
 Residual, Gray, black, lithified, SILT derived from decomposition of parent rock, trace rock fragments, hard, moist **ML**

DEPTH (ft)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	MOISTURE CONTENT (%)
2			6.1
4			15.7
6			13.9
8			13.6
10			14.3
12			13.3
14			18.7
16			16.8
18			29.7
20			11.8
22			17.4

REMARKS: Rig Type: Acker XLS.
 Cave-in at 16.7'. Bulk sample collected from 2' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 2
B-A3-1

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A3-1
 PAGE 2 OF 2

STATION: 26+00 OFFSET: 20 RT
 NORTHING: 355172.3987 ft Easting: 3626568.6573 ft
 SURFACE ELEVATION: 187.0 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 11/22/2021 - 11/22/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA										
150										⚡ FIRST ENCOUNTERED AT 20.0 ft DEPTH								
38		31								FIELD DESCRIPTION OF STRATA			LL	PI				
40		50/5"	47	38.5	40					40.0 / 147.0 Boring terminated at 40ft								18.1

REMARKS: Rig Type: Acker XLS.
 Cave-in at 16.7'. Bulk sample collected from 2' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 2 OF 2
B-A3-1

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: MSE WALL

B-A3-2
PAGE 1 OF 2

STATION: 25+00
NORTHING: 355083.9063 ft
SURFACE ELEVATION: 189.2 ft
OFFSET: 12 LT
Easting: 3626512.2718 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/17/2021 - 11/18/2021

LAB DATA

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 20.7 ft DEPTH

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
LL	PI		

FIELD DESCRIPTION OF STRATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	189.2							18" Asphalt ASPH
1.5	187.7	34	100	3				18" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry CRA
3.0	186.2	25	100	5				Gray-brown mix, ELASTIC SILT, medium stiff to stiff, moist MH
8.5	180.7	7	60	8				Brown, tan, fine to medium, POORLY GRADED SAND WITH SILT, medium dense, moist SP-SM
18.5	170.7	12	87	10				Gray, black, fine to coarse, POORLY GRADE SAND, trace Silt, dense, moist to wet below 20.5ft SP
23.5	165.7	50/2"	40	20				Residual, Gray, SILT DRIVEN FROM DECOMPOSITION OF BED ROCK, hard, dry ML
28.5	160.7	60/3"	20	20				Gray, fine to coarse, SILTY AND GRAVEL SIZE DECOMPOSED ROCK FRAGMENTS, little elastic fine, extremely dense to dense to extremely dense, dry to moist SM
34.5	155	4	40	20				

2	185	3	100	3.5				4.3	
4	185	5	100	6				40.8	
6	185	8	100	7.5				42.4	
8	180	5	60	8.5				14.3	
10	180	4	87	10				14.5	21.0
12	175	5	80	11				13.9	
14	175	6	80	12.5				15.3	
16	175	8	100	13.5				14.7	
18	170	6	87	15				20.4	
20	170	12	87	16				15.6	
22				17.5					
24	165	24	40	18.5					
26				20					
28				23.5					
30	160	60/3"	20	25					
32				28.5					
34	155	4	40	30					
36				33.5					
				35					

REMARKS: Rig Type: Acker XLS.
 Cave-in at 34.5'. Boring was offset 5' towards south due to underground utility. As drilled boring elevation is the same as the original location. Bulk sample collected from 1.5' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 2
B-A3-2

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A3-2
 PAGE 2 OF 2

STATION: 25+00
 NORTHING: 355083.9063 ft
 SURFACE ELEVATION: 189.2 ft
 OFFSET: 12 LT
 Easting: 3626512.2718 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA										
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND	Date(s) Drilled: 11/17/2021 - 11/18/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	GROUND WATER ▽ FIRST ENCOUNTERED AT 20.7 ft DEPTH	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA												
38	150	53/2"	13		38.5															
40					40														8.6	
										FIELD DESCRIPTION OF STRATA										
										Gray, fine to coarse, SILTY AND GRAVEL SIZE DECOMPOSED ROCK FRAGMENTS, little elastic fine, extremely dense to dense to extremely dense, dry to moist 40.0 / 149.2 Boring terminated at 40ft										

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP.I: SPT7.GDT.gINT _version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Cave-in at 34.5'. Boring was offset 5' towards south due to underground utility. As drilled boring elevatoin is the same as the original location. Bulk sample collected from 1.5' - 8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 2 OF 2
B-A3-2



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: MSE WALL

B-A3-3
PAGE 1 OF 1

STATION: 24+00
NORTHING: 354978.3553 ft
SURFACE ELEVATION: 185.4 ft
OFFSET: 23 RT
Easting: 3626520.1235 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/29/2021 - 11/29/2021

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	LAB DATA			
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA		DIP °	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
0.0	185.4								GROUND WATER ▽ FIRST ENCOUNTERED AT 19.5 ft DEPTH			
FIELD DESCRIPTION OF STRATA									LL	PI		
0.0	185.4											
2	184.15	6	67	2								
4	183.4	6	80	3.5							16.1	
6	183.4	6	100	5							18.0	
8	178.9	3	100	7.5							13.5	
10	176.9	3	100	8.5					41	16	22.4	89.0
12	174.4	4	100	11							12.7	
14	172.4	6	67	13.5							16.8	
16	170	4	100	15							17.6	
18	165	8	100	16							24.8	
20	165	8	100	17.5								
22				18.5								
24	160	10	80	20								
26				23.5								
28		14	87	25								
30		34	41	28.5							15.4	
30.0	155.4			30								

REMARKS: Rig Type: Acker XLS.
 Boring was offset 6' towards north due to underground utility. Cave-in at 25.2'. Hole backfilled with soil cutting and patched with cold asphalt at the surface. Shelby tube sample was taken from an offset boring from 14' - 16'

PAGE 1 OF 1
B-A3-3

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP1:SPT7.GDT.gINT _version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: MSE WALL

B-A3-4
PAGE 1 OF 1

STATION: 23+50
NORTHING: 354937.3133 ft
SURFACE ELEVATION: 187.2 ft
OFFSET: 6 LT
Easting: 3626479.5403 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/16/2021 - 11/16/2021
 Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s): Shelby Tube Sample
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

LAB DATA

DEPTH (ft)	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
22.8	55	27	19.7	45.0
14.0	30	9	19.9	46.0
18.5			20.9	
20.0			21.0	
24.0			22.5	
24.0			14.9	
28.5			19.4	

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 22.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0.0	187.2							18" Asphalt ASPH
1.5	185.7	25	73	1.5				18" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry CRA
3.0	184.2	40	60	3				Gray, fine to coarse, SILTY SAND AND GRAVEL, medium dense, moist SM
5.0	182.2	30	60	3.5				Light brown, fine to medium, SILTY SAND, some Gravel, medium dense, moist SM
8.5	178.7	7	87	5				Gray, fine to medium, CLAYEY SAND, trace Gravel, trace root, loose to very loose, moist SC
12.5	175	6	87	6				
13.5		3	87	6				
14.0		5	53	7.5				
15.0		6	75	8.5				
16.0		3	100	10				
17.5		2	100	11				
18.5		4	100	12.5				
20.0		4	100	13.5				
22.0	165	2	87	14				
23.5		4	87	15				
24.0		2	87	16				
25.0		4	87	17.5				
28.5		4	33	18.5				
30.0		4	33	20				

0.0 / 187.2
 18" Asphalt ASPH

1.5 / 185.7
 18" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, very dense, dry CRA

3.0 / 184.2
 Gray, fine to coarse, SILTY SAND AND GRAVEL, medium dense, moist SM

5.0 / 182.2
 Light brown, fine to medium, SILTY SAND, some Gravel, medium dense, moist SM

8.5 / 178.7
 Gray, fine to medium, CLAYEY SAND, trace Gravel, trace root, loose to very loose, moist SC

12.5 / 175
 13.5 / 14
 14.0 / 15
 15.0 / 16
 16.0 / 17
 17.5 / 18
 18.5 / 20
 22.0 / 165
 23.5 / 24
 24.0 / 163.2
 Residual, Light brown-gray, SILT DRIVEN FROM DECOMPOSITION OF BED ROCK, hard, dry. HARD AUGERING BELOW 27.5FT ML

24.0 / 163.2
 Residual, Light brown-gray, SILT DRIVEN FROM DECOMPOSITION OF BED ROCK, hard, dry. HARD AUGERING BELOW 27.5FT ML

28.5 / 160
 30.0 / 157.2
 Boring terminated at 30ft

REMARKS: Rig Type: Acker XLS.
 Cave-in at 23.8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A3-4

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT _version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
LOCATION: I-95 Express way/Opitz Blvd.
STRUCTURE: MSE WALL

B-A3-5
PAGE 1 OF 1

STATION: 22+00
NORTHING: 354785.0818 ft
SURFACE ELEVATION: 183.5 ft
OFFSET: 35 RT
Easting: 3626468.6903 ft
COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/29/2021 - 11/29/2021

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
0.0	183.5								0.0 / 183.5 15" Asphalt ASPH				
1.3	182.2								1.3 / 182.2 9" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, dry CRA			17.4	
2.0	181.5								2.0 / 181.5 Fill, Tan-light brown, fine to medium, POORLY GRADED SAND WITH SILT, trace Gravel, medium dense, moist SP-SM			15.4	27.0
7.0	176.5								7.0 / 176.5 Fill, Gray, fine to medium, CLAYEY, SILTY SAND, seam of clay at 7ft to 7.3ft, trace Gravel, trace to some woods, loose, moist SC	46	21	16.6	35.0
16.0	167.5								16.0 / 167.5 Residual, Brown-light gray, fine to medium, POORLY GRADED SAND WITH SILT, clay seam, very loose, moist SP-SM			17.8	
19.0	164.5								19.0 / 164.5 Residual, Gray, black, lithified, SILT derived from decomposition of parent rock, trace rock fragments, medium stiff, moist ML			25.9	
20.0	163.5								20.0 / 163.5 Boring terminated at 20ft.				

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS GP1:SPT7.GDT.gINT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Cave-in at 15.7'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A3-5



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A3-8
 PAGE 1 OF 1

STATION: 19+00 OFFSET: 4 LT
 NORTHING: 354503.8875 ft Easting: 3626358.4498 ft
 SURFACE ELEVATION: 181.1 ft COORD. DATUM: VA South

FIELD DATA										Date(s) Drilled: 11/18/2021 - 11/18/2021		LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	GROUND WATER		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)	
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION		DIP °	STRATA					JOINTS
FIELD DESCRIPTION OF STRATA										LL	PI				
0.0	181.1														
1.0	180.5	15			1.5										
2.0	180.0	24			3										
3.0	179.5	19			3.5										
4.0	179.0	6			5										
5.0	178.5	5			5										
6.0	178.0	3			6										
7.0	177.5	3			7.5										
8.0	177.0	3			8.5										
9.0	176.5	6			10										
10.0	176.0	7													
0.0 / 181.1 19" Asphalt ASPH															
1.58 / 179.52 23" Subbase material, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dense, dry CRA												3.5			
3.5 / 177.6 Tan, black mix, fine to coarse, SILTY SAND, trace Gravel, none to trace elastic fine, loose, moist SM												12.2			
8.5 / 172.6 Tan, gray, SILT, stiff, moist ML												29.3	56.0		
10.0 / 171.1 Boring terminated at 10ft												29.2			

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Cave-in at 6.5'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A3-8



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: MSE WALL

B-A3-9
 PAGE 1 OF 1

STATION: 17+99
 NORTHING: 354398.3209 ft
 SURFACE ELEVATION: 179.9 ft
 OFFSET: 29 RT
 Easting: 3626366.6296 ft
 COORD. DATUM: VA South

FIELD DATA										Date(s) Drilled: 11/30/2021 - 11/30/2021		LAB DATA	
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION						
0.0	179.9								0.0 / 179.9				
1.0	178.8	9	60	X	1.5			9" Asphalt ASPH					
2.0	178.8							0.75 / 179.15			17.9		
3.0	176.4	7	87	X	3.5			3" Concrete CONC					
4.0	176.4							1.0 / 178.9			19.1	24.0	
5.0	174.7	8	67	X	5			3" Asphalt ASPH					
6.0	174.7							1.25 / 178.65			19.2		
7.0	172.3	5	100	X	8.5			9" Subbase material, Gray, medium to coarse, SAND AND GRAVEL, dry CRA					
8.0	172.3							2.0 / 177.9			20.7		
9.0	170.3							Fill, Brown, fine to medium, POORLY GRADED SAND WITH SILT, Clayey Silt layer at 8.8'-9.5', medium dense, moist SP-SM					
10.0	170.3							10.0 / 169.9 Boring terminated at 10ft.					

REMARKS: Rig Type: Acker XLS.
 Cave-in at 6.8'. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-A3-9

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-1
 PAGE 1 OF 1

STATION: 727+80
 NORTHING: 355034.259 ft
 SURFACE ELEVATION: 186.1 ft
 OFFSET: 17 RT
 Easting: 3626573.5922 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					DATE(S) DRILLED: 12/1/2021 - 12/1/2021	DRILLING METHOD(S): HSA	SPT METHOD: Automatic Hammer	OTHER TEST(S):	DRILLER: SaLUT, Inc.	LOGGER: J. Yadeta	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS									
										GROUND WATER NOT ENCOUNTERED DURING DRILLING								
										FIELD DESCRIPTION OF STRATA						LL	PI	
0.0	186.1										0.0 / 186.1	14" Asphalt ASPH						
1.2	184.9	4	45	2							1.2 / 184.9	10" Subbase <i>materila</i> Gray, medium to coarse SAND AND GRAVEL, dry CCA					25.2	
2.0	184.1	4	85	4							2.0 / 184.1	Fill, Brown, hint of black, fine to medium, SILTY SAND, trace to none elastic fine, medium dense to loose to medium dense, moist SM					16.3	
8.0	178.1	6	75	6							8.0 / 178.1	Boring terminated at 8ft.					16.9	

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 3' towards south due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 4.8'

PAGE 1 OF 1
B-A4-1



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-2
 PAGE 1 OF 1

STATION: 724+55
 NORTHING: 354720.1225 ft
 SURFACE ELEVATION: 183.0 ft
 OFFSET: 17 LT
 Easting: 3626490.2662 ft
 COORD. DATUM: VA South

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					DATE(S) DRILLED: 12/1/2021 - 12/1/2021	DRILLING METHOD(S): HSA	SPT METHOD: Automatic Hammer	OTHER TEST(S):	DRILLER: SaLUT, Inc.	LOGGER: J. Yadeta	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS										
0.0	182.0																		
1.0	182.0																		
2.0	182.0																		
3.0	182.0																		
4.0	182.0	4			2														
5.0	180.0	5	7	65															
6.0	180.0	3	9		4														
7.0	178.0	6	6	65															
8.0	178.0	2	5		6														
9.0	176.0	4	6	75															
10.0	176.0	6	7		8														
										GROUND WATER									
										NOT ENCOUNTERED DURING DRILLING									
										FIELD DESCRIPTION OF STRATA				LL	PI				
										0.0 / 183.0									
										17" Asphalt ASPH									
										1.42 / 181.58									
										8" <i>Subbase materila</i> Gray, medium to coarse SAND AND GRAVEL, dry CCA						15.6	27.0		
										2.08 / 180.92									
										Fill, Brown, fine to medium, SILTY SAND, trace to some to none Gravel, medium dense to loose, moist SM						14.8			
										8.0 / 175.0									
										Boring terminated at 8ft.						15.8			

REMARKS: Rig Type: Acker XLS.
 Boring was offset 7' towards south due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 5.0'

PAGE 1 OF 1
B-A4-2

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-3
 PAGE 1 OF 1

STATION: 721+55 OFFSET: 18 RT
 NORTHING: 354430.0292 ft Easting: 3626413.789 ft
 SURFACE ELEVATION: 180.2 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA			
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					DATE(S) DRILLED: 12/1/2021 - 12/1/2021	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS				
0.0	180.2												
0.5										GROUND WATER NOT ENCOUNTERED DURING DRILLING			
FIELD DESCRIPTION OF STRATA										LL	PI		
0.5										0.0 / 180.2			
1.0										17" Asphalt ASPH			
1.42	178.78	5	65	X	2					1.42 / 178.78			17.8
1.42 - 2.08		5	6	X	4					8" Subbase <i>materila</i> Gray, medium to coarse SAND AND GRAVEL, dry CCA			
1.76	176.3	6	50	X	6					2.08 / 178.12			16.8
1.76 - 2.08		6	6	X	6					Fill, Brown, fine to medium, SILTY SAND, trace Gravel, loose to medium dense to loose, moist SM			
1.74	174.4	4	85	X	8								16.1
1.74 - 2.08		4	5	X									
2.08		5	6	X						8.0 / 172.2			
2.08 - 8.0		6								Boring terminated at 8ft.			

REMARKS: Rig Type: Acker XLS.
 Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 4.9'

PAGE 1 OF 1
B-A4-3

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-4
 PAGE 1 OF 1

STATION: 718+64 OFFSET: 18 LT
 NORTHING: 354157.6633 ft Easting: 3626304.2854 ft
 SURFACE ELEVATION: 179.0 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 11/30/2021 - 11/30/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	GROUND WATER NOT ENCOUNTERED DURING DRILLING	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION												
										FIELD DESCRIPTION OF STRATA				LL	PI				
0.0	178								0.0 / 179.0										
1.0									15" Asphalt ASPH										
1.5		18			2				1.25 / 177.75										
2.0		12							9" <i>Subbase materila</i> Gray, medium to coarse SAND AND GRAVEL, dry CCA								12.9	32.0	
2.5	176	5	50		4				2.0 / 177.0										
3.0		3							Fill, Tan, fine to medium, POORLY GRADED SAND WITH SILT, medium dense to loose, moist SP-SM								15.4		
3.5		3																	
4.0	174	4	75		6														
4.5																			
5.0																			
5.5																			
6.0									6.0 / 173.0										
6.0									Boring terminated at 6ft.										

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA

REMARKS: Rig Type: Acker XLS.
 Boring was offset 4' towards west due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 3.2'

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B-A4-4



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-5
 PAGE 1 OF 1

STATION: 686+81 OFFSET: 18 LT
 NORTHING: 351117.2654 ft Easting: 3625366.614 ft
 SURFACE ELEVATION: 172.1 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	Date(s) Drilled: 12/2/2021 - 12/2/2021	Drilling Method(s): HSA	SPT Method: Automatic Hammer	Other Test(s):	Driller: SaLUT, Inc.	Logger: J. Yadeta	GROUND WATER NOT ENCOUNTERED DURING DRILLING	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION											
FIELD DESCRIPTION OF STRATA															LL	PI		
0.0	172.1								0.0 / 172.1									
1.1	172.0								16" Asphalt ASPH									
2.2	170.3	7	85		2				1.33 / 170.77									
3.3	168.6	6							9" <i>Subbase materila</i> Gray, medium to coarse SAND AND GRAVEL, dry CCA								15.6	
4.4	168.4	8	65		4				2.08 / 170.02									
5.5	166.6	6							Fill, Brown-tan, fine to medium, SILTY SAND, trace elastic fine, medium dense to loose, moist SM								17.4	
6.6	166.3	7			6													
7.7	166.3	3	90														13.0	
8.8	164.1	3			8				8.0 / 164.1									
9.9									Boring terminated at 8ft.									

REMARKS: Rig Type: Acker XLS.
 Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 4.7'

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B-A4-5

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-7
 PAGE 1 OF 1

STATION: 672+06 OFFSET: 18 LT
 NORTHING: 349743.9644 ft Easting: 3624827.123 ft
 SURFACE ELEVATION: 149.8 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA								
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					DATE(S) DRILLED: 12/2/2021 - 12/2/2021	DRILLING METHOD(S): HSA	SPT METHOD: Automatic Hammer	OTHER TEST(S):	DRILLER: SaLUT, Inc.	LOGGER: J. Yadeta	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS									
0.0	149.8																	
0.5	148.7	7			2													
1.0	148.5	18																
1.5	148.3	15																
2.0	148.1	13																
2.5	147.9	8			4													
3.0	147.7	6																
3.5	147.5	4																
4.0	147.3	3			6													
4.5	147.1	2																
5.0	146.9	3																
5.5	146.7	5			8													
6.0	146.5																	
6.5	146.3																	
7.0	146.1																	
7.5	145.9																	
8.0	145.7																	
FIELD DESCRIPTION OF STRATA										LL	PI							
0.0 / 149.8																		
15" Asphalt ASPH																		
1.25 / 148.55																		
10" Subbase material Gray, medium to coarse SAND AND GRAVEL, dry CCA													5.9					
2.08 / 147.72																		
Fill, Brown/gray, fine to medium, CLAYEY, SILTY SAND, medium dense to loose, moist SC-SM													18.3					
6.0 / 143.8																		
Brown, fine to medium, POORLY GRADED SAND, trace Silt, medium dense, moist SP													14.7					
8.0 / 141.8																		
Boring terminated at 8ft.																		

REMARKS: Rig Type: Acker XLS.
 Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 4.7'

PAGE 1 OF 1
B-A4-7

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPIT7.GDT:gjnt_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd.
 STRUCTURE: PAVEMENT

B-A4-8
 PAGE 1 OF 1

STATION: 668+56
 NORTHING: 349415.1818 ft
 SURFACE ELEVATION: 140.3 ft
 OFFSET: 18 LT
 Easting: 3624707.6334 ft
 COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 12/2/2021 - 12/2/2021

LAB DATA

DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK				STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °	
0	140								
1									
2									
3									
4									
5									
6									
7	138	18	65	2					
8	136	6	75	4					
1	134	2	60	6					
3		3		8					
5									

Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

FIELD DESCRIPTION OF STRATA

0.0 / 140.3
 15" Asphalt **ASPH**

1.25 / 139.05
 33" *Subbase materila* Gray, medium to coarse SAND AND GRAVEL, dry **CCA**

4.0 / 136.3
Fill, Dark gray-brown, fine to medium, CLAYEY, SILTY SAND, loose, moist **SM**

8.0 / 132.3
 Boring terminated at 8ft.

LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	FINES CONTENT #200 (%)
		16.2	59.0
		21.0	
		12.4	

REMARKS: Rig Type: Acker XLS.
 Hole backfilled with soil cutting and patched with cold asphalt at the surface. Cave-in at 4.5'

PAGE 1 OF 1
B-A4-8

SPT_LOGB:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gnT_version 10.02.00.04:1/20/22:WRA



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd
 STRUCTURE: PAVEMENT

B-PE-1
 PAGE 1 OF 1

STATION: 70+75 OFFSET: 50 RT
 NORTHING: 355235.5276 ft Easting: 3626916.6181 ft
 SURFACE ELEVATION: 209.8 ft COORD. DATUM: VA South

FIELD DATA										LAB DATA									
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK					DATE(S) DRILLED: 11/9/2021 - 11/9/2021	DRILLING METHOD(S): HSA	SPT METHOD: Automatic Hammer	OTHER TEST(S):	DRILLER: SaLUT, Inc.	LOGGER: J. Yadeta	GROUND WATER NOT ENCOUNTERED DURING DRILLING	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	JOINTS										
209	4				1.25														
208	3	3	75																
207	3	3			3.25														
FIELD DESCRIPTION OF STRATA 0.0 / 209.8 4.5" Asphalt ASPH 0.38 / 209.42 10.5" <i>Subbase material</i> , Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry CRA 1.25 / 208.55 <i>Fill</i> , Light brown, fine to medium, SILTY SAND, some Gravel, some elastic fine, loose, moist. SM 3.25 / 206.55 Boring terminated at 3.25ft										LL	PI								

REMARKS: Rig Type: Acker XLS.
 Boring was offset 5' towards west due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

PAGE 1 OF 1
B-PE-1

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gjnt_version 10.02.00.04:3/24/22:Whitman, Raquardt, and Associates



PROJECT #: 45893-001
 LOCATION: I-95 Express way/Opitz Blvd
 STRUCTURE: PAVEMENT

B-PE-2
 PAGE 1 OF 1

STATION: 71+25 OFFSET: 52 RT
 NORTHING: 355218.8102 ft Easting: 3626963.7834 ft
 SURFACE ELEVATION: 208.1 ft COORD. DATUM: VA South

FIELD DATA

Date(s) Drilled: 11/9/2021 - 11/9/2021
 Drilling Method(s): HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: SaLUT, Inc.
 Logger: J. Yadeta

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL		SAMPLE LEGEND	SAMPLE INTERVAL	ROCK			STRATA LEGEND
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)			CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	STRATA	
207	4				1.3				
206	5	4	60						
205	4	4			3.3				

0.0 / 208.1
 3.0" Asphalt **ASPH**
 0.25 / 207.85
 11" *Subbase material*, Light gray, medium to coarse, SAND AND GRAVEL, trace Silt, dry **CCA**
 1.17 / 206.93
Fill, Light gray, fine to medium, SILTY SAND, some Gravel, loose, moist. (Possible Subbase) **SM**
 2.0 / 206.1
Fill, Tan, fine to coarse, SAND WITH GRAVEL, loose, damp. **SP/GP**
 3.2 / 204.9
 Boring terminated at 3.2ft

SPT_LOG:I-95 EXPRESS LANE- OPITZ BLVD BORINGS.GPJ:SPT7.GDT:gINT_version 10.02.00.04:3/24/22:Whitman, Raquardt, and Associates

REMARKS: Rig Type: Acker XLS.
 Boring was offset 4' towards west due to underground utility. Hole backfilled with soil cutting and patched with cold asphalt at the surface.

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B-PE-2

APPENDIX C.3

DCP Logs



PROJECT #: 45893-001
 LOCATION: Prince William County, VA
 STRUCTURE:

DCP-NE Upper

PAGE 1 OF 1

STATION: NORTHING: 6916998.2 ft SURFACE ELEVATION: 203.0 ft
 OFFSET: Easting: 11828744.7 ft COORD. DATUM: VA North

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION					
0.0	203.0	3	2					0.0 / 203.0 1-inch Topsoil TOPS				
0.5								0.1 / 202.9 <i>FILL</i> , Brown, fine- to medium-grained SILTY SAND with gravel, contains rock fragments, dry (SM) SM				
1.0	202	2						1.0 / 202.0 <i>FILL</i> , Orange-brown, fine- to medium-grained SILTY SAND with clay and gravel, dry to moist (SM) SM				
1.5		2										
2.0		3										
2.5		3										
3.0	200											
3.5		2						3.25 ft: Contains rounded quartz gravel				
4.0		2										
4.5		2										
5.0	198											
5.5		1						5.25 / 197.75 <i>FILL</i> , Orange-brown, fine- to medium-grained CLAYEY SAND, contains organics, moist to wet (SC) SC				
6.0		3										
6.5		2										
7.0	196	3						Boring terminated at 7 ft.				

SPT_LOG-OPITZ BLVD_DCP.GF-JSPT7.GDT.gINT_version 10.02.00.04:12/1/21:WRA

REMARKS: DCP test conducted at 1-ft. intervals. Recorded blows are blows per 2-inches; Boring location and elevation estimated using Google Earth

PAGE 1 OF 1

DCP-NE Upper



PROJECT #: 45893-001
 LOCATION: Prince William County, VA
 STRUCTURE:

DCP-SE

PAGE 1 OF 1

STATION: NORTHING: 6916895.8 ft SURFACE ELEVATION: 207.0 ft
 OFFSET: Easting: 11828717.5 ft COORD. DATUM: VA North

FIELD DATA

Date(s) Drilled: 11/29/2021 - 11/29/2021

LAB DATA

Drilling Method(s): Hand Auger
 SPT Method:
 Other Test(s): Hand-Held DCP
 Driller: WRA
 Logger: Burtis / Burroughs

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

DEPTH (ft)	ELEVATION (ft)	SOIL		ROCK				STRATA LEGEND			
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION	DIP °		STRATA	JOINTS	
0.0	207.0	1	0	1							
0.5			1	0.5							
1.0	206	1	1	1							
1.5			1	1.5							
2.0		1	1	2							
2.5			1	2.5							
3.0	204	1	1	3							
3.5			1	3.5							
4.0		1	1	4							
4.5			1	4.5							
5.0	202	1	1	5							
5.5			2	5.5							
6.0		2	3	6							
6.5		2	2	6.5							
7.0	200	2	2	7							

0.0 / 207.0
 1-inch Topsoil **TOPS**

0.1 / 206.9
 FILL, Orange-brown, CLAYEY SAND, contains rock fragments, moist to wet (SC) **SC**

3.0 / 204.0
 FILL, Light brown and gray, fine- to medium-grained CLAYEY SAND, contains trace organic material, moist (SC) **SC**

Boring terminated at 7 ft.

SPT_LOG-OPITZ BLVD_DCP.GF-JSPT7.GDT.gINT_version 10.02.00.04:12/1/21:WRA

REMARKS: DCP test conducted at 1-ft. intervals. Recorded blows are blows per 2-inches; Boring location and elevation estimated using Google Earth

PAGE 1 OF 1

DCP-SE



PROJECT #: 45893-001
 LOCATION: Prince William County, VA
 STRUCTURE:

DCP-SW

PAGE 1 OF 1

STATION: NORTHING: 6917039.1 ft SURFACE ELEVATION: 211.0 ft
 OFFSET: Easting: 11828255.7 ft COORD. DATUM: VA North

FIELD DATA										LAB DATA		
DEPTH (ft)	ELEVATION (ft)	SOIL			ROCK			STRATA LEGEND	FIELD DESCRIPTION OF STRATA	LL	PI	MOISTURE CONTENT (%)
		STANDARD PENETRATION TEST HAMMER BLOWS	SOIL RECOVERY (%)	SAMPLE LEGEND	SAMPLE INTERVAL	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION					
									Date(s) Drilled: 11/29/2021 - 11/29/2021 Drilling Method(s): Hand Auger SPT Method: Other Test(s): Hand-Held DCP Driller: WRA Logger: Burtis / Burroughs GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN			
									FIELD DESCRIPTION OF STRATA			
0.0	211.0	3	3		0.5				0.0 / 211.0 4-inch Topsoil TOPS			
0.5									0.3 / 210.7 <i>FILL</i> , Orange-brown, fine- to medium-grained SANDY CLAY, moist to wet (SC) SC			
1.0	210	3	4		1				1.0 / 210.0 <i>FILL</i> , Orange-brown, fine- to medium-grained SILTY SAND, contains rock fragments, rounded gravel, trace clay, moist (SM) SM			
1.5												
2.0		2	2		2							
2.5		2	3		2.5							
3.0	208	2	5		3				3.0 / 208.0 <i>FILL</i> , Light brown, fine- to medium-grained SILTY SAND, contains organic material, moist (SM) SM			
3.5												
4.0												
4.5		3	3		4.5				4.5 / 206.5 <i>FILL</i> , Brown to orange-brown, fine- to medium-grained SILTY SAND, contains lenses to pockets of silty clay, organic material (SM) SM			
5.0	206	3	3		5							
5.5		3	3		5.5							
6.0		3	2		6							
6.5		3	2		6.5							
7.0	204	2	2		7				Boring terminated at 7 ft.			

SPT_LOG-OPITZ BLVD_DCP.GF-JSPT7.GDT.gINT_version 10.02.00.04:12/1/21:WRA

REMARKS: DCP test conducted at 1-ft. intervals. Recorded blows are blows per 2-inches; Boring location and elevation estimated using Google Earth

PAGE 1 OF 1

DCP-SW

APPENDIX C.4

Pavement Core Records

Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate Mix	2.5	7.0	4.5	14.0	
Asphalt-Base Mix	7.0	14.0	7.0		
Concrete	-	-	-		
Aggregate Base	14.0	24.0	10.0	10.0	

Additional Notes:

Delineation between intermediate and base mix layers are approximate.



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate Mix	2.5	7.0	4.5	17.0	
Asphalt-Base Mix	7.0	17.0	10.0		
Concrete	-	-	-		
Aggregate Base	17.0	25.0	8.0	8.0	

Additional Notes:

Delineation between intermediate and base mix layers are approximate.



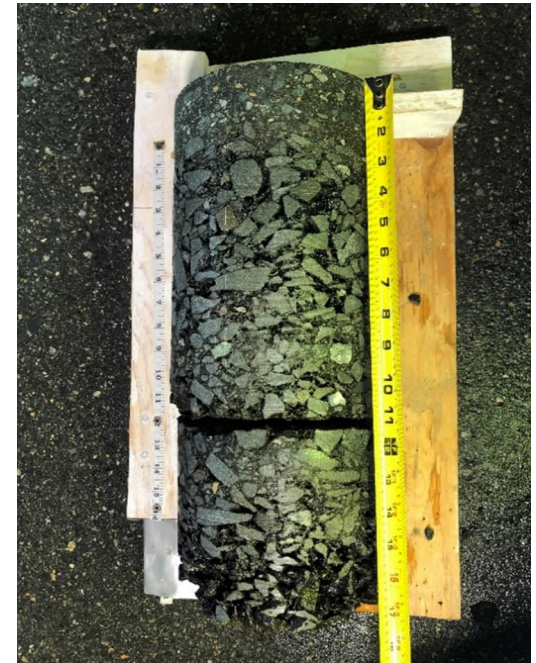
Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	3.0	3.0		
Asphalt-Intermediate Mix	3.0	8.0	5.0	17.0	
Asphalt-Base Mix	8.0	17.0	9.0		
Concrete	-	-	-		
Aggregate Base	17.0	25.0	8.0	8.0	

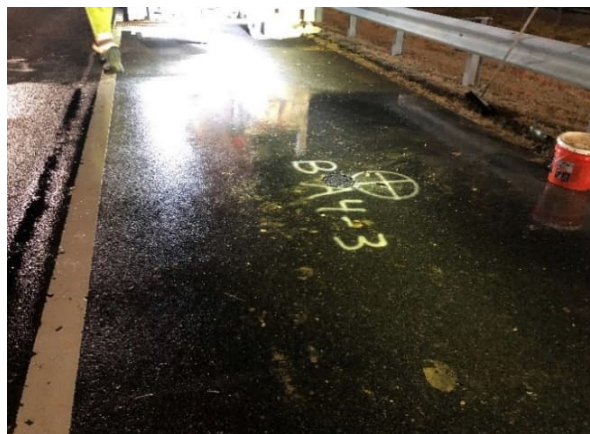
Additional Notes:



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	3.0	3.0		
Asphalt-Intermediate Mix	3.0	7.0	4.0	15.0	
Asphalt-Base Mix	7.0	15.0	8.0		
Concrete	-	-	-		
Aggregate Base	15.0	24.0	9.0	9.0	

Additional Notes:

1.5" Pavement overlay



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate Mix	2.5	8.0	5.5	16.0	
Asphalt-Base Mix	8.0	16.0	8.0		
Concrete	-	-	-		
Aggregate Base	16.0	25.0	9.0	9.0	

Additional Notes:



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate Mix	2.5	7.0	4.5	15.0	
Asphalt-Base Mix	7.0	15.0	8.0		
Concrete	-	-	-		
Aggregate Base	15.0	25.0	10.0	10.0	

Additional Notes:

Thicknesses based on picture.

Delineation between intermediate and base mix layers are approximate.



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample

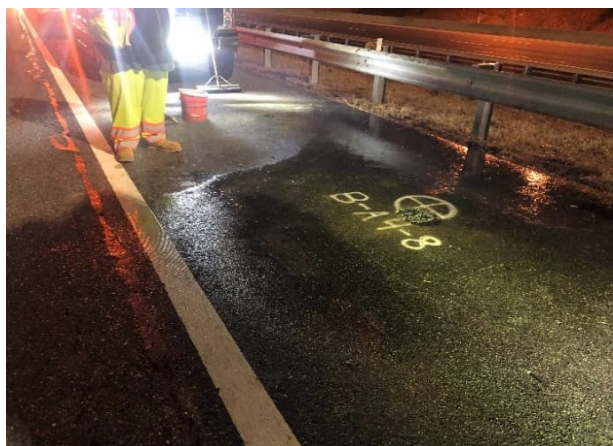


Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate Mix	2.5	7.0	4.5	16.0	
Asphalt-Base Mix	7.0	16.0	9.0		
Concrete	-	-	-		
Aggregate Base	16.0	25.0	9.0	9.0	

Additional Notes:



Proposed Pavement Core Location



As drilled Pavement Core Location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	2.5	2.5		
Asphalt-Intermediate & Base Mix	2.5	15.0	12.5	15.0	
Concrete	-	-	-		
Aggregate Base	15.0	48.0	33.0	33.0	

Additional Notes:

Unable to differentiate between intermediate and base asphalt layers.



Proposed and as drilled pavement core location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate Mix	1.5	5.5	4.0	12.0	
Asphalt-Base Mix	5.5	12.0	6.5		
Concrete	-	-	-		
Aggregate Base	12.0	16.0	4.0	4.0	

Additional Notes:



Proposed and as drilled pavement core location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate & Base Mix	1.5	11.0	9.5	11.0	
Concrete	-	-	-		
Aggregate Base	11.0	18.0	7.0	7.0	

Additional Notes:

Unable to differentiate between intermediate and base asphalt layers.



Pavement Core Sample

Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate Base Mix	1.5	4.5	3.0	4.5	
Concrete	-	-	-		
Aggregate Base	4.5	15.0	10.5	10.5	
<u>Additional Notes:</u>					

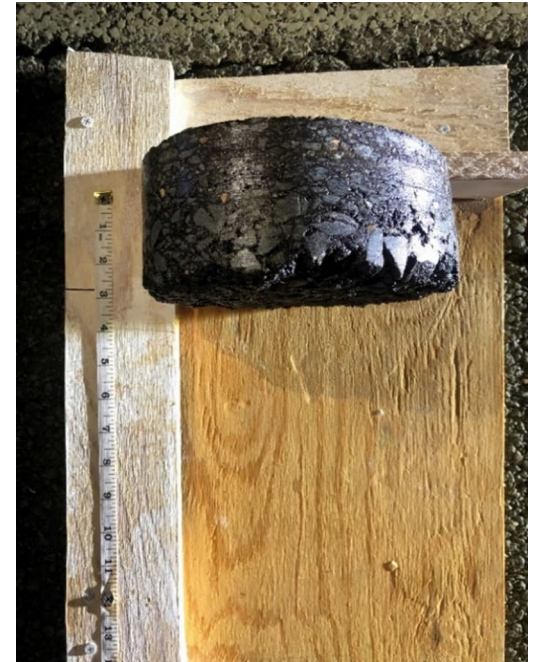


Proposed Pavement Core Location

As drilled Pavement Core Location

Pavement Core Sample

Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate Mix	1.5	3.0	1.5	3.0	
Concrete	-	-	-		
Aggregate Base	3.0	14.0	11.0	11.0	
<u>Additional Notes:</u>					



Proposed and as drilled pavement core location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate & Base Mix	1.5	12.0	10.5	12.0	
	-	-	-		
Concrete	-	-	-		
Aggregare Base	12.0	16.0	4.0	4.0	

Additional Notes:



Proposed and as drilled pavement core location



Pavement Core Sample



Material Description	Depth (in.)		Thickness (in.)	Total Thickness (in.)	Condition
	From	To			
Asphalt -Surface Mix	0.0	1.5	1.5		
Asphalt-Intermediate & Base Mix	1.5	11.0	9.5	11.0	
	-	-	-		
Concrete	-	-	-		
Aggregare Base	11.0	18.0	7.0	7.0	

Additional Notes:



APPENDIX D

Laboratory Test Results

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A1-1	S1	1.5 - 3.0								8.3
B-A1-1	S2	3.5 - 5.0								35.2
B-A1-1	S3	6.0 - 7.5	68	27	41	100	76	CH	A-7-6	30.0
B-A1-1	S4	8.5 - 10.0								24.1
B-A1-1	S5	11.0 - 12.5								21.3
B-A1-1	S6	13.5 - 15.0								13.8
B-A1-2	S1	1.5 - 3.0								21.7
B-A1-2	S2	3.5 - 5.0								33.7
B-A1-2	S3	6.0 - 7.5								21.4
B-A1-2	S4	8.5 - 10.0								29.8
B-A1-2	S5	11.0 - 12.5				100	76			26.6
B-A1-2	S6	13.5 - 15.0								16.4
B-A1-2	S7	16.0 - 17.5								14.8
B-A1-2	S8	18.5 - 20.0								13.0
B-A1-3	S1	0.0 - 1.5								18.7
B-A1-3	S2	1.5 - 3.0								15.2
B-A1-3	S3	5.0 - 6.5				99	25			13.9
B-A1-3	S4	7.5 - 9.0								17.5
B-A1-3	S5	10.0 - 11.5								16.0
B-A1-3	S6	12.5 - 14.0								17.8
B-A1-3	S7	15.0 - 16.5								19.6
B-A1-3	S8	17.5 - 19.0								11.5
B-A1-3	S9	23.5 - 25.0								11.7
B-A1-3	S10	28.5 - 30.0								9.1
B-A1-4	S1	1.0 - 2.5								19.9
B-A1-4	S2	3.5 - 5.0								20.8
B-A1-4	S3	6.0 - 7.5								13.6

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A1-4	S4	8.5 - 10.0								18.6
B-A1-4	S5	11.0 - 12.5								16.6
B-A1-4	S6	13.5 - 15.0								15.6
B-A1-4	S7	16.0 - 17.5								15.7
B-A1-4	S8	18.5 - 20.0								24.4
B-A1-4	S9	21.0 - 21.3								11.1
B-A1-4	S10	23.5 - 23.9								11.1
B-A1-4	S11	28.5 - 28.8								13.5
B-A1-6	S1	0.5 - 2.0								6.6
B-A1-6	S2	3.5 - 5.0								19.3
B-A1-6	S3	6.0 - 7.5								18.9
B-A1-6	S4	8.5 - 10.0								13.3
B-A1-6	S5	11.0 - 12.5								18.7
B-A1-6	S6	13.5 - 15.0	35	24	11	100	23	SC	A-2-6	15.6
B-A1-6	S7	16.0 - 17.5								15.8
B-A1-6	S8	18.5 - 20.0								15.6
B-A1-6	S9	23.5 - 25.0								16.1
B-A1-6	S10	28.5 - 30.0								26.6
B-A1-6	S11	33.5 - 35.0								16.5
B-A1-6	S12	38.5 - 40.0								18.3
B-A1-6	S13	43.5 - 45.0	35	24	11	100	98	CL	A-6	19.2
B-A1-6	S14	48.5 - 50.0								17.2
B-A1-6	S15	53.5 - 55.0								12.1
B-A1-6	S16	58.5 - 60.0								11.9
B-A1-6	S17	63.5 - 65.0								14.9
B-A1-6	S18	68.5 - 70.0								19.7
B-A1-6	S19	73.5 - 75.0								16.2

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A2-1	S1	1.5 - 3.0								10.1
B-A2-1	S2	3.5 - 5.0								18.1
B-A2-1	S3	6.0 - 7.5								14.4
B-A2-1	S4	8.5 - 10.0				99	22			12.7
B-A2-1	S5	11.0 - 12.5								10.8
B-A2-1	S6	13.5 - 15.0								14.3
B-A2-1	S7	16.0 - 17.5								16.2
B-A2-1	S8	18.5 - 20.0								20.7
B-A2-1	S9	23.5 - 25.0								23.1
B-A2-1	S10	28.5 - 30.0				94	46			10.1
B-A2-1	S11	33.5 - 35.0								10.0
B-A2-1	S12	38.5 - 40.0								10.0
B-A2-1	S13	43.5 - 45.0								12.5
B-A2-1	S14	48.5 - 50.0								12.4
B-A2-1	S15	53.5 - 55.0								9.8
B-A2-1	S16	58.5 - 60.0								14.8
B-A3-1	S1	1.5 - 3.0								6.1
B-A3-1	S2	3.5 - 5.0								15.7
B-A3-1	S3	6.0 - 7.5								13.9
B-A3-1	S4	8.5 - 10.0								13.6
B-A3-1	S5	11.0 - 12.5								14.3
B-A3-1	S6	13.5 - 15.0								13.3
B-A3-1	S7	16.0 - 17.5								18.7
B-A3-1	S8	18.5 - 20.0								16.8
B-A3-1	S9	23.5 - 25.0								29.7
B-A3-1	S10	28.5 - 30.0								11.8
B-A3-1	S11	33.5 - 35.0								17.4

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A3-1	S12	38.5 - 40.0								18.1
B-A3-2	S1	1.5 - 3.0								4.3
B-A3-2	S2	3.5 - 5.0								40.8
B-A3-2	S3	6.0 - 7.5								42.4
B-A3-2	S4	8.5 - 10.0								14.3
B-A3-2	S5	11.0 - 12.5				98	21			14.5
B-A3-2	S6	13.5 - 15.0								13.9
B-A3-2	S7	16.0 - 17.5								15.3
B-A3-2	S8	18.5 - 20.0								14.7
B-A3-2	S9	23.5 - 25.0								20.4
B-A3-2	S10	28.5 - 30.0								15.6
B-A3-2	S11	33.5 - 35.0								15.2
B-A3-2	S12	38.5 - 40.0								8.6
B-A3-3	S1	2.0 - 3.5								16.1
B-A3-3	S2	3.5 - 5.0								18.0
B-A3-3	S3	6.0 - 7.5								13.5
B-A3-3	S4	8.5 - 10.0	41	25	16	100	89	CL	A-7-6	22.4
B-A3-3	S5	11.0 - 12.5								12.7
B-A3-3	S6	13.5 - 15.0								16.8
B-A3-3	S7	16.0 - 17.5								17.6
B-A3-3	S8	18.5 - 20.0								24.8
B-A3-3	S9	23.5 - 25.0								19.1
B-A3-3	S10	28.5 - 30.0								15.4
B-A3-4	S1	1.5 - 3.0								4.2
B-A3-4	S2	3.5 - 5.0								14.8
B-A3-4	S3	6.0 - 7.5								19.4
B-A3-4	S4	8.5 - 10.0								20.8

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A3-4	S5	11.0 - 12.5	55	28	27	97	45	SC	A-7-6	19.7
B-A3-4	S6	13.5 - 14.0								20.9
B-A3-4	ST-1	14.0 - 16.0	30	21	9	99	46	SC	A-4	19.9
B-A3-4	S7	16.0 - 17.5								21.0
B-A3-4	S8	18.5 - 20.0								22.5
B-A3-4	S9	23.5 - 25.0								14.9
B-A3-4	S10	28.5 - 30.0								19.4
B-A3-5	S1	2.0 - 3.5								17.4
B-A3-5	S2	3.5 - 5.0				91	27			15.4
B-A3-5	S3	6.0 - 7.5								22.2
B-A3-5	S4	8.5 - 10.0	46	25	21	100	35	SC	A-2-7	16.6
B-A3-5	S5	11.0 - 12.5								14.5
B-A3-5	S6	13.5 - 15.0								16.9
B-A3-5	S7	16.0 - 17.5								17.8
B-A3-5	S8	18.5 - 20.0								25.9
B-A3-6	S1	1.5 - 3.0								4.1
B-A3-6	S2	3.5 - 5.0								22.4
B-A3-6	S3	6.0 - 7.5								31.6
B-A3-6	S4	8.5 - 10.0								16.0
B-A3-6	S5	11.0 - 12.5								15.1
B-A3-6	S6	13.5 - 15.0								17.1
B-A3-6	S7	16.0 - 17.5								14.8
B-A3-6	S8	18.5 - 20.0								17.2
B-A3-7	S1	2.0 - 3.5								7.8
B-A3-7	S2	3.5 - 5.0								29.0
B-A3-7	S3	6.0 - 7.5				100	20			14.8
B-A3-7	S4	8.5 - 10.0								20.0

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A3-7	S5	11.0 - 12.5								35.3
B-A3-7	S6	13.5 - 15.0								15.5
B-A3-8	S1	1.5 - 3.0								3.5
B-A3-8	S2	3.5 - 5.0								12.2
B-A3-8	S3	6.0 - 7.5				100	56			29.3
B-A3-8	S4	8.5 - 10.0								29.2
B-A3-9	S1	1.5 - 3.0								17.9
B-A3-9	S2	3.5 - 5.0				100	24			19.1
B-A3-9	S3	6.0 - 7.5								19.2
B-A3-9	S4	8.5 - 10.0								20.7
B-A4-1	S-1	2.0 - 4.0								25.2
B-A4-1	S-2	4.0 - 6.0								16.3
B-A4-1	S-3	6.0 - 8.0								16.9
B-A4-2	S-1	2.0 - 4.0				100	27			15.6
B-A4-2	S-2	4.0 - 6.0								14.8
B-A4-2	S-3	6.0 - 8.0								15.8
B-A4-3	S-1	2.0 - 4.0								17.8
B-A4-3	S-2	4.0 - 6.0								16.8
B-A4-3	S-3	6.0 - 8.0								16.1
B-A4-4	S-1	2.0 - 4.0				92	32			12.9
B-A4-4	S-2	4.0 - 6.0								15.4
B-A4-4	S-3	6.0 - 8.0								37.0
B-A4-5	S-1	2.0 - 4.0								15.6
B-A4-5	S-2	4.0 - 6.0								17.4
B-A4-5	S-3	6.0 - 8.0								13.0
B-A4-6	S-1	2.0 - 4.0				94	55			24.2
B-A4-6	S-2	4.0 - 6.0								15.6

TLB LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038

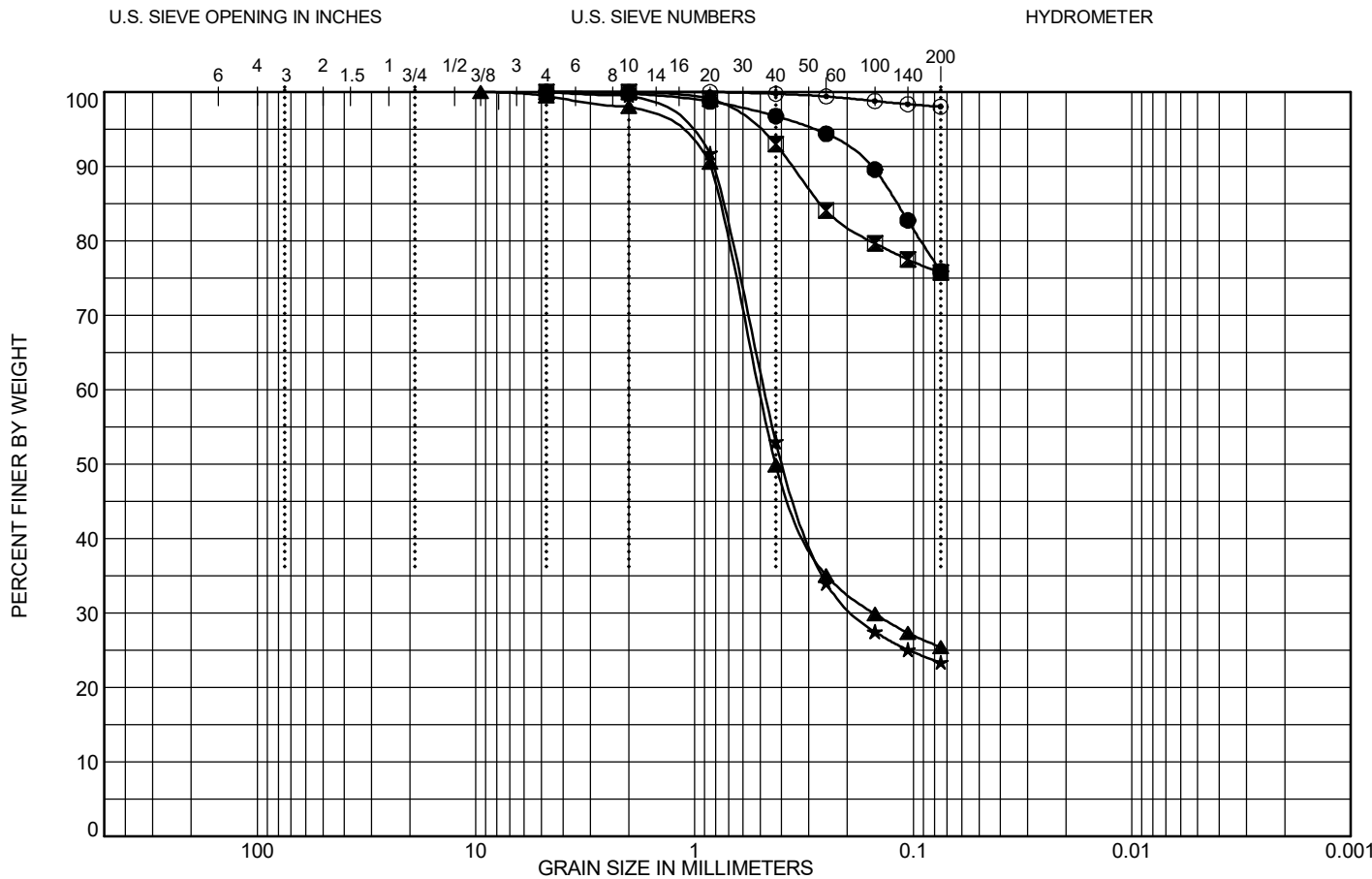
Boring	S No.	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% < #4 Sieve	% < #200 Sieve	Classification	AASHTO	Water Content (%)
B-A4-6	S-3	6.0 - 8.0								15.9
B-A4-7	S-1	2.0 - 4.0								5.9
B-A4-7	S-2	4.0 - 6.0								18.3
B-A4-7	S-3	6.0 - 8.0								14.7
B-A4-8	S-1	2.0 - 4.0				100	59			16.2
B-A4-8	S-2	4.0 - 6.0								21.0
B-A4-8	S-3	6.0 - 8.0								12.4

T.B. LAB SUMMARY - BASIC OPTIZ BLVD.GPJ - PROJECT.GDT - 1/19/22



Summary of Laboratory Results
Opitz Blvd

Woodbridge, VA
Project Number: 21-0038



	D10	D30	D60	D100
●				4.76
☒				4.76
▲		0.152	0.505	9.5
★		0.183	0.482	4.76
◎				4.76

Test Method: VTM-25

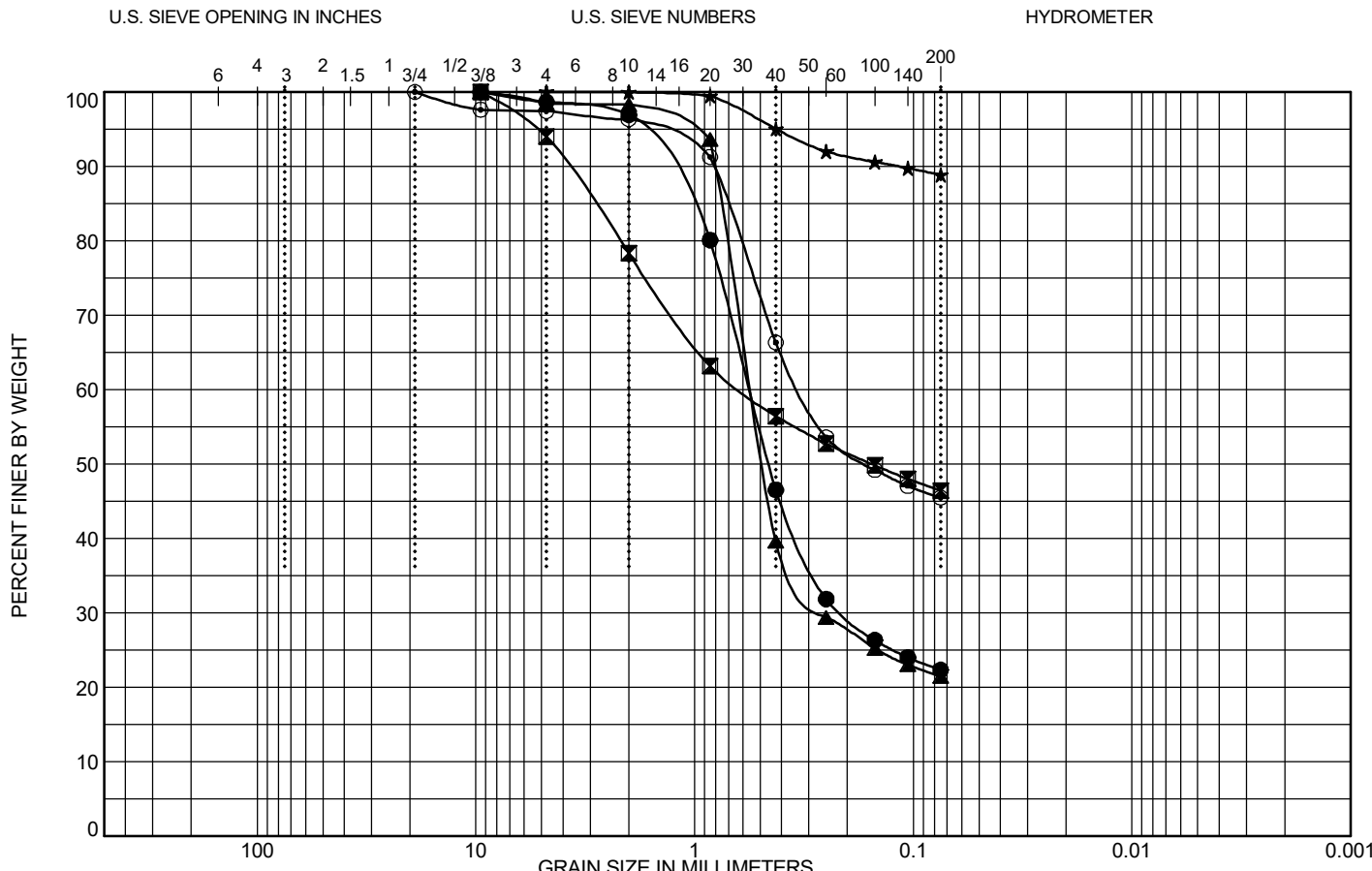
Tested By: CL, KZ, SM Date: 12/21/2021

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	B-A1-1	S3	6.0 - 7.5	0.0	24.1	75.9	68	41	30.0		FAT CLAY with SAND(CH)	A-7-6
☒	B-A1-2	S5	11.0 - 12.5	0.0	24.3	75.7			26.6			
▲	B-A1-3	S3	5.0 - 6.5	0.5	74.0	25.4			13.9			
★	B-A1-6	S6	13.5 - 15.0	0.0	76.6	23.4	35	11	15.6		CLAYEY SAND(SC)	A-2-6
◎	B-A1-6	S13	43.5 - 45.0	0.0	2.0	98.0	35	11	19.2		LEAN CLAY(CL)	A-6

	GRAIN SIZE DISTRIBUTION Opitz Blvd	Woodbridge, VA Project Number: 21-0038	Sheet 1 of 4
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T&E GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD.GPJ SALUT2014.GDT 1/3/22




	D10	D30	D60	D100
●		0.211	0.561	9.5
☒			0.614	9.5
▲		0.258	0.552	9.5
★				4.76
◎			0.327	19

Test Method: VTM-25

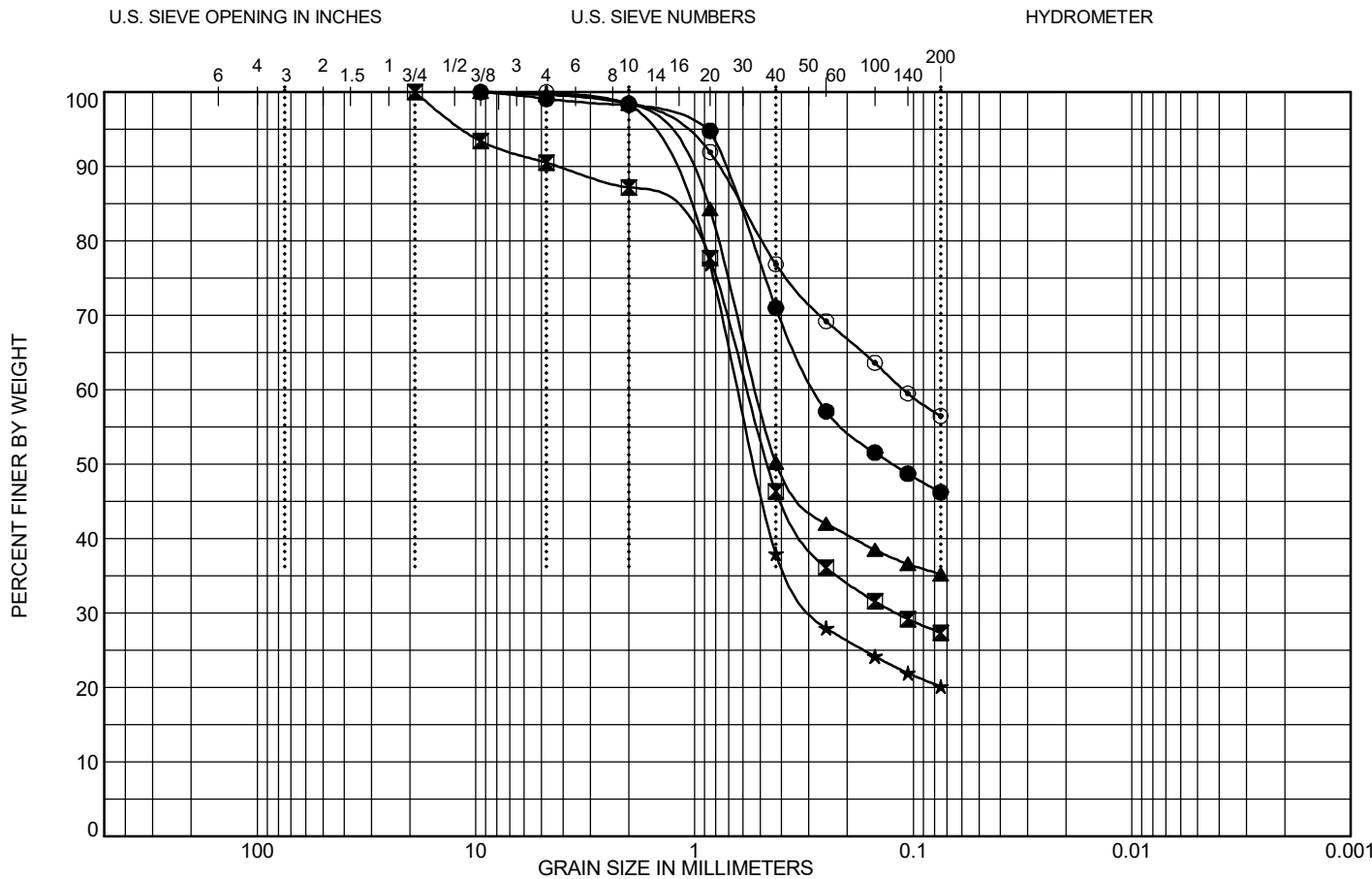
Tested By: CL, KZ, SM Date: 12/22/2021

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	B-A2-1	S4	8.5 - 10.0	1.3	76.3	22.3				12.7		
☒	B-A2-1	S10	28.5 - 30.0	6.0	47.5	46.4				10.1		
▲	B-A3-2	S5	11.0 - 12.5	1.6	77.0	21.4				14.5		
★	B-A3-3	S4	8.5 - 10.0	0.0	11.1	88.9	41	16	22.4		LEAN CLAY(CL)	A-7-6
◎	B-A3-4	S5	11.0 - 12.5	2.6	51.9	45.5	55	27	19.7		CLAYEY SAND(SC)	A-7-6

	GRAIN SIZE DISTRIBUTION Opitz Blvd	Woodbridge, VA Project Number: 21-0038	Sheet 2 of 4
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T&E GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD.GPJ SALUT2014.GDT 1/3/22




	D10	D30	D60	D100
●			0.279	9.5
☒		0.119	0.575	19
▲			0.519	9.5
★		0.278	0.629	9.5
⊙			0.111	4.76

Test Method: VTM-25

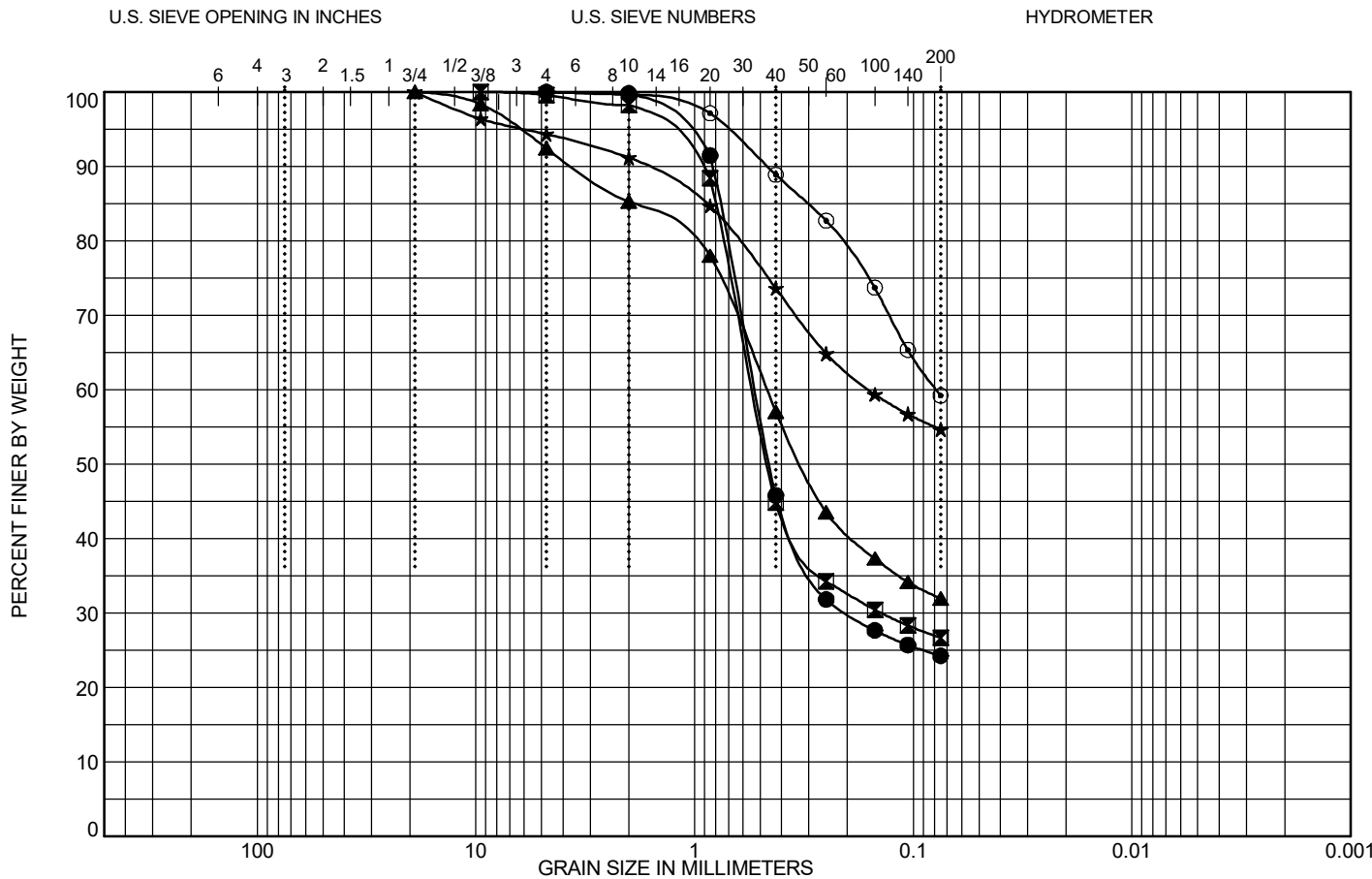
Tested By: CL, KZ, SM Date: 12/22/2021

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	B-A3-4	ST-1	14.0 - 16.0	0.9	52.8	46.2	30	9	19.9		CLAYEY SAND(SC)	A-4
☒	B-A3-5	S2	3.5 - 5.0	9.5	63.1	27.4			15.4			
▲	B-A3-5	S4	8.5 - 10.0	0.4	64.4	35.2	46	21	16.6		CLAYEY SAND(SC)	A-2-7
★	B-A3-7	S3	6.0 - 7.5	0.1	79.7	20.1			14.8			
⊙	B-A3-8	S3	6.0 - 7.5	0.0	43.5	56.5			29.3			

	GRAIN SIZE DISTRIBUTION Opitz Blvd	Woodbridge, VA Project Number: 21-0038	Sheet 3 of 4
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TLB GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD.GPJ SALUT2014.GDT 1/3/22




	D10	D30	D60	D100
●		0.2	0.527	4.76
☒		0.139	0.541	9.5
▲			0.468	19
★			0.159	19
◎			0.078	4.76

Test Method: VTM-25

Tested By: CL, KZ, SM Date: 12/28/2021

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring	S No.	Depth	%Gravel	%Sand	%Silt	%Clay	LL	PI	MC(%)	Classification	AASHTO
●	B-A3-9	S2	3.5 - 5.0	0.0	75.7	24.3				19.1		
☒	B-A4-2	S-1	2.0 - 4.0	0.4	72.9	26.7				15.6		
▲	B-A4-4	S-1	2.0 - 4.0	7.6	60.5	31.9				12.9		
★	B-A4-6	S-1	2.0 - 4.0	5.7	39.7	54.6				24.2		
◎	B-A4-8	S-1	2.0 - 4.0	0.0	40.8	59.2				16.2		

	GRAIN SIZE DISTRIBUTION Opitz Blvd	Woodbridge, VA Project Number: 21-0038	Sheet 4 of 4
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T&E GRAIN SIZE LANDSCAPE USGS OPTIZ BLVD.GPJ SALUT2014.GDT 1/3/22

Laboratory Testing - pH of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A1-6</u>	Method:	<u>ASTM D4972</u>
Sample No.:	<u>S6</u>		
Depth:	<u>13.5' - 15.0'</u>		

Calibration Data

	Buffer used for Calibration			Re-check
	pH 4.0	pH 7.00	pH 10.0	pH 7.00
Reading	4.00	7.00	10.00	7.01
Temperature C	20.1	20.1	20.1	20.1

pH reading for Soil

	pH	T(°C)
Trial 1	5.33	20.3
Trial 2	5.26	20.3
Trial 3	5.33	20.3
Average	5.31	

Laboratory Testing - Resistivity of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A1-6</u>	Method:	<u>ASTM G57</u>
Sample No.:	<u>S6</u>		
Depth:	<u>13.5' - 15.0'</u>		

	In situ condition	Saturated condition
Resistance reading	<u>2.54 kΩ</u>	<u>0.845 kΩ</u>
Sample resistivity	<u>2540 Ω-cm</u>	<u>845 Ω-cm</u>



Laboratory Testing - pH of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A1-6</u>	Method:	<u>ASTM D4972</u>
Sample No.:	<u>S13</u>		
Depth:	<u>43.5' - 45.0'</u>		

Calibration Data

	Buffer used for Calibration			Re-check
	pH 4.0	pH 7.00	pH 10.0	pH 7.00
Reading	4.00	7.00	10.00	7.01
Temperature C	20.1	20.1	20.1	20.1

pH reading for Soil

	pH	T(°C)
Trial 1	5.95	20.3
Trial 2	5.95	20.3
Trial 3	5.97	20.3
Average	5.96	

Laboratory Testing - Resistivity of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A1-6</u>	Method:	<u>ASTM G57</u>
Sample No.:	<u>S13</u>		
Depth:	<u>43.5' - 45.0'</u>		

	In situ condition	Saturated condition
Resistance reading	<u>3.2 kΩ</u>	<u>1.4 kΩ</u>
Sample resistivity	<u>3200 Ω-cm</u>	<u>1400 Ω-cm</u>



Laboratory Testing - pH of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A2-1</u>	Method:	<u>ASTM D4972</u>
Sample No.:	<u>S4</u>		
Depth:	<u>8.5' - 10.0'</u>		

Calibration Data

	Buffer used for Calibration			Re-check
	pH 4.0	pH 7.00	pH 10.0	pH 7.00
Reading	4.00	7.00	10.00	7.01
Temperature C	20.1	20.1	20.1	20.1

pH reading for Soil

	pH	T(°C)
Trial 1	4.30	20.3
Trial 2	4.26	20.3
Trial 3	4.34	20.3
Average	4.30	

Laboratory Testing - Resistivity of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A2-1</u>	Method:	<u>ASTM G57</u>
Sample No.:	<u>S4</u>		
Depth:	<u>8.5' - 10.0'</u>		

	In situ condition	Saturated condition
Resistance reading	<u>9.18 kΩ</u>	<u>3.17 kΩ</u>
Sample resistivity	<u>9180 Ω-cm</u>	<u>3170 Ω-cm</u>



Laboratory Testing - pH of Soil

Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A2-1</u>	Method:	<u>ASTM D4972</u>
Sample No.:	<u>S10</u>		
Depth:	<u>28.5' - 30.0'</u>		

Calibration Data

	Buffer used for Calibration			Re-check
	pH 4.0	pH 7.00	pH 10.0	pH 7.00
Reading	4.00	7.00	10.00	7.01
Temperature C	20.1	20.1	20.1	20.1

pH reading for Soil

	pH	T(°C)
Trial 1	5.04	20.3
Trial 2	5.09	20.3
Trial 3	5.10	20.3
Average	5.08	

Laboratory Testing - Resistivity of Soil

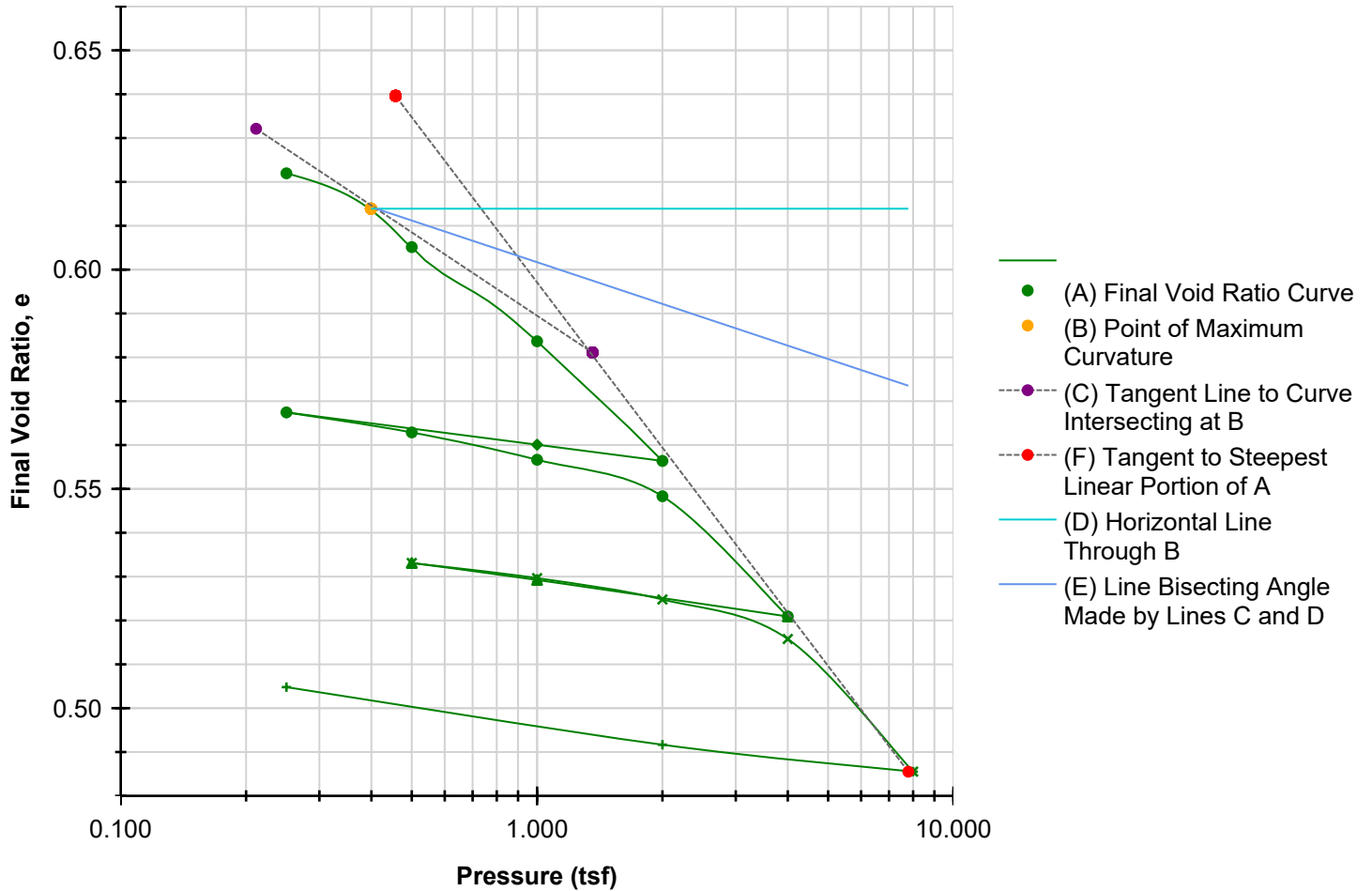
Project Name:	<u>Opitz Blvd.</u>	Date:	<u>12/20/2021</u>
Project No.:	<u>21-0038</u>	Tested By:	<u>SM</u>
Boring No.:	<u>B-A2-1</u>	Method:	<u>ASTM G57</u>
Sample No.:	<u>S10</u>		
Depth:	<u>28.5' - 30.0'</u>		

	In situ condition	Saturated condition
Resistance reading	<u>28.7 kΩ</u>	<u>11.8 kΩ</u>
Sample resistivity	<u>28700 Ω-cm</u>	<u>11800 Ω-cm</u>



Final Voids [Log]

ASTM D2435



Preconsolidation Stress (tsf)	0.893	Cc	0.124	Cr	0.017
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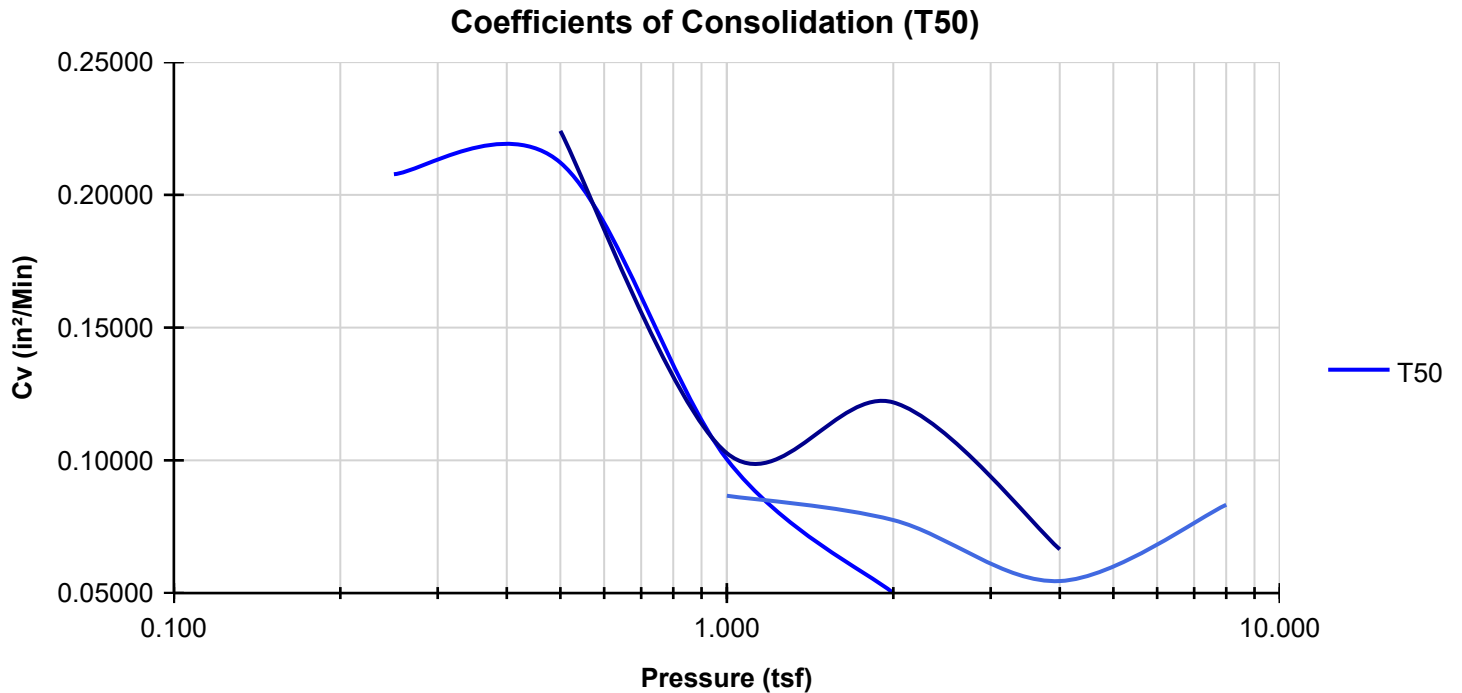
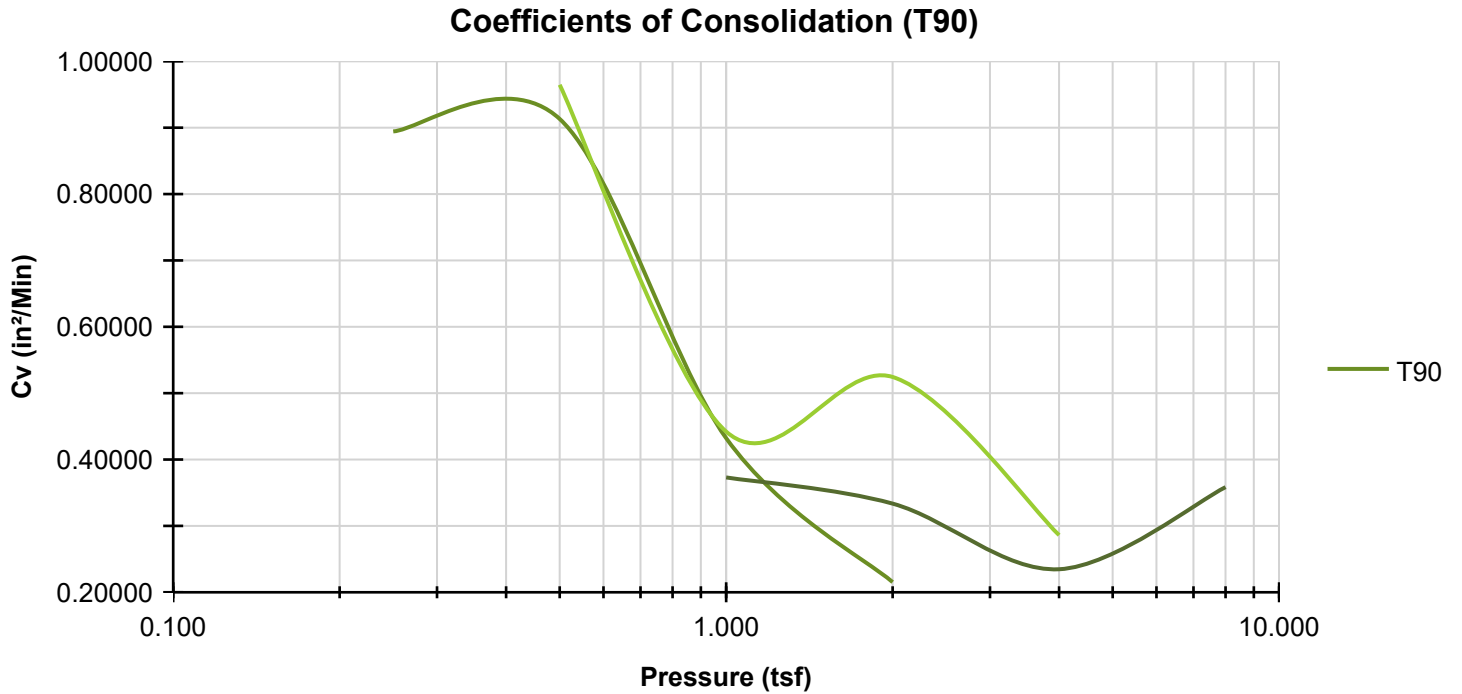
	BEFORE	AFTER	Liquid Limits	30	Test Date	12/20/2021
Moisture (%)	19.9	20.7	Plastic Limits	21		
Dry Density (pcf)	100.5	106.7				
Saturation (%)	81.4	99.9				
Void Ratio	0.65	0.55	Specific Gravity	2.65	ASSUMED	

Sample Description	Clayey SAND (SC), contains roots & decay pieces of wood in tubes				
Project Number	21-0038 (WRA#45893-001)	Depth (ft)	15.5	Remarks PP=2.2 tsf	
Sample Number	ST-1	Boring Number	B-A3-4		
Project	Opitz Blvd				
Client	Whitman, Requardt & Associates, LLP (WR&A)				
Location	Woodbridge, VA				

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Coefficients of Consolidation

ASTM D2435



Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

Test Date: 12/20/2021

Checked By: OE

Date: 12/23/2021

Summary

ASTM D2435

Sample Description	Clayey SAND (SC), contains roots & decay pieces of wood in tubes		
Project Number	21-0038 (WRA#45893-001)	Depth (ft)	15.5
Sample Number	ST-1	Boring Number	B-A3-4
Project	Opitz Blvd		
Client	Whitman, Requardt & Associates, LLP (WR&A)		
Location	Woodbridge, VA		
Remarks			

Index	Loading Sequence (tsf)	Cummulative Change in Height (in)	Specimen Height (in)	Height of Voids (in)	Vertical Strain (%)	Void Ratio	T90 Fitting Time (Hr)	T50 Fitting Time (Hr)	T90 Cv (in ² /Min)	T50 Cv (in ² /Min)	Sequence Status
0	0.000	0.0000	1.0000	0.0000	0.0	0.647	0.000	0.000	0.00000	0.00000	ENABLED
1	0.250	0.0132	0.9868	0.3784	1.3	0.622	0.016	0.004	0.89438	0.20778	ENABLED
2	0.500	0.0234	0.9766	0.3682	2.3	0.605	0.015	0.004	0.91317	0.21214	ENABLED
3	1.000	0.0365	0.9635	0.3551	3.7	0.584	0.031	0.007	0.43222	0.10041	ENABLED
4	2.000	0.0531	0.9469	0.3385	5.3	0.556	0.059	0.013	0.21528	0.05001	ENABLED
5	1.000	0.0508	0.9492	0.3408	5.1	0.560	0.000	0.000	0.00000	0.00000	ENABLED
6	0.250	0.0464	0.9536	0.3452	4.6	0.567	0.000	0.000	0.00000	0.00000	ENABLED
7	0.500	0.0491	0.9509	0.3425	4.9	0.563	0.013	0.003	0.96466	0.22410	ENABLED
8	1.000	0.0529	0.9471	0.3387	5.3	0.557	0.042	0.006	0.44211	0.10271	ENABLED
9	2.000	0.0580	0.9420	0.3336	5.8	0.548	0.028	0.005	0.52438	0.12182	ENABLED
10	4.000	0.0747	0.9253	0.3169	7.5	0.521	0.051	0.009	0.28608	0.06646	ENABLED
11	1.000	0.0696	0.9304	0.3220	7.0	0.529	0.000	0.000	0.00000	0.00000	ENABLED
12	0.500	0.0673	0.9327	0.3243	6.7	0.533	0.000	0.000	0.00000	0.00000	ENABLED
13	1.000	0.0694	0.9306	0.3222	6.9	0.530	0.041	0.007	0.37304	0.08666	ENABLED
14	2.000	0.0723	0.9277	0.3193	7.2	0.525	0.038	0.008	0.33359	0.07750	ENABLED
15	4.000	0.0778	0.9222	0.3138	7.8	0.516	0.048	0.011	0.23470	0.05452	ENABLED
16	8.000	0.0962	0.9038	0.2954	9.6	0.486	0.028	0.007	0.35842	0.08327	ENABLED

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

Test Date:
12/20/2021

Checked By: OE

Date: 12/23/2021

Summary

ASTM D2435

Index	Loading Sequence (tsf)	Cummulative Change in Height (in)	Specimen Height (in)	Height of Voids (in)	Vertical Strain (%)	Void Ratio	T90 Fitting Time (Hr)	T50 Fitting Time (Hr)	T90 Cv (in ² /Min)	T50 Cv (in ² /Min)	Sequence Status
17	2.000	0.0925	0.9075	0.2991	9.2	0.492	0.000	0.000	0.00000	0.00000	ENABLED
18	0.250	0.0845	0.9155	0.3071	8.4	0.505	0.000	0.000	0.00000	0.00000	ENABLED

Technician: B.Aung

Test Date:
12/20/2021

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Checked By: OE

Date: 12/23/2021

Consolidated Test Results

ASTM D2435

Project:	Opitz Blvd
Project Number:	21-0038 (WRA#45893-001)
Job Number:	
Test Date:	12/20/2021

Sampling Date:	11/30/2021
Sample Number:	ST-1
Depth (ft)	15.5
Boring Number:	B-A3-4
Location:	Woodbridge, VA
Client Name:	Whitman, Requardt & Associates, LLP (WR&A)
Remarks:	

Specific Gravity:	2.65	Plastic Limit:	21	Liquid Limit:	30
Specific Gravity Method:	ASSUMED			Weight of Ring (g)	109.1
Sampling Method:	Undisturbed	Soil Classification:			
Specimen Description:	Clayey SAND (SC), contains roots & decay pieces of wood in tubes				

Parameters	Initial	Final
Height (in)	1.0000	0.9155
Height Source	NA	TEST RESULTS
Diameter (in)	2.5000	NA
Area (in ²)	4.909	NA
Volume (in ³)	4.9087	4.4941
Weight of Container (g)	51.0	78.8
Weight of Wet Soil + Container (g)	204.8	230.6
Weight of Dry Soil + Container (g)	179.3	204.6
Moisture Content (%)	19.9	20.7
Moist Weight + Ring Weight (g)	264.3	261.1
Dry Density (pcf)	100.5	106.7
Wet Density (pcf)	120.4	128.9
Saturation (%)	81.4	99.9
Void Ratio	0.6	0.5

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

Test Date:
12/20/2021

Checked By: OE

Date: 12/23/2021

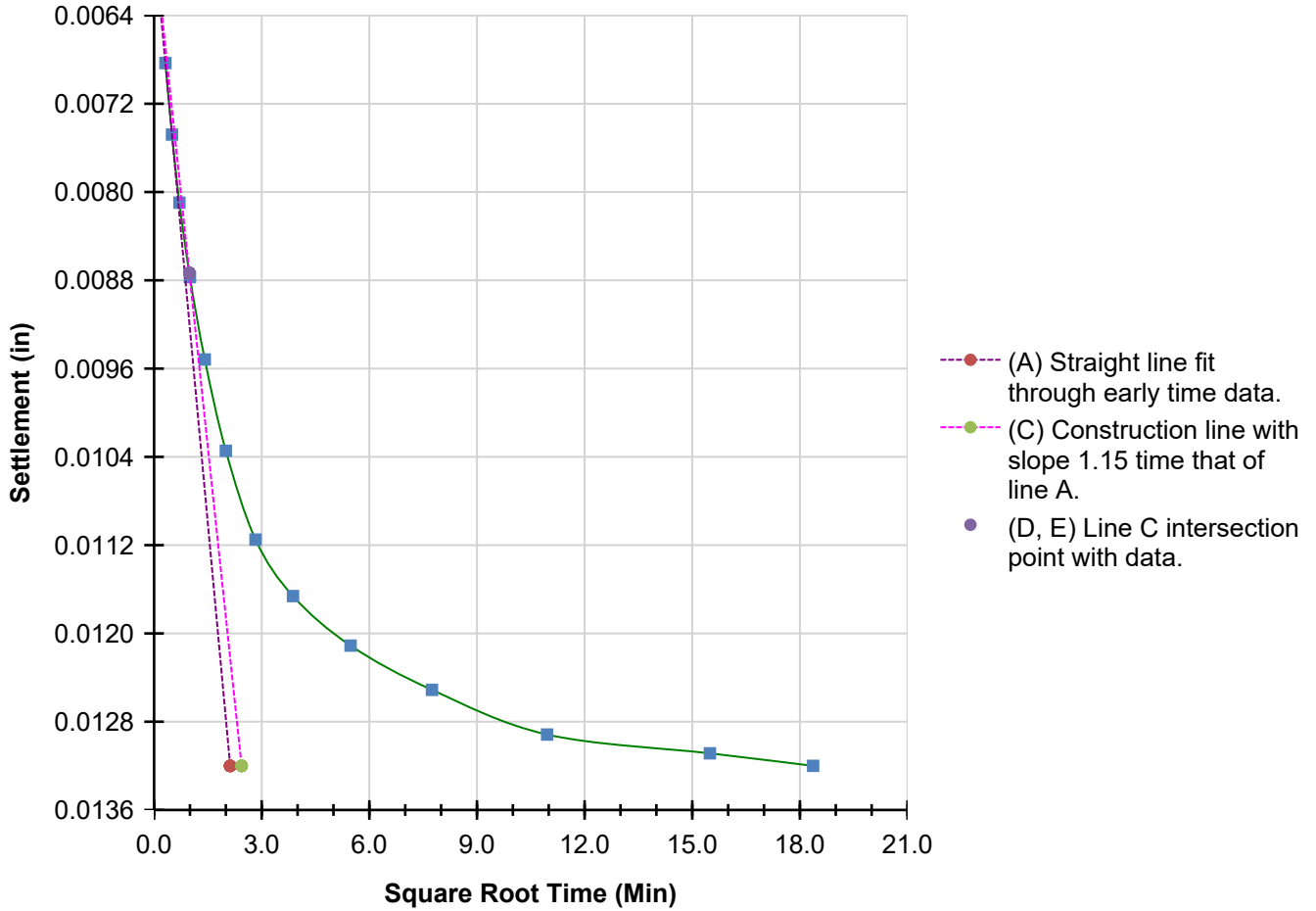
Consolidation Test Results

ASTM D2435

Specimen 1	
Test Description:	Maximum Loading to 8tsf, unloading cycle at 2 & 4 tsf.
Other Associated Tests:	
Device Details:	Humboldt IPC5470 (CON-2)
Test Specification:	
Test Time:	12/20/2021 12:00:00 AM
Technician:	B.Aung
Sampling Method:	Undisturbed
Specimen Code:	Specimen Lab #:
Specimen Description:	Clayey SAND (SC), contains roots & decay pieces of wood in tubes
Specimen Preparation:	Cutting Shoe
Large Particle:	
Moisture Content:	Inundated
Test Condition:	initial seating 0.05TSF
Test Procedure:	ASTM D2435
Seating Pressure Used:	YES
Seating Pressure (tsf):	0.050
Preconsolidation Stress:	
Percent Strain [LOG] Graph (tsf):	NA
Final Voids Graph (tsf):	0.893

Square Root Time [1] 0.250 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	0.967
T50 (Min)	0.227
Cv (in ² /Min)	0.8944

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

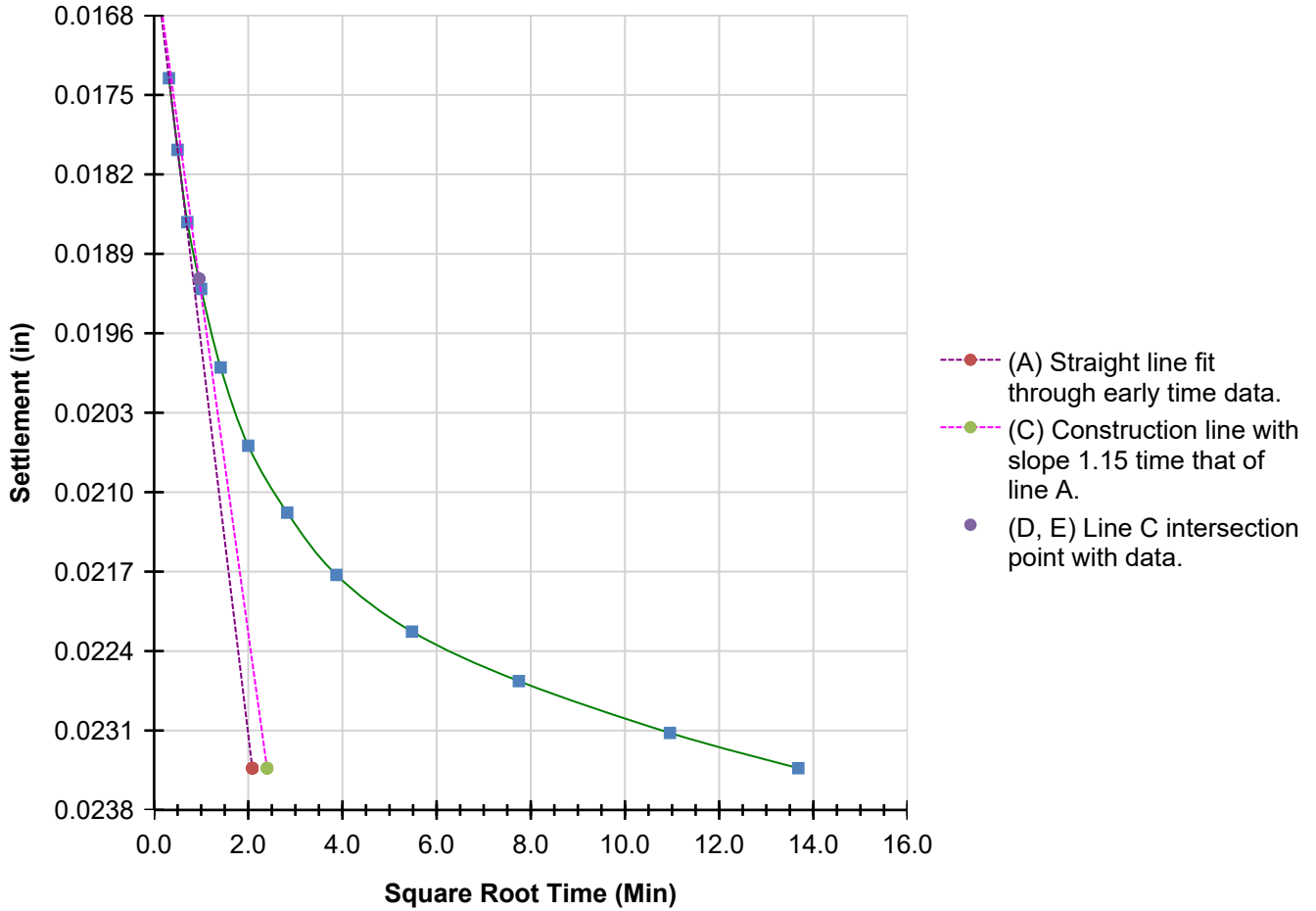
Test Date: 12/20/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [2] 0.500 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	0.913
T50 (Min)	0.213
Cv (in ² /Min)	0.9132

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

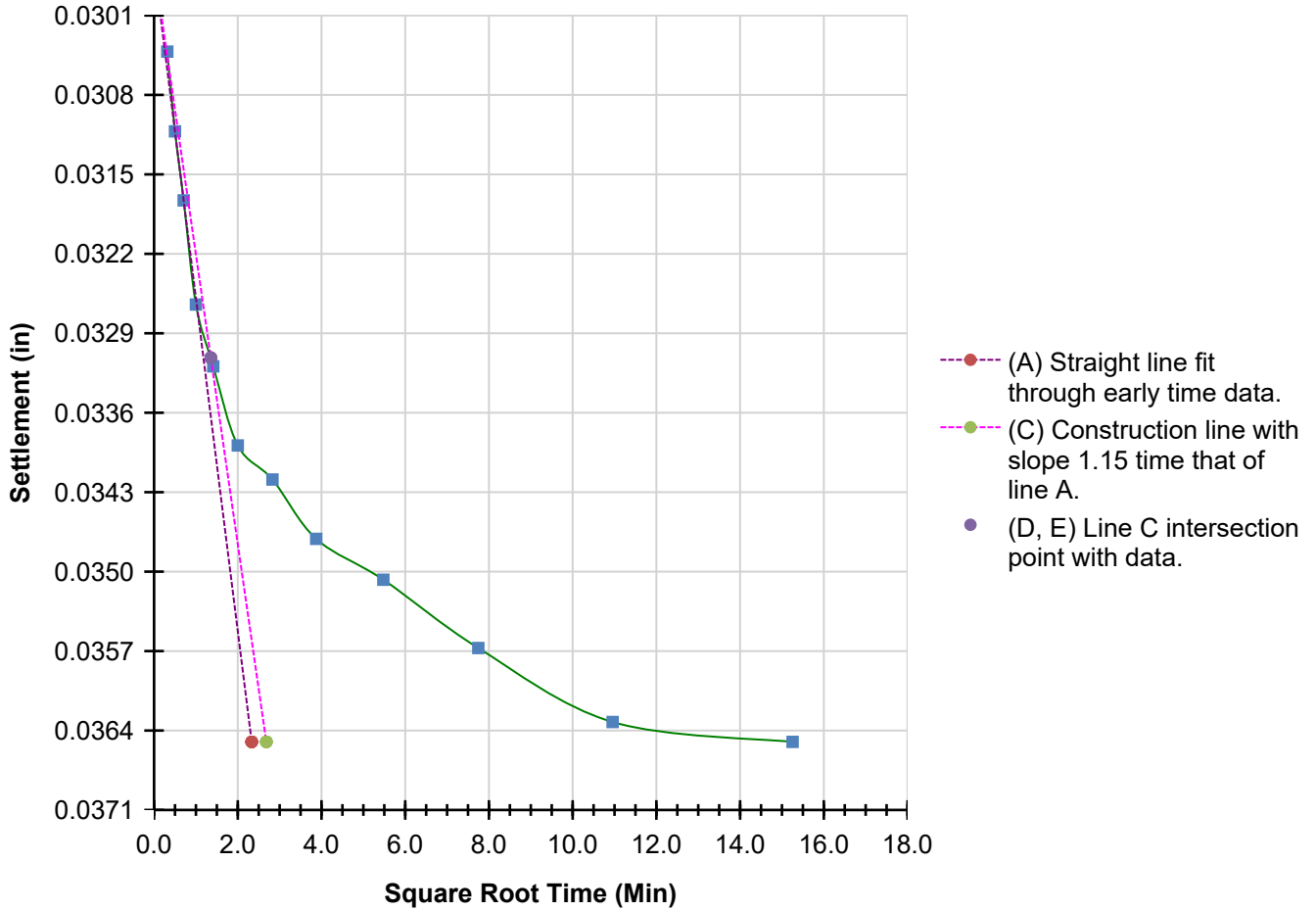
Test Date: 12/20/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [3] 1.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	1.839
T50 (Min)	0.426
Cv (in ² /Min)	0.4322

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

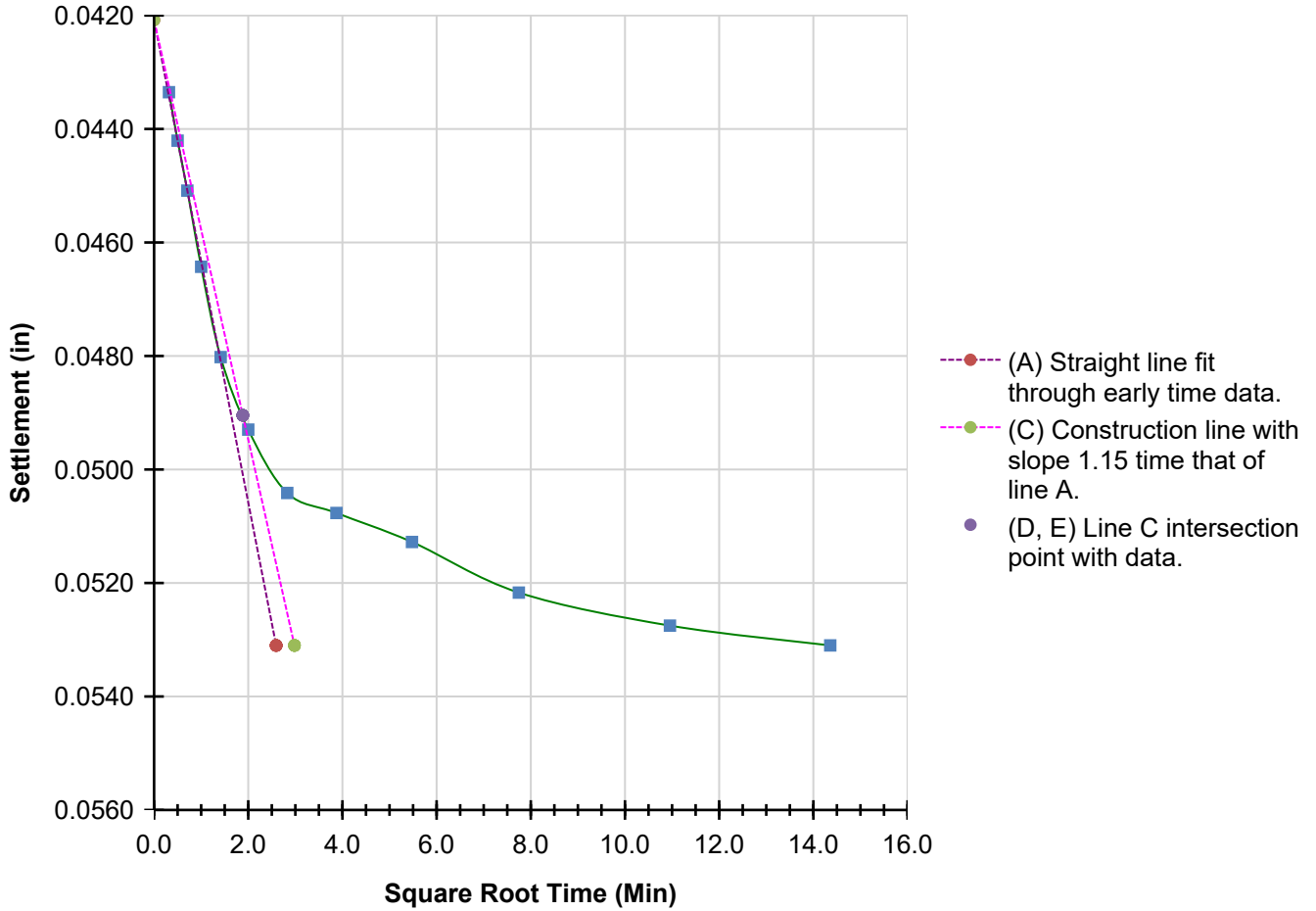
Test Date: 12/20/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [4] 2.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	3.550
T50 (Min)	0.799
Cv (in ² /Min)	0.2153

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

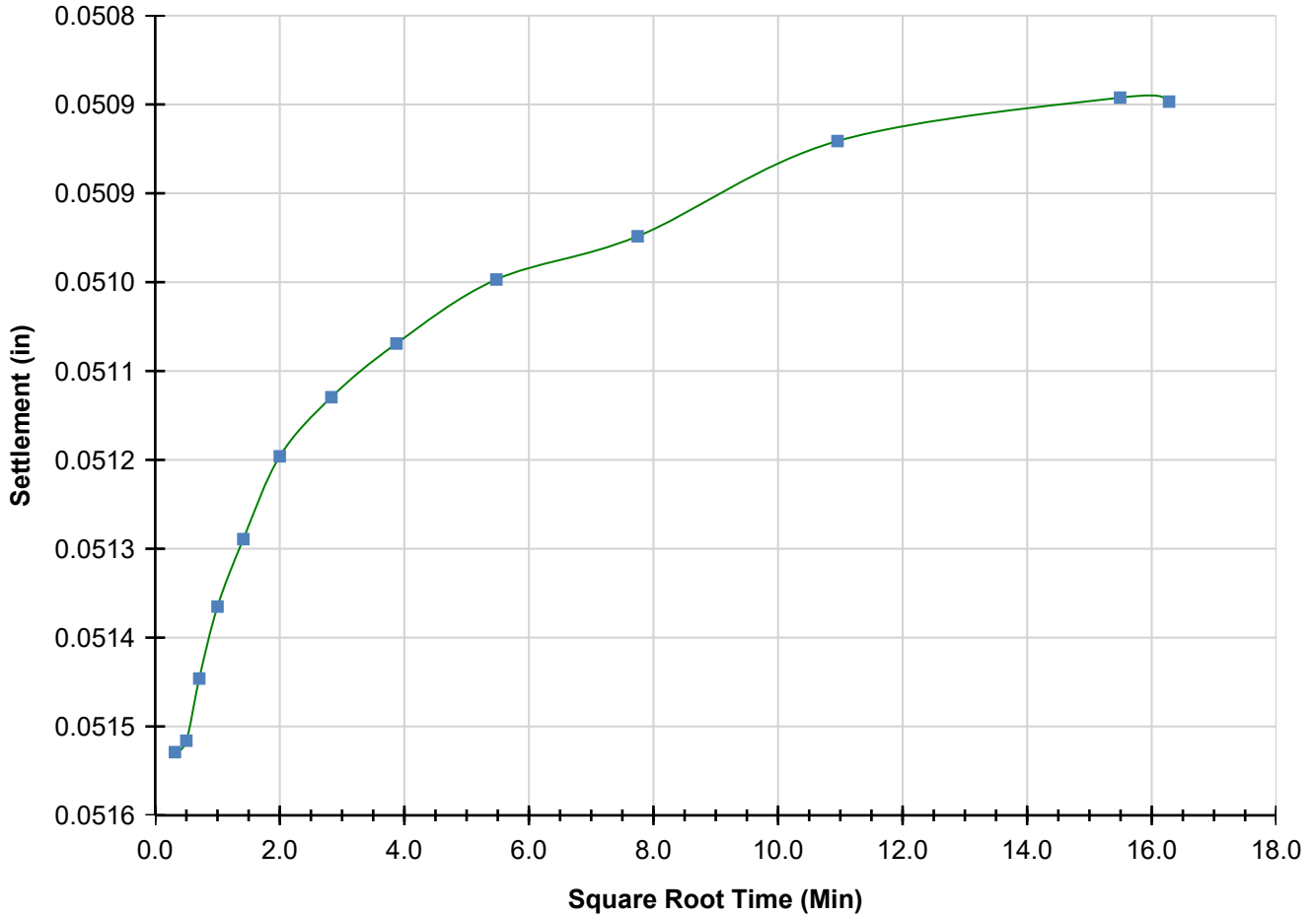
Test Date: 12/20/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [5] 1.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

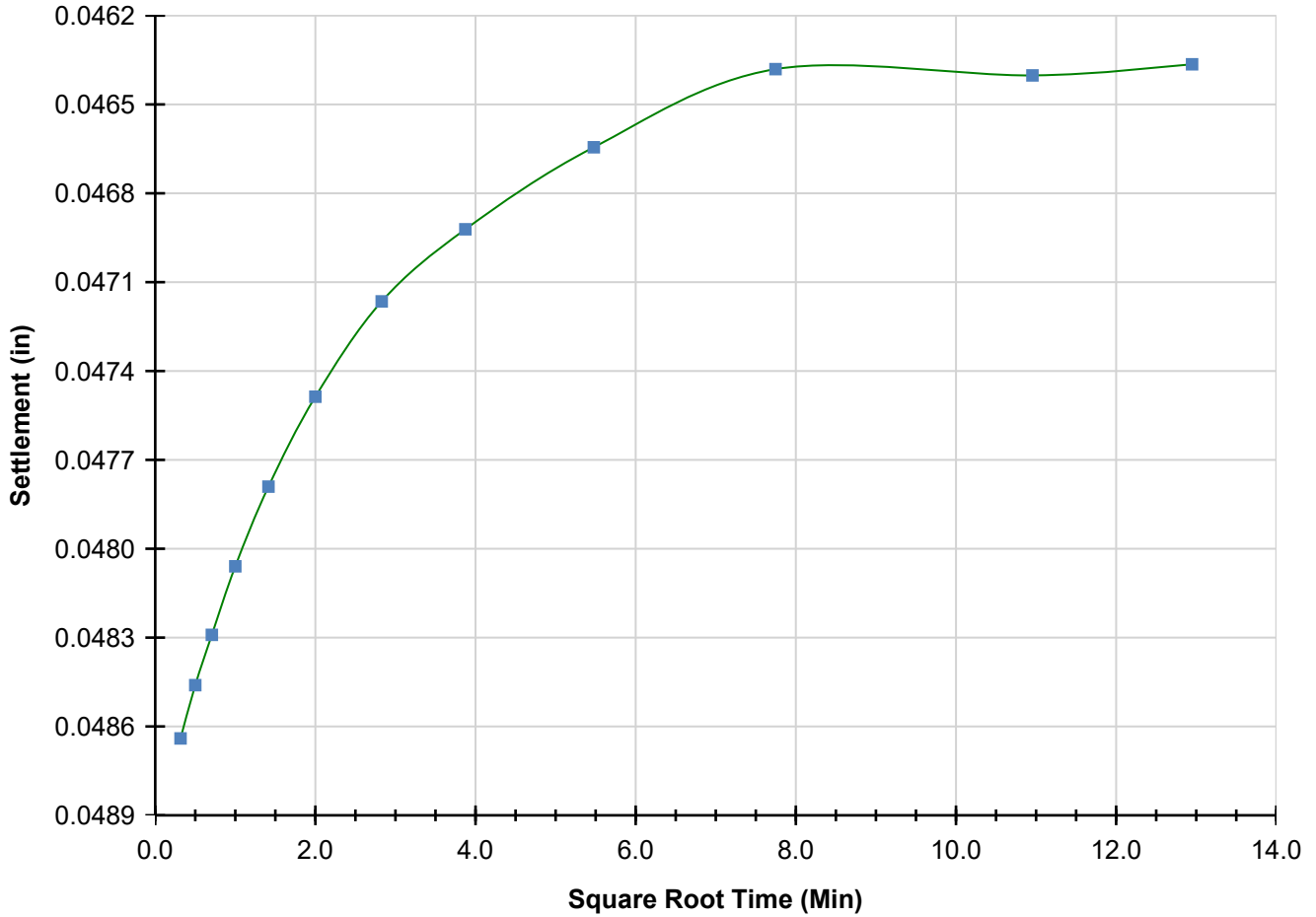
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [6] 0.250 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

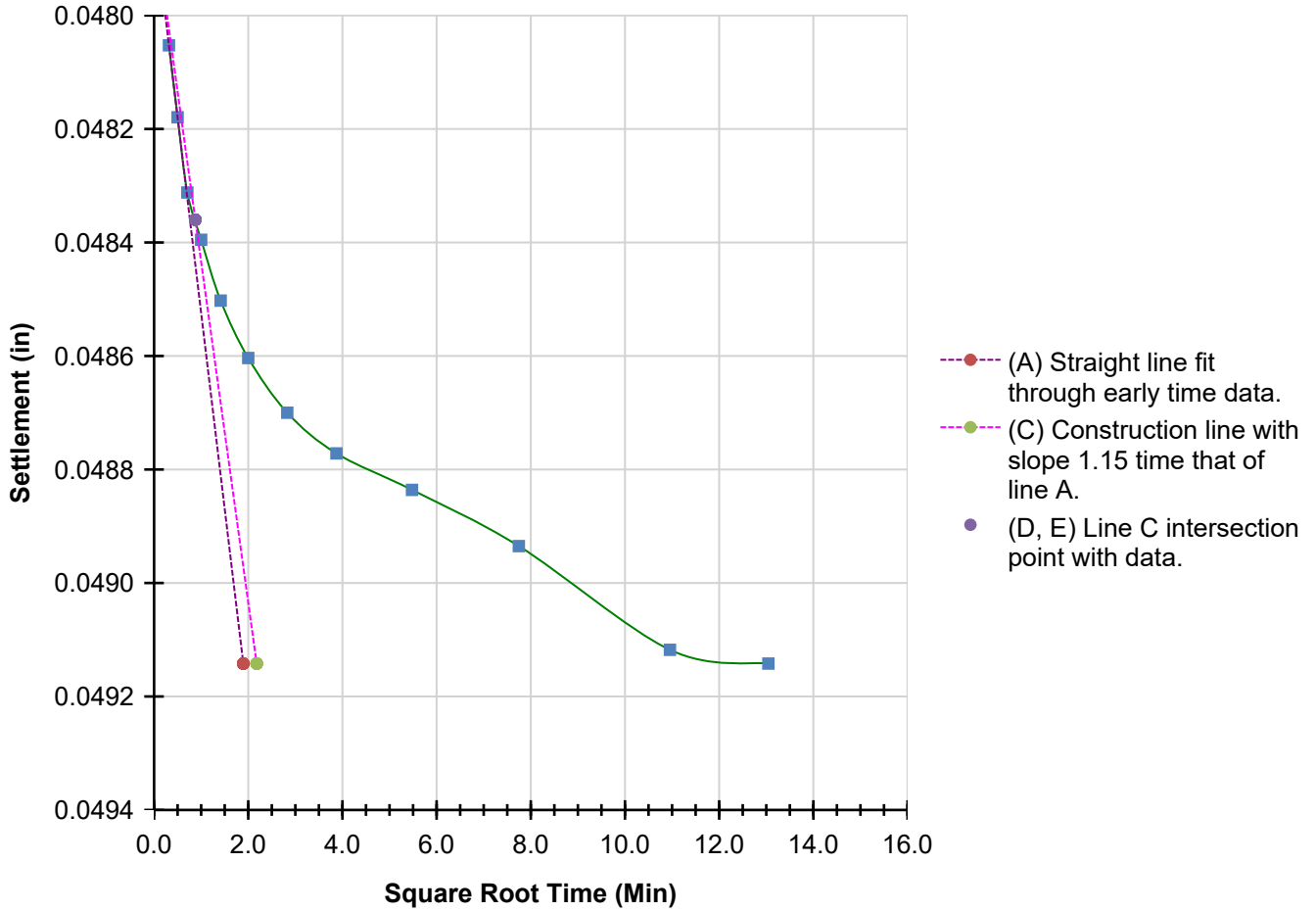
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [7] 0.500 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	0.767
T50 (Min)	0.179
Cv (in ² /Min)	0.9647

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

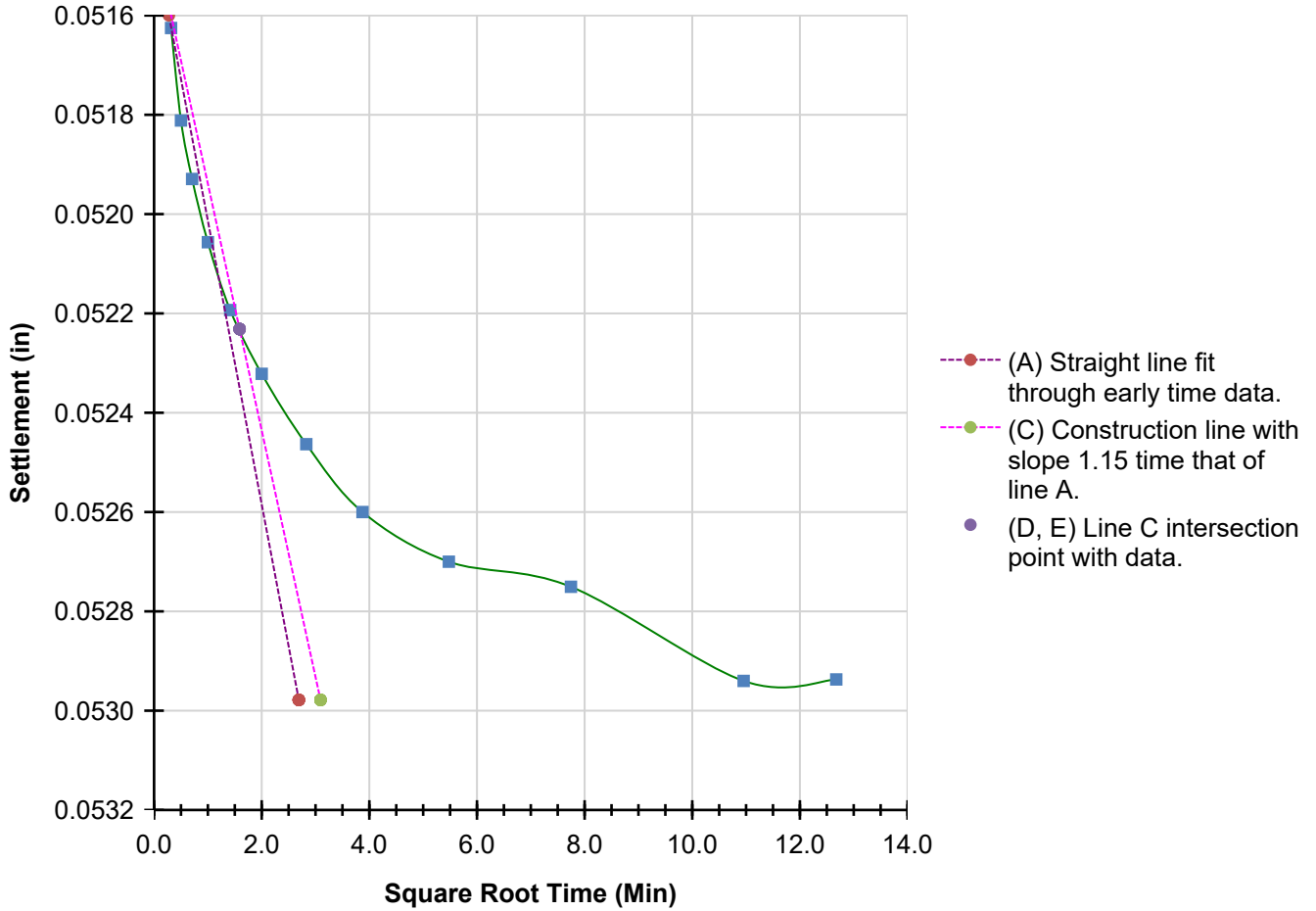
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [8] 1.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	2.525
T50 (Min)	0.384
Cv (in ² /Min)	0.4421

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

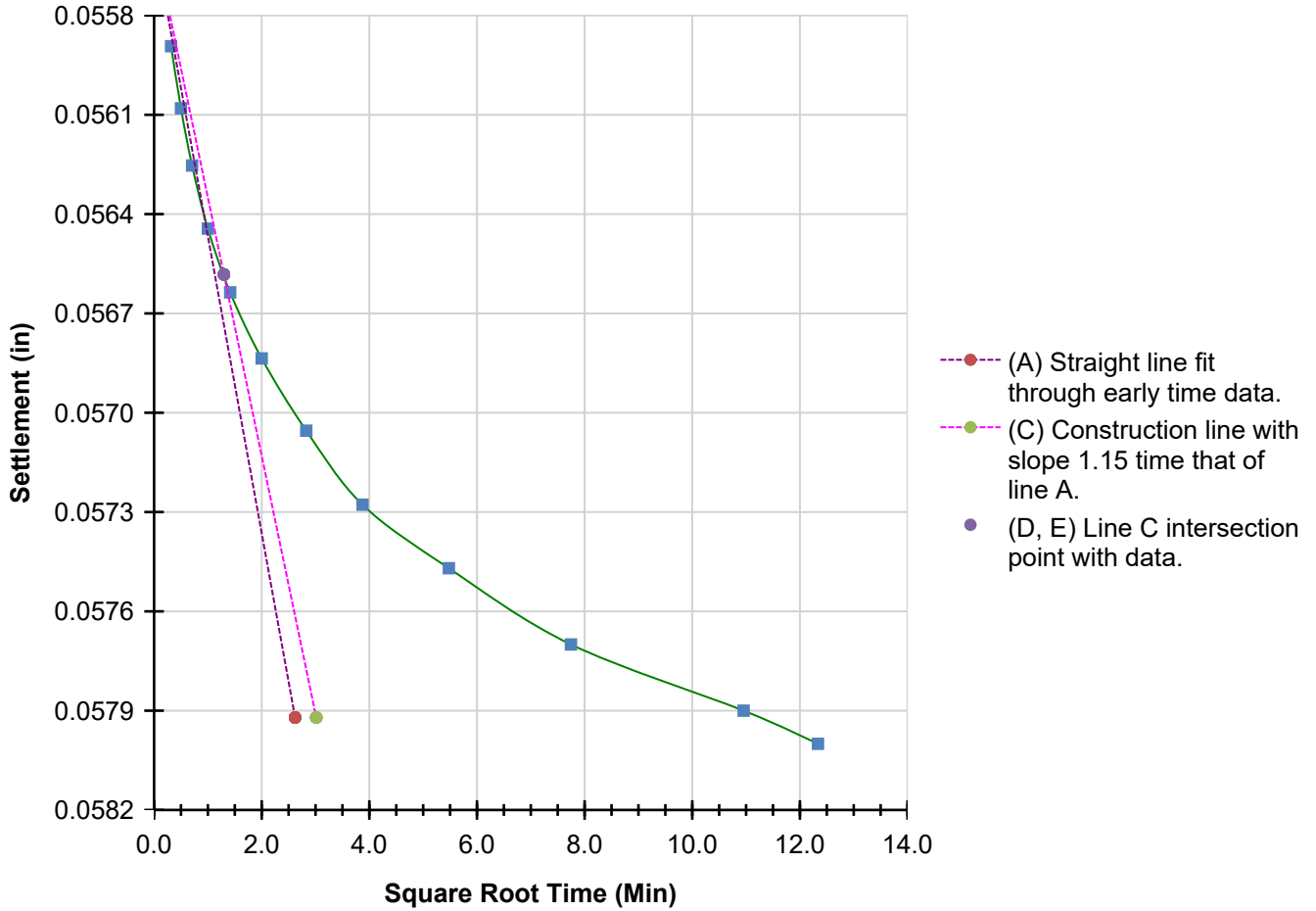
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [9] 2.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	1.684
T50 (Min)	0.317
Cv (in ² /Min)	0.5244

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

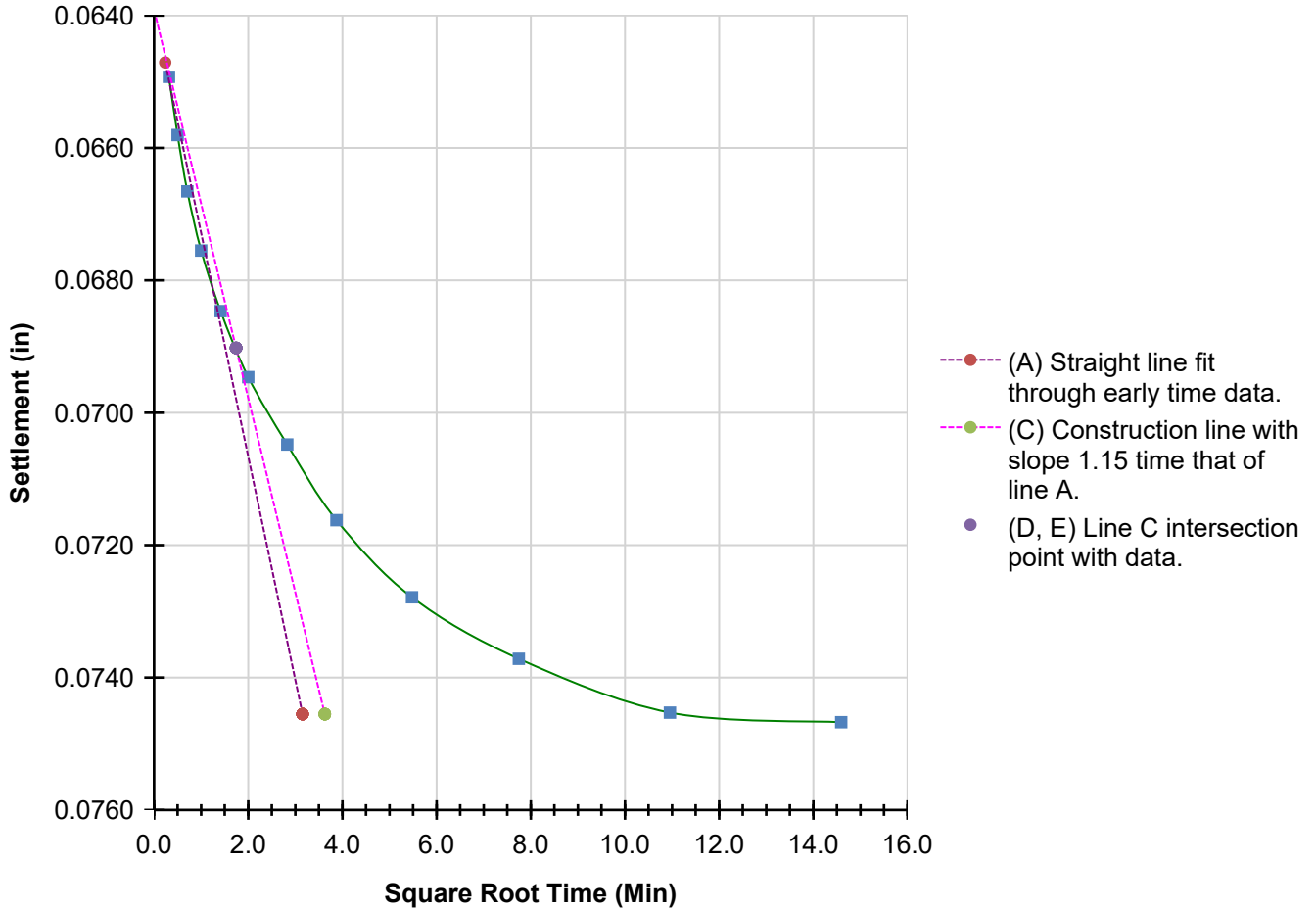
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [10] 4.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	3.032
T50 (Min)	0.546
Cv (in ² /Min)	0.2861

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

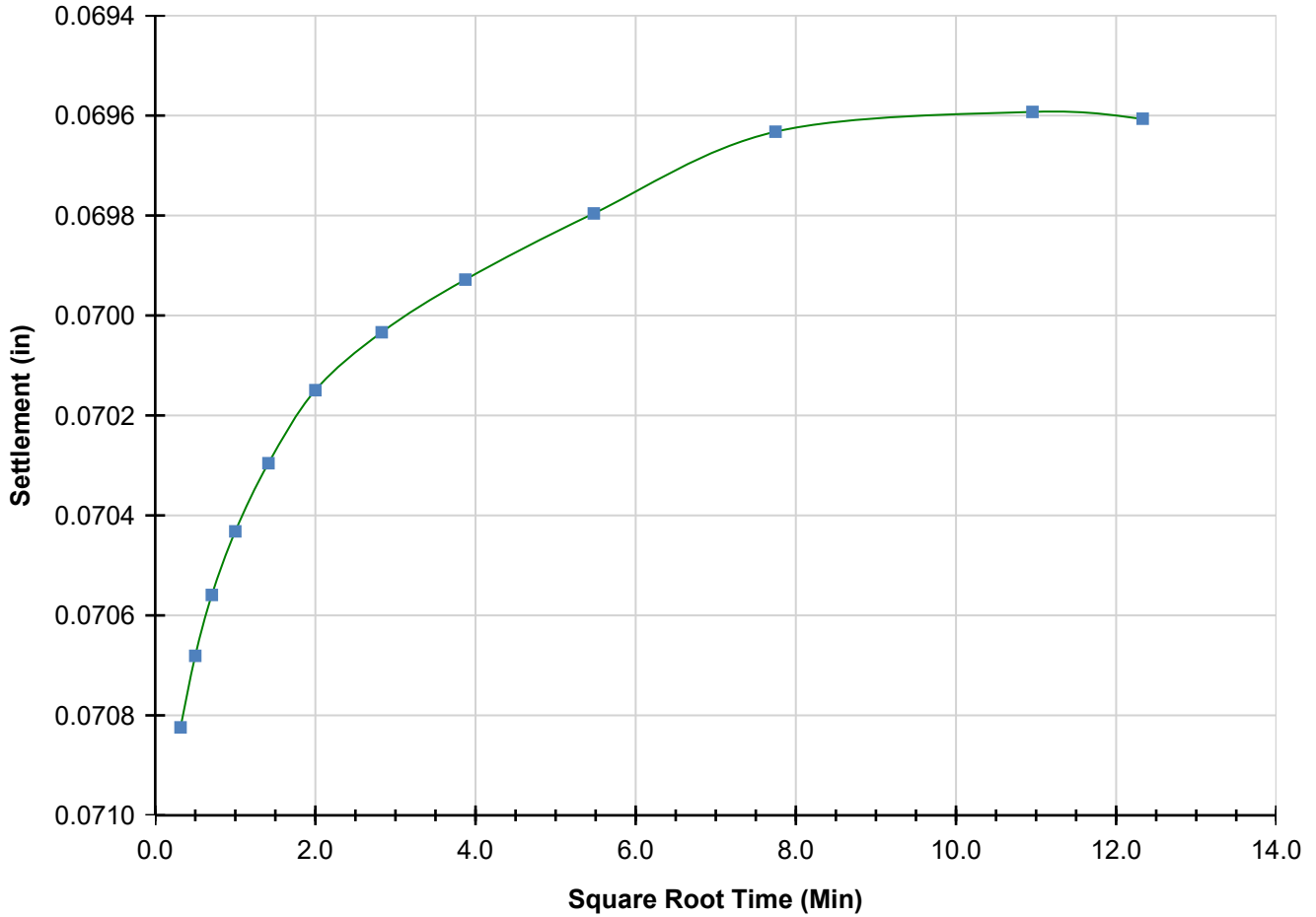
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [11] 1.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

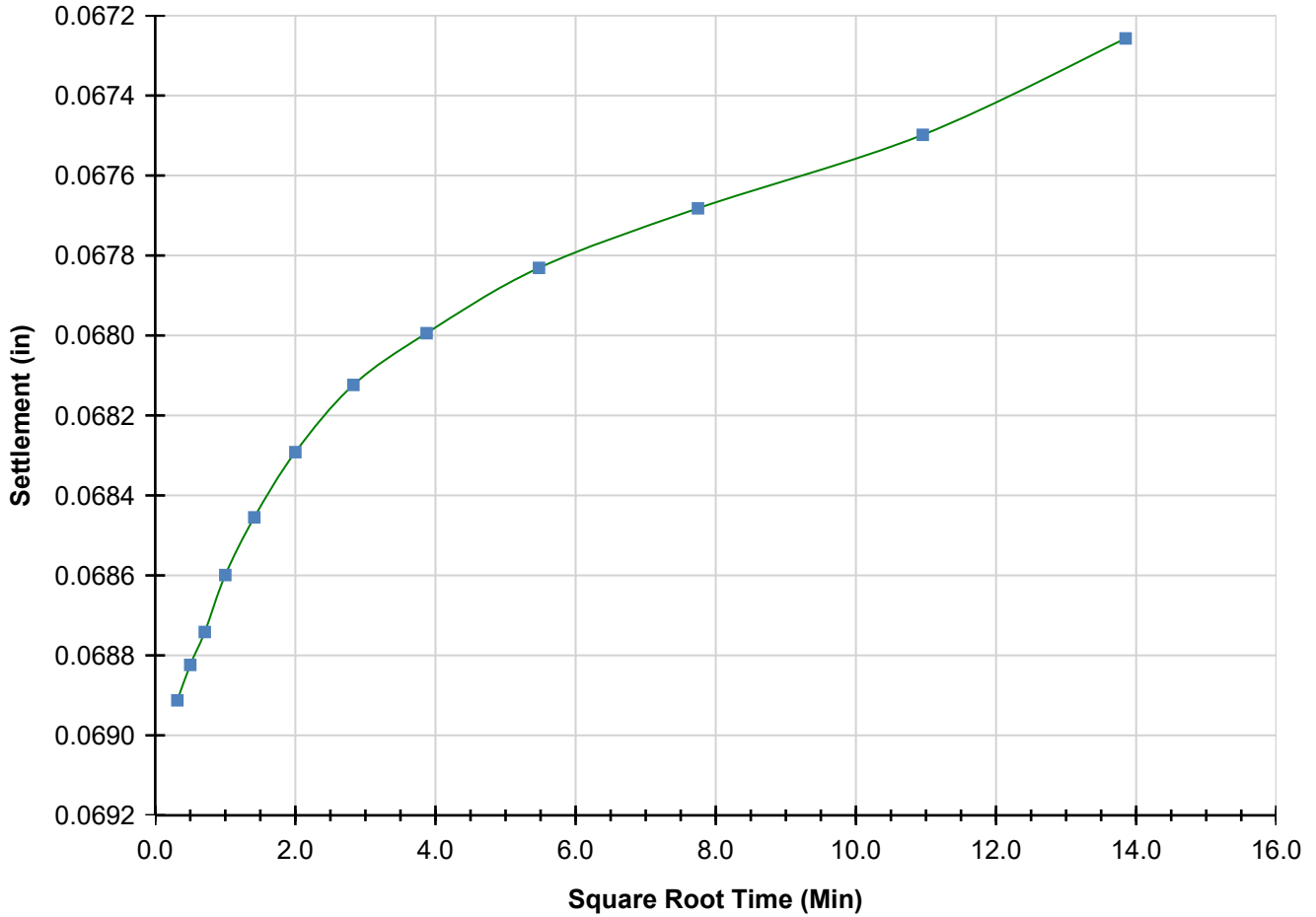
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [12] 0.500 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

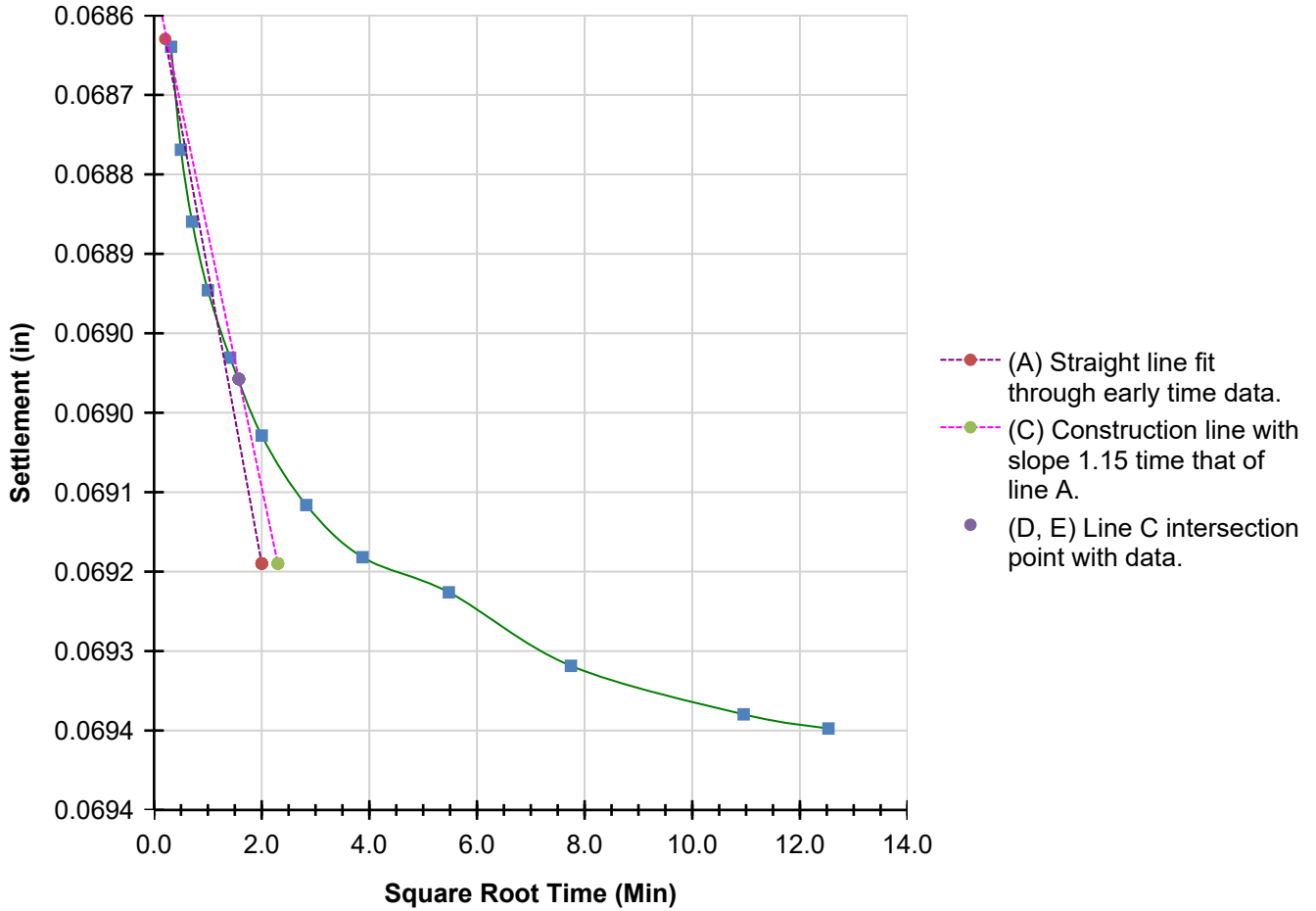
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [13] 1.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	2.479
T50 (Min)	0.422
Cv (in ² /Min)	0.3730

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

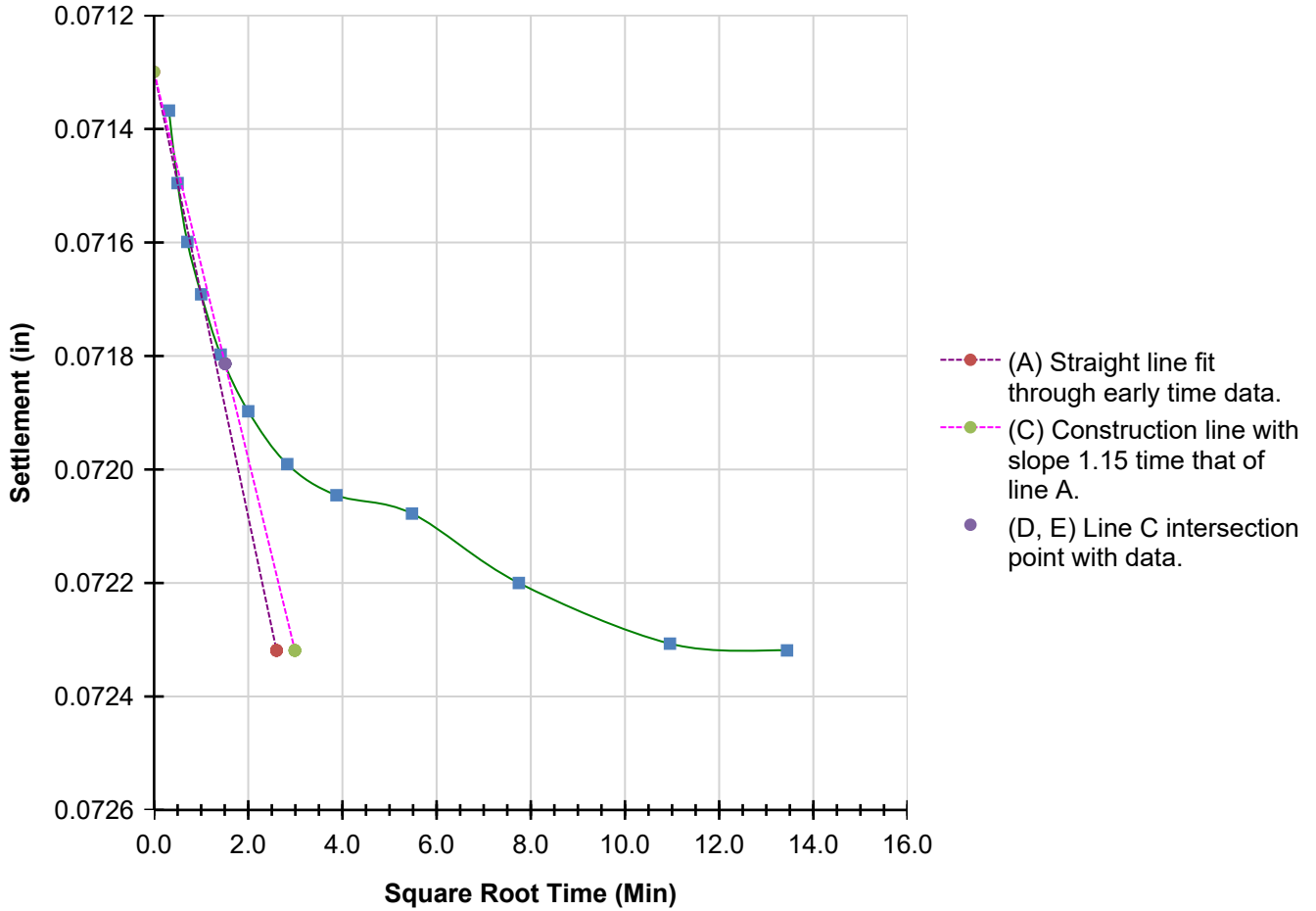
Test Date: 12/21/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [14] 2.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	2.277
T50 (Min)	0.466
Cv (in ² /Min)	0.3336

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

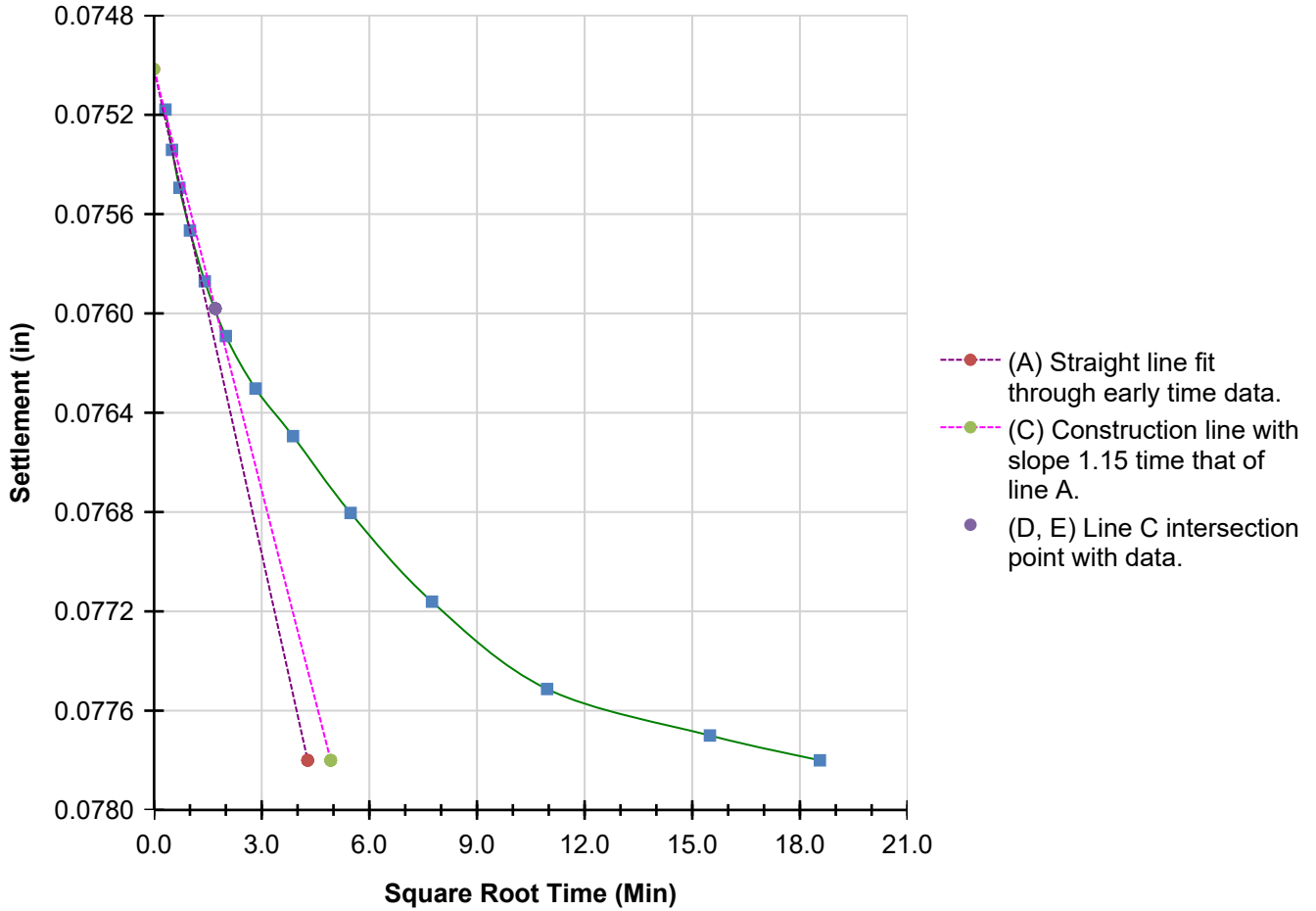
Test Date: 12/22/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [15] 4.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	2.909
T50 (Min)	0.647
Cv (in ² /Min)	0.2347

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

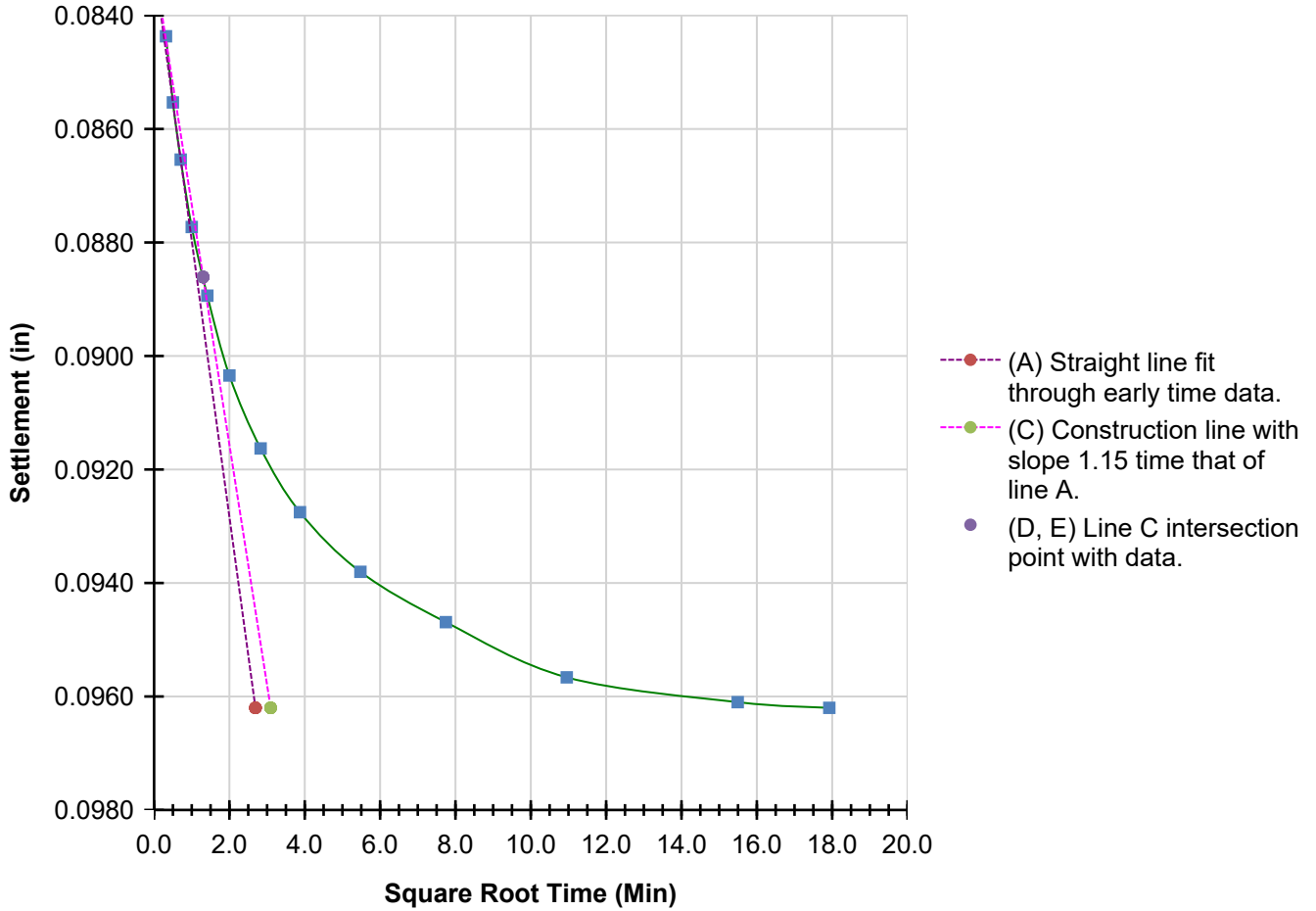
Test Date: 12/22/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [16] 8.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	1.695
T50 (Min)	0.395
Cv (in ² /Min)	0.3584

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

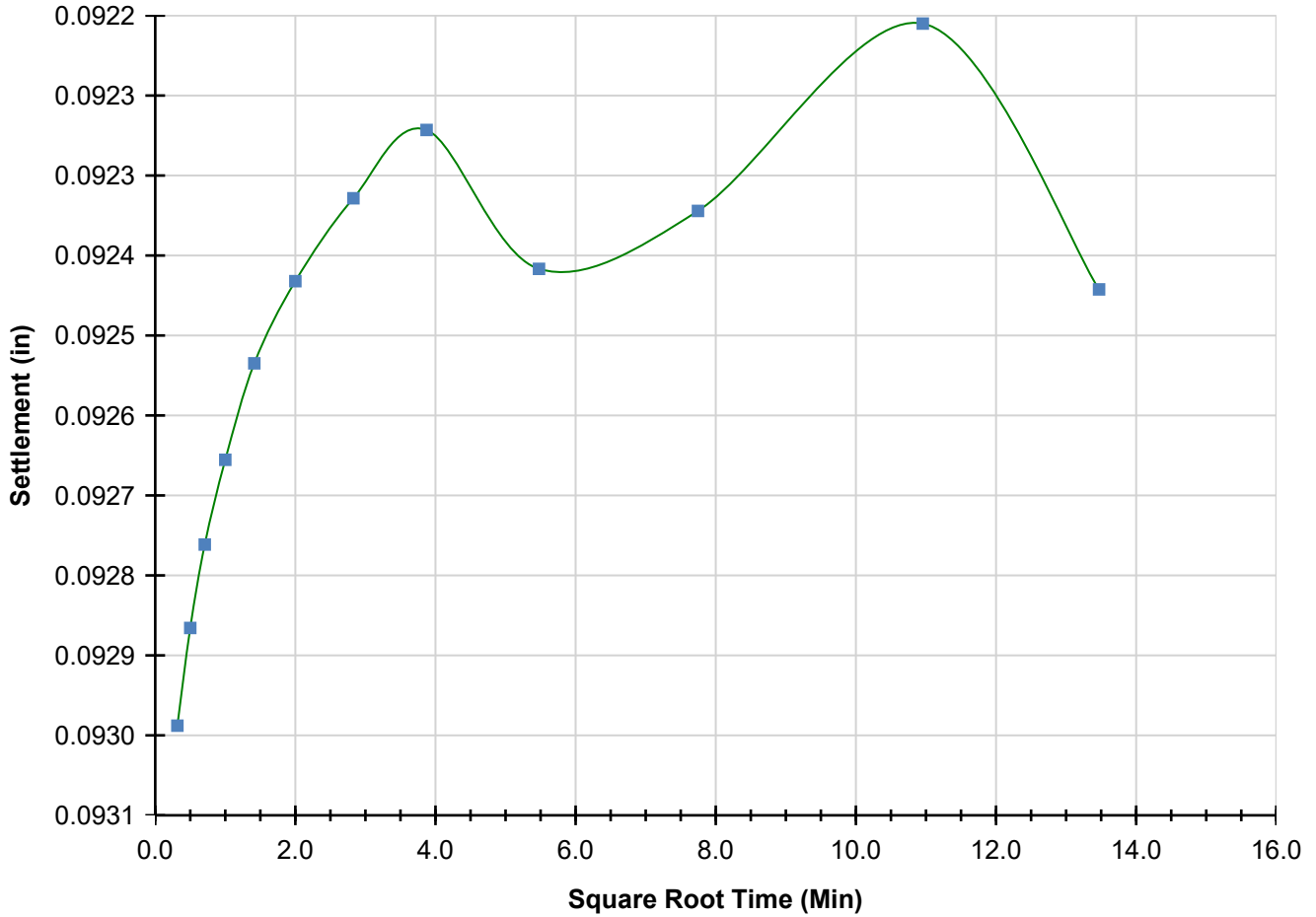
Test Date: 12/22/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [17] 2.000 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

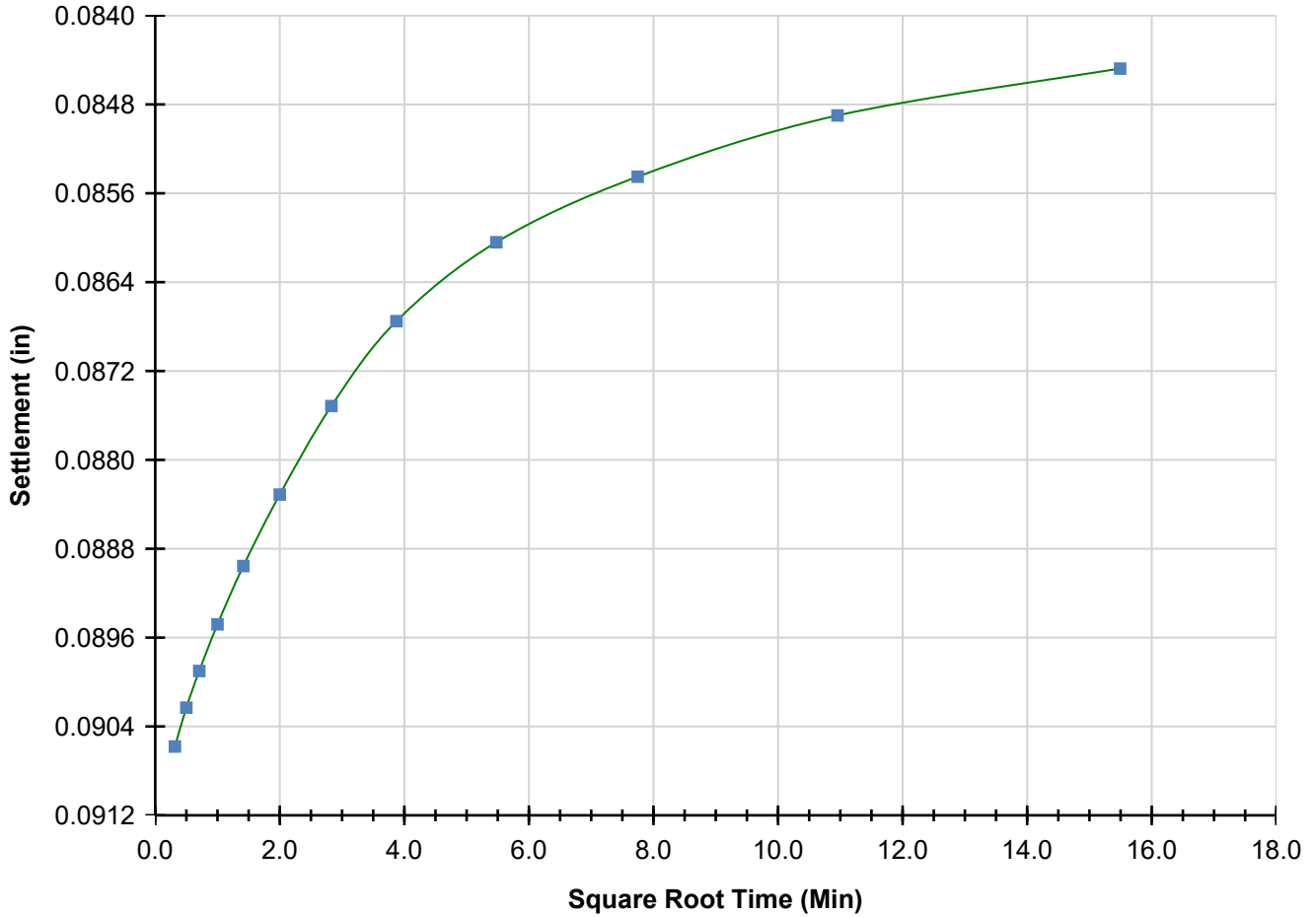
Test Date: 12/22/2021

Checked By: OE

Date: 12/23/2021

Square Root Time [18] 0.250 tsf

ASTM D2435



Tangent Construction Results

T90 (Min)	NA
T50 (Min)	NA
Cv (in ² /Min)	NA

Project Name: Opitz Blvd Project Number: 21-0038 (WRA#45893-001), B-A3-4, ST-1

Technician: B.Aung

Test Date: 12/22/2021

Checked By: OE

Date: 12/23/2021

APPENDIX E
Calculations

APPENDIX E.1

Seismic Site Classification & Overburden Corrections



Project: I-95 Expressway /Opitz Blvd
Woodbridge, VA

Boring No. B-A1-6
Ground Water Depth: 58.0 ft

WRA # 32175-000

Hammer Efficiency: 0.850

Calc by: skk

Date: 12/22/2021

Chk by: scb

Date: 12/22/21

Reference:

NCHRP REPORT 651

**LRFD Design and Construction
of Shallow Foundations
for Highway Bridge Structures**

AASHTO LRFD 2016 Table 10.4.6.5.4-1

(Description boundaries modified)

Table 30. Summary of equations correlating internal friction angle (ϕ_f) to corrected SPT N value ($(N_1)_{60}$).

Reference	Correlation equation	Equation no.
Peck, Hanson, and Thornburn (PHT) (1974) as mentioned in Kulhawy and Mayne (1990)	$\phi_f \approx 54 - 27.6034 \cdot \exp(-0.014(N_1)_{60})$	(100)
Hatanaka and Uchida (1996)	$\phi_f = \sqrt{20(N_1)_{60}} + 20$ for $3.5 \leq (N_1)_{60} \leq 30$	(101)
PHT (1974) as mentioned by Wolff (1989)	$\phi_f = 27.1 + 0.3(N_1)_{60} - 0.00054(N_1)_{60}^2$	(102)
Mayne et al. (2001) based on data from Hatanaka and Uchida (1996)	$\phi_f = \sqrt{15.4(N_1)_{60}} + 20$	(103)
Specifications for Highway Bridges (SHB) Japan, JRA (1996)	$\phi_f = \sqrt{15(N_1)_{60}} + 15$ for $(N_1)_{60} > 5$ and $\phi_f \leq 45^\circ$	(104)

Note: p_a is the atmospheric pressure and σ'_v is effective overburden pressure in the same units. For English units, $p_a = 1$ and σ'_v is expressed in tsf at the depth N_{60} is observed. $(N_1)_{60}$ is the corrected SPT N value corrected using the correction given by Liao and Whitman (1986):

$$(N_1)_{60} = \sqrt{\frac{p_a}{\sigma'_v}} \cdot N_{60} \quad (105)$$

$(N_1)_{60}$	Friction Angle		Descrip.
	Min	Max	
1	25	30	Very Loose
4	25	30	
5	27	32	Loose
10	27	32	
11	30	35	Medium
30	30	35	
31	35	40	Dense
50	35	40	
51	38	43	Very Dense
100	38	43	

Overburden Correction References

ASCE Liao and R.V.Whitman, 1986, "Overburden Correction Factors for SPT in Sand" Journal of Geotechnical Engineering, ASCE, v.112:3, p.373-377

AASHTO Equation 10.4.6.2.4-1

$$N_1 = C_N N \quad (10.4.6.2.4-1)$$

N_1 = SPT blow count corrected for overburden pressure, σ'_v (blows/ft)

C_N = $[0.77 \log_{10}(40/\sigma'_v)]$, and $C_N < 2.0$

σ'_v = vertical effective stress (ksf)

N = uncorrected SPT blow count (blows/ft)

APPENDIX E.2

MSE Wall Calculations – Wall 1, Wall2, and Wall 3

APPENDIX E.2

MSE Wall Calculations – Wall 1, Wall2, and Wall 3

- E.2.1 Wall 2 – External Stability and Bearing Resistance**
- E.2.2 Wall 2 – Settlement Analysis at Abutment C
- E.2.3 Walls 1 & 3 – Back to Back MSE Check
- E.2.4 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.24+50 (19' Wall)
- E.2.5 Walls 1 & 3 – Settlements @ Sta.24+50 (19' Wall)
- E.2.6 Walls 1 & 3 – Slope Stability @ Sta.24+50 (19' Wall)
- E.2.7 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.22+50 (10' Wall)
- E.2.8 Walls 1 & 3 – Settlements @ Sta.22+50 (10' Wall)
- E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: **Opitz Blve**

WRA#: **032023.000**

Design: **skk 12/14/2021**

Str. No. **Wall-2 @ Abutment C**

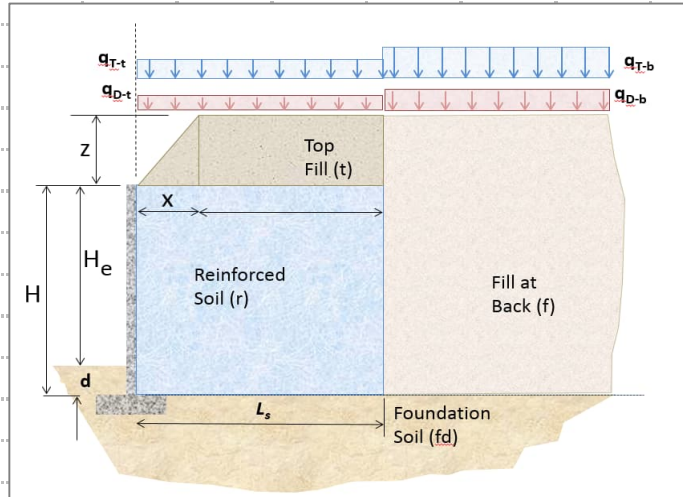
Wall No.: **Wall 2**

Check: **SCB 12/21/21**

Assumptions/Notes:

Front of the abutment is modeled as a triangular portion.

Lateral loads behind the wall are assumed to be horizontal (per MSE-W assumption for slope < 45 deg.)



Wall Configuration

Backfill Slope

Broken Back Slope:

Height z (ft.) = **10.00**

Length x (ft.) = **6.00**

Infinite Backfill: **Yes**

Infinite Slope $\beta_{inf} =$ **0.00**

Fall face assumed vertical

$\alpha =$ **0.00 deg.**

Case	β_{eq}	Δh	h
5	0.00	0.00	30.00

Wall Dimensions

Exposed wall height	$H_e = $	28.00 ft.	<i>Table C.11.10.2.2-1 Minimum Embedment</i>
Embedded Height	$d = $	2.00 ft.	Minimum Embedment = $H/20$ 1.50 ok
Total Wall Length		36.00 ft.	<== (for bearing capacity calculations)

Reinforced Backfill	Friction Angle	$\phi_r = $	34.0 degree	Unit Wt.	$\gamma_r = $	105.0 pcf
Retained Fill (f) (above and behind reinf. zone)		$\phi_f = $	32.0 degree		$\gamma_f = $	120.0 pcf
Foundation Soil:		$\phi_{fd} = $	32.0 degree		$\gamma_{fd} = $	120.0 pcf
Cohesion:	$c_{fd} = $	0.0 psf	Mayerhof Bearing, $q_{ult} = $	20.96 ksf		

Top of wall Backfill	Friction Angle	$\phi_t = $	34.0 degree	Unit Wt.	$\gamma_t = $	105.0 pcf
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Surcharge Loading

Traffic @ wall Top	↓	$q_{T-t} = $	250 psf	Dead -top	↓	$q_{D-t} = $	0 psf
Traffic @ behind wall	↓	$q_{T-b} = $	250 psf	Dead -Behind	↓	$q_{D-b} = $	0 psf
Added horizontal Load	←	$P_{BR-H} = $	1000 lb/LF				

Design Height and Estimated Reinforcement Length

Estimated Reinforcement Length :	$L = $	23.00 ft.	<i>Check for minimum L</i>
Design Height of the wall: $H = H_e + d$	$H = $	30.00 ft.	$L_{min} = $ 7.0 ft ok
Ratio for Estimated Reinforcement Length (> 0.7):	0.77 (L/H)	ok	$L \leq 2H$ ok to use this spreadsheet

Results Summary

LRFD:	ASD:	Bearing Resistnace:		
Direct Sliding	CDR= 1.477	$FS_{sliding} = $	2.277	Required Factored Bearing= 6.427 ksf
Bearing Resist.	CDR= 2.120	$FS_{bearing} = $	5.061	Required Service Bearing= 4.141 ksf
1.244	$e/L = $ 0.201 Critical	$e/L = $	0.129	$e/L = $ 0.135 $e = $ 3.11 ft



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No. Wall-2 @ Abutment C

Check: **SCB 12/21/21**

Load Factors	EV	EH	ES	LS	Resistance Factors
Strength I (maximum)	1.35	1.50	1.50	1.75	Sliding of MSE wall on foundation soil: 1.00
Strength I (minimum)	1.00	0.90	0.75	0.00	Bearing resistance: 0.65
Service I	1.00	1.00	1.00	1.00	Tensile resistance (for steel strips): 0.75

Calculation of β_{eq} and h

$L = 23.0$ ft. $H = 30.0$ ft. $x =$ ft. $z =$ ft.

Case Description	β_{eq}	Δh	L_T	$L_R = L - L_T$
1 For $x < z$; $\beta_{eq} = 0$		$\Delta h = z$	$L_T = 0$	
2 $x < L$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = z$	$L_T = x$	
3 $L < x < 2H$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = Lz/x$	$L_T = L$	
4 $x > 2H$ $\beta_{eq} = \tan^{-1}(z/x)$		$\Delta h = Lz/x$	$L_T = L$	
5 Infinite $\beta_{eq} = \beta_{infinite}$	0.00	0.00	$L_T = L$	0.00 23.00
5 <= Current Case	$\beta_{eq} = 0.00$ degree	$\Delta h = 0.00$ ft.	0.00	23.00
	$\beta_{eq} =$	$h = H + \Delta h$	$h = 30.00$ ft.	

Coulomb Active Earth Pressure Coefficient for Retained fill

Reference: Eq. 3.11.5.3-1 AASHTO

$$K_A = \frac{\sin^2(\theta + \phi')}{\sin^2\theta \sin(\theta - \delta) \left[1 + \sqrt{\frac{\sin(\phi + \delta) \sin(\phi' - \beta)}{\sin(\theta - \delta) \sin(\theta + \beta)}} \right]^2}$$

Note: $\phi' > \beta$ $\phi' = 32.0$ degree
 $\beta = 0.00$ degree
 $\theta = 90 + \alpha$ $\theta = 90.0$ degree
 $\delta = \beta$ $\delta = 0.0$ degree

$T_1 = 0.2808$ $T_2 = 1$ $\Gamma = [1 + \sqrt{T_1/T_2}]^2$ $\Gamma = 2.3407$
 $T_t = 0.7192$ $T_b = 1$ $K_A = T_t / (T_b * \Gamma)$ $K_{af} = 0.307$

Rankine Earth Pressure Coefficients

Equation 5.12 from FHWA-IF-03-017

$$K_A = \cos\beta \frac{\cos\beta - \sqrt{\cos^2\beta - \cos^2\phi'}}{\cos\beta + \sqrt{\cos^2\beta - \cos^2\phi'}}$$

(for comparison purposes)

$T_{sq} = 0.5299$ $T_{cos} = 1$
 $K_A = T_{cos}(T_{cons} - T_{sq}) / (T_{cos} + T_{sq})$
 $K_A = 0.307$

Note :



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

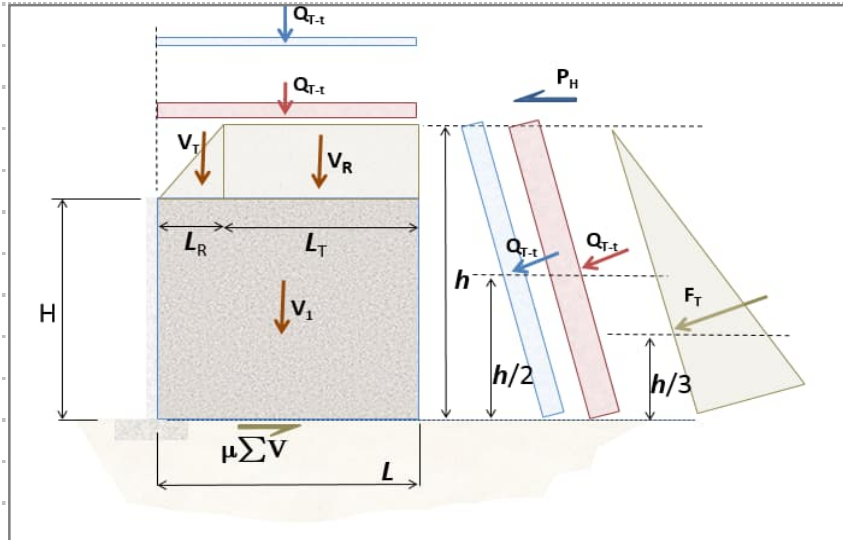
Str. No. Wall-2 @ Abutment C

Check: SCB 12/21/21

Loads and Moments:

Data for Calculations:

- $L = 23.00$ ft.
- $H = 30.00$ ft.
- $h = 30.00$ ft.
- $L_T = 0.00$ ft.
- $L_R = 23.00$ ft.
- $K_{af} = 0.307$
- $\gamma_r = 105.0$ pcf
- $\gamma_t = 120.0$ pcf
- $\gamma_b = 105.0$ pcf
- $\beta = 0.00$ deg.
- $q_{D\ top} = 0$ psf
- $q_{D\ b} = 0$ psf
- $q_{T\ top} = 250$ psf
- $q_{T\ beh} = 250$ psf



$p_H = 1000$ lb/LF rounding force = 2 length = 2

Un-factored Loads: Horizontal, Vertical & Moment about Point A

						Arm	M
					(kips/LF)	12 (ft.)	(ft. kips)
1	$V_1 = \gamma_r H L$	Reinforced Mass	EV	↓	$V_1 = 72.45$	$L/2 = 11.50$	833.18
2	$V_T = (1/2) \gamma_t (h-H) L_T$	Top Triangle Mass	EV	↓	$V_T = 0.00$	$2L_T/3 = 0.00$	0.00
3	$V_R = \gamma_t (h-H) L_R$	Top Rectangle Mass	EV	↓	$V_R = 0.00$	$L_T + L_R/2 = 11.50$	0.00
4	$F_{TV} = (1/2) \gamma_f h^2 K_{af} \sin \beta$ $F_T = 16.58$	Earth Pressure	EH	↓	$F_{TV} = 0.00$	$L = 23.00$	0.00
5	$F_{TH} = (1/2) \gamma_f h^2 K_{af} \cos \beta$	Earth Pressure	EH	←	$F_{TH} = 16.58$	$h/3 = 10.00$	165.80
6	$Q_{D\ top-V} = (q_{D\ top}) L$	Surch. Dead: Top	ES-t	↓	$Q_{D\ top-V} = 0.00$	$L/2 = 11.50$	0.00
7	$Q_{D\ V} = (q_D) h K_{af} \sin \beta$	Surch. Dead: Behind	ES-b	↓	$Q_{D\ V} = 0.00$	$L = 23.00$	0.00
8	$Q_{D\ H} = (q_D) h K_{af} \cos \beta$	Surch. Dead: Behind	ES-b	←	$Q_{D\ H} = 0.00$	$h/2 = 15.00$	0.00
9	$Q_{T\ top-V} = (q_T) L$	Surch. Traffic: Top	LS-t	↓	$Q_{T\ top-V} = 5.75$	$L/2 = 11.50$	66.13
10	$Q_{T\ V} = (q_{T-b}) h K_{af} \sin \beta$	Surch. Traffic: Behind	LS-b	↓	$Q_{T\ V} = 0.00$	$L = 23.00$	0.00
11	$Q_{T\ H} = (q_{T-b}) h K_{af} \cos \beta + P_{BR}$	Surch. traffic: Behind	LS-b	←	$Q_{T\ H} = 3.30$	$h/2 = 15.00$	49.50



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No. Wall-2 @ Abutment C

Check: SCB 12/21/21

Static Sliding				5	2	3	4					
				5	9	11	8	Strength I(max)		Strength I(Min)		Critical
Horizontal Driving Forces				ASD		Max.Load Factor		Min.Load Factor		Crit.Load Factor		
Horizontal Forces				Factor	Load	Factor	Load	Factor	Load	Factor	Load	
5	Earth Pressure	←	16.58	EH	1.0	16.58	1.50	24.87	0.90	14.92	1.50	24.87
8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch.traffic:Behind	←	3.30	LS-b	1.0	3.30	1.75	5.78	0.00	0.00	1.75	5.78
Total Horizontal				$\Sigma H_{driving}$	19.88	---	30.65	---	14.92	---	30.65	
Vertical Loads												
1	Reinforced Mass	↓	72.45	EV	1.0	72.45	1.35	97.81	1.00	72.45	1.00	72.45
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	5.75	LS-t	0.0	0.00	1.75	10.06	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical				ΣV	72.45	---	107.87	---	72.45	---	72.45	
Resisting Horizontal Loads for				$\phi_{crit} = 32.00$	ASD	Max	Min	Crit.				
1	Reinforced Mass	↓			45.27	61.12	45.27	45.27				
2	Top Tringle Mass	↓			0.00	0.00	0.00	0.00				
3	Top Rectangle Mass	↓			0.00	0.00	0.00	0.00				
4	Earth Pressure	↓			0.00	0.00	0.00	0.00				
6	Surch.Dead:Top	↓			0.00	0.00	0.00	0.00				
7	Surch.Dead:Behind	↓			0.00	0.00	0.00	0.00				
9	Surch.Traffic:Top	↓			0.00	6.29	0.00	0.00				
10	Surch.Traffic:Behind	↓			0.00	0.00	0.00	0.00				
Cohesion $C_H = c_{fd} L$					0.00	0.00	0.00	0.00				
				ΣV_{resist}	45.27	67.40	45.27	45.27				
Results												
ASD	$FS_{SL} = 2.277$			Load F	Max	Min	Crit	ASD				
LRFD	$CDR = 1.477$			EV	1.35	1.00	1.00	1.0				
Note:	For geogrid reinforced MSE, the sliding friction angle may be taken as minimum of ϕ_{rd} and two thirds of reinforced soil friction angle, $(2/3) \phi_r$			EH	1.50	0.90	1.50	1.0				
	$\phi_{rd} = 32.00$	Sliding $\phi_r = 34$		ES-t	1.35	1.00	1.00	1.0				
	$2/3 \phi_r = 22.67$	$\phi_{crit} = 22.67$		ES-b	1.50	0.75	1.50	1.0				
				LS-t	1.75	0.00	0.00	0.0				
				LS-b	1.75	0.00	1.75	1.0				



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No. Wall-2 @ Abutment C

Check: **SCB 12/21/21**

Eccentricity: 5 2 3 4

5 9 8 ASD LRFD Max Load Factored Min Load Factored Crit Load Factored

Moments: Counter-Clockwise 14 Un-factored Factor Load Factor Load Factor Load

5	Earth Pressure	←	165.80	EH	1.0	165.80	1.50	248.70	0.90	149.22	1.50	248.70
---	----------------	---	--------	----	-----	--------	------	--------	------	--------	------	--------

8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

11	Surch.traffic:Behind	←	49.50	LS-b	1.0	49.50	1.75	86.63	0.00	0.00	1.75	86.63
----	----------------------	---	-------	------	-----	-------	------	-------	------	------	------	-------

Total: Counter-Clockwise Moments			ΣM_{-}			215.30	---	335.33	---	149.22	---	335.33
----------------------------------	--	--	----------------	--	--	--------	-----	--------	-----	--------	-----	--------

Moments: Clockwise 14

1	Reinforced Mass	↓	833.18	EV	1.0	833.18	1.35	1124.79	1.00	833.18	1.00	833.18
---	-----------------	---	--------	----	-----	--------	------	---------	------	--------	------	--------

2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	------------------	---	------	----	-----	------	------	------	------	------	------	------

3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	--------------------	---	------	----	-----	------	------	------	------	------	------	------

4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
---	----------------	---	------	----	-----	------	------	------	------	------	------	------

6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	----------------	---	------	------	-----	------	------	------	------	------	------	------

7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

9	Surch.Traffic:Top	↓	66.13	LS-t	0.0	0.00	1.75	115.73	0.00	0.00	0.00	0.00
---	-------------------	---	-------	------	-----	------	------	--------	------	------	------	------

10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
----	----------------------	---	------	------	-----	------	------	------	------	------	------	------

Total: Clockwise Moments			ΣM_{+}			833.18	---	1240.52	---	833.18	---	833.18
--------------------------	--	--	----------------	--	--	--------	-----	---------	-----	--------	-----	--------

Vertical Load 11

1	Reinforced Mass	↓	72.45	EV	1.0	72.45	1.35	97.81	1.00	72.45	1.00	72.45
---	-----------------	---	-------	----	-----	-------	------	-------	------	-------	------	-------

2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	------------------	---	------	----	-----	------	------	------	------	------	------	------

3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	--------------------	---	------	----	-----	------	------	------	------	------	------	------

4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
---	----------------	---	------	----	-----	------	------	------	------	------	------	------

6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	----------------	---	------	------	-----	------	------	------	------	------	------	------

7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

9	Surch.Traffic:Top	↓	5.75	LS-t	0.0	0.00	1.75	10.06	0.00	0.00	0.00	0.00
---	-------------------	---	------	------	-----	------	------	-------	------	------	------	------

10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
----	----------------------	---	------	------	-----	------	------	------	------	------	------	------

Total Vertical Loads			ΣV			72.45	---	107.87	---	72.45	---	72.45
----------------------	--	--	------------	--	--	-------	-----	--------	-----	-------	-----	-------

Resultant from point A, y (ft.) 8.53 8.39 9.44 6.87

Eccentricity: $e = L/2 - y$ (ft.)

Results:

		$e = L/2 - y$	e/L		Load F	Max	Min	Crit	ASD
ASD		2.97 ft.	0.129	Ok	EV	1.35	1.00	1.00	1.0
LRFD	Max	3.11 ft.	0.135	Ok	EH	1.50	0.90	1.50	1.0
LRFD	Min	2.06 ft.	0.090	Ok	ES-t	1.35	1.00	1.00	1.0
LRFD	Crit.	4.63 ft.	0.201	Ok	ES-b	1.50	0.75	1.50	1.0
					LS-t	1.75	0.00	0.00	0.0
					LS-b	1.75	0.00	1.75	1.0



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No. Wall-2 @ Abutment C

Check: SCB 12/21/21

Critical Bearing:				5	2	3	4					
5	9	14	8	Eccentricity: $e = L/2 - y$		Meyerhof str. $\sigma_v = \Sigma V / (L - 2e)$						
				ASD	LRFD	Max Load Factor	Factored Load	Min Load Factor	Factored Load	Crit. Load Factor	Factored Load	
Moments: Counter-Clockwise				Un-factored								
5	Earth Pressure	←	165.80	EH	1.0	165.80	1.50	248.70	0.90	149.22	1.50	248.70
8	Surch. Dead: Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch. traffic: Behind	←	49.50	LS-b	1.0	49.50	1.75	86.63	0.00	0.00	1.75	86.63
Total: Counter-Clockwise Moments				ΣM_-	215.30	---	335.33	---	149.22	---	335.33	
Moments: Clockwise				5	9	11	8					
1	Reinforced Mass	↓	833.18	EV	1.0	833.18	1.35	1124.79	1.00	833.18	1.35	1124.79
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch. Traffic: Top	↓	66.13	LS-t	1.0	66.13	1.75	115.73	0.00	0.00	1.75	115.73
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total: Clockwise Moments				ΣM_+	899.31	---	1240.52	---	833.18	---	1240.52	
Vertical Load				5	9	11	8					
1	Reinforced Mass	↓	72.45	EV	1.0	72.45	1.35	97.81	1.00	72.45	1.35	97.81
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch. Traffic: Top	↓	5.75	LS-t	1.0	5.75	1.75	10.06	0.00	0.00	1.75	10.06
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.00	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical Loads				ΣV	78.20	---	107.87	---	72.45	---	107.87	
Resultant from point A, y (ft.)					8.75	---	8.39	---	9.44	---	8.39	
									1.5		1.75	

Results:	ASD	LRFD	LRFD	LRFD	Load F	Max	Min	Crit	ASD
	Ser.	Max	Min	Crit.	EV	1.35	1.00	1.35	1.0
ΣV (kips)	78.20	107.87	72.45	107.87	EH	1.50	0.90	1.50	1.0
(ft)	8.75	8.39	9.44	8.39	ES-t	1.35	1.00	1.50	1.0
$e = L/2 - y$ (ft)	2.75	3.11	2.06	3.11	ES-b	1.50	0.75	1.50	1.0
e/L	0.120	0.135	0.090	0.135	LS-t	1.75	0.00	1.75	1.0
$\sigma_v = \Sigma V / (L - 2e)$ (ksf)	4.470	6.427	3.837	6.427	LS-b	1.75	0.00	1.75	1.0

1.50 Chosen to match MSE-W approach



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No. Wall-2 @ Abutment C

Check: **SCB 12/21/21**

Critical Bearing (ctd):

Foundation Length $L_w = 23.0$ ft.

Mayerhof Bearing Capacity/Nominal Resistance, $q_{ult} = 20.96$ ksf

ASD *Values corresponds to un-factored loads & capacities*

Eccentricity	e	2.75 ft.
Vertical Loads, un-factored	ΣV	72.45 kips/LF
Required Allowable Bearing Capacity	$\sigma_v =$	4.14 ksf
Ultimate Bearing Capacity	$q_{ult} =$	20.96 ksf
Factor of Safety against Bearing	$FS_{bearing} =$	5.061

LRFD *Values corresponds to maximum load factors*

		Serv.	Max	Min	Crit.
Eccentricity	e	2.75	3.11	2.06	3.11
Vertical Loads, un-factored	ΣV	78.20	107.87	72.45	107.87
Required Factored Bearing Stress	$\sigma_v =$	4.47	6.43	3.84	6.43
Nominal Bearing Capacity	$q_{ult} =$	20.96	20.96	20.96	20.96
Resistance factor for Bearing:	$\Phi_b =$	0.5	0.65	0.65	0.65
Factored Bearing Resistance		10.48	13.62	13.62	13.62
	CDR =	2.34	2.12	3.55	2.12
	Bearing Resistance: $CDR_{min} =$	2.12			

Summary:

LRFD CDR	Target	Calc.	
Sliding	1.00	1.48	ok
Bearing	1.00	2.12	

ASD FS	Target	Calc.
Sliding	2.00	2.28
Bearing	3.00	5.06

Eccentricity	Max	ASD	LRFD
e/L	0.250	0.129	0.201
		ok	ok

Bearing Resistance / Capacity

Required Factored Bearing Resistance: 6.43 ksf

Required Allowable Bearing Capacity: 4.14 ksf

Notes: For excentricity and sliding



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

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Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/14/2021

Str. No.: Wall-2 @ Abutment C

Check: SCB 12/21/21

EVALUATION OF NOMINAL BEARING RESISTANCE

DATA FROM PREVIOUS SHEETS:

Soil Parameters				20.96
Cohesion $c =$	0.0 psf	Foundatn Subgr. Soil Unit Wt. γ_{fs}	125.0 pcf	
Friction Ang. $\phi_f =$	32.0 degree	Surcharge Soil Unit Wt. γ_{sur}	120.0 pcf	
Soils above footing bearing are as competent as subgrade soils?				Yes
Foundation Dimensions				
Footing Width $B =$	23.00 ft.	Footing Depth $D_f =$	2.00 ft	
Footing Length $L =$	36.00 ft.	G. Water Depth $D_w =$	50.00 ft	
Foundation Loads:				
Unfactored Vert. Load $V =$	72.5 kips	Load Angle θ	0.0 deg	
Unfactored Horz. Load $H =$	19.9 kips	Moment:	----	
Eccentricity: $e_b =$	3.0 ft.	$(<5.8) ok$	$e_L (ft) =$	$(<9.0) ok$

CALCULATION OF BEARING NOMINAL RESISTANCE:

Bearing Capacity Factors :				
$N_c = (N_q - 1) \cot \phi$	$N_\gamma = 2 (N_q + 1) \tan \phi$	$N_q = e^{(\gamma \tan \phi)} \tan^2(45^\circ + \phi/2)$		
$N_c = 35.49$	$N_\gamma = 30.21$	$N_q = 23.18$		
Effective Footing Dimensions:		(Area reduction for assumed eccentricity)		
$B' = B - 2e_b = 17.1$	ft	$L' = L - 2e_L =$	36.0 ft	
Footing Shape Correction Factors:				
For $\phi = 0$	$S_c = 1 + (B'/5L')$	$S_\gamma = 1.0$	$S_q = 1$	
For $\phi > 0$	$S_c = 1 + (B'/L') (N_q/N_c)$	$S_\gamma = 1 - 0.4 (B'/L')$	$S_q = 1 + (B'/L') \tan \phi$	
	$S_c = 0.963$	$S_\gamma = 0.81$	$S_q = 1.296$	
Groundwater Correction Factors				
$C_{wq} =$	1.000	$C_{w\gamma} =$	1.000	
Depth Correction Factor:				
Competent surcharge soils:	Yes	$D_f/B = 0.12$	$d_q = 1.00$	
Load Inclination Factors:				
$i_c =$	1.000	$i_q =$	0.640	
		$i_\gamma =$	0.465	
Nominal Bearing Resistance:				
$q_n = c (N_c S_c i_c) + \gamma_{sur} D_f (N_q S_q d_q i_q) C_{wq} + 0.5 \gamma_{fs} B (N_\gamma S_\gamma i_\gamma) C_{w\gamma}$			ASD FOS	
C term	0.00	q term	4.62	B term
			16.34	LRFD Φ_q
$q_n = 20.96$	ksf	Allowable q	10.48	ksf
		Factored q	13.62	ksf

NOTES:

Calc based on assumed foundation length and water table depth.



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: **Opitz Blve**

WRA#: **032023.000**

Design: **skk 01/03/2021**

Str. No. **Walls 1 & 3 at Abut.C**

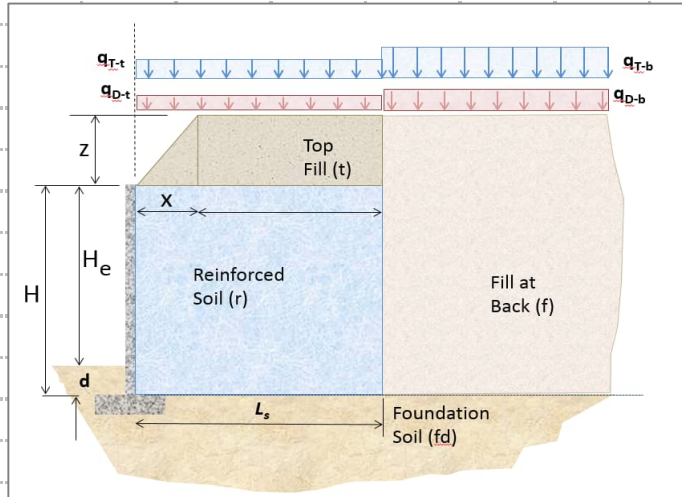
Wall No.: **Max H=30'**

Check: **scb 01/03/2022**

Assumptions/Notes:

Front of the abutment is modeled as a triangular portion.

Lateral loads behind the wall are assumed to be horizontal (per MSE-W assumption for slope < 45 deg.)



Wall Configuration

Backfill Slope

Broken Back Slope:

Height z (ft.)= **10.00**

Length x (ft.)= **6.00**

Infinite Backfill: **Yes**

Infinite Slope β_{inf} = **0.00**

Fall face assumed vertical

α = **0.00 deg.**

Case	β_{eq}	Δh	h
5	0.00	0.00	30.00

Wall Dimensions

Exposed wall height	H_e =	28.00 ft.	<i>Table C.11.10.2.2-1 Minimum Embedment</i>
Embedded Height	d =	2.00 ft.	Minimum Embedment = $H/20$ 1.50 ok
Total Wall Length		36.00 ft. <==	(for bearing capacity calculations)

Reinforced Backfill	Friction Angle	ϕ_r =	34.0 degree	Unit Wt.	γ_r =	105.0 pcf	
Retained Fill (f) (above and behind reinf. zone)		ϕ_f =	34.0 degree		γ_f =	105.0 pcf	
Foundation Soil:		ϕ_{fd} =	30.0 degree		γ_{fd} =	120.0 pcf	
Cohesion:	c_{fd} =	0.0 psf	Mayerhof Bearing, q_{ult} =	16.64 ksf			
Top of wall Backfill	Friction Angle	ϕ_t =	34.0 degree	Unit Wt.	γ_t =	105.0 pcf	
Surcharge Loading							
Traffic @ wall Top	↓	q_{T-t} =	250 psf	Dead -top	↓	q_{D-t} =	0 psf
Traffic @ behind wall	↓	q_{T-b} =	250 psf	Dead -Behind	↓	q_{D-b} =	0 psf
Added horizontal Load	←	P_{BR-H} =	100 lb/LF				

Design Height and Estimated Reinforcement Length

Estimated Reinforcement Length :	L =	21.00 ft.	<i>Check for minimum L</i>
Design Height of the wall: $H = H_e + d$	H =	30.00 ft.	L_{min} = 7.0 ft. ok
Ratio for Estimated Reinforcement Length (> 0.7):	0.70	(L/H) <i>chk</i>	$L \leq 2H$ ok to use this spreadsheet

Results Summary

LRFD:		ASD:		Bearing Resistnace:	
Direct Sliding	CDR= 1.595	$FS_{sliding}$	2.450	Required Factored Bearing=	6.256 ksf
Bearing Resist.	CDR= 1.729	$FS_{bearing}$	4.106	Required Service Bearing=	4.053 ksf
e/L =	0.186	CDR= 1.344	Critical	e/L =	0.120
				e =	2.63 ft



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

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Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 01/03/2021

Str. No. Walls 1 & 3 at Abut.C

Check: scb 01/03/2022

Load Factors	EV	EH	ES	LS	Resistance Factors
Strength I (maximum)	1.35	1.50	1.50	1.75	Sliding of MSE wall on foundation soil: 1.00
Strength I (minimum)	1.00	0.90	0.75	0.00	Bearing resistance: 0.65
Service I	1.00	1.00	1.00	1.00	Tensile resistance (for steel strips): 0.75

Calculation of β_{eq} and h

$L = 21.0$ ft. $H = 30.0$ ft. $x =$ ft. $z =$ ft.

Case Description	β_{eq}	Δh	L_T	$L_R = L - L_T$
1 For $x < z$; $\beta_{eq} = 0$		$\Delta h = z$	$L_T = 0$	
2 $x < L$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = z$	$L_T = x$	
3 $L < x < 2H$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = Lz/x$	$L_T = L$	
4 $x > 2H$ $\beta_{eq} = \tan^{-1}(z/x)$		$\Delta h = Lz/x$	$L_T = L$	
5 Infinite $\beta_{eq} = \beta_{infinite}$	0.00	0.00	$L_T = L$	0.00 21.00
5 \Leftarrow Current Case $\beta_{eq} =$ 0.00 degree	0.00 degree	$\Delta h = 0.00$ ft.	0.00	21.00
$\beta_{eq} =$	$h = H + \Delta h$	$h = 30.00$ ft.		

Coulomb Active Earth Pressure Coefficient for Retained fill

Reference: Eq. 3.11.5.3-1 AASHTO

$$K_A = \frac{\sin^2(\theta + \phi')}{\sin^2\theta \sin(\theta - \delta) \left[1 + \sqrt{\frac{\sin(\phi + \delta) \sin(\phi' - \beta)}{\sin(\theta - \delta) \sin(\theta + \beta)}} \right]^2}$$

Note: $\phi' > \beta$ $\phi' = 34.0$ degree
 $\beta = 0.00$ degree
 $\theta = 90 + \alpha$ $\theta = 90.0$ degree
 $\delta = \beta$ $\delta = 0.0$ degree

$T_1 = 0.3127$ $T_2 = 1$ $\Gamma = [1 + \sqrt{(T_1/T_2)}]^2$ $\Gamma = 2.4311$
 $T_t = 0.6873$ $T_b = 1$ $K_A = T_t / (T_b * \Gamma)$ $K_{af} = 0.283$

Rankine Earth Pressure Coefficients

Equation 5.12 from FHWA-IF-03-017

$$K_A = \cos\beta \frac{\cos\beta - \sqrt{\cos^2\beta - \cos^2\phi'}}{\cos\beta + \sqrt{\cos^2\beta - \cos^2\phi'}}$$

(for comparison purposes)

$T_{sq} = 0.5592$ $T_{cos} = 1$
 $K_A = T_{cos}(T_{cos} - T_{sq}) / (T_{cos} + T_{sq})$
 $K_A = 0.283$

Note :



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 01/03/2021

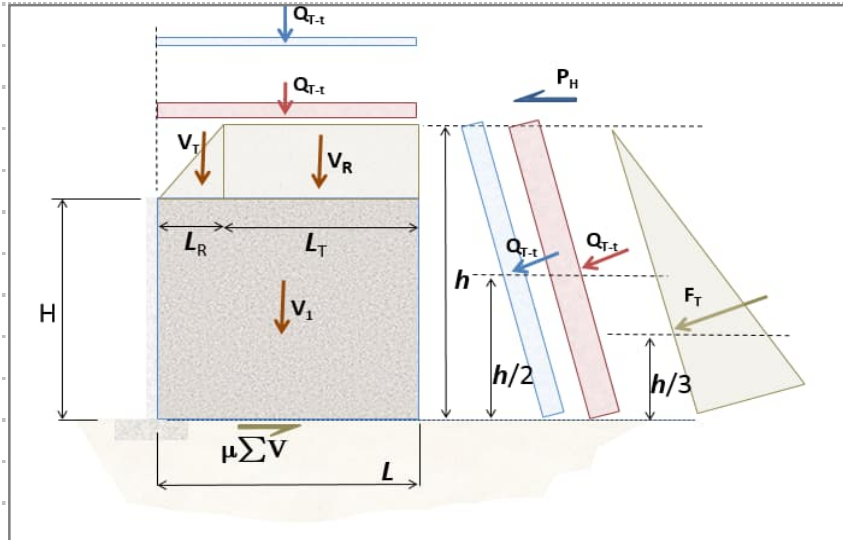
Str. No. Walls 1 & 3 at Abut.C

Check: scb 01/03/2022

Loads and Moments:

Data for Calculations:

- $L = 21.00$ ft.
- $H = 30.00$ ft.
- $h = 30.00$ ft.
- $L_T = 0.00$ ft.
- $L_R = 21.00$ ft.
- $K_{af} = 0.283$
- $\gamma_r = 105.0$ pcf
- $\gamma_t = 105.0$ pcf
- $\gamma_i = 105.0$ pcf
- $\beta = 0.00$ deg.
- $q_{D\ top} = 0$ psf
- $q_{D\ b} = 0$ psf
- $q_{T\ top} = 250$ psf
- $q_{T\ beh} = 250$ psf



$p_H = 100$ lb/LF rounding force = 2 length = 2

Un-factored Loads: Horizontal, Vertical & Moment about Point A

					(kips/LF)	Arm 12 (ft.)	M (ft. kips)
1	$V_1 = \gamma_r H L$	Reinforced Mass	EV	↓	$V_1 = 66.15$	$L/2 = 10.50$	694.58
2	$V_T = (1/2) \gamma_t (h-H) L_T$	Top Tringle Mass	EV	↓	$V_T = 0.00$	$2L_T/3 = 0.00$	0.00
3	$V_R = \gamma_t (h-H) L_R$	Top Rectangle Mass	EV	↓	$V_R = 0.00$	$L_T + L_R/2 = 10.50$	0.00
4	$F_{TV} = (1/2) \gamma_r h^2 K_{af} \sin \beta$ $F_T = 13.37$	Earth Pressure	EH	↓	$F_{TV} = 0.00$	$L = 21.00$	0.00
5	$F_{TH} = (1/2) \gamma_r h^2 K_{af} \cos \beta$	Earth Pressure	EH	←	$F_{TH} = 13.37$	$h/3 = 10.00$	133.70
6	$Q_{D\ top-V} = (q_{D\ top}) L$	Surch. Dead: Top	ES-t	↓	$Q_{D\ top-V} = 0.00$	$L/2 = 10.50$	0.00
7	$Q_{D\ V} = (q_D) h K_{af} \sin \beta$	Surch. Dead: Behind	ES-b	↓	$Q_{D\ V} = 0.00$	$L = 21.00$	0.00
8	$Q_{D\ H} = (q_D) h K_{af} \cos \beta$	Surch. Dead: Behind	ES-b	←	$Q_{D\ H} = 0.00$	$h/2 = 15.00$	0.00
9	$Q_{T\ top-V} = (q_T) L$	Surch. Traffic: Top	LS-t	↓	$Q_{T\ top-V} = 5.25$	$L/2 = 10.50$	55.13
10	$Q_{T\ V} = (q_{T-b}) h K_{af} \sin \beta$	Surch. Traffic: Behind	LS-b	↓	$Q_{T\ V} = 0.00$	$L = 21.00$	0.00
11	$Q_{T\ H} = (q_{T-b}) h K_{af} \cos \beta + P_{BR}$	Surch. traffic: Behind	LS-b	←	$Q_{T\ H} = 2.22$	$h/2 = 15.00$	33.30



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Static Sliding				5	2	3	4					
5	9	11	8	Strength I(max)		Strength I(Min)		Critical				
Horizontal Driving Forces				ASD		Max.Load Factor		Min.Load Factor		Crit.Load Factor		
Horizontal Forces				Factor	Load	Factor	Load	Factor	Load	Factor	Load	
5	Earth Pressure	←	13.37	EH	1.0	13.37	1.50	20.06	0.90	12.03	1.50	20.06
8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch.traffic:Behind	←	2.22	LS-b	1.0	2.22	1.75	3.89	0.00	0.00	1.75	3.89
Total Horizontal				$\Sigma H_{driving}$	15.59	---	23.94	---	12.03	---	23.94	---
Vertical Loads												
1	Reinforced Mass	↓	66.15	EV	1.0	66.15	1.35	89.30	1.00	66.15	1.00	66.15
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	5.25	LS-t	0.0	0.00	1.75	9.19	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical				ΣV	66.15	---	98.49	---	66.15	---	66.15	---
Resisting Horizontal Loads for				$\phi_{crit} = 30.00$	ASD	Max	Min	Crit.				
1	Reinforced Mass	↓			38.19	51.56	38.19	38.19				
2	Top Tringle Mass	↓			0.00	0.00	0.00	0.00				
3	Top Rectangle Mass	↓			0.00	0.00	0.00	0.00				
4	Earth Pressure	↓			0.00	0.00	0.00	0.00				
6	Surch.Dead:Top	↓			0.00	0.00	0.00	0.00				
7	Surch.Dead:Behind	↓			0.00	0.00	0.00	0.00				
9	Surch.Traffic:Top	↓			0.00	5.30	0.00	0.00				
10	Surch.Traffic:Behind	↓			0.00	0.00	0.00	0.00				
Cohesion				$C_H = c_{fd} L$	0.00	0.00	0.00	0.00				
				ΣV_{resist}	38.19	56.86	38.19	38.19				
Results												
ASD	$FS_{SL} = 2.450$			Load F	Max	Min	Crit	ASD				
LRFD	$CDR = 1.595$			EV	1.35	1.00	1.00	1.0				
Note:	For geogrid reinforced MSE, the sliding friction angle may be taken as minimum of ϕ_{rd} and two thirds of reinforced soil friction angle, $(2/3) \phi_r$			EH	1.50	0.90	1.50	1.0				
	$\phi_{rd} = 30.00$	Sliding $\phi_r = 34$		ES-t	1.35	1.00	1.00	1.0				
	$2/3 \phi_r = 22.67$	$\phi_{crit} = 22.67$		ES-b	1.50	0.75	1.50	1.0				
				LS-t	1.75	0.00	0.00	0.0				
				LS-b	1.75	0.00	1.75	1.0				



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

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Project: Opitz Blve

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Design: skk 01/03/2021

Str. No. Walls 1 & 3 at Abut.C

Check: scb 01/03/2022

Eccentricity: 5 2 3 4

5 9 8 ASD LRFD Max Load Factored Min Load Factored Crit Load Factored

Moments: Counter-Clockwise 14 Un-factored Factor Load Factor Load Factor Load

5	Earth Pressure	←	133.70	EH	1.0	133.70	1.50	200.55	0.90	120.33	1.50	200.55
---	----------------	---	--------	----	-----	--------	------	--------	------	--------	------	--------

8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

11	Surch.traffic:Behind	←	33.30	LS-b	1.0	33.30	1.75	58.28	0.00	0.00	1.75	58.28
----	----------------------	---	-------	------	-----	-------	------	-------	------	------	------	-------

Total: Counter-Clockwise Moments			ΣM_{-}			167.00	---	258.83	---	120.33	---	258.83
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Moments: Clockwise 14

1	Reinforced Mass	↓	694.58	EV	1.0	694.58	1.35	937.68	1.00	694.58	1.00	694.58
---	-----------------	---	--------	----	-----	--------	------	--------	------	--------	------	--------

2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	------------------	---	------	----	-----	------	------	------	------	------	------	------

3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	--------------------	---	------	----	-----	------	------	------	------	------	------	------

4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
---	----------------	---	------	----	-----	------	------	------	------	------	------	------

6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	----------------	---	------	------	-----	------	------	------	------	------	------	------

7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

9	Surch.Traffic:Top	↓	55.13	LS-t	0.0	0.00	1.75	96.48	0.00	0.00	0.00	0.00
---	-------------------	---	-------	------	-----	------	------	-------	------	------	------	------

10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
----	----------------------	---	------	------	-----	------	------	------	------	------	------	------

Total: Clockwise Moments			ΣM_{+}			694.58	---	1034.16	---	694.58	---	694.58
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Vertical Load 11

1	Reinforced Mass	↓	66.15	EV	1.0	66.15	1.35	89.30	1.00	66.15	1.00	66.15
---	-----------------	---	-------	----	-----	-------	------	-------	------	-------	------	-------

2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	------------------	---	------	----	-----	------	------	------	------	------	------	------

3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	--------------------	---	------	----	-----	------	------	------	------	------	------	------

4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
---	----------------	---	------	----	-----	------	------	------	------	------	------	------

6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
---	----------------	---	------	------	-----	------	------	------	------	------	------	------

7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

9	Surch.Traffic:Top	↓	5.25	LS-t	0.0	0.00	1.75	9.19	0.00	0.00	0.00	0.00
---	-------------------	---	------	------	-----	------	------	------	------	------	------	------

10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
----	----------------------	---	------	------	-----	------	------	------	------	------	------	------

Total Vertical Loads			ΣV			66.15	---	98.49	---	66.15	---	66.15
----------------------	--	--	------------	--	--	-------	-----	-------	-----	-------	-----	-------

Resultant from point A, y (ft.) 7.98 7.87 8.68 6.59

Eccentricity: $e = L/2 - y$ (ft.)

Results:

		$e = L/2 - y$	e/L		Load F	Max	Min	Crit	ASD
ASD		2.52 ft.	0.120	Ok	EV	1.35	1.00	1.00	1.0
LRFD	Max	2.63 ft.	0.125	Ok	EH	1.50	0.90	1.50	1.0
LRFD	Min	1.82 ft.	0.087	Ok	ES-t	1.35	1.00	1.00	1.0
LRFD	Crit.	3.91 ft.	0.186	Ok	ES-b	1.50	0.75	1.50	1.0
					LS-t	1.75	0.00	0.00	0.0
					LS-b	1.75	0.00	1.75	1.0



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

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Check: scb 01/03/2022

Critical Bearing:

5	9	14	8	5	2	3	4				
Eccentricity: $e = L/2 - y$				Meyerhof str. $\sigma_v = \Sigma V / (L - 2e)$							
ASD				LRFD							
Un-factored				Max Load Factor		Factored Load		Min Load Factor		Factored Load	

Moments: Counter-Clockwise

5	9	14	8	ASD	LRFD	Max Load Factor	Factored Load	Min Load Factor	Factored Load	Crit. Load Factor	Factored Load	
5	Earth Pressure	←	133.70	EH	1.0	133.70	1.50	200.55	0.90	120.33	1.50	200.55
8	Surch. Dead: Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch. traffic: Behind	←	33.30	LS-b	1.0	33.30	1.75	58.28	0.00	0.00	1.75	58.28
Total: Counter-Clockwise Moments ΣM_-					167.00	---	258.83	---	120.33	---	258.83	

Moments: Clockwise

5	9	14	8	ASD	LRFD	Max Load Factor	Factored Load	Min Load Factor	Factored Load	Crit. Load Factor	Factored Load	
1	Reinforced Mass	↓	694.58	EV	1.0	694.58	1.35	937.68	1.00	694.58	1.35	937.68
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch. Traffic: Top	↓	55.13	LS-t	1.0	55.13	1.75	96.48	0.00	0.00	1.75	96.48
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total: Clockwise Moments ΣM_+					749.71	---	1034.16	---	694.58	---	1034.16	

Vertical Load

5	9	11	8	ASD	LRFD	Max Load Factor	Factored Load	Min Load Factor	Factored Load	Crit. Load Factor	Factored Load	
1	Reinforced Mass	↓	66.15	EV	1.0	66.15	1.35	89.30	1.00	66.15	1.35	89.30
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch. Traffic: Top	↓	5.25	LS-t	1.0	5.25	1.75	9.19	0.00	0.00	1.75	9.19
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.00	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical Loads ΣV					71.40	---	98.49	---	66.15	---	98.49	

Resultant from point A, y (ft.)

8.16	7.87	8.68	7.87
------	------	------	------

1.5 1.75

Results:	ASD	LRFD	LRFD	LRFD	Load F	Max	Min	Crit	ASD
	Ser.	Max	Min	Crit.	EV	1.35	1.00	1.35	1.0
ΣV (kips)	71.40	98.49	66.15	98.49	EH	1.50	0.90	1.50	1.0
(ft)	8.16	7.87	8.68	7.87	ES-t	1.35	1.00	1.50	1.0
$e = L/2 - y$ (ft)	2.34	2.63	1.82	2.63	ES-b	1.50	0.75	1.50	1.0
e/L	0.111	0.125	0.087	0.125	LS-t	1.75	0.00	1.75	1.0
$\sigma_v = \Sigma V / (L - 2e)$ (ksf)	4.374	6.256	3.810	6.256	LS-b	1.75	0.00	1.75	1.0

1.50 Chosen to match MSE-W approach



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Static Sliding, Eccentricity & Bearing

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Critical Bearing (ctd):

Foundation Length $L_w = 21.0$ ft.

Mayerhof Bearing Capacity/Nominal Resistance, $q_{ult} = 16.64$ ksf

ASD Values corresponds to un-factored loads & capacities

Eccentricity $e = 2.34$ ft.

Vertical Loads, un-factored $\Sigma V = 66.15$ kips/LF

Required Allowable Bearing Capacity $\sigma_v = 4.05$ ksf

Ultimate Bearing Capacity $q_{ult} = 16.64$ ksf

Factor of Safety against Bearing $FS_{bearing} = 4.106$

LRFD Values corresponds to maximum load factors

		Serv.	Max	Min	Crit.
Eccentricity	e	2.34	2.63	1.82	2.63
Vertical Loads, un-factored	ΣV	71.40	98.49	66.15	98.49
Required Factored Bearing Stress	$\sigma_v =$	4.37	6.26	3.81	6.26
Nominal Bearing Capacity	$q_{ult} =$	16.64	16.64	16.64	16.64
Resistance factor for Bearing:	$\Phi_b =$	0.5	0.65	0.65	0.65
Factored Bearing Resistance		8.32	10.82	10.82	10.82
	CDR =	1.90	1.73	2.84	1.73
	Bearing Resistance: $CDR_{min} =$	1.73			

Summary:

LRFD CDR	Target	Calc.	
Sliding	1.00	1.60	ok
Bearing	1.00	1.73	

ASD FS	Target	Calc.
Sliding	2.00	2.45
Bearing	3.00	4.11

Eccentricity	Max	ASD	LRFD
e/L	0.250	0.120	0.186
		ok	ok

Bearing Resistance / Capacity

Required Factored Bearing Resistance: 6.26 ksf

Required Allowable Bearing Capacity: 4.05 ksf

Notes: For excentricity and sliding



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 01/03/2021

Str. No.: Walls 1 & 3 at Abut.C

Check: scb 01/03/2022

EVALUATION OF NOMINAL BEARING RESISTANCE

DATA FROM PREVIOUS SHEETS:

Soil Parameters				16.64
Cohesion $c =$	0.0 psf	Foundatn Subgr. Soil Unit Wt. γ_{fs}	125.0 pcf	
Friction Ang. $\phi_f =$	30.0 degree	Surcharge Soil Unit Wt. γ_{sur}	120.0 pcf	
Soils above footing bearing are as competent as subgrade soils?				Yes
Foundation Dimensions				
Footing Width $B =$	21.00 ft.	Footing Depth $D_f =$	2.00 ft	
Footing Length $L =$	36.00 ft.	G.Water Depth $D_w =$	50.00 ft	
Foundation Loads:				
Unfactored Vert. Load $V =$	66.2 kips	Load Angle θ	0.0 deg	
Unfactored Horz. Load $H =$	15.6 kips	Moment:	----	
Eccentricity: $e_b =$	2.5 ft.	$(<5.3) ok$	$e_L (ft) =$	$(<9.0) ok$

CALCULATION OF BEARING NOMINAL RESISTANCE:

Bearing Capacity Factors :			
$N_c = (N_q - 1) \cot \phi$	$N_\gamma = 2 (N_q + 1) \tan \phi$	$N_q = e^{(\gamma \tan \phi)} \tan^2(45^\circ + \phi/2)$	
$N_c = 30.14$	$N_\gamma = 22.40$	$N_q = 18.40$	
Effective Footing Dimensions:		(Area reduction for assumed eccentricity)	
$B' = B - 2e_b =$	16.0 ft	$L' = L - 2e_L =$	36.0 ft
Footing Shape Correction Factors:			
For $\phi = 0$	$S_c = 1 + (B'/5L')$	$S_\gamma = 1.0$	$S_q = 1$
For $\phi > 0$	$S_c = 1 + (B'/L') (N_q/N_c)$	$S_\gamma = 1 - 0.4 (B'/L')$	$S_q = 1 + (B'/L') \tan \phi$
	$S_c = 0.881$	$S_\gamma = 0.823$	$S_q = 1.256$
Groundwater Correction Factors			
$C_{wq} =$	1.000	$C_{w\gamma} =$	1.000
Depth Correction Factor:			
Competent surcharge soils:	Yes	$D_f/B =$	0.13
		$d_q =$	1.00
Load Inclination Factors:			
$i_c =$	1.000	$i_q =$	0.529
Nominal Bearing Resistance:			
$q_n = c (N_c S_c i_c) + \gamma_{sur} D_f (N_q S_q d_q i_q) C_{wq} + 0.5 \gamma_{fs} B (N_\gamma S_\gamma i_\gamma) C_{w\gamma}$			ASD FOS
C term 0.00	q term 3.84	B term 12.80	LRFD Φ_q
$q_n = 16.64$ ksf	Allowable q	8.32 ksf	Factored q 10.82 ksf

NOTES:

Calc based on assumed foundation length and water table depth.

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- E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50



Project Data

Project:	Opitz Blvd Express Lane	Location:	Abutment C
WRA WO#:	45893-001	Date:	11/4/2021
Subject:	T-Ramp Loading at the edge.		

Calculation / Check

Calc :	JY
Date:	4 - Nov - 21
Chk:	sk
Date:	14 - Dec - 21

Subsurface Test Borings	B-A2-1	SPT Hammer Efficiency					
Number of Layers (up to 14)	5	Rig No.	E_m	Soil Types for C'	1	1 - Clean Uniform medium SAND	
Depth to Groundwater (ft):	20	1. CME 55 (E2CR)	84%	Curve Selection	2	2 - Well Graded Silty SAND and GRAVEL	
SPT Corrected for overburden (Yes/No)	Yes	2. CME 45 (F&R)	78%		3	3 - Clean well graded fine to coarse Silty SAND	
SPT Correction for Efficiency (Yes/No)	Yes	3. Salut	88%	$E_m = 88\%$	4	4 - Well graded fine to medium Silty SAND	
Select the Rig for Hammer Eff.	3. Salut	4. CME 45 Cathead	66%	$\gamma_{water} = 62.4$	5	5 - Inorganic SILT	Yes
							No

Layer Data

Layer No.	Bottom Depth (ft)	SPT N Value	Soil Unit Wt. (pcf)	Curve for Bearing Capacity Index-C'			Soil Layer		Overburden		SPT N Value (correctd)	C' (top)	C' (bott)	C'	
				Soil	Top	% Top	Description	Top (z ₁) (ft)	Bott.(z ₂) (ft)	center p _c (psf)					bottom p ₂ (psf)
				USCS	Curve	Curve									
1	3.0	19	115.0	SM	1	100.0	100% Ty.1+0% Ty.2	0.0	3.0	172.5	345.0	56	294	195	294
2	6.5	7	120.0	SM	1	100.0	100% Ty.1+0% Ty.2	3.0	6.5	555.0	765.0	19	85	75	85
3	25.0	15	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	6.5	25.0	1921.3	2765.5	22	94	82	94
4	50.0	70	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	25.0	50.0	3548.0	4330.5	77	557	315	557
5	100.0	100	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	50.0	100.0	5895.5	7460.5	85	697	375	697

Project: Opitz Blvd Express Lane

Location: Abutment C

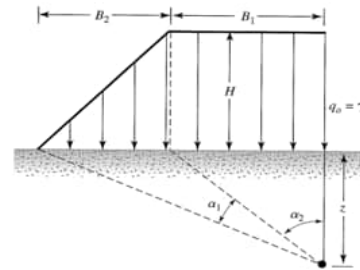
Subject:

Subject: T-Ramp Loading at the edge.

Stress Distribution for Two Areas

	Area 1	Area 2	Area 3
Multiplier	1	1	0
Height of Embankment	26	26	0
Soil Unit Weight	105	105	0
Rectangular Loading Width B_1	18	18	0
Triangular Loading Width B_2	0	0	0
FHWA Recommended factor for final settlement: k_{FHWA}			0.5
Default Min. Value for B_2 =	1E-10		

Formulas:



$$\Delta\sigma_z = \frac{q_o}{\pi} \left[\left(\frac{B_1 + B_2}{B_2} \right) (\alpha_1 + \alpha_2) - \frac{B_1}{B_2} (\alpha_2) \right]$$

$$\Delta H = H \left(\frac{1}{C'} \right) \log_{10} \frac{p_o + \Delta p}{p_o}$$

Settlement Calculations:

Layer Data					Angles (radians)						Influence Factors			$q_0^{(a)}$	$q_0^{(b)}$	$q_0^{(c)}$	Total Δp	Settlements		
Layer No.	Middle Depth z_{mid} (ft)	Layer Thick. h_i (ft)	Overbr. Press. p_o (psf)	Bear. Factor C'	Area (a)		Area (b)		Area (c)		Area(a)	Area (b)	Area (c)	$q_0^* I_z^{(c)}$	$q_0^* I_z^{(c)}$	$q_0^* I_z^{(c)}$		Per Layer (inch)	Cumulative (inch)	
					B_1	B_2	B_1	B_2	B_1	B_2				$\Delta p^{(a)}$ (psf)	$\Delta p^{(b)}$ (psf)	$\Delta p^{(c)}$ (psf)				
					$\alpha_1^{(a)}$	$\alpha_2^{(a)}$	$\alpha_1^{(b)}$	$\alpha_2^{(b)}$	$\alpha_1^{(c)}$	$\alpha_2^{(c)}$	$I_z^{(a)}$	$I_z^{(b)}$	$I_z^{(c)}$							
1	1.5	3.0	172.5	294	0.000	1.488	0.000	1.488	0.000	0.000	0.474	0.474	0.000	1292.7	1292.7	0.0	2585.3	0.15	0.15	
2	4.8	3.5	555.0	85	0.000	1.313	0.000	1.313	0.000	0.000	0.418	0.418	0.000	1140.9	1140.9	0.0	2281.7	0.35	0.50	
3	15.8	18.5	1921.3	94	0.000	0.852	0.000	0.852	0.000	0.000	0.271	0.271	0.000	740.4	740.4	0.0	1480.8	0.59	1.08	
4	37.5	25.0	3548.0	557	0.000	0.448	0.000	0.448	0.000	0.000	0.142	0.142	0.000	388.8	388.8	0.0	777.5	0.05	1.13	
5	75.0	50.0	5895.5	697	0.000	0.236	0.000	0.236	0.000	0.000	0.075	0.075	0.000	204.8	204.8	0.0	409.5	0.03	1.16	
																	Total $\Delta H =$		1.16 inches	
Final settlement					$(k_{FHWA} * \Delta H)$						1.16 x 0.50 =			0.58 inches (center and middle of infinite strip)						

Edge of at aboutment, loading is half

0.29 inches. (at the pile locations, 60 %)

Elastic Stress Distribution

Ref: Das, Braja M, (2001), *Principles of Geotechnical Engineering*,
5th Edition, Brooks/Cole - Thomson Learning, Inc. Pacific Grove, California

9.5

Vertical Stress Due to Embankment Loading

Figure 9.10 shows the cross section of an embankment of height H . For this two-dimensional loading condition the vertical stress increase may be expressed as

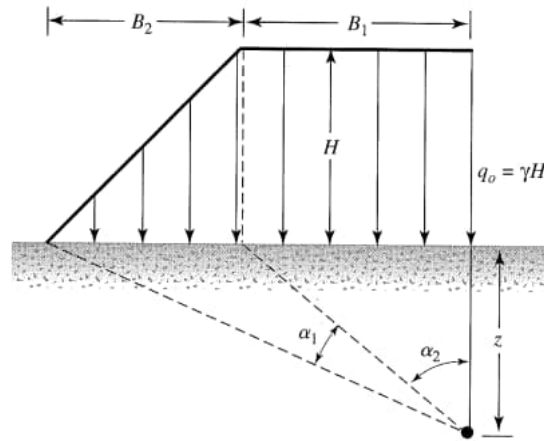


Figure 9.10
Embankment loading

$$\Delta\sigma_z = \frac{q_0}{\pi} \left[\left(\frac{B_1 + B_2}{B_2} \right) (\alpha_1 + \alpha_2) - \frac{B_1}{B_2} (\alpha_2) \right] \quad (9.19)$$

where $q_0 = \gamma H$

γ = unit weight of the embankment soil

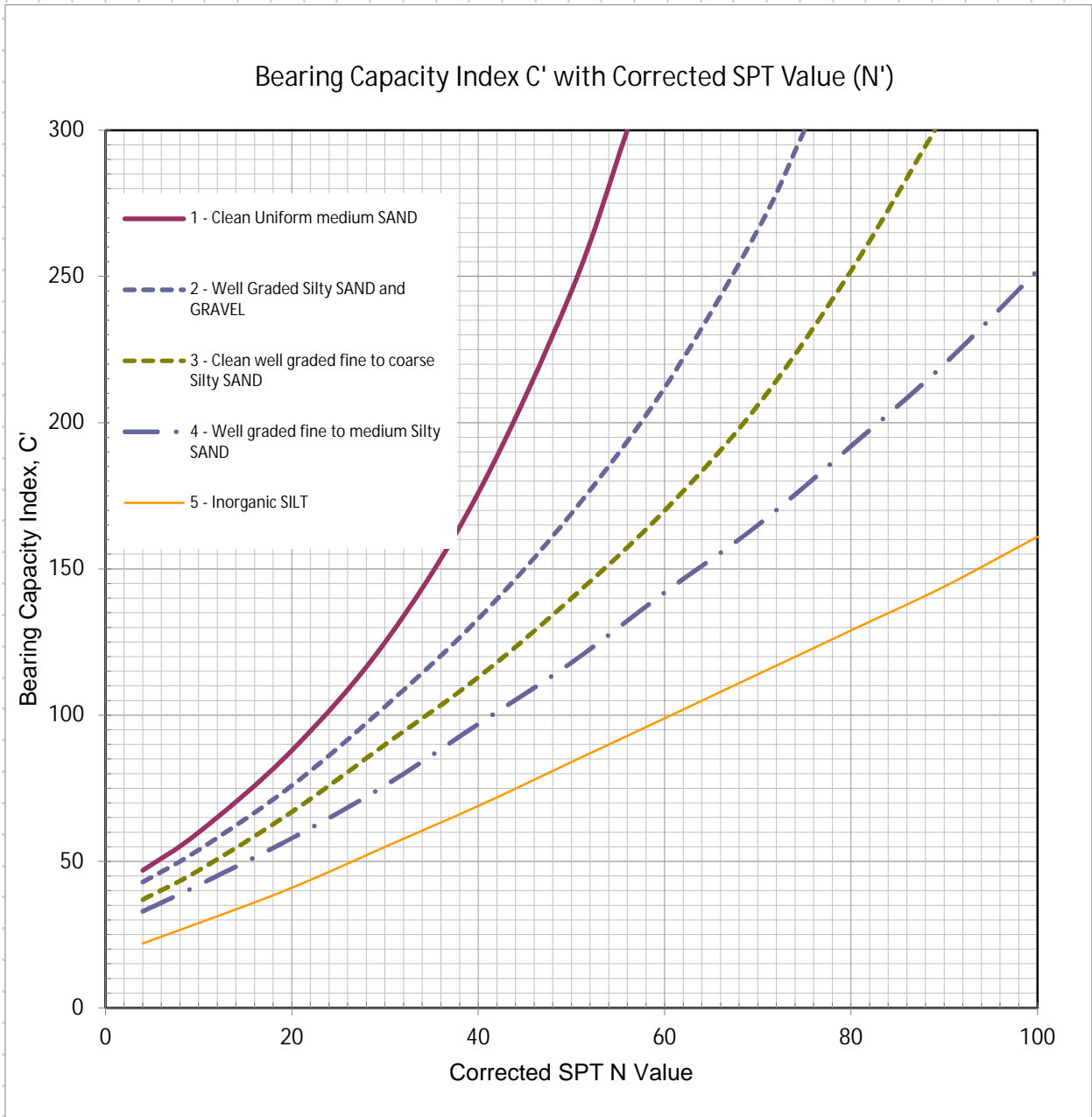
H = height of the embankment

$$\alpha_1 \text{ (radians)} = \tan^{-1} \left(\frac{B_1 + B_2}{z} \right) - \tan^{-1} \left(\frac{B_1}{z} \right) \quad (9.20)$$

$$\alpha_2 = \tan^{-1} \left(\frac{B_1}{z} \right) \quad (9.21)$$

Reference: **FHWA (2006) Soils and Foundation, FHWA-NHI-06-088 (2006) Vol 1**

Figure 7.7



Settlement

$$\Delta H = H \left(\frac{1}{C'} \right) \log_{10} \frac{p_o + \Delta p}{p_o}$$

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BACK-TO-BACK
MSE (BBMSC)
WALLS

Version 01.00 sk 12/14/2021

Project: *Opitz Blvd*
Virginia
Structure: *T-Ramp Back-to-Back Walls, Wall 1 & Wall 3.*
Calc by: *skk 12/14/2021* Chk by:

Sheet 1 of 2

WRA No. 445893-000

Wall Data

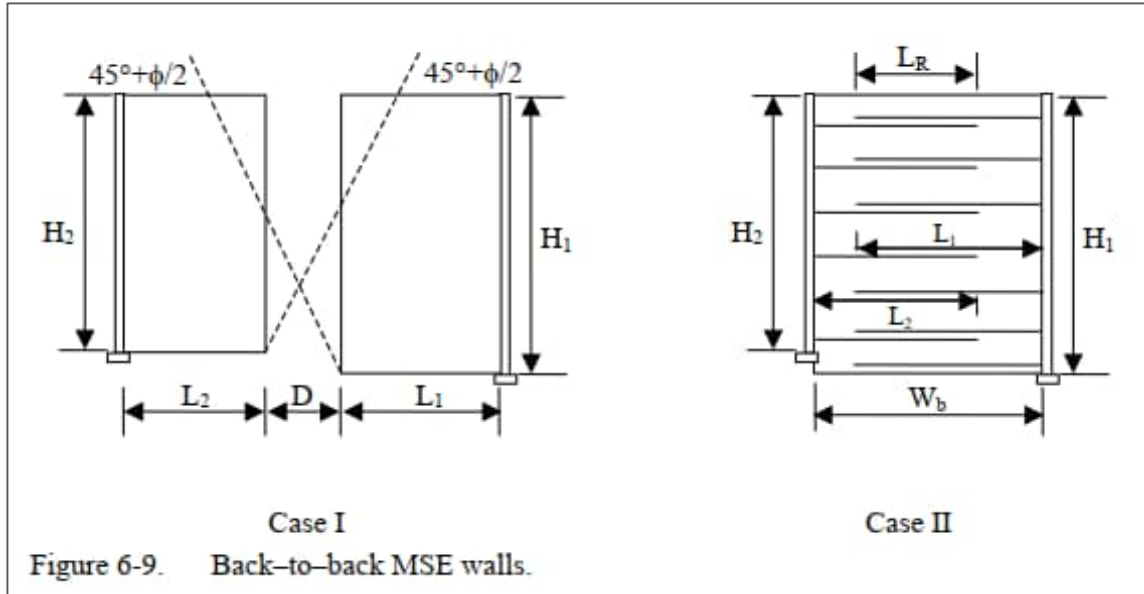
Friction Angle (Reinforced fill) ϕ 34 deg Reinforcement Lengths 0.7 H
 Total Width of the Ramp W_b 36.3 ft. Minimum strap Length 8.0 ft.
 Depth below subgrade 2.0 ft.
 Wall height above Parapet 3.0 ft. Minimum distance for Back to Back Walls
 Wall height included in Clear Height 1.0 ft. Min for BBMSE, D_{min} 2.0 ft
 Amount to be added to clear height h_a 4.0 ft. $D^* = H_1 \tan(45^\circ - \phi/2)$

Wall Station (ft.)	Drawing Readings From Drawings (h_o)		Exposed Height h_c $h_e = h_c + h_a$		Effective Heights $h_{eff} = h_o + h_a$		Sorted	
	West Wall (ft.)	East Wall (ft.)	West Wall (ft.)	East Wall (ft.)	West Wall (ft.)	East Wall (ft.)	Taller Wall	Shorter Wall
							H_1 (ft.)	H_2 (ft.)
27+00	22.0	26.0	24.0	28.0	26.0	30.0	30.0	26.0
26+50	20.0	24.0	22.0	26.0	24.0	28.0	28.0	24.0
26+00	20.0	23.0	22.0	25.0	24.0	27.0	27.0	24.0
25+50	18.0	22.0	20.0	24.0	22.0	26.0	26.0	22.0
25+00	17.0	19.0	19.0	21.0	21.0	23.0	23.0	21.0
24+50	15.0	15.0	17.0	17.0	19.0	19.0	19.0	19.0
24+00	13.0	13.0	15.0	15.0	17.0	17.0	17.0	17.0
23+50	11.0	11.0	13.0	13.0	15.0	15.0	15.0	15.0
23+00	9.0	9.0	11.0	11.0	13.0	13.0	13.0	13.0
22+50	6.0	6.0	8.0	8.0	10.0	10.0	10.0	10.0

Wall Station (ft.)	L_1 (ft.)	L_2 (ft.)	D ($W_b - L_1 - L_2$) (ft.)	D^* (ft.)	L_R (ft.)	Conditions for Back to Back		Design Strap Length	
						$W_b/H_1 > 1.1$	$D < D^*$	L_{1D} (ft.)	L_{2D} (ft.)
27+00	21.0	18.2	-2.9	16.0	7.8	1.2	BBMSE	23.5	20.7
26+50	19.6	16.8	-0.1	14.9	7.2	1.3	BBMSE	23.2	20.4
26+00	18.9	16.8	0.6	14.4	7.2	1.3	BBMSE	22.8	20.7
25+50	18.2	15.4	2.7	13.8	6.6	1.4	MSE	18.2	15.4
25+00	16.1	14.7	5.5	12.2	6.3	1.6	MSE	16.1	14.7
24+50	13.3	13.3	9.7	10.1	5.7	1.9	MSE	13.3	13.3
24+00	11.9	11.9	12.5	9.0	5.1	2.1	MSE	11.9	11.9
23+50	10.5	10.5	15.3	8.0	4.5	2.4	MSE	10.5	10.5
23+00	9.1	9.1	18.1	6.9	3.9	2.8	MSE	9.1	9.1
22+50	8.0	8.0	20.3	5.3	3.0	3.6	MSE	8.0	8.0

Notes from the Reference:

FHWA NHL-10-024
MSE Walls and RSS – Vol I



Case I

- (i) $D > 0$ (must). (ii) D may be greater than D_{min} and/or D^*

Case II

For Case II geometries with overlaps (L_R) greater than $0.3H_2$, the following guidelines should be used:

- $L_1/H_1 \geq 0.6$ where L_1 and H_1 is the length of the reinforcement and height, respectively, of the taller wall.
- $L_2/H_2 \geq 0.6$ where L_2 and H_2 is the length of the reinforcement and height, respectively of the shorter wall.
- $W_b/H_1 \geq 1.1$ where W_b is the base width as shown in Figure 6-9 and H_1 is the height of the taller wall.

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- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50



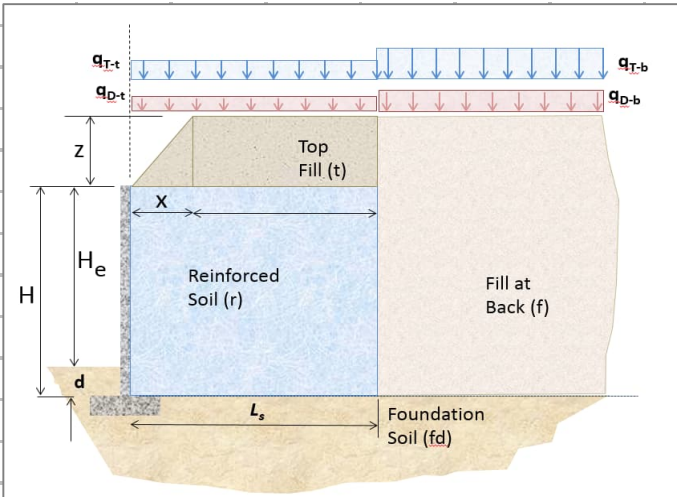
MSE Wall - External Stability Check
Static Sliding, Eccentricity & Bearing
 Ref: FHWA-NHI-10-024 & 025

Version: 2016-06
 Coding: skk 10/27/2016
 Validation: scb by MSE-W 10/31

Project: Opitz Blue	WRA#: 032023.000	Design: skk 12/20/2021
Wall ID Walls 1 & 3, Sta. 24+50 (h=19')	Wall No.: Wall 1&3	Check: scb 12/20/2021

Assumptions/Notes:

- Front of the abutment is modeled as a triangular portion.
- Lateral loads behind the wall are assumed to be horizontal (per MSE-W assumption for slope < 45 deg.)



Wall Configuration			
Backfill Slope			
Broken Back Slope:			
Height z (ft.)=	10.00		
Length x (ft.)=	6.00		
Infinite Backfill:	Yes		
Infinite Slope β_{inf} =	0.00		
Fall face assumed vertical			
α =	0.00 deg.		
Case	β_{eq}	Δh	h
5	0.00	0.00	19.00

Wall Dimensions

Exposed wall height	$H_e =$	17.00 ft.	Table C.11..10.2.2.-1 Minimum Embedment
Embedded Height	$d =$	2.00 ft.	Minimum Embedment = $H/20$ 0.95 ok
Total Wall Length		50.00 ft.	<== (for bearing capacity calculations)

Reinforced Backfill	Friction Angle	$\phi_r =$	34.0 degree	Unit Wt:	$\gamma_r =$	105.0 pcf
Retained Fill (f) (above and behind reinf. zone)		$\phi_f =$	34.0 degree		$\gamma_f =$	105.0 pcf
Foundation Soil:		$\phi_{fd} =$	30.0 degree		$\gamma_{fd} =$	110.0 pcf
Cohesion:	$c_{fd} =$	0.0 psf	Mayerhof Bearing, $q_{ult} =$	12.31 ksf		

Top of wall Backfill	Friction Angle	$\phi_t =$	34.0 degree	Unit Wt:	$\gamma_t =$	105.0 pcf
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Surcharge Loading

Traffic @ wall Top	↓	$q_{T-t} =$	250 psf	Dead -top	↓	$q_{D-t} =$	0 psf
Traffic @ behind wall	↓	$q_{T-b} =$	250 psf	Dead -Behind	↓	$q_{D-b} =$	0 psf
Added horizontal Load	←	$P_{BR-H} =$	0 lb/LF				

Design Height and Estimated Reinforcement Length

Estimated Reinforcement Length :	$L =$	13.40 ft.	Check for minimum L
Design Height of the wall: $H = H_e + d$	$H =$	19.00 ft.	$L_{min} =$ 7.0 ft. ok
Ratio for Estimated Reinforcement Length (> 0.7):	0.71	(L/H) ok	$L \leq 2H$ ok to use this spreadsheet

Results Summary

LRFD:	ASD:	Bearing Resistnace:
Direct Sliding CDR= 1.486	$FS_{Sliding} =$ 2.303	Required Factored Bearing= 4.232 ksf
Bearing Resist. CDR= 1.891	$FS_{bearing} =$ 4.743	Required Service Bearing= 2.596 ksf
1.225 $e/L =$ 0.204 Critical	$e/L =$ 0.130	$e/L =$ 0.130 $e =$ 1.74 ft



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Load Factors	EV	EH	ES	LS	Resistance Factors
Strength I (maximum)	1.35	1.50	1.50	1.75	Sliding of MSE wall on foundation soil 1.00
Strength I (minimum)	1.00	0.90	0.75	0.00	Bearing resistance 0.65
Service I	1.00	1.00	1.00	1.00	Tensile resistance (for steel strips) 0.75

Calculation of β_{eq} and h

$L = 13.4$ ft. $H = 19.0$ ft. $x =$ ft. $z =$ ft.

Case Description	β_{eq}	Δh	L_T	$L_R = L - L_T$
1 For $x < z$: $\beta_{eq} = 0$		$\Delta h = z$	$L_T = 0$	
2 $x < L$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = z$	$L_T = x$	
3 $L < x < 2H$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = Lz/x$	$L_T = L$	
4 $x > 2H$ $\beta_{eq} = \tan^{-1}(z/x)$		$\Delta h = Lz/x$	$L_T = L$	
5 Infinite $\beta_{eq} = \beta_{infinite}$	0.00	0.00	$L_T = L$	0.00 13.40
5 \leq Current Case	$\beta_{eq} = 0.00$ degree	$\Delta h = 0.00$ ft.	0.00	13.40
	$\beta_{eq} =$	$h = H + \Delta h$		$h = 19.00$ ft.

Coulomb Active Earth Pressure Coefficient for Retained fill

Reference: Eq. 3.11.5.3-1 AASHTO

$$K_A = \frac{\sin^2(\theta + \phi')}{\sin^2\theta \sin(\theta - \delta) \left[1 + \sqrt{\frac{\sin(\phi + \delta) \sin(\phi' - \beta)}{\sin(\theta - \delta) \sin(\theta + \beta)}} \right]^2}$$

Note: $\phi' > \beta$ $\phi' = 34.0$ degree
 $\beta = 0.00$ degree
 $\theta = 90 + \alpha$ $\theta = 90.0$ degree
 $\delta = \beta$ $\delta = 0.0$ degree

$T_1 = 0.3127$ $T_2 = 1$ $\Gamma = [1 + \sqrt{T_1/T_2}]^2$ $\Gamma = 2.4311$
 $T_t = 0.6873$ $T_b = 1$ $K_A = T_t / (T_b * \Gamma)$ $K_{af} = 0.283$

Rankine Earth Pressure Coefficients

Equation 5.12 from FHWA-IF-03-017

$$K_A = \cos\beta \frac{\cos\beta - \sqrt{\cos^2\beta - \cos^2\phi'}}{\cos\beta + \sqrt{\cos^2\beta - \cos^2\phi'}}$$

(for comparison purposes)
 $T_{sq} = 0.5592$ $T_{cos} = 1$
 $K_A = T_{cos}(T_{cons} - T_{sq}) / (T_{cos} + T_{sq})$
 $K_A = 0.283$

Note :



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

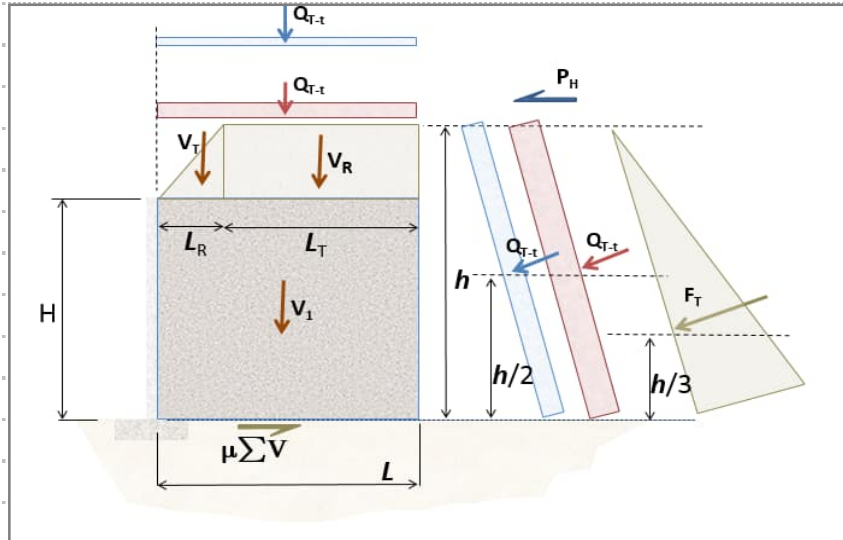
Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Loads and Moments:

Data for Calculations:

- $L = 13.40$ ft.
- $H = 19.00$ ft.
- $h = 19.00$ ft.
- $L_T = 0.00$ ft.
- $L_R = 13.40$ ft.
- $K_{af} = 0.283$
- $\gamma_r = 105.0$ pcf
- $\gamma_t = 105.0$ pcf
- $\gamma_i = 105.0$ pcf
- $\beta = 0.00$ deg.
- $q_{D\ top} = 0$ psf
- $q_{D\ b} = 0$ psf
- $q_{T\ top} = 250$ psf
- $q_{T\ beh} = 250$ psf



Un-factored Loads: Horizontal, Vertical & Moment about Point A

					Force	Arm	M
					(kips/LF)	12 (ft.)	(ft. kips)
1	$V_1 = \gamma_r H L$	Reinforced Mass	EV	↓	$V_1 = 26.73$	$L/2 = 6.70$	179.09
2	$V_T = (1/2) \gamma_t (h-H) L_T$	Top Triangle Mass	EV	↓	$V_T = 0.00$	$2L_T/3 = 0.00$	0.00
3	$V_R = \gamma_t (h-H) L_R$	Top Rectangle Mass	EV	↓	$V_R = 0.00$	$L_T + L_R/2 = 6.70$	0.00
4	$F_{TV} = (1/2) \gamma_r h^2 K_{af} \sin \beta$ $F_T = 5.36$	Earth Pressure	EH	↓	$F_{TV} = 0.00$	$L = 13.40$	0.00
5	$F_{TH} = (1/2) \gamma_r h^2 K_{af} \cos \beta$	Earth Pressure	EH	←	$F_{TH} = 5.36$	$h/3 = 6.33$	33.93
6	$Q_{D\ top-V} = (q_{D\ top}) L$	Surch. Dead: Top	ES-t	↓	$Q_{D\ top-V} = 0.00$	$L/2 = 6.70$	0.00
7	$Q_{D\ V} = (q_D) h K_{af} \sin \beta$	Surch. Dead: Behind	ES-b	↓	$Q_{D\ V} = 0.00$	$L = 13.40$	0.00
8	$Q_{D\ H} = (q_D) h K_{af} \cos \beta$	Surch. Dead: Behind	ES-b	←	$Q_{D\ H} = 0.00$	$h/2 = 9.50$	0.00
9	$Q_{T\ top-V} = (q_T) L$	Surch. Traffic: Top	LS-t	↓	$Q_{T\ top-V} = 3.35$	$L/2 = 6.70$	22.45
10	$Q_{T\ V} = (q_{T\ b}) h K_{af} \sin \beta$	Surch. Traffic: Behind	LS-b	↓	$Q_{T\ V} = 0.00$	$L = 13.40$	0.00
11	$Q_{T\ H} = (q_{T\ b}) h K_{af} \cos \beta + P_{BR}$	Surch. traffic: Behind	LS-b	←	$Q_{T\ H} = 1.34$	$h/2 = 9.50$	12.73



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

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Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Static Sliding				5			2			3			4
		5	9	11	8	Strength I(max)		Strength I(Min)		Critical			
Horizontal Driving Forces				ASD		Max.Load Factor		Min.Load Factor		Crit.Load Factor			
Horizontal Forces				Factor	Load	Factor	Load	Factor	Load	Factor	Load	Factor	Load
5	Earth Pressure	←	5.36	EH	1.0	5.36	1.50	8.04	0.90	4.82	1.50	8.04	
8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00	
11	Surch.traffic:Behind	←	1.34	LS-b	1.0	1.34	1.75	2.35	0.00	0.00	1.75	2.35	
Total Horizontal		$\Sigma H_{driving}$			6.70	---	10.39	---	4.82	---	10.39		
Vertical Loads													
1	Reinforced Mass	↓	26.73	EV	1.0	26.73	1.35	36.09	1.00	26.73	1.00	26.73	
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00	
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00	
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00	
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00	
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00	
9	Surch.Traffic:Top	↓	3.35	LS-t	0.0	0.00	1.75	5.86	0.00	0.00	0.00	0.00	
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00	
Total Vertical		ΣV			26.73	---	41.95	---	26.73	---	26.73		
Resisting Horizontal Loads for		$\phi_{crit} = 30.00$		ASD		Max		Min		Crit.			
1	Reinforced Mass	↓			15.43		20.83		15.43		15.43		
2	Top Tringle Mass	↓			0.00		0.00		0.00		0.00		
3	Top Rectangle Mass	↓			0.00		0.00		0.00		0.00		
4	Earth Pressure	↓			0.00		0.00		0.00		0.00		
6	Surch.Dead:Top	↓			0.00		0.00		0.00		0.00		
7	Surch.Dead:Behind	↓			0.00		0.00		0.00		0.00		
9	Surch.Traffic:Top	↓			0.00		3.38		0.00		0.00		
10	Surch.Traffic:Behind	↓			0.00		0.00		0.00		0.00		
Cohesion $C_H = c_{fd} L$					0.00		0.00		0.00		0.00		
		ΣV_{resist}			15.43		24.22		15.43		15.43		
Results													
ASD		$FS_{SL} = 2.303$				Load F		Max	Min	Crit	ASD		
LRFD		$CDR = 1.486$				EV		1.35	1.00	1.00	1.0		
Note:		For geogrid reinforced MSE, the sliding friction angle may be taken as minimum of ϕ_{fd} and two thirds of reinforced soil friction angle, $(2/3) \phi_r$.				EH		1.50	0.90	1.50	1.0		
						ES-t		1.35	1.00	1.00	1.0		
						ES-b		1.50	0.75	1.50	1.0		
						LS-t		1.75	0.00	0.00	0.0		
						LS-b		1.75	0.00	1.75	1.0		
		$\phi_{fd} = 30.00$		Sliding $\phi_r = 34$									
		$2/3 \phi_r = 22.67$		$\phi_{crit} = 22.67$									



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Eccentricity:				5	2	3	4					
				5	9	8						
				ASD	LRFD	Max.Load	Factored	Min.Load	Factored	Crit.Load	Factored	
				Un-factored	Factor	Load	Factor	Load	Factor	Load	Factor	
Moments: Counter-Clockwise				14								
5	Earth Pressure	←	33.93	EH	1.0	33.93	1.50	50.90	0.90	30.54	1.50	50.90
8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch.traffic:Behind	←	12.73	LS-b	1.0	12.73	1.75	22.28	0.00	0.00	1.75	22.28
Total: Counter-Clockwise Moments				ΣM_-	46.66	---	73.17	---	30.54	---	73.17	
Moments: Clockwise				14								
1	Reinforced Mass	↓	179.09	EV	1.0	179.09	1.35	241.77	1.00	179.09	1.00	179.09
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	22.45	LS-t	0.0	0.00	1.75	39.29	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total: Clockwise Moments				ΣM_+	179.09	---	281.06	---	179.09	---	179.09	
Vertical Load				11								
1	Reinforced Mass	↓	26.73	EV	1.0	26.73	1.35	36.09	1.00	26.73	1.00	26.73
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	3.35	LS-t	0.0	0.00	1.75	5.86	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical Loads				ΣV	26.73	---	41.95	---	26.73	---	26.73	
Resultant from point A, y (ft.)					4.95		4.96		5.56		3.96	
Eccentricity: $e = L/2 - y$ (ft.)												

Results:					Load F	Max	Min	Crit	ASD
		$e=L/2-y$	e/L		EV	1.35	1.00	1.00	1.0
ASD		1.75 ft.	0.130	Ok	EH	1.50	0.90	1.50	1.0
LRFD	Max	1.74 ft.	0.130	Ok	ES-t	1.35	1.00	1.00	1.0
LRFD	Min	1.14 ft.	0.085	Ok	ES-b	1.50	0.75	1.50	1.0
LRFD	Crit.	2.74 ft.	0.204	Ok	LS-t	1.75	0.00	0.00	0.0
					LS-b	1.75	0.00	1.75	1.0



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Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Critical Bearing:

				5			2			3			4
5	9	14	8	Eccentricity: $e = L/2 - y$		Meyerhof str $\sigma_v = \Sigma V / (L - 2e)$							
				ASD	LRFD	Max. Load	Factored	Min. Load	Factored	Crit. Load	Factored		
				Un-factored		Factor	Load	Factor	Load	Factor	Load		
Moments: Counter-Clockwise													
5	Earth Pressure	←	33.93	EH	1.0	33.93	1.50	50.90	0.90	30.54	1.50	50.90	
8	Surch. Dead: Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00	
11	Surch. traffic: Behind	←	12.73	LS-b	1.0	12.73	1.75	22.28	0.00	0.00	1.75	22.28	
Total: Counter-Clockwise Moments ΣM_-					46.66		---	73.17		---	30.54		---

				5	9	14	8			2			3			4
Moments: Clockwise																
1	Reinforced Mass	↓	179.09	EV	1.0	179.09	1.35	241.77	1.00	179.09	1.35	241.77				
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00				
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00				
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00				
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00				
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00				
9	Surch. Traffic: Top	↓	22.45	LS-t	1.0	22.45	1.75	39.29	0.00	0.00	1.75	39.29				
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00				
Total: Clockwise Moments ΣM_+					201.54		---	281.06		---	179.09		---			

				5	9	11	8			2			3			4
Vertical Load																
1	Reinforced Mass	↓	26.73	EV	1.0	26.73	1.35	36.09	1.00	26.73	1.35	36.09				
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00				
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00				
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00				
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00				
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00				
9	Surch. Traffic: Top	↓	3.35	LS-t	1.0	3.35	1.75	5.86	0.00	0.00	1.75	5.86				
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00				
Total Vertical Loads ΣV					30.08		---	41.95		---	26.73		---			
Resultant from point A, y (ft.)					5.15		---	4.96		---	5.56		---			

Results:	ASD	LRFD	LRFD	LRFD	Load F	Max	Min	Crit	ASD
	Ser.	Max	Min	Crit.	EV	1.35	1.00	1.35	1.0
ΣV (kips)	30.08	41.95	26.73	41.95	EH	1.50	0.90	1.50	1.0
(ft)	5.15	4.96	5.56	4.96	ES-t	1.35	1.00	1.50	1.0
$e = L/2 - y$ (ft)	1.55	1.74	1.14	1.74	ES-b	1.50	0.75	1.50	1.0
e/L	0.116	0.130	0.085	0.130	LS-t	1.75	0.00	1.75	1.0
$\sigma_v = \Sigma V / (L - 2e)$ (ksf)	2.921	4.232	2.405	4.232	LS-b	1.75	0.00	1.75	1.0

1.50 Chosen to match MSE-W approach



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Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

Critical Bearing (ctd):

Foundation Length $L_w = 13.4$ ft.

Mayerhof Bearing Capacity/Nominal Resistance, $q_{ult} = 12.31$ ksf

ASD Values corresponds to un-factored loads & capacities

Eccentricity	e	1.55 ft.
Vertical Loads, un-factored	ΣV	26.73 kips/LF
Required Allowable Bearing Capacity	$\sigma_v =$	2.60 ksf
Ultimate Bearing Capacity	$q_{ult} =$	12.31 ksf
Factor of Safety against Bearing	$FS_{bearing} =$	4.743

LRFD Values corresponds to maximum load factors

		Serv.	Max	Min	Crit.
Eccentricity	e	1.55	1.74	1.14	1.74
Vertical Loads, un-factored	ΣV	30.08	41.95	26.73	41.95
Required Factored Bearing Stress	$\sigma_v =$	2.92	4.23	2.40	4.23
Nominal Bearing Capacity	$q_{ult} =$	12.31	12.31	12.31	12.31
Resistance factor for Bearing:	$\Phi_b =$	0.5	0.65	0.65	0.65
Factored Bearing Resistance		6.16	8.00	8.00	8.00
	CDR =	2.11	1.89	3.33	1.89
	Bearing Resistance: $CDR_{min} =$	1.89			

Summary:

LRFD CDR	Target	Calc.	
Sliding	1.00	1.49	ok
Bearing	1.00	1.89	

ASD FS	Target	Calc.
Sliding	2.00	2.30
Bearing	3.00	4.74

Eccentricity	Max	ASD	LRFD
e/L	0.250	0.130	0.204
		ok	ok

Bearing Resistance / Capacity

Required Factored Bearing Resistance: 4.23 ksf

Required Allowable Bearing Capacity: 2.60 ksf

Notes: For excentricity and sliding



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

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Str. No.: Walls 1 & 3, Sta. 24+50 (h=19')

Check: scb 12/20/2021

EVALUATION OF NOMINAL BEARING RESISTANCE

DATA FROM PREVIOUS SHEETS:

Soil Parameters				12.31
Cohesion $c =$	0.0 psf	Foundatn Subgr. Soil Unit Wt. γ_{fs}	125.0 pcf	
Friction Ang. $\phi_f =$	30.0 degree	Surcharge Soil Unit Wt. γ_{sur}	110.0 pcf	
Soils above footing bearing are as competent as subgrade soils?				Yes
Foundation Dimensions				
Footing Width $B =$	13.40 ft.	Footing Depth $D_f =$	2.00 ft	
Footing Length $L =$	50.00 ft.	G. Water Depth $D_w =$	50.00 ft	
Foundation Loads:				
Unfactored Vert. Load $V =$	26.7 kips	Load Angle θ	0.0 deg	
Unfactored Horz. Load $H =$	6.7 kips	Moment:	----	
Eccentricity: $e_b =$	1.7 ft.	(<3.4) ok	e_L (ft) =	(<12.5) ok

CALCULATION OF BEARING NOMINAL RESISTANCE:

Bearing Capacity Factors:				
$N_c = (N_q - 1) \cot \phi$	$N_\gamma = 2 (N_q + 1) \tan \phi$	$N_q = e^{(1.44 \phi)} \tan^2 (45^\circ + \phi/2)$		
$N_c = 30.14$	$N_\gamma = 22.40$	$N_q = 18.40$		
Effective Footing Dimensions: (Area reduction for assumed eccentricity)				
$B' = B - 2e_b = 9.9$	ft	$L' = L - 2e_L =$	50.0 ft	
Footing Shape Correction Factors:				
For $\phi = 0$	$S_c = 1 + (B'/5L')$	$S_\gamma = 1.0$	$S_q = 1$	
For $\phi > 0$	$S_c = 1 + (B'/L') (N_q/N_c)$	$S_\gamma = 1 - 0.4 (B'/L')$	$S_q = 1 + (B'/L') \tan \phi$	
	$S_c = 0.731$	$S_\gamma = 0.921$	$S_q = 1.114$	
Groundwater Correction Factors				
$C_{wq} =$	1.000	$C_{w\gamma} =$	1.000	
Depth Correction Factor:				
Competent surcharge soils:	Yes	$D_f/B = 0.20$	$d_q = 1.00$	
Load Inclination Factors:				
$i_c =$	1.000	$i_q =$	0.705	
		$i_\gamma =$	0.528	
Nominal Bearing Resistance:				
$q_n = c (N_c S_c i_c) + \gamma_{sur} D_f (N_q S_q d_q i_q) C_{wq} + 0.5 \gamma_{fs} B (N_\gamma S_\gamma i_\gamma) C_{w\gamma}$			ASD FOS	
C term	0.00	q term	3.18	LRFD Φ_q
		B term	9.13	0.65
$q_n =$	12.31 ksf	Allowable q	6.16 ksf	Factored q
				8.00 ksf

NOTES:

Calc based on assumed foundation length and water table depth.

APPENDIX E.2

MSE Wall Calculations – Wall 1, Wall2, and Wall 3

- E.2.1 Wall 2 – External Stability and Bearing Resistance
- E.2.2 Wall 2 – Settlement Analysis at Abutment C
- E.2.3 Walls 1 & 3 – Back to Back MSE Check
- E.2.4 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.24+50 (19' Wall)
- E.2.5 Walls 1 & 3 – Settlements @ Sta.24+50 (19' Wall)**
- E.2.6 Walls 1 & 3 – Slope Stability @ Sta.24+50 (19' Wall)
- E.2.7 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.22+50 (10' Wall)
- E.2.8 Walls 1 & 3 – Settlements @ Sta.22+50 (10' Wall)
- E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50



Project Data				Calculation / Check	
Project:	Opitz Blvd Express Lane	Location:	T-Ramp	Calc :	skk
			Sta. 24+50 (H=19')	Date:	20-Dec-21
WRA WO#:	45893-001	Date:	12/20/2021	Chk:	SCB 12/21/21
Subject:	T-Ramp Loading mostly granular fill			Date:	

Subsurface Test Borings		SPT Hammer Efficiency		Soil Types for C' Curve Selection	1	
B-A3-2 (lower DR)		Rig No.	E_m		1	1 - Clean Uniform medium SAND
Number of Layers (up to 14)	7	1. CME 55 (E2CR)	84%	2	2 - Well Graded Silty SAND and GRAVEL	
Depth to Groundwater (ft):	20	2. CME 45 (F&R)	78%	3	3 - Clean well graded fine to coarse Silty SAND	
SPT Corrected for overburden (Yes/No)	Yes	3. Salut	88%	4	4 - Well graded fine to medium Silty SAND	
SPT Correction for Efficiency (Yes/No)	Yes	4. CME 45 Cathead	66%	5	5 - Inorganic SILT Yes	
Select the Rig for Hammer Eff.	3. Salut				No	

Layer Data																
Layer No.	Bottom Depth (ft)	SPT N Value	Soil Unit Wt. (pcf)	Curve for Bearing Capacity Index-C'				Soil Layer		Overburden		SPT N Value (correctd)	C' (top)	C' (bott)	C'	
				Soil	Top	% Top	Description	Top (z ₁) (ft)	Bott.(z ₂) (ft)	center p _c (psf)	bottom p ₂ (psf)					
				USCS	Curve	Curve										
1	3.0	55	115.0	SM	1	100.0	100% Ty.1+0% Ty.2	0.0	3.0	172.5	345.0	161	3656	1546	3656	
2	8.5	11	120.0	SM	1	100.0	100% Ty.1+0% Ty.2	3.0	8.5	675.0	1005.0	28	116	97	116	
3	18.5	16	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	8.5	18.5	1630.0	2255.0	26	108	92	108	
4	23.5	37	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	18.5	23.5	2505.1	2661.6	48	227	161	227	
5	28.5	100	125.0	ML	5	100.0	100% Ty.5+0% Ty.6	23.5	28.5	2818.1	2974.6	124	193	193	193	
6	36.0	33	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	28.5	36.0	3209.4	3444.1	38	162	126	162	
7	50.0	100	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	36.0	50.0	3882.3	4320.5	105	1165	569	1165	

Project: Opitz Blvd Express Lane

Location: T-Ramp

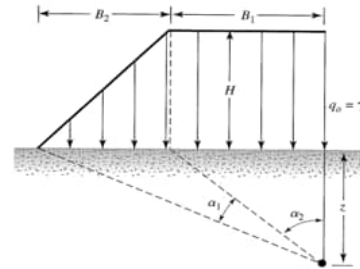
Subject:

Subject: T-Ramp Loading mostly granular fill

Stress Distribution for Two Areas

	Area 1	Area 2	Area 3
Multiplier	1	1	0
Height of Embankment	19	19	0
Soil Unit Weight	108	108	0
Rectangular Loading Width B_1	18	18	0
Triangular Loading Width B_2	0	0	0
FHWA Recommended factor for final settlement: k_{FHWA}			0.5
Default Min. Value for B_2 =	1E-10		

Formulas:



$$\Delta\sigma_z = \frac{q_o}{\pi} \left[\left(\frac{B_1 + B_2}{B_2} \right) (\alpha_1 + \alpha_2) - \frac{B_1}{B_2} (\alpha_2) \right]$$

$$\Delta H = H \left(\frac{1}{C'} \right) \log_{10} \frac{p_o + \Delta p}{p_o}$$

Settlement Calculations:

Layer Data					Angles (radians)						Influence Factors			$q_0^{(a)}$	$q_0^{(b)}$	$q_0^{(c)}$	Total Δp	Settlements	
Layer No.	Middle Depth z_{mid} (ft)	Layer Thick. h_i (ft)	Overbr. Press. p_o (psf)	Bear. Factor C'	Area (a)		Area (b)		Area (c)		Area(a)	Area (b)	Area (c)	2052	2052	0		(psf)	Per Layer
					B_1	B_2	B_1	B_2	B_1	B_2				$q_0^* I_z^{(c)}$	$q_0^* I_z^{(c)}$	$q_0^* I_z^{(c)}$	(psf)		(inch)
					$\alpha_1^{(a)}$	$\alpha_2^{(a)}$	$\alpha_1^{(b)}$	$\alpha_2^{(b)}$	$\alpha_1^{(c)}$	$\alpha_2^{(c)}$	$I_z^{(a)}$	$I_z^{(b)}$	$I_z^{(c)}$	$\Delta p^{(a)}$	$\Delta p^{(b)}$	$\Delta p^{(c)}$			
1	1.5	3.0	172.5	3656	0.000	1.488	0.000	1.488	0.000	0.000	0.474	0.474	0.000	971.6	971.6	0.0	1943.2	0.01	0.01
2	5.8	5.5	675.0	116	0.000	1.262	0.000	1.262	0.000	0.000	0.402	0.402	0.000	824.1	824.1	0.0	1648.2	0.31	0.32
3	13.5	10.0	1630.0	108	0.000	0.927	0.000	0.927	0.000	0.000	0.295	0.295	0.000	605.8	605.8	0.0	1211.5	0.27	0.58
4	21.0	5.0	2505.1	227	0.000	0.709	0.000	0.709	0.000	0.000	0.226	0.226	0.000	462.7	462.7	0.0	925.5	0.04	0.62
5	26.0	5.0	2818.1	193	0.000	0.606	0.000	0.606	0.000	0.000	0.193	0.193	0.000	395.4	395.4	0.0	790.8	0.03	0.65
6	32.3	7.5	3209.4	162	0.000	0.509	0.000	0.509	0.000	0.000	0.162	0.162	0.000	332.4	332.4	0.0	664.8	0.05	0.70
7	43.0	14.0	3882.3	1165	0.000	0.396	0.000	0.396	0.000	0.000	0.126	0.126	0.000	259.0	259.0	0.0	517.9	0.01	0.71
																	$\Delta H =$	0.71 inches	
Final settlement					($k_{FHWA} * \Delta H$)		0.71		x 0.50 =		0.35 inches								

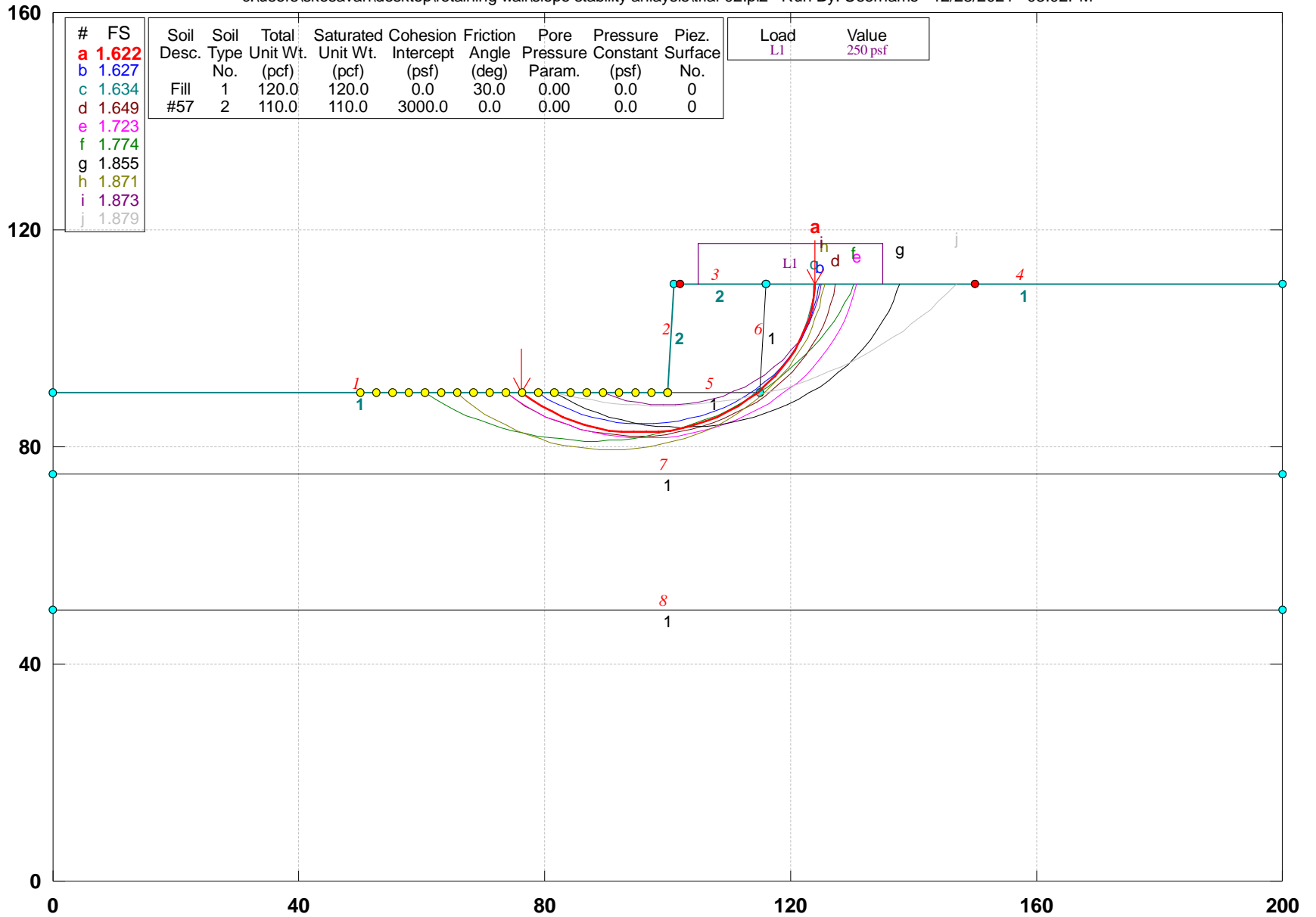
APPENDIX E.2

MSE Wall Calculations – Wall 1, Wall2, and Wall 3

- E.2.1 Wall 2 – External Stability and Bearing Resistance
- E.2.2 Wall 2 – Settlement Analysis at Abutment C
- E.2.3 Walls 1 & 3 – Back to Back MSE Check
- E.2.4 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.24+50 (19' Wall)
- E.2.5 Walls 1 & 3 – Settlements @ Sta.24+50 (19' Wall)
- E.2.6 Walls 1 & 3 – Slope Stability @ Sta.24+50 (19' Wall)**
- E.2.7 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.22+50 (10' Wall)
- E.2.8 Walls 1 & 3 – Settlements @ Sta.22+50 (10' Wall)
- E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50

I-95 Exressway/Opitz Blvd (Trial-02) Global Stability Sta 24+50

c:\users\skesavan\desktop\retaining wall\slope stability anlysis\trial-02.pl2 Run By: Username 12/28/2021 03:02PM



GSTABL7 v.2 FSmin=1.622

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX E.2

MSE Wall Calculations – Wall 1, Wall2, and Wall 3

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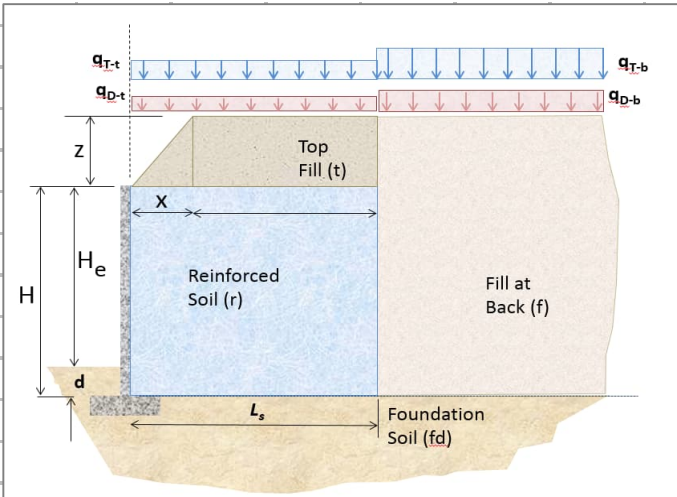
MSE Wall - External Stability Check
Static Sliding, Eccentricity & Bearing
 Ref: FHWA-NHI-10-024 & 025

Version: 2016-06
 Coding: skk 10/27/2016
 Validation: scb by MSE-W 10/31

Project: Opitz Blve	WRA#: 032023.000	Design: skk 12/20/2021
Wall ID Walls 1 & 3, Sta. 22+50 (H=10')	Wall No.:	Check: scb 12/20/2021

Assumptions/Notes:

- Front of the abutment is modeled as a triangular portion.
- Lateral loads behind the wall are assumed to be horizontal (per MSE-W assumption for slope < 45 deg.)



Wall Configuration			
Backfill Slope			
Broken Back Slope:	No		
Height z (ft.)=			
Length x (ft.)=			
Infinite Backfill: Yes			
Infinite Slope β_{inf} =	0.00		
Fall face assumed vertical			
α =	0.00 deg.		
Case	β_{eq}	Δh	h
5	0.00	0.00	10.00

Wall Dimensions

Exposed wall height	H_e =	8.00 ft.	Table C.11..10.2.2.-1 Minimum Embedment
Embedded Height	d =	2.00 ft.	Minimum Embedment = $H/20$ 0.50 ok
Total Wall Length		30.00 ft.	<== (for bearing capacity calculations)

Reinforced Backfill	Friction Angle	ϕ_r =	34.0 degree	Unit Wt:	γ_r =	105.0 pcf
Retained Fill (f) (above and behind reinf. zone)		ϕ_f =	34.0 degree		γ_f =	105.0 pcf
Foundation Soil:		ϕ_{fd} =	30.0 degree		γ_{fd} =	120.0 pcf
Cohesion:	c_{fd} =	0.0 psf	Mayerhof Bearing, q_{ult} =	8.68 ksf		

Top of wall Backfill	Friction Angle	ϕ_t =	34.0 degree	Unit Wt:	γ_t =	105.0 pcf
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Surcharge Loading

Traffic @ wall Top	↓	q_{T-t} =	250 psf	Dead -top	↓	q_{D-t} =	0 psf
Traffic @ behind wall	↓	q_{T-b} =	250 psf	Dead -Behind	↓	q_{D-b} =	0 psf
Added horizontal Load	←	P_{BR-H} =	0 lb/LF				

Design Height and Estimated Reinforcement Length

Estimated Reinforcement Length :	L =	8.00 ft.	Check for minimum L
Design Height of the wall: $H = H_e + d$	H =	10.00 ft.	L_{min} = 8.0 ft. ok
Ratio for Estimated Reinforcement Length (> 0.7):	0.80	(L/H) ok	$L \leq 2H$ ok to use this spreadsheet

Results Summary

LRFD:	ASD:	Bearing Resistnace:								
Direct Sliding CDR=	1.395	$FS_{Sliding}$	2.204	Required Factored Bearing=	2.409 ksf					
Bearing Resist. CDR=	2.342	$FS_{bearing}$	6.576	Required Service Bearing=	1.320 ksf					
e/L =	0.203	CDR=	1.232	Critical	e/L =	0.127	e/L =	0.115	e =	0.92 ft



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

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Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

Load Factors	EV	EH	ES	LS	Resistance Factors
Strength I (maximum)	1.35	1.50	1.50	1.75	Sliding of MSE wall on foundation soil 1.00
Strength I (minimum)	1.00	0.90	0.75	0.00	Bearing resistance 0.65
Service I	1.00	1.00	1.00	1.00	Tensile resistance (for steel strips) 0.75

Calculation of β_{eq} and h

$L = 8.0$ ft. $H = 10.0$ ft. $x =$ ft. $z =$ ft.

Case Description	β_{eq}	Δh	L_T	$L_R = L - L_T$
1 For $x < z$: $\beta_{eq} = 0$		$\Delta h = z$	$L_T = 0$	
2 $x < L$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = z$	$L_T = x$	
3 $L < x < 2H$ $\beta_{eq} = \tan^{-1}(z/2H)$		$\Delta h = Lz/x$	$L_T = L$	
4 $x > 2H$ $\beta_{eq} = \tan^{-1}(z/x)$		$\Delta h = Lz/x$	$L_T = L$	
5 Infinite $\beta_{eq} = \beta_{infinite}$	0.00	0.00	$L_T = L$	0.00 8.00
5 \leq Current Case	$\beta_{eq} = 0.00$ degree	$\Delta h = 0.00$ ft.	0.00	8.00
	$\beta_{eq} =$	$h = H + \Delta h$	$h = 10.00$ ft.	

Coulomb Active Earth Pressure Coefficient for Retained fill

Reference: Eq. 3.11.5.3-1 AASHTO

$$K_A = \frac{\sin^2(\theta + \phi')}{\sin^2\theta \sin(\theta - \delta) \left[1 + \sqrt{\frac{\sin(\phi + \delta) \sin(\phi' - \beta)}{\sin(\theta - \delta) \sin(\theta + \beta)}} \right]^2}$$

Note: $\phi' > \beta$ $\phi' = 34.0$ degree
 $\beta = 0.00$ degree
 $\theta = 90 + \alpha$ $\theta = 90.0$ degree
 $\delta = \beta$ $\delta = 0.0$ degree

$T_1 = 0.3127$ $T_2 = 1$ $\Gamma = [1 + \sqrt{T_1/T_2}]^2$ $\Gamma = 2.4311$
 $T_t = 0.6873$ $T_b = 1$ $K_A = T_t / (T_b * \Gamma)$ $K_{af} = 0.283$

Rankine Earth Pressure Coefficients

Equation 5.12 from FHWA-IF-03-017

$$K_A = \cos\beta \frac{\cos\beta - \sqrt{\cos^2\beta - \cos^2\phi'}}{\cos\beta + \sqrt{\cos^2\beta - \cos^2\phi'}}$$

(for comparison purposes)

$T_{sq} = 0.5592$ $T_{cos} = 1$
 $K_A = T_{cos}(T_{cons} - T_{sq}) / (T_{cos} + T_{sq})$
 $K_A = 0.283$

Note :



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

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Version: 2016-06

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Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

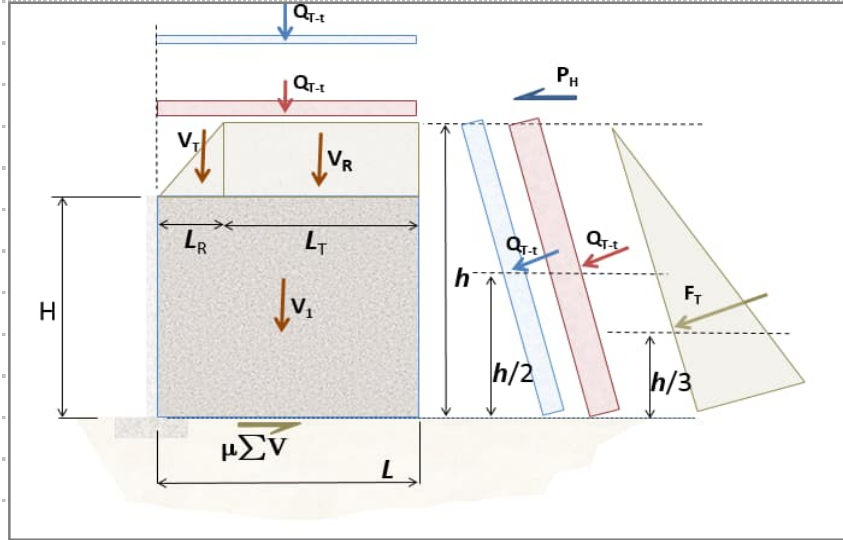
Str. No. Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

Loads and Moments:

Data for Calculations:

- $L = 8.00$ ft.
- $H = 10.00$ ft.
- $h = 10.00$ ft.
- $L_T = 0.00$ ft.
- $L_R = 8.00$ ft.
- $K_{af} = 0.283$
- $\gamma_r = 105.0$ pcf
- $\gamma_t = 105.0$ pcf
- $\gamma_i = 105.0$ pcf
- $\beta = 0.00$ deg.
- $q_{D\ top} = 0$ psf
- $q_{D\ b} = 0$ psf
- $q_{T\ top} = 250$ psf
- $q_{T\ beh} = 250$ psf



$p_H = 0$ lb/LF *rounding force = 2 length 2 2*

Un-factored Loads: Horizontal, Vertical & Moment about Point A

(kips/LF) Arm (ft.) M (ft. kips)

1	$V_1 = \gamma_r H L$	Reinforced Mass	EV	↓	V_1	8.40	$L/2 =$	4.00	33.60
2	$V_T = (1/2) \gamma_t (h-H) L_T$	Top Tringle Mass	EV	↓	V_T	0.00	$2L_T/3 =$	0.00	0.00
3	$V_R = \gamma_t (h-H) L_R$	Top Rectangle Mass	EV	↓	V_R	0.00	$L_T + L_R/2 =$	4.00	0.00
4	$F_{TV} = (1/2) \gamma_r h^2 K_{af} \sin \beta$ $F_T = 1.49$	Earth Pressure	EH	↓	F_{TV}	0.00	$L =$	8.00	0.00
5	$F_{TH} = (1/2) \gamma_r h^2 K_{af} \cos \beta$	Earth Pressure	EH	←	F_{TH}	1.49	$h/3 =$	3.33	4.96
6	$Q_{D\ top-V} = (q_{D\ top}) L$	Surch. Dead: Top	ES-t	↓	$Q_{D\ top-V}$	0.00	$L/2 =$	4.00	0.00
7	$Q_{D\ V} = (q_D) h K_{af} \sin \beta$	Surch. Dead: Behind	ES-b	↓	$Q_{D\ bV}$	0.00	$L =$	8.00	0.00
8	$Q_{D\ H} = (q_D) h K_{af} \cos \beta$	Surch. Dead: Behind	ES-b	←	$Q_{D\ bH}$	0.00	$h/2 =$	5.00	0.00
9	$Q_{T\ top-V} = (q_T) L$	Surch. Traffic: Top	LS-t	↓	$Q_{T\ top-V}$	2.00	$L/2 =$	4.00	8.00
10	$Q_{T\ V} = (q_{T\ b}) h K_{af} \sin \beta$	Surch. Traffic: Behind	LS-b	↓	$Q_{T\ bV}$	0.00	$L =$	8.00	0.00
11	$Q_{T\ H} = (q_{T\ b}) h K_{af} \cos \beta + P_{BR}$	Surch. traffic: Behind	LS-b	←	$Q_{T\ bH}$	0.71	$h/2 =$	5.00	3.55



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

Eccentricity:				5	2	3	4					
5	9	8		ASD	LRFD	Max.Load	Factored	Min.Load	Factored	Crit.Load	Factored	
				Un-factored		Factor	Load	Factor	Load	Factor	Load	
Moments: Counter-Clockwise			14									
5	Earth Pressure	←	4.96	EH	1.0	4.96	1.50	7.44	0.90	4.46	1.50	7.44
8	Surch.Dead:Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
11	Surch.traffic:Behind	←	3.55	LS-b	1.0	3.55	1.75	6.21	0.00	0.00	1.75	6.21
Total: Counter-Clockwise Moments			ΣM_-		8.51	---	13.65	---	4.46	---	13.65	

Moments: Clockwise				14								
1	Reinforced Mass	↓	33.60	EV	1.0	33.60	1.35	45.36	1.00	33.60	1.00	33.60
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	8.00	LS-t	0.0	0.00	1.75	14.00	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total: Clockwise Moments			ΣM_+		33.60	---	59.36	---	33.60	---	33.60	

Vertical Load				11								
1	Reinforced Mass	↓	8.40	EV	1.0	8.40	1.35	11.34	1.00	8.40	1.00	8.40
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00
6	Surch.Dead:Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.00	0.00
7	Surch.Dead:Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00
9	Surch.Traffic:Top	↓	2.00	LS-t	0.0	0.00	1.75	3.50	0.00	0.00	0.00	0.00
10	Surch.Traffic:Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00
Total Vertical Loads			ΣV		8.40	---	14.84	---	8.40	---	8.40	

Resultant from point A, y (ft.)

2.99

3.08

3.47

2.37

Eccentricity: $e = L/2 - y$ (ft.)

Results:

		$e = L/2 - y$	e/L	
ASD		1.01 ft.	0.127	Ok
LRFD	Max	0.92 ft.	0.115	Ok
LRFD	Min	0.53 ft.	0.066	Ok
LRFD	Crit.	1.63 ft.	0.203	Ok

Load F	Max	Min	Crit	ASD
EV	1.35	1.00	1.00	1.0
EH	1.50	0.90	1.50	1.0
ES-t	1.35	1.00	1.00	1.0
ES-b	1.50	0.75	1.50	1.0
LS-t	1.75	0.00	0.00	0.0
LS-b	1.75	0.00	1.75	1.0



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

Critical Bearing:

				5			2			3			4		
5	9	14	8	Eccentricity: $e = L/2 - y$		Meyerhof str		$\sigma_v = \Sigma V / (L - 2e)$							
				ASD	LRFD	Max. Load	Factored	Min. Load	Factored	Crit. Load	Factored				
				Un-factored		Factor	Load	Factor	Load	Factor	Load				
Moments: Counter-Clockwise															
5	Earth Pressure	←	4.96	EH	1.0	4.96	1.50	7.44	0.90	4.46	1.50	7.44			
8	Surch. Dead: Behind	←	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00			
11	Surch. traffic: Behind	←	3.55	LS-b	1.0	3.55	1.75	6.21	0.00	0.00	1.75	6.21			
Total: Counter-Clockwise Moments ΣM_-					8.51	---	13.65	---	4.46	---	13.65				

5	9	14	8												
Moments: Clockwise															
1	Reinforced Mass	↓	33.60	EV	1.0	33.60	1.35	45.36	1.00	33.60	1.35	45.36			
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00			
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00			
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00			
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00			
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00			
9	Surch. Traffic: Top	↓	8.00	LS-t	1.0	8.00	1.75	14.00	0.00	0.00	1.75	14.00			
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.0	0.00	1.75	0.00	0.00	0.00	1.75	0.00			
Total: Clockwise Moments ΣM_+					41.60	---	59.36	---	33.60	---	59.36				

5	9	11	8												
Vertical Load															
1	Reinforced Mass	↓	8.40	EV	1.0	8.40	1.35	11.34	1.00	8.40	1.35	11.34			
2	Top Tringle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00			
3	Top Rectangle Mass	↓	0.00	EV	1.0	0.00	1.35	0.00	1.00	0.00	1.35	0.00			
4	Earth Pressure	↓	0.00	EH	1.0	0.00	1.50	0.00	0.90	0.00	1.50	0.00			
6	Surch. Dead: Top	↓	0.00	ES-t	1.0	0.00	1.35	0.00	1.00	0.00	1.50	0.00			
7	Surch. Dead: Behind	↓	0.00	ES-b	1.0	0.00	1.50	0.00	0.75	0.00	1.50	0.00			
9	Surch. Traffic: Top	↓	2.00	LS-t	1.0	2.00	1.75	3.50	0.00	0.00	1.75	3.50			
10	Surch. Traffic: Behind	↓	0.00	LS-b	1.00	0.00	1.75	0.00	0.00	0.00	1.75	0.00			
Total Vertical Loads ΣV					10.40	---	14.84	---	8.40	---	14.84				
Resultant from point A, y (ft.)					3.18		3.08		3.47		3.08				

Results:	ASD	LRFD	LRFD	LRFD	Load F	Max	Min	Crit	ASD
	Ser.	Max	Min	Crit.	EV	1.35	1.00	1.35	1.0
ΣV (kips)	10.40	14.84	8.40	14.84	EH	1.50	0.90	1.50	1.0
(ft)	3.18	3.08	3.47	3.08	ES-t	1.35	1.00	1.50	1.0
$e = L/2 - y$ (ft)	0.82	0.92	0.53	0.92	ES-b	1.50	0.75	1.50	1.0
e/L	0.102	0.115	0.066	0.115	LS-t	1.75	0.00	1.75	1.0
$\sigma_v = \Sigma V / (L - 2e)$ (ksf)	1.634	2.409	1.211	2.409	LS-b	1.75	0.00	1.75	1.0

1.50 Chosen to match MSE-W approach



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No. Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

Critical Bearing (ctd):

Foundation Length $L_w = 8.0$ ft.

Mayerhof Bearing Capacity/Nominal Resistance, $q_{ult} = 8.68$ ksf

ASD Values corresponds to un-factored loads & capacities

Eccentricity	e	0.82 ft.
Vertical Loads, un-factored	ΣV	8.40 kips/LF
Required Allowable Bearing Capacity	$\sigma_v =$	1.32 ksf
Ultimate Bearing Capacity	$q_{ult} =$	8.68 ksf
Factor of Safety against Bearing	$FS_{bearing} =$	6.576

LRFD Values corresponds to maximum load factors

		Serv.	Max	Min	Crit.
Eccentricity	e	0.82	0.92	0.53	0.92
Vertical Loads, un-factored	ΣV	10.40	14.84	8.40	14.84
Required Factored Bearing Stress	$\sigma_v =$	1.63	2.41	1.21	2.41
Nominal Bearing Capacity	$q_{ult} =$	8.68	8.68	8.68	8.68
Resistance factor for Bearing:	$\Phi_b =$	0.5	0.65	0.65	0.65
Factored Bearing Resistance		4.34	5.64	5.64	5.64
	CDR =	2.66	2.34	4.66	2.34
	Bearing Resistance: $CDR_{min} =$	2.34			

Summary:

LRFD CDR	Target	Calc.	
Sliding	1.00	1.40	ok
Bearing	1.00	2.34	

ASD FS	Target	Calc.
Sliding	2.00	2.20
Bearing	3.00	6.58

Eccentricity	Max	ASD	LRFD
e/L	0.250	0.127	0.203
		ok	ok

Bearing Resistance / Capacity

Required Factored Bearing Resistance: 2.41 ksf

Required Allowable Bearing Capacity: 1.32 ksf

Notes: For excentricity and sliding



MSE Wall - External Stability Check

Static Sliding, Eccentricity & Bearing

Ref: FHWA-NHI-10-024 & 025

Version: 2016-06

Coding: skk 10/27/2016

Validation: scb by MSE-W 10/31

Project: Opitz Blve

WRA#: 032023.000

Design: skk 12/20/2021

Str. No.: Walls 1 & 3, Sta. 22+50 (H=10')

Check: scb 12/20/2021

EVALUATION OF NOMINAL BEARING RESISTANCE

DATA FROM PREVIOUS SHEETS:

Soil Parameters				8.68
Cohesion $c =$	0.0 psf	Foundatn Subgr. Soil Unit Wt. γ_{fs}	125.0 pcf	
Friction Ang. $\phi_f =$	30.0 degree	Surcharge Soil Unit Wt. γ_{sur}	120.0 pcf	
Soils above footing bearing are as competent as subgrade soils?				Yes
Foundation Dimensions				
Footing Width $B =$	8.00 ft.	Footing Depth $D_f =$	2.00 ft	
Footing Length $L =$	30.00 ft.	G. Water Depth $D_w =$	50.00 ft	
Foundation Loads:				
Unfactored Vert. Load $V =$	8.4 kips	Load Angle θ	0.0 deg	
Unfactored Horz. Load $H =$	2.2 kips	Moment:	----	
Eccentricity: $e_b =$	1.0 ft.	(<2.0) ok	e_L (ft) =	(<7.5) ok

CALCULATION OF BEARING NOMINAL RESISTANCE:

Bearing Capacity Factors :				
$N_c = (N_q - 1) \cot \phi$	$N_\gamma = 2 (N_q + 1) \tan \phi$	$N_q = e^{(1.44 \phi)} \tan^2(45^\circ + \phi/2)$		
$N_c = 30.14$	$N_\gamma = 22.40$	$N_q = 18.40$		
Effective Footing Dimensions: (Area reduction for assumed eccentricity)				
$B' = B - 2e_b =$	6.0 ft	$L' = L - 2e_L =$	30.0 ft	
Footing Shape Correction Factors:				
For $\phi = 0$	$S_c = 1 + (B'/5L')$	$S_\gamma = 1.0$	$S_q = 1$	
For $\phi > 0$	$S_c = 1 + (B'/L') (N_q/N_c)$	$S_\gamma = 1 - 0.4 (B'/L')$	$S_q = 1 + (B'/L') \tan \phi$	
	$S_c = 0.732$	$S_\gamma = 0.92$	$S_q = 1.115$	
Groundwater Correction Factors				
$C_{wq} =$	1.000	$C_{w\gamma} =$	1.000	
Depth Correction Factor:				
Competent surcharge soils:	Yes	$D_f/B =$	0.33	
		$d_q =$	1.00	
Load Inclination Factors:				
$i_c =$	1.000	$i_q =$	0.692	
		$i_\gamma =$	0.511	
Nominal Bearing Resistance:				
$q_n = c (N_c S_c i_c) + \gamma_{sur} D_f (N_q S_q d_q i_q) C_{wq} + 0.5 \gamma_{fs} B (N_\gamma S_\gamma i_\gamma) C_{w\gamma}$			ASD FOS	
C term	0.00	q term	3.41	B term
			5.27	LRFD Φ_q
$q_n =$	8.68 ksf	Allowable q	4.34 ksf	Factored q
			5.64 ksf	

NOTES:

Calc based on assumed foundation length and water table depth.

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- E.2.3 Walls 1 & 3 – Back to Back MSE Check
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- E.2.5 Walls 1 & 3 – Settlements @ Sta.24+50 (19' Wall)
- E.2.6 Walls 1 & 3 – Slope Stability @ Sta.24+50 (19' Wall)
- E.2.7 Walls 1 & 3 – External Stability and Bearing Resistance @ Sta.22+50 (10' Wall)
- E.2.8 Walls 1 & 3 – Settlements @ Sta.22+50 (10' Wall)**
- E.2.9 Walls 1 & 3 – Slope Stability @ Sta.22+50 (10' Wall)
- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50



Project Data

Project:	Opitz Blvd Express Lane	Location:	T-Ramp
			Sta. 22+50 (H=10')
WRA WO#:	45893-001	Date:	12/20/2021
Subject:	T-Ramp Loading mostly soil		

Calculation / Check

Calc :	skk
Date:	20-Dec-21
Chk:	SCB 12/21/21
Date:	

Subsurface Test Borings	B-A3-5 (Weak hole)	SPT Hammer Efficiency				
Number of Layers (up to 14)	7	Rig No.	E_m	Soil Types for C'	1	1 - Clean Uniform medium SAND
Depth to Groundwater (ft):	20	1. CME 55 (E2CR)	84%	Curve Selection	2	2 - Well Graded Silty SAND and GRAVEL
SPT Corrected for overburden (Yes/No)	Yes	2. CME 45 (F&R)	78%		3	3 - Clean well graded fine to coarse Silty SAND
SPT Correction for Efficiency (Yes/No)	Yes	3. Salut	88%	$E_m = 88\%$	4	4 - Well graded fine to medium Silty SAND
Select the Rig for Hammer Eff.	3. Salut	4. CME 45 Cathead	66%	$\gamma_{water} = 62.4$	5	5 - Inorganic SILT Yes
						No

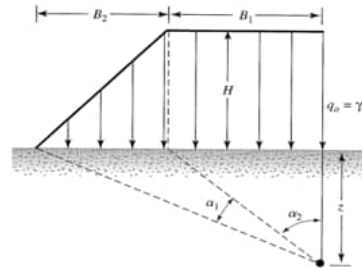
Layer Data

Layer No.	Bottom Depth (ft)	SPT N Value	Soil Unit Wt. (pcf)	Curve for Bearing Capacity Index-C'			Soil Layer		Overburden		SPT N Value (correctd)	C' (top)	C' (bott)	C'	
				Soil	Top	% Top	Description	Top (z ₁) (ft)	Bott.(z ₂) (ft)	center p _c (psf)					bottom p ₂ (psf)
				USCS	Curve	Curve									
1	4.0	12	115.0	SM	1	100.0	100% Ty.1+0% Ty.2	0.0	4.0	230.0	460.0	35	147	117	147
2	7.0	6	120.0	SM	1	100.0	100% Ty.1+0% Ty.2	4.0	7.0	640.0	820.0	16	76	68	76
3	16.0	7	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	7.0	16.0	1382.5	1945.0	12	66	59	66
4	18.0	4	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	16.0	18.0	2070.0	2195.0	6	51	46	51
5	20.0	4	125.0	ML	5	100.0	100% Ty.5+0% Ty.6	18.0	20.0	2320.0	2445.0	5	23	23	23
6	36.0	15	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	20.0	36.0	2945.8	3446.6	18	82	73	82
7	50.0	25	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	36.0	50.0	3884.8	4323.0	26	108	92	108

Project: Opitz Blvd Express Lane Location: T-Ramp Subject: Subject: T-Ramp Loading mostly soil

Stress Distribution for Two Areas			
	Area 1	Area 2	Area 3
Multiplier	7	7	0
Height of Embankment	10	10	0
Soil Unit Weight	115	115	0
Rectangular Loading Width B_1	18	18	0
Triangular Loading Width B_2	0	0	0
FHWA Recommended factor for final settlement: k_{FHWA}			0.5
Default Min. Value for B_2 =	1E-10		

Formulas:



$$\Delta\sigma_z = \frac{q_0}{\pi} \left[\left(\frac{B_1 + B_2}{B_2} \right) (\alpha_1 + \alpha_2) - \frac{B_1}{B_2} (\alpha_2) \right]$$

$$\Delta H = H \left(\frac{1}{C'} \right) \log_{10} \frac{p_0 + \Delta p}{p_0}$$

Settlement Calculations:					Angles (radians)						Influence Factors			$q_0^{(a)}$	$q_0^{(b)}$	$q_0^{(c)}$	Total Δp	Settlements		
Layer Data					Area (a)		Area (b)		Area (c)		Area(a)	Area (b)	Area (c)	1150	1150	0		Δp	Per Layer	Cumulative
Layer No.	Middle Depth z_{mid} (ft)	Layer Thick. h_i (ft)	Overbr. Press. p_0 (psf)	Bear. Factor C'	B_1	B_2	B_1	B_2	B_1	B_2	$I_z^{(a)}$	$I_z^{(b)}$	$I_z^{(c)}$	$q_0 * I_z^{(c)}$	$q_0 * I_z^{(c)}$	$q_0 * I_z^{(c)}$	(psf)			
					$\alpha_1^{(a)}$	$\alpha_2^{(a)}$	$\alpha_1^{(b)}$	$\alpha_2^{(b)}$	$\alpha_1^{(c)}$	$\alpha_2^{(c)}$				$\Delta p^{(a)}$	$\Delta p^{(b)}$	$\Delta p^{(c)}$				
1	2.0	4.0	230.0	147	0.000	1.460	0.000	1.460	0.000	0.000	0.465	0.465	0.000	534.4	534.4	0.0	1068.8	0.25	0.25	
2	5.5	3.0	640.0	76	0.000	1.274	0.000	1.274	0.000	0.000	0.406	0.406	0.000	466.4	466.4	0.0	932.9	0.18	0.43	
3	11.5	9.0	1382.5	66	0.000	1.002	0.000	1.002	0.000	0.000	0.319	0.319	0.000	366.9	366.9	0.0	733.7	0.30	0.73	
4	17.0	2.0	2070.0	51	0.000	0.814	0.000	0.814	0.000	0.000	0.259	0.259	0.000	298.0	298.0	0.0	595.9	0.05	0.78	
5	19.0	2.0	2320.0	23	0.000	0.758	0.000	0.758	0.000	0.000	0.241	0.241	0.000	277.6	277.6	0.0	555.2	0.10	0.88	
6	28.0	16.0	2945.8	82	0.000	0.571	0.000	0.571	0.000	0.000	0.182	0.182	0.000	209.1	209.1	0.0	418.1	0.13	1.02	
7	43.0	14.0	3884.8	108	0.000	0.396	0.000	0.396	0.000	0.000	0.126	0.126	0.000	145.1	145.1	0.0	290.3	0.05	1.07	
																	$\Delta H =$	1.07 inches		
Final settlement					$(k_{FHWA} * \Delta H)$		1.07		x 0.50 =		0.53 inches									

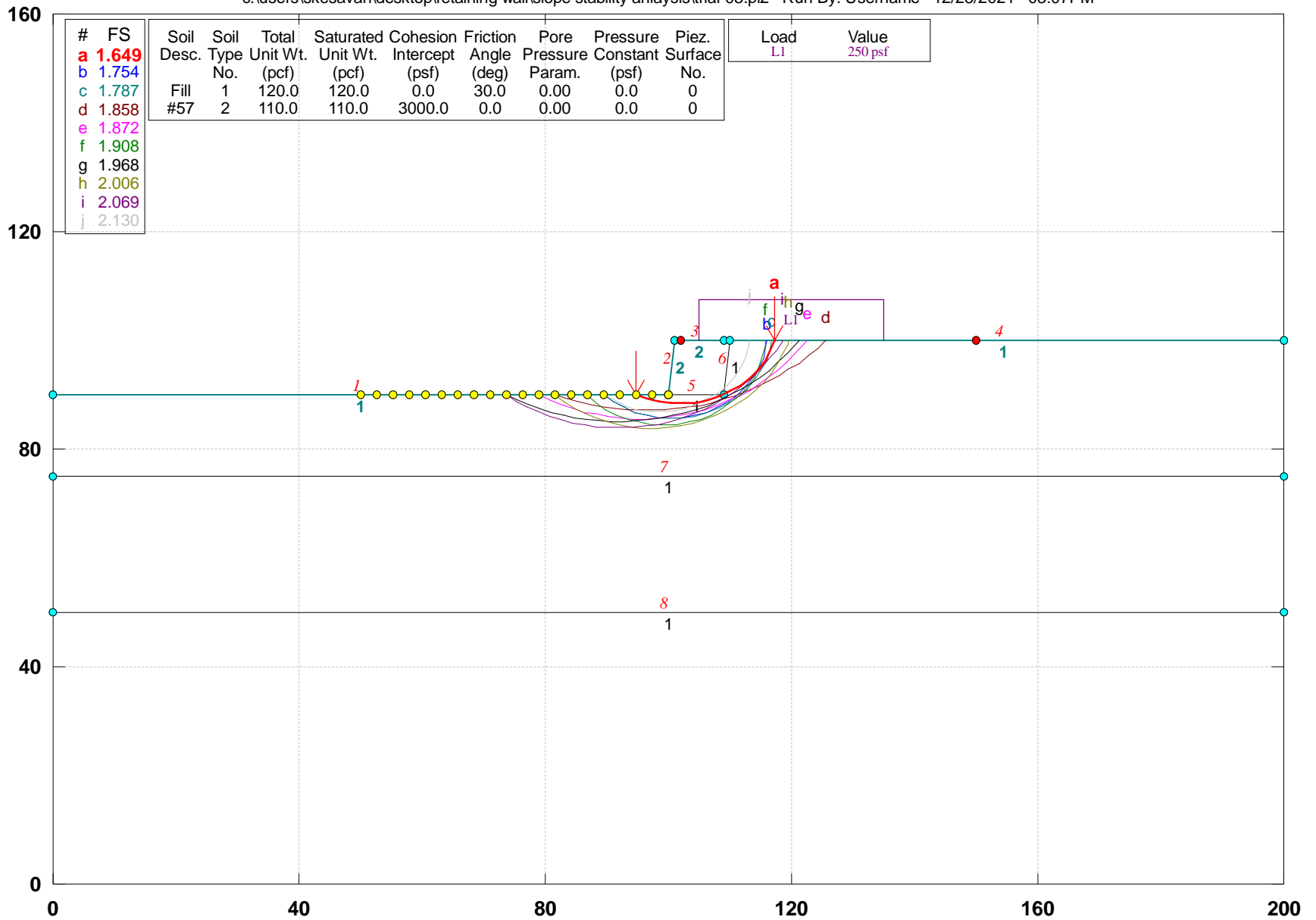
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- E.2.10 Walls 1 & 3 – Consolidation Settlement at Sta.23+50

I-95 Exressway/Opitz Blvd (Trial-03) Global Stability Sta 22+50

c:\users\skesavan\desktop\retaining wall\slope stability anlysis\trial-03.pl2 Run By: Username 12/28/2021 03:07PM



GSTABL7 v.2 FSmin=1.649

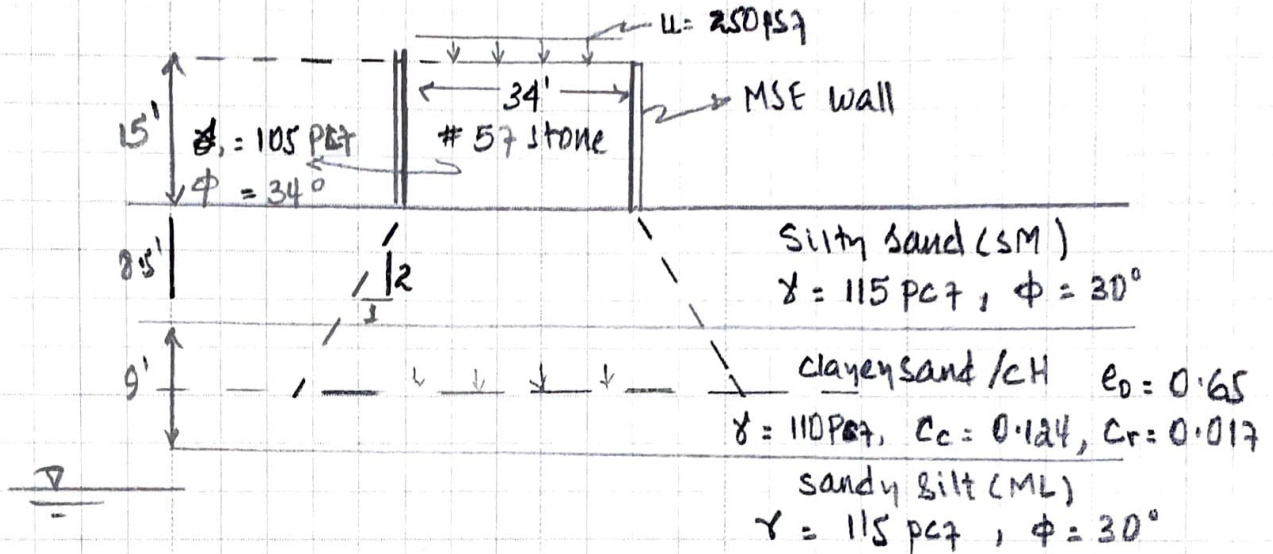
Safety Factors Are Calculated By The Modified Bishop Method

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consolidation Settlement computation (MSE wall Sta. 23+50)
 Boring considered in the analysis (B-A3-4)



$$P_0 \text{ @ center of clayey layer} = (115 \times 8.5) + (110 \times 4.5)$$

$$= \underline{1.472 \text{ ksf}}$$

$$\Delta p = \left((105 \text{ pcf} \times 15 \text{ ft}) + 250 \text{ psf} \right) \frac{34 \text{ ft}}{47 \text{ ft}} = \underline{1.32 \text{ ksf}}$$

$$P_c \text{ (pre consolidation pressure)} = \underline{1.786 \text{ ksf}}$$

$$P_0 + \Delta p = 1.472 \text{ ksf} + 1.32 \text{ ksf} = 2.792 \text{ ksf} > P_c$$

$$S_c = \frac{C_r H}{1 + e_0} \log \frac{P_c}{P_0} + \frac{C_c H}{1 + e_0} \log \left(\frac{P_0 + \Delta p}{P_c} \right)$$

$$= \frac{0.017}{1.65} \log \left(\frac{1.786}{1.472} \right) + \frac{0.124(9)}{1.65} \log \left(\frac{2.792}{1.786} \right)$$

$$= 0.0078 \text{ ft} + 0.1312 = 0.14 \text{ ft} = \underline{1.67 \text{ inches}}$$



Project Data				Calculation / Check	
Project:	Opitz Blvd Express Lane	Location:	T-Ramp	Calc :	skk
			Sta. 23+50 (H=10')	Date:	4-Jan-22
WRA WO#:	45893-001	Date:	1/4/2022	Chk:	scb
Subject:	T-Ramp Loading mostly soil			Date:	4-Jan-22

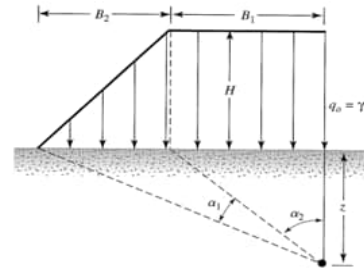
Subsurface Test Borings		SPT Hammer Efficiency		Soil Types for C' Curve Selection	1	
B-A3-4 (Weak hole)		Rig No.	E_m		1	1 - Clean Uniform medium SAND
Number of Layers (up to 14)	5	1. CME 55 (E2CR)	84%	2	2 - Well Graded Silty SAND and GRAVEL	
Depth to Groundwater (ft):	20	2. CME 45 (F&R)	78%	3	3 - Clean well graded fine to coarse Silty SAND	
SPT Corrected for overburden (Yes/No)	Yes	3. Salut	88%	4	4 - Well graded fine to medium Silty SAND	
SPT Correction for Efficiency (Yes/No)	Yes	4. CME 45 Cathead	66%	5	5 - Inorganic SILT	Yes
Select the Rig for Hammer Eff.	3. Salut					No
				$E_m = 88\%$		
				$\gamma_{water} = 62.4$		

Layer Data																
Layer No.	Bottom Depth (ft)	SPT N Value	Soil Unit Wt. (pcf)	Curve for Bearing Capacity Index-C'				Soil Layer		Overburden		SPT N Value (correctd)	C' (top)	C' (bott)	C'	
				Soil	Top	% Top	Description	Top (z ₁) (ft)	Bott.(z ₂) (ft)	center p _c (psf)	bottom p ₂ (psf)					
				USCS	Curve	Curve										
1	3.0	70	115.0	SM	1	100.0	100% Ty.1+0% Ty.2	0.0	3.0	172.5	345.0	205	7256	2922	7256	
2	12.0	10	120.0	SM	1	100.0	100% Ty.1+0% Ty.2	3.0	12.0	885.0	1425.0	22	94	82	94	
3	21.0	200	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	12.0	21.0	1987.5	2487.6	294	20752	8012	20752	
4	25.0	100	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	21.0	25.0	2612.8	2738.0	128	1951	883	1951	
5	70.0	100	125.0	SP/GP	1	100.0	100% Ty.1+0% Ty.2	25.0	70.0	4146.5	5555.0	102	1083	536	1083	

Project: Opitz Blvd Express Lane Location: T-Ramp Subject: Subject: T-Ramp Loading mostly soil

Stress Distribution for Two Areas			
	Area 1	Area 2	Area 3
Multiplier	1	1	0
Height of Embankment	10	10	0
Soil Unit Weight	115	115	0
Rectangular Loading Width B_1	18	18	0
Triangular Loading Width B_2	0	0	0
FHWA Recommended factor for final settlement: k_{FHWA}			0.5
Default Min. Value for B_2 =	1E-10		

Formulas:



$$\Delta\sigma_z = \frac{q_o}{\pi} \left[\left(\frac{B_1 + B_2}{B_2} \right) (\alpha_1 + \alpha_2) - \frac{B_1}{B_2} (\alpha_2) \right]$$

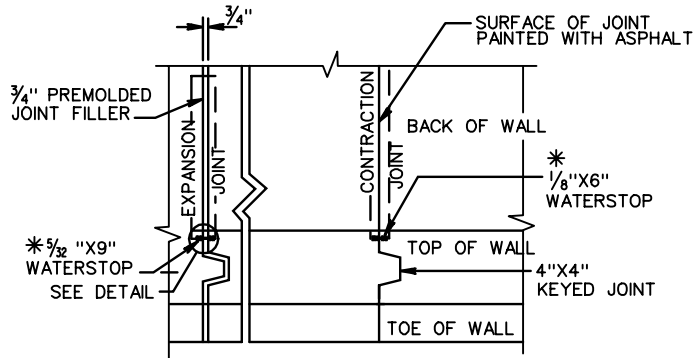
$$\Delta H = H \left(\frac{1}{C'} \right) \log_{10} \frac{p_o + \Delta p}{p_o}$$

Settlement Calculations:																			
Layer Data					Angles (radians)						Influence Factors			$q_0^{(a)}$	$q_0^{(b)}$	$q_0^{(c)}$	Total Δp	Settlements	
Layer No.	Middle Depth z_{mid} (ft)	Layer Thick. h_i (ft)	Overbr. Press. p_o (psf)	Bear. Factor C'	Area (a)		Area (b)		Area (c)		Area(a)	Area (b)	Area (c)	$q_0^{(a)} \cdot I_z^{(c)}$	$q_0^{(b)} \cdot I_z^{(c)}$	$q_0^{(c)} \cdot I_z^{(c)}$		Per Layer (inch)	Cumulative (inch)
					$\alpha_1^{(a)}$	$\alpha_2^{(a)}$	$\alpha_1^{(b)}$	$\alpha_2^{(b)}$	$\alpha_1^{(c)}$	$\alpha_2^{(c)}$	$I_z^{(a)}$	$I_z^{(b)}$	$I_z^{(c)}$	$\Delta p^{(a)}$ (psf)	$\Delta p^{(b)}$ (psf)	$\Delta p^{(c)}$ (psf)			
1	1.5	3.0	172.5	7256	0.000	1.488	0.000	1.488	0.000	0.000	0.474	0.474	0.000	544.5	544.5	0.0	1089.1	0.00	0.00
2	7.5	9.0	885.0	94	0.000	1.176	0.000	1.176	0.000	0.000	0.374	0.374	0.000	430.4	430.4	0.0	860.9	0.34	0.34
3	16.5	9.0	1987.5	20752	0.000	0.829	0.000	0.829	0.000	0.000	0.264	0.264	0.000	303.4	303.4	0.0	606.7	0.00	0.34
4	23.0	4.0	2612.8	1951	0.000	0.664	0.000	0.664	0.000	0.000	0.211	0.211	0.000	243.1	243.1	0.0	486.2	0.00	0.35
5	47.5	45.0	4146.5	1083	0.000	0.362	0.000	0.362	0.000	0.000	0.115	0.115	0.000	132.6	132.6	0.0	265.2	0.01	0.36
																	$\Delta H =$	0.36 inches	
Final settlement					$(k_{FHWA} * \Delta H)$						0.36 x 0.50 =			0.18 inches					
Consolidation Settlement					1.67 inch						Total			1.85 inch					

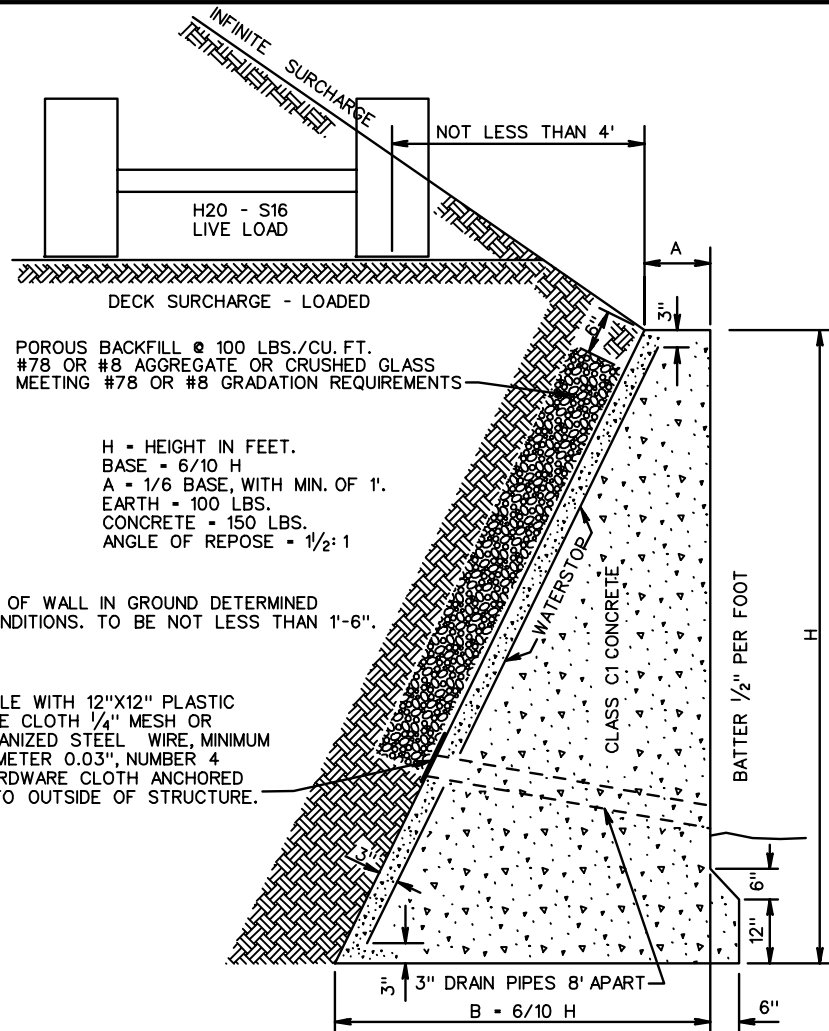
APPENDIX E.3

RW-3 Gravity Retaining Wall

- E.3.1 VDOT RW-3 Specifications**
- E.3.2 DCP Friction Angle and Compactness
- E.3.3 AASHTO Bearing Capacity
- E.3.4 AASHTO Reduction Factor for Footing on Slope



CONTRACTION JOINTS AT INTERVALS NOT EXCEEDING 30'.
 EXPANSION JOINTS AT INTERVALS NOT EXCEEDING 90'.
 * WATER STOPS TO BE ELASTOMERIC OR OTHER APPROVED MATERIAL. DIMENSIONS SHOWN ARE ABSOLUTE MINIMUM.



NOTE:
 DEPTH OF WALL IN GROUND DETERMINED BY CONDITIONS. TO BE NOT LESS THAN 1'-6".

HEIGHT OF WALL "H" IN FEET	THICKNESS AT TOP "A" IN FEET	THICKNESS AT BASE B=.6H	COMPRESSION AT TOE LBS. PER SQ. FT.	AREA OF SECTION SQ. FT.
3	1'-0"	1'-9 5/8"	856	4.83
4	1'-0"	2'-4 3/4"	1141	7.43
5	1'-0"	3'-0"	1427	10.63
6	1'-0"	3'-7 1/4"	1712	14.43
7	1'-0"	4'-2 3/8"	1997	18.83
8	1'-0"	4'-9 5/8"	2283	23.83
9	1'-0"	5'-4 3/4"	2568	29.43
10	1'-0"	6'-0"	2853	35.63
11	1'-1 1/4 "	6'-7 1/4"	3139	42.98
12	1'-2 3/8 "	7'-2 3/8"	3424	51.03
13	1'-3 5/8 "	7'-9 5/8"	3709	59.78
14	1'-4 3/4 "	8'-4 3/4"	3995	69.23
15	1'-6"	9'-0"	4280	79.38

SAFE BEARING CAPACITY OF SOIL	
ROCK MINIMUM.....	10,000 - 20,000 LBS. PER SQ. FT.
GRAVEL AND COARSE SAND, WELL CEMENTED	16,000 - 20,000 LBS. PER SQ. FT.
CLAY IN THICK BEDS, ALWAYS DRY.....	12,000 - 16,000 LBS. PER SQ. FT.
CLAY IN THICK BEDS, MODERATELY DRY.....	8,000 - 12,000 LBS. PER SQ. FT.
CLAY, SOFT.....	2,000 - 4,000 LBS. PER SQ. FT.
SAND, DRY, COMPACT, AND WELL CEMENTED	8,000 - 12,000 LBS. PER SQ. FT.
SAND, CLEAN, DRY	4,000 - 8,000 LBS. PER SQ. FT.
ALLUVIAL SOILS, ETC	1,000 - 2,000 LBS. PER SQ. FT.

NOTE: IF COMPRESSION AT TOE EXCEEDS SAFE BEARING CAPACITY OF SOIL, A SPECIAL FOOTING IS TO BE USED.

CONCRETE GRAVITY RETAINING WALLS INFINITE SURCHARGE AND DECK SURCHARGE - LOADED

SPECIFICATION REFERENCE

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APPENDIX E.3

RW-3 Gravity Retaining Wall

- E.3.1 VDOT RW-3 Specifications
- E.3.2 DCP Friction Angle and Compactness**
- E.3.3 AASHTO Bearing Capacity
- E.3.4 AASHTO Reduction Factor for Footing on Slope



**Friction Angle
from DCP and
STP Correlations**

Project: I-95 Expressway /Opitz Blvd
Woodbridge, VA
WRA # 32175-000
Test Date: _____

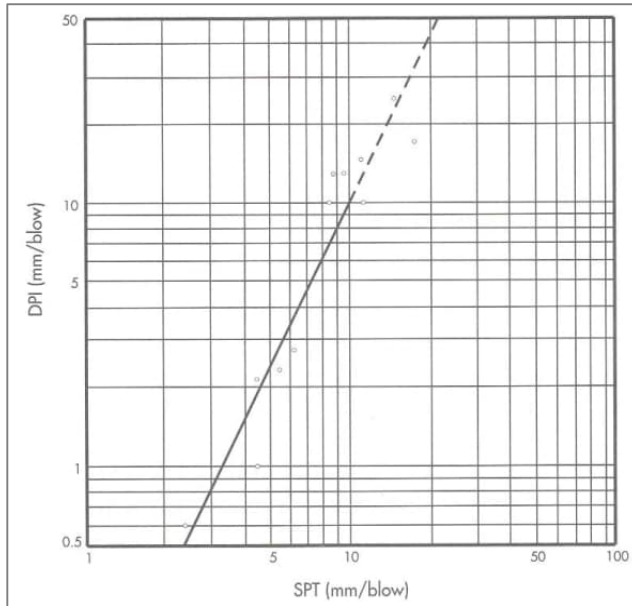
DCP No. DCP-SE
Calc by: skk 12/27/2021
Chk by: scb
DCP Weight Used: 8 kg (17.6 lb)

Test Hole: DCP-SE

DCP Penetration Index (DPI) and SPT Results

Ref: MnROAD (1993), User guide to the DCP

Mn/DOT Office of Material Research and Engineering



SPT N and Friction Angle

AASHTO LRFD 2016 Table 10.4.6.5.4-1 (Description boundaries modified)			
$(N_1)_{60}$	Friction Angle		Descrip.
	Min	Max	
1	25°	30°	Very Loose
4	25°	30°	
5	27°	32°	Loose
10	27°	32°	
11	30°	35°	Medium
30	30°	35°	
31	35°	40°	Dense
50	35°	40°	
51	38°	43°	Very Dense
100	38°	43°	

Log - Log Straight Line

	Point-1	Point-2	
I_{SPT} (y)	3.0	10.0	$m = 0.4767$
I_{DCP} (x)	0.8	10.0	

Equation $\log_{10}(I_{SPT}) = m \log_{10}(I_{DCP}) + c$

Overburden Correction

Assumed soil Unit Wt. 120.0 pcf

$N_1 = C_N N$

$C_N = [0.77 \log_{10}(40/\sigma'_v)]$, and $C_N < 2.0$


Wt. Factor 2

Sample Mid Depth (ft.)	DCP blows/6"	Estimation of Equivalent SPT N					Surcharge Pressure (ksf)	Overburden Corrected N_1 blows/12"	Friction Angle ϕ AASHTO Table 10.4.6.5.4-1		
		I_{DCP} mm/blow	$\log_{10}(I_{DCP})$	$\log_{10}(I_{SPT})$	I_{DCP} mm/blow	SPT N blows/12"			Min	Max	
		1	<u>0.50</u>	<u>2</u>	152.4	2.183			1.564	36.6	8
2	<u>1.50</u>	<u>3</u>	101.6	2.007	1.480	30.2	10	0.180	18	30°	35°
3	<u>2.50</u>	<u>3</u>	101.6	2.007	1.480	30.2	10	0.300	16	30°	35°
4	<u>3.50</u>	<u>3</u>	101.6	2.007	1.480	30.2	10	0.420	15	30°	35°
5	<u>4.50</u>	<u>3</u>	101.6	2.007	1.480	30.2	10	0.540	14	30°	35°
6	<u>5.50</u>	<u>4</u>	76.2	1.882	1.420	26.3	11	0.660	15	30°	35°
7	<u>6.50</u>	<u>7</u>	43.5	1.639	1.305	20.2	15	0.780	19	30°	35°
8	<u>6.75</u>	<u>6</u>	50.8	1.706	1.336	21.7	14	0.810	18	30°	35°
9											
10											

Notes: For lighter hammer weight, a factor 2 is used per ASTM D6951.

APPENDIX E.3 RW-3 Gravity Retaining Wall

- E.3.1 VDOT RW-3 Specifications
- E.3.2 DCP Friction Angle and Compactness
- E.3.3 AASHTO Bearing Capacity**
- E.3.4 AASHTO Reduction Factor for Footing on Slope

Nominal Bearing Resistance		sk	Ver:	V.03.00	
Reference: AASHTO LRFD		WR&A	Date:	12/29/21	
Project & Structure Data:					
Project: <u>I-95 Express Way /Opitz Blvd</u>		Structure: <u>RW-3 Walls at SE Quadrant</u>			
WRA #: <u>045893-001</u>		Foundation: <u>Foundations for 5 ft wall</u>			
Calculated by: <u>skk, 12/29/2021</u>			Checked by: <u>skk, 12/29/2021</u>		
Soil Parameters					
Cohesion $c =$	<u>0.0</u> psf	Foundatn Subgr. Soil Unit Wt. γ_{fs}	<u>125.0</u> pcf		
Friction Ang. $\phi_r =$	<u>30.0</u> degree	Surcharge Soil Unit Wt. γ_{sur}	<u>125.0</u> pcf		
Soils above footing bearing are as competent as subgrade soils?					<u>Yes</u>
Foundation Dimensions					
Footing Width	$B =$ <u>5.00</u> ft	Footing Depth	$D_f =$ <u>5.0</u> ft		
Footing Length	$L =$ <u>40.0</u> ft	G.Water Depth	$D_w =$ <u>15.0</u> ft		
Foundation Loads:					
Unfactored Vert. Load $V =$	<u>0.0</u> kips	Load Angle θ	<u>0.0</u> deg		
Unfactored Horz. Load $H =$	<u>0.0</u> kips	Moment:	----		
Assumed Eccentricity:	e_b (ft) = <u>0.0</u>	(< -0.8) ok	e_l (ft) = <u>0.0</u>	(< -6.7) ok	
Bearing Capacity Factors :					
$N_c = (N_q - 1) \cot \phi$	$N_\gamma = 2 (N_q + 1) \tan \phi$	$N_q = e^{(\gamma \tan \phi)} \tan^2(45^\circ + \phi/2)$			
$N_c = 30.14$	$N_\gamma = 22.40$	$N_q = 18.40$			
Effective Footing Dimensions: (Area reduction for assumed eccentricity)					
$B' = B - 2e_b =$ <u>5.0</u>	ft	$L' = L - 2e_l =$ <u>40.0</u>	ft		
Footing Shape Correction Factors:					
For $\phi = 0$	$S_c = 1 + (B'/5L')$	$S_\gamma = 1.0$	$S_q = 1$		
For $\phi > 0$	$S_c = 1 + (B'/L') (N_q/N_c)$	$S_\gamma = 1 - 0.4 (B'/L')$	$S_q = 1 + (B'/L') \tan \phi$		
	$S_c = 0.687$	$S_\gamma = 0.95$	$S_q = 1.072$		
Groundwater Correction Factors					
$C_{wq} =$ <u>1.000</u>				$C_{wy} =$ <u>1.000</u>	
Depth Correction Factor:					
Competent surcharge soils: <u>Yes</u>		$D_f/B =$ <u>1.00</u>	$d_q =$ <u>1.00</u>		
Load Inclination Factors:					
$i_c =$ <u>1.000</u>	$i_q =$ <u>1.000</u>			$i_\gamma =$ <u>1.000</u>	
Nominal Bearing Resistance:					
$q_n = c (N_c S_c i_c) + \gamma_{sur} D_f (N_q S_q d_q i_q) C_{wq} + 0.5 \gamma_{fs} B' (N_\gamma S_\gamma i_\gamma) C_{wy}$				ASD FOS	<u>3.0</u>
C term	<u>0.00</u>	q term	<u>12.33</u>	B term	<u>6.65</u>
		LRFD Φq		<u>0.45</u>	
$q_n =$ <u>18.98</u> ksf	$q_{all} =$ <u>6.33</u> ksf			$q_{factored} =$ <u>8.54</u> ksf	
Notes: Correction value for slope = <u>0.69</u> <u>qall</u> <u>4.37 ksf</u>					

APPENDIX E.3

RW-3 Gravity Retaining Wall

- E.3.1 VDOT RW-3 Specifications
- E.3.2 DCP Friction Angle and Compactness
- E.3.3 AASHTO Bearing Capacity
- E.3.4 AASHTO Reduction Factor for Footing on Slope**



Input

Slope Angle: (Range 20 to 30 deg)

$x = 47.00 \text{ ft.}$
 $y = 22.00 \text{ ft.}$
 $\beta = 25.1^\circ$

Internal Friction Angle: (Range 20 to 40 deg)

$\phi = 30.0^\circ$

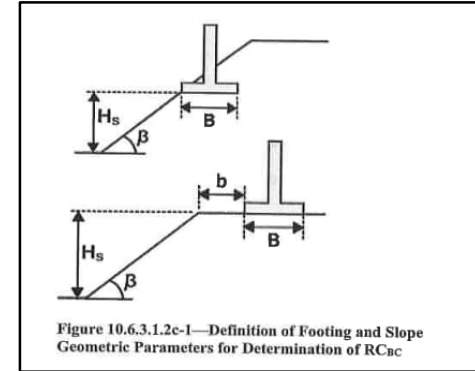
Foundation Dimensions

$b = 8.00 \text{ ft.}$
 $B = 4.30 \text{ ft.}$
 $H = 32.00 \text{ ft.}$

Interpolation Range

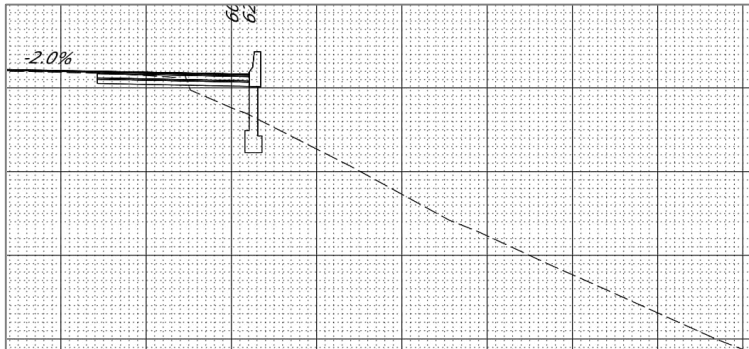
$\phi = 30.0^\circ$	$B/H = 0.13$
$\phi_1 = 30^\circ$	$[B/H]_1 = 0.20$
$\phi_2 = 30^\circ$	$[B/H]_2 = 0.20$
$\beta = 25.1^\circ$	$b/B = 1.86$
$\beta_1 = 20^\circ$	$[b/B]_1 = 1.25$
$\beta_2 = 30^\circ$	$[b/B]_2 = 2.50$

Schematic



Typical Section

Section at Sta. 70+25



Results: Final $RC_{BC} = 0.69$

Notes:

- Coefficients for $(B/H)=0.2$ are assumed for cases $(B/H)<0.2$.
- Purely Cohesionless soils ($c'=0$)
- Friction angle (ϕ) should be greater than slope angle.

Interpolation

Final RC_{BC}	VLOOKUP Code Multiplier				VLOOKUP Code	RC_{BC}	
	1.00E+04	1.00E+03	1.00E+03	1.00E+00			
0.69	$\phi=30$	$\beta=25$	$B/H=0.13$	$b/B=1.86$			
	$\phi=30$	$\beta=20$	$B/H=0.2$	$b/B=1.25$	320201.25	0.72	
		$\beta=20$	$B/H=0.2$	$b/B=2.50$	320202.50	0.94	
			$B/H=0.2$	$b/B=1.25$	320201.25	0.72	
			$B/H=0.2$	$b/B=2.50$	320202.50	0.94	
		$\beta=30$	$B/H=0.2$	$b/B=1.25$	330201.25	0.38	
		$\beta=30$	$B/H=0.2$	$b/B=2.50$	330202.50	0.74	
			$B/H=0.2$	$b/B=1.25$	330201.25	0.38	
			$B/H=0.2$	$b/B=2.50$	330202.50	0.74	
		$\phi=30$	$\beta=20$	$B/H=0.2$	$b/B=1.25$	320201.25	0.72
		$\phi=30$	$\beta=20$	$B/H=0.2$	$b/B=2.50$	320202.50	0.94
				$B/H=0.2$	$b/B=1.25$	320201.25	0.72
			$B/H=0.2$	$b/B=2.50$	320202.50	0.94	
		$\beta=30$	$B/H=0.2$	$b/B=1.25$	330201.25	0.38	
		$\beta=30$	$B/H=0.2$	$b/B=2.50$	330202.50	0.74	
			$B/H=0.2$	$b/B=1.25$	330201.25	0.38	
			$B/H=0.2$	$b/B=2.50$	330202.50	0.74	
Interpolation direction <-- <-- <-- <-- <-- <--							

Reduction Coefficients (RC_{BC}) - Footing on Slope

Ref: Table 10.6.3.1.2c-2, AASHTO LRFD Bridge Design Specifications, 8th Ed.

10-74

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION, 2017

Table 10.6.3.1.2c-2—Reduction Coefficients (RC_{BC}) for Footings Placed Adjacent to Slopes Composed of either Purely Cohesive Soils, ($\phi = 0$); Purely Cohesionless Soils ($c' = 0$); or Soils with both Cohesive and Cohesionless Strength Components

ϕ (°)	B/H	b/B	$\beta = 10^\circ$				$\beta = 20^\circ$				$\beta = 30^\circ$				$\beta = 40^\circ$			
			N _s				N _s				N _s				N _s			
			0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0
0	0.2	0	0.89	0.88	0.88	0.00	0.89	0.87	0.86	0.00	0.82	0.81	0.78	0.00	0.76	0.73	0.69	0.00
		0.5	0.97	0.96	0.96	0.00	0.95	0.93	0.91	0.00	0.92	0.89	0.87	0.00	0.86	0.83	0.76	0.00
		1.25	1.00	0.99	0.98	0.00	1.00	0.98	0.96	0.00	1.00	0.97	0.95	0.00	0.95	0.91	0.81	0.00
		2.5	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.97	0.84	0.00
		5	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.89	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	0.5	0	0.92	0.91	0.88	0.00	0.85	0.82	0.76	0.00	0.77	0.73	0.63	0.00	0.71	0.65	0.52	0.00
		0.5	0.96	0.95	0.89	0.00	0.92	0.89	0.78	0.00	0.87	0.84	0.68	0.00	0.83	0.76	0.56	0.00
		1.25	0.98	0.97	0.90	0.00	0.96	0.94	0.80	0.00	0.94	0.92	0.71	0.00	0.90	0.83	0.58	0.00
		2.5	1.00	1.00	1.00	0.00	1.00	1.00	0.86	0.00	1.00	1.00	0.79	0.00	1.00	0.93	0.68	0.00
		5	1.00	1.00	1.00	0.00	1.00	1.00	0.95	0.00	1.00	1.00	0.93	0.00	1.00	1.00	0.88	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	1	0	0.87	0.84	0.75	0.00	0.87	0.79	0.56	0.00	0.80	0.66	0.42	0.00	0.73	0.56	0.33	0.00
		0.5	0.95	0.91	0.82	0.00	0.92	0.83	0.65	0.00	0.86	0.73	0.46	0.00	0.81	0.67	0.40	0.00
		1.25	0.97	0.94	0.83	0.00	0.95	0.87	0.67	0.00	0.92	0.81	0.50	0.00	0.89	0.76	0.46	0.00
		2.5	1.00	0.98	0.88	0.00	1.00	0.97	0.77	0.00	1.00	1.00	0.84	0.00	0.99	0.92	0.63	0.00
		5	1.00	1.00	0.95	0.00	1.00	1.00	0.90	0.00	1.00	1.00	0.84	0.00	1.00	1.00	0.83	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	2	0	0.87	0.79	0.57	0.00	0.87	0.71	0.44	0.00	0.81	0.62	0.35	0.00	0.75	0.56	0.29	0.00
		0.5	0.97	0.93	0.65	0.00	0.94	0.79	0.49	0.00	0.89	0.72	0.42	0.00	0.85	0.69	0.37	0.00
		1.25	0.99	0.98	0.73	0.00	0.99	0.91	0.57	0.00	0.98	0.86	0.51	0.00	0.96	0.83	0.47	0.00
		2.5	1.00	0.99	0.82	0.00	1.00	0.96	0.69	0.00	1.00	0.95	0.64	0.00	1.00	0.95	0.61	0.00
		5	1.00	1.00	0.96	0.00	1.00	1.00	0.87	0.00	1.00	1.00	0.84	0.00	1.00	1.00	0.81	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
20	0.2	0	0.90	0.89	0.90	0.68	0.75	0.73	0.72	0.21	0.62	0.59	0.56	0.00	0.52	0.49	0.45	0.00
		0.5	0.78	0.87	0.86	0.70	0.74	0.76	0.74	0.40	0.63	0.65	0.63	0.00	0.52	0.56	0.52	0.00
		1.25	0.86	0.92	0.92	0.82	0.83	0.84	0.83	0.70	0.74	0.75	0.74	0.00	0.63	0.66	0.63	0.00
		2.5	0.96	0.98	0.99	0.83	0.95	0.94	0.95	0.84	0.90	0.89	0.90	0.00	0.78	0.81	0.78	0.00
		5	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	0.96	0.98	0.96	0.00
		10	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	0.99	0.99	1.00	0.00
	0.5	0	0.86	0.86	0.84	0.60	0.73	0.70	0.67	0.22	0.62	0.56	0.51	0.00	0.52	0.45	0.39	0.00
		0.5	0.84	0.91	0.92	0.71	0.80	0.80	0.79	0.40	0.70	0.68	0.67	0.00	0.62	0.59	0.56	0.00
		1.25	0.88	1.00	0.97	0.82	0.85	0.88	0.86	0.70	0.76	0.75	0.75	0.00	0.68	0.66	0.64	0.00
		2.5	0.97	1.00	1.00	0.81	0.95	0.97	0.98	0.84	0.90	0.94	0.96	0.00	0.84	0.86	0.87	0.00
		5	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	1	0	0.85	0.82	0.78	0.58	0.72	0.64	0.58	0.26	0.61	0.50	0.42	0.00	0.52	0.39	0.30	0.00
		0.5	0.84	0.91	0.91	0.71	0.81	0.80	0.79	0.46	0.70	0.69	0.67	0.00	0.64	0.62	0.60	0.00
		1.25	0.87	0.95	0.96	0.82	0.85	0.85	0.85	0.73	0.76	0.76	0.75	0.00	0.71	0.70	0.69	0.00
		2.5	0.97	1.00	1.00	0.82	0.95	0.97	0.98	0.83	0.90	0.94	0.97	0.00	0.86	0.89	0.91	0.00
		5	1.00	1.00	1.00	0.83	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.83	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	2	0	0.90	0.90	0.90	0.58	0.87	0.86	0.84	0.33	0.84	0.81	0.78	0.00	0.81	0.77	0.74	0.00
		0.5	0.90	0.93	0.93	0.70	0.88	0.88	0.87	0.54	0.84	0.83	0.81	0.00	0.84	0.82	0.81	0.00
		1.25	0.92	0.97	0.99	0.81	0.90	0.92	0.92	0.77	0.86	0.86	0.86	0.00	0.85	0.85	0.84	0.00
		2.5	0.98	1.00	1.00	0.81	0.97	0.98	1.00	0.81	0.93	0.97	1.00	0.00	0.92	0.96	0.99	0.00
		5	1.00	1.00	1.00	0.82	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.82	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00

Reduction Coefficients (RC_{BC}) - Footing on Slope

Ref: Table 10.6.3.1.2c-2, AASHTO LRFD Bridge Design Specifications, 8th Ed.

SECTION 10: FOUNDATIONS

10-75

Table 10.6.3.1.2c-2 (cont.)

φ (°)	B/H	b/B	β=10°				β=20°				β=30°				β=40°			
			N _s				N _s				N _s				N _s			
			0	2	4	c ^l =0	0	2	4	c ^l =0	0	2	4	c ^l =0	0	2	4	c ^l =0
30	0.2	0	0.93	0.92	0.91	0.76	0.65	0.64	0.63	0.39	0.51	0.50	0.48	0.11	0.40	0.37	0.36	0.00
		0.5	0.74	0.81	0.80	0.75	0.70	0.66	0.65	0.50	0.57	0.52	0.49	0.21	0.47	0.42	0.39	0.00
		1.25	0.78	0.85	0.86	0.86	0.74	0.73	0.72	0.72	0.63	0.60	0.59	0.38	0.54	0.50	0.47	0.00
		2.5	0.84	0.92	0.93	0.99	0.81	0.82	0.83	0.94	0.72	0.73	0.74	0.74	0.64	0.62	0.61	0.00
		5	0.95	1.00	1.00	1.00	0.93	0.98	1.00	1.00	0.88	0.95	1.00	0.97	0.80	0.85	0.87	0.00
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	0.5	0	0.79	0.79	0.78	0.70	0.63	0.59	0.55	0.36	0.50	0.43	0.39	0.13	0.39	0.32	0.27	0.00
		0.5	0.76	0.87	0.87	0.74	0.72	0.71	0.70	0.51	0.58	0.56	0.54	0.24	0.49	0.46	0.43	0.00
		1.25	0.79	0.85	0.92	0.87	0.75	0.73	0.76	0.72	0.63	0.62	0.61	0.45	0.54	0.52	0.50	0.00
		2.5	0.87	0.91	1.00	0.99	0.84	0.85	0.90	0.98	0.74	0.78	0.80	0.80	0.67	0.70	0.71	0.00
		5	0.97	1.00	1.00	1.00	0.95	1.00	1.00	1.00	0.90	1.00	1.00	1.00	0.85	0.94	0.98	0.00
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	1	0	0.79	0.75	0.73	0.67	0.63	0.53	0.49	0.41	0.55	0.41	0.35	0.24	0.48	0.33	0.26	0.00
		0.5	0.78	0.87	0.89	0.74	0.75	0.74	0.74	0.51	0.64	0.62	0.60	0.35	0.59	0.56	0.54	0.00
		1.25	0.81	0.90	0.91	0.88	0.78	0.78	0.78	0.72	0.68	0.67	0.66	0.58	0.64	0.62	0.61	0.00
		2.5	0.88	0.99	1.00	0.96	0.85	0.90	0.92	0.95	0.78	0.81	0.84	0.88	0.75	0.78	0.80	0.00
		5	0.97	1.00	1.00	1.00	0.96	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.89	0.98	1.00	0.00
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	2	0	0.88	0.88	0.87	0.65	0.87	0.85	0.83	0.48	0.85	0.82	0.80	0.38	0.83	0.80	0.76	0.00
		0.5	0.89	0.91	0.91	0.75	0.89	0.89	0.87	0.58	0.88	0.86	0.84	0.51	0.87	0.85	0.82	0.00
1.25		0.90	0.92	0.93	0.88	0.90	0.90	0.90	0.75	0.89	0.87	0.87	0.70	0.89	0.87	0.86	0.00	
2.5		0.97	1.00	1.00	1.00	0.96	0.97	0.98	0.98	0.92	0.94	0.96	0.95	0.91	0.92	0.94	0.00	
5		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	
40	0.2	0	0.69	0.69	0.69	0.78	0.51	0.48	0.47	0.37	0.37	0.33	0.30	0.16	0.27	0.23	0.20	0.05
		0.5	0.65	0.73	0.71	0.74	0.60	0.55	0.53	0.38	0.64	0.38	0.35	0.25	0.34	0.29	0.25	0.13
		1.25	0.68	0.77	0.75	0.86	0.63	0.60	0.58	0.55	0.74	0.44	0.42	0.39	0.39	0.34	0.31	0.25
		2.5	0.72	0.83	0.84	1.00	0.68	0.68	0.68	0.76	0.87	0.53	0.53	0.62	0.45	0.43	0.41	0.48
		5	0.80	0.93	0.95	1.00	0.76	0.82	0.85	1.00	1.00	0.72	0.76	1.00	0.57	0.61	0.63	0.94
	10	0.94	1.00	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.93	1.00	1.00	
	0.5	0	0.67	0.69	0.67	0.69	0.50	0.45	0.43	0.35	0.36	0.30	0.26	0.17	0.27	0.20	0.17	0.07
		0.5	0.68	0.81	0.81	0.73	0.63	0.62	0.61	0.46	0.47	0.44	0.41	0.25	0.39	0.35	0.32	0.09
		1.25	0.70	0.82	0.84	0.85	0.65	0.65	0.66	0.60	0.51	0.49	0.47	0.40	0.43	0.41	0.39	0.18
		2.5	0.76	0.92	0.96	1.00	0.72	0.77	0.80	0.81	0.59	0.62	0.63	0.60	0.54	0.56	0.56	0.37
		5	0.84	1.00	1.00	1.00	0.81	0.91	0.94	1.00	0.71	0.82	0.88	1.00	0.67	0.77	0.83	0.84
	10	0.96	1.00	1.00	1.00	0.94	1.00	1.00	1.00	0.89	1.00	1.00	1.00	0.86	1.00	1.00	1.00	
	1	0	0.69	0.64	0.62	0.70	0.63	0.48	0.43	0.45	0.58	0.39	0.33	0.32	0.54	0.33	0.27	0.24
		0.5	0.77	0.81	0.82	0.74	0.75	0.73	0.72	0.49	0.71	0.66	0.62	0.38	0.68	0.62	0.57	0.30
		1.25	0.78	0.84	0.85	0.84	0.77	0.76	0.75	0.64	0.73	0.69	0.66	0.55	0.71	0.66	0.63	0.48
		2.5	0.83	0.92	0.95	1.00	0.81	0.85	0.87	0.85	0.76	0.78	0.79	0.76	0.75	0.76	0.77	0.72
		5	0.89	1.00	1.00	1.00	0.87	0.95	0.98	1.00	0.80	0.90	0.95	1.00	0.80	0.89	0.94	1.00
	10	0.98	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.94	1.00	1.00	1.00	0.93	1.00	1.00	1.00	
	2	0	0.93	0.92	0.89	0.45	0.92	0.90	0.87	0.60	0.91	0.88	0.84	0.53	0.89	0.85	0.81	0.47
		0.5	0.93	0.95	0.93	0.76	0.93	0.92	0.90	0.65	0.92	0.89	0.87	0.64	0.92	0.89	0.86	0.60
1.25		0.93	0.95	0.94	0.86	0.93	0.93	0.92	0.78	0.93	0.91	0.89	0.74	0.93	0.90	0.88	0.74	
2.5		0.94	0.99	1.00	1.00	0.94	0.98	0.98	0.92	0.94	0.97	0.97	0.87	0.94	0.96	0.96	0.88	
5		0.95	1.00	1.00	1.00	0.96	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.96	1.00	1.00	1.00	
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00		

APPENDIX E.4

Soldier Pile and Lagging (SPL) Wall

E.4.1 Section and Embedment Design

E.4.2 Top Deflection Estimations

WHITMAN, REQUARDT & ASSOCIATES, LLP 801 South Caroline St., Baltimore, MD 21231	Version 05.00 Coded S Kesavan 05/28/15, Reformatted Feb.2022
	Project: Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1 Location: West Approach WRA No. 45893-001 Calc by: ssk 2021/12/14 Chk by:

Design Type:	Soldier Pile Design		
Wall Type:	Cantilever		
Design Methodology	LRFD		
Load & Resistance Factors	ASD	LRFD	Selected
Active Earth Pr. K_a (γ_{EH})	1.00	1.50	1.50
Passive Earth Pr. K_p (Φ)	1.00	0.75	0.75
Live Load Surcharge (γ_{LS})	1.00	1.75	1.75
Earth Load Surcharge (γ_{LS})	1.00	1.50	1.50
Embedment FOS -Teng Method	1.40	1.20	1.20

Wall H= 12.0 ft Rqd Zx 126 in^3

Results	<input type="button" value="Solve"/>
OK	
Final Embedment=1.20 Do	23.92 ft
Pile Tip Elevation:	179.08 ft
Factored Anchor Force:	N/A
Factored Bending Moment:	525 ft-k/pile
Do = 19.930 0	EL 183.07
Unit Wt. of Water (pcf)	62.4


Geometry: Top of Wall / Anchor/ Top of Soil Elevations and Angles

E.1 Top of wall (>soil-1)	EL	215.00 ft	(Should be greater than or equal to top of Layer-1 elevation)
Dredge Side (Left / Low Side):		Retained Side (Right / High Side):	
E.3 Top of Dredge Line (Top of Layer-5 elevation)	EL	203.00 ft	E.2 Top of Retained (Soil-1) EL 215.00 ft
E.5 Water on Dredge Side	EL	181.00 ft	E.4 Anchor /Raker EL [redacted] ft
			E.6 Water-Retained Side EL 181.00 ft

Geometry: Pile Spacing and Wall & Retained Soil Angles

Pile Spacing s	6.00 ft	Pile/Hole Dia. (b)	14.0 inch	Wall Face Angle	$\theta = 90.0^\circ$
<i>(For Sheet Pile Wall Design, s and b assumed at 1.0 ft)</i>				Ret. Slope Angle:	$\beta = 0.0^\circ$
Is Special Loading Widths Required below dredge?		No		(may required for secant piles)	
Below Dredge Loading Widths:	Active side $s_w =$	1.00 ft	Passive Side $s_p =$	3.50 ft	

Soil Parameters	Above Dredge				Below Dredge			
	Soil Layers above dredge: 1				Soil Layers below dredge: 3			
Soil Layer ID	1	2	3	4	5	6	7	8
Layer top EL (ft)	215.00				203.00	190.00	185.00	
Layer Soil Type: sand/clay	Sand				Sand	Sand	Sand	
Total unit Weight γ_i (pcf)	120.0				120.0	125.0	125.0	
Friction Angle ϕ_i degree	30.0°				30.0°	34.0°	38.0°	
Wall Friction Angle δ_i degree	0.0°				0.0°	0.0°	0.0°	
Cohesion c_i (psf)	0.0				0.0	0.0	0.0	
Selected Pressure Coeff: (Yes/No)	No				No	No	No	
Activ/At-rest Earth Pressure Coeff. K_a								
Passive Earth Pressure Coeff. K_p								
Check: Layer bottom EL (ft)	203.00				190.00	185.00	Last	

	Soldier Pile Wall Design	Soldier Pile Design	West Approach
	Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1	45893-001	skk 2021/12/14

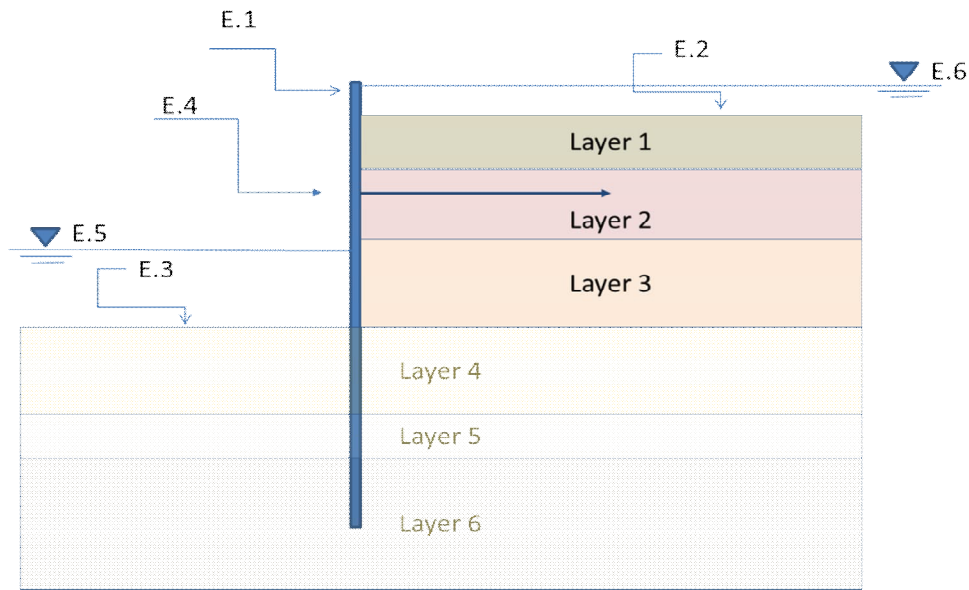
Surcharge Loads: <i>(Lat. Pressure from equivalent soil column - dependent on Ka/Ko)</i>			
Dead Loads (Vertical):	q_{sur-D}	0.000 ksf	Live Loads (Vertical): q_{sur-L} 0.250 ksf
Dredge side Mud surcharge	q_{sur-D}	0.500 ksf	(not included yet)

Lateral Load from Special Surcharge: <i>(Lat. Pressure from Elastic solutions -not dependent on Ka/Ko)</i>			
Single Horizontal force:	Q_{spe}	0.000 kips/LF	Elevation -9.000 ft
Distributed Horizontal Pressure:	<i>Define special surcharge up to 5 boxes:</i>		Number of Boxes 0
No. of Boxes			
Elev (ft) From	14.00		
To	4.00	-6.00	
Pressure (psf)	0.0	0.0	

Note: Dredge @ EL 203.00

Input Parameter Sketch			
Raker	0 kips	@	EL -9.5

Input Parameter Sketch



Dimension Diagram:



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

Soldier Pile Design

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West Approach

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Calculations

Sheet Pile WT=1/Soldier Pile WT=2

WT= 2

Trial D _o	19.93 ft	(pile penetration depth below dredge level)	Trial Pile Tip EL	183.07 ft
s (ft)=	6.00	b (ft)= 1.17	S _w (ft) = 1.17	S _p (ft) = 3.50
Total Retained above Dredge H _R =		12.00 ft	Anchor Height above Dredge L _A = -203.00 ft	
L _{WR} =		-22.00 ft	L _{WL} = -22.00 ft	
			L _X = -183.07 ft	
			185.00	

Soil ID		1	2	3	4	5	6	7	8
Layer top EL (ft)		215.00				203.00	190.00	185.00	
Layer Bottom EL (ft)		203.00				190.00	185.00	183.07	
Right side Water EL (H) (ft)		181.00				181.00	181.00	181.00	
Right Water Condition (dry/wet/mixed)		Dry				Dry	Dry	Dry	
Left side Water EL (L) (ft)						181.00	181.00	181.00	
Left Water Condition (dry/wet/mixed)						Dry	Dry	Dry	
Right Side Layer Thicknesses									
Thickness -Total H _i (ft)		12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Thickness -Dry H _{ID} (ft)		12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Thickness -Wet H _{IW} (ft)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Left Side Layer Thicknesses									
Thickness -Total						13.00	5.00	1.93	0.00
Thickness -Dry						13.00	5.00	1.93	0.00
Thickness -Wet						0.00	0.00	0.00	0.00

Layer Parameters		1	2	3	4	5	6	7	8
Total unit Weight γ _i (ksf)		0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Total unit Weight γ _{ib} (ksf)		0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Active EP Coef k _a		0.333	0.000	0.000	0.000	0.333	0.283	0.238	0.000
Passive EP Coef k _p						3.039	3.522	4.183	0.000
Cos δ		1.000	0.000	0.000	0.000	1.000	1.000	1.000	0.000
Load Factor for Ka		1.50	0.00	0.00	0.00	1.50	1.50	1.50	0.00
Resistance Factor for Kp		0.75	0.00	0.00	0.00	0.75	0.75	0.75	0.00
Factored Active EP Coef. K _a		0.500	0.000	0.000	0.000	0.500	0.425	0.357	0.000
Factored Passive EP Coef. K _p		0.00	0.00	0.00	0.00	2.279	2.642	3.137	0.000
y to layer top (ft)		31.93	0.00	0.00	0.00	19.93	6.93	1.93	0.00
Loading Width - Active Side (ft)		6.00	0.00	0.00	0.00	1.17	1.17	1.17	0.00
Loading Width - Passive Side (ft)						3.50	3.50	3.50	0.00



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

Soldier Pile Design

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West Approach

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Moment about Pile Tip (F*y) - Driving Moments									F	F*y
Retained Side: Soil-1 (i = 1) Active Above Dredge EL										
$K_{ai} =$	0.333	$\Upsilon_{EH} =$	1.50	$\text{Cos } \delta =$	1.000	$K_{Ai} =$	0.499			
Loading w= s	6.00 ft			y to layer top:	31.93 ft					
Geostatic Pressurre g_i : Layer I = 1										
	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8		
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00		
Dry γ	0.120	0.000	0.000	0.000	0.120	0.125	0.125	0.000		
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Wet γ_b	0.058	0.000	0.000	0.000	0.058	0.063	0.063	0.000		
Sum										
$g_{i-top} =$	0.000		$H_{iD} =$	12.00 ft		$H_{iW} =$	0.00 ft			
$g_{i-water} =$	1.440		$\gamma_i =$	0.1200 kcf		$\gamma_{ib} =$	0.0576 kcf			
$g_{i-bottom} =$	1.440		$p_{iD-R} =$	0.000 ksf/LF		$p_{iD-T} =$	0.719 ksf/LF			
			$p_{iW-R} =$	0.719 ksf/LF		$p_{iW-T} =$	0.000 ksf/LF			
Dry- Rectangular:	$P_{iD-R} =$	0.0000 kips/w					y=25.93		0.00	0.00
Dry- Trangular:	$P_{iD-T} =$	25.8936 kips/w					y=23.93		25.89	619.65
Wet- Rectangular:	$P_{iW-R} =$	0.000 kips/w					y=19.93		0.00	0.00
Wet- Trangular:	$P_{iW-T} =$	0.00 kips/w					y=19.93		0.00	0.00
Retained Side: Soil-2 (i = 2) Active Above Dredge EL										
$K_{ai} =$	0.000	$\Upsilon_{EH} =$	1.50	$\text{Cos } \delta =$	0.000	$K_{Ai} =$	0.000			
Loading w= b	0.00 ft			y to layer top:	0.00 ft					
Geostatic Pressurre g_i : Layer I = 2										
	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8		
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00		
Dry γ	0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000		
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Wet γ_b	0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000		
Sum	1.440									
$g_{i-top} =$	1.440		$H_{iD} =$	0.00 ft		$H_{iW} =$	0.00 ft			
$g_{i-water} =$	1.440		$\gamma_i =$	0.0000 kcf		$\gamma_{ib} =$	0.0000 kcf			
$g_{i-bottom} =$	1.440		$p_{iD-R} =$	0.000 ksf/LF		$p_{iD-T} =$	0.000 ksf/LF			
			$p_{iW-R} =$	0.000 ksf/LF		$p_{iW-T} =$	0.000 ksf/LF			
Dry- Rectangular:	$P_{iD-R} =$	0.00 kips/w					y=0.00		0.00	0.00
Dry- Trangular:	$P_{iD-T} =$	0.00 kips/w					y=0.00		0.00	0.00

Wet- Rectangular:	$P_{iW-R} =$	0.00 kips/w	$y=0.00$	0.00	0.00
Wet- Trangular:	$P_{iW-T} =$	0.00 kips/w	$y=0.00$	0.00	0.00

Retained Side: Soil-3 (i = 3) Active Above Dredge EL

$K_{ai} = 0.000$ $\Upsilon_{EH} = 1.50$ $\text{Cos } \delta = 0.000$ $K_{Ai} = 0.000$
 Loading $w = b$ 0.00 ft y to layer top: 0.00 ft

Geostatic Pressurre g_i : Layer I = 3

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	1.440	0.000						

$g_{i-top} = 1.440$ $H_{iD} = 0.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 1.440$ $\gamma_i = 0.0000$ kcf $\gamma_{ib} = 0.0000$ kcf
 $g_{i-bottom} = 1.440$ $p_{iD-R} = 0.000$ ksf/LF $p_{iD-T} = 0.000$ ksf/LF
 $p_{iW-R} = 0.000$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular:	$P_{iD-R} =$	0.0000 kips/w	$y=0.00$	0.00	0.00
Dry- Trangular:	$P_{iD-T} =$	0.0000 kips/w	$y=0.00$	0.00	0.00
Wet- Rectangular:	$P_{iW-R} =$	0.000 kips/w	$y=0.00$	0.00	0.00
Wet- Trangular:	$P_{iW-T} =$	0.00 kips/w	$y=0.00$	0.00	0.00

Retained Side: Soil-4 (i = 4) Active Above Dredge EL

$K_{ai} = 0.000$ $\Upsilon_{EH} = 1.50$ $\text{Cos } \delta = 0.000$ $K_{Ai} = 0.000$
 Loading $w = b$ 0.00 ft y to layer top: 0.00 ft

Geostatic Pressurre g_i : Layer I = 4

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	1.440	0.000	0.000					

$g_{i-top} = 1.440$ $H_{iD} = 0.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 1.440$ $\gamma_i = 0.0000$ kcf $\gamma_{ib} = 0.0000$ kcf
 $g_{i-bottom} = 1.440$ $p_{iD-R} = 0.000$ ksf/LF $p_{iD-T} = 0.000$ ksf/LF
 $p_{iW-R} = 0.000$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular:	$P_{iD-R} =$	0.0000 kips/w	$y=0.00$	0.00	0.00
Dry- Trangular:	$P_{iD-T} =$	0.0000 kips/w	$y=0.00$	0.00	0.00

Wet- Rectangular: $P_{iW-R} = 0.000$ kips/w $y=0.00$
 Wet- Trangular: $P_{iW-T} = 0.00$ kips/w $y=0.00$

0.00	0.00
0.00	0.00

Retained Side: Soil-5 (i = 5) Active Below Dredge EL

$K_{ai} = 0.333$ $\Upsilon_{EH} = 1.50$ $\text{Cos } \delta = 1.000$ $K_{Ai} = 0.500$
 Loading $w = b$ 1.17 ft y to layer top: 19.93 ft

Geostatic Pressurre g_{i-top} : Layer I = 5

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	1.440	0.000	0.000	0.000				

$g_{i-top} = 1.440$ $H_{iD} = 13.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 3.000$ $\gamma_i = 0.1200$ kcf $\gamma_{ib} = 0.0576$ kcf
 $g_{i-bottom} = 3.000$ $p_{iD-R} = 0.719$ ksf/LF $p_{iD-T} = 0.779$ ksf/LF
 $p_{iW-R} = 1.499$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular: $P_{iD-R} = 10.9091$ kips/w $y=13.43$
 Dry- Trangular: $P_{iD-T} = 5.9091$ kips/w $y=11.26$
 Wet- Rectangular: $P_{iW-R} = 0.000$ kips/w $y=6.93$
 Wet- Trangular: $P_{iW-T} = 0.0000$ kips/w $y=6.93$

10.91	146.51
5.91	66.56
0.00	0.00
0.00	0.00

Retained Side: Soil-6 (i = 6) Active Below Dredge EL

$K_{ai} = 0.283$ $\Upsilon_{EH} = 1.50$ $\text{Cos } \delta = 1.000$ $K_{Ai} = 0.425$
 Loading $w = b$ 1.17 ft y to layer top: 6.93 ft

Geostatic Pressurre g_{i-top} : Layer I = 6

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - H_{iD}	12.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.1200	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - H_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0576	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	1.440	0.000	0.000	0.000	1.560			

$g_{i-top} = 3.000$ $H_{iD} = 5.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 3.625$ $\gamma_i = 0.1250$ kcf $\gamma_{ib} = 0.0626$ kcf
 $g_{i-bottom} = 3.625$ $p_{iD-R} = 1.274$ ksf/LF $p_{iD-T} = 0.265$ ksf/LF
 1.53881 $p_{iW-R} = 1.539$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular: $P_{iD-R} = 7.4288$ kips/w $y=4.43$
 Dry- Trangular: $P_{iD-T} = 0.7738$ kips/w $y=3.60$
 Wet- Rectangular: $P_{iW-R} = 0.000$ kips/w $y=1.93$

7.43	32.91
0.77	2.78
0.00	0.00

Total	74.57	1328.82
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Moment about Pile Tip (F*y) - Resisting Moments

Dredge Side: Layer 5 (i = 5) Passive

$K_{pi} = 3.039$ $\Omega = 0.75$ $\text{Cos } \delta = 1.000$ $K_{pi} = 2.279$
 Loading $w = \min(s, 3b)$ 3.50 ft y to layer top: 19.93 ft

Geostatic Pressurre g_i Layer I = 5

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - L_{iD}	0.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.0000	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - L_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0000	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	0.000	0.000	0.000	0.000				

$g_{i-top} = 0.000$ $H_{iD} = 13.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 1.560$ $\gamma_i = 0.1200$ kcf $\gamma_{ib} = 0.0576$ kcf
 $g_{i-bottom} = 1.560$ $p_{iD-R} = 0.000$ ksf/LF $p_{iD-T} = 3.556$ ksf/LF
 3.55563 $p_{iW-R} = 3.556$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular:	$P_{iD-R} = 0.000$ kips/w	y=13.43	0.00	0.00
Dry- Trangular:	$P_{iD-T} = 80.891$ kips/w	y=11.26	80.89	911.13
Wet- Rectangular:	$P_{iD-R} = 0.000$ kips/w	y=6.93	0.00	0.00
Dry- Trangular:	$P_{iD-T} = 0.000$ kips/w	y=6.93	0.00	0.00

Dredge Side: Layer 6 (i = 6) Passive

$K_{pi} = 3.522$ $\Omega = 0.75$ $\text{Cos } \delta = 1.000$ $K_{pi} = 2.642$
 Loading $w = \min(s, 3b)$ 3.50 ft y to layer top: 6.93 ft

Geostatic Pressurre g_i Layer I = 6

	Layer-1	Layer-2	Layer-3	Layer-4	Layer-5	Layer-6	Layer-7	Layer-8
Dry - L_{iD}	0.00	0.00	0.00	0.00	13.00	5.00	1.93	0.00
Dry γ	0.0000	0.0000	0.0000	0.0000	0.1200	0.1250	0.1250	0.0000
Wet - L_{iW}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wet γ_b	0.0000	0.0000	0.0000	0.0000	0.0576	0.0626	0.0626	0.0000
Sum	0.000	0.000	0.000	0.000	1.560			

$g_{i-top} = 1.560$ $H_{iD} = 5.00$ ft $H_{iW} = 0.00$ ft
 $g_{i-water} = 2.185$ $\gamma_i = 0.1250$ kcf $\gamma_{ib} = 0.0626$ kcf
 $g_{i-bottom} = 2.185$ $p_{iD-R} = 4.121$ ksf/LF $p_{iD-T} = 1.651$ ksf/LF
 5.77168 $p_{iW-R} = 5.772$ ksf/LF $p_{iW-T} = 0.000$ ksf/LF

Dry- Rectangular:	$P_{iD-R} = 72.113$ kips/w	y=4.43	72.11	319.49
Dry- Trangular:	$P_{iD-T} = 14.446$ kips/w	y=3.60	14.45	51.96
Wet- Rectangular:	$P_{iD-R} = 0.000$ kips/w	y=1.93	0.00	0.00
Dry- Trangular:	$P_{iD-T} = 0.000$ kips/w	y=1.93	0.00	0.00

Dredge Side: Layer 7 (i = 7) Passive

$K_{pi} = 4.183$ $\Omega = 0.75$ $\text{Cos } \delta = 1.000$ $K_{pi} = 3.137$
 Loading $w = \min(s, 3b)$ 3.50 ft y to layer top: 1.93 ft

Rectangular: $p_{w1} = 0.0000$ ksf
 Loading width below dredge, $s_w = 1.17$ ft
 $P_{w2-Br} = p_{w1} D_o s_w = 0.00$ kips/pile

Triangular:
 $L_{adj} = -22.00$ ft
 $p_{w3} = \gamma_w (D_o + L_{adj}) = -0.129$ ksf/LF
 $P_{w2-Bt} = 0.5 p_{w3} (D_o + D_{adj}) s_w = 0.156$ kips/pile

Dredge Side: Anchor Force *Last*
 $T = 0.00$ kips/LF

		0.00	0.00
		0.16	-0.11
		0.00	0.00
		Total	
		216.48	1328.82
	<i>Difference:</i>	141.91	0.00



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

Soldier Pile Design

45893-001

West Approach

skk 2021/12/14

Active Earth Pre.Coeff.(Coulomb) (For $\beta > \phi$; $\sin(\phi - \beta)$ is assumed 0)											
Layer	ϕ	δ	β	θ	$\sin(\phi + \delta)$	$\sin(\phi - \beta)$	$\sin(\theta - \delta)$	$\sin(\theta + \beta)$	$\sin(\theta + \phi)$	Γ	k_a
1	30.0°	0.0°	0.0°	90.0°	0.500	0.500	1.000	1.000	0.866	2.250	0.333
5	30.0°	0.0°	0.0°	90.0°	0.500	0.500	1.000	1.000	0.866	2.250	0.333
6	34.0°	0.0°	0.0°	90.0°	0.559	0.559	1.000	1.000	0.829	2.431	0.283
7	38.0°	0.0°	0.0°	90.0°	0.616	0.616	1.000	1.000	0.788	2.610	0.238

Note: k_a is calculated based on AASHTO equations 3.11.5.3-1 and 3.11.5.3-2

Passive Earth Pres.Coeff.-Vertical Wall (AASHTO Figure 3.11.5.4-2) $\beta = 0.0^\circ$											
Layer	ϕ	δ	δ/ϕ	Interpolation of R			β/ϕ	k_p at	k_p at	Chart k_p	R^*K_p
				R_{down}	R_{up}	R		$\beta/\phi=0$	$\beta/\phi=1$		
5	30.0°	0.0°	0.00	0.467	0.467	0.467	0.000	6.508	15.638	6.508	3.039
6	34.0°	0.0°	0.00	0.383	0.383	0.383	0.000	9.197	30.518	9.197	3.522
7	38.0°	0.0°	0.00	0.302	0.302	0.302	0.000	13.852	61.339	13.852	4.183
				#VALUE!							

(For Comparison)

Passive Earth Pressure Coeff. (Coulomb) Bowles(1982), Eq.11-6 $\beta = 0.0^\circ$ $\theta = 90.0^\circ$											
Layer	ϕ	δ	$\sin(\phi + \delta)$	$\sin(\phi + \beta)$	$\sin(\theta + \delta)$	$\sin(\theta + \beta)$	Γ	$\sin(\theta - \phi)$	$\sin(\theta)$	Coulomb k_a	Rankine k_a
5	30.0°	0.0°	0.500	0.500	1.000	1.000	0.250	0.866	1.000	3.000	3.000
6	34.0°	0.0°	0.559	0.559	1.000	1.000	0.194	0.829	1.000	3.537	3.537
7	38.0°	0.0°	0.616	0.616	1.000	1.000	0.148	0.788	1.000	4.204	4.204

Fifth Order interpolation Function for K_p						
Coeff.	ϕ^5	ϕ^4	ϕ^3	ϕ^2	ϕ	Const.
$\beta/\phi=0$	2.26E-06	-2.34E-04	9.45E-03	-1.73E-01	1.48E+00	-2.91E+00
$\beta/\phi=1$	6.51E-06	-4.69E-04	1.33E-02	-1.70E-01	1.13E+00	-1.63E+00

ASD	Yes	
LRFD	No	Sand
		Rock

Layer	k_a	K_p
1	0.333	
2		
3		
4		
5	0.333	3.039
6	0.283	3.522
7	0.238	4.183
8		



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

Soldier Pile Design

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West Approach

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Interpolated R Values based AASHTO Table 3-11.5.4-2

ϕ	δ/ϕ_f										
	-1.0	-0.9	-0.8	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0.0
10	1.000	0.993	0.985	0.978	0.962	0.946	0.929	0.912	0.898	0.881	0.864
11	1.000	0.992	0.983	0.975	0.956	0.938	0.919	0.900	0.884	0.865	0.846
12	1.000	0.991	0.981	0.971	0.951	0.930	0.910	0.889	0.871	0.850	0.828
13	1.000	0.989	0.978	0.968	0.945	0.923	0.900	0.877	0.857	0.834	0.811
14	1.000	0.988	0.976	0.964	0.940	0.915	0.891	0.866	0.844	0.819	0.793
15	1.000	0.987	0.974	0.961	0.934	0.907	0.881	0.854	0.830	0.803	0.775
16	1.000	0.985	0.971	0.956	0.927	0.898	0.870	0.841	0.814	0.786	0.756
17	1.000	0.984	0.968	0.951	0.921	0.889	0.858	0.827	0.799	0.768	0.736
18	1.000	0.982	0.964	0.946	0.914	0.880	0.847	0.814	0.783	0.751	0.717
19	1.000	0.981	0.961	0.941	0.908	0.871	0.835	0.800	0.768	0.733	0.697
20	1.000	0.979	0.958	0.936	0.901	0.862	0.824	0.787	0.752	0.716	0.678
21	1.000	0.977	0.955	0.931	0.893	0.851	0.818	0.772	0.735	0.697	0.657
22	1.000	0.976	0.952	0.926	0.885	0.840	0.812	0.757	0.718	0.678	0.636
23	1.000	0.974	0.948	0.922	0.876	0.830	0.807	0.741	0.700	0.658	0.616
24	1.000	0.973	0.945	0.917	0.868	0.819	0.801	0.726	0.683	0.639	0.595
25	1.000	0.971	0.942	0.912	0.860	0.808	0.795	0.711	0.666	0.620	0.574
26	1.000	0.969	0.937	0.905	0.850	0.796	0.773	0.694	0.648	0.600	0.553
27	1.000	0.967	0.933	0.898	0.840	0.783	0.751	0.677	0.629	0.580	0.531
28	1.000	0.964	0.928	0.892	0.831	0.771	0.730	0.661	0.611	0.560	0.510
29	1.000	0.962	0.924	0.885	0.821	0.758	0.708	0.644	0.592	0.540	0.488
30	1.000	0.960	0.919	0.878	0.811	0.746	0.686	0.627	0.574	0.520	0.467
31	1.000	0.957	0.914	0.870	0.799	0.732	0.669	0.609	0.554	0.499	0.446
32	1.000	0.954	0.908	0.861	0.787	0.717	0.653	0.591	0.534	0.479	0.425
33	1.000	0.952	0.903	0.853	0.776	0.703	0.636	0.572	0.515	0.458	0.404
34	1.000	0.949	0.897	0.844	0.764	0.688	0.620	0.554	0.495	0.438	0.383
35	1.000	0.946	0.892	0.836	0.752	0.674	0.603	0.536	0.475	0.417	0.362
36	1.000	0.942	0.885	0.825	0.738	0.658	0.585	0.517	0.455	0.397	0.342
37	1.000	0.939	0.878	0.815	0.724	0.641	0.567	0.497	0.435	0.377	0.322
38	1.000	0.935	0.871	0.804	0.710	0.625	0.548	0.478	0.415	0.356	0.302
39	1.000	0.932	0.864	0.794	0.696	0.608	0.530	0.458	0.395	0.336	0.282
40	1.000	0.928	0.857	0.783	0.682	0.592	0.512	0.439	0.375	0.316	0.262
41	1.000	0.924	0.848	0.770	0.666	0.574	0.492	0.419	0.368	0.297	0.244
42	1.000	0.920	0.839	0.757	0.649	0.555	0.473	0.399	0.361	0.278	0.227
43	1.000	0.915	0.829	0.744	0.633	0.537	0.453	0.379	0.353	0.259	0.209
44	1.000	0.911	0.820	0.731	0.616	0.518	0.434	0.359	0.346	0.240	0.192
45	1.000	0.907	0.811	0.718	0.600	0.500	0.414	0.339	0.339	0.221	0.174



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

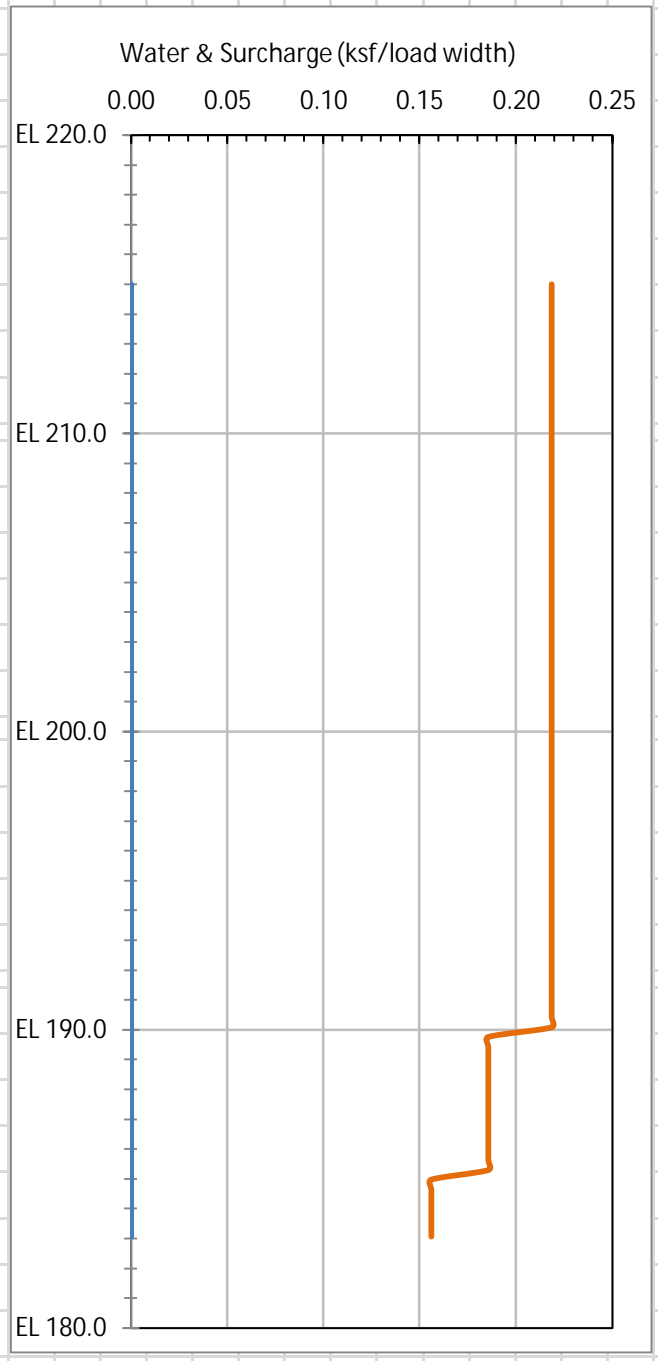
Soldier Pile Design

45893-001

West Approach

skk 2021/12/14

Results: Moment and Shear Diagrams



Notes:



Soldier Pile Wall Design

Opitz Blvd Wall, Sta. 64+50, Boring B-A3-1

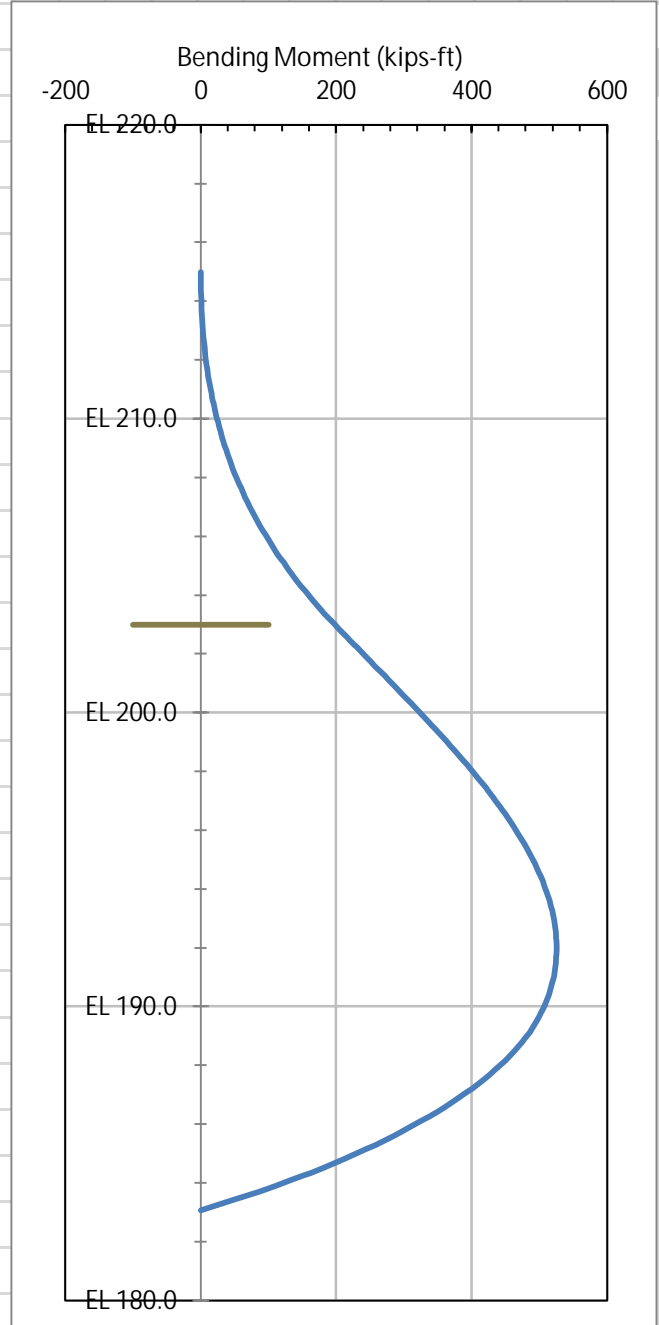
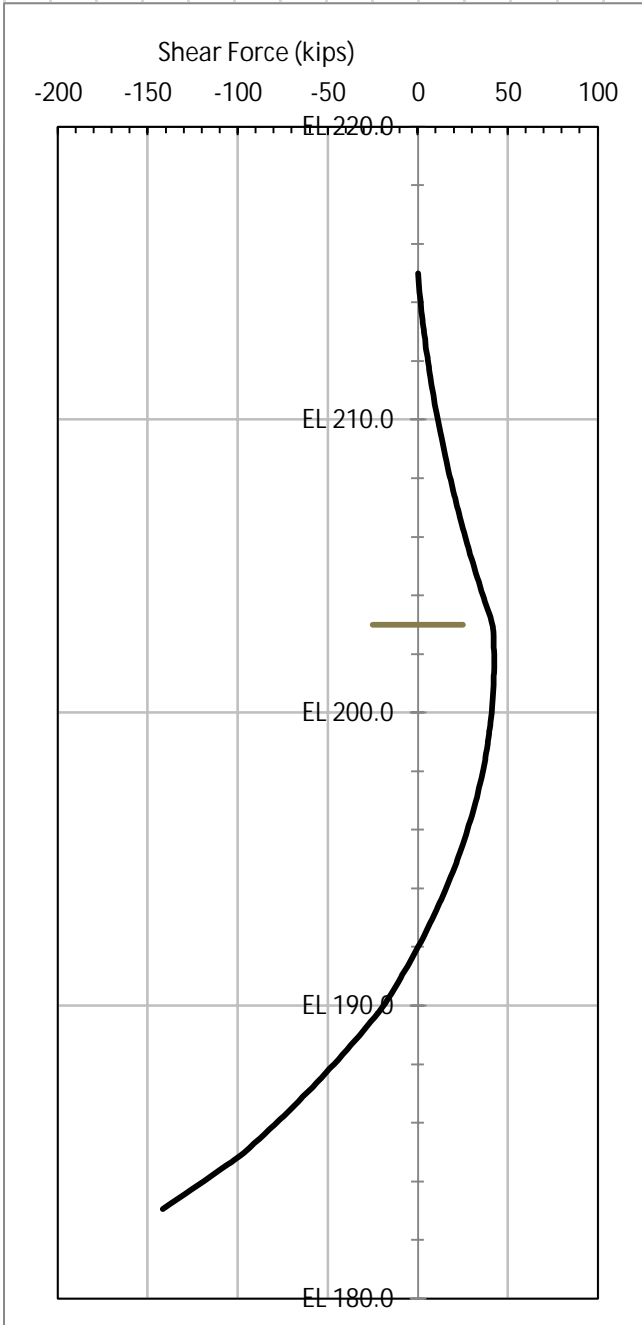
Soldier Pile Design

45893-001

West Approach

skk 2021/12/14

Results: Moment and Shear Diagrams



Max Moment: 525.2 ft-kips
 Required Z_x : 126.1 inch^3

Yield Strength, f_y : 50 ksi
 Resistance Factor: 1 (for f_y)

Notes:

APPENDIX E.4

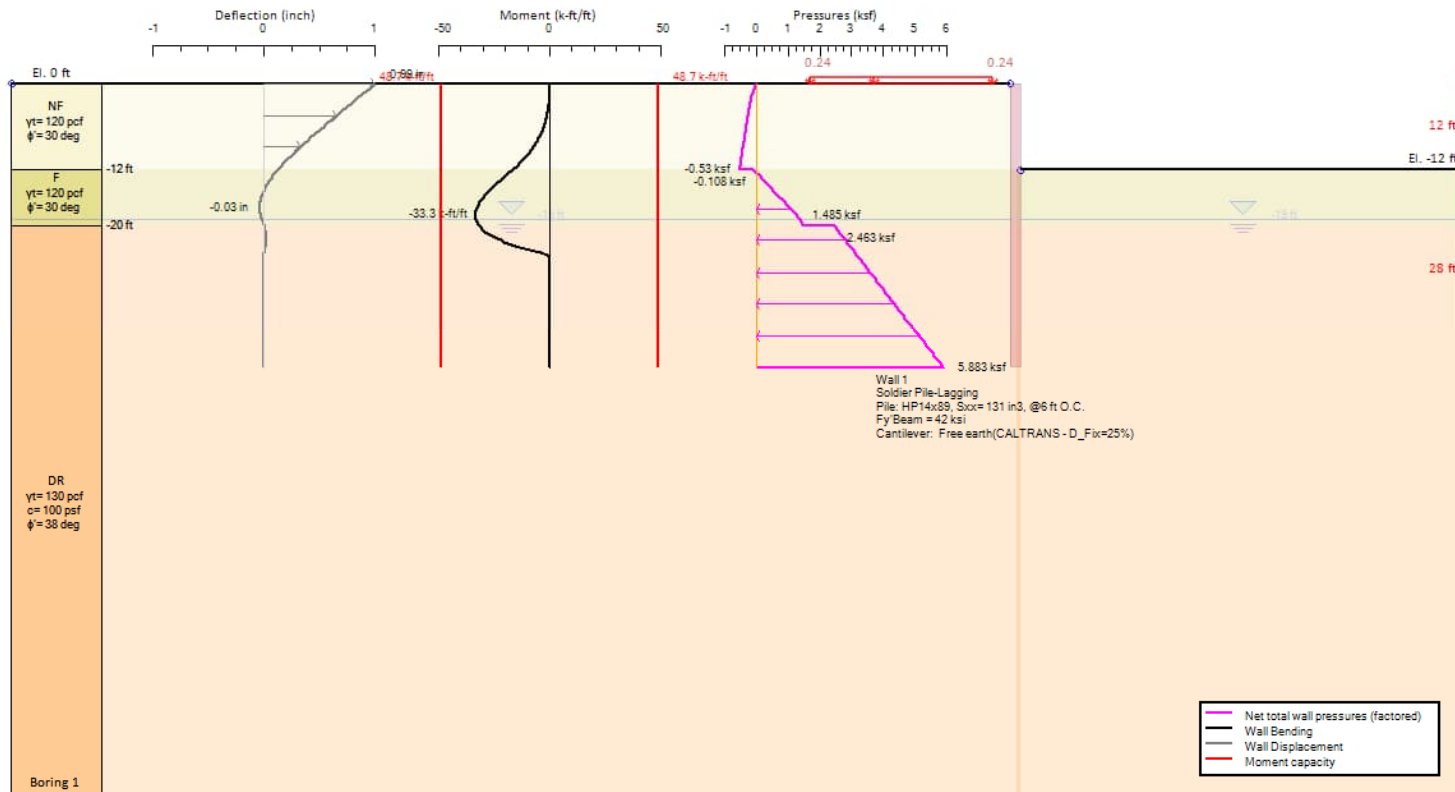
Soldier Pile and Lagging (SPL) Wall

E.4.1 Section and Embedment Design

E.4.2 Top Deflection Estimations

Base model

Concrete Code:	EC2-German Annex/1.5
Steel Code:	AISC 360-16 ALL
1st Wall Limit Equilibrium	California Shoring Manual-11
Drain State Clays	Default
Water $\gamma_w = 62.4$ pcf	Simple flow
Drive	Ka
Resist	Kp



***Project: Opitz Blvd SPL Wall at West Approach
Results for Design Section 0: Base model***

ANALYSIS AND CHECKING SUMMARY

The following tables summarize critical results for all design sections. These results may include wall moments, shears, displacements, stress checks, wall embedment safety factors, basal & slope stability safety factors, etc.

Summary vs Design Section

Base model	Wall Moment	Wall Shear	Wall Displace	Max Support	Critical Support	Embedment	Comments
	(k-ft/ft)	(k/ft)	(in)	Reaction (k/ft)	Check	Wall FS	
Base model	33.3	14.04	0	No supports	No supports	2.295	Calculation successful

Extended Summary

Table: Extended summary for all design sections.

Design Section	Calculation Result	Wall Displacement	Settlement
Name		(in)	(in)
Base model	Calculation successful	0.99	1.07

Table: Extended summary for wall moments and shears for all design sections.

Design Section	Wall Moment	Wall Moment	Wall Shear	Wall Shear
Name	(k-ft/ft)	(k-ft)	(k/ft)	(k)
Base model	33.3	199.83	14.04	84.25

Table: Extended summary for wall stress checks for all design sections.

Design Section	STR Combined	STR Moment	STR Shear	Wall Concrete Service
Name	Wall Ratio	Wall Ratio	Wall Ratio	Stress Ratio FIC
Base model	0.684	0.684	0.722	N/A

Table notes:

- STR Combined: Combined stress check, along eccentricity line considering axial load and moment (demand/capacity).
- STR Moment : Moment stress check, assuming constant axial load on wall (demand/capacity).
- STR Shear : Shear stress check (shear force demand/wall shear capacity).

Table: Extended summary for support results for all design sections

Design Section	Max Support	Max Support	Critical	STR Support	Support Geotech
Name	Reaction (k/ft)	Reaction (k)	Support Check	Ratio	Capacity Ratio (pull)
Base model	No supports	No supports	No supports	No supports	No supports

Table notes:

- STR Support ratio: Critical structural stress check for support (force demand/structural capacity).
- Support geotech capacity ratio: Critical geotechnical capacity stress check (demand/geotechnical capacity).
- Critical support check: Critical demand/design capacity ratio (structural or geotechnical).

Table: Summary for basal stability and wall embedment safety factors from conventional analyses.

Design Section	FS	Toe FS	Toe FS	Toe FS
Name	Basal	Passive	Rotation	Length
Base model	3.359	12.528	5.299	2.295

Table notes:

- FSbasal : Critical basal stability safety factor (relevant only when soft clays are present beneath the excavation).
- TOE FS Passive : Safety factor for wall embedment based on FS= Available horizontal thrust resistance/Driving hor. thrust.
- TOE FS Rotation: Safety factor for wall embedment based on FS= Available resisting moment/Driving moment.
- TOE FS Length : Safety factor for wall embedment based on FS= Available wall embedment/Required embedment for FS=1.0

Table: Summary for wall embedment safety factors from elastoplastic analyses.

Design Section	FS Mobilized	FS
Name	Passive	True/Active
Base model	N/A	N/A

Table notes:

- FS Mobilized Passive : Safety factor= Available horizontal passive resistance/Mobilized passive thrust.
- FS True/Active : Soil thrust on retained wall side/Minimum theoretically horizontal active force thrust.

Table: Summary for hydraulic safety factors, water flow, and slope stability

Design Section	Hydraulic	Qflow	FSslope
Name	Heave FS	(ft ³ /hr)	
Base model	2.717	N/A	N/A

Max. Moment vs Stage

	Base Model
M stg0 (k-ft/ft)	DS: 0
M stg1 (k-ft/ft)	-33.3

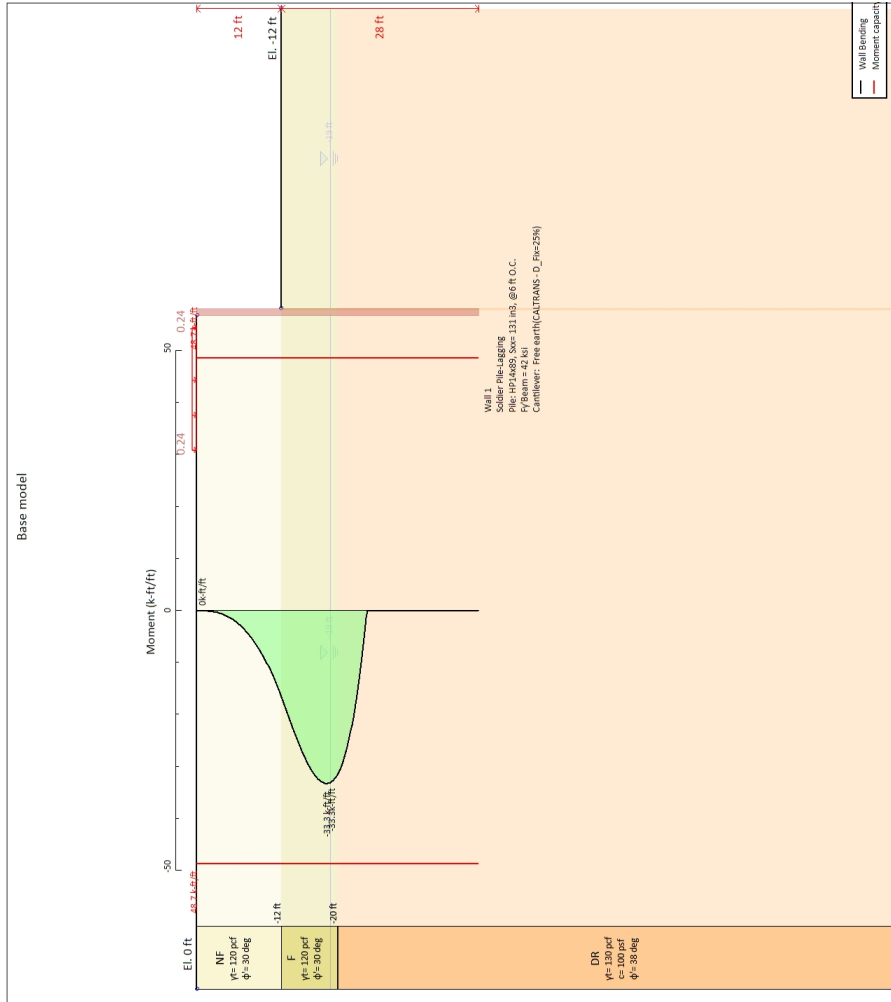
Max. Shear vs Stage

	Base Model
V stg0 (k/ft)	DS: 0
V stg1 (k/ft)	-14.04

Max. Support F vs Stage

	Base Model
Rmax Stage 0 (k/ft)	DS: 0
Rmax Stage 1 (k/ft)	

ANALYSIS AND CHECKING SUMMARY



Company: My Company	Quick summary	Deep Excavation LCC
Engineer: Engineer		DeepEX 2020
\\ad...pEx - Opitz Blvd\Tiral-1 12 ft fill-6-ft spacing - Copy.DEEP		2/17/2022

Summary of Wall Moments and Toe Requirements

Top Wall (ft)	Wall Section	L-Wall (ft)	H-Exc. (ft)	Max+M/Cap (k-ft/ft)	Max-M/Cap (k-ft/ft)	FS Toe Passive	FS Toe Rotation	FS Toe Embedment	FS 1 Toe EL. (ft)	Slope Stab. FS
0	Wall 1	40	12	0/48.71	33.3/48.71	12.528	5.299	2.295	-24.2	N/A

Summary of Basal Stability and Predicted Wall Movements According to Clough 1989 Method Wall: W

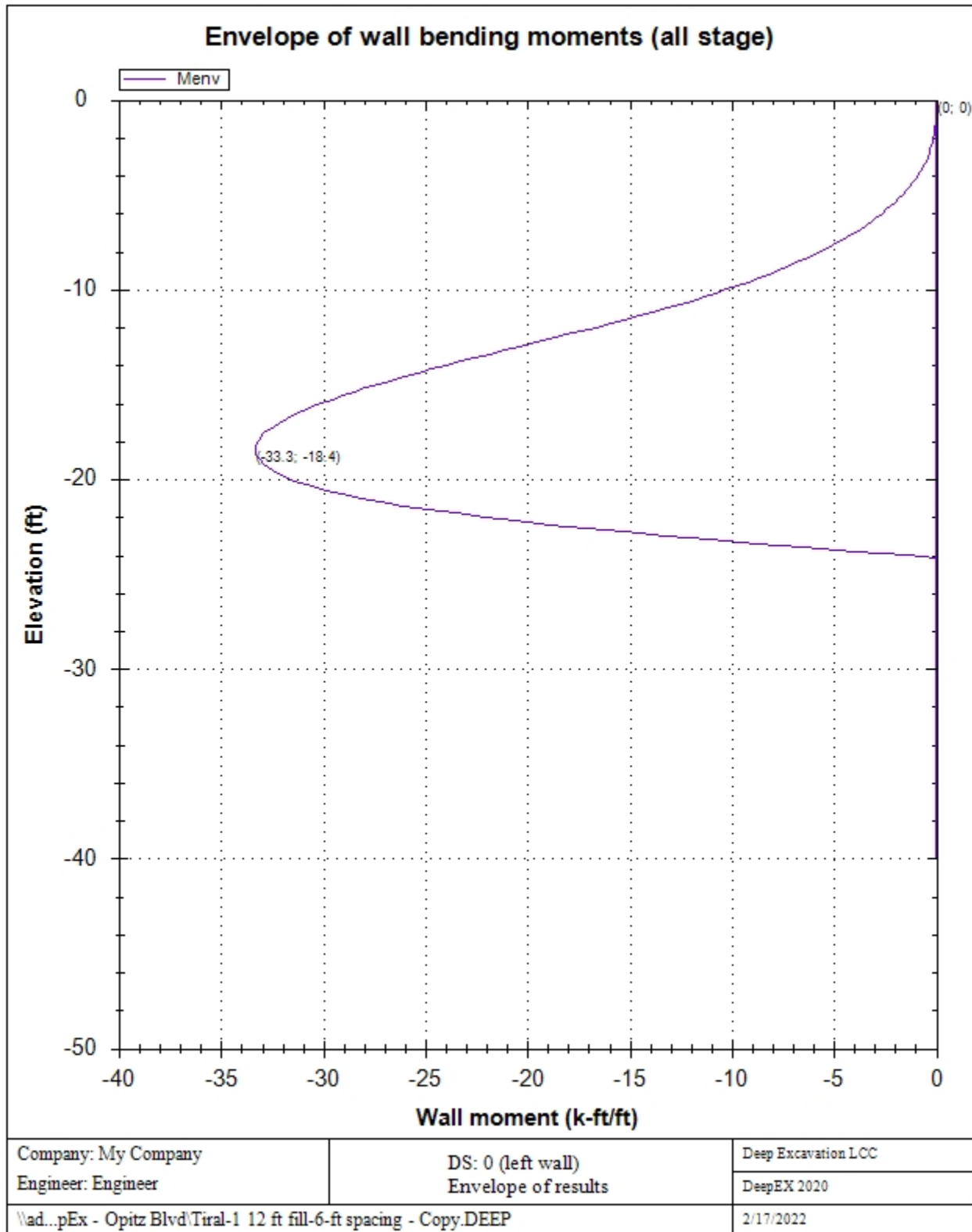
1. FSmin @ stage 1	2. DxMax (in) @ stage 1	2. Stiffness @ DxMax	2. FSbasal @ DxMax	3. Dx/H (%) @ stage 1	3. Stiffness @ Dx/H max	3. FSbasal @ Dx/H max
3.359	0.396	23.5	3.359	0.275	23.45	3.359

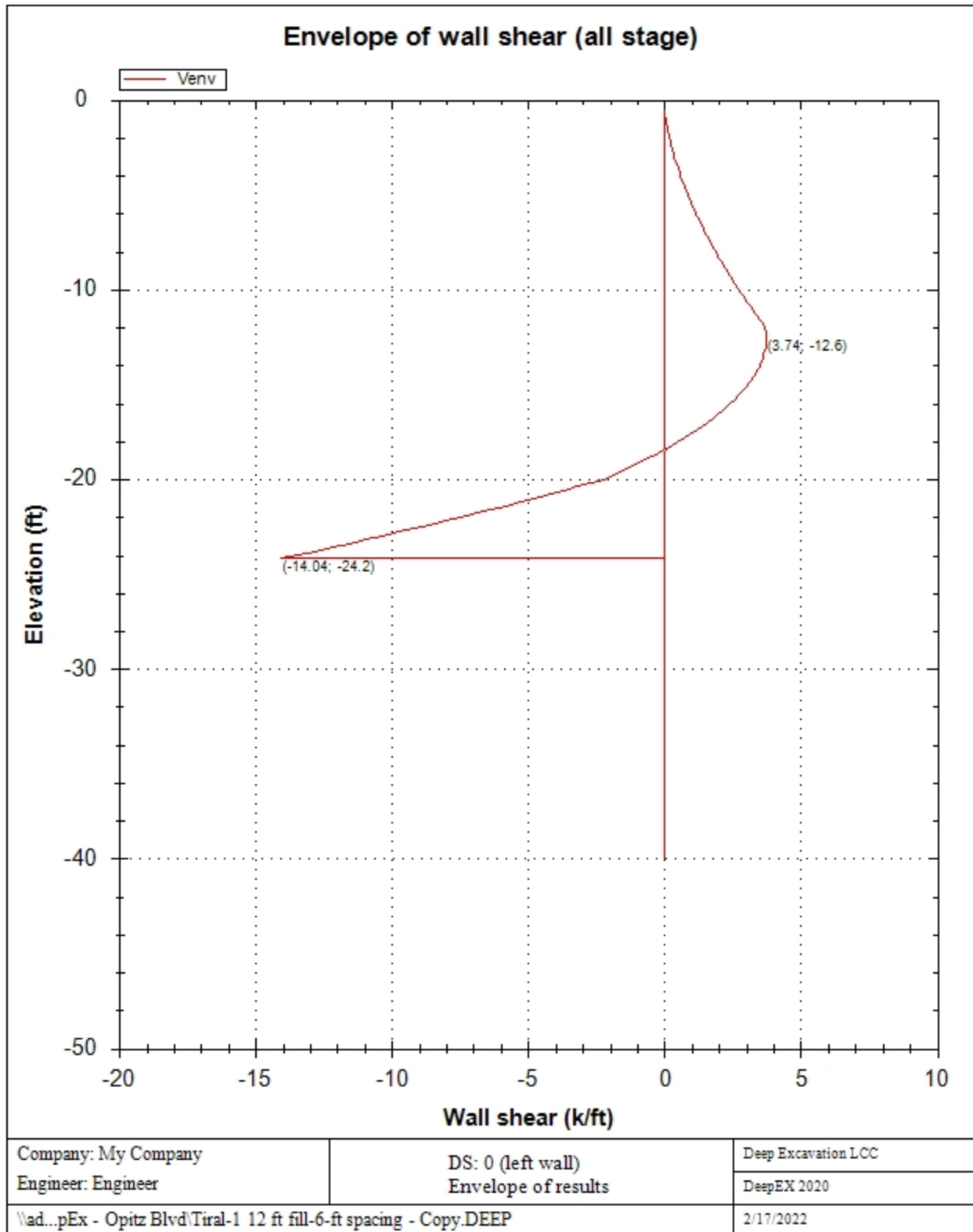
General assumptions for last stage: Stage 1

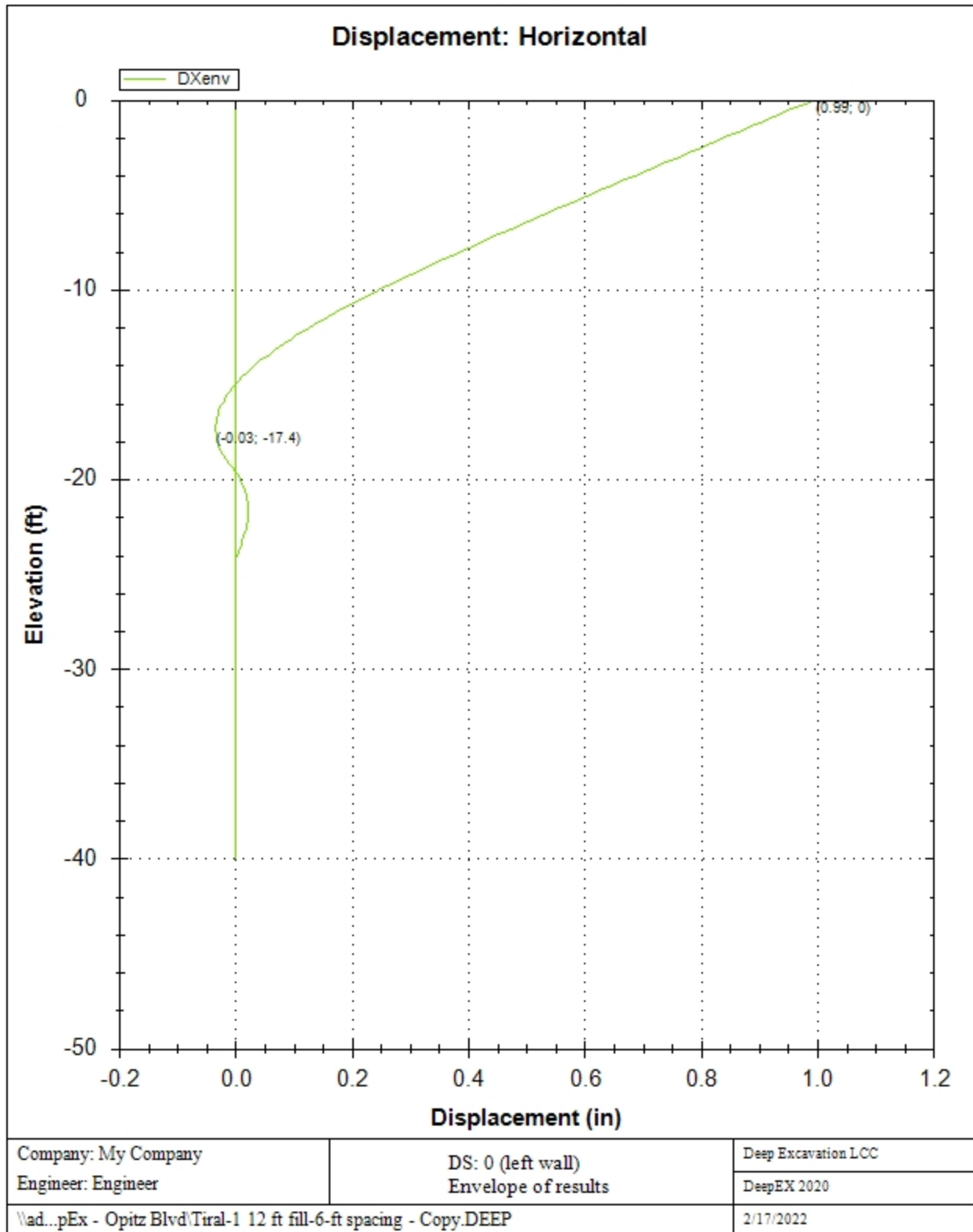
Concrete Code:	EC2-German Annex/1.5
Steel Code:	AISC 360-16 ALL.
1st Wall Limit Equilibrium	California Shoring Manual-11
Drain State Clays	Default
Water $\gamma = 62.4$ pcf	Simple flow
Drive	Ka
Resist	Kp

Envelope of results

A sequence of result diagrams for each excavation stage is reported







Extended vs Stage

	Calculation Result	Wall Displaceme (in)	Settlement (in)	Wall Moment (k-ft/ft)	Wall Moment (k-ft)
Stage 0	Calculated	0	N/A	0	0
Stage 1	Calculated	0.99	1.07	33.3	199.83

	Wall Shear (k/ft)	Wall Shear (k)	STR Combined Wall Ratio	STR Moment Wall Ratio	STR Shear Wall Ratio
Stage 0	0	0	0	0	0
Stage 1	14.04	84.25	0.684	0.684	0.722

Table notes:

STR Combined: Combined stress check, along eccentricity line considering axial load and moment (demand/capacity).

STR Moment : Moment stress check, assuming constant axial load on wall (demand/capacity).

STR Shear : Shear stress check (shear force demand/wall shear capacity).

	Max Support Reaction (k/ft)	Max Support Reaction (k)	Critical Support Check	STR Support Ratio	Support Geotech Capacity Ratio (pull out)
Stage 0	0	0	N/A	No supports	No supports
Stage 1	0	0	N/A	No supports	No supports

Table notes:

STR Support ratio: Critical structural stress check for support (force demand/structural capacity).

Support geotech capacity ratio: Critical geotechnical capacity stress check (demand/geotechnical capacity).

Critical support check: Critical demand/design capacity ratio (structural or geotechnical).

	FS Basal	Toe FS Passive	Toe FS Rotation	Toe FS Length	Zcut (nonlinear)	FS Mobilized Passive	FS True/Active
Stage 0	1000	49.035	39.735	200	N/A	N/A	N/A
Stage 1	3.359	12.528	5.299	2.295	N/A	N/A	N/A

	Hydraulic Heave FS	Qflow (ft3/hr)	FSslope
Stage 0	3.396	N/A	N/C
Stage 1	2.717	N/A	N/C

Support Force/S vs Stage

	No Supports
0:Stage 0	No support
1:Stage 1	

Support Force vs Stage

Support Force vs Stage

	No Supports
0:Stage 0	No support
1:Stage 1	

Embedment FS vs Stage

	Min Toe FS	FS1 Passive	FS2 Rotation	FS3 Length (from FS1, FS2)	FS4 Mobilized Passive	FS5 Actual Drive Thrust / Theory
Stage 0	39.735	49.035	39.735	200	N/A	N/A
0:Stage 0	2.295	12.528	5.299	2.295	N/A	N/A

Table notes:

FSbasal : Critical basal stability safety factor (relevant only when soft clays are present beneath the excavation).

Wall embedment safety factors from conventional analysis (limit-equilibrium):

FS1 Passive : Safety factor for wall embedment based on FS= Available horizontal thrust resistance/Driving hor. thrust.

FS2 Rotation: Safety factor for wall embedment based on FS= Available resisting moment/Driving moment.

FS3 Length : Safety factor for wall embedment based on FS= Available wall embedment/Required embedment for FS=1.0

Wall embedment safety factors from non-linear analysis:

FS4 Mobilized Passive : Safety factor= Available horizontal passive resistance/Mobilized passive thrust.

FS5 True/Active : Soil thrust on retained wall side/Minimum theoretically horizontal active force thrust.

Tables for stress checks follow: Support force/Design capacity

Support Check vs Stage

	No Supports
0:Stage 0	No support
1:Stage 1	

Forces (Res. F, M/Drive F, M)

	FS1 Passive (FxResist/FxDrive)	FS2 Rotation (Mresist/Mdrive)	FS3 Length (Embedment/ToeFS=1)	FS4 Mobilized Passive (FxPassive/FxPas_Mobili)	FS5 Actual Drive / Theory Active	Fh EQ Soil	Fh EQ Water
Stage 0	1165.768/23.774	15377.64/387	40/0.2	N/A	N/A	N/A	N/A
Stage 1	554.709/44.279	5419.83/299.43	28/12.2	N/A	N/A	N/A	N/A

Reinforcement Requirements

	Parameter Description
Note:	Wall does not use steel reinforcement. Section does not apply.

SOIL DATA

Name	g tot (pcf)	g dry (pcf)	Frict (deg)	C' (psf)	Su (psf)	FRp (deg)	FRCv (deg)	Eload (ksf)	rEur (-)	kAp NL	kPp NL	kAcv NL	kPcv NL	Vary	Spring Model	Color
NF	120	120	30	0	N/A	N/A	N/A	300	3	0.33	3	N/A	N/A	True	EXP	
F	120	120	30	0	N/A	N/A	N/A	300	3	0.33	3	N/A	N/A	True	EXP	
DR	130	130	38	100	N/A	N/A	N/A	600	3	0.24	4.2	N/A	N/A	True	EXP	

Name	Poisson v	Min Ka (clays)	Min sh (clays)	ko.NC -	nOCR -	aH.EXP (0 to 1)	aV.EXP (0 to 1)	qSkin (psi)	qNails (psi)	kS.nails (k/ft3)	PL (ksi)
NF	0.35	-	-	0.5	0.5	1	0	12	4.8	20	-
F	0.35	-	-	0.441	0.44	1	0	12	4.8	20	-
DR	0.35	-	-	0.384	0.5	1	0	30	14.5	30	-

g_{tot} = total soil specific weight

g_{dry} = dry weight of the soil

Frict = friction angle

C' = effective cohesion

Su = Undrained shear strength (only for CLAY soils in undrained conditions, used as a cutoff strength in NL analysis)

E_{vc} = Virgin compression elastic modulus

E_{ur} = unloading/reloading elastic modulus

K_{ap} = Peak active thrust coefficient (initial value, may be modified on each stage according to analysis settings).

K_{pp} = Peak passive thrust coefficient (initial value, may be modified on each stage according to analysis settings).

K_{acv} = Constant volume active thrust coeff (only for clays, initial value)

K_{pcv} = Constant volume passive thrust coeff (only for clays, initial value).

Spring models= spring model (LIN= constant E over the soil layer height , EXP=exponential , SIMC=simplified winkler)

LIN= Linear-Elastic-Perfectly Plastic,

EXP: Exponential, SUB: Modulus of Subgrade Reaction

SIMC= Simplified Clay mode

DESIGN APPROACHES AND COMBINATION FACTORS

The Design Approaches (from Codes or Customized by the user) and related safety factors are the following:

F_{tan} fr=mult factor for friction angle

F C'= safety factor on effective cohesion (Eurocode 7 methods)

APPENDIX E.5

Abutment and Pier Piles

- E.5.1 DRIVEN Analysis**
- E.5.2 Typical LPILE Analysis
- E.5.3 Typical WEAP Analysis Results

Pile Design Summary

By skk 1/4/2022

Driven Output

Check sb 1/4/2022

HP 10x 57 Piles, with Nominal Capacity of 385 kips

Bridge Element	Pile Cap Subgrade EL (ft.)	(Depth Ref) Ground EL (ft.)	Pile top Depth (ft.)	DRIVEN INPUT						RESULTS Pile Depth (ft.)	Estimated Pile Tip EL (ft.)	Estimated Pile Top EL (ft.)	Estimated Pile Length (ft.)
				Boring ID (ft.)	Opitz Sta. (ft.)	Groundwater		Top of DR					
						EL (ft.)	Depth (ft.)	EL (ft.)	Depth (ft.)				
Abut.A	205	205	0	1 & 2	65+44	182	23	180	25	55	150	206	56
Pier 1	189	194	5	4	66+52	182	12	178	16	50	144	190	46
Pier 2	186	191	5	5 & 6	68+10	169	22	167	24	45	146	187	41
Pier 3	185	190	5	7 & 8	69+78	167	23	166	24	45	145	186	41
Abut B	201	201	0	9 & 10	70+15	167	34	165	36	50	151	202	51
Abut C	191	191	0	B-A2-1	67+50	165	26	162	29	50	141	192	51

Notes Pile cap subgrade is assumed at existing grade for Abutment C.
 PDA testing should be performed on a 70 feet long pile at each locations.
 All ground elevations are approximate.

DRIVEN 1.2
GENERAL PROJECT INFORMATION

Filename: C:\HOLD\ABUT-A.DVN
Project Name: Opitz Abut A
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 0.00 ft
Perimeter Analysis: Box
Tip Analysis: Box Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	15.00 ft
	- Driving/Restrike:	15.00 ft
	- Ultimate:	15.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	25.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	25.00 ft	0.00%	120.00 pcf	36.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	120.00 pcf	36.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	120.00 pcf	36.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
14.99 ft	Cohesionless	899.40 psf	22.81	N/A	14.04 Kips
15.01 ft	Cohesionless	1800.29 psf	22.81	N/A	14.08 Kips
24.01 ft	Cohesionless	2059.49 psf	22.81	N/A	33.38 Kips
24.99 ft	Cohesionless	2087.71 psf	22.81	N/A	35.77 Kips
25.01 ft	Cohesionless	2376.29 psf	27.37	N/A	35.84 Kips
34.01 ft	Cohesionless	2635.49 psf	27.37	N/A	78.05 Kips
43.01 ft	Cohesionless	2894.69 psf	27.37	N/A	128.57 Kips
49.99 ft	Cohesionless	3095.71 psf	27.37	N/A	173.47 Kips
50.01 ft	Cohesionless	3816.29 psf	27.37	N/A	173.60 Kips
59.01 ft	Cohesionless	4075.49 psf	27.37	N/A	238.88 Kips
59.99 ft	Cohesionless	4103.71 psf	27.37	N/A	246.49 Kips
60.01 ft	Cohesionless	4392.29 psf	27.37	N/A	246.65 Kips
69.01 ft	Cohesionless	4651.49 psf	27.37	N/A	321.15 Kips
69.99 ft	Cohesionless	4679.71 psf	27.37	N/A	329.76 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
14.99 ft	Cohesionless	1798.80 psf	30.00	9.45 Kips	9.45 Kips
15.01 ft	Cohesionless	1800.58 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2318.98 psf	30.00	9.45 Kips	9.45 Kips
24.99 ft	Cohesionless	2375.42 psf	30.00	9.45 Kips	9.45 Kips
25.01 ft	Cohesionless	2376.58 psf	110.40	190.54 Kips	134.38 Kips
34.01 ft	Cohesionless	2894.98 psf	110.40	190.54 Kips	163.69 Kips
43.01 ft	Cohesionless	3413.38 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3815.42 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3816.58 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4334.98 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4391.42 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	4392.58 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	4910.98 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	4967.42 psf	110.40	190.54 Kips	190.54 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
14.99 ft	14.04 Kips	9.45 Kips	23.49 Kips
15.01 ft	14.08 Kips	9.45 Kips	23.52 Kips
24.01 ft	33.38 Kips	9.45 Kips	42.83 Kips
24.99 ft	35.77 Kips	9.45 Kips	45.22 Kips
25.01 ft	35.84 Kips	134.38 Kips	170.22 Kips
34.01 ft	78.05 Kips	163.69 Kips	241.75 Kips
43.01 ft	128.57 Kips	190.54 Kips	319.11 Kips
49.99 ft	173.47 Kips	190.54 Kips	364.01 Kips
50.01 ft	173.60 Kips	190.54 Kips	364.14 Kips
59.01 ft	238.88 Kips	190.54 Kips	429.42 Kips
59.99 ft	246.49 Kips	190.54 Kips	437.03 Kips
60.01 ft	246.65 Kips	190.54 Kips	437.19 Kips
69.01 ft	321.15 Kips	190.54 Kips	511.69 Kips
69.99 ft	329.76 Kips	190.54 Kips	520.30 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
14.99 ft	Cohesionless	899.40 psf	22.81	N/A	14.04 Kips
15.01 ft	Cohesionless	1800.29 psf	22.81	N/A	14.08 Kips
24.01 ft	Cohesionless	2059.49 psf	22.81	N/A	33.38 Kips
24.99 ft	Cohesionless	2087.71 psf	22.81	N/A	35.77 Kips
25.01 ft	Cohesionless	2376.29 psf	27.37	N/A	35.84 Kips
34.01 ft	Cohesionless	2635.49 psf	27.37	N/A	78.05 Kips
43.01 ft	Cohesionless	2894.69 psf	27.37	N/A	128.57 Kips
49.99 ft	Cohesionless	3095.71 psf	27.37	N/A	173.47 Kips
50.01 ft	Cohesionless	3816.29 psf	27.37	N/A	173.60 Kips
59.01 ft	Cohesionless	4075.49 psf	27.37	N/A	238.88 Kips
59.99 ft	Cohesionless	4103.71 psf	27.37	N/A	246.49 Kips
60.01 ft	Cohesionless	4392.29 psf	27.37	N/A	246.65 Kips
69.01 ft	Cohesionless	4651.49 psf	27.37	N/A	321.15 Kips
69.99 ft	Cohesionless	4679.71 psf	27.37	N/A	329.76 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
14.99 ft	Cohesionless	1798.80 psf	30.00	9.45 Kips	9.45 Kips
15.01 ft	Cohesionless	1800.58 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2318.98 psf	30.00	9.45 Kips	9.45 Kips
24.99 ft	Cohesionless	2375.42 psf	30.00	9.45 Kips	9.45 Kips
25.01 ft	Cohesionless	2376.58 psf	110.40	190.54 Kips	134.38 Kips
34.01 ft	Cohesionless	2894.98 psf	110.40	190.54 Kips	163.69 Kips
43.01 ft	Cohesionless	3413.38 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3815.42 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3816.58 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4334.98 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4391.42 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	4392.58 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	4910.98 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	4967.42 psf	110.40	190.54 Kips	190.54 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
14.99 ft	14.04 Kips	9.45 Kips	23.49 Kips
15.01 ft	14.08 Kips	9.45 Kips	23.52 Kips
24.01 ft	33.38 Kips	9.45 Kips	42.83 Kips
24.99 ft	35.77 Kips	9.45 Kips	45.22 Kips
25.01 ft	35.84 Kips	134.38 Kips	170.22 Kips
34.01 ft	78.05 Kips	163.69 Kips	241.75 Kips
43.01 ft	128.57 Kips	190.54 Kips	319.11 Kips
49.99 ft	173.47 Kips	190.54 Kips	364.01 Kips
50.01 ft	173.60 Kips	190.54 Kips	364.14 Kips
59.01 ft	238.88 Kips	190.54 Kips	429.42 Kips
59.99 ft	246.49 Kips	190.54 Kips	437.03 Kips
60.01 ft	246.65 Kips	190.54 Kips	437.19 Kips
69.01 ft	321.15 Kips	190.54 Kips	511.69 Kips
69.99 ft	329.76 Kips	190.54 Kips	520.30 Kips

ULTIMATE - SKIN FRICTION

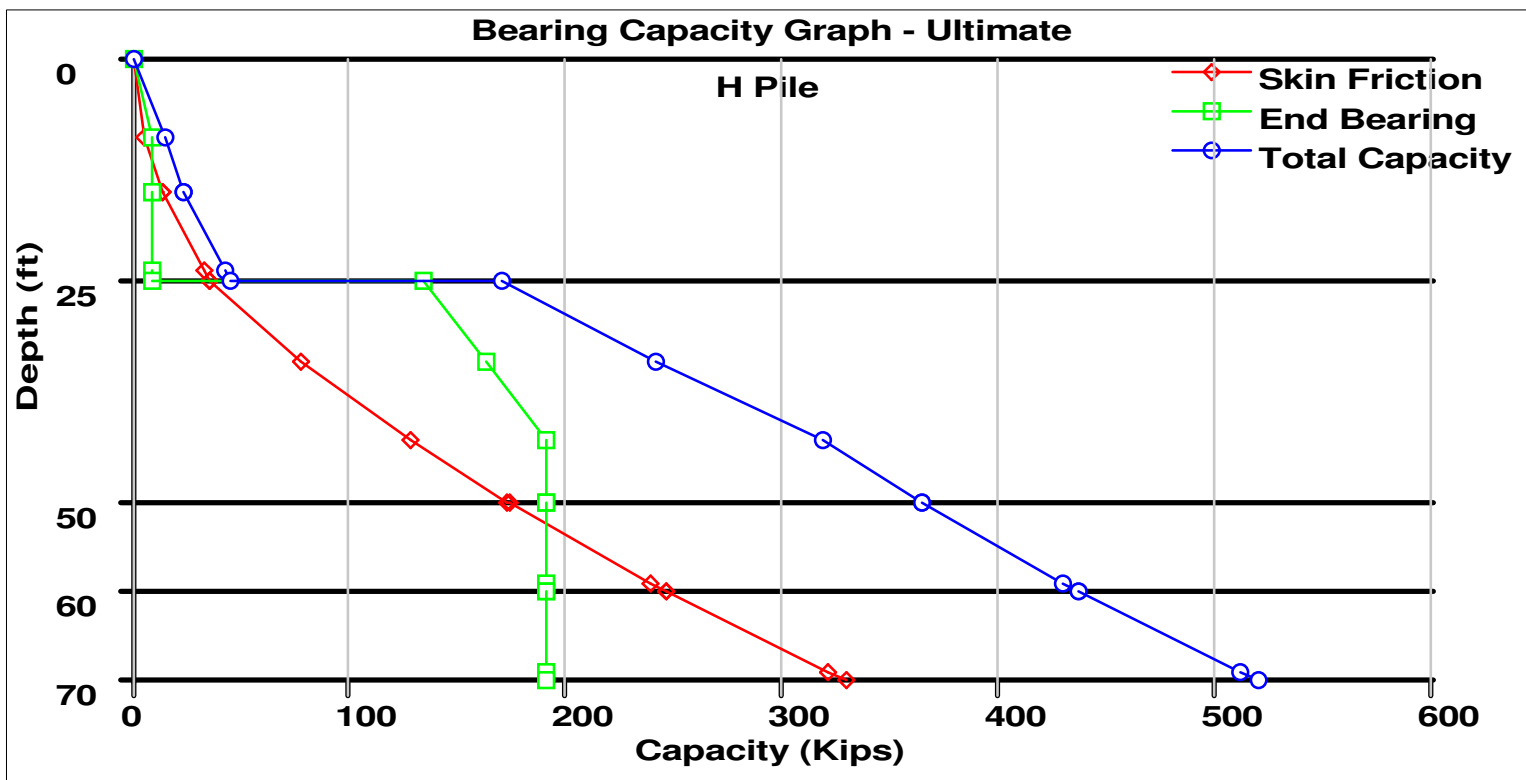
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
14.99 ft	Cohesionless	899.40 psf	22.81	N/A	14.04 Kips
15.01 ft	Cohesionless	1800.29 psf	22.81	N/A	14.08 Kips
24.01 ft	Cohesionless	2059.49 psf	22.81	N/A	33.38 Kips
24.99 ft	Cohesionless	2087.71 psf	22.81	N/A	35.77 Kips
25.01 ft	Cohesionless	2376.29 psf	27.37	N/A	35.84 Kips
34.01 ft	Cohesionless	2635.49 psf	27.37	N/A	78.05 Kips
43.01 ft	Cohesionless	2894.69 psf	27.37	N/A	128.57 Kips
49.99 ft	Cohesionless	3095.71 psf	27.37	N/A	173.47 Kips
50.01 ft	Cohesionless	3816.29 psf	27.37	N/A	173.60 Kips
59.01 ft	Cohesionless	4075.49 psf	27.37	N/A	238.88 Kips
59.99 ft	Cohesionless	4103.71 psf	27.37	N/A	246.49 Kips
60.01 ft	Cohesionless	4392.29 psf	27.37	N/A	246.65 Kips
69.01 ft	Cohesionless	4651.49 psf	27.37	N/A	321.15 Kips
69.99 ft	Cohesionless	4679.71 psf	27.37	N/A	329.76 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
14.99 ft	Cohesionless	1798.80 psf	30.00	9.45 Kips	9.45 Kips
15.01 ft	Cohesionless	1800.58 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2318.98 psf	30.00	9.45 Kips	9.45 Kips
24.99 ft	Cohesionless	2375.42 psf	30.00	9.45 Kips	9.45 Kips
25.01 ft	Cohesionless	2376.58 psf	110.40	190.54 Kips	134.38 Kips
34.01 ft	Cohesionless	2894.98 psf	110.40	190.54 Kips	163.69 Kips
43.01 ft	Cohesionless	3413.38 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3815.42 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3816.58 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4334.98 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4391.42 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	4392.58 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	4910.98 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	4967.42 psf	110.40	190.54 Kips	190.54 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
14.99 ft	14.04 Kips	9.45 Kips	23.49 Kips
15.01 ft	14.08 Kips	9.45 Kips	23.52 Kips
24.01 ft	33.38 Kips	9.45 Kips	42.83 Kips
24.99 ft	35.77 Kips	9.45 Kips	45.22 Kips
25.01 ft	35.84 Kips	134.38 Kips	170.22 Kips
34.01 ft	78.05 Kips	163.69 Kips	241.75 Kips
43.01 ft	128.57 Kips	190.54 Kips	319.11 Kips
49.99 ft	173.47 Kips	190.54 Kips	364.01 Kips
50.01 ft	173.60 Kips	190.54 Kips	364.14 Kips
59.01 ft	238.88 Kips	190.54 Kips	429.42 Kips
59.99 ft	246.49 Kips	190.54 Kips	437.03 Kips
60.01 ft	246.65 Kips	190.54 Kips	437.19 Kips
69.01 ft	321.15 Kips	190.54 Kips	511.69 Kips
69.99 ft	329.76 Kips	190.54 Kips	520.30 Kips



DRIVEN 1.2

GENERAL PROJECT INFORMATION

Filename: C:\HOLD\ABUT-B.DVN
Project Name: Opitz Abut B
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 0.00 ft
Perimeter Analysis: Box
Tip Analysis: Box Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	34.00 ft
	- Driving/Restrike	34.00 ft
	- Ultimate:	34.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	36.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	14.00 ft	0.00%	125.00 pcf	36.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	125.00 pcf	36.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	120.00 pcf	36.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
27.01 ft	Cohesionless	1620.60 psf	22.81	N/A	45.58 Kips
33.99 ft	Cohesionless	2039.40 psf	22.81	N/A	72.18 Kips
34.01 ft	Cohesionless	4080.29 psf	22.81	N/A	72.26 Kips
35.99 ft	Cohesionless	4137.31 psf	22.81	N/A	80.79 Kips
36.01 ft	Cohesionless	4195.51 psf	27.37	N/A	80.91 Kips
45.01 ft	Cohesionless	4477.21 psf	27.37	N/A	152.62 Kips
49.99 ft	Cohesionless	4633.09 psf	27.37	N/A	196.18 Kips
50.01 ft	Cohesionless	5071.91 psf	27.37	N/A	196.36 Kips
59.01 ft	Cohesionless	5353.61 psf	27.37	N/A	282.11 Kips
59.99 ft	Cohesionless	5384.29 psf	27.37	N/A	291.99 Kips
60.01 ft	Cohesionless	5697.89 psf	27.37	N/A	292.20 Kips
69.01 ft	Cohesionless	5957.09 psf	27.37	N/A	387.61 Kips
69.99 ft	Cohesionless	5985.31 psf	27.37	N/A	398.50 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
27.01 ft	Cohesionless	3241.20 psf	30.00	9.45 Kips	9.45 Kips
33.99 ft	Cohesionless	4078.80 psf	30.00	9.45 Kips	9.45 Kips
34.01 ft	Cohesionless	4080.58 psf	30.00	9.45 Kips	9.45 Kips
35.99 ft	Cohesionless	4194.62 psf	30.00	9.45 Kips	9.45 Kips
36.01 ft	Cohesionless	4195.83 psf	110.40	190.54 Kips	190.54 Kips
45.01 ft	Cohesionless	4759.23 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	5070.97 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	5072.23 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5635.63 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5696.97 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5698.18 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	6216.58 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6273.02 psf	110.40	190.54 Kips	190.54 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
27.01 ft	45.58 Kips	9.45 Kips	55.03 Kips
33.99 ft	72.18 Kips	9.45 Kips	81.63 Kips
34.01 ft	72.26 Kips	9.45 Kips	81.71 Kips
35.99 ft	80.79 Kips	9.45 Kips	90.24 Kips
36.01 ft	80.91 Kips	190.54 Kips	271.45 Kips
45.01 ft	152.62 Kips	190.54 Kips	343.16 Kips
49.99 ft	196.18 Kips	190.54 Kips	386.72 Kips
50.01 ft	196.36 Kips	190.54 Kips	386.90 Kips
59.01 ft	282.11 Kips	190.54 Kips	472.65 Kips
59.99 ft	291.99 Kips	190.54 Kips	482.53 Kips
60.01 ft	292.20 Kips	190.54 Kips	482.73 Kips
69.01 ft	387.61 Kips	190.54 Kips	578.15 Kips
69.99 ft	398.50 Kips	190.54 Kips	589.04 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
27.01 ft	Cohesionless	1620.60 psf	22.81	N/A	45.58 Kips
33.99 ft	Cohesionless	2039.40 psf	22.81	N/A	72.18 Kips
34.01 ft	Cohesionless	4080.29 psf	22.81	N/A	72.26 Kips
35.99 ft	Cohesionless	4137.31 psf	22.81	N/A	80.79 Kips
36.01 ft	Cohesionless	4195.51 psf	27.37	N/A	80.91 Kips
45.01 ft	Cohesionless	4477.21 psf	27.37	N/A	152.62 Kips
49.99 ft	Cohesionless	4633.09 psf	27.37	N/A	196.18 Kips
50.01 ft	Cohesionless	5071.91 psf	27.37	N/A	196.36 Kips
59.01 ft	Cohesionless	5353.61 psf	27.37	N/A	282.11 Kips
59.99 ft	Cohesionless	5384.29 psf	27.37	N/A	291.99 Kips
60.01 ft	Cohesionless	5697.89 psf	27.37	N/A	292.20 Kips
69.01 ft	Cohesionless	5957.09 psf	27.37	N/A	387.61 Kips
69.99 ft	Cohesionless	5985.31 psf	27.37	N/A	398.50 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
27.01 ft	Cohesionless	3241.20 psf	30.00	9.45 Kips	9.45 Kips
33.99 ft	Cohesionless	4078.80 psf	30.00	9.45 Kips	9.45 Kips
34.01 ft	Cohesionless	4080.58 psf	30.00	9.45 Kips	9.45 Kips
35.99 ft	Cohesionless	4194.62 psf	30.00	9.45 Kips	9.45 Kips
36.01 ft	Cohesionless	4195.83 psf	110.40	190.54 Kips	190.54 Kips
45.01 ft	Cohesionless	4759.23 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	5070.97 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	5072.23 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5635.63 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5696.97 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5698.18 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	6216.58 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6273.02 psf	110.40	190.54 Kips	190.54 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
27.01 ft	45.58 Kips	9.45 Kips	55.03 Kips
33.99 ft	72.18 Kips	9.45 Kips	81.63 Kips
34.01 ft	72.26 Kips	9.45 Kips	81.71 Kips
35.99 ft	80.79 Kips	9.45 Kips	90.24 Kips
36.01 ft	80.91 Kips	190.54 Kips	271.45 Kips
45.01 ft	152.62 Kips	190.54 Kips	343.16 Kips
49.99 ft	196.18 Kips	190.54 Kips	386.72 Kips
50.01 ft	196.36 Kips	190.54 Kips	386.90 Kips
59.01 ft	282.11 Kips	190.54 Kips	472.65 Kips
59.99 ft	291.99 Kips	190.54 Kips	482.53 Kips
60.01 ft	292.20 Kips	190.54 Kips	482.73 Kips
69.01 ft	387.61 Kips	190.54 Kips	578.15 Kips
69.99 ft	398.50 Kips	190.54 Kips	589.04 Kips

ULTIMATE - SKIN FRICTION

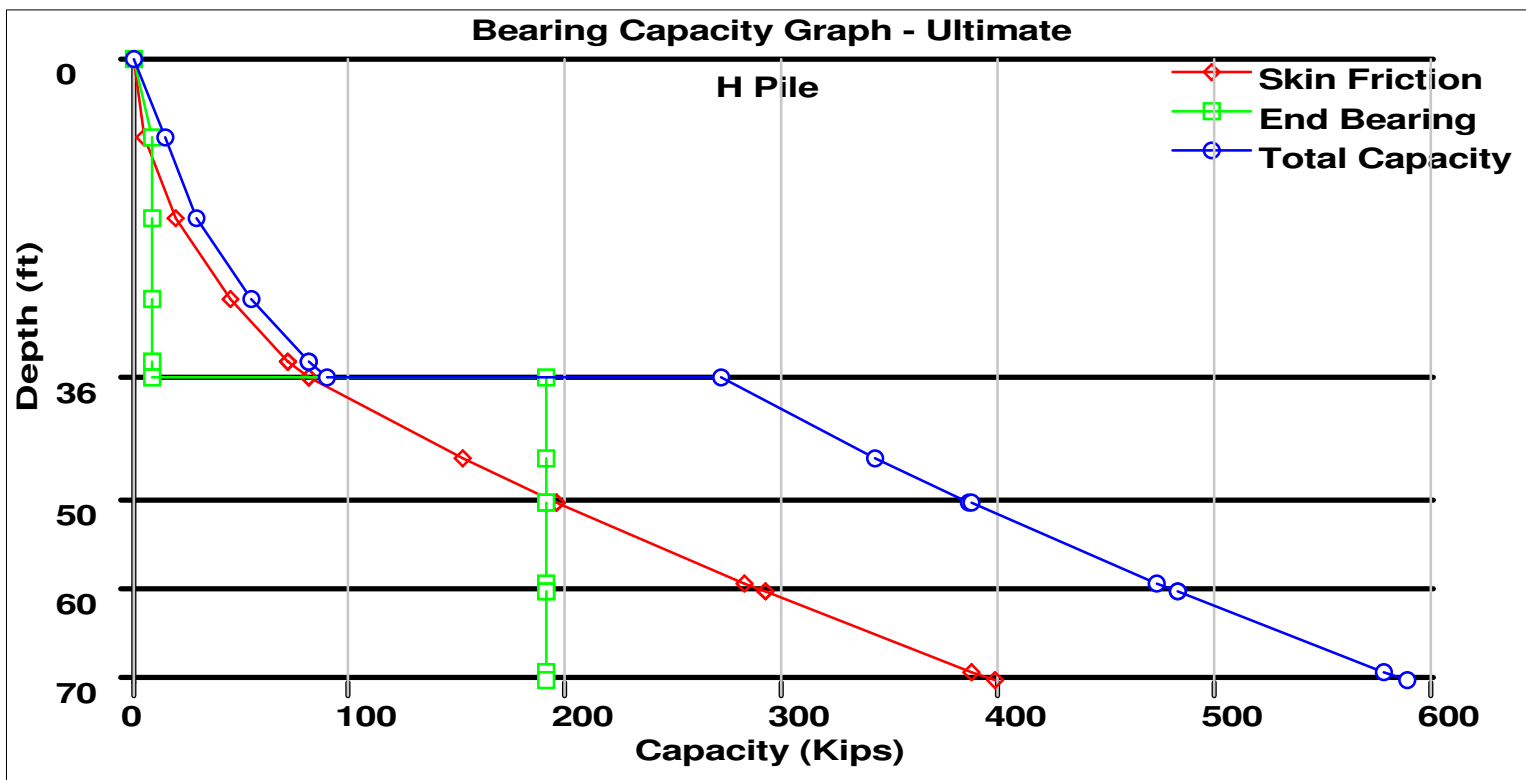
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
27.01 ft	Cohesionless	1620.60 psf	22.81	N/A	45.58 Kips
33.99 ft	Cohesionless	2039.40 psf	22.81	N/A	72.18 Kips
34.01 ft	Cohesionless	4080.29 psf	22.81	N/A	72.26 Kips
35.99 ft	Cohesionless	4137.31 psf	22.81	N/A	80.79 Kips
36.01 ft	Cohesionless	4195.51 psf	27.37	N/A	80.91 Kips
45.01 ft	Cohesionless	4477.21 psf	27.37	N/A	152.62 Kips
49.99 ft	Cohesionless	4633.09 psf	27.37	N/A	196.18 Kips
50.01 ft	Cohesionless	5071.91 psf	27.37	N/A	196.36 Kips
59.01 ft	Cohesionless	5353.61 psf	27.37	N/A	282.11 Kips
59.99 ft	Cohesionless	5384.29 psf	27.37	N/A	291.99 Kips
60.01 ft	Cohesionless	5697.89 psf	27.37	N/A	292.20 Kips
69.01 ft	Cohesionless	5957.09 psf	27.37	N/A	387.61 Kips
69.99 ft	Cohesionless	5985.31 psf	27.37	N/A	398.50 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
27.01 ft	Cohesionless	3241.20 psf	30.00	9.45 Kips	9.45 Kips
33.99 ft	Cohesionless	4078.80 psf	30.00	9.45 Kips	9.45 Kips
34.01 ft	Cohesionless	4080.58 psf	30.00	9.45 Kips	9.45 Kips
35.99 ft	Cohesionless	4194.62 psf	30.00	9.45 Kips	9.45 Kips
36.01 ft	Cohesionless	4195.83 psf	110.40	190.54 Kips	190.54 Kips
45.01 ft	Cohesionless	4759.23 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	5070.97 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	5072.23 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5635.63 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5696.97 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5698.18 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	6216.58 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6273.02 psf	110.40	190.54 Kips	190.54 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
27.01 ft	45.58 Kips	9.45 Kips	55.03 Kips
33.99 ft	72.18 Kips	9.45 Kips	81.63 Kips
34.01 ft	72.26 Kips	9.45 Kips	81.71 Kips
35.99 ft	80.79 Kips	9.45 Kips	90.24 Kips
36.01 ft	80.91 Kips	190.54 Kips	271.45 Kips
45.01 ft	152.62 Kips	190.54 Kips	343.16 Kips
49.99 ft	196.18 Kips	190.54 Kips	386.72 Kips
50.01 ft	196.36 Kips	190.54 Kips	386.90 Kips
59.01 ft	282.11 Kips	190.54 Kips	472.65 Kips
59.99 ft	291.99 Kips	190.54 Kips	482.53 Kips
60.01 ft	292.20 Kips	190.54 Kips	482.73 Kips
69.01 ft	387.61 Kips	190.54 Kips	578.15 Kips
69.99 ft	398.50 Kips	190.54 Kips	589.04 Kips



DRIVEN 1.2
GENERAL PROJECT INFORMATION

Filename: C:\HOLD\ABUT-C.DVN
Project Name: Opitz Abut C
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 0.00 ft
Perimeter Analysis: Box
Tip Analysis: Box Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	26.00 ft
	- Driving/Restrike:	26.00 ft
	- Ultimate:	26.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	29.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	21.00 ft	0.00%	130.00 pcf	36.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	130.00 pcf	36.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	130.00 pcf	36.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
25.99 ft	Cohesionless	1559.40 psf	22.81	N/A	42.20 Kips
26.01 ft	Cohesionless	3120.29 psf	22.81	N/A	42.26 Kips
28.99 ft	Cohesionless	3206.11 psf	22.81	N/A	52.21 Kips
29.01 ft	Cohesionless	3293.14 psf	27.37	N/A	52.31 Kips
38.01 ft	Cohesionless	3597.34 psf	27.37	N/A	109.93 Kips
47.01 ft	Cohesionless	3901.54 psf	27.37	N/A	177.29 Kips
49.99 ft	Cohesionless	4002.26 psf	27.37	N/A	201.74 Kips
50.01 ft	Cohesionless	4712.74 psf	27.37	N/A	201.91 Kips
59.01 ft	Cohesionless	5016.94 psf	27.37	N/A	282.27 Kips
59.99 ft	Cohesionless	5050.06 psf	27.37	N/A	291.61 Kips
60.01 ft	Cohesionless	5388.74 psf	27.37	N/A	291.80 Kips
69.01 ft	Cohesionless	5692.94 psf	27.37	N/A	382.98 Kips
69.99 ft	Cohesionless	5726.06 psf	27.37	N/A	393.50 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
25.99 ft	Cohesionless	3118.80 psf	30.00	9.45 Kips	9.45 Kips
26.01 ft	Cohesionless	3120.58 psf	30.00	9.45 Kips	9.45 Kips
28.99 ft	Cohesionless	3292.22 psf	30.00	9.45 Kips	9.45 Kips
29.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
38.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
47.01 ft	Cohesionless	4510.28 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4711.72 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4713.08 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5321.48 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5387.72 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5389.08 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	5997.48 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6063.72 psf	110.40	190.54 Kips	190.54 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
25.99 ft	42.20 Kips	9.45 Kips	51.65 Kips
26.01 ft	42.26 Kips	9.45 Kips	51.71 Kips
28.99 ft	52.21 Kips	9.45 Kips	61.66 Kips
29.01 ft	52.31 Kips	186.22 Kips	238.53 Kips
38.01 ft	109.93 Kips	190.54 Kips	300.47 Kips
47.01 ft	177.29 Kips	190.54 Kips	367.83 Kips
49.99 ft	201.74 Kips	190.54 Kips	392.28 Kips
50.01 ft	201.91 Kips	190.54 Kips	392.45 Kips
59.01 ft	282.27 Kips	190.54 Kips	472.81 Kips
59.99 ft	291.61 Kips	190.54 Kips	482.15 Kips
60.01 ft	291.80 Kips	190.54 Kips	482.34 Kips
69.01 ft	382.98 Kips	190.54 Kips	573.52 Kips
69.99 ft	393.50 Kips	190.54 Kips	584.04 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
25.99 ft	Cohesionless	1559.40 psf	22.81	N/A	42.20 Kips
26.01 ft	Cohesionless	3120.29 psf	22.81	N/A	42.26 Kips
28.99 ft	Cohesionless	3206.11 psf	22.81	N/A	52.21 Kips
29.01 ft	Cohesionless	3293.14 psf	27.37	N/A	52.31 Kips
38.01 ft	Cohesionless	3597.34 psf	27.37	N/A	109.93 Kips
47.01 ft	Cohesionless	3901.54 psf	27.37	N/A	177.29 Kips
49.99 ft	Cohesionless	4002.26 psf	27.37	N/A	201.74 Kips
50.01 ft	Cohesionless	4712.74 psf	27.37	N/A	201.91 Kips
59.01 ft	Cohesionless	5016.94 psf	27.37	N/A	282.27 Kips
59.99 ft	Cohesionless	5050.06 psf	27.37	N/A	291.61 Kips
60.01 ft	Cohesionless	5388.74 psf	27.37	N/A	291.80 Kips
69.01 ft	Cohesionless	5692.94 psf	27.37	N/A	382.98 Kips
69.99 ft	Cohesionless	5726.06 psf	27.37	N/A	393.50 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
25.99 ft	Cohesionless	3118.80 psf	30.00	9.45 Kips	9.45 Kips
26.01 ft	Cohesionless	3120.58 psf	30.00	9.45 Kips	9.45 Kips
28.99 ft	Cohesionless	3292.22 psf	30.00	9.45 Kips	9.45 Kips
29.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
38.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
47.01 ft	Cohesionless	4510.28 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4711.72 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4713.08 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5321.48 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5387.72 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5389.08 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	5997.48 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6063.72 psf	110.40	190.54 Kips	190.54 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
25.99 ft	42.20 Kips	9.45 Kips	51.65 Kips
26.01 ft	42.26 Kips	9.45 Kips	51.71 Kips
28.99 ft	52.21 Kips	9.45 Kips	61.66 Kips
29.01 ft	52.31 Kips	186.22 Kips	238.53 Kips
38.01 ft	109.93 Kips	190.54 Kips	300.47 Kips
47.01 ft	177.29 Kips	190.54 Kips	367.83 Kips
49.99 ft	201.74 Kips	190.54 Kips	392.28 Kips
50.01 ft	201.91 Kips	190.54 Kips	392.45 Kips
59.01 ft	282.27 Kips	190.54 Kips	472.81 Kips
59.99 ft	291.61 Kips	190.54 Kips	482.15 Kips
60.01 ft	291.80 Kips	190.54 Kips	482.34 Kips
69.01 ft	382.98 Kips	190.54 Kips	573.52 Kips
69.99 ft	393.50 Kips	190.54 Kips	584.04 Kips

ULTIMATE - SKIN FRICTION

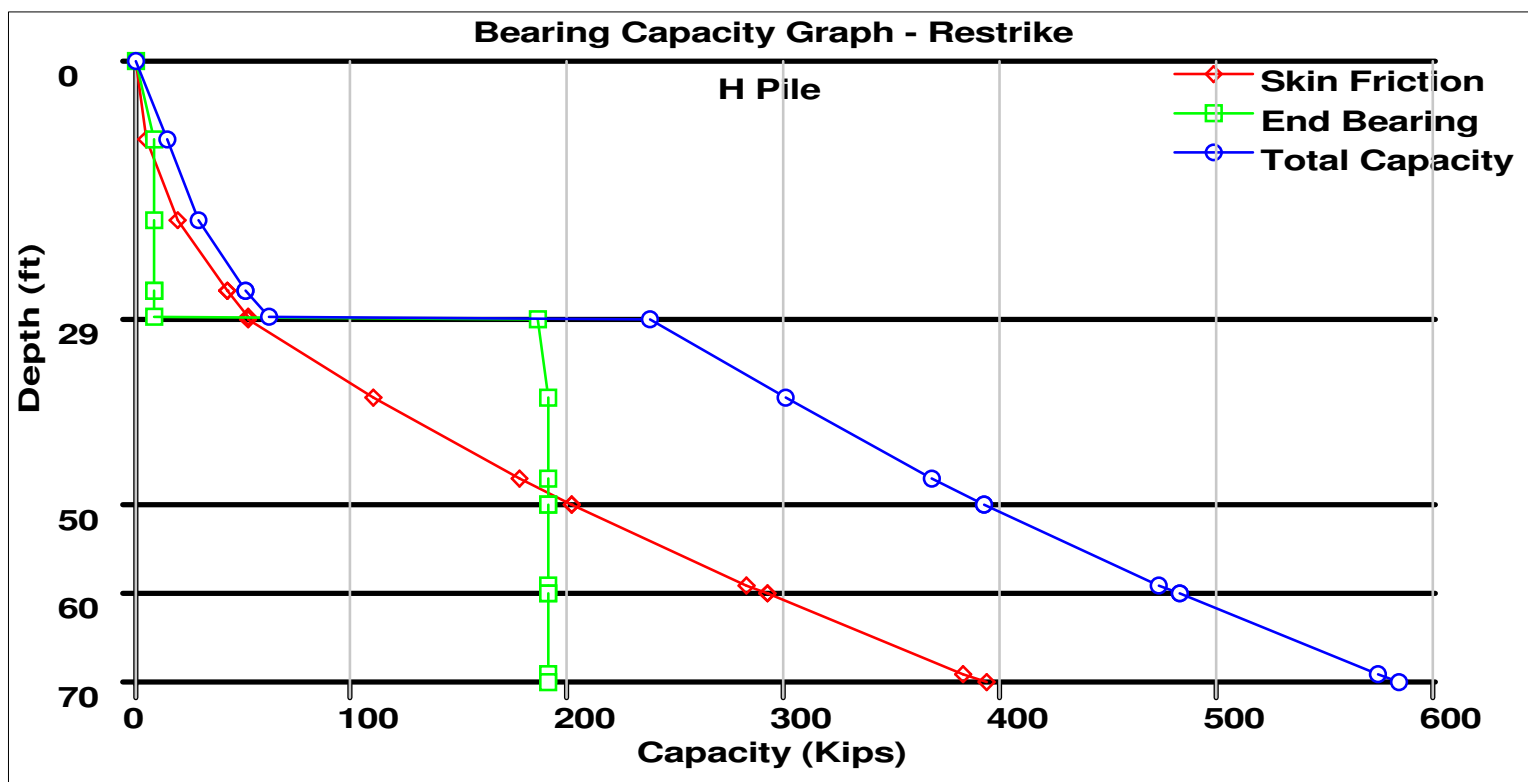
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
18.01 ft	Cohesionless	1080.60 psf	22.81	N/A	20.26 Kips
25.99 ft	Cohesionless	1559.40 psf	22.81	N/A	42.20 Kips
26.01 ft	Cohesionless	3120.29 psf	22.81	N/A	42.26 Kips
28.99 ft	Cohesionless	3206.11 psf	22.81	N/A	52.21 Kips
29.01 ft	Cohesionless	3293.14 psf	27.37	N/A	52.31 Kips
38.01 ft	Cohesionless	3597.34 psf	27.37	N/A	109.93 Kips
47.01 ft	Cohesionless	3901.54 psf	27.37	N/A	177.29 Kips
49.99 ft	Cohesionless	4002.26 psf	27.37	N/A	201.74 Kips
50.01 ft	Cohesionless	4712.74 psf	27.37	N/A	201.91 Kips
59.01 ft	Cohesionless	5016.94 psf	27.37	N/A	282.27 Kips
59.99 ft	Cohesionless	5050.06 psf	27.37	N/A	291.61 Kips
60.01 ft	Cohesionless	5388.74 psf	27.37	N/A	291.80 Kips
69.01 ft	Cohesionless	5692.94 psf	27.37	N/A	382.98 Kips
69.99 ft	Cohesionless	5726.06 psf	27.37	N/A	393.50 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
25.99 ft	Cohesionless	3118.80 psf	30.00	9.45 Kips	9.45 Kips
26.01 ft	Cohesionless	3120.58 psf	30.00	9.45 Kips	9.45 Kips
28.99 ft	Cohesionless	3292.22 psf	30.00	9.45 Kips	9.45 Kips
29.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
38.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
47.01 ft	Cohesionless	4510.28 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4711.72 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4713.08 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	5321.48 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5387.72 psf	110.40	190.54 Kips	190.54 Kips
60.01 ft	Cohesionless	5389.08 psf	110.40	190.54 Kips	190.54 Kips
69.01 ft	Cohesionless	5997.48 psf	110.40	190.54 Kips	190.54 Kips
69.99 ft	Cohesionless	6063.72 psf	110.40	190.54 Kips	190.54 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
18.01 ft	20.26 Kips	9.45 Kips	29.71 Kips
25.99 ft	42.20 Kips	9.45 Kips	51.65 Kips
26.01 ft	42.26 Kips	9.45 Kips	51.71 Kips
28.99 ft	52.21 Kips	9.45 Kips	61.66 Kips
29.01 ft	52.31 Kips	186.22 Kips	238.53 Kips
38.01 ft	109.93 Kips	190.54 Kips	300.47 Kips
47.01 ft	177.29 Kips	190.54 Kips	367.83 Kips
49.99 ft	201.74 Kips	190.54 Kips	392.28 Kips
50.01 ft	201.91 Kips	190.54 Kips	392.45 Kips
59.01 ft	282.27 Kips	190.54 Kips	472.81 Kips
59.99 ft	291.61 Kips	190.54 Kips	482.15 Kips
60.01 ft	291.80 Kips	190.54 Kips	482.34 Kips
69.01 ft	382.98 Kips	190.54 Kips	573.52 Kips
69.99 ft	393.50 Kips	190.54 Kips	584.04 Kips



DRIVEN 1.2
GENERAL PROJECT INFORMATION

Filename: C:\HOLD\PIER-1.DVN
Project Name: Opitz Pier-1
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 0.00 ft
Perimeter Analysis: Box
Tip Analysis: Box Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	12.00 ft
	- Driving/Restrike:	12.00 ft
	- Ultimate:	12.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	16.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	24.00 ft	0.00%	130.00 pcf	38.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	130.00 pcf	38.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	130.00 pcf	38.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
11.99 ft	Cohesionless	719.40 psf	22.81	N/A	8.98 Kips
12.01 ft	Cohesionless	1440.29 psf	22.81	N/A	9.01 Kips
15.99 ft	Cohesionless	1554.91 psf	22.81	N/A	15.46 Kips
16.01 ft	Cohesionless	1670.74 psf	28.89	N/A	15.51 Kips
25.01 ft	Cohesionless	1974.94 psf	28.89	N/A	54.24 Kips
34.01 ft	Cohesionless	2279.14 psf	28.89	N/A	104.89 Kips
39.99 ft	Cohesionless	2481.26 psf	28.89	N/A	145.14 Kips
40.01 ft	Cohesionless	3293.14 psf	28.89	N/A	145.29 Kips
49.01 ft	Cohesionless	3597.34 psf	28.89	N/A	215.82 Kips
49.99 ft	Cohesionless	3630.46 psf	28.89	N/A	224.22 Kips
50.01 ft	Cohesionless	3969.14 psf	28.89	N/A	224.40 Kips
59.01 ft	Cohesionless	4273.34 psf	28.89	N/A	308.18 Kips
59.99 ft	Cohesionless	4306.46 psf	28.89	N/A	318.03 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
11.99 ft	Cohesionless	1438.80 psf	30.00	9.45 Kips	9.45 Kips
12.01 ft	Cohesionless	1440.58 psf	30.00	9.45 Kips	9.45 Kips
15.99 ft	Cohesionless	1669.82 psf	30.00	9.45 Kips	9.45 Kips
16.01 ft	Cohesionless	1671.08 psf	110.40	190.54 Kips	94.49 Kips
25.01 ft	Cohesionless	2279.48 psf	110.40	190.54 Kips	128.89 Kips
34.01 ft	Cohesionless	2887.88 psf	110.40	190.54 Kips	163.29 Kips
39.99 ft	Cohesionless	3292.12 psf	110.40	190.54 Kips	186.15 Kips
40.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
49.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3968.12 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3969.48 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4577.88 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4644.12 psf	110.40	190.54 Kips	190.54 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
11.99 ft	8.98 Kips	9.45 Kips	18.43 Kips
12.01 ft	9.01 Kips	9.45 Kips	18.46 Kips
15.99 ft	15.46 Kips	9.45 Kips	24.90 Kips
16.01 ft	15.51 Kips	94.49 Kips	110.00 Kips
25.01 ft	54.24 Kips	128.89 Kips	183.13 Kips
34.01 ft	104.89 Kips	163.29 Kips	268.18 Kips
39.99 ft	145.14 Kips	186.15 Kips	331.29 Kips
40.01 ft	145.29 Kips	186.22 Kips	331.51 Kips
49.01 ft	215.82 Kips	190.54 Kips	406.36 Kips
49.99 ft	224.22 Kips	190.54 Kips	414.76 Kips
50.01 ft	224.40 Kips	190.54 Kips	414.93 Kips
59.01 ft	308.18 Kips	190.54 Kips	498.72 Kips
59.99 ft	318.03 Kips	190.54 Kips	508.57 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
11.99 ft	Cohesionless	719.40 psf	22.81	N/A	8.98 Kips
12.01 ft	Cohesionless	1440.29 psf	22.81	N/A	9.01 Kips
15.99 ft	Cohesionless	1554.91 psf	22.81	N/A	15.46 Kips
16.01 ft	Cohesionless	1670.74 psf	28.89	N/A	15.51 Kips
25.01 ft	Cohesionless	1974.94 psf	28.89	N/A	54.24 Kips
34.01 ft	Cohesionless	2279.14 psf	28.89	N/A	104.89 Kips
39.99 ft	Cohesionless	2481.26 psf	28.89	N/A	145.14 Kips
40.01 ft	Cohesionless	3293.14 psf	28.89	N/A	145.29 Kips
49.01 ft	Cohesionless	3597.34 psf	28.89	N/A	215.82 Kips
49.99 ft	Cohesionless	3630.46 psf	28.89	N/A	224.22 Kips
50.01 ft	Cohesionless	3969.14 psf	28.89	N/A	224.40 Kips
59.01 ft	Cohesionless	4273.34 psf	28.89	N/A	308.18 Kips
59.99 ft	Cohesionless	4306.46 psf	28.89	N/A	318.03 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
11.99 ft	Cohesionless	1438.80 psf	30.00	9.45 Kips	9.45 Kips
12.01 ft	Cohesionless	1440.58 psf	30.00	9.45 Kips	9.45 Kips
15.99 ft	Cohesionless	1669.82 psf	30.00	9.45 Kips	9.45 Kips
16.01 ft	Cohesionless	1671.08 psf	110.40	190.54 Kips	94.49 Kips
25.01 ft	Cohesionless	2279.48 psf	110.40	190.54 Kips	128.89 Kips
34.01 ft	Cohesionless	2887.88 psf	110.40	190.54 Kips	163.29 Kips
39.99 ft	Cohesionless	3292.12 psf	110.40	190.54 Kips	186.15 Kips
40.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
49.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3968.12 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3969.48 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4577.88 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4644.12 psf	110.40	190.54 Kips	190.54 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
11.99 ft	8.98 Kips	9.45 Kips	18.43 Kips
12.01 ft	9.01 Kips	9.45 Kips	18.46 Kips
15.99 ft	15.46 Kips	9.45 Kips	24.90 Kips
16.01 ft	15.51 Kips	94.49 Kips	110.00 Kips
25.01 ft	54.24 Kips	128.89 Kips	183.13 Kips
34.01 ft	104.89 Kips	163.29 Kips	268.18 Kips
39.99 ft	145.14 Kips	186.15 Kips	331.29 Kips
40.01 ft	145.29 Kips	186.22 Kips	331.51 Kips
49.01 ft	215.82 Kips	190.54 Kips	406.36 Kips
49.99 ft	224.22 Kips	190.54 Kips	414.76 Kips
50.01 ft	224.40 Kips	190.54 Kips	414.93 Kips
59.01 ft	308.18 Kips	190.54 Kips	498.72 Kips
59.99 ft	318.03 Kips	190.54 Kips	508.57 Kips

ULTIMATE - SKIN FRICTION

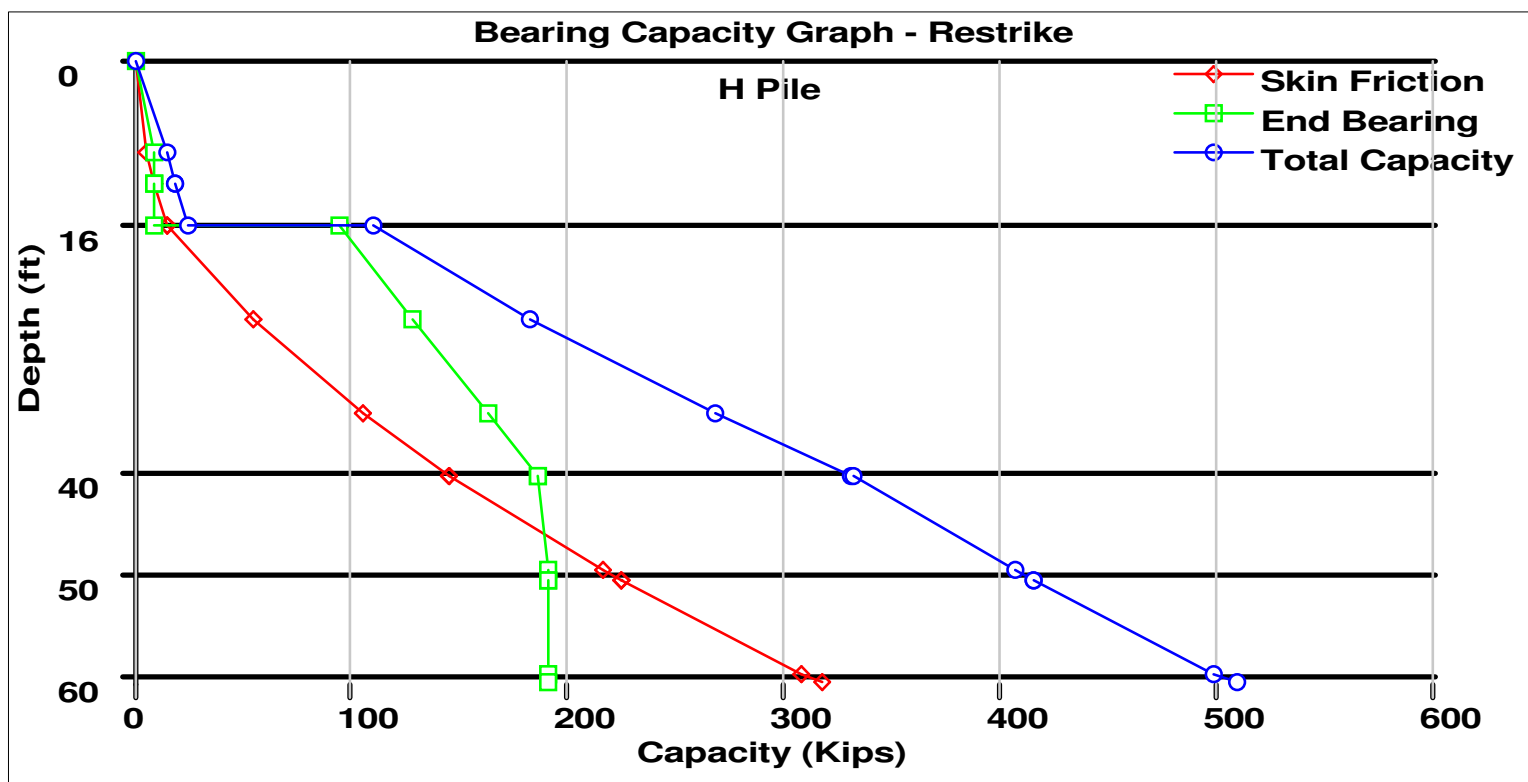
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.60 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	540.60 psf	22.81	N/A	5.07 Kips
11.99 ft	Cohesionless	719.40 psf	22.81	N/A	8.98 Kips
12.01 ft	Cohesionless	1440.29 psf	22.81	N/A	9.01 Kips
15.99 ft	Cohesionless	1554.91 psf	22.81	N/A	15.46 Kips
16.01 ft	Cohesionless	1670.74 psf	28.89	N/A	15.51 Kips
25.01 ft	Cohesionless	1974.94 psf	28.89	N/A	54.24 Kips
34.01 ft	Cohesionless	2279.14 psf	28.89	N/A	104.89 Kips
39.99 ft	Cohesionless	2481.26 psf	28.89	N/A	145.14 Kips
40.01 ft	Cohesionless	3293.14 psf	28.89	N/A	145.29 Kips
49.01 ft	Cohesionless	3597.34 psf	28.89	N/A	215.82 Kips
49.99 ft	Cohesionless	3630.46 psf	28.89	N/A	224.22 Kips
50.01 ft	Cohesionless	3969.14 psf	28.89	N/A	224.40 Kips
59.01 ft	Cohesionless	4273.34 psf	28.89	N/A	308.18 Kips
59.99 ft	Cohesionless	4306.46 psf	28.89	N/A	318.03 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.20 psf	30.00	9.45 Kips	0.01 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
11.99 ft	Cohesionless	1438.80 psf	30.00	9.45 Kips	9.45 Kips
12.01 ft	Cohesionless	1440.58 psf	30.00	9.45 Kips	9.45 Kips
15.99 ft	Cohesionless	1669.82 psf	30.00	9.45 Kips	9.45 Kips
16.01 ft	Cohesionless	1671.08 psf	110.40	190.54 Kips	94.49 Kips
25.01 ft	Cohesionless	2279.48 psf	110.40	190.54 Kips	128.89 Kips
34.01 ft	Cohesionless	2887.88 psf	110.40	190.54 Kips	163.29 Kips
39.99 ft	Cohesionless	3292.12 psf	110.40	190.54 Kips	186.15 Kips
40.01 ft	Cohesionless	3293.48 psf	110.40	190.54 Kips	186.22 Kips
49.01 ft	Cohesionless	3901.88 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	3968.12 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	3969.48 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4577.88 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	4644.12 psf	110.40	190.54 Kips	190.54 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.01 Kips	0.01 Kips
9.01 ft	5.07 Kips	9.45 Kips	14.52 Kips
11.99 ft	8.98 Kips	9.45 Kips	18.43 Kips
12.01 ft	9.01 Kips	9.45 Kips	18.46 Kips
15.99 ft	15.46 Kips	9.45 Kips	24.90 Kips
16.01 ft	15.51 Kips	94.49 Kips	110.00 Kips
25.01 ft	54.24 Kips	128.89 Kips	183.13 Kips
34.01 ft	104.89 Kips	163.29 Kips	268.18 Kips
39.99 ft	145.14 Kips	186.15 Kips	331.29 Kips
40.01 ft	145.29 Kips	186.22 Kips	331.51 Kips
49.01 ft	215.82 Kips	190.54 Kips	406.36 Kips
49.99 ft	224.22 Kips	190.54 Kips	414.76 Kips
50.01 ft	224.40 Kips	190.54 Kips	414.93 Kips
59.01 ft	308.18 Kips	190.54 Kips	498.72 Kips
59.99 ft	318.03 Kips	190.54 Kips	508.57 Kips



DRIVEN 1.2
GENERAL PROJECT INFORMATION

Filename: C:\HOLD\PIER-2.DVN
Project Name: Opitz Pier-2
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 5.00 ft
Perimeter Analysis: Box
Tip Analysis: Pile Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	22.00 ft
	- Driving/Restrike:	22.00 ft
	- Ultimate:	22.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	24.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	26.00 ft	0.00%	130.00 pcf	38.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	120.00 pcf	38.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	120.00 pcf	38.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
21.99 ft	Cohesionless	1619.40 psf	22.81	N/A	28.65 Kips
22.01 ft	Cohesionless	2640.29 psf	22.81	N/A	28.70 Kips
23.99 ft	Cohesionless	2697.31 psf	22.81	N/A	34.26 Kips
24.01 ft	Cohesionless	2755.54 psf	28.89	N/A	34.35 Kips
33.01 ft	Cohesionless	3059.74 psf	28.89	N/A	94.35 Kips
42.01 ft	Cohesionless	3363.94 psf	28.89	N/A	166.27 Kips
49.99 ft	Cohesionless	3633.66 psf	28.89	N/A	240.02 Kips
50.01 ft	Cohesionless	4513.09 psf	28.89	N/A	240.22 Kips
59.01 ft	Cohesionless	4772.29 psf	28.89	N/A	333.78 Kips
59.99 ft	Cohesionless	4800.51 psf	28.89	N/A	344.59 Kips
60.01 ft	Cohesionless	5089.09 psf	28.89	N/A	344.81 Kips
69.01 ft	Cohesionless	5348.29 psf	28.89	N/A	449.67 Kips
69.99 ft	Cohesionless	5376.51 psf	28.89	N/A	461.70 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	1.55 Kips	1.22 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	1.55 Kips	1.55 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	1.55 Kips	1.55 Kips
21.99 ft	Cohesionless	2638.80 psf	30.00	1.55 Kips	1.55 Kips
22.01 ft	Cohesionless	2640.58 psf	30.00	1.55 Kips	1.55 Kips
23.99 ft	Cohesionless	2754.62 psf	30.00	1.55 Kips	1.55 Kips
24.01 ft	Cohesionless	2755.88 psf	110.40	31.34 Kips	25.63 Kips
33.01 ft	Cohesionless	3364.28 psf	110.40	31.34 Kips	31.29 Kips
42.01 ft	Cohesionless	3972.68 psf	110.40	31.34 Kips	31.34 Kips
49.99 ft	Cohesionless	4512.12 psf	110.40	31.34 Kips	31.34 Kips
50.01 ft	Cohesionless	4513.38 psf	110.40	31.34 Kips	31.34 Kips
59.01 ft	Cohesionless	5031.78 psf	110.40	31.34 Kips	31.34 Kips
59.99 ft	Cohesionless	5088.22 psf	110.40	31.34 Kips	31.34 Kips
60.01 ft	Cohesionless	5089.38 psf	110.40	31.34 Kips	31.34 Kips
69.01 ft	Cohesionless	5607.78 psf	110.40	31.34 Kips	31.34 Kips
69.99 ft	Cohesionless	5664.22 psf	110.40	31.34 Kips	31.34 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	1.22 Kips	1.22 Kips
9.01 ft	3.51 Kips	1.55 Kips	5.06 Kips
18.01 ft	18.70 Kips	1.55 Kips	20.26 Kips
21.99 ft	28.65 Kips	1.55 Kips	30.20 Kips
22.01 ft	28.70 Kips	1.55 Kips	30.26 Kips
23.99 ft	34.26 Kips	1.55 Kips	35.82 Kips
24.01 ft	34.35 Kips	25.63 Kips	59.98 Kips
33.01 ft	94.35 Kips	31.29 Kips	125.63 Kips
42.01 ft	166.27 Kips	31.34 Kips	197.61 Kips
49.99 ft	240.02 Kips	31.34 Kips	271.36 Kips
50.01 ft	240.22 Kips	31.34 Kips	271.55 Kips
59.01 ft	333.78 Kips	31.34 Kips	365.12 Kips
59.99 ft	344.59 Kips	31.34 Kips	375.92 Kips
60.01 ft	344.81 Kips	31.34 Kips	376.15 Kips
69.01 ft	449.67 Kips	31.34 Kips	481.01 Kips
69.99 ft	461.70 Kips	31.34 Kips	493.04 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
21.99 ft	Cohesionless	1619.40 psf	22.81	N/A	28.65 Kips
22.01 ft	Cohesionless	2640.29 psf	22.81	N/A	28.70 Kips
23.99 ft	Cohesionless	2697.31 psf	22.81	N/A	34.26 Kips
24.01 ft	Cohesionless	2755.54 psf	28.89	N/A	34.35 Kips
33.01 ft	Cohesionless	3059.74 psf	28.89	N/A	94.35 Kips
42.01 ft	Cohesionless	3363.94 psf	28.89	N/A	166.27 Kips
49.99 ft	Cohesionless	3633.66 psf	28.89	N/A	240.02 Kips
50.01 ft	Cohesionless	4513.09 psf	28.89	N/A	240.22 Kips
59.01 ft	Cohesionless	4772.29 psf	28.89	N/A	333.78 Kips
59.99 ft	Cohesionless	4800.51 psf	28.89	N/A	344.59 Kips
60.01 ft	Cohesionless	5089.09 psf	28.89	N/A	344.81 Kips
69.01 ft	Cohesionless	5348.29 psf	28.89	N/A	449.67 Kips
69.99 ft	Cohesionless	5376.51 psf	28.89	N/A	461.70 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	1.55 Kips	1.22 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	1.55 Kips	1.55 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	1.55 Kips	1.55 Kips
21.99 ft	Cohesionless	2638.80 psf	30.00	1.55 Kips	1.55 Kips
22.01 ft	Cohesionless	2640.58 psf	30.00	1.55 Kips	1.55 Kips
23.99 ft	Cohesionless	2754.62 psf	30.00	1.55 Kips	1.55 Kips
24.01 ft	Cohesionless	2755.88 psf	110.40	31.34 Kips	25.63 Kips
33.01 ft	Cohesionless	3364.28 psf	110.40	31.34 Kips	31.29 Kips
42.01 ft	Cohesionless	3972.68 psf	110.40	31.34 Kips	31.34 Kips
49.99 ft	Cohesionless	4512.12 psf	110.40	31.34 Kips	31.34 Kips
50.01 ft	Cohesionless	4513.38 psf	110.40	31.34 Kips	31.34 Kips
59.01 ft	Cohesionless	5031.78 psf	110.40	31.34 Kips	31.34 Kips
59.99 ft	Cohesionless	5088.22 psf	110.40	31.34 Kips	31.34 Kips
60.01 ft	Cohesionless	5089.38 psf	110.40	31.34 Kips	31.34 Kips
69.01 ft	Cohesionless	5607.78 psf	110.40	31.34 Kips	31.34 Kips
69.99 ft	Cohesionless	5664.22 psf	110.40	31.34 Kips	31.34 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	1.22 Kips	1.22 Kips
9.01 ft	3.51 Kips	1.55 Kips	5.06 Kips
18.01 ft	18.70 Kips	1.55 Kips	20.26 Kips
21.99 ft	28.65 Kips	1.55 Kips	30.20 Kips
22.01 ft	28.70 Kips	1.55 Kips	30.26 Kips
23.99 ft	34.26 Kips	1.55 Kips	35.82 Kips
24.01 ft	34.35 Kips	25.63 Kips	59.98 Kips
33.01 ft	94.35 Kips	31.29 Kips	125.63 Kips
42.01 ft	166.27 Kips	31.34 Kips	197.61 Kips
49.99 ft	240.02 Kips	31.34 Kips	271.36 Kips
50.01 ft	240.22 Kips	31.34 Kips	271.55 Kips
59.01 ft	333.78 Kips	31.34 Kips	365.12 Kips
59.99 ft	344.59 Kips	31.34 Kips	375.92 Kips
60.01 ft	344.81 Kips	31.34 Kips	376.15 Kips
69.01 ft	449.67 Kips	31.34 Kips	481.01 Kips
69.99 ft	461.70 Kips	31.34 Kips	493.04 Kips

ULTIMATE - SKIN FRICTION

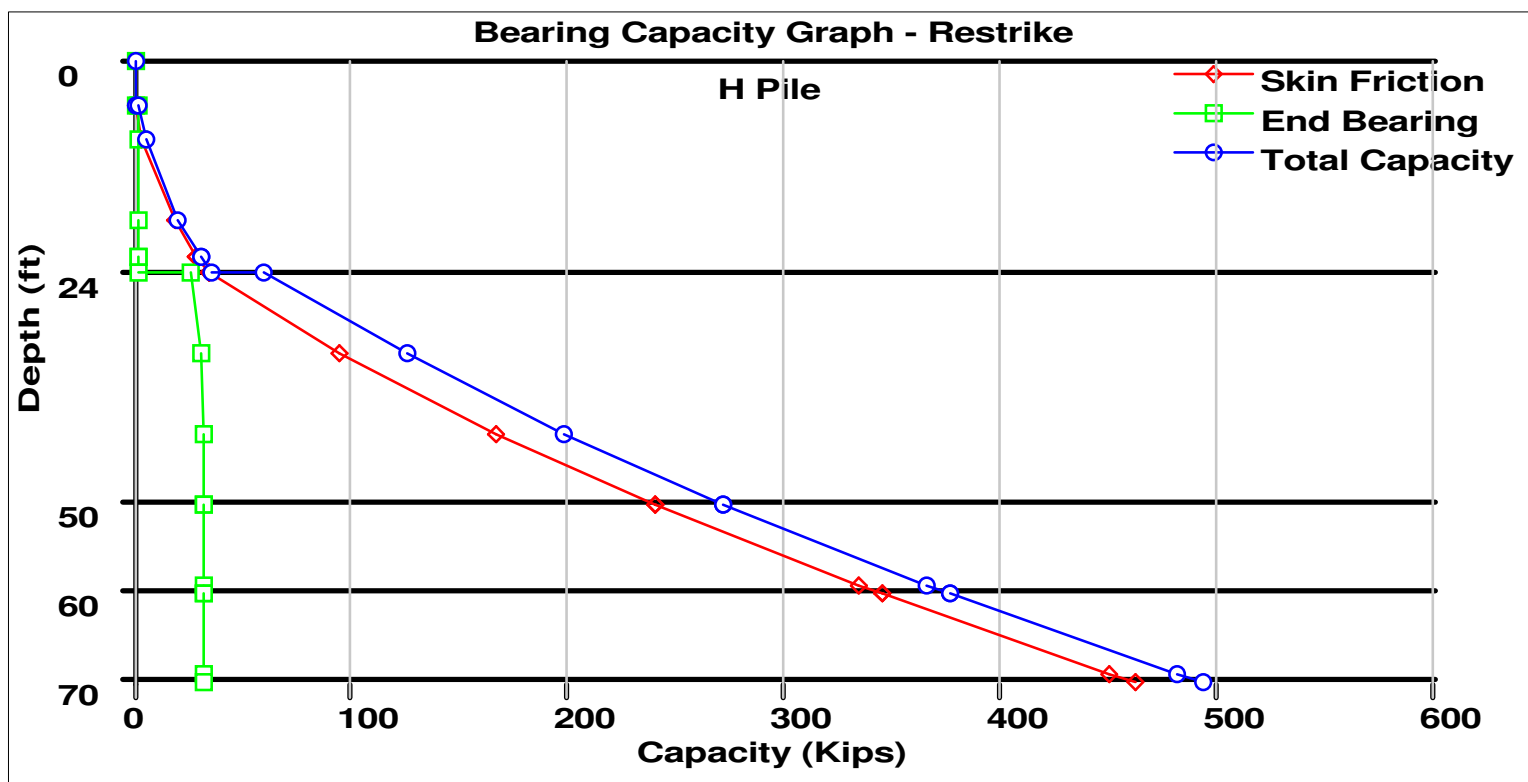
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
21.99 ft	Cohesionless	1619.40 psf	22.81	N/A	28.65 Kips
22.01 ft	Cohesionless	2640.29 psf	22.81	N/A	28.70 Kips
23.99 ft	Cohesionless	2697.31 psf	22.81	N/A	34.26 Kips
24.01 ft	Cohesionless	2755.54 psf	28.89	N/A	34.35 Kips
33.01 ft	Cohesionless	3059.74 psf	28.89	N/A	94.35 Kips
42.01 ft	Cohesionless	3363.94 psf	28.89	N/A	166.27 Kips
49.99 ft	Cohesionless	3633.66 psf	28.89	N/A	240.02 Kips
50.01 ft	Cohesionless	4513.09 psf	28.89	N/A	240.22 Kips
59.01 ft	Cohesionless	4772.29 psf	28.89	N/A	333.78 Kips
59.99 ft	Cohesionless	4800.51 psf	28.89	N/A	344.59 Kips
60.01 ft	Cohesionless	5089.09 psf	28.89	N/A	344.81 Kips
69.01 ft	Cohesionless	5348.29 psf	28.89	N/A	449.67 Kips
69.99 ft	Cohesionless	5376.51 psf	28.89	N/A	461.70 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	1.55 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	1.55 Kips	1.22 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	1.55 Kips	1.55 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	1.55 Kips	1.55 Kips
21.99 ft	Cohesionless	2638.80 psf	30.00	1.55 Kips	1.55 Kips
22.01 ft	Cohesionless	2640.58 psf	30.00	1.55 Kips	1.55 Kips
23.99 ft	Cohesionless	2754.62 psf	30.00	1.55 Kips	1.55 Kips
24.01 ft	Cohesionless	2755.88 psf	110.40	31.34 Kips	25.63 Kips
33.01 ft	Cohesionless	3364.28 psf	110.40	31.34 Kips	31.29 Kips
42.01 ft	Cohesionless	3972.68 psf	110.40	31.34 Kips	31.34 Kips
49.99 ft	Cohesionless	4512.12 psf	110.40	31.34 Kips	31.34 Kips
50.01 ft	Cohesionless	4513.38 psf	110.40	31.34 Kips	31.34 Kips
59.01 ft	Cohesionless	5031.78 psf	110.40	31.34 Kips	31.34 Kips
59.99 ft	Cohesionless	5088.22 psf	110.40	31.34 Kips	31.34 Kips
60.01 ft	Cohesionless	5089.38 psf	110.40	31.34 Kips	31.34 Kips
69.01 ft	Cohesionless	5607.78 psf	110.40	31.34 Kips	31.34 Kips
69.99 ft	Cohesionless	5664.22 psf	110.40	31.34 Kips	31.34 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	1.22 Kips	1.22 Kips
9.01 ft	3.51 Kips	1.55 Kips	5.06 Kips
18.01 ft	18.70 Kips	1.55 Kips	20.26 Kips
21.99 ft	28.65 Kips	1.55 Kips	30.20 Kips
22.01 ft	28.70 Kips	1.55 Kips	30.26 Kips
23.99 ft	34.26 Kips	1.55 Kips	35.82 Kips
24.01 ft	34.35 Kips	25.63 Kips	59.98 Kips
33.01 ft	94.35 Kips	31.29 Kips	125.63 Kips
42.01 ft	166.27 Kips	31.34 Kips	197.61 Kips
49.99 ft	240.02 Kips	31.34 Kips	271.36 Kips
50.01 ft	240.22 Kips	31.34 Kips	271.55 Kips
59.01 ft	333.78 Kips	31.34 Kips	365.12 Kips
59.99 ft	344.59 Kips	31.34 Kips	375.92 Kips
60.01 ft	344.81 Kips	31.34 Kips	376.15 Kips
69.01 ft	449.67 Kips	31.34 Kips	481.01 Kips
69.99 ft	461.70 Kips	31.34 Kips	493.04 Kips



DRIVEN 1.2
GENERAL PROJECT INFORMATION

Filename: C:\HOLD\PIER-3.DVN
Project Name: Opitz Pier-2
Project Client: Transurban
Computed By: SKK
Project Manager: MJ

Project Date: 02/20/2020

PILE INFORMATION

Pile Type: H Pile - HP10X57
Top of Pile: 5.00 ft
Perimeter Analysis: Box
Tip Analysis: Box Area

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	23.00 ft
	- Driving/Restrike:	23.00 ft
	- Ultimate:	23.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	24.00 ft	0.00%	120.00 pcf	30.0/30.0	Nordlund
2	Cohesionless	16.00 ft	0.00%	130.00 pcf	38.0/38.0	Nordlund
3	Cohesionless	10.00 ft	0.00%	120.00 pcf	38.0/38.0	Nordlund
4	Cohesionless	10.00 ft	0.00%	120.00 pcf	38.0/38.0	Nordlund

RESTRIKE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
22.99 ft	Cohesionless	1679.40 psf	22.81	N/A	31.46 Kips
23.01 ft	Cohesionless	2760.29 psf	22.81	N/A	31.52 Kips
23.99 ft	Cohesionless	2788.51 psf	22.81	N/A	34.36 Kips
24.01 ft	Cohesionless	2817.94 psf	28.89	N/A	34.45 Kips
33.01 ft	Cohesionless	3122.14 psf	28.89	N/A	95.67 Kips
39.99 ft	Cohesionless	3358.06 psf	28.89	N/A	151.36 Kips
40.01 ft	Cohesionless	3899.49 psf	28.89	N/A	151.53 Kips
49.01 ft	Cohesionless	4158.69 psf	28.89	N/A	233.07 Kips
49.99 ft	Cohesionless	4186.91 psf	28.89	N/A	242.56 Kips
50.01 ft	Cohesionless	4475.49 psf	28.89	N/A	242.76 Kips
59.01 ft	Cohesionless	4734.69 psf	28.89	N/A	335.59 Kips
59.99 ft	Cohesionless	4762.91 psf	28.89	N/A	346.31 Kips

RESTRIKE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	9.45 Kips	7.41 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
22.99 ft	Cohesionless	2758.80 psf	30.00	9.45 Kips	9.45 Kips
23.01 ft	Cohesionless	2760.58 psf	30.00	9.45 Kips	9.45 Kips
23.99 ft	Cohesionless	2817.02 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2818.28 psf	110.40	190.54 Kips	159.35 Kips
33.01 ft	Cohesionless	3426.68 psf	110.40	190.54 Kips	190.54 Kips
39.99 ft	Cohesionless	3898.52 psf	110.40	190.54 Kips	190.54 Kips
40.01 ft	Cohesionless	3899.78 psf	110.40	190.54 Kips	190.54 Kips
49.01 ft	Cohesionless	4418.18 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4474.62 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4475.78 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4994.18 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5050.62 psf	110.40	190.54 Kips	190.54 Kips

RESTRIKE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	7.41 Kips	7.41 Kips
9.01 ft	3.51 Kips	9.45 Kips	12.96 Kips
18.01 ft	18.70 Kips	9.45 Kips	28.15 Kips
22.99 ft	31.46 Kips	9.45 Kips	40.91 Kips
23.01 ft	31.52 Kips	9.45 Kips	40.96 Kips
23.99 ft	34.36 Kips	9.45 Kips	43.81 Kips
24.01 ft	34.45 Kips	159.35 Kips	193.81 Kips
33.01 ft	95.67 Kips	190.54 Kips	286.21 Kips
39.99 ft	151.36 Kips	190.54 Kips	341.90 Kips
40.01 ft	151.53 Kips	190.54 Kips	342.07 Kips
49.01 ft	233.07 Kips	190.54 Kips	423.61 Kips
49.99 ft	242.56 Kips	190.54 Kips	433.10 Kips
50.01 ft	242.76 Kips	190.54 Kips	433.30 Kips
59.01 ft	335.59 Kips	190.54 Kips	526.13 Kips
59.99 ft	346.31 Kips	190.54 Kips	536.85 Kips

DRIVING - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
22.99 ft	Cohesionless	1679.40 psf	22.81	N/A	31.46 Kips
23.01 ft	Cohesionless	2760.29 psf	22.81	N/A	31.52 Kips
23.99 ft	Cohesionless	2788.51 psf	22.81	N/A	34.36 Kips
24.01 ft	Cohesionless	2817.94 psf	28.89	N/A	34.45 Kips
33.01 ft	Cohesionless	3122.14 psf	28.89	N/A	95.67 Kips
39.99 ft	Cohesionless	3358.06 psf	28.89	N/A	151.36 Kips
40.01 ft	Cohesionless	3899.49 psf	28.89	N/A	151.53 Kips
49.01 ft	Cohesionless	4158.69 psf	28.89	N/A	233.07 Kips
49.99 ft	Cohesionless	4186.91 psf	28.89	N/A	242.56 Kips
50.01 ft	Cohesionless	4475.49 psf	28.89	N/A	242.76 Kips
59.01 ft	Cohesionless	4734.69 psf	28.89	N/A	335.59 Kips
59.99 ft	Cohesionless	4762.91 psf	28.89	N/A	346.31 Kips

DRIVING - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	9.45 Kips	7.41 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
22.99 ft	Cohesionless	2758.80 psf	30.00	9.45 Kips	9.45 Kips
23.01 ft	Cohesionless	2760.58 psf	30.00	9.45 Kips	9.45 Kips
23.99 ft	Cohesionless	2817.02 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2818.28 psf	110.40	190.54 Kips	159.35 Kips
33.01 ft	Cohesionless	3426.68 psf	110.40	190.54 Kips	190.54 Kips
39.99 ft	Cohesionless	3898.52 psf	110.40	190.54 Kips	190.54 Kips
40.01 ft	Cohesionless	3899.78 psf	110.40	190.54 Kips	190.54 Kips
49.01 ft	Cohesionless	4418.18 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4474.62 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4475.78 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4994.18 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5050.62 psf	110.40	190.54 Kips	190.54 Kips

DRIVING - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	7.41 Kips	7.41 Kips
9.01 ft	3.51 Kips	9.45 Kips	12.96 Kips
18.01 ft	18.70 Kips	9.45 Kips	28.15 Kips
22.99 ft	31.46 Kips	9.45 Kips	40.91 Kips
23.01 ft	31.52 Kips	9.45 Kips	40.96 Kips
23.99 ft	34.36 Kips	9.45 Kips	43.81 Kips
24.01 ft	34.45 Kips	159.35 Kips	193.81 Kips
33.01 ft	95.67 Kips	190.54 Kips	286.21 Kips
39.99 ft	151.36 Kips	190.54 Kips	341.90 Kips
40.01 ft	151.53 Kips	190.54 Kips	342.07 Kips
49.01 ft	233.07 Kips	190.54 Kips	423.61 Kips
49.99 ft	242.56 Kips	190.54 Kips	433.10 Kips
50.01 ft	242.76 Kips	190.54 Kips	433.30 Kips
59.01 ft	335.59 Kips	190.54 Kips	526.13 Kips
59.99 ft	346.31 Kips	190.54 Kips	536.85 Kips

ULTIMATE - SKIN FRICTION

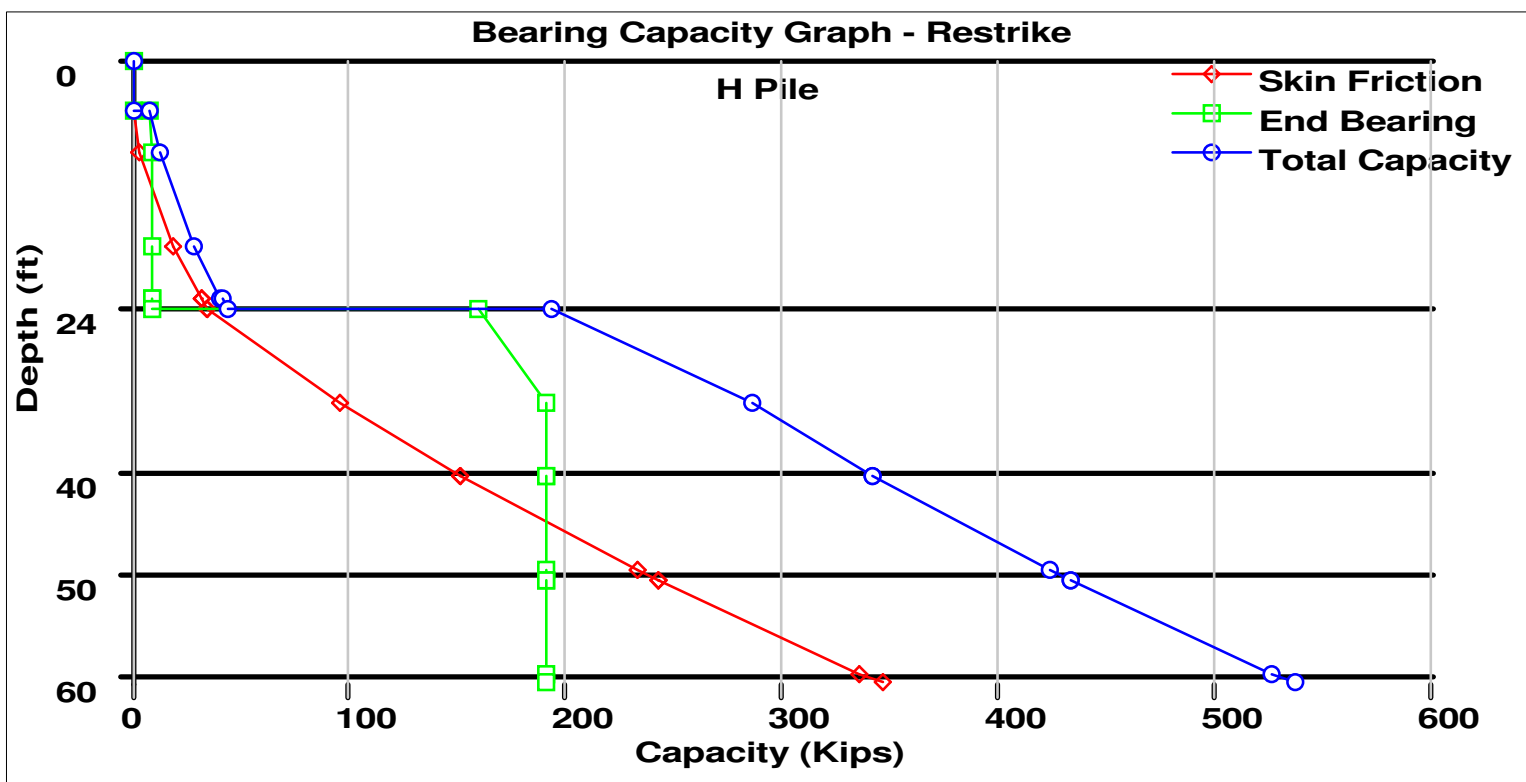
Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	22.81	N/A	0.00 Kips
9.01 ft	Cohesionless	840.60 psf	22.81	N/A	3.51 Kips
18.01 ft	Cohesionless	1380.60 psf	22.81	N/A	18.70 Kips
22.99 ft	Cohesionless	1679.40 psf	22.81	N/A	31.46 Kips
23.01 ft	Cohesionless	2760.29 psf	22.81	N/A	31.52 Kips
23.99 ft	Cohesionless	2788.51 psf	22.81	N/A	34.36 Kips
24.01 ft	Cohesionless	2817.94 psf	28.89	N/A	34.45 Kips
33.01 ft	Cohesionless	3122.14 psf	28.89	N/A	95.67 Kips
39.99 ft	Cohesionless	3358.06 psf	28.89	N/A	151.36 Kips
40.01 ft	Cohesionless	3899.49 psf	28.89	N/A	151.53 Kips
49.01 ft	Cohesionless	4158.69 psf	28.89	N/A	233.07 Kips
49.99 ft	Cohesionless	4186.91 psf	28.89	N/A	242.56 Kips
50.01 ft	Cohesionless	4475.49 psf	28.89	N/A	242.76 Kips
59.01 ft	Cohesionless	4734.69 psf	28.89	N/A	335.59 Kips
59.99 ft	Cohesionless	4762.91 psf	28.89	N/A	346.31 Kips

ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
4.99 ft	Cohesionless	0.00 psf	30.00	9.45 Kips	0.00 Kips
5.00 ft	Cohesionless	600.00 psf	30.00	9.45 Kips	7.41 Kips
9.01 ft	Cohesionless	1081.20 psf	30.00	9.45 Kips	9.45 Kips
18.01 ft	Cohesionless	2161.20 psf	30.00	9.45 Kips	9.45 Kips
22.99 ft	Cohesionless	2758.80 psf	30.00	9.45 Kips	9.45 Kips
23.01 ft	Cohesionless	2760.58 psf	30.00	9.45 Kips	9.45 Kips
23.99 ft	Cohesionless	2817.02 psf	30.00	9.45 Kips	9.45 Kips
24.01 ft	Cohesionless	2818.28 psf	110.40	190.54 Kips	159.35 Kips
33.01 ft	Cohesionless	3426.68 psf	110.40	190.54 Kips	190.54 Kips
39.99 ft	Cohesionless	3898.52 psf	110.40	190.54 Kips	190.54 Kips
40.01 ft	Cohesionless	3899.78 psf	110.40	190.54 Kips	190.54 Kips
49.01 ft	Cohesionless	4418.18 psf	110.40	190.54 Kips	190.54 Kips
49.99 ft	Cohesionless	4474.62 psf	110.40	190.54 Kips	190.54 Kips
50.01 ft	Cohesionless	4475.78 psf	110.40	190.54 Kips	190.54 Kips
59.01 ft	Cohesionless	4994.18 psf	110.40	190.54 Kips	190.54 Kips
59.99 ft	Cohesionless	5050.62 psf	110.40	190.54 Kips	190.54 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
4.99 ft	0.00 Kips	0.00 Kips	0.00 Kips
5.00 ft	0.00 Kips	7.41 Kips	7.41 Kips
9.01 ft	3.51 Kips	9.45 Kips	12.96 Kips
18.01 ft	18.70 Kips	9.45 Kips	28.15 Kips
22.99 ft	31.46 Kips	9.45 Kips	40.91 Kips
23.01 ft	31.52 Kips	9.45 Kips	40.96 Kips
23.99 ft	34.36 Kips	9.45 Kips	43.81 Kips
24.01 ft	34.45 Kips	159.35 Kips	193.81 Kips
33.01 ft	95.67 Kips	190.54 Kips	286.21 Kips
39.99 ft	151.36 Kips	190.54 Kips	341.90 Kips
40.01 ft	151.53 Kips	190.54 Kips	342.07 Kips
49.01 ft	233.07 Kips	190.54 Kips	423.61 Kips
49.99 ft	242.56 Kips	190.54 Kips	433.10 Kips
50.01 ft	242.76 Kips	190.54 Kips	433.30 Kips
59.01 ft	335.59 Kips	190.54 Kips	526.13 Kips
59.99 ft	346.31 Kips	190.54 Kips	536.85 Kips



APPENDIX E.5

Abutment and Pier Piles

- E.5.1 DRIVEN Analysis
- E.5.2 Typical LPILE Analysis**
- E.5.3 Typical WEAP Analysis Results

LPILE for Windows, Version 2019-11.009

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
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This copy of LPILE is being used by:

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xx

Serial Number of Security Device: 239146869

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is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:

\Users\skesavan\Desktop\00 Opitz Geotech Report skk\Desktop\Program Runs\LPILE - Opitz Blvd\

Name of input data file:

Abut Pile.lp11-B.lp11d

Name of output report file:

Abut Pile.lp11-B.lp11o

Name of plot output file:

Abut Pile.lp11-B.lp11p

Name of runtime message file:

Abut Pile.lp11-B.lp11r

Date and Time of Analysis

Date: December 28, 2021

Time: 7:17:45

Problem Title

Project Name:Opitz Blvd
Job Number:45893-001
Client: Transurban
Engineer: skk
Description: HP 10x57 Pile

Program Options and Settings

Computational Options:

- Conventional Analysis

Engineering Units Used for Data Input and Computations:

- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed = 500

- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in
- Number of pile increments = 100

Loading Type and Number of Cycles of Loading:

- Static loading specified
- Analysis uses p-y modification factors for p-y curves
- Analysis uses layering correction (Method of Georgiadis)
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Input of side resistance moment along pile not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

 Pile Structural Properties and Geometry

- Number of pile sections defined = 1
- Total length of pile = 30.000 ft
- Depth of ground surface below top of pile = 0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	10.2000
2	30.000	10.2000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

- Section 1 is a H weak axis steel pile
- Length of section = 30.000000 ft
- Pile width = 10.000000 in
- Shear capacity of section = 0.0000 lbs

 Ground Slope and Pile Batter Angles

- Ground Slope Angle = 0.000 degrees
 = 0.000 radians
- Pile Batter Angle = 0.000 degrees
 = 0.000 radians

 Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

```

Distance from top of pile to top of layer      =      0.0000 ft
Distance from top of pile to bottom of layer   =     10.000000 ft
Effective unit weight at top of layer          =    120.000000 pcf
Effective unit weight at bottom of layer       =    120.000000 pcf
Friction angle at top of layer                =     32.000000 deg.
Friction angle at bottom of layer             =     32.000000 deg.
Subgrade k at top of layer                    =    100.000000 pci
Subgrade k at bottom of layer                 =    100.000000 pci
    
```

Layer 2 is stiff clay with water-induced erosion

```

Distance from top of pile to top of layer      =     10.000000 ft
Distance from top of pile to bottom of layer   =     40.000000 ft
Effective unit weight at top of layer          =     65.000000 pcf
Effective unit weight at bottom of layer       =     65.000000 pcf
Undrained cohesion at top of layer            =         3000. psf
Undrained cohesion at bottom of layer         =         3000. psf
Epsilon-50 at top of layer                    =         0.0000
Epsilon-50 at bottom of layer                 =         0.0000
Subgrade k at top of layer                    =         0.0000 pci
Subgrade k at bottom of layer                 =         0.0000 pci
    
```

NOTE: Default values for Epsilon-50 will be computed for this layer.

NOTE: Default values for subgrade k will be computed for this layer.

(Depth of the lowest soil layer extends 10.000 ft below the pile tip)

 Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Cohesion psf	Angle of Friction deg.	E50 or krm	kpy pci
1	Sand (Reese, et al.)	0.00 10.0000	120.0000 120.0000	-- --	32.0000 32.0000	-- --	100.0000 100.0000
2	Stiff Clay with Free Water	10.0000 40.0000	65.0000 65.0000	3000. 3000.	-- --	default default	default default

 p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.5000	1.0000
2	100.000	0.5000	1.0000

 Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

 Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Analysis No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length	Run
1	2	V = 5000. lbs	S = 0.0000 in/in	50000.	No	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Steel H Weak Axis:

Length of Section	=	30.000000 ft
Flange Width	=	10.200000 in
Section Depth	=	10.000000 in
Flange Thickness	=	0.565000 in
Web Thickness	=	0.565000 in
Yield Stress of Pipe	=	50.000000 ksi
Elastic Modulus	=	29000. ksi
Cross-sectional Area	=	16.537550 sq. in.
Moment of Inertia	=	100.063738 in^4
Elastic Bending Stiffness	=	2901848. kip-in^2
Plastic Modulus, Z	=	30.099181in^3
Plastic Moment Capacity = Fy Z	=	1505.in-kip

Axial Structural Capacities:

Nom. Axial Structural Capacity = Fy As	=	826.877 kips
Nominal Axial Tensile Capacity	=	-826.877 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	50.000

Definition of Run Messages:

Y = part of pipe section has yielded.

Axial Thrust Force = 50.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress ksi	Run Msg
0.00000707	20.5060402	2901683.	19.8526161	4.0581718	
0.00001413	41.0120803	2901683.	12.4763081	5.0929212	
0.00002120	61.5181205	2901683.	10.0175387	6.1276706	

0.00002827	82.0241606	2901683.	8.7881540	7.1624199	
0.00003533	102.5302008	2901683.	8.0505232	8.1971693	
0.00004240	123.0362409	2901683.	7.5587694	9.2319187	
0.00004947	143.5422811	2901683.	7.2075166	10.2666680	
0.00005654	164.0483212	2901683.	6.9440770	11.3014174	
0.00006360	184.5543614	2901683.	6.7391796	12.3361668	
0.00007067	205.0604015	2901683.	6.5752616	13.3709162	
0.00007774	225.5664417	2901683.	6.4411469	14.4056655	
0.00008480	246.0724818	2901683.	6.3293847	15.4404149	
0.00009187	266.5785220	2901683.	6.2348166	16.4751643	
0.00009894	287.0845621	2901683.	6.1537583	17.5099136	
0.0001060	307.5906023	2901683.	6.0835077	18.5446630	
0.0001131	328.0966424	2901683.	6.0220385	19.5794124	
0.0001201	348.6026826	2901683.	5.9678009	20.6141617	
0.0001272	369.1087227	2901683.	5.9195898	21.6489111	
0.0001343	389.6147629	2901683.	5.8764535	22.6836605	
0.0001413	410.1208030	2901683.	5.8376308	23.7184099	
0.0001484	430.6268432	2901683.	5.8025055	24.7531592	
0.0001555	451.1328833	2901683.	5.7705735	25.7879086	
0.0001625	471.6389235	2901683.	5.7414181	26.8226580	
0.0001696	492.1449636	2901683.	5.7146923	27.8574073	
0.0001767	512.6510038	2901683.	5.6901046	28.8921567	
0.0001837	533.1570439	2901683.	5.6674083	29.9269061	
0.0001908	553.6630841	2901683.	5.6463932	30.9616555	
0.0001979	574.1691242	2901683.	5.6268791	31.9964048	
0.0002049	594.6751644	2901683.	5.6087109	33.0311542	
0.0002120	615.1812045	2901683.	5.5917539	34.0659036	
0.0002191	635.6872447	2901683.	5.5758908	35.1006529	
0.0002261	656.1932848	2901683.	5.5610193	36.1354023	
0.0002332	676.6993250	2901683.	5.5470490	37.1701517	
0.0002403	697.2053651	2901683.	5.5339005	38.2049010	
0.0002473	717.7114053	2901683.	5.5215033	39.2396504	
0.0002544	738.2174454	2901683.	5.5097949	40.2743998	
0.0002615	758.7234856	2901683.	5.4987194	41.3091492	
0.0002685	779.2295257	2901683.	5.4882267	42.3438985	
0.0002756	799.7355659	2901683.	5.4782722	43.3786479	
0.0002897	840.7476462	2901683.	5.4598199	45.4481466	
0.0003039	881.7597265	2901683.	5.4430841	47.5176454	
0.0003180	922.7718068	2901683.	5.4278359	49.5871441	
0.0003321	962.4164303	2897566.	5.4155958	50.0000000	Y
0.0003463	999.6513162	2886826.	5.4073270	50.0000000	Y
0.0003604	1035.	2871023.	5.4023379	50.0000000	Y
0.0003745	1067.	2848392.	5.3986091	50.0000000	Y
0.0003887	1096.	2818785.	5.3949974	50.0000000	Y
0.0004028	1121.	2783546.	5.3914802	50.0000000	Y
0.0004169	1144.	2744866.	5.3880442	50.0000000	Y
0.0004311	1165.	2703409.	5.3845803	50.0000000	Y
0.0004452	1184.	2660196.	5.3813780	50.0000000	Y
0.0004594	1202.	2616018.	5.3782446	50.0000000	Y
0.0004735	1217.	2571164.	5.3750762	50.0000000	Y
0.0004876	1232.	2526177.	5.3719837	50.0000000	Y
0.0005018	1245.	2481377.	5.3689771	50.0000000	Y
0.0005159	1257.	2437004.	5.3660446	50.0000000	Y
0.0005300	1268.	2393257.	5.3631753	50.0000000	Y
0.0005442	1279.	2350161.	5.3602583	50.0000000	Y
0.0005583	1288.	2307689.	5.3575367	50.0000000	Y
0.0005724	1297.	2266199.	5.3548510	50.0000000	Y
0.0005866	1306.	2225787.	5.3521928	50.0000000	Y
0.0006007	1313.	2186260.	5.3496625	50.0000000	Y
0.0006148	1320.	2147557.	5.3470911	50.0000000	Y
0.0006290	1327.	2110094.	5.3445261	50.0000000	Y
0.0006431	1333.	2073399.	5.3422306	50.0000000	Y
0.0006572	1339.	2037763.	5.3397170	50.0000000	Y
0.0006714	1345.	2003144.	5.3375681	50.0000000	Y
0.0006855	1350.	1969343.	5.3350864	50.0000000	Y
0.0006996	1355.	1936577.	5.3330058	50.0000000	Y
0.0007138	1359.	1904653.	5.3305992	50.0000000	Y
0.0007279	1364.	1873651.	5.3286529	50.0000000	Y
0.0007420	1368.	1843468.	5.3262951	50.0000000	Y
0.0007562	1372.	1814154.	5.3244201	50.0000000	Y
0.0007703	1375.	1785567.	5.3222471	50.0000000	Y
0.0007844	1379.	1757888.	5.3202203	50.0000000	Y
0.0007986	1382.	1730856.	5.3183398	50.0000000	Y
0.0008127	1385.	1704607.	5.3162858	50.0000000	Y
0.0008268	1388.	1679147.	5.3144922	50.0000000	Y
0.0008410	1391.	1654192.	5.3125858	50.0000000	Y
0.0008975	1401.	1561198.	5.3053851	50.0000000	Y

0.0009540	1410.	1477492.	5.2987224	50.0000000	Y
0.0010106	1417.	1401820.	5.2924846	50.0000000	Y
0.0010671	1423.	1333162.	5.2865798	50.0000000	Y
0.0011236	1428.	1270678.	5.2809324	50.0000000	Y
0.0011802	1432.	1213612.	5.2756225	50.0000000	Y
0.0012367	1436.	1161292.	5.2708860	50.0000000	Y
0.0012933	1440.	1113223.	5.2660613	50.0000000	Y
0.0013498	1443.	1068800.	5.2617285	50.0000000	Y
0.0014063	1445.	1027852.	5.2575091	50.0000000	Y
0.0014629	1448.	989716.	5.2535615	50.0000000	Y
0.0015194	1450.	954391.	5.2498172	50.0000000	Y
0.0015759	1452.	921386.	5.2461350	50.0000000	Y
0.0016325	1454.	890581.	5.2427997	50.0000000	Y

 Summary of Results for Nominal Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Moment Capacity in-kips
1	50.0000000000	1454.

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

 Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.00	0.00	N.A.	No	0.00	95039.
2	10.0000	145.7845	No	No	95039.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

 Computed Values of Pile Loading and Deflection
 for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 5000.0 lbs
 Rotation of pile head = 0.000E+00 radians
 Axial load at pile head = 50000.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p	Soil Spr. Es*H	Distrib. Lat. Load
---------	------------	----------------	-------------	---------	--------------	-------------------	-------------	----------------	--------------------

feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.1093	-196331.	5000.	0.00	13030.	2.90E+09	0.00	0.00	0.00
0.3000	0.1089	-178309.	4985.	-2.32E-04	12111.	2.90E+09	-8.1303	268.8014	0.00
0.6000	0.1077	-160353.	4939.	-4.42E-04	11196.	2.90E+09	-17.4257	582.7306	0.00
0.9000	0.1057	-142587.	4860.	-6.30E-04	10291.	2.90E+09	-26.8631	914.9076	0.00
1.2000	0.1031	-125137.	4747.	-7.96E-04	9401.	2.90E+09	-35.5697	1242.	0.00
1.5000	0.09997	-108120.	4605.	-9.41E-04	8534.	2.90E+09	-43.3193	1560.	0.00
1.8000	0.09634	-91640.	4438.	-0.00107	7694.	2.90E+09	-49.5718	1852.	0.00
2.1000	0.09230	-75782.	4251.	-0.00117	6886.	2.90E+09	-54.1275	2111.	0.00
2.4000	0.08792	-60609.	4051.	-0.00125	6113.	2.90E+09	-57.0830	2337.	0.00
2.7000	0.08327	-46162.	3842.	-0.00132	5376.	2.90E+09	-58.9179	2547.	0.00
3.0000	0.07842	-32468.	3628.	-0.00137	4678.	2.90E+09	-59.9597	2753.	0.00
3.3000	0.07342	-19545.	3416.	-0.00140	4020.	2.90E+09	-58.3003	2859.	0.00
3.6000	0.06833	-7372.	3203.	-0.00142	3399.	2.90E+09	-60.0322	3163.	0.00
3.9000	0.06321	4024.	2980.	-0.00142	3229.	2.90E+09	-63.7461	3630.	0.00
4.2000	0.05811	14593.	2745.	-0.00141	3767.	2.90E+09	-66.5331	4122.	0.00
4.5000	0.05307	24297.	2498.	-0.00138	4262.	2.90E+09	-70.7978	4802.	0.00
4.8000	0.04815	33078.	2236.	-0.00135	4709.	2.90E+09	-74.9876	5607.	0.00
5.1000	0.04337	40879.	1959.	-0.00130	5107.	2.90E+09	-78.5696	6522.	0.00
5.4000	0.03877	47653.	1671.	-0.00125	5452.	2.90E+09	-81.4732	7565.	0.00
5.7000	0.03438	53361.	1374.	-0.00118	5743.	2.90E+09	-83.6383	8757.	0.00
6.0000	0.03024	57973.	1070.	-0.00112	5978.	2.90E+09	-85.0168	10122.	0.00
6.3000	0.02635	61470.	763.3427	-0.00104	6156.	2.90E+09	-85.5728	11691.	0.00
6.6000	0.02274	63844.	455.8020	-9.64E-04	6277.	2.90E+09	-85.2831	13503.	0.00
6.9000	0.01941	65098.	157.6534	-8.84E-04	6341.	2.90E+09	-80.3550	14904.	0.00
7.2000	0.01637	65297.	-114.2972	-8.03E-04	6351.	2.90E+09	-70.7287	15552.	0.00
7.5000	0.01363	64565.	-351.9873	-7.23E-04	6314.	2.90E+09	-61.3214	16200.	0.00
7.8000	0.01117	63023.	-556.4615	-6.43E-04	6236.	2.90E+09	-52.2754	16848.	0.00
8.1000	0.00899	60790.	-729.2401	-5.67E-04	6122.	2.90E+09	-43.7128	17496.	0.00
8.4000	0.00709	57976.	-872.2469	-4.93E-04	5978.	2.90E+09	-35.7354	18144.	0.00
8.7000	0.00545	54687.	-987.7343	-4.23E-04	5811.	2.90E+09	-28.4243	18792.	0.00
9.0000	0.00404	51017.	-1078.	-3.57E-04	5624.	2.90E+09	-21.8399	19440.	0.00
9.3000	0.00287	47052.	-1146.	-2.97E-04	5422.	2.90E+09	-16.0226	20088.	0.00
9.6000	0.00191	42870.	-1195.	-2.41E-04	5208.	2.90E+09	-10.9936	20736.	0.00
9.9000	0.00114	38535.	-1227.	-1.90E-04	4987.	2.90E+09	-6.7553	21384.	0.00
10.2000	5.38E-04	34104.	-1298.	-1.45E-04	4762.	2.90E+09	-32.9266	220320.	0.00
10.5000	9.11E-05	29239.	-1368.	-1.06E-04	4514.	2.90E+09	-5.7391	226800.	0.00
10.8000	-2.25E-04	24293.	-1352.	-7.28E-05	4262.	2.90E+09	14.5948	233280.	0.00
11.1000	-4.33E-04	19531.	-1274.	-4.56E-05	4019.	2.90E+09	28.8411	239760.	0.00
11.4000	-5.54E-04	15138.	-1154.	-2.41E-05	3795.	2.90E+09	37.8690	246240.	0.00
11.7000	-6.07E-04	11233.	-1009.	-7.75E-06	3596.	2.90E+09	42.5846	252720.	0.00
12.0000	-6.09E-04	7876.	-853.3121	4.11E-06	3425.	2.90E+09	43.8788	259200.	0.00
12.3000	-5.77E-04	5087.	-697.6741	1.21E-05	3283.	2.90E+09	42.5868	265680.	0.00
12.6000	-5.22E-04	2849.	-549.9887	1.71E-05	3169.	2.90E+09	39.4606	272160.	0.00
12.9000	-4.54E-04	1121.	-415.6872	1.95E-05	3081.	2.90E+09	35.1513	278640.	0.00
13.2000	-3.81E-04	-151.1912	-298.0527	2.01E-05	3031.	2.90E+09	30.2012	285120.	0.00
13.5000	-3.09E-04	-1032.	-198.6119	1.94E-05	3076.	2.90E+09	25.0437	291600.	0.00
13.8000	-2.42E-04	-1588.	-117.5187	1.78E-05	3104.	2.90E+09	20.0081	298080.	0.00
14.1000	-1.81E-04	-1885.	-53.9110	1.56E-05	3119.	2.90E+09	15.3295	304560.	0.00
14.4000	-1.29E-04	-1982.	-6.2289	1.32E-05	3124.	2.90E+09	11.1606	311040.	0.00
14.7000	-8.60E-05	-1934.	27.5133	1.08E-05	3122.	2.90E+09	7.5851	317520.	0.00
15.0000	-5.15E-05	-1788.	49.5034	8.48E-06	3115.	2.90E+09	4.6317	324000.	0.00
15.3000	-2.49E-05	-1581.	61.9570	6.39E-06	3104.	2.90E+09	2.2870	330480.	0.00
15.6000	-5.42E-06	-1344.	66.9870	4.58E-06	3092.	2.90E+09	0.5075	336960.	0.00
15.9000	8.07E-06	-1100.	66.5156	3.06E-06	3079.	2.90E+09	-0.7694	343440.	0.00
16.2000	1.66E-05	-866.1557	62.2196	1.84E-06	3068.	2.90E+09	-1.6173	349920.	0.00
16.5000	2.13E-05	-652.8803	55.5051	9.02E-07	3057.	2.90E+09	-2.1130	356400.	0.00
16.8000	2.31E-05	-466.8437	47.5045	2.07E-07	3047.	2.90E+09	-2.3318	362880.	0.00
17.1000	2.28E-05	-310.9225	39.0899	-2.75E-07	3039.	2.90E+09	-2.3430	369360.	0.00
17.4000	2.12E-05	-185.2972	30.8977	-5.83E-07	3033.	2.90E+09	-2.2082	375840.	0.00
17.7000	1.86E-05	-88.2490	23.3599	-7.53E-07	3028.	2.90E+09	-1.9795	382320.	0.00
18.0000	1.57E-05	-16.8349	16.7385	-8.18E-07	3024.	2.90E+09	-1.6991	388800.	0.00
18.3000	1.28E-05	32.5627	11.1601	-8.08E-07	3025.	2.90E+09	-1.4000	395280.	0.00
18.6000	9.91E-06	63.8088	6.6485	-7.48E-07	3027.	2.90E+09	-1.1064	401760.	0.00
18.9000	7.36E-06	80.7014	3.1541	-6.59E-07	3028.	2.90E+09	-0.8349	408240.	0.00
19.2000	5.17E-06	86.7552	0.5787	-5.55E-07	3028.	2.90E+09	-0.5958	414720.	0.00
19.5000	3.37E-06	85.0680	-1.2031	-4.48E-07	3028.	2.90E+09	-0.3941	421200.	0.00
19.8000	1.94E-06	78.2543	-2.3284	-3.47E-07	3027.	2.90E+09	-0.2311	427680.	0.00
20.1000	8.71E-07	68.4287	-2.9333	-2.56E-07	3027.	2.90E+09	-0.1050	434160.	0.00
20.4000	1.03E-07	57.2265	-3.1450	-1.78E-07	3026.	2.90E+09	-0.01255	440640.	0.00
20.7000	-4.10E-07	45.8490	-3.0758	-1.14E-07	3026.	2.90E+09	0.05095	447120.	0.00
21.0000	-7.18E-07	35.1216	-2.8212	-6.38E-08	3025.	2.90E+09	0.09050	453600.	0.00
21.3000	-8.69E-07	25.5592	-2.4583	-2.61E-08	3025.	2.90E+09	0.1111	460080.	0.00
21.6000	-9.06E-07	17.4311	-2.0469	5.42E-10	3024.	2.90E+09	0.1175	466560.	0.00
21.9000	-8.65E-07	10.8215	-1.6307	1.81E-08	3024.	2.90E+09	0.1137	473040.	0.00
22.2000	-7.76E-07	5.6833	-1.2399	2.83E-08	3024.	2.90E+09	0.1034	479520.	0.00

22.5000	-6.62E-07	1.8839	-0.8930	3.30E-08	3024.	2.90E+09	0.08933	486000.	0.00
22.8000	-5.39E-07	-0.7583	-0.5996	3.37E-08	3023.	2.90E+09	0.07369	492480.	0.00
23.1000	-4.19E-07	-2.4452	-0.3624	3.17E-08	3024.	2.90E+09	0.05808	498960.	0.00
23.4000	-3.10E-07	-3.3789	-0.1794	2.81E-08	3024.	2.90E+09	0.04357	505440.	0.00
23.7000	-2.17E-07	-3.7471	-0.04550	2.37E-08	3024.	2.90E+09	0.03082	511920.	0.00
24.0000	-1.40E-07	-3.7151	0.04623	1.90E-08	3024.	2.90E+09	0.02014	518400.	0.00
24.3000	-7.96E-08	-3.4211	0.1034	1.46E-08	3024.	2.90E+09	0.01160	524880.	0.00
24.6000	-3.46E-08	-2.9761	0.1334	1.07E-08	3024.	2.90E+09	0.00511	531360.	0.00
24.9000	-2.88E-09	-2.4642	0.1434	7.28E-09	3024.	2.90E+09	4.30E-04	537840.	0.00
25.2000	1.78E-08	-1.9461	0.1393	4.54E-09	3024.	2.90E+09	-0.00269	544320.	0.00
25.5000	2.98E-08	-1.4626	0.1263	2.43E-09	3023.	2.90E+09	-0.00456	550800.	0.00
25.8000	3.53E-08	-1.0379	0.1082	8.78E-10	3023.	2.90E+09	-0.00547	557280.	0.00
26.1000	3.61E-08	-0.6838	0.08819	-1.90E-10	3023.	2.90E+09	-0.00566	563760.	0.00
26.4000	3.39E-08	-0.4029	0.06832	-8.64E-10	3023.	2.90E+09	-0.00538	570240.	0.00
26.7000	2.99E-08	-0.1915	0.05002	-1.23E-09	3023.	2.90E+09	-0.00479	576720.	0.00
27.0000	2.51E-08	-0.04230	0.03408	-1.38E-09	3023.	2.90E+09	-0.00406	583200.	0.00
27.3000	2.00E-08	0.05433	0.02087	-1.37E-09	3023.	2.90E+09	-0.00328	589680.	0.00
27.6000	1.52E-08	0.1085	0.01045	-1.27E-09	3023.	2.90E+09	-0.00252	596160.	0.00
27.9000	1.09E-08	0.1300	0.00265	-1.12E-09	3023.	2.90E+09	-0.00182	602640.	0.00
28.2000	7.11E-09	0.1280	-0.00279	-9.62E-10	3023.	2.90E+09	-0.00120	609120.	0.00
28.5000	3.94E-09	0.1103	-0.00617	-8.14E-10	3023.	2.90E+09	-6.73E-04	615600.	0.00
28.8000	1.25E-09	0.08387	-0.00777	-6.94E-10	3023.	2.90E+09	-2.16E-04	622080.	0.00
29.1000	-1.06E-09	0.05463	-0.00782	-6.08E-10	3023.	2.90E+09	1.85E-04	628560.	0.00
29.4000	-3.12E-09	0.02776	-0.00650	-5.56E-10	3023.	2.90E+09	5.51E-04	635040.	0.00
29.7000	-5.06E-09	0.00803	-0.00388	-5.34E-10	3023.	2.90E+09	9.03E-04	641520.	0.00
30.0000	-6.97E-09	0.00	0.00	-5.29E-10	3023.	2.90E+09	0.00125	324000.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.10932575 inches
 Computed slope at pile head = 0.000000 radians
 Maximum bending moment = -196331. inch-lbs
 Maximum shear force = 5000. lbs
 Depth of maximum bending moment = 0.000000 feet below pile head
 Depth of maximum shear force = 0.000000 feet below pile head
 Number of iterations = 10
 Number of zero deflection points = 5

 Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
 Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
 Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
 Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
 Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type	Load Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	5000.	S, rad	0.00	50000.	0.1093	0.00	5000.	-196331.

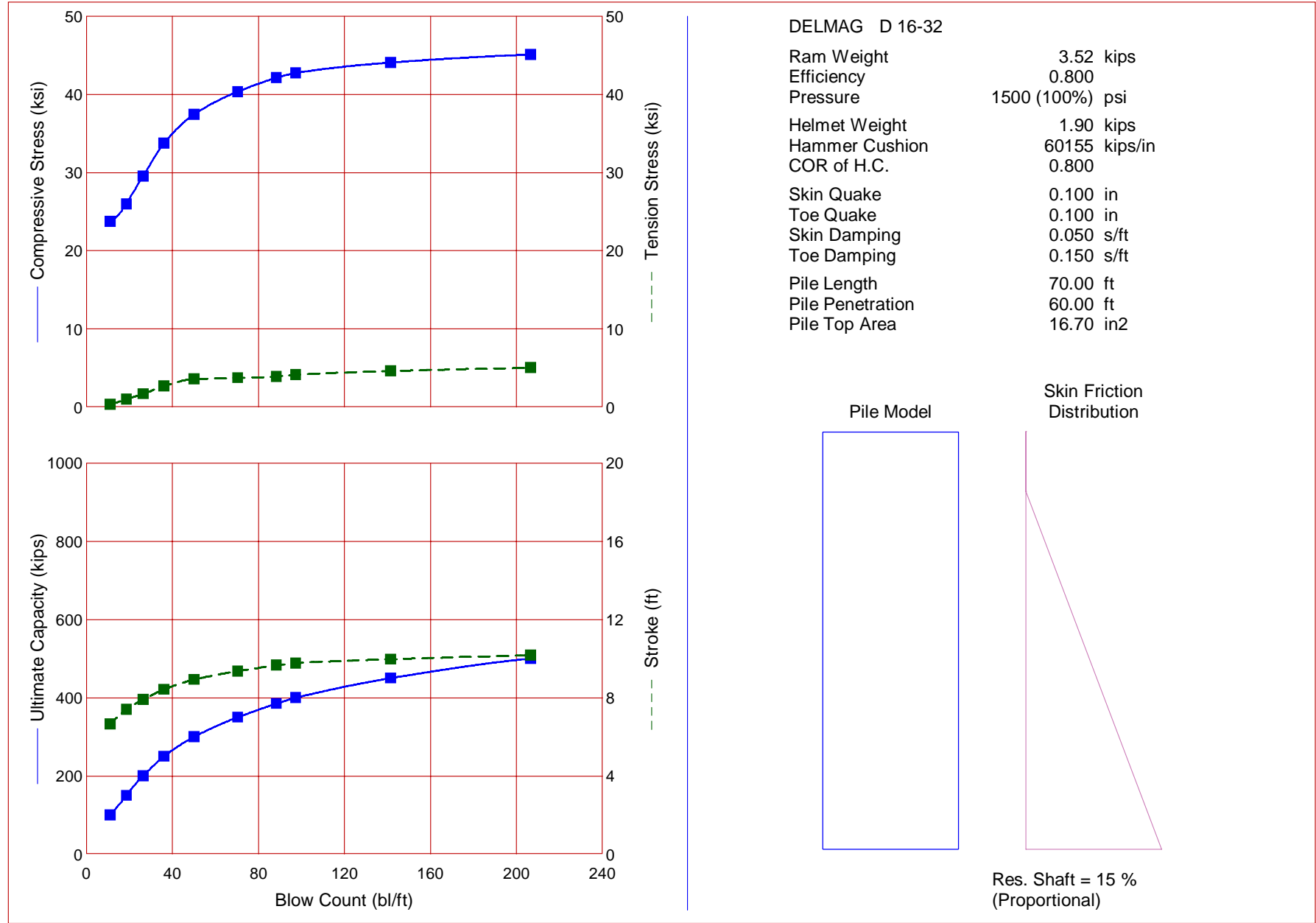
Maximum pile-head deflection = 0.1093257457 inches
 Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

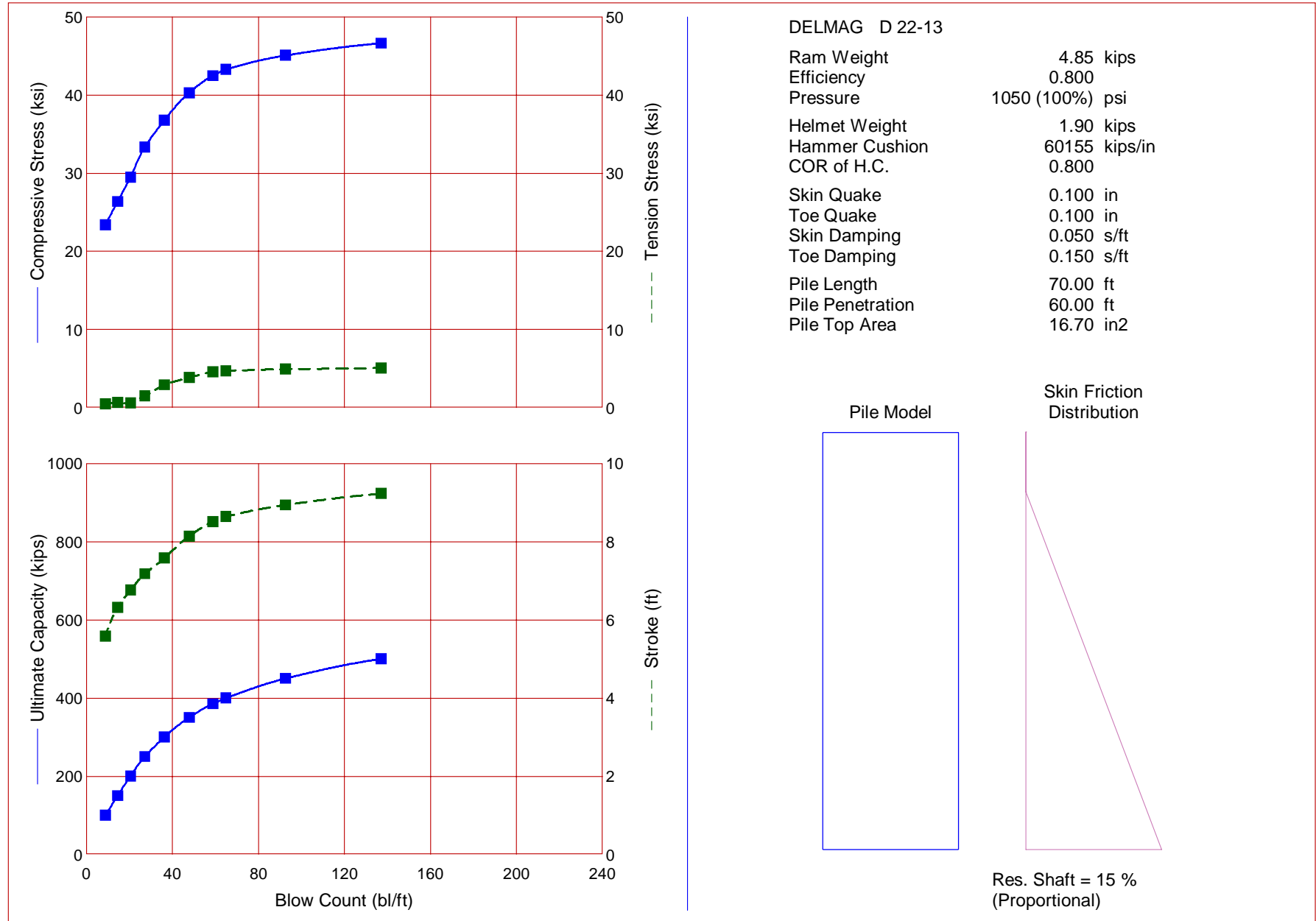
The analysis ended normally.

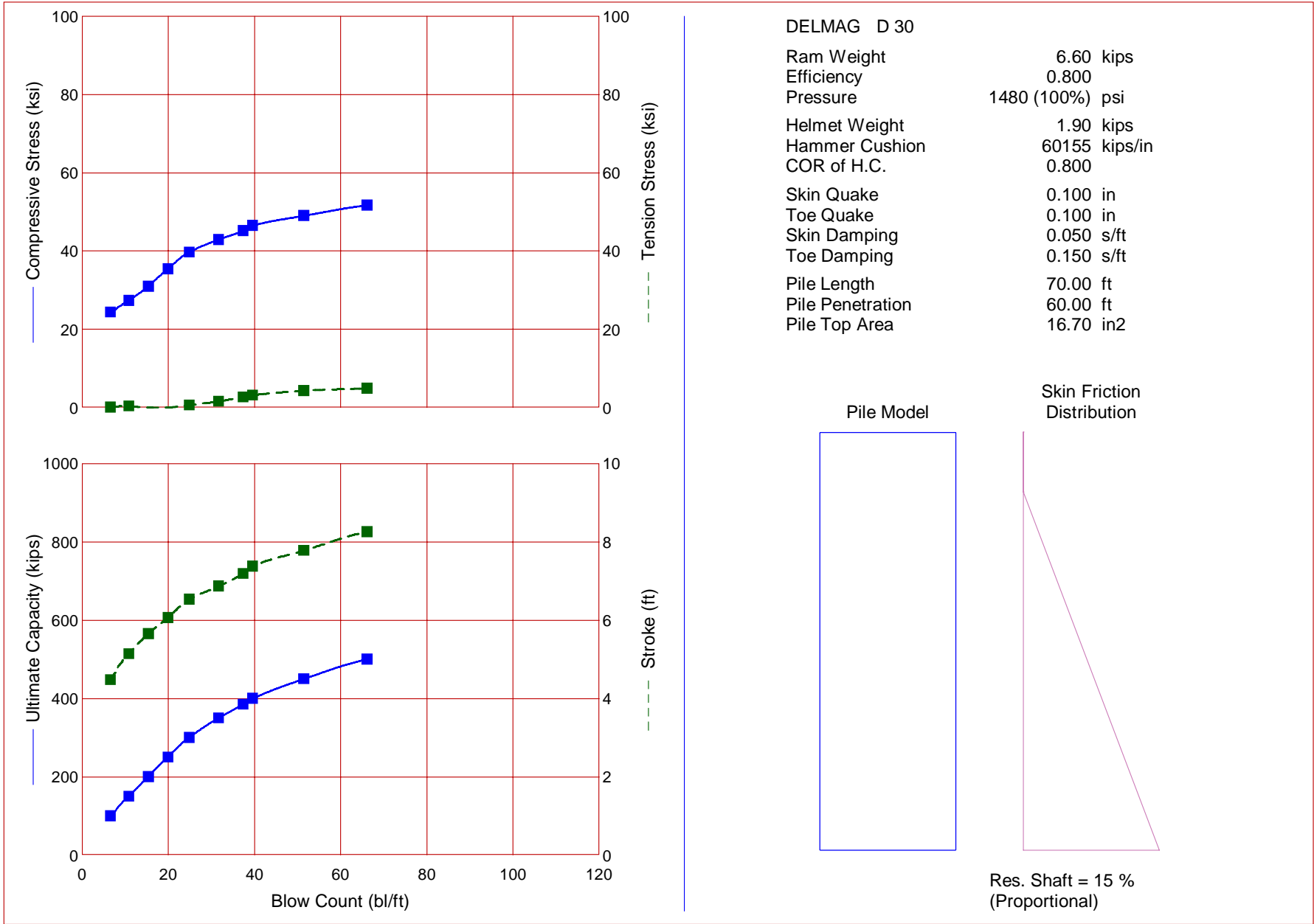
APPENDIX E.5

Abutment and Pier Piles

- E.5.1 DRIVEN Analysis
- E.5.2 Typical LPILE Analysis
- E.5.3 Typical WEAP Analysis Results**







APPENDIX E.6

MOT Pavement Section

E.6.1 Pavement Analyses

E.6.2 Record Drawings

FLEXIBLE PAVEMENT DESIGN



Whitman, Requardt & Associates, LLP
Engineers - Architects - Environmental Planners Est. 1915

Design Per VDOT Specifications

Ver.04.10 skk

9/14/2021

Ver.4.10

Sheet 1 of 2

1. Project Data

Project: Optiz Blvd Woodbridge, VA	Section: MOT Pavement Section	Design: skk
WRA # 45893-001	Station: I-95 GP SB Shoulders	Check: jmb
	Date: 1/28/2022	

2. Traffic Growth Rate

Traffic Growth Rate Provided ?	Given/Assumed	Given Growth Rate (g):	2.00%
Data & Calculation of Traffic Growth Rate	Year	Time Duration	
	ADT	Calculated g	
Growth Rate for Design:			2.00%

3. Design Year Average Daily Traffic (ADT)

Construction/Design Year	2022	Given ADT Data	
ADT for Design Year Given?	Needs to be Estimated	g: 2.00%	
Data & Calculation of Design Year ADT	Data Used Year	Calculated ADT:	
	2018	72731	
	ADT	67,192	
Project ADT for Cons. Year:			72,731

4. Data for Pavement Design

Initial Structural Design Life (Performance Period)	0.5 years	
Reliability R (%) (for calculation of Z_R)	95 %	Calculated $Z_R = -1.645$
Initial Serviceability $(PSI)_1$	4.2	
Terminal Serviceability $(PSI)_2$	2.8	Calculated $\Delta (PSI) = 1.4$
Percent Truck	7.42%	
Truck Factor	Needs to be Estimated	1.10 (See Sec 5 for truck factor Estimation)
Directional Split/Distribution (Note 1)	100%	
Design Lane Factor/Distribution (Note 2)	70%	
Subgrade CBR (for M_R calculations)	3.33	Method AASHTO 1993
Overall Standard Deviation	0.49	Calculated $M_R = 5,000$

5. Rigorous ESAL Calculations

Data	ADT= 72,731	Lane dis. 100%	Dir.Dis. 70%	g= 2.00%	n= 0.5		
Class	Vehicle Type	% ADT	ADT by Type	Growth factor	Design Traffic	ESAL Factor	Design ESAL
1	Car	92.58	67,334	0.498	8,559,379	0.0002	1,712
2	Single Unit Trucks	1.60	1,164	0.498	147,926	0.46	68,046
3	Combined Trucks	5.82	4,233	0.498	538,082	1.05	564,986
Total:		100.00	72,731			ESAL	634,744
						Equivalent Truck Factor	0.9253

Project: Optiz Blvd
Woodbridge, VA
WRA # 45893-001
Design: skk

Section: MOT Pavement Section
Station: I-95 GP SB Shoulders
Date: 1/28/2022
Check: jmb

6. Calculated Design Structural Number

ADT 72,731	g: 2.00%	Growth Factor 0.498	Truck Factor: 0.9253
Traffic 26,546,815 per year		Wt 18 (18kips ESAL) =	634,744
Calculated Resilient Modulus M_r	5000 psi	per	AASHTO 1993
Reliability Standard Dev. Z_R	-1.645	Δ (PSI) =	1.4 Overall STD 0.49
Calculated Design Structural Number:			4.310

7. Specified Layer and Lift Design

(VDOT Specifications)

Lift ID	Layer Description	Struct. Coeff.	Drainage Coeff.	Selected Thickness (in)	Check Thickness Limits	Layer Lift Thickness		Calculated SN
						Min. (in)	Max (in)	
1	05. SMA 12.5	0.44	1.0	2.00	-Ok-	1.50	3.00	0.88
2	09. BM-25.0	0.44	1.0	3.00	-Ok-	2.50	4.00	1.32
3	09. BM-25.0	0.44	1.0	4.00	-Ok-	2.50	4.00	1.76
4	11. Agg.Base	0.12	1.0	6.00	-Ok-	3.00	8.00	0.72
Totals:		Total Pavement Thickness=			15 inches	Total SN=		4.680
						Required SN	4.310	Ok

8. Summary of Pavement Section

Total Number of Layers: **3**

Layer No	Layer Description	Layer Thickness
1	SMA 12.5	2.0 inch
2	BM-25.0	7.0 inch
3	Agg.Base	6.0 inch

9. Notes

Project: Optiz Blvd
Woodbridge, VA
WRA # 45893-001
Design: skk

Section: Mainline Sections
Station: Express Lanes
Date: 1/28/2022
Check: jmb

6. Calculated Design Structural Number

ADT 72,731	g: 2.00%	Growth Factor 40.568	Truck Factor: 6.8655
Traffic 26,546,815 per year		Wt 18 (18kips ESAL) =	51,756,880
Calculated Resilient Modulus M_r	5000 psi	per	AASHTO 1993
Reliability Standard Dev. Z_R	-1.645	Δ (PSI) =	1.4 Overall STD 0.49
Calculated Design Structural Number:			7.930

7. Specified Layer and Lift Design

(VDOT Specifications)

Lift ID	Layer Description	Struct. Coeff.	Drainage Coeff.	Selected Thickness (in)	Check Thickness Limits	Layer Lift Thickness		Calculated SN
						Min. (in)	Max. (in)	
1	05. SMA 12.5	0.44	1.0	2.00	-Ok-	1.50	3.00	0.88
2	07. IM-19.0	0.44	1.0	2.00	-Ok-	2.00	3.00	0.88
3	09. BM-25.0	0.44	1.0	3.00	-Ok-	2.50	4.00	1.32
4	09. BM-25.0	0.44	1.0	4.00	-Ok-	2.50	4.00	1.76
5	09. BM-25.0	0.44	1.0	4.00	-Ok-	2.50	4.00	1.76
6	11. Agg.Base	0.12	1.0	6.00	-Ok-	3.00	8.00	0.72
7	11. Agg.Base	0.12	1.0	6.00	-Ok-	3.00	8.00	0.72
Totals:		Total Pavement Thickness=			27 inches	Total SN=		8.040
					Required SN	7.930		Ok

8. Summary of Pavement Section

Total Number of Layers: 4

Layer No	Layer Description	Layer Thickness
1	SMA 12.5	2.0 inch
2	IM-19.0	2.0 inch
3	BM-25.0	11.0 inch
4	Agg.Base	12.0 inch

9. Notes

APPENDIX E.6

MOT Pavement Section

E.6.1 Pavement Analyses

E.6.2 Record Drawings

FOR INDEX OF SHEETS SEE SHEET 1B

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT'S ENGINEERING DESIGN PACKAGE (GEOPAK).
GEOPAK Computer Identification No. 94105



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY

ALL CONSTRUCTION IS TO BE PERFORMED WITHIN EXISTING RIGHT OF WAY.

PRINCE WILLIAM COUNTY
I-95 LEFT SHOULDER & AUXILIARY LANES IMPROVEMENTS
FROM: 1.18 MILES S. OF DUMFRIES ROAD
TO: 0.18 MILES N. OF PRINCE WILLIAM COUNTY PKWY

FHWA 534 DATA 4A121
UPC 94105

STATE	FEDERAL AID PROJECT	ROUTE	STATE PROJECT	SHEET NO.
VA.	HSP-095-2(521) <small>(SEE TABULATION BELOW FOR SECTION NUMBERS)</small>	95	(F0) 0095-076-005 <small>(SEE TABULATION BELOW FOR SECTION NUMBERS)</small>	1

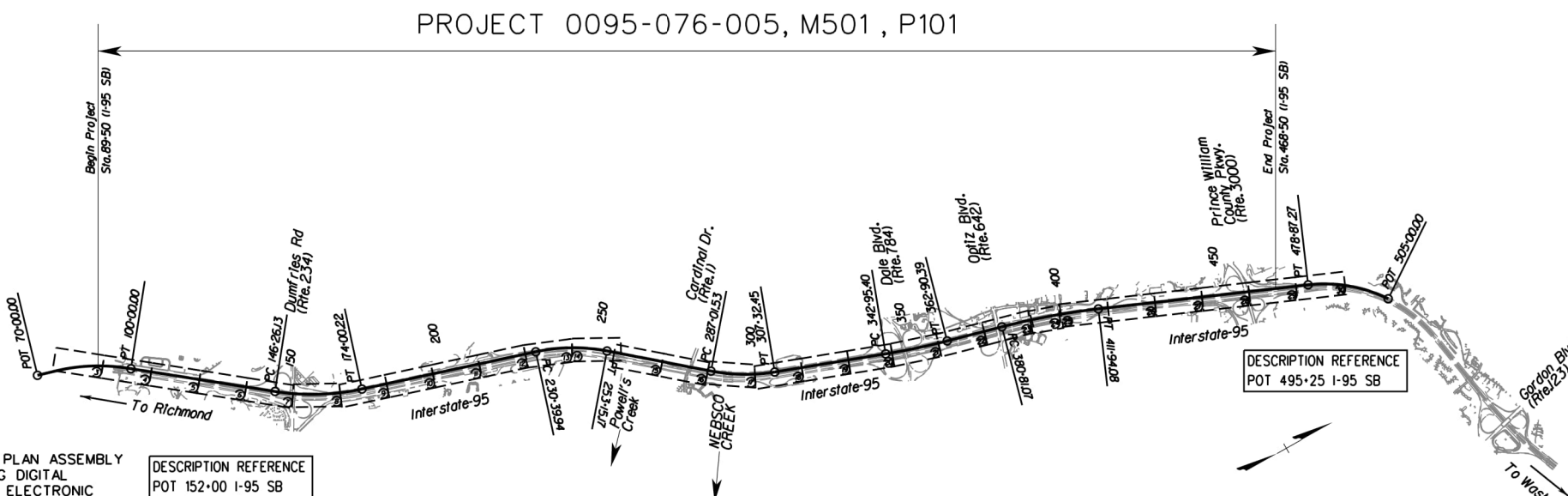
FUNCTIONAL CLASSIFICATION AND TRAFFIC DATA	
URBAN PRINCIPAL ARTERIAL FREEWAY - 70MPH MIN. DESIGN SPEED	
	Fr: 1.18 MILES S. OF DUMFRIES ROAD To: 0.18 MILES N. OF PWC PKWY
ADT (2012)	95,000
ADT (2034)	104,000
DHV	9,500
D (%) (design hour)	60
T (%) (design hour)	7
V (MPH)	70 (DESIGN), 65 (POSTED)

PROJECT MANAGER: Jeffrey S. Daily, P.E. (703)259-2993
SURVEYED BY VDOT: NOVA District Survey
DESIGN SUPERVISED BY: Thomas H. Hill, P.E. (703)246-0028
DESIGNED BY: Rummel, Klepper & Kahl, LLP (703)246-0028

CONVENTIONAL SIGNS

STATE LINE	---
COUNTY LINE	----
CITY, TOWN OR VILLAGE	-----
RIGHT OF WAY LINE	-----
FENCE LINE	-----
UNFENCED PROPERTY LINE	-----
FENCED PROPERTY LINE	-----
WATER LINE	-----
SANITARY SEWER LINE	-----
GAS LINE	-----
ELECTRIC UNDERGROUND CABLE	-----
TRAVELED WAY	-----
GUARD RAIL	-----
RETAINING WALL	-----
RAILROADS	-----
BASE OR SURVEY LINE	-----

LEVEE OR EMBANKMENT	-----
BRIDGES	-----
CULVERTS	-----
DROP INLET	-----
POWER POLES	-----
TELEPHONE OR TELEGRAPH POLES	-----
TELEPHONE OR TELEGRAPH LINES	-----
HEDGE	-----
TREES	-----
HEAVY WOODS	-----
GROUND ELEVATION	-----
GRADE ELEVATION	-----



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DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT'S 2007 ROAD AND BRIDGE SPECIFICATIONS, 2008 ROAD AND BRIDGE STANDARDS, 2009 MUTCD, 2011 VIRGINIA SUPPLEMENT TO THE MUTCD, 2011 VIRGINIA WORK AREA PROTECTION MANUAL AND AS AMENDED BY CONTRACT PROVISIONS AND THE COMPLETE ELECTRONIC PDF VERSION OF THE PLAN ASSEMBLY.

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Prince William County Population 402,002 (2010 Census)

STATE PROJECT NO.	SECTION	FEDERAL AID PROJECT NO.	TYPE CODE	UPC NO.	EQUALITIES	LENGTH INCLUDING BRIDGE(S)		LENGTH EXCLUDING BRIDGE(S)		BRIDGE PROJECT NO.	TYPE PROJECT	DESCRIPTION
						FEET	MILES	FEET	MILES			
0095-076-005	P-101	HSP-5A01(047)	SFTY	94105	N/A	37,900	7.18	37,200	7.05	N/A	Prelim. Engr.	FR: 1.18 MILES S. OF DUMFRIES RD.
	M-501	HSP-095-2(521)	SFTY	94105	N/A	37,900	7.18	37,200	7.05	N/A	Construction	TO: 0.18 MILES N. OF PWC PKWY

Project Lengths are based on I-95 Southbound Baseline

RECOMMENDED FOR APPROVAL FOR CONSTRUCTION

6/19/12	Diane L. Mitchell
DATE	PROGRAMMING DIVISION DIRECTOR
6/20/12	Mohammad Mirshahi
DATE	STATE LOCATION AND DESIGN ENGINEER
6/22/12	Reta Busher
DATE	CHIEF OF PLANNING AND PROGRAMMING

APPROVED FOR CONSTRUCTION

6/22/12	Malcolm T. Kerley
DATE	CHIEF ENGINEER

APPROVED

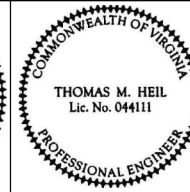
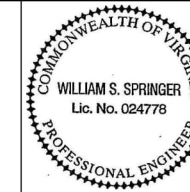
DATE	DIVISION ADMINISTRATOR FEDERAL HIGHWAY ADMINISTRATION U.S. DEPARTMENT OF TRANSPORTATION
------	---

Copyright 2012, Commonwealth of Virginia

PROJECT MANAGER: Jeffrey S. Dally, P.E. (703)259-2993
 SURVEYED BY: VDOT NOVA District Survey
 DESIGN SUPERVISED BY: Thomas M. Heil, P.E. (703)246-0028
 DESIGNED BY: Rummel, Klepper & Kahl, LLP (703)246-0028

CURVE DATA

Curve SBC5
 PI • 352-93.57
 DELTA • 5° 09' 37.02" (LT)
 D • 0' 15' 3"
 T • 998.17'
 L • 1994.99'
 R • 22150.82'
 PC • 342-95.40
 PT • 362-90.39
 V • 70 mph
 e • NC

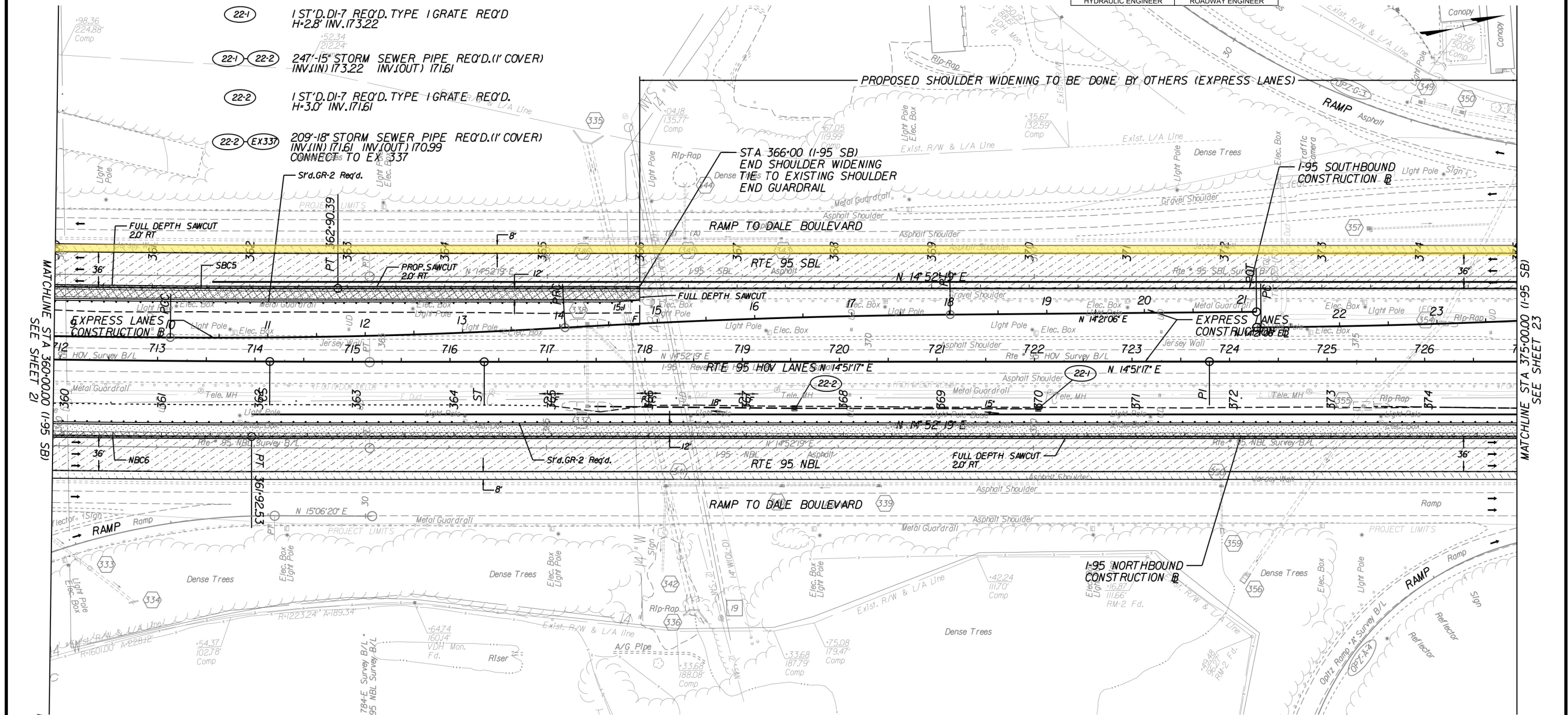


REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-005.M501	22

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Rummel, Klepper & Kahl, LLP
 Fairfax, Virginia
 HYDRAULIC ENGINEER

Rummel, Klepper & Kahl, LLP
 Fairfax, Virginia
 ROADWAY ENGINEER



MATCHLINE STA 360+00 (I-95 SB) SEE SHEET 21

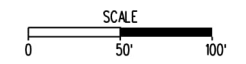
MATCHLINE STA 375+00 (I-95 SB) SEE SHEET 23

--- Denotes Construction Limits In Cuts
 --- Denotes Construction Limits In Fills

- Denotes Demolition of Pavement
- Denotes Proposed Pavement
- Denotes Mill & Overlay Pavement
- Denotes 10" Mill & Overlay Pavement

CURVE DATA

Curve NBC6
 PI • 359-41.48
 DELTA • 1° 47' 39.74" (LT)
 D • 0' 21' 26"
 T • 251.08'
 L • 502.13'
 R • 16,033.34'
 PCC • 356-90.40
 PT • 361-92.53
 V • 70 mph
 e • NC

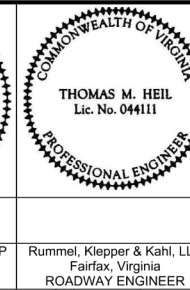
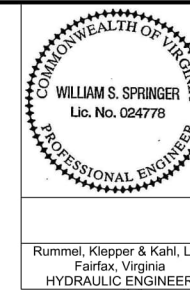


PROJECT	SHEET NO.
0095-076-005	22

PROJECT MANAGER: Jeffrey S. Daily, P.E. (703)259-2993
 SURVEYED BY: VDOT, NOVA District Survey
 DESIGN SUPERVISED BY: Thomas M. Heil, P.E. (703)246-0028
 DESIGNED BY: Rummel, Klepper & Kahl, LLP (703)246-0028

CURVE DATA

Curve SBC5
 PI • 396+40.06
 DELTA • 7°55'19.08" (RT)
 D • 0'15'16"
 T • 1558.99'
 L • 3113.01'
 R • 22514.93'
 PC • 380+81.07
 PT • 411+94.08
 V • 70 mph
 e • NC

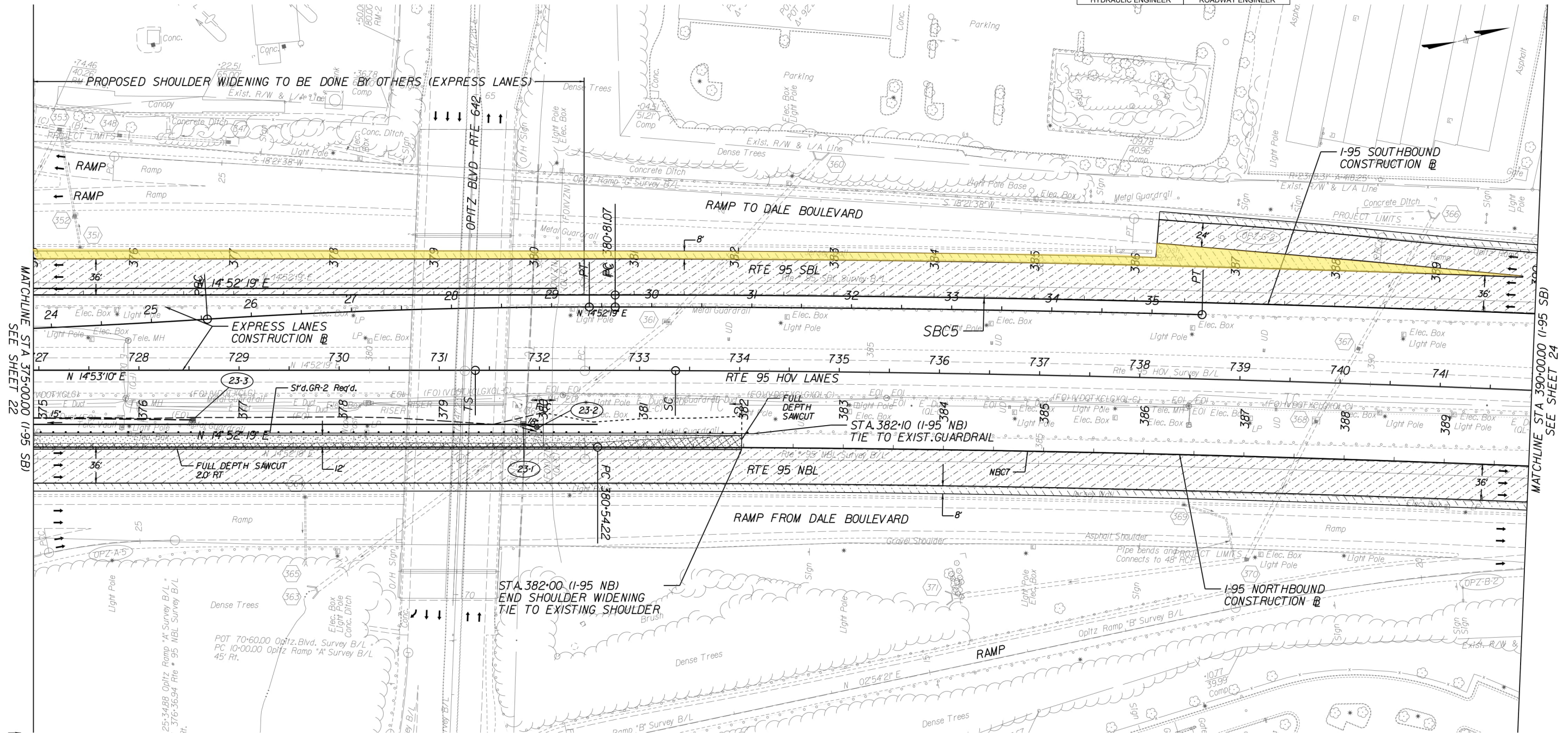


Rummel, Klepper & Kahl, LLP
 Fairfax, Virginia
 HYDRAULIC ENGINEER

Rummel, Klepper & Kahl, LLP
 Fairfax, Virginia
 ROADWAY ENGINEER

REVISED	STATE	ROUTE	STATE	PROJECT	SHEET NO.
	VA.	95		0095-076-005, M501	23

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



MATCHLINE STA 375+00.00 (I-95 SB) SEE SHEET 22

MATCHLINE STA 390+00.00 (I-95 SB) SEE SHEET 24

C --- Denotes Construction Limits In Cuts
F --- Denotes Construction Limits In Fills

- Denotes Demolition of Pavement
- Denotes Proposed Pavement
- Denotes Mill & Overlay Pavement
- Denotes 10" Mill & Overlay Pavement

CURVE DATA

Curve NBC7
 PI • 396+35.62
 DELTA • 7°55'18.96" (RT)
 D • 0'15'03"
 T • 1581.41'
 L • 3157.77'
 R • 22838.74'
 PC • 380+54.22
 PT • 412+11.99
 V • 70 mph
 e • NC

- (23-1) 1ST'D DI-7B REQ'D TYPE 1 GRATE REQ'D H=3.0' INV.180.2
- (23-1) (23-2) 10'-18" STORM SEWER PIPE REQ'D (1' COVER) INV.(IN) 180.2 INV.(OUT) 179.8 CONNECT TO EX 362
- (23-2) MODIFY EXISTING DROP INLET ADJUST TO GRADE, RAISE 1.0' 1ST'D MH-1 FRAME & COVER REQ'D CONVERT DIT TO MANHOLE
- (23-3) 1ST'D DI-7 REQ'D TYPE 1 GRATE REQ'D H=2.3' INV.179.0
- (23-2) (EX355) 304'-15" STORM SEWER PIPE REQ'D (1' COVER) INV.(IN) 179.0 INV.(OUT) 175.0 CONNECT TO EX 355

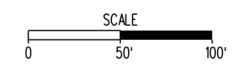


EXHIBIT B-4
TMS INTERFACE PLAN

Exhibit B-4 TMS Interface Plan

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Appendix A

Detailed Division of Responsibilities between the Construction Contractor
and TMS Contractor A-1

Appendix B

Minimum List of TMS Interface Milestones B-1

1 Introduction

1.1 Description of Project

The 95 Express Lanes Opitz Boulevard Ramp Project (“Project Opitz” or “Project”) will add new access opportunities for the 95 Express Lanes in the vicinity of Potomac Mills in Prince William County. Project Opitz will add a south-facing access T ramp connecting the 95 Express Lanes and Opitz Boulevard. During northbound operations, the ramp will provide northbound 95 Express Lanes users the opportunity to exit onto Opitz Boulevard near Potomac Mills mall and Sentara Northern Virginia Medical Center. During southbound operations, the ramp will provide a new entrance from Opitz Boulevard onto the southbound 95 Express Lanes. Figure 1 below illustrates the proposed south-facing ramp connecting Opitz Boulevard and the 95 Express Lanes. Improvements on Opitz Boulevard includes Opitz Bridge widening and reconfiguration including a new eastbound right turn lane and new westbound left turn lane, both of which would only be open during southbound operations, with access managed by gates. This new reversible T ramp will be controlled by a new traffic signal on Opitz Boulevard between the existing signals at Telegraph Road and at River Rock Way.

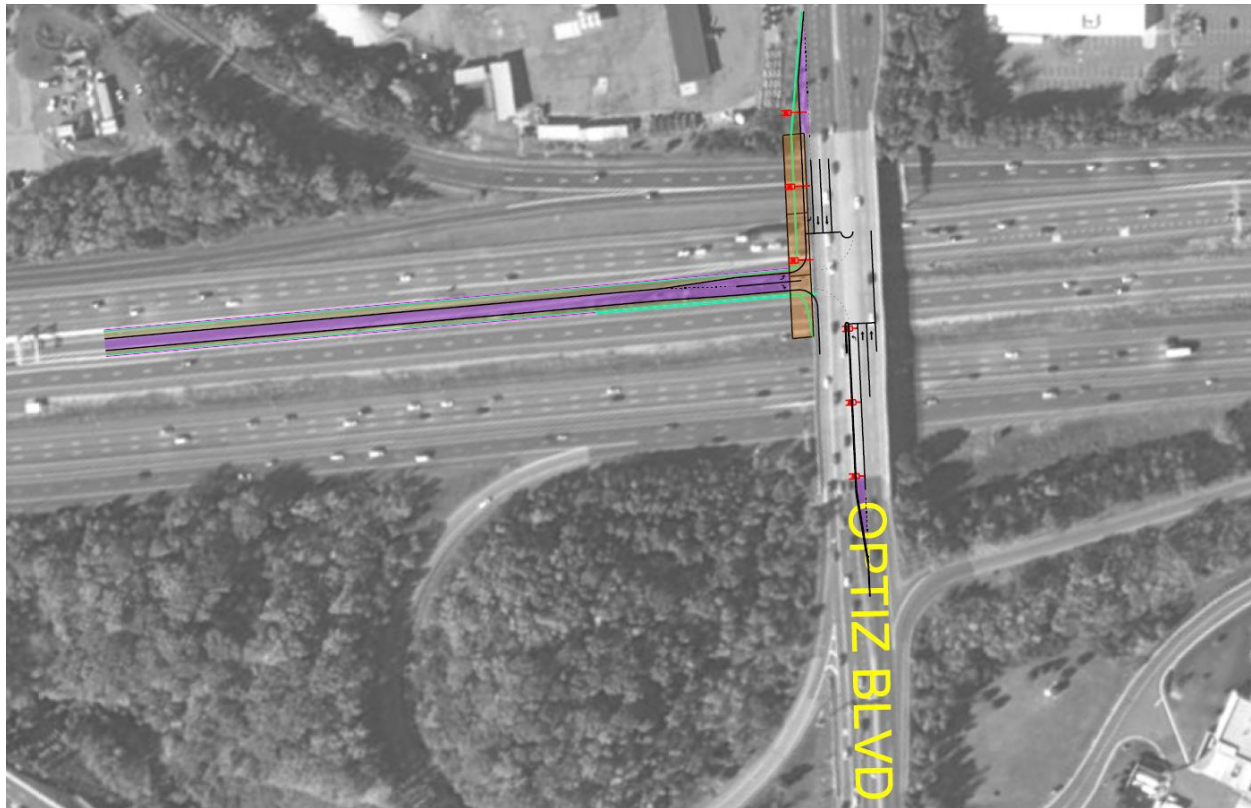


Figure 1. Project Opitz Boulevard Access Ramp

The existing southbound GP slip ramp to the southbound Express Lanes will be relocated south of Dale Boulevard. Figure 2 below illustrates the proposed relocation of the southbound Express Lanes slip ramp.



Figure 2. Project Opitz Relocated Southbound Express Slip Ramp

1.2 Project Structure

Figure 3 provides an overview of Project Opitz delivery structure and contracting relationships. The proposed project structure will require a collaborative approach between the Construction Contractor and TMS Contractor to ensure successful and timely delivery of the project.

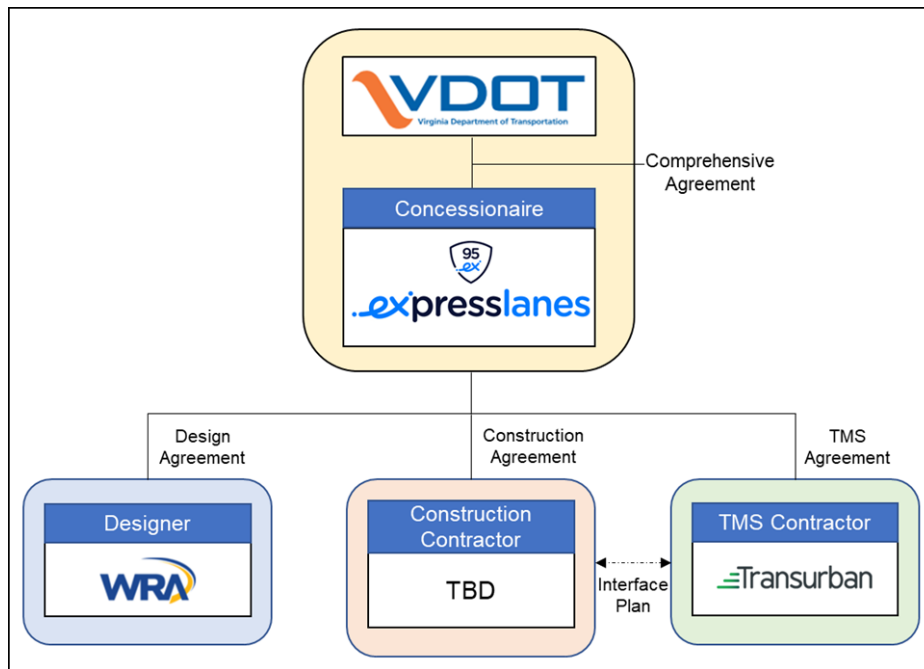


Figure 3. Project Contracting Structure

1.3 95 Express Lanes LLC (Concessionaire)

95 Express Lanes LLC (Concessionaire) is responsible for the design, construction, financing, and ongoing operations and maintenance of the Project in accordance with the Third Amended and Restated Comprehensive Agreement Relating to the I-95/395 HOV/HOT Lanes Project with Virginia Department of Transportation (VDOT) for the Project (“Comprehensive Agreement”).

1.4 Construction Contractor

The Construction Contractor will be the principal contractor under contract to Concessionaire to complete the construction of Project Opitz. The Construction Contractor is responsible for providing the civil works and a number of component elements of the Traffic Management System (TMS), including all required civil infrastructure and TMS roadside equipment. The Construction Contractor will also be responsible for interfacing with TMS Contractor throughout the project in relation to TMS systems integration and sub-system components.

1.5 TMS Contractor (Transurban (USA) Inc.)

Transurban (USA) Inc. will be the designated TMS Contractor under contract to the Concessionaire to provide systems integration and commissioning services. The TMS Contractor is responsible for upgrades and updates to the existing 95 Express Lanes traffic management systems software necessary to operate Project Opitz, and integration and commissioning of the new TMS roadside equipment provided by the Construction Contractor into the 95 Express Lanes operating systems and operations center.

1.6 Document Purpose

The purpose of the TMS Interface Plan is to further define the specific scope of work responsibilities of the Construction Contractor and the TMS Contractor for Project Opitz that form the basis for the design, installation/construction, turnover, testing, and integration of the various TMS component elements and to identify the interfaces and obligations between the two parties required to support the delivery of Project Opitz.

The Interface Plan establishes a framework for interface management and protocols to identify, coordinate and control the interfaces and interface points between the Construction Contractor scope of services and TMS Contractor scope of services. This document will identify the division of responsibilities between the Construction Contractor and TMS Contractor, as it pertains to the broader Traffic Management System (TMS) delivery of the project, and defines installation, testing and integration responsibilities, information exchange, review process, notifications, and appropriate documentation and deliverables required for delivery of the TMS as part of the overall complete project. This document does not address VDOT ITS equipment.

This TMS Interface Plan is included in the Construction Contract and will be incorporated by reference into the TMS Contract between the Concessionaire and Transurban (USA) Inc.

1.7 Tolling and Traffic Management System Overview

Figure 4 provides an overview of the major elements and subsystems that comprise the tolling and traffic management system used for the 95 Express Lanes. A summary of each is provided below.

The **Tolling System** is used for collection and enforcement of tolls, and consists of electronic toll collection (ETC) roadside equipment located in the field, and ETC system and back office system

(BOS) software and hardware located in the Express Lanes Operations Center (also known as HOT-OC).

There are no additional toll points or tolling system upgrades included in the scope of Project Opitz. This Project involves only TMS components as mentioned below.

The **Traffic Management System** provides a centralized platform for the traffic control room operators to manage the various TMS roadside equipment installed in the field. With the TMS, the operators conduct gate reversibility, monitor traffic conditions, and provide real time information to motorists to support roadway and en-route traffic management, and report and manage incidents along the Express Lanes. The TMS roadside equipment is located in the field and TMS software and hardware is located at the Express Lanes Operations Center. The TMS roadside equipment includes:

- a. Dynamic message signs (DMS) to provide dynamic pricing and traveller information to motorists on the road,
- b. Microwave vehicle detectors (MVDS) to collect traffic data, including volume, speed, and occupancy,
- c. Closed circuit television (CCTV) cameras, and
- d. Automated incident detection (AID) cameras,

The existing **Communications Network** is comprised of fiber optic cable forming a trunk and distribution topology. This network also provides system redundancy to the Express Lanes Operations Center. Other TMS roadside equipment will complete the communications and roadside infrastructure, including TMS cabinets, UPS (uninterrupted power supply), generators, device enclosures, and network equipment.

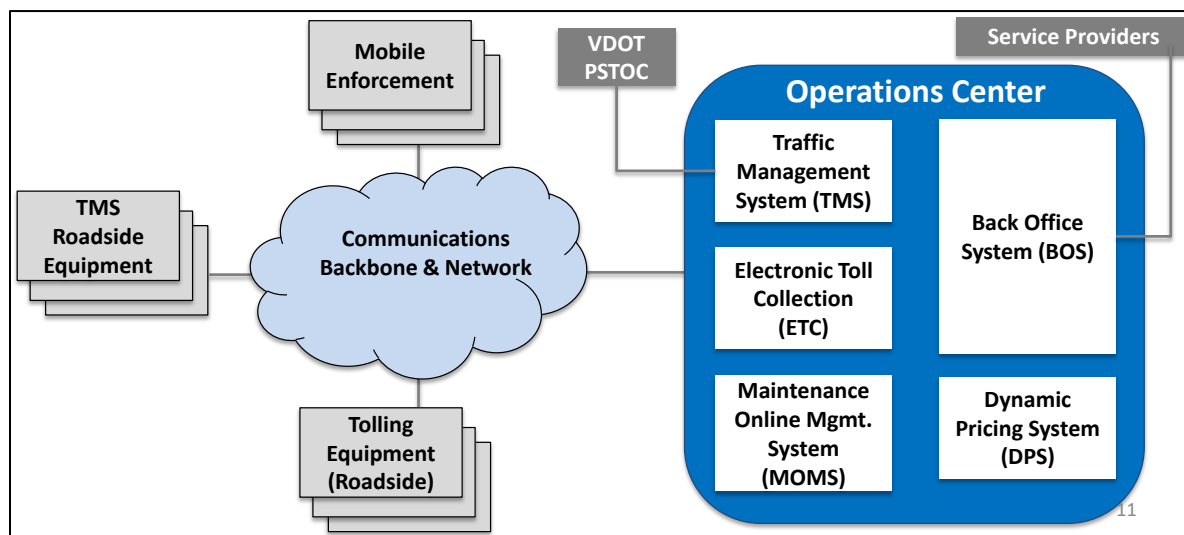


Figure 4. Express Lanes Systems Overview

1.8 Existing TMS Roadside Equipment

The Project also includes work by the Construction Contractor related to the existing 95 Express Lanes Communications and TMS Roadside Equipment, which is integrated back to the Express Lanes Operations Center and the Traffic Management System. Requirements for this work are addressed in the Design Documents, Technical Requirements and Special Provisions.

1.9 Commitment to Work Collaboratively and Openly

Construction Contractor and the TMS Contractor each commit to working together in a collaborative and open manner, in accordance with the applicable requirements of the Opitz Contract Documents and TMS Interface Plan, to avoid conflicts and disputes. As a result, Construction Contractor and the TMS Contractor agree to promptly notify the other, as well as Concessionaire, of: (a) any actual or perceived problems, concerns, issues, differences of opinion or conflicts in relation to the work on the Project, whether involving physical Site conflicts, workspace or schedule conflicts, or equipment and system performance conflicts; and (b) any other matter which may be contrary to the principles reflected in this Interface Plan.

1.10 Communications and Coordination Protocol

As a means of implementing the commitments noted in Section 1.9 above, the parties agree that they will participate in regular coordination meetings (at least monthly) and hold additional meetings as required during the Contract period to address open or unresolved issues related to TMS interfaces. One of the primary purposes of the coordination meetings is to create an environment whereby issues that could impact performance of either Construction Contractor or the TMS Contractor are identified and brought to the attention of the Concessionaire and the other party at the soonest opportunity, and that such issues are resolved or mitigated in a timely manner. Construction Contractor will be responsible for leading and administering these coordination meetings. Meeting shall be held at least monthly, with more frequent meetings as needed to accomplish to complete the TMS Work. Construction Contractor will also be responsible for integrating the activities of the TMS Contractor into the Baseline Schedule and all updates to such schedule.

Construction Contractor and the TMS Contractor recognize that their ability to perform work efficiently and effectively is dependent upon receiving timely and accurate information from the other party. Each agrees that it will give the other reasonable advance notice of its needs and/or requirements, and that the other party will reasonably attempt to meet the needs of the other party. Construction Contractor will have primary responsibility for coordinating and administering the process of submitting and exchanging information (including but not limited to design changes and documentation) with the TMS Contractor.

Construction Contractor and the TMS Contractor recognize that it is possible that their ability to perform certain work may shift because of field progress. One of the primary functions of this communications and coordination protocol is to provide a framework for the parties to discuss these issues and obtain advance knowledge of any such issues. Construction Contractor and the TMS Contractor each agree to provide the other with reasonable notice (3 calendar days) of any field delay issues, and the affected party will make best efforts to reasonably work around these issues. This is not intended to affect the contractual rights of any of the parties for Contract Price or Contract Time adjustments that may be due.

Construction Contractor and the TMS Contractor further recognize that one of the critical issues for Project success is to deal effectively with the interface points between and among their respective work. While Construction Contractor will have primary responsibility to schedule and coordinate these interfaces, it is understood that Construction Contractor and the TMS Contractor will work together collaboratively and cooperatively to focus on this issue and to cooperate with each other to identify interfaces that could create problems and work cooperatively to resolve such problems.

2 Interface Roles and Responsibilities

Construction Contractor will be responsible for managing, coordinating and scheduling the work related to supply, installation, testing, and integration of the TMS roadside equipment and related infrastructure, including active coordination and engagement with TMS Contractor throughout the entire project duration.

Construction Contractor will be responsible for ensuring that milestones and all related predecessor activities are being met and reviews are requested from TMS Contractor to meet schedule requirements. The TMS Contractor will be responsible for supporting the Construction Contractor to complete integration of the TMS roadside equipment with the existing TMS subsystems.

The scope of services related to the delivery of the TMS for the project stakeholders are listed below. The responsibilities of the Construction Contractor and the TMS Contractor are further defined for the design, construction and testing phases of the project.

A detailed scope split of Construction Contractor and TMS Contractor activities is provided in **Appendix A**.

2.1 Concessionaire Responsibility

Concessionaire will provide oversight of the interface management between the Construction Contractor and TMS Contractor to ensure that the civil works and TMS scope of services are properly coordinated and managed throughout all phases of the project delivery.

2.2 Construction Contractor Scope

Construction Contractor will be responsible for following scope of services related to the delivery of the TMS:

- a. overall management associated with the delivery of the TMS roadside equipment, including incorporating and integrating all necessary TMS activities and milestones related to the civil works-system interfaces into the Construction Contractor's overall project schedule,
- b. supply and construction of all civil works necessary for the installation of TMS roadside equipment, including utilities (new service and relocations), drainage, foundations, structures (e.g. sign structures and/or poles), TMS roadside cabinets and enclosures, TMS equipment access points, and roadway barriers required to protect TMS equipment,
- c. supply, installation, and commissioning of all power and communications cabling deemed necessary to support the TMS roadside equipment, structures and roadside cabinets,
- d. supply, installation and testing of TMS roadside equipment, including dynamic messaging signs, microwave traffic detectors, CCTV cameras, automated incident detection cameras, and gate control system equipment,
- e. supply, installation, and commissioning of the fiber optic communications backbone along the entire project length and connections to the Express Lanes Operations Center, and

- f. demonstrating the proper performance of the TMS roadside equipment, communications backbone and network and ancillary roadside equipment as part of testing and commissioning.
- g. relocation of existing VDOT ITS and Concessionaire TMS roadside equipment located within the Project Opitz Right of Way that is affected by construction, including power and communication service to the equipment, and shall ensure that loss of functionality is minimized.

2.3 TMS Contractor Scope

TMS Contractor will be responsible for following scope of services related to TMS:

- a. coordinating with the Construction Contractor to ensure all necessary TMS integration and testing activities and milestones related to civil works interfaces are properly incorporated in the Construction Contractor's overall project schedule throughout all phases of project delivery,
- b. providing to the Construction Contractor the technical and performance requirements and specifications for the TMS subsystem, including associated roadside equipment,
- c. integrating the TMS roadside equipment with the existing Express Lanes traffic management software and other subsystems at the Express Lanes Operations Center, and
- d. completing the overall integration, testing and commissioning of the Express Lanes Traffic Management Systems needed for revenue operations.

2.4 Systems Design Phase

2.4.1 Construction Contractor Responsibilities

Construction Contractor will be responsible for following scope of services:

- a. providing the Concessionaire a formal design and factory review of the typical TMS cabinets to be provided by Construction Contractor,
- b. using the TMS Roadside Equipment (TMS RSE) Asset Database provided by Concessionaire, the Construction Contractor will maintain all asset location, configuration and other pertinent data in a single database. The database will be maintained through all phases of construction, installation, and turnover. Database will be maintained by Construction Contractor and regularly updated and available to all parties.

2.4.2 TMS Contractor Responsibilities

During the TMS Contractor System design phase, the TMS systems and components will undergo requirements definition phase, detailed system design, including a Design Review, leading to a detailed System Design that meets the Technical Requirements and the TMS System Requirements specification. The timing of the Design Review will be performed to support the Construction Contractor's schedule for turnover.

The TMS Contractor will be responsible for following scope of services related to design:

- a. Network High Level Design document, which provides an overview for the design of the roadside Wide Area Network (WAN), bandwidth requirements, and data center networks,
- b. Network Detailed Design document, which provides detailed design of the network,
- c. TMS roadside equipment configuration requirements.

The TMS Contractor will provide the roadside equipment configuration requirements and the Network Interface Protocol (IP) Schema to the Construction Contractor.

2.5 Construction/Installation Phase

Construction Contractor acknowledges that its Work may be affected by the carrying out of the work by the TMS Contractor performed within or near the project site, and shall ensure that the planning, integration, programming, testing and performance of work by both contractors are properly coordinated, taking into account their concurrent and sequential nature. In particular, the Construction Contractor shall: a) plan, program and perform its Work so as to not unnecessarily interfere with or hinder the activities of the TMS Contractor and b) at all times take all reasonable steps to protect the TMS Contractor's Work from accidental damage caused by the Construction Contractor's personnel and Work.

The Construction Contractor shall allow the TMS Contractor access to the project site to the extent necessary or appropriate for TMS Contractor to simultaneously or progressively, as appropriate, carry out its obligations under the TMS Interface Plan. The Construction Work and the TMS Work, as applicable, shall be delivered in a fit-for-purpose condition such that the Construction Contractor or TMS Contractor, as applicable, can integrate or tie-in its Work without modification, re-design or delay.

While on the project site, the TMS Contractor and its subcontractors shall at all times (a) adhere to the health, safety and security directions, procedures and guidelines established by Construction Contractor (b) if required by Construction Contractor, with respect to matters that deviate from the agreed schedule, confine their activities to a specified location on the project site or vacate the project site if the Construction Contractor reasonably determines that the presence of TMS Contractor or its contractors and/or their activities are materially interfering with the performance of the Construction Work or creating an immediate and serious threat to public health, safety, security or the environment. In the event that the Construction Contractor so confines or removes the TMS Contractor, it shall provide TMS Contractor with a reasonable, alternate time to conduct such activities.

2.5.1 Construction Contractor Responsibilities

The Construction Contractor will be responsible for the following activities related to construction:

- a. Provide access network switches to TMS Contractor for configuration
- b. Configure all other equipment
- c. providing safe and secure access to the TMS work locations, including all Maintenance of Traffic (MOT), safe access, and any fencing and barricades. Construction Contractor shall

provide all labor materials and miscellaneous items required to install, maintain any required safety provisions relating to the TMS work,

- d. maintaining clean project site and provide required access to TMS work sites generally clear of mud, standing water, ice, and snow, and

2.5.2 TMS Contractor Responsibilities

The TMS Contractor will be responsible for the following activities related to construction:

- a. configuration of the access network switches provided by Construction Contractor
- b. preventing mud or soil from TMS Contractor or its subcontractors' vehicles being tracked off project work site to any roadway, and
- c. following the Construction Contractor's safety rules and precautions for the project site.

2.6 Testing and Commissioning Phase

The testing and commissioning of the TMS will be achieved through the following test phases and activities. The purpose of the test phases is to validate that each subsystem, and combinations of subsystems, progressively meets the functional and performance requirements defined by System Requirements and the System Design. The TMS subsystems will follow a progressive commissioning and testing process, therefore reducing subsequent test phases from undergoing redundant tests performed in the previous phases.

2.6.1 Factory Acceptance Test (FAT)

All required FATs will be conducted by the Construction Contractor for the TMS roadside equipment. The TMS Contractor shall be provided an opportunity to witness and participate in any scheduled FATs.

The TMS Contractor will conduct the FAT for any necessary modifications to the Back Office System and the Traffic Management System at the Express Lanes Operations Center and TMS Provider facility, as appropriate.

2.6.2 Incremental Installation and Level A and B Testing for TMS Roadside Equipment

Level A and B testing will be conducted by the Construction Contractor.

Level A testing is to certify TMS roadside equipment installed by the Construction Contractor is installed and fully operational in line with agreed design requirements as demonstrated by executed test procedures approved and witnessed by TMS Contractor.

Level B testing is to certify TMS roadside equipment is successfully integrated with Express Lanes communication network as demonstrated by executed test procedures approved and witnessed by the Concessionaire and TMS Contractor.

2.6.3 Integration and Level C Testing for TMS Roadside Equipment

Level C testing will be conducted by TMS Contractor to certify that TMS systems at the Express Lanes Operations Center can communicate and control TMS roadside equipment as demonstrated by executed test procedures defined by TMS Contractor. TMS Contractor will be

responsible for this test and the Construction Contractor will provide support to TMS Contractor for successful and on-time execution of this test, including but not limited to Maintenance of Traffic and safe access to the Site.

2.6.4 Training

Construction Contractor will provide training on new or next generation Express Lanes TMS Roadside Equipment procured and installed by Construction Contractor.

2.6.5 Integration Acceptance Test

The Integration Acceptance Test(s) will be conducted by TMS Contractor to validate that the fully integrated TTMS systems, in a normal operational environment, complies with the System Requirements, System Design and other Contract Documents. TMS Contractor will be responsible for this test and the Construction Contractor will provide support to TMS Contractor for successful and on-time execution of this test, including but not limited to promptly addressing items identified that are related to roadside equipment installed by Construction Contractor.

2.6.6 User Acceptance Test

The User Acceptance Test will be conducted by the Concessionaire's Operations and Maintenance personnel to verify that the TMS meets operational requirements and system functionality. The Concessionaire is responsible for the independent verification of the system prior to commissioning of the system after completion of IAT. Concessionaire will be responsible for this test and the Construction Contractor and TMS Contractor will provide support to Concessionaire for successful and on-time execution of this test, including but not limited to promptly addressing items identified that are related to roadside equipment installed by Construction Contractor and TMS Contractor.

2.6.7 Operational Readiness

Construction Contractor and TMS Contractor will coordinate and provide support to Concessionaire for Operational Readiness, including but not limited to promptly addressing items identified that are related to TMS roadside equipment installed and operating system updates by Construction Contractor and TMS Contractor respectively.

2.6.8 Start-Up and Service Commencement

Construction Contractor and TMS Contractor will coordinate and provide support to Concessionaire for Start-Up and Service Commencement, including but not limited to promptly addressing items identified that are related to roadside equipment installed by Construction Contractor and TMS Contractor respectively.

2.6.9 Construction Contractor Responsibilities

The Construction Contractor shall support all testing and commissioning phases and activities as follows:

- a. develop a Turnover Plan for the TMS roadside equipment that includes representative equipment, schedule for installation, Level A and B Testing, and documentation submission to TMS Contractor,
- b. develop a Wide Area Network (WAN) Turnover Plan for integrating the proposed RSE devices and new network infrastructure into the existing Express Lanes System and

Network. The Turnover plan shall demonstrate how to maintain the current system operations, while building and integrating the proposed infrastructure based on the construction sequencing and schedule.

- c. provide interim and final updated TMS RSE Asset Database.
- d. develop test procedures to test the fiber optic cable, communications network and the ancillary equipment,
- e. conduct tests of the fiber optic cable, communication network and ancillary equipment and provide test report as part of Turnover of the communications network and ancillary equipment to TMS Contractor,
- f. conduct required FATs for the TMS Roadside Equipment,
- g. develop Level A test procedures for the TMS Roadside Equipment,
- h. develop Level B test procedures for the TMS Roadside Equipment based on the templates provided by TMS Contractor,
- i. conduct Level A and B test for the TMS Roadside Equipment and provide test report as part of the Turnover of the TMS roadside equipment to TMS Contractor for integration, and
- j. coordinate and provide MOT to support TMS Contractor and others' test activities, including Level C testing, IAT, UAT, Operational Readiness and Start-Up.
- k. provide field support to troubleshoot and resolve any RSE, network or power related issues.

2.6.10 TMS Contractor Responsibilities

The TMS Contractor shall support testing and commissioning phases and activities as follows:

- a. develop TMS Test Strategy and Plan, to provide framework for the test strategy and commissioning strategy for the TMS, and outlines sequence of testing and commissioning and preliminary schedule and milestone dates and related documentation and responsible and participating parties,
- b. develop FAT, and IAT procedures related to TMS and systems integration,
- c. conduct FAT, and IAT tests related to TMS and systems integration,
- d. support UAT test conduct related to TMS and systems integration,
- e. provide FAT, and IAT Test Reports related to TMS and systems integration,
- f. support UAT Test Report development related to TMS and systems integration,

- g. coordinate with Construction Contractor to schedule and conduct Level C and IAT tests related to TMS and systems integration,
- h. provide training, as needed, on the TMS subsystems to Concessionaire personnel, and
- i. develop Level B test procedure templates for the TMS Roadside Equipment.

3 Interface Management Process

Construction Contractor and TMS Contractor will be responsible for implementing the interface management processes and procedures necessary to identify, control and manage the interfaces and interface points between parties' respective scopes of work related to overall TMS delivery.

These TMS interface management protocols will be used to ensure project stakeholders are aware of the required interfaces, and are working proactively to ensure that integration activities are focused on reducing the potential impacts to the Project cost, schedule, design changes, construction quality, or operations and maintenance of Project Opitz TMS.

3.1 Interface Protocols

Interface management shall include following protocols:

- b. Construction Contractor Representative and TMS Contractor Representative will identify technical representatives for interface activities throughout all phases of delivery, including construction, integration, testing and commissioning, and start-up.
- c. Construction Contractor and TMS Contractor will exchange any entity dependency related information as required.
- d. Interface requirements and deliverables will be documented and placed under appropriate levels of configuration management, and available to Construction Contractor and TMS Contractor, as required.
- e. Construction Contractor will require TMS Contractor input and agreement prior to formal submission of deliverables to Concessionaire for components related to civil works infrastructure and TMS system interface.
- f. Construction Contractor and TMS Contractor will provide a review period of 15 business days for documents exchanged between parties as part of the Interface Plan to allow adequate time for review, comments and updates by other parties of the agreement.
- g. Construction Contractor shall provide documentation to TMS Contractor a minimum of 1 week (5 business days) prior to scheduled reviews.
- h. Construction Contractor shall include TMS Contractor on any potential design changes relating to TMS components and/or interfaces.

3.2 Interface Documents

To facilitate coordination and collaboration between the project stakeholders, a series of interface documents will be developed as part of the project scope of work related to TMS. These documents will ensure information is being exchanged and jointly coordinated throughout the entire project duration. This section identifies these documents and who is responsible for their respective development and delivery. Documents will typically involve multiple submissions, including draft and final versions.

3.2.1 Concessionaire Documents

- a. Concept of Operations for Project Opitz, provided to TMS Contractor
- b. Business Rules and Requirements for Project Opitz, provided to TMS Contractor
- c. Technical Requirements, provided to Construction Contractor and TMS Contractor
- d. TMS Special Provisions and Equipment Sole Source List, provided to Construction Contractor and TMS Contractor
- e. TMS RSE Asset Database (Preliminary)
- f. UAT Test Procedures (Draft and Final) provided to the TMS Contractor
- g. UAT Test Report (Draft and Final) provided to the TMS Contractor
- h. Design Plans (Preliminary, Updated, 100% Approved for Construction, Design Changes)

3.2.2 Construction Contractor Documents

- a. Construction Contractor's Project Schedule (e.g Initial Baseline, Baseline, Regular Updates, and as required, Revised Baseline)
- b. TMS RSE Asset Database (Regular Updates, Final)
- c. TMS Cabinet Factory Review
- d. TMS RSE Turnover Plan (Draft and Final)
- e. WAN Turnover Plan (Draft and Final)
- f. TMS Roadside Equipment Level A and B Test Procedures (Draft and Final)
- g. Communications Backbone Test Procedures (Draft and Final)
- h. Communications Backbone Test Report (Draft and Final)

3.2.3 TMS Contractor Documents

- a. TMS Contractor's Project Schedule (e.g., Initial Baseline, Baseline, Regular Updates, and as required, Revised Baseline)
- b. Design Document
- c. Template for Test Procedures for Level B Testing of TMS Roadside Equipment
- d. TMS Test Plan
- e. Level C Test Procedures for TMS Roadside Equipment

- f. FAT Test Procedures (Draft and Final)
- g. FAT Test Report (Draft and Final)
- h. IAT Test Procedures (Draft and Final)
- i. IAT Test Report (Draft and Final)

4 Schedule

The Construction Contractor shall consult with TMS Contractor when preparing the Initial Baseline Schedule, and shall include therein the specific work elements that the Construction Contractor must complete before TMS Contractor can commence or complete performance of related elements of the TMS Work. The Construction Contractor shall accommodate the TMS Contractor's requests regarding scheduling and timing of TMS Contractor access necessary to complete the TMS Work. Should there be any changes to the construction deadlines related to TMS Work in the approved Baseline Schedule, the Construction Contractor shall accommodate TMS Contractor's requests in relation to the revised schedule and use good faith efforts to provide sufficient lead time so as to allow the TMS Contractor a reasonable opportunity to work around the delay.

Construction Contractor will incorporate, track, and update the following key activities in the Baseline Schedule and subsequent updates.

4.1 General

- a. Construction Contractor will provide notifications to the Concessionaire twenty-one (21) days prior to date of any factory reviews.
- b. Construction Contractor will provide documentation to the Concessionaire at least fourteen (14) days prior to scheduled date of factory review.
- c. Construction Contractor's Schedule will include interface milestones in support of the TMS Contractor's work. Appendix B includes a minimum list of interface milestones to be included in the Construction Contractor's schedule. These activities and milestones will be expanded as needed to support Construction Contractor's project sequencing and to streamline coordination between Construction Contractor's and TMS Contractor's work.
- d. Turnover of the Communications Network is a predecessor activity to be completed prior to the turnover of TMS Roadside Equipment.

4.2 Post-TMS Roadside Equipment Turnover Handover Durations

- a. Construction Contractor and TMS Contractor acknowledge that for the Opitz Project, it is necessary for the relocated slip ramp to be constructed and put into service prior to the existing slip ramp being taken out of service. It is further acknowledged that the new Opitz Boulevard Ramp to the Express Lanes cannot be constructed until the existing slip ramp is taken out of service. That being the case, there will be two distinct handovers and service commencements on the Opitz Project, the Dale Boulevard Slip Ramp Opening and the overall Opitz Boulevard Ramp Project Service Commencement, both of which are time critical.
- b. Dale Boulevard Slip Ramp Opening:
 - i. The "Dale Boulevard Slip Ramp TMS Turnover" will be deemed to have occurred once the Construction Contractor has provided all TMS Roadside Equipment required for the Dale Boulevard Slip Ramp Opening to the TMS Contractor for integration, testing and commissioning, provided the Construction Contractor has given the TMS Contractor at least thirty (30)

days' notice of the planned turnover. If the Construction Contractor does not provide the 30 days' notice, the Dale Boulevard Slip Ramp TMS Turnover will occur within the notice period at the sole discretion of the TMS Contractor and upon written notification from the TMS Contractor that it is prepared to proceed with its integration, testing and commissioning work. All associated TMS Roadside Equipment and network infrastructure and components must be fully operational and have successfully completed Level A and B testing by the Construction Contractor in order for the Dale Boulevard Slip Ramp TMS Turnover to be deemed to have occurred. After the Dale Boulevard Slip Ramp TMS Turnover, the TMS Contractor will have one hundred twenty (120) days to complete its integration and Level C Testing for the TMS Scope of Work.

- ii. Early turnover of portions of TMS roadside equipment shall not obligate the TMS Contractor to commence Integration and Level C Testing of the TMS Scope of Work.

c. Service Commencement

- i. The "Opitz Boulevard Ramp TMS Turnover" will be deemed to have occurred on the earlier date of either (i) 30 days following written notice from the Construction Contractor of the planned turnover date and once the Construction Contractor has provided all remaining TMS Roadside Equipment required for the Project to the TMS Contractor for integration, testing and commissioning, or (ii) 120 days before the Scheduled Service Commencement Date and the Construction Contractor has provided all remaining TMS Roadside Equipment required for the Project to the TMS Contractor for integration, testing and commissioning. Notwithstanding the foregoing, if the TMS Contractor is prepared to proceed with its integration and Level C Testing for the TMS Scope of Work prior to 120 days before the Scheduled Service Commencement Date but within any 30-day notice period provided by the Construction Contractor, the Opitz Boulevard Ramp TMS Turnover will be deemed to have occurred within the notice period at the sole discretion of the TMS Contractor and upon written notice from the TMS Contractor that it intends to proceed with its integration, testing and commissioning work. All associated TMS Roadside Equipment and network infrastructure and components must be fully operational and have successfully completed Level A and B testing by the Construction Contractor in order for the Opitz Boulevard Ramp TMS Turnover to be deemed to have occurred. After the Opitz Boulevard Ramp TMS Turnover, the TMS Contractor will have one hundred twenty (120) days to complete its integration and Level C Testing for the TMS Scope of Work.
- ii. Early turnover of a portion of the TMS roadside equipment shall not obligate the TMS Contractor to commence field installation sooner than one hundred twenty (120) days before the Scheduled Service Commencement Date.

Appendix A

Detailed Division of Responsibilities between the Construction Contractor and TMS Contractor

Traffic Management System

Class	Item	Who	Comment
Operational Configuration	Concept of Operations	95 Express	Overall framework for the design and operation of the Express Lanes system (TMS and operations).
Operational Configuration	TMS Requirements Layout	TMS	TMS Contractor to provide functional and performance requirements for TMS system and TMS roadside equipment. CC to finalize design and configuration based on TMS system requirements and overall civil design or As-Builts.
VDOT ITS	VDOT ITS Equipment and Structures	CC	Relocation/Replacement of Existing VDOT ITS Roadside Equipment and supporting infrastructure
Civil Works	Utilities	CC	Service connections and utility relocations necessary to install and operate TMS roadside equipment and associated infrastructure (e.g., lighting, cabinets, etc.)
Civil Works	Other Civil Works	CC	Necessary drainage, retaining walls, barrier structures, protective structures, and equipment access points.
Civil Works	Foundations for TMS Structures and Other Equipment Structures	CC	Footings and conduits necessary for communications and power cabling as per TMS Contractor and CC-provided equipment requirements.
Civil Works	Foundations for TMS Roadside Cabinets	CC	Footings and conduits necessary for communications and power cabling as per CC-provided equipment requirements.
Communications & Cabling	Wide Area Communications Network and Cabling (Communications "Backbone")	CC	Redundant fiber optic telecommunication network along the full length of the Project, connected to all roadside cabinets. Minimum of two connections from this network to Express Lanes Operations Center.

Traffic Management System

Class	Item	Who	Comment
Communications & Cabling	TMS Roadside Cabling	CC	All communications cabling for the TMS devices – from equipment (sensors) mounted on gantries/sign structures/poles/other to the junction box in the footing of the sign structures, then to the cabinets. Terminations of TMS equipment within roadside cabinets.
Electrical Power & Cabling	TMS Roadside Equipment Cabling	CC	Power supply and all distribution cabling and conduits necessary for the operation of the TMS roadside equipment and associated cabinets. Includes conduits and cabling from the junction box located in the footing of gantry to the cabinets. Placement, layout, and sizing of generators to provide temporary operating power and/or uninterrupted power supply equipment. Installation and integration of associated equipment, including site access.
TMS Roadside	Overhead and Dynamic Signage	CC	Quantity, placement, layout, sizing, and configuration of overhead and roadside dynamic message signs. Construction of approved signage. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.
TMS Roadside	Closed Circuit TV Cameras (Pan-Tilt-Zoom)	CC	Quantity, placement, layout, sizing, and configuration of CCTV cameras. Installation, configuration, integration, and site-testing of approved cameras configuration. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.
TMS Roadside	Automated Incident Detectors	CC	Quantity, placement, layout, sizing, and configuration of AID devices. Installation, configuration, integration, and site-testing of approved AID configuration. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.

Traffic Management System

Class	Item	Who	Comment
TMS Roadside	Microwave Traffic Detectors	CC	Quantities, placement, layout, sizing, and configuration of microwave traffic detectors. Installation configuration, integration, and site-testing of approved sensor/detector configuration. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.
TMS Roadside	Network Equipment	CC	Quantities, placement, layout and sizing of Network Equipment. Installation and site-testing support. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.
TMS Roadside	Gate Control System	CC	Quantity, placement, layout, sizing, and configuration of Gate Control devices. Installation, configuration, integration, and site-testing of approved gate system. Performance specifications and functional requirements provided by TMS Contractor to be confirmed and finalized by CC.
TMS Roadside	Sign Structures, Pole and/or Mounting Structures	CC	Placement, layout and installation of: <ul style="list-style-type: none"> ▪ TMS Sign Structures ▪ Monopoles and/or other mounting structures ▪ Lighting, including power supply Designed per specifications from TMS Contractor provided to CC, including clearances, loads, deflection, and specialized installation requirements.
TMS Roadside	Testing and Commissioning	CC	Required testing and commissioning of CC-installed roadside equipment. Includes Level A and Level B Testing.
TMS Roadside	Manuals	CC	O&M manuals for CC-provided equipment and systems

Traffic Management System

Class	Item	Who	Comment
TMS System	TMS Delivery and Integration	TMS	Delivery of TMS, including IT infrastructure and commissioning at the Express Lanes Operations Center. Integration of TMS Roadside Equipment with system. TMS testing, including the conduct of FAT and IAT, as well as UAT support.
TMS Roadside	Testing and Commissioning	TMS	Required testing and commissioning of CC-installed roadside equipment. Includes Level C Testing.
TMS System	Training	TMS	Training for TMS Contractor-provided equipment and systems
Systems Engineering	Network Architecture and Configuration	TMS	Systems engineering for TMS systems, including network architecture, configuration management, system interface control, and systems integration
System Integration	End-to-end Integration	TMS	Development, integration and commissioning of the end-to-end integrated systems.

Key:**CC** = Construction Contractor**TMS** = TMS Contractor**95 Express** = Concessionaire

Appendix B

Minimum List of TMS Interface Milestones

1. TMS Roadside Equipment Design Review
2. Factory Acceptance Testing
3. Level A & B Testing (by Type of TMS Roadside Equipment) - Start and Finish
4. TMS Roadside Equipment Turnover (by Type of TMS Roadside Equipment)

EXHIBIT C

FEDERAL REQUIREMENTS AND CIVIL RIGHTS REQUIREMENTS

Exhibit Description

Exhibit C-1 – Federal Requirements

Exhibit C-2 – Civil Rights Requirements

EXHIBIT C-1
FEDERAL REQUIREMENTS

<u>Exhibit Description</u>	<u>No. of Pages</u>
Attachment 1 – Federal Requirements for Federal-Aid Construction Projects	3
Attachment 2 – FHWA Form 1273 (July 2022)	13
Attachment 3 – Federal Prevailing Wage Rates	6
Attachment 4 – Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)	4
Attachment 5 – Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)	3
Attachment 6 – Certification Regarding Use of Contract Funds for Lobbying	1
Attachment 7 – Compliance with Buy America Requirements	2
Attachment 8 – Special Provision for Use of Domestic Metal	3
Attachment 9 – Certification of Non-Discrimination in Employment	1
Attachment 10 – Not Used	

ATTACHMENT 1

FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

GENERAL. — The Work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to the Work as a result of the Project being financed in whole or part with Federal funds will apply to such Work. The "Required Contract Provisions, Federal-Aid Construction Contracts, Form FHWA 1273," are included in this exhibit. Whenever in said required contract provisions references are made to:

- a. "contracting officer", or "authorized representative", such references shall be construed to mean the Department or its Authorized Representative;
- b. "contractor" or "Contractor", "prime contractor", "bidder", "Federal-aid construction contractor", "prospective first tier participant or First Tier Participant", such references shall be construed to mean the Concessionaire or its authorized representative and/or the Construction Contractor or its authorized representative, as may be appropriate under the circumstances;
- c. "contract" or "Contract" or "prime contract", "Federal-aid construction contract" or "construction contract", such references shall be construed to mean the Construction Contract;
- d. "subcontractor" or "Subcontractor", "supplier", "vendor", "prospective lower tier participant", lower tier prospective participant, "Lower Tier participant" or "lower tier subcontractor", such references shall be construed to mean, as appropriate, any Contractors other than the Construction Contractor; and
- e. "department", "agency" or "department or agency with which this transaction originated" or "contracting agency", such references shall be construed to mean the Department, except where a different department or agency or officer is specified.

PERFORMANCE OF PREVIOUS CONTRACT. — In addition to the provisions in Section II, "Nondiscrimination," and Section VI, "Subletting or Assigning the Contract," of the Form 1273 required contract provisions, the Concessionaire shall comply with the following:

The bidder shall execute the **CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS** located in the proposal. No request for subletting or assigning any portion of the contract in excess of \$10,000 will be considered under the provisions of Section VI of the required contract provisions unless such request is accompanied by the **CERTIFICATION** referred to above, executed by the proposed subcontractor.

NON-COLLUSION PROVISION. — The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary Projects. Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28 U.S.C., Sec. 1746, is included in the Proposal.

PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES IN SUBCONTRACTING. — Part 26, Title 49, Code of Federal Regulations applies to the Project. Pertinent sections of said Code are incorporated within other sections of the Contract and the Department Disadvantaged Business Enterprise Program adopted pursuant to 49 CFR Part 26.

CONVICT PRODUCED MATERIALS

- a. FHWA Federal-aid projects are subject to 23 CFR § 635.417, Convict produced materials.
- b. Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal aid highway construction project if such materials have been: (i) produced by convicts who are on parole, supervised release, or probation from a prison, or (ii) produced in a prison project in which convicts, during the 12 month period ending July 1, 1987, produced materials for use in Federal aid highway construction projects, and the cumulative annual production amount of such materials for use in Federal aid highway construction does not exceed the amount of such materials produced in such project for use in Federal aid highway construction during the 12 month period ending July 1, 1987.

ACCESS TO RECORDS

- a. As required by 49 CFR 18.36(i)(10), the Concessionaire and its Contractors shall allow FHWA and the Comptroller General of the United States, or their duly authorized representatives, access to all books, documents, papers, and records of the Concessionaire and Contractors or Subcontractors which are directly pertinent to any grantee or subgrantee contract, for the purpose of making audit, examination, excerpts, and transcriptions thereof. In addition, as required by 49 CFR 18.36(i)(11), the Concessionaire and its Contractors shall retain all such books, documents, papers, and records for three years after final payment is made pursuant to any such contract and all other pending matters are closed.
- b. The Concessionaire agrees to include this section in each Contract at each tier, without modification except as appropriate to identify the Contractor who will be subject to its provisions.

SUBCONTRACTING

- a. Any distribution of work shall be evidenced by a written binding agreement on file at the project site. Where no field office exists, such agreement shall be readily available upon request to Department inspector(s) assigned to the project.
- b. The provisions contained in Form FHWA-1273 specifically, and other federal provisions included with the prime Contract are generally applicable to all Federal-aid construction projects and must be made a part of, and physically incorporated in all contracts as well as appropriate subcontracts for work so as to be binding in those agreements

ATTACHMENT 2

FHWA-1273 -- Revised July 5, 2022

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Non-segregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work

performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide

sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

- (1) Withholding monthly progress payments;
- (2) Assessing sanctions;
- (3) Liquidated damages; and/or
- (4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway

Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding (29 CFR 5.5)

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics,

including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records (29 CFR 5.5)

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or

subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees (29 CFR 5.5)

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State

Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the

corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor

set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility (29 CFR 5.5)

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1 of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1 of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section. 29 CFR 5.5.

* \$27 as of January 23, 2019 (See 84 FR 213-01, 218) as may be adjusted annually by the Department of Labor; pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990).

3. Withholding for unpaid wages and liquidated damages.

The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this section. 29 CFR 5.5.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 1 through 4 of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1 through 4 of this section. 29 CFR 5.5.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;
- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or

equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on longstanding interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance

with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of \$150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.326.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders

or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.326.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant

who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

3. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is

submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(a) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(b) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(c) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier

subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS
PREFERENCE FOR APPALACHIAN DEVELOPMENT
HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS
ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

ATTACHMENT 3
FEDERAL PREVAILING WAGE RATES

General Decision Number: VA20220185 02/25/2022

Superseded General Decision Number: VA20210185

State: Virginia

Construction Type: Highway

Counties: Manassas Park*, Manassas* and Prince William Counties in Virginia.

*including the independent cities of Manassas and Manassas Park

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

<p>If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:</p>	<p>Executive Order 14026 generally applies to the contract.</p> <p>The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.</p>
<p>If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:</p>	<p>Executive Order 13658 generally applies to the contract.</p> <p>The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.</p>

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022

ELEC0080-011 06/01/2019

	Rates	Fringes
ELECTRICIAN, Includes Traffic Signalization	\$28.35	15.95%+7.00

PLAS0891-011 06/01/2020

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	\$20.70	8.03

SUVA2016-070 07/02/2018

	Rates	Fringes
CARPENTER, Includes Form Work	\$20.97	0.00
FENCE ERECTOR	\$15.28	0.00
IRONWORKER, REINFORCING	\$34.18	0.00
IRONWORKER, STRUCTURAL	\$34.18	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor	\$19.05	1.75
LABORER: Common or General	\$15.77	0.00
LABORER: Grade Checker	\$14.88**	0.00
LABORER: Pipelayer	\$20.48	0.00
LABORER: Power Tool Operator	\$15.69	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	\$23.93	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader	\$19.00	3.49
OPERATOR: Broom/Sweeper	\$17.40	2.01

	Rates	Fringes
OPERATOR: Crane.....	\$29.46	0.00
OPERATOR: Drill.....	\$24.89	0.00
OPERATOR: Gradall	\$19.26	0.00
OPERATOR: Grader/Blade.....	\$23.21	0.00
OPERATOR: Hydroseeder.....	\$16.64	0.00
OPERATOR: Loader	\$18.35	2.90
OPERATOR: Mechanic.....	\$22.84	0.00
OPERATOR: Milling Machine	\$23.19	2.94
G OPERATOR: PAVEMENT PLANERROUNDSMEN.....	\$19.75	0.00
OPERATOR: PAVEMENT PLANER .	\$20.10	1.24
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	\$20.90	1.56
OPERATOR: Piledriver.....	\$21.83	4.08
OPERATOR: Roller (Finishing).....	\$18.40	3.87
OPERATOR: Roller	\$18.92	0.00
OPERATOR: Screed	\$22.13	4.89
OPERATOR: Asphalt Spreader and Distributor	\$19.27	2.51
OPERATOR: Bulldozer, Including Utility	\$20.64	0.00
PAVEMENT MARKING OPERATOR	\$22.15	0.00
PAVEMENT MARKING TRUCK DRIVER.....	\$18.78	0.00
TRAFFIC CONTROL: Flagger.....	\$14.86	0.21
TRUCK DRIVER : HEAVY 7CY & UNDER.....	\$15.53	0.00
TRUCK DRIVER: Fuel and Lubricant Service	\$18.25	0.00

	Rates	Fringes
TRUCK DRIVER: HEAVY OVER 7 CY	\$18.05	0.00
TRUCK DRIVER: Single & Multi Axle.....	\$19.22	3.15

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$15.00) or 13658 (\$11.25). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ““identifiers”” that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ““SU”” or ““UAVG”” denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the “SU” identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

- 1.) Has there been an initial decision in the matter? This can be:
 - an existing published wage determination
 - a survey underlying a wage determination
 - a Wage and Hour Division letter setting forth a position on a wage determination matter
 - a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

ATTACHMENT 4

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As, used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941;
 - d. "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (ii) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors and Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction Contractors performing contracts in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the contract is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or any

Federal procurement contracting officer. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union, or if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report. etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc. prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed and disposition of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of Contractor's workforce.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training. etc. such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are non-segregated, except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a

group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. Nondiscrimination programs require that Federal-aid recipients, subrecipients, and contractors prevent discrimination and ensure nondiscrimination in all of their programs and activities, whether those programs and activities are federally funded or not. The factors prohibited from serving as a basis for action or inaction which discriminates include race, color, national origin, sex, age, and handicap/disability. The efforts to prevent discrimination must address, but not be limited to a program's impacts, access, benefits, participation, treatment, services, contracting opportunities, training opportunities, investigations of complaints, allocations of funds, prioritization of projects, and the functions of right-of-way, research, planning, and design.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director will proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity, to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractor shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
16. In addition to the reporting requirements set forth elsewhere in this contract, the contractor and the subcontractors holding subcontracts, not including material suppliers, of \$10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form PR 1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

ATTACHMENT 5
NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE
EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

1. **General.** In addition to the affirmative action requirements of Attachment 4 titled "Standard Federal Equal Employment Opportunity Construction Contract Specifications" as set forth elsewhere in this Contract, the Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" set forth herein.

2. **Goals.**
 - a. The goals for female and minority participation, expressed in percentage terms of the Contractor's aggregate work force in each trade on all construction works in the covered area, are as follows:

Females - 6.9%
Minorities - See Attachment "A"

 - b. The goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area, whether or not it is Federal or federally assisted. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

 - c. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Standard Federal Equal Employment Opportunity Construction Contract Specifications and its efforts to meet the goals. Equal Opportunity Clause, The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. **Subcontracting.** The Contractor shall provide written notification to the Department within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction works under this contract. The notification shall list the name, address and telephone number of the subcontractor, employer identification number, estimated dollar amount of the subcontract, estimated starting and completion dates of the subcontract and the geographical area in which the contract is to be performed.

4. **Reports.** The Contractor is hereby notified that he may be subject to the Office of Federal Contract Compliance Programs (OFCCP) reporting and record keeping requirements as provided for under Executive Order 11246 as amended. OFCCP will provide direct notice to the contractor as to the specific reporting requirements that he will be expected to fulfill.

ATTACHMENT A

Economic Area	Goal (Percent)
Virginia:	
021 Roanoke-Lynchburg, VA	
SMSA Counties:	
4640 Lynchburg, VA.....	19.3
VA Amherst; VA Appomattox; VA Campbell; VA Lynchburg.	
6800 Roanoke, VA.....	10.2
VA Botetourt; VA Craig; VA Roanoke; VA Roanoke City; VA Salem	
Non-SMSA Counties.....	12.0
VA Alleghany; VA Augusta; VA Bath; VA Bedford; VA Bland; VA Carroll;	
VA Floyd; VA Franklin; VA Giles; VA Grayson; VA Henry; VA Highland;	
VA Montgomery; VA Nelson; VA Patrick; VA Pittsylvania; VA Pulaski;	
VA Rockbridge; VA Rockingham; VA Wythe; VA Bedford City; VA Buena Vista; VA Clifton	
Forge; VA Covington; VA Danville; VA Galax; VA Harrisonburg;	
VA Lexington; VA Martinsville; VA Radford; VA Staunton; VA Waynesboro; WV Pendleton.	
022 Richmond, VA:	
SMSA Counties:	
6140 Petersburg - Colonial Heights - Hopewell, VA.....	30.6
VA Dinwiddie; VA Prince George; VA Colonial Heights; VA Hopewell;	
VA Petersburg.	
6760 Richmond,.....	24.9
VA Charles City; VA Chesterfield; VA Goochland, VA Hanover; VA Henrico; VA New Kent;	
VA Powhatan; VA Richmond.	
Non-SMSA Counties.....	27.9
VA Albermarle; VA Amelia; VA Brunswick; VA Buckingham, VA Caroline;	
VA Charlotte; VA Cumberland; VA Essex; VA Fluvanna; VA Greene;	
VA Greensville; VA Halifax; VA King and Queen; VA King William;	
VA Lancaster; VA Louisa; VA Lunenburg; VA Madison; VA .Mecklenburg;	
VA Northumberland; VA Nottoway; VA Orange; VA Prince Edward;	
VA Richmond; VA Sussex; VA Charlottesville; VA Emporia; VA South Boston	
023 Norfolk - Virginia Beach - Newport News VA:	
SMSA Counties:	
5680 Newport News- Hampton, VA.....	27.1
VA Gloucester; VA James City; VA York; VA Hampton; VA Newport News;	
VA Williamsburg.	
5720 Norfolk - Virginia Beach - Portsmouth, VA - NC.....	26.6
NC Currituck; VA Chesapeake; VA Norfolk; VA Portsmouth; VA Suffolk;	
VA Virginia Beach.	
Non-SMSA Counties.....	29.7
NC Bertie; NC Camden; NC Chowan; NC Gates; NC Hertford;	
NC Pasquotank; NC Perquimans; VA Isle of Wight; VA Matthews;	
VA Middlesex; VA Southampton; VA Surry; VA Franklin.	
Washington, DC:	
020 Washington, DC.	
SMSA Counties:	
8840 Washington, DC - MD – VA.....	28.0
DC District of Columbia; MD Charles; MD Montgomery MD Prince Georges;	
VA Arlington; VA Fairfax; VA Loudoun; VA Prince William	
VA Alexandria; VA Fairfax City; VA Falls Church.	
Non- SMSA Counties.....	25.2
MD Calvert; MD Frederick; MD St. Marys; MD Washington; VA Clarke;	

VA Culpeper; VA Fauquier; VA Frederick; VA King George; VA Page;
VA Rappahannock; VA Shenandoah; VA Spotsylvania; VA Stafford;
VA Warren; VA Westmoreland; VA Fredericksburg; VA Winchester WV Berkeley;
WV Grant; WV Hampshire; WV Hardy; WV Jefferson; WV Morgan.

Tennessee:

052 Johnson City - Kingsport - Bristol, TN – VA

SMSA Counties:

3630 Johnson City - Kingsport -Bristol, TN-VA.....2.6

TN Carter; TN Hawkins; TN Sullivan; TN Washington; VA Scott;

VA Washington; VA Bristol.

Non-SMSA Counties3.2

TN Greene; TN Johnson; VA Buchanan; VA Dickenson; VA Lee;

VA Russell; VA Smyth; VA Tazewell; VA Wise; VA Norton; WV McDowell;

WV Mercer.

ATTACHMENT 6

CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

By signing and submitting its proposal or bid, and by executing the Contract or Subcontract, the prospective Contractor and Subcontractors (at all tiers) shall be deemed to have signed and delivered the following:

1. The prospective Contractor and Subcontractor(s) certifies, to the best of its knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions, and shall include a copy of said form in its proposal or bid, or submit it with the executed Contract or Subcontract.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The Contractor and Subcontractor(s) shall require that the language of this certification be included in all lower tier Subcontracts which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.
4. The undersigned certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the undersigned understands and agrees that the provisions of 31 U.S.C. §3801, et seq., apply to this certification and disclosure, if any.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each expenditure or failure.]

ATTACHMENT 7

COMPLIANCE WITH BUY AMERICA REQUIREMENTS

The Contractor shall comply with the Federal Highway Administration (FHWA) Buy America Requirement in 23 CFR 635.410, which permits FHWA participation in the Contract only if domestic steel and iron will be used on the Project. To be considered domestic, all steel and iron used and all products manufactured from steel and iron must be produced in the United States and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied. This requirement does not preclude a minimal use of foreign steel and iron materials, provided the cost of such materials does not exceed 0.1% of the contract price under the Contract.

Concurrently with execution of the Contract, the Contractor has completed and submitted, or shall complete and submit, to the Department a Buy America Certificate, in format below. After submittal, the Contractor is bound by its original certification.

A false certification is a criminal act in violation of 18 U.S.C. 1001. Should this Contract be investigated, the Contractor has the burden of proof to establish that it is in compliance.

At the Contractor's request, the Department may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist. However, the Contractor certifies that it will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Department. A request for a waiver shall be treated as a Concessionaire request for a Deviation under the Agreement.

BUY AMERICA CERTIFICATE

The undersigned certifies on behalf of itself and all proposed subcontractors (at all tiers) that only domestic steel and iron will be used in the Project.

A. The Contractor shall comply with the Federal Highway Administration (“FHWA”) Buy America Requirements of 23 CFR 635.410, which permits FHWA participation in the Contract only if domestic steel and iron will be used on the Project. To be considered domestic, all steel and iron used and all products manufactured from steel and iron must be produced in the United States, and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes which protect or enhance the value of the material to which the coating is applied. This requirement does not preclude a minimal use of foreign steel and iron materials, provided the cost of such materials does not exceed 0.1% of the Contract Price.

B. A false certification is a criminal act in violation of 18 U.S.C. 1001. Should this Contract be investigated, the Concessionaire has the burden of proof to establish that it is in compliance.

C. At the Contractor’s request, the Department may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist. However, the Contractor certifies that it will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Department.

CONTRACTOR	
SIGNATURE	
NAME (Printed or Typed)	
TITLE	
DATE	

ATTACHMENT 8

[SP102-000510-02](#)

VIRGINIA DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION FOR USE OF DOMESTIC MATERIAL

December 19, 2018

SECTION 102.05 PREPARATION OF BID of the Specifications is amended to include the following:

In accordance with the provisions of Section 635.410(b) of Title 23 CFR, hereinafter referred to as “Buy America”, except as otherwise specified, all iron and steel (including miscellaneous items such as fasteners, nuts, bolts and washers) to be permanently incorporated for use on federal aid projects shall be produced in the United States of America. This applies to any iron or steel item brought onto the project, regardless of the percentage of iron or steel that exists in the pay item or in the final form they take; however, electrical components (i.e., combination products such as signal controllers and similar products which are only sold as a unit) are not subject to Buy America provisions if the product as purchased by the Contractor is less than 50% steel and iron. "Produced in the United States of America" means all manufacturing processes occur in one of the 50 United States, the District of Columbia, Puerto Rico or in the territories and possessions of the United States. “Manufacturing processes” are defined as any process which alters or modifies the chemical content, physical size or shape, or final finish of iron or steel material (such as rolling, extruding, bending, machining, fabrication, grinding, drilling, finishing, or coating). For the purposes of satisfying this requirement “coating” is defined as the application of epoxy, galvanizing, painting or any other such process that protects or enhances the value of the material to which the coating is applied. Non-iron and non-steel materials used in the coating process do not need to be produced in the United States as long as the application of the coating occurred in the United States. The manufacturing process is considered complete when the resultant product is ready for use as an item in the project (e.g. fencing, posts, girders, pipe, manhole covers, etc.) or is incorporated as a component of a more complex product by means of further manufacturing. Final assembly of a product may occur outside of the United States of America provided no further manufacturing processes take place.

For the purposes of this provision, all steel or iron material meeting the criteria as produced in the United States of America will be considered as “Domestic Material.” All iron and steel items not meeting the criteria as produced in the United States of America will be considered “Non-Domestic Material.”

A minimal amount of “Non-Domestic” steel or iron material may be incorporated in the permanent work on a federal-aid contract provided that the cost of such materials or products does not exceed one-tenth of one percent of the Contract amount or \$2500, whichever is greater. The cost of the “Non-Domestic Material” is defined as its monetary value delivered to the job site and supported by invoices or bill of sale to the Contractor. This delivered-to-

site cost must include transportation, assembly, installation and testing.

Buy America provisions do not apply to iron or steel products used temporarily in the construction of a project such as temporary sheet piling, temporary bridges, steel scaffolding, falsework or such temporary material or product or material that remains in place for the Contractor's convenience.

Raw materials such as iron ore, pig iron, processed, pelletized and reduced iron ore, waste products (including scrap, that is, steel or iron no longer useful in its present form from old automobiles, machinery, pipe, railroad rail, or the like and steel trimmings from mills or product manufacturing) and other raw materials used in the production of steel and/or iron products may, however, be imported. Extracting, handling, or crushing the raw materials which are inherent to the transporting the materials for later use in the manufacturing process are exempt from Buy America.

Any items containing foreign source steel or iron billet shall be considered "Non-Domestic Materials." Additionally, iron or steel ingots or billets produced in the United States, but shipped outside the United States of America for any manufacturing process and returned for permanent use in a project shall be considered "Non-Domestic Materials."

Waivers:

The process for receiving a waiver for Buy America provisions is identified in 23 CFR 635.410(c). The Contractor shall not anticipate that any Buy America provisions will be waived.

Certification of Compliance:

The Contractor is required to submit a Certificate of Compliance prior to incorporating any items containing iron or steel items into the project. This shall be accomplished by the Contractor submitting the Form C-76 Certificate of Compliance to the Department when the items are delivered to the project site. The Certification of Compliance will certify whether the items are considered "Domestic Material" or "Non-Domestic Material" as referenced in this Special Provision. The certificate must be signed and dated by the Prime Contractor's Superintendent and include a Buy America Submittal Number. The Buy America Submittal Number is simply the Contractor's project specific sequential numbering system that will allow the Contractor and Department to track the total number of certificates provided and the individual items containing iron or steel associated with each certificate.

Supporting Documentation:

Supporting documentation to demonstrate compliance with Buy America provisions (such as mill test reports manufacturer/supplier certifications, etc.) shall be organized by Buy America Submittal Number and maintained by the Contractor from the date of delivery until three years after project acceptance. The Contractor may maintain this documentation electronically or in paper format.

The Department or FHWA may review the Contractor's supporting documentation to verify compliance with the Buy America provisions at any time. Supporting documentation shall be provided within five business days of the request. The burden of proof to meet the Buy America provisions rests with the Contractor. If the supporting documentation does not undeniably demonstrate to FHWA or the Department that the "Domestic Materials" identified in the Certificates of Compliance were produced in the United States of America, then the Department may deduct payment from moneys due the Contractor for the value of the iron and steel that did not meet the Buy America provisions.

ATTACHMENT 9

CERTIFICATION OF NONDISCRIMINATION IN EMPLOYMENT

By signing this Contract, the Contractor certifies that he has participated in a previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, or if he has not participated in a previous contract of this type, or if he has had previous contract or subcontracts and has not filed, he will file with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

Note: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b)(1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

EXHIBIT C-2

CIVIL RIGHTS REQUIREMENTS

Modern Slavery Policy

Modern Slavery means slavery, servitude, forced labor, trafficking in persons, forced marriage, child labor, debt bondage and any other slavery-like practices.

“Guiding Principle on Business and Human Rights” means the United Nations’ Guiding Principles on Business and Human Rights: Implementing the United Nations “Protect, Respect and Remedy Framework” (available at https://www.ohchr.org/documents/publicatons/guidingprinciplesbusinessher_en.pdf).

Contractor represents and warrants, that at the time of entering into this Agreement and on an ongoing basis:

- (a) neither it, nor any of its officers, employees or agents, have been involved in any conduct constituting Modern Slavery;
- (b) neither it, nor any of its officers, employees or agents, have admitted to or been convicted of any offense relating to Modern Slavery;
- (c) neither it, nor any of its officers, employees or agents, have been, or are subject to or involved in, any past, current, pending or threatened investigation of any offense or allegation relating to Modern Slavery, including by any law enforcement, regulator or other governmental agency, or any customer or supplier;
- (d) neither it, nor any of its officers, employees or agents, are aware of any circumstances within its supply chain that is being investigated or could give rise to an investigation relating to Modern Slavery, including by any law enforcement, regulator or other governmental agency, or any customer or supplier;
- (e) it is not conducting, and has not conducted, any internal investigation in relation to allegations of Modern Slavery and no person has reported any instance or suspected instance of Modern Slavery;
- (f) it will use all reasonable endeavors to prevent and respond to Modern Slavery in its supply chain and activities, including performing appropriate due diligence for the identification of Modern Slavery in its supply chain and activities; and
- (g) it will not supply any goods or services that have their origin in, or are otherwise sourced, supplied, manufactured, assembled, developed, or otherwise provided or produced in any high risk jurisdiction. This includes, but is not limited to, the following countries and/or territories: Cambodia, Mauritania, the Democratic People’s Republic of Korea, the Democratic Republic of Congo, the Islamic

Republic of Pakistan, the Republic of Iraq, the Republic of Yemen, the Federal Republic of Somalia, Eritrea, the Republic of South Sudan, the Republic of Sudan, and the Syrian Arab Republic.

If at any time the Contractor becomes aware of any potential or actual incidence of Modern Slavery in the operations and supply chains utilised in its performance of the Contract, the Contractor must promptly:

- (a) notify the Concessionaire of the potential or actual incidence of Modern Slavery and provide any information reasonably requested by the Concessionaire in relation to such incidence;
- (b) take all reasonable action to address or remove such incidence of Modern Slavery, including where relevant by addressing any incidence identified in relation to other entities in its supply chains; and
- (c) take all reasonable steps to remediate any adverse impacts caused or contributed to by the Contractor from a potential or actual incidence of Modern Slavery in accordance with the Guiding Principles on Business and Human Rights.

Equal Employment Opportunity

- (a) The Contractor shall comply with the applicable provisions of presidential executive orders and the rules, regulations, and orders of the President's Committee on Equal Employment Opportunity ("EEO"). The Contractor shall maintain the following records and reports as required by the EEO provisions:
 - record of all applicants for employment
 - new hires by race, work classification, hourly rate, and date employed
 - minority and non-minority employees employed in each work classification
 - changes in work classifications
 - employees enrolled in approved training programs and the status of each
 - minority subcontractor or subcontractors with meaningful minority group representation
 - copies of Form C-57 (Contractor's Monthly EEO Report) submitted by subcontractors

The Contractor shall cooperate with the Department in carrying out EEO obligations and in the Department's review of activities under the Agreement. The Contractor shall comply with the specific EEO requirements specified in this Exhibit and shall include these requirements in every subcontract of \$10,000 or more with such modification of language as may be necessary to make them binding on the subcontractors.

- (b) EEO Policy: The Contractor shall accept as operating policy the following statement:

It is the policy of this Company to assure that applicants are employed and that employees are treated during employment without regard to their race, religion, sex, sexual orientation, gender identity, color, or national origin. Such action shall include employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship or on-the-job training.

- (c) EEO Officer: The Contractor shall designate and make known to the Department an EEO Officer who can effectively administer and promote an active Contractor EEO program and who shall be assigned adequate authority and responsibility to do so.
- (d) Dissemination of Policy:
 - 1. Members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees or recommend such action or are substantially involved in such action shall be made fully aware of and shall implement the Contractor's EEO policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. The following actions shall be taken as a minimum:
 - a. Periodic meetings of supervisory and personnel office employees shall be conducted before the start of work and at least once every 6 months thereafter, at which time the Contractor's EEO policy and its implementation shall be reviewed and explained. The meetings shall be conducted by the EEO Officer or another knowledgeable company official.
 - b. New supervisory or personnel office employees shall be given a thorough indoctrination by the EEO Officer or another knowledgeable company official covering all major aspects of the Contractor's EEO obligations within 30 days following their reporting for duty with the Contractor.
 - c. The EEO Officer or appropriate company official shall instruct employees engaged in the direct recruitment of employees for the Project relative to the methods followed by the Contractor in locating and hiring minority group employees.
 - 2. In order to make the Contractor's EEO policy known to all employees, prospective employees, and potential sources of employees such as, but not limited to, schools, employment agencies, labor unions where appropriate, and college placement officers, the Contractor shall take the following actions:
 - a. Notices and posters setting forth the Contractor's EEO policy shall be placed in areas readily accessible to employees, applicants for employment, and potential employees.

The Contractor shall furnish, erect, and maintain at least two bulletin boards having dimensions of at least 48 inches in width and 36 inches in height at locations readily accessible to all personnel concerned with the project. The boards shall be erected immediately upon initiation of the Agreement work and shall be maintained until the completion of such work, at which time they shall be removed from the project. Each bulletin board shall be equipped with a removable glass or plastic cover that when in place shall protect posters from weather or damage. The Contractor shall promptly post official notices on the bulletin boards.

- b. The Contractor's EEO policy and the procedures to implement such policy shall be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

(e) Recruitment:

1. When advertising for employees, the Contractor shall include in all advertisements for employees the notation "An Equal Opportunity Employer" and shall insert all such advertisements in newspapers or other publications having a large circulation among minority groups in the area from which the project work force would normally be derived.
2. Unless precluded by a valid bargaining agreement, the Contractor shall conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants, including, but not limited to, state employment agencies, schools, colleges, and minority group organizations. The Contractor shall identify sources of potential minority group employees and shall establish procedures with such sources whereby minority group applicants may be referred to it for employment consideration.
3. The Contractor shall encourage its employees to refer minority group applicants for employment by posting appropriate notices or bulletins in areas accessible to all employees. In addition, information and procedures with regard to referring minority group applicants shall be discussed with employees.

(f) Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel action of any type shall be taken without regard to race, color, religion, sex, or national origin.

1. The Contractor shall conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of personnel.
2. The Contractor periodically shall evaluate the spread of wages paid within each classification to determine whether there is evidence of discriminatory wage practices.

3. The Contractor periodically shall review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the Contractor promptly shall take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, corrective action shall include all affected persons.
4. The Contractor shall investigate all complaints of alleged discrimination made to it in connection with obligations under the Agreement, attempt to resolve such complaints, and take appropriate corrective action. If the investigation indicates that the discrimination may affect persons other than the complainant, corrective action shall include those persons. Upon completion of each investigation, the Contractor shall inform every complainant of all avenues of appeal.

(g) Training:

1. The Contractor shall assist in locating, qualifying, and increasing the skills of minority group and women employees and applicants for employment.
2. Consistent with work force requirements and as permissible under Federal and state regulations, the Contractor shall make full use of training programs, i.e., apprenticeship and on-the-job training programs for the geographical area of Contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation should be in their first year of apprenticeship or training.
3. The Contractor shall advise employees and applicants for employment of available training programs and the entrance requirements for each.
4. The Contractor periodically shall review the training and promotion potential of minority group employees and shall encourage eligible employees to apply for such training and promotion.

(h) Unions: If the Contractor relies in whole or in part on unions as a source of employees, best efforts shall be made to obtain the cooperation of such unions to increase opportunities for minority groups and women in the unions and to effect referrals by such unions of minority and women employees. Actions by the Contractor, either directly or through its agents or subcontractors, shall include the following procedures:

1. In cooperation with the unions, best efforts shall be used to develop joint training programs aimed toward qualifying more minority group members and women for membership in the unions and to increase the skills of minority group employees and women so that they may qualify for higher-paying employment.
2. Best efforts shall be used to incorporate an EEO clause into union agreements to the end that unions shall be contractually bound to refer applicants without regard to race, color, religion, sex, sexual orientation, gender identity or national origin.

3. Information shall be obtained concerning referral practices and policies of the labor union except that to the extent the information is within the exclusive possession of the union. If the labor union refuses to furnish the information to the Contractor, the Contractor shall so certify to the Department and shall set forth what efforts he made to obtain the information.
 4. If a union is unable to provide the Contractor with a reasonable flow of minority and women referrals within the time limit set forth in the union agreement, the Contractor shall, through its recruitment procedures, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity or national origin, making full efforts to obtain qualified or qualifiable minority group persons and women. If union referral practice prevents the Contractor from complying with the EEO requirements, the Contractor shall immediately notify the Department.
- (i) Subcontracting: The Contractor shall use best efforts to use minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees. The Contractor shall use best efforts to ensure subcontractor compliance with its EEO obligations.
1. Records and Reports: The Contractor shall keep such records as are necessary to determine compliance with its EEO obligations. The records shall be designed to indicate the following:
 - i. the number of minority and nonminority group members and females employed in each work classification on the Project;
 - ii. the progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and females if unions are used as a source of the work force;
 - iii. the progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
 - iv. the progress and efforts being made in securing the services of minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees
 2. Records shall be retained for a period of three years following completion of the Work and shall be available at reasonable times and places for inspection by authorized Representatives of the Department.
 3. Form C-57 shall be submitted each month for the first three months after each Contractor commences the Work pursuant to a Notice to Proceed issued by the Concessionaire and every month of July thereafter for the duration of the Project. Form C-57 shall be completed to indicate the number of minority, nonminority, and female employees currently engaged in each work classification shown on the form. The completed

Form C-57 shall be submitted within three weeks after the reporting period. Failure to do so may result in delay of approval of the Contractor's monthly Application for Payment.

Civil Rights Compliance

- (a) DBE-SWaM Forms: The Contractor shall complete the following forms or equivalent forms as part of its compliance with the DBE-SWaM goals set forth in the Contract.

Form C-111 (Minimum DBE Requirements)

Form C-112 (Certification Of Binding Agreement)

Form C-48 (Subcontractor/Supplier Solicitation And Utilization Form)

Form C-49 (DBE Good Faith Efforts Documentation)

- (b) Payments made to DBE and SWaM consultants must be submitted on form C-63 (DBE Report) or an equivalent form on a quarterly basis. Form C-63 and submittal information for the form is set forth in the Department's Construction Directive Memorandum CD-2007-6.

- (c) Construction Requirements and Submittals:

1. EEO Contract Compliance:

- i. The following forms and associated submittal information are required from the Contractor and its subcontractors (including haulers and suppliers as applicable).

Form C-64 (Company Employment)

Letter Designating EEO Officer

Semi-annual Minutes of an EEO Meeting

Form C-57 (Contractor's Monthly EEO Report)

- ii. The Contractor and its subcontractors are subject to formal Department EEO Contractor Compliance Reviews at least annually.

2. Labor Compliance: The Contractor shall submit, or cause the submission, of the following. In addition, the Contractor's employees (and the employees of its subcontractors) may be subject to interviews by the Department.

- i. weekly payrolls from the Contractor and its subcontractors and haulers;

- ii. Form C-28 (Basic Hourly Rates paid by Contractor); and
 - iii. Form C-56 (Statement of Compliance).
3. DBE Compliance: The Contractor shall comply with all the requirements of “Virginia Department of Transportation Special Provision for Section 107.15 [Use of Disadvantaged Business Enterprises (DBEs)] For Design-Build Projects” dated January 4, 2017, attached hereto as Attachment 1. Use of the term “Design-Builder” or “Offeror” in Attachment 1 shall be read to mean “Contractor”.
- i. DBE subcontractors, suppliers, manufacturers and haulers must be listed and submitted on Form C-111 or an equivalent form, indicating the task(s) assigned and the approximate dollar value of the planned work pursuant to Attachment 1.
 - ii. Payments made to DBE firms must be submitted on form C-63 on a quarterly basis. Form C-63 and submittal information for the form is provided in the Department’s Construction Directive Memorandum CD-2007-6.
 - iii. All DBE firms are subject to formal DBE contract compliance reviews at least once during active participation on the project.
 - iv. Attachment 1 provides guidance on removal of a DBE firm from the contract or for substituting another firm for all or portions of items of work designated to be performed by a DBE firm. Advance approval must be obtained from the VDOT district Civil Rights Office.
4. SWaM Compliance: The Contractor shall comply with all the requirements of “Virginia Department of Transportation Special Provision for Section 107.15 Use of Small, Women-Owned and Minority-Owned-Businesses (SWaM) for Design-Build Projects” dated January 4, 2017, attached hereto as Attachment 2. Use of the term “Design-Builder” in Attachment 2 shall be read to mean “Contractor”.
- i. SWaM subcontractors, suppliers, manufacturers and haulers shall be listed and submitted on Form C-111 or an equivalent form, indicating the task(s) assigned and the approximate dollar value of the planned work pursuant to Attachment 2.
 - ii. Payments made to SWaM firms must be submitted on form C-63 on a quarterly basis in order to receive credit. See Construction Memorandum CD-2007-6.

ATTACHMENT 1

VIRGINIA DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION FOR SECTION 107.15 FOR DESIGN-BUILD PROJECTS

January 4, 2017

Section 107.15 of the Specifications is replaced by the following:

Section 107.15—Use of Disadvantaged Business Enterprises (DBEs) for Design-Build Projects

A. Disadvantaged Business Enterprise (DBE) Program Requirements

Any Design-Builder, subcontractor, supplier, DBE firm, and contract surety involved in the performance of work on a federal-aid contract shall comply with the terms and conditions of the United States Department of Transportation (USDOT) DBE Program as the terms appear in Part 26 of the Code of Federal Regulations (49 CFR as amended), the USDOT DBE Program regulations; and the Virginia Department of Transportation's (VDOT or the Department) Road and Bridge Specifications and DBE Program rules and regulations.

For the purposes of this provision, Offeror is defined as any individual, partnership, corporation, or Joint Venture that formally submits a Statement of Qualification or Proposal for the work contemplated there under; Design-Builder is defined as any individual, partnership, or Joint Venture that contracts with the Department to perform the Work; and subcontractor is defined as any supplier, manufacturer, or subcontractor performing work or furnishing material, supplies or services to the contract. The Design-Builder shall physically include this same contract provision in every supply or work/service subcontract that it makes or executes with a subcontractor having work for which it intends to claim credit.

In accordance with 49 CFR Part 26 and VDOT's DBE Program requirements, the Design-Builder, for itself and for its subcontractors and suppliers, whether certified DBE firms or not, shall commit to complying fully with the auditing, record keeping, confidentiality, cooperation, and anti-intimidation or retaliation provisions contained in those federal and State DBE Program legal requirements. By submitting a Proposal on this contract, and by accepting and executing this contract, the Design-Builder agrees to assume these contractual obligations and to bind the Design-Builder's subcontractors contractually to the same at the Design-Builder's expense.

The Design-Builder and each subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Design-Builder shall carry out applicable requirements of 49 CFR Part 26 in the award, administration, and performance of this contract. Failure by the Design-Builder to carry out these requirements is a material breach of this contract, which will result in the termination of this contract or other such remedy, as VDOT deems appropriate.

All administrative remedies noted in this provision are automatic unless the Design-Builder exercises the right of appeal within the required timeframe(s) specified herein.

Appeal requirements, processes, and procedures shall be in accordance with guidelines stated herein and current at the time of the proceedings. Where applicable, the Department will notify the Design-Builder of any changes to the appeal requirements, processes, and procedures after receiving notification of the Design-Builder's desire to appeal.

All time frames referenced in this provision are expressed in business days unless otherwise indicated. Should the expiration of any deadline fall on a weekend or holiday, such deadline will automatically be extended to the next normal business day.

B. DBE Certification

The only DBE firms eligible to perform work on a federal-aid contract for DBE contract goal credit are firms certified as Disadvantaged Business Enterprises by the Virginia Department of Small Business and Supplier Diversity (SBSD) or the Metropolitan Washington Airports Authority (MWAA) in accordance with federal and VDOT guidelines. DBE firms must be certified in the specific work listed for DBE contract goal credit. A directory listing of certified DBE firms can be obtained from the Virginia Department of Small Business and Supplier Diversity's website: <http://www.sbsd.virginia.gov>.

C. DBE Program-Related Certifications Made by Offerors/Design-Builders

By submitting a Proposal and by entering into any contract on the basis of that Proposal, the Offeror/Design-Builder certifies to each of the following DBE Program-related conditions and assurances:

1. That the Offeror/Design-Builder agrees to comply with the project construction and administration obligations of the USDOT DBE Program, 49 CFR Part 26 as amended, and the Standard Specifications setting forth the Department's DBE Program requirements.
2. Design-Builder shall comply fully with the DBE Program requirements in the execution and performance of the contract. Design-Builder acknowledges that failure to comply may result in enjoinder from participation in future Department or State procurements and/or other legal sanctions.
3. To ensure that DBE firms have been given full and fair opportunity to participate in the performance of the contract. The Design-Builder certifies that all reasonable steps were, and will be, taken to ensure that DBE firms had, and will have, an opportunity to compete for and perform work on the contract. The Design-Builder further certifies that the Design-Builder shall not discriminate on the basis of race, color, age, national origin, or sex in the performance of the contract or in the award of any subcontract. Any agreement between a Design-Builder and a DBE whereby the DBE promises not to provide quotations for performance of work to other Design-Builders are prohibited.
4. Design-Builder shall make good faith efforts to obtain DBE participation in the proposed contract at or above the goal. The Offeror shall submit a written statement as a part of its Statement of Qualifications and/or Proposal indicating the Offeror's commitment to achieve the minimum requirement related to DBE

goal indicated in Request for Qualification (RFQ) and/or Request for Proposal (RFP) for the entire value of the contract. The Offeror, by signing and submitting its Proposal, certifies the DBE participation information that will be submitted within the required time thereafter is true, correct, and complete, and that the information to be provided includes the names of all DBE firms that will participate in the contract, the specific item(s) that each listed DBE firm will perform, and the creditable dollar amounts of the participation of each listed DBE.

5. Offeror further certifies, by signing its Proposal, it has committed to meet the contract goal for DBE participation. Award of the contract will be conditioned upon meeting these and other listed requirements of 49 CFR Part 26.53 and the contract documents. By signing the Proposal, the Offeror certifies that good faith efforts will be made on work that it proposes to sublet; and that it will seek out and consider DBE firms as potential subcontractors and subconsultants. The Design-Builder shall, as a continuing obligation, contact DBE firms to solicit their interest, capability, and prices in sufficient time to allow them to respond effectively, and shall retain on file proper documentation to substantiate its good faith efforts.
6. Design-Builder shall not unilaterally terminate, substitute for, or replace any DBE firm that was designated in the executed contract in whole or in part with another DBE, any non-DBE firm, or with the Design-Builder's own forces or those of an affiliate of the Design-Builder without the prior written consent of Department as set out within the requirements of this Special Provision.
7. Design-Builder shall designate and make known to the Department a liaison officer who is assigned the responsibility of administering and promoting an active and inclusive DBE program as required by 49 CFR Part 26 for DBE firms. The designation and identity of this officer needs to be submitted only once by the Design-Builder.
8. Design-Builder shall comply fully with all contractual requirements and Legal Requirements of the USDOT DBE Program, and shall cause each DBE firm participating in the contract to fully perform the designated work items with the DBE firm's own forces and equipment under the DBE firm's direct supervision, control, and management. Where a contract exists and where the Design-Builder, DBE firm, or any other firm retained by the Design-Builder has failed to comply with federal or Department DBE Program requirements, Department has the authority and discretion to determine the extent to which the DBE contract regulations have not been met, and will assess against the Design-Builder any remedies available at law or provided in the contract.
9. If a bond surety assumes the completion of work, if for any reason VDOT has terminated the Design-Builder, the surety shall be obligated to meet the same DBE contract terms and requirements as were required of the original Design-Builder in accordance with the requirements of this specification.

D. DBE Program Compliance Procedures

The following procedures shall apply to the contract for DBE Program compliance purposes:

1. **Prequalification of Subcontractors:** All prospective DBE subcontractors shall prequalify with the Department in accordance with the *Rules Governing Prequalification*.
2. **DBE Goal, Good Faith Efforts Specified:** Design-Builder shall evidence attainment of the DBE commitment equal to or greater than the required DBE Goal through submission, to Department, of completed Form C-111, Minimum DBE Requirements; Form C-112, Certification of Binding Agreement; and Form C-48, Subcontractor/Supplier Solicitation and Utilization, as a part of the good faith efforts documentation set forth below:

Design Phase: Thirty (30) days after the Notice to Proceed for Design, the Design-Builder shall submit to Department for review and approval Forms C-111 and C-112 for each DBE firm to be utilized during the design phase to meet the DBE minimum requirement and Form C-48. Failure to submit the required documentation within the specified timeframe shall be cause to deny credit for any work performed by a DBE firm and delay approval of the Design-Builder's monthly payment.

Construction Phase: No later than thirty (30) days prior to the DBE firm undertaking any work, Design-Builder shall submit to Department for review and approval Forms C-111, C-112, and C-48. Failure to submit the required documentation within the specified timeframe shall result in disallowed credit of any work performed prior to approval of Forms C-111 and C-112 and delay approval of monthly payment.

The District Civil Rights Office (DCRO) will monitor good faith effort documentation quarterly to determine progress being made toward meeting the DBE minimum requirement established for the contract.

Forms C-48, C-49, C-111, and C-112 can be obtained from the VDOT website at:

<http://vdotforms.vdot.virginia.gov/>

3. **Good Faith Efforts Described:** Department will determine if Design-Builder demonstrated adequate good faith efforts, and if given all relevant circumstances, those efforts were made actively and aggressively to meet the DBE requirements. Efforts to obtain DBE participation are not good faith efforts if they could not reasonably be expected to produce a level of DBE firm participation sufficient to meet the DBE Program requirements and DBE Goal.

Good faith efforts may be determined through use of the following list of the types of actions the Design-Builder may make to obtain DBE participation. This is not intended to be a mandatory checklist, nor is it intended to be

exclusive or exhaustive. Other factors or types of efforts of similar intent may be relevant in appropriate cases:

- (a) Soliciting through reasonable and available means, such as but not limited to, attendance at pre-bid meetings, advertising, and written notices to DBE firms who have the capability to perform the work of the contract. Examples include: advertising in at least one daily/weekly/monthly newspaper of general circulation, as applicable; phone contact with a completely documented telephone log, including the date and time called, contact person, or voice mail status; and internet contacts with supporting documentation, including dates advertised. DBE firms shall have no less than five (5) business days to reasonably respond to the solicitation. Design-Builder shall determine with certainty if the DBE firms are interested by taking reasonable steps to follow up initial solicitations as evidenced by documenting such efforts as requested on Form C-49, DBE Good Faith Efforts Documentation.
- (b) Selecting portions of the work to be performed by DBE firms in order to increase the likelihood that the DBE Goal will be achieved. This includes, where appropriate, breaking out work items into economically feasible units to facilitate DBE firm participation, even when the Design-Builder might otherwise prefer to completely perform all portions of this work in its entirety or use its own forces;
- (c) Providing interested DBE firms with adequate information about the plans, specifications, and requirements of the contract in a timely manner, which will assist the DBE firms in responding to a solicitation;
- (d) Negotiating for participation in good faith with interested DBE firms;
 - 1. Evidence of such negotiation shall include the names, addresses, and telephone numbers of DBE firms that were considered; dates DBE firms were contacted; a description of the information *provided* regarding the plans, specifications, and requirements of the contract for the work selected for subcontracting; and, if insufficient DBE participation seems likely, evidence as to why additional agreements could not be reached for DBE firms to perform the work;
 - 2. Design-Builder should, using good business judgment, consider a number of factors in negotiating with subcontractors/subconsultants, and should take a DBE firm's price, qualifications, and capabilities, as well as contract goals, into consideration. However, the fact that there may be some additional costs involved in finding and using DBE firms is not sufficient reason for a Design-Builder's failure to meet the DBE goal as long as such costs are reasonable and comparable to costs customarily appropriate to the type of work under consideration. Also, the ability or desire of a Design-Builder to perform the work with its own organization does not relieve the Design-

Builder of the responsibility to make diligent good faith efforts. Design-Builders are not, however, required to accept higher quotes from DBE firms if the price difference can be shown by the Design-Builder to be excessive, unreasonable, or greater than would normally be expected by industry standards;

- (e) A Design-Builder cannot reject a DBE firm as being unqualified without sound reasons based on a thorough investigation of the DBE firm's capabilities. The DBE firm's standing within its industry, membership in specific groups, organizations, associations, and political or social affiliations, and union vs. non-union employee status are not legitimate causes for the rejection or non-solicitation of bids in the Design-Builder's efforts to meet the contract goal for DBE participation;
- (f) Making efforts to assist interested DBE firms in obtaining bonding, lines of credit, or insurance as required by Department or by Design-Builder;
- (g) Making efforts to assist interested DBE firms in obtaining necessary equipment, supplies, materials, or related assistance or services subject to the restrictions contained in this Special Provision;
- (h) Effectively using the services of appropriate personnel from VDOT and from SBSD; available minority/women community or minority organizations; contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and utilization of qualified DBEs.

E. Documentation and Administrative Reconsideration of Good Faith Efforts

Design-Builder must provide Form C-49, DBE Good Faith Efforts Documentation, of its efforts made to meet the DBE goal within the time frames specified in this provision. The means of transmittal and the risk for timely receipt of this information shall be the responsibility of the Design-Builder. Design-Builder shall attach additional pages to the certification, if necessary, in order to fully detail specific good faith efforts made to obtain the DBE firm's participation in the proposed work.

However, Design-Builder shall timely submit its completed and executed forms C-111, C-112, C-48, and C-49, as aforementioned. Failure to submit the required documentation within the specified time frames shall be cause to disallow DBE goal credit and delay approval of the Design-Builder's monthly payment.

During the Contract: If a DBE, through no fault of the Design-Builder, is unable or unwilling to fulfill his agreement with the Design-Builder, the Design-Builder shall immediately notify the Department and provide all relevant facts. If a Design-Builder relieves a DBE subcontractor of the responsibility to perform work under their subcontract, the Design-Builder is encouraged to take the appropriate steps to obtain another DBE firm to perform the remaining subcontracted work for the amount that would have been paid to the original DBE firm. In such instances, Design-Builder is expected to seek DBE participation towards meeting the goal during the performance of the contract.

If at any point during the execution and performance of the contract it becomes evident that the remaining dollar value of allowable DBE goal credit for performing the subcontracted work is insufficient to obtain the DBE contract goal, and the Design-Builder has not taken the preceding actions, the Design-Builder and any aforementioned affiliates may be subject to disallowance of DBE credit until such time as sufficient progress toward achievement of the DBE goal is achieved or evidenced.

Project Completion: If, at final completion, the Design-Builder fails to meet the DBE goal, and fails to adequately document that it made good faith efforts to achieve sufficient DBE goal, then Design-Builder and any prime contractual affiliates, as in the case of a joint venture, may be enjoined from bidding, responding, or participating on Department projects for a period of ninety (90) days and be removed from Department's prequalification list.

Prior to such enjoinder or removal, Design-Builder may submit documentation to the State Construction Engineer or other designee of Department to substantiate that failure was due solely to quantitative underrun(s), elimination of items subcontracted to DBEs, or to circumstances beyond Design-Builder's control and that all feasible means had been used to achieve the DBE goal. The State Construction Engineer, or such other designee, upon verification of such documentation shall determine whether Design-Builder has met the requirements of the contract.

If it is determined that the aforementioned documentation is insufficient or the failure to meet required participation is due to other reasons, the Design-Builder may request an appearance before the Department's Administrative Reconsideration Panel to establish that all feasible means were used to meet such participation requirements. The Administrative Reconsideration Panel will be made up of Department Division Administrators or their designees, none of who took part in the initial determination that the Design-Builder failed to make the DBE goal or make adequate good faith efforts to do so. After reconsideration, Department shall notify the Design-Builder in writing of its decision and explain the basis for finding that the Design-Builder did or did not meet the DBE goal or make adequate good faith efforts to do so. The decision of the Administrative Reconsideration Panel shall be administratively final. If the decision is made to enjoin the Design-Builder from bidding or participating on other Department work as described herein, the enjoinder period will begin upon Design-Builder's failure to request a hearing within the designated time frame or upon the Administrative Reconsideration Panel's decision to enjoin, as applicable.

F. DBE Participation for Contract Goal Credit

DBE participation on the contract will count toward meeting the DBE contract goal in accordance with the following criteria:

1. The applicable percentage of the total dollar value of the contract or subcontract awarded to the DBE firm will be counted toward meeting the DBE goal in accordance with the **DBE Program-Related Certifications Made by Offerors/Design-Builder's** section of this Special Provision for the value of the work, goods, or services that are actually performed or provided by the DBE firm itself or subcontracted by the DBE to other DBE firms.

2. When a DBE performs work as a participant in a joint venture with a non-DBE firm, the Design-Builder may count toward the DBE goal only that portion of the total dollar value of the subcontract equal to the distinctly defined portion of the work that the DBE firm has performed with the DBE firm's own forces or in accordance with the provisions of this Section. The Department shall be contacted in advance regarding any joint venture involving both a DBE firm and a non-DBE firm to coordinate Department review and approval of the joint venture's organizational structure and proposed operation where the Design-Builder seeks to claim the goal credit.
3. When a DBE firm subcontracts part of the work to another firm, the value of that subcontracted work may be counted toward the DBE contract goal only if the DBE firm's subcontractor is a DBE firm. Work that a DBE firm subcontracts to a non-DBE firm, or to a firm that may be eligible to be a DBE firm, but has not yet been certified as a DBE firm, will not count toward the DBE. The cost of supplies and equipment a DBE subcontractor purchases or leases from the Design-Builder or prime contractual affiliates, as in the case of a joint venture, will not count toward the DBE goal.
4. The Design-Builder may count expenditures to a DBE subcontractor toward the DBE goal only if the DBE performs a Commercially Useful Function (CUF) on that subcontract, as such term is defined in subparagraph H below.
5. A Design-Builder may not count the participation of a DBE subcontractor toward the DBE goal until the amount being counted has actually been paid to the DBE firm. Design-Builder may count sixty (60) percent of its expenditures actually paid for materials and supplies obtained from a DBE certified as a regular dealer, and one hundred (100) percent of such expenditures actually paid for materials and supplies obtained from a regular dealer of the goods or a manufacturer DBE firm.
 - (a) For the purposes of this Special Provision, a "regular dealer" is defined as a firm or person that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles, or equipment required and used under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the DBE firm or person shall be an established business that regularly engages, as its principal business and under its own name, in the purchase and sale or lease of the products or equipment in question. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions will not be considered regular dealers.
 - (b) A DBE firm or person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business where it keeps such items in stock if the DBE firm both owns and operates distribution equipment for the products it sells and provides for the work, *provided* further that the DBE firm or person has been certified with an appropriate North American Industry Classification System (NAICS) code for supply of such bulk items. Any supplementation of a regular

dealer's own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis to be eligible for credit to meet the DBE goal credit.

- (c) If a DBE regular dealer is used for DBE goal credit, no additional credit will be given for hauling or delivery to the project site goods or materials sold by that DBE regular dealer. Those delivery costs shall be deemed included in the price charged for the goods or materials by the DBE regular dealer, which shall be responsible for distribution of the goods or materials.
- (d) For the purposes of this Special Provision, a manufacturer will be defined as a firm that operates or maintains a factory or establishment that produces on the premises the materials, supplies, articles, or equipment required under the contract and of the general character described by the project specifications. A manufacturer shall include firms that produce finished goods or products from raw or unfinished material, or purchase and substantially alter goods and materials to make them suitable for construction use before reselling them.
- (e) A Design-Builder may count toward the DBE goal the following expenditures to DBE firms that are not regular dealers or manufacturers for DBE program purposes:
 - 1. The entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant or managerial services, or for providing bonds or insurance specifically required for the performance of the federal-aid contract, if the fee is reasonable and not excessive or greater than would normally be expected by industry standards for the same or similar services.
 - 2. The entire amount of that portion of the contract that is performed by the DBE firm's own forces and equipment under the DBE firm's supervision. This includes the cost of supplies and materials ordered and paid for by the DBE firm for work, including supplies purchased or equipment leased by the DBE firm, except Design-Builder supplies and equipment a DBE subcontractor purchases or leases from the Design-Builder or its affiliates.
- (f) Design-Builder may count toward the DBE goal one hundred (100) percent of the fees paid to a DBE trucker or hauler for the delivery of material and supplies required on the project job site, but not for the cost of those materials or supplies themselves, provided that the trucking or hauling fee is determined by Department to be reasonable, as compared with fees customarily charged by non-DBE firms for similar services. Design-Builder shall not count costs for the removal or relocation of excess material from or on the job site when the DBE trucking company is the manufacturer of or a regular dealer in those materials and supplies. The DBE trucking firm shall also perform a CUF on the project and not

operate merely as a pass through for the purposes of gaining DBE goal credit. Prior to entering into a trucking subcontract, Design-Builder shall determine, or contact the Department Civil Rights Division or its district offices for assistance in determining, whether a DBE trucking firm will meet the criteria for performing a CUF on the project. See section on **Miscellaneous DBE Program Requirements; Factors used to Determine if a DBE Trucking Firm is Performing a CUF.**

- (g) Design-Builder will receive DBE goal credit for the fees or commissions charged by and paid to a DBE broker who arranges or expedites sales, leases, or other work arrangements provided that those fees are determined by Department to be reasonable and not excessive as compared with fees customarily charged by non-DBE firms for similar services. For the purposes of this Special Provision, a broker is defined as a person or firm that regularly engages in arranging for delivery of material, supplies, and equipment, or regularly arranges for the providing of project services as a course of routine business, but does not own or operate the delivery equipment necessary to transport materials, supplies or equipment to or from a job site.

G. Performing a Commercially Useful Function (CUF)

No credit toward the DBE goal will be allowed for payments or reimbursement of expenditures to a DBE firm if that DBE firm does not perform a CUF on that contract. A DBE firm performs a CUF when the DBE is solely responsible for execution of a distinct element of the work and the DBE firm actually performs, manages, and supervises such work with the DBE firm's own forces or in accordance with the provisions of the **DBE Participation for Contract Goal Credit** section of this Special Provision. To perform a CUF the DBE firm alone shall be responsible and bear the risk for the material and supplies used on the contract, selecting a supplier or dealer from those available, negotiating price, determining quality and quantity, ordering the material and supplies, installing those materials with the DBE firm's own forces and equipment, and paying for those materials and supplies. The amount the DBE firm is to be paid under the subcontract shall be commensurate with the work the DBE actually performs and the DBE goal credit claimed for the DBE firm's performance.

Monitoring CUF Performance: It shall be the Design-Builder's responsibility to confirm that all DBE firms selected for subcontract work on the contract, for which he seeks to claim credit toward the DBE goal, perform a CUF. Further, the Design-Builder is responsible for and shall confirm that each DBE firm fully performs the DBE firm's designated tasks in accordance with the provisions of the **DBE Participation for Contract Goal Credit** section of this Special Provision. For the purposes of this Special Provision the DBE firm's equipment will mean either equipment directly owned by the DBE as evidenced by title, bill of sale or other such documentation, or leased by the DBE firm, and over which the DBE has control as evidenced by the leasing agreement from a firm not owned in whole or part by the Design-Builder or an affiliate of the Design-Builder.

Department will monitor Design-Builder's DBE involvement during the performance of the contract. However, Department is under no obligation to warn the Design-Builder that a DBE firm's participation will not count toward the goal.

DBE Firms Must Perform a Useful and Necessary Role in Contract Completion:

A DBE firm does not perform a CUF if the DBE firm's role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE firm participation.

DBE Firms Must Perform The Contract Work With Their Own Workforces:

If a DBE firm does not perform and exercise responsibility for at least thirty (30) percent of the total cost of the DBE firm's contract with the DBE firm's own work force, or the DBE firm subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involve, Department will presume that the DBE firm is not performing a CUF and such participation will not be counted toward the DBE goal.

Department Makes Final Determination On Whether a CUF Is Performed:

Department has the final authority to determine, in its sole discretion, whether a DBE firm has performed a CUF on the contract. To determine whether a DBE is performing or has performed a CUF, Department will evaluate the amount of work subcontracted by that DBE firm or performed by other firms and the extent of the involvement of other firms' forces and equipment. Any DBE work performed by the Design-Builder or by employees or equipment of the Design-Builder shall be subject to disallowance under the DBE Program, unless the independent validity and need for such an arrangement and work is demonstrated. When a DBE firm is presumed not to be performing a commercially useful function the DBE may present evidence to rebut the Department's finding. Department has the final authority to determine, in its sole discretion, whether a DBE firm has performed a CUF on the contract.

H. Verification of DBE Participation and Imposed Damages

Within fourteen (14) days after subcontract execution between Design-Builder and DBE subcontractors (or subcontract execution between DBE subcontractors and DBE subcontractors), Design-Builder shall submit to the DCRO, a copy of the fully executed subcontract agreement for each DBE firm used to claim credit in accordance with the requirements stated on Form C-111. The subcontract shall be executed by both parties stating the work to be performed, the details or specifics concerning such work, and the price which will be paid to the DBE subcontractor. Because of the commercial damage that the Design-Builder and its DBE subcontractor could suffer if their subcontract pricing, terms, and conditions were known to competitors, the Department staff will treat subcontract agreements as proprietary Design-Builder trade secrets with regard to Freedom of Information Act requests. In lieu of subcontracts, purchase orders may be submitted for haulers, suppliers, and manufacturers. These too, will be treated confidentially and protected. Such purchase orders must contain, as a minimum, the following information: authorized signatures of both parties; description of the scope of work to include contract item numbers, quantities, and prices; and required federal contract provisions.

The Design-Builder shall also furnish, and shall require each subcontractor to furnish, information relative to all DBE involvement on the project for each quarter during the life of the contract in which participation occurs and verification is available. The information shall be indicated on Form C-63, DBE and SWAM Payment Compliance Report. The Department reserves the right to request proof of payment via copies of cancelled checks with appropriate identifying notations. Failure to provide Form C-63

to the DCRO within five (5) business days after the reporting period may result in delay of approval of the Design-Builder's monthly payment. The names and certification numbers of DBE firms provided by the Design-Builder on the various forms indicated in this Special Provision shall be exactly as shown on SBSD's latest list of certified DBEs. Signatures on all forms indicated herein shall be those of authorized representatives of the Design-Builder as shown on the Prequalification Application, Form C-32 or the Prequalification/Certification Renewal Application, Form C-32A, or authorized by letter from the Design-Builder. If DBE firms are used which have not been previously documented with the Design-Builder's minimum DBE requirements documentation and for which the Design-Builder now desires to claim credit toward the contract goal, the Design-Builder shall be responsible for submitting necessary documentation in accordance with the procedures stipulated in this Special Provision to cover such work prior to the DBE firm beginning work. Form C-63 can be obtained from the VDOT website at: <http://vdotforms.vdot.virginia.gov/>

Design-Builder shall submit to the Department's Project Manager with a copy to the DCRO, a narrative with each project schedule submission, as required in the Special Provision for Design-Build Project Schedule (Part 3, Exhibit 11.1). The project schedule narrative shall include a log of applicable DBE participation activities in the Design-Builder's project schedule for which the Design-Builder intends to claim credit for attaining the DBE goal required in the contract. The log shall include the proposed start/finish dates, durations, and dollar values of the DBE participation activities.

Narratives or other agreeable format of schedule information requirements and subsequent progress determination shall be based on the commitment information shown on the latest Form C-111 as compared with the appropriate Form C-63.

Prior to beginning any major component of the work to be performed by a DBE firm not previously submitted, Design-Builder shall furnish a revised Form C-111 showing the name(s) and certification number(s) of any such DBEs for which Design-Builder seeks DBE goal credit. Design-Builder shall obtain the prior approval of the Department for any assistance it may provide to the DBE firm beyond its existing resources in executing its commitment to perform the work in accordance with the requirements listed in the **Good Faith Efforts Described** section of this Special Provision. If Design-Builder is aware of any assistance beyond a DBE firm's existing resources that Design-Builder, or another subcontractor, may be contemplating or may deem necessary and that have not been previously approved, Design-Builder shall submit a new or revised narrative statement for Department's approval prior to assistance being rendered.

If the Design-Builder fails to correctly complete and any of the required documentation requested by this Special Provision within the specified time frames, the Department will withhold payment until such time as the required submissions are received by Department. Where such failures to provide required submittals or documentation are repeated, Department will move to enjoin the Design-Builder and any prime contractual affiliates, as in the case of a joint venture, from bidding, responding or participating Department projects until such submissions are received.

I. Documentation Required for Semi-final Payment

Design-Builder must submit Form C-63 to the DCRO sixty (60) days prior to date of final completion, set forth on the Baseline Schedule (as updated from time to time in accordance with the contract). The form must include each DBE firm used on the contract and the work performed by each DBE firm. The form shall include the actual dollar amount paid to each DBE firm for the accepted creditable work. The form shall be certified under penalty of perjury, or other applicable legal requirements, to be accurate and complete. Department will use this certification and other information available to determine applicable DBE credit allowed to date by Department and the extent to which the DBE firms were fully paid for that work. The Design-Builder acknowledges by the act of filing the form that the information is supplied to obtain payment regarding the contract as a federal participation contract. A letter of certification, signed by both the Design-Builder and appropriate DBE firms, will accompany the form, indicating the amount, including any retainage, if present, that remains to be paid to the DBE firm(s).

J. Documentation Required for Final Payment

In anticipation of final payment, Design-Builder shall submit a final Form C-63 marked "Final" to the DCRO, within thirty (30) days of the anticipated date of final completion, as set forth on the Baseline Schedule (as updated from time to time in accordance with the contract). The form must include each DBE firm used on the contract and the work performed by each DBE firm. The form shall include the actual dollar amount paid to each DBE firm for the creditable work. Department will use this form and other information available to determine if Design-Builder and DBE firms have satisfied the DBE goal and the extent to which credit was allowed. Design-Builder acknowledges by the act of signing and filing the form that the information is supplied to obtain payment regarding the contract as a federal participation contract.

K. Prompt Payment Requirements

Design-Builder shall make prompt and full payment to the subcontractor(s) (including DBE subcontractors) of any retainage held by Design-Builder after the subcontractor's work is satisfactorily completed.

For purposes of this Special Provision, a subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished, documented, and accepted as required by the contract documents by Department. If Department has made partial acceptance of a portion of the contract, then Department will consider the work of any subcontractor covered by that partial acceptance to be satisfactorily completed. Payment will be made in accordance with the requirements of Section 107.01, Section 109.08, and Section 109.09 of the Division I Amendments to the Standard Specifications (Part 5).

Upon Department's payment of the subcontractor's portion of the work as shown on the application for payment and the receipt of payment by Design-Builder for such work, the Design-Builder shall make compensation in full to the subcontractor for that portion of the work satisfactorily completed and accepted by the Department. For the purposes of this Special Provision, payment of the subcontractor's portion of the work shall mean the Design-Builder has issued payment in full, less agreed upon retainage,

if any, to the subcontractor for that portion of the subcontractor's work that Department paid to Design-Builder pursuant to the applicable application for payment.

Design-Builder shall make payment of the subcontractor's portion of the work within seven (7) days of the receipt of payment from Department in accordance with the requirements of Section 107.01, Section 109.08, and Section 109.09 of the Division I Amendments to the Standard Specifications (Part 5).

If Design-Builder fails to make payment for the subcontractor's portion of the work within the time frame specified herein, the subcontractor shall notify the Department and the Design-Builder's bonding company in writing. Upon written notice from the subcontractor, the Design-Builder's bonding company and Department will investigate the cause for non-payment. Barring mitigating circumstances that would make the subcontractor ineligible for payment, the Design-Builder's bonding company shall be responsible for insuring payment to the subcontractor in accordance with the applicable requirements of Section 107.01, Section 109.08, and Section 109.09 of the Division I Amendments to the Standard Specifications (Part 5).

By accepting and executing this contract, the Design-Builder agrees to assume these obligations, and to bind the Design-Builder's subcontractors contractually to these obligations.

Nothing contained herein shall preclude Design-Builder from withholding payment to the subcontractor in accordance with the terms of the subcontract in order to protect the Design-Builder from loss or cost of damage due to a breach of the subcontract by the subcontractor.

L. Miscellaneous DBE Program Requirements

Loss of DBE Eligibility: When a DBE firm has been removed from eligibility as a certified DBE firm, the following actions will be taken:

1. When a Design-Builder has made a commitment to use a DBE firm that is not currently certified, thereby making the Design-Builder ineligible to receive DBE goal credit for work performed, the ineligible DBE firm's work does not count toward the DBE goal. Design-Builder shall meet the DBE goal with a DBE firm that is eligible to receive DBE credit for work performed, or must demonstrate to the DCRO that it has made good faith efforts to do so.
2. When a Design-Builder has executed a subcontract with a DBE firm prior to official notification of the DBE firm's loss of eligibility, Design-Builder may continue to use the firm on the contract and shall continue to receive DBE credit toward DBE goal for the subcontractor's work.
3. When Department has executed a prime contract with a DBE firm that is certified at the time of contract execution but that is later ruled ineligible, the portion of the ineligible firm's performance on the contract before VDOT has issued the notice of its ineligibility shall count toward the contract goal.

Termination of DBE: If a DBE subcontractor is terminated, or fails, refuses, or is unable to complete the work on the contract for any reason, Design-Builder

must promptly request approval to substitute or replace that DBE firm in accordance with this section of this Special Provision.

Design-Builder, shall notify DCRO in writing before terminating and/or replacing the DBE firm that is being used or represented to fulfill DBE-related contract obligations during the term of the contract. Written consent from the DCRO for terminating the performance of any DBE firm shall be granted only when the Design-Builder can demonstrate that the DBE firm is unable, unwilling, or ineligible to perform its obligations for which the Design-Builder sought credit toward the DBE goal. Such written consent by the Department to terminate any DBE shall concurrently constitute written consent to substitute or replace the terminated DBE with another DBE. Consent to terminate a DBE firm shall not be based on the Design-Builder's ability to negotiate a more advantageous contract with another subcontractor whether that subcontractor is, or is not, a DBE firm.

4. All Design-Builder requests to terminate, substitute, or replace a DBE firm shall be in writing, and shall include the following information:
 - (a) The date the Design-Builder determined the DBE to be unwilling, unable, or ineligible to perform.
 - (b) The projected date that the Design-Builder shall require a substitution or replacement DBE to commence work if consent is granted to the request.
 - (c) A brief statement of facts describing and citing specific actions or inaction by the DBE firm giving rise to Design-Builder's assertion that the DBE firm is unwilling, unable, or ineligible to perform;
 - (d) A brief statement of the DBE firm's capacity and ability to perform the work as determined by the Design-Builder;
 - (e) A brief statement of facts regarding actions taken by the Design-Builder, that Design-Builder believes constitute good faith efforts toward enabling the DBE firm to perform;
 - (f) The current percentage of work completed by the DBE firm;
 - (g) The total dollar amount currently paid for work performed by the DBE firm;
 - (h) The total dollar amount remaining to be paid to the DBE firm for work completed, but for which the DBE firm has not received payment, and with which the Design-Builder has no dispute;
 - (i) The total dollar amount remaining to be paid to the DBE firm for work completed, but for which the DBE firm has not received payment, and over which the Design-Builder and/or the DBE firm have a dispute.
5. Design-Builder's Written Notice to DBE of Pending Request to Terminate and Substitute with another DBE.

Design-Builder shall send a copy of the “request to terminate and substitute” letter to the affected DBE firm and make best efforts to ensure its receipt by the DBE firm, in conjunction with submitting the request to the DCRO. The DBE firm may submit a response letter to the DCRO and Department within two (2) business days of receiving the notice to terminate from the Design-Builder. If the DBE firm submits a response letter, then Design-Builder shall, as part of its subcontract, obligate the DBE firm to explain its position concerning performance on the committed work. The Department will consider both the Design-Builder’s request and the DBE firm’s response and explanation before approving the Design-Builder’s termination and substitution request.

If, after making its best efforts to deliver a copy of the “request to terminate and substitute” letter, the Design-Builder is unsuccessful in notifying the affected DBE firm, the Department will verify that the DBE firm is unable or unwilling to continue performing its subcontract let with respect to the contract. Department will timely approve the Design-Builder’s request for a substitution.

6. Proposed Substitution of Another Certified DBE

Upon termination of a DBE firm, Design-Builder shall use reasonable good faith efforts to replace the terminated DBE firm. The termination of such DBE firm shall not relieve Design-Builder of its obligations under this Special Provision, and the unpaid portion of the terminated DBE firm’s subcontract will not be counted toward the DBE goal.

When a DBE substitution is necessary, the Design-Builder shall submit an amended Form C-111 to the DCRO for approval with the name of another DBE firm, the proposed work to be performed by that DBE firm, and the dollar amount of the work to replace the unfulfilled portion of the work of the original DBE firm.

Should Design-Builder be unable to commit the remaining required dollar value to the substitute DBE firm, the Design-Builder shall provide written evidence of good faith efforts made to obtain the substitute value requirement. Department will review the quality, thoroughness, and intensity of those efforts. Efforts that are viewed by Department as merely superficial or pro-forma will not be considered good faith efforts to meet the DBE goal. Design-Builder must document the steps taken that demonstrated its good faith efforts to obtain participation as set forth in **the Good Faith Efforts Described** section of this Special Provision.

Factors Used to determine if a DBE Trucking Firm is performing a CUF:

The following factors will be used to determine whether a DBE trucking company is performing a CUF:

1. To perform a CUF, the DBE trucking firm shall be completely responsible for the management and supervision of the entire trucking operation for which the DBE trucking firm is responsible by subcontract under the contract. There shall not be a contrived arrangement, including, but not limited to, any arrangement that would not

customarily and legally exist under customary construction project subcontracting practices for the purpose of meeting the DBE goal;

2. The DBE firm must own and operate at least one fully licensed, insured, and operational truck used in the performance of the contract work. This does not include a supervisor's pickup truck or a similar vehicle that is not suitable for and customarily used in hauling the subject materials or supplies;
3. Design-Builder is eligible to receive full credit toward the DBE goal for the total reasonable amount the DBE firm is paid for the transportation services provided on the subcontract under the contract using acceptable trucks the DBE firm owns, insures, and operates using drivers that the DBE employs and manages;
4. The DBE trucking firm may lease trucks from another DBE firm, including from an owner-operator who is a DBE firm. Design-Builder is eligible to receive credit for the total fair market value actually paid for transportation services the lessee DBE firm provides to the DBE firm that leases trucks from such lessee DBE firm on the contract;
5. The DBE firm may also lease trucks from a non-DBE firm, including an owner-operator. Design-Builder may be eligible to receive DBE goal credit for the services of a DBE firm who leases trucks from a non-DBE firm up to the total value of the transportation services provided by non-DBE lessees, not to exceed the value of transportation services provided by DBE-owned trucks on the contract. For additional participation by non-DBE lessees, the DBE will only receive credit for the fee or commission it receives as a result of the lease arrangement.

Truck Counting

Design-Builders may count for credit against the DBE goal the dollar volume attributable to no more than twice the number of trucks owned by a DBE firm or leased from another DBE firm.

As an example, DBE credit would be awarded for the total transportation services provided by DBE Firm X and DBE Firm Y, and may also be awarded for the total value of transportation services by four (4) of the six (6) trucks provided by non-DBE Firm Z (not to exceed the value of transportation services provided by DBE-owned trucks).

Value of Transportation Services (For Illustrative Purposes Only)

Firm X

Truck 1	Owned by DBE	\$100 per day
Truck 2	Owned by DBE	\$100 per day

Value of Transportation Services
(For Illustrative Purposes Only)

Firm Y

Truck 3	Leased from DBE	\$110 per day
Truck 4	Leased from DBE	\$110 per day

Firm Z

Truck 1	Leased from Non-DBE	\$125 per day
Truck 2	Leased from Non-DBE	\$125 per day
Truck 3	Leased from Non-DBE	\$125 per day
Truck 4	Leased from Non-DBE	\$125 per day
Truck 5	Leased from Non-DBE*	\$125 per day
Truck 6	Leased from Non-DBE*	\$125 per day

DBE credit would be awarded for the total transportation services provided by DBE firm X and DBE Firm Y, and may also be awarded for the total value of transportation services by four (4) of the six (6) trucks provided by non-DBE Firm Z (not to exceed the value of transportation services provided by DBE-owned trucks).

Credit = 8 Trucks

Total Value of Transportation Services = \$820.00

In all, full DBE credit would be allowed for the participation of eight (8) trucks (twice the number of DBE trucks owned and leased) and the dollar value attributable to the Value of Transportation Services provided by the eight (8) trucks.

* With respect to the other two trucks provided by non-DBE Firm Z, DBE credit could be awarded only for the fees or commissions pertaining to those trucks that DBE Firm X receives as a result of the lease with non-DBE Firm Z.

1. For purposes of this section, the lease must indicate that the DBE firm leasing the truck has exclusive use of and control over the truck. This will not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, provided the lease gives the DBE absolute priority for and control over the use of the leased truck. Leased trucks must display the name

and identification number of the DBE firm that has leased the truck at all times during the life of the lease.

M. Suspect Evidence of Criminal Behavior

Failure of Design-Builder or any subcontractor to comply with the Standard Specifications, this Special Provision, or any other contract document wherein there appears to be evidence of criminal conduct shall be referred to the Attorney General for the Commonwealth of Virginia and/or the FHWA Inspector General for criminal investigation and, if warranted prosecution.

Suspected DBE Fraud

In appropriate cases, Department will bring to the attention of the United States Department of Transportation any appearance of false, fraudulent, or dishonest conduct in connection with the DBE program, so that USDOT can take the steps, e.g., referral to the Department of Justice for criminal prosecution, referral to the USDOT Inspector General, action under suspension and debarment or “Program Fraud and Civil Penalties” rules provided in 49 CFR Part 31.

ATTACHMENT 2

VIRGINIA DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION FOR SECTION 107.15 USE OF SMALL, WOMEN-OWNED, AND MINORITY-OWNED BUSINESSES (SWaM) FOR DESIGN-BUILD PROJECTS

January 4, 2017

It is the policy of the Department that Small, Women-Owned, and Minority-Owned Businesses (SWaMs) shall have the maximum opportunity to participate in the performance of the Contract. The Contractor is encouraged to take necessary and reasonable steps to ensure that SWaMs have the maximum opportunity to compete for and perform work on the Contract, including participation in any subsequent subcontracts.

A SWaM firm shall mean a small business concern (as defined pursuant to the Code of Virginia, Title 2.2-1401 for the purpose of reporting small, women-owned, and minority-owned business participation in state contracts and purchases pursuant to §§ 2.2-1404 and 2.2-1405. To that end the following terms shall apply:

Small business means an independently owned and operated business which, together with affiliates, has 250 or fewer employees, or average annual gross receipts of \$10 million or less.

Women-owned business means a business concern that is at least 51% owned by one or more women who are U.S. citizens or legal resident aliens, or in the case of a corporation, partnership, or limited liability company or other entity, at least 51% of the equity ownership interest is owned by one or more women who are citizens of the United States or non-citizens who are in full compliance with the United States immigration law, and both the management and daily business operations are controlled by one or more women who are U.S. citizens or legal resident aliens.

Minority-owned business means a business concern that is at least 51% owned by one or more minority individuals or in the case of a corporation, partnership, or limited liability company or other entity, at least 51% of the equity ownership interest in the corporation, partnership, or limited liability company or other entity is owned by one or more minority individuals and both the management and daily business operations are controlled by one or more minority individuals.

Minority individual means an individual who is a citizen of the United States or a non-citizen who is in full compliance with United States immigration law and who satisfies one or more of the following definitions:

1. African American means a person having origins in any of the original peoples of Africa and who is regarded as such by the community of which this person claims to be a part.
2. Asian American means a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands, including but not limited to Japan, China, Vietnam, Samoa, Laos, Cambodia, Taiwan, Northern Mariana, the Philippines, a U.S. territory of the Pacific, India,

Pakistan, Bangladesh, or Sri Lanka and who is regarded as such by the community of which this person claims to be a part.

3. Hispanic American means a person having origins in any of the Spanish-speaking peoples of Mexico, South or Central America, or the Caribbean Islands or other Spanish or Portuguese cultures and who is regarded as such by the community of which this person claims to be a part.
4. Native American means a person having origins in any of the original peoples of North America and who is regarded as such by the community of which this person claims to be a part or who is recognized by a tribal organization.
5. A member of another group, or other individual, found to be economically and socially disadvantaged by the Small Business Administration under 8(a) of the Small Business Act as amended (15 U.S.C. 637(a)).

State agency means any authority, board, department, instrumentality, institution, agency, or other unit of state government. "State agency" shall not include any county, city, or town.

A list of Virginia Department of Small Business and Supplier Diversity (SBSD) certified SWaM firms is maintained on the SBSBD web site (<http://www.sbsd.virginia.gov>) under the **SWaM Vendor Directory** link.

SWaM certification entitles firms to participate in VDOT's SWaM program; however, this certification does not guarantee that the firm will obtain work nor does it attest to the firm's abilities to perform any particular work.

The Contractor shall designate and make known to the Department a liaison officer who is assigned the responsibility of actively and effectively administering, encouraging and promoting a responsive program for the use of SWaMs.

The performance of the Contract for the purpose of this specification shall be interpreted to include, but not necessarily be limited to, subcontracting; furnishing materials, supplies, and services; and, leasing equipment or where applicable, any combination thereof.

If the Contractor intends to sublet a portion of the work on the project in accordance with the provisions of Section 105.06 of the Specifications, the Contractor is encouraged to seek out and consider SWaMs as potential subcontractors. The Contractor is encouraged to contact SWaMs to solicit their interest, capability, and prices and shall retain on file the proper documentation to substantiate such contacts.

If the Department has determined that specific opportunities for participation by SWaMs are available on a particular Contract and the bidder chooses to claim credit for SWaM participation, the extent of such participation will be shown as a percentage of the Contract amount and will be indicated on Form C-111, *SWaM Participation*.

Design Phase: Thirty (30) days after the Notice to Proceed for Design, the Design-Builder shall submit to the Department for review and approval Forms C-111 and C-112 for each SWaM firm to be utilized during the design phase to meet the SWaM contract goal requirement. Failure to submit the required documentation within the specified timeframe shall be cause to

deny credit for any work performed by a SWaM firm and delay approval of the Design-Builder's monthly payment.

Construction Phase: No later than thirty (30) days prior to the SWaM firm undertaking any work, the Design-Builder shall submit to the Department for review and approval Forms C-111, and C-112. Failure to submit the required documentation within the specified timeframe shall result in disallowed cred of any work performed prior to approval of Forms C-111 and C-112 and delay approval of monthly payment.

The following are examples of efforts the Department encourages bidders and Contractors to make in soliciting SWaM participation. Other factors or types of efforts may be relevant in appropriate cases. The Contractor is encouraged to:

- (a) attend any pre-solicitation or pre-bid meetings at which SWaMs could be present and/or informed of contracting and subcontracting opportunities;
- (b) advertise in general circulation, trade association and minority-focus media concerning the subcontracting opportunities;
- (c) provide written notice to a reasonable number of specific SWaMs that their interest in the Contract is being solicited in sufficient time to allow the SWaMs to participate effectively;
- (d) follow-up initial solicitations of interest by contacting SWaMs to determine with certainty whether the SWaMs are interested;
- (e) select portions of the work to be performed by SWaMs in order to increase the likelihood of obtaining SWaM participation (including, where appropriate, breaking down proposed contract work into economically feasible units to facilitate SWaM participation);
- (f) provide interested SWaMs with adequate information about the plans, Specifications, and requirements of the Contract
- (g) negotiate in good faith with interested SWaMs, not rejecting SWaMs as unqualified without sound reasons based on a thorough investigation of their capabilities;
- (h) make efforts to assist interested SWaMs in obtaining bonding, lines of credit, or insurance required by the Department or Contractor;
- (i) make efforts to assist interested SWaMs in obtaining necessary equipment, supplies, materials, or other necessary or related assistance or services; and,
- (j) effectively use the services of available minority, woman and small business community organizations; minority, woman and small business contractors' groups; local, state and federal minority, woman and small business assistance offices; and other organizations that provide assistance in the recruitment and placement of SWaMs.

Any agreement between the Design-Builder and a SWaM firm whereby the SWaM firm agrees not to provide quotations for performance of work to other contractors/consultants is prohibited.

The Design-Builder shall furnish, and require each subcontractor to furnish, on a quarterly basis, information relative to all SWaM involvement on the project. The information shall be indicated on Form C-63, DBE and SWAM Payment Compliance Report or by copies of canceled checks with appropriate identifying notations. If participation achievement is to be fulfilled with a SWaM whose name has not been previously furnished to the Department for the Contract in question, an initial or revised Form C-111, whichever is appropriate, shall be submitted prior to such SWaM beginning the work. Failure to provide the Department the forms by the fifth of the month following each quarterly reporting period may result in delay of the Design-Builders estimate for payment.

If a SWaM, through no fault of the Contractor, is unable or unwilling to fulfill his agreement with the Contractor, the Contractor shall immediately notify the Department and provide all relevant facts. If any subcontractor is relieved of the responsibility to perform work under their subcontract, the Contractor is encouraged to take the appropriate steps to obtain a SWaM to perform an equal or greater dollar value of the remaining subcontracted work. The substitute SWaM's name, description of the work, and dollar value of the work shall be submitted to the Department on Form C-111 prior to such SWaM beginning the work, if such work is to be counted for participation achievement.

EXHIBIT D

SPECIAL PROVISIONS

MASTER LIST

No.	Doc. No.	Title	Revision Date
1	-	Opitz Project TMS Special Provisions	Jul 15, 2020
2	-	Opitz Project Sustainability Special Provisions	-
3	-	Prince William County Contract Special Provisions	-
4	-	Not Used	-
5	-	VDOT 2020 Road and Bridge Specs – Payment for Material on Hand (Section 109.09)	-
6	-	Not Used	-
7	-	VDOT Special Provision for Soldier Pile Retaining Walls	Dec 20, 2018
8	-	Not Used	-
9	-	VDOT Special Provision for Quality Assurance/Quality Control (QA/QC) for the Construction of Deep Foundation Systems	Dec 20, 2018
10	-	VDOT Special Provision for Mechanically Stabilized Earth Walls (Concrete Panel Facing)	Feb 2, 2017
11	-	VDOT Special Provision for Dismantling and Removing Existing Structures or Removing Portions of Existing Structures	Dec 20, 2018
12	-	VDOT General Notes for Alternate Retaining Wall Plans	Apr 10, 2009
13	-	VDOT Guidelines for Preparation of Alternate Retaining Wall Plans	Mar 6, 2008
14	-	VDOT Special Provision for Architectural Finish, Concrete Form Liners and Color Stain Coating	Apr 29, 2021
15	SP109-000100-03	VDOT Special Provision for Asphalt Material Price Adjustment	Sep 6, 2019
16	SP109-000110-00	VDOT Special Provision for Optional Adjustment for Fuel	Jul 12, 2016
17	SS200-002020-03	VDOT 2020 Road and Bridge SS - General	Aug 25, 2020
18	SS202-002020-01	VDOT 2020 Road and Bridge SS - Fine Aggregate	Sep 23, 2019
19	SS203-002020-01	VDOT 2020 Road and Bridge SS - Coarse Aggregate	Sep 19, 2019
20	SS204-002020-01	VDOT 2020 Road and Bridge SS - Stone for Masonry, Riprap, Porous Backfill, and Gabions	Feb 22, 2019
21	SS206-002020-01	VDOT 2020 Road and Bridge SS - Lightweight Aggregate	Sep 23, 2019
22	SS210-002020-01	VDOT 2020 Road and Bridge SS - Asphalt Materials	May 19, 2020
23	SS211-002020-01	VDOT 2020 Road and Bridge SS - Asphalt Concrete	Aug 20, 2020

No.	Doc. No.	Title	Revision Date
24	SP217-000120-00	VDOT Special Provision for Mass Concrete	Mar 19, 2020
25	SS217-002020-01	VDOT 2020 Road and Bridge SS - Hydraulic Cement Concrete	Sep 27, 2019
26	SS223-002020-01	VDOT 2020 Road and Bridge SS - Steel Reinforcement	Jul 3, 2019
27	SS226-002020-01	VDOT 2020 Road and Bridge SS - Structural Steel	Sep 27, 2019
28	SS237-002020-01	VDOT 2020 Road and Bridge SS – Structure Bedding Material and Bearing Pads	Jul 27, 2020
29	SS245-002020-01	VDOT 2020 Road and Bridge SS – Geosynthetics and Low Permeability Liners	Apr 30, 2020
30	SS246-002020-01	VDOT 2020 Road and Bridge SS – Pavement Marking	Aug 23, 2020
31	SP302-000140-01	VDOT Special Provision for Pipe Rehabilitation	Nov 7, 2016
32	SS305-002020-01	VDOT 2020 Road and Bridge SS – Subgrade and Shoulders	Jun 2, 2020
33	cn315-000100-00	CN for Placing and Finishing	Jan 18, 2017
34	SS315-002020-01	VDOT 2020 Road and Bridge SS – Asphalt Concrete Placement	Sep 17, 2020
35	SS316-002020-01	VDOT 2020 Road and Bridge SS – Hydraulic Cement Concrete Pavement	Sep 2, 2020
36	SS319-002020-01	VDOT 2020 Road and Bridge SS – Thin Hot Mix Asphalt Concrete Overlay	Jul 6, 2020
37	SS320-002020-01	VDOT 2020 Road and Bridge SS – BM-25.0D with Increased Asphalt Content	Jul 6, 2020
38	SS321-002020-01	VDOT 2020 Road and Bridge SS – Trench Widening	May 26, 2020
39	SS322-002020-01	VDOT 2020 Road and Bridge SS – Asphalt Surface Preparation and Overlay	Sep 9, 2020
40	SS323-002020-01	VDOT 2020 Road and Bridge SS – Asphalt Patching of Existing Flexible and Rigid Pavement and Shoulders	Sep 9, 2020
41	SP401-000100-01	VDOT Special Provision for Clearing and Grubbing at Bridge Approaches	Feb 28, 2018
42	SS401-002020-01	VDOT 2020 Road and Bridge SS – Structure Excavation	May 1, 2020
43	SS405-002020-01	VDOT 2020 Road and Bridge SS – Prestressed Concrete	Jun 23, 2020
44	SS406-002020-01	VDOT 2020 Road and Bridge SS – Reinforcing Steel	Jun 22, 2020
45	SS407-002020-01	VDOT 2020 Road and Bridge SS – Steel and Other Metal Structures	Aug 29, 2019
46	SS410-002020-01	VDOT 2020 Road and Bridge SS – Railings and Parapets	Jan 4, 2021
47	SS412-002020-01	VDOT 2020 Road and Bridge SS – Widening, Repairing, and Reconstructing Existing Structures	May 11, 2020
48	SP505-000200-00	VDOT Special Provision for Guardrail Terminal Site Preparation	Oct 2, 2020
49	cq512-000321-00	CQ for Contractor Maintenance of Temporary Markings	Jun 13, 2017
50	SP512-000140-00	VDOT Special Provision for Installation of Work Zone No Handheld Communication Devices Signs	Mar 18, 2020

No.	Doc. No.	Title	Revision Date
51	SS512-002020-02	VDOT 2020 Road and Bridge SS – Maintaining Traffic	Sep 22, 2020
52	SP515-000100-00	VDOT Special Provision for Cold Planing (Milling) Asphalt Concrete Operation	Jul 12, 2016
53	SS520-002020-01	VDOT 2020 Road and Bridge SS – Water and Sanitary Sewer Facilities	Apr 14, 2020
54	cq522-000100-03	CQ for Protection of Bat Species	Jan 17, 2018
55	cq522-000110-00	CQ for Abatement of Asbestos Containing Materials	Nov 5, 2018
56	SP522-000240-00	VDOT Special Provision for Removal of Asbestos from Bridge Structures	Sep 12, 2017
57	SS700-002020-01	VDOT 2020 Road and Bridge SS – General	Jul 17, 2020
58	SS701-002020-01	VDOT 2020 Road and Bridge SS – Traffic Signs	Oct 20, 2020
59	SP703-000100-00	VDOT Special Provision for Mast Arm Hanger Assembly STD SM-3 and SMD-2	Jul 12, 2016
60	SP703-000110-00	VDOT Special Provision for Replacement of Loop Detectors	Mar 16, 2017
61	SP704-000120-00	VDOT Special Provision for Inlaid Pavement Markers	Aug 26, 2019
62	SS704-002020-01	VDOT 2020 Road and Bridge SS – Pavement Markings and Markers	Sep 3, 2020
63	SP705-000100-00	VDOT Special Provision for Light Emitting Diode (LED) Luminaires	Jul 27, 2018
64	SP801-000100-01	VDOT Special Provision for Lane Closure Coordination (LCC) and Lane Closure Implementation (LCI)	Sep 20, 2017
65	SP102-000510-02	VDOT Special Provision for Use of Domestic Material	Dec 19, 2018

**Traffic Management System (TMS)
Special Provisions**

TMS SPECIAL PROVISIONS

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**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 238—ELECTRICAL AND SIGNAL COMPONENTS
(OPITZ PROJECT TMS)**

July 15, 2020

Section 238 – Electrical and Signal Components is amended as follows:

238.02 (a) is amended to include the following:

Liquid-tight flexible metallic conduit shall meet the requirements of UL 360.

238.02 (f) is amended to include the following:

In bridge parapets, barriers, and similar structures, bolts and machine screws used to secure the lid to the box must have hexagonal heads.

Boxes for power cables shall meet the requirements for Type R junction boxes except that they need not have bottoms.

238.02 (g) 2 is amended to include the following:

- e. **Copper communication cable between Traffic Management System cabinets** shall comply with IMSA specification 59-2 or 60-2 and shall use 19-gauge wire unless otherwise noted on the plans.

238.02 (h) is amended to add the following:

- 30. **Cable end caps** used on electrical and communication cables shall meet the requirements of 238.02(h)27.

238.02 is amended to add the following:

- (i) **Innerduct** shall be three-inch, three-cell textile innerduct composed of nylon and polyester. It shall have a factory-installed pull tape in each duct and shall meet the following requirements:
 - 1. Breaking strength (ASTM D2256): 2,530 pounds.
 - 2. Coefficient of friction using HDPE cable and no additional lubricant (ASTM D4518): 0.12 maximum.
 - 3. Hydrocarbon resistance (Bellcore 356 4.3.2): 7.5% maximum tensile loss.
 - 4. Print durability: Meets Bellcore 356 5.3.5.
- (j) **Duct Plugs** shall be removable and reusable. They shall incorporate compression gaskets to form a watertight and gastight seal. They shall have an eye for attaching a pull tape to the plug on the face that is inside the conduit. Identical duct plugs may be used for conduit ends underground in junction boxes and exposed conduit stubs at sign structures.
- (k) **Labels.**
 - 1. Labels for cables. Use self-laminating vinyl labels at least 1.5 inches wide and long enough that the translucent portion of the label completely covers the white area bearing the legend. The vinyl shall be 0.004 inches thick with a 0.00059-inch layer of pressure sensitive acrylic adhesive. The labels shall resist oil, water, and solvents and shall be self-extinguishing. The legend shall be machine printed in letters at least 0.08 inches high. Prior to labeling any cables, submit a sample of the proposed material to the Engineer for approval. The samples shall be imprinted with a typical cable ID.

2. Labels for pigtails. Use white, self-adhesive polypropylene labels applied as flags near the connector. The area available for the text shall be at least 1" by $\frac{3}{4}$ " and the area in adhered to the jumper shall be at least 0.25 square inches.
3. Labels for jumpers shall be self-adhesive vinyl wire markers preprinted with letters.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 510—RELOCATING OR MODIFYING EXISTING MISCELLANEOUS ITEMS
(OPITZ PROJECT TMS)**

July 15, 2020

Section 510 – Relocating or Modifying Existing Miscellaneous Items is amended as follows:

510.03 – Procedures is amended to include the following:

All work related to relocating or modifying existing miscellaneous items shall be in compliance with the requirements of the Technical Requirements and related addenda and the provisions set forth in this Section.

Modification of existing cables includes labeling the cables and sealing the ducts in accordance with Section 700.05. It also includes distributing the cable slack equally among the junction boxes and manholes through which the installed cable passes and storing the slack neatly on the hooks in the boxes and manholes. At no additional cost, replace cables that are damaged during removal and reinstallation. Proper operation and visual inspection of the cable will be adequate proof that the cable is undamaged. If a cable appears to be damaged prior to removal, do not remove it until the Engineer has inspected the cable and decided whether it should be reused. Similarly, if an existing cable appears damaged prior to installation, do not install it until the Engineer has determined that it is fit for installation.

Prior to relocating or modifying a cabinet, prepare a table or diagram of the existing fiber splices and connections in that cabinet. Replicate those splices and connections in the new location if the connection diagrams in the plans do not indicate otherwise.

Before relocating a cabinet, inspect it for damage. Bring any defects to the attention of the Engineer. The Engineer will then determine how to proceed. After relocation, repair or replace any damage occurring during the relocation. At the new location, provide lifetime silicone sealant on the bottom surface of the base adapter to seal the gap between the adapter and the foundation.

Foundation removal, which is part of cabinet and generator relocation, entails complete demolition of the existing concrete foundation to a depth of at least 2 ft. below grade and proper disposal of the resulting debris. Cap the conduits to prevent entry of water and rodents. Unless the foundation area is to be paved, it also entails provision of clean fill, compaction, application of 2 in. of Class B topsoil, and seeding with a grass seed mix appropriate for the location.

Relocation of electrical equipment entails testing the equipment prior to relocation to confirm that the equipment is working. If it is not working, demonstrate that fact to the Engineer's representative. The Engineer will then determine how to proceed. It also entails testing the relocated equipment using the same procedures developed for new equipment. For detectors and cameras, the work includes the same setup activities as for new installations. For dynamic message signs, the work includes all setup and testing recommended by the manufacturer of that equipment. For all relocated equipment, confirm proper communication from the HOT-OC.

Detector stations and Dynamic Message Signs, as identified on the plans, will be relocated or removed by the Contractor. Coordinate work in the area of this equipment with the Concessionaire or the Concessionaire's contractors before any work is performed.

Relocation or modification to reversible roadway gates and gate controller cabinets shall follow the provisions of Section 818.

Transitioning cabinets and service panels from VDOT operation to Express Lanes operation includes:

- Replacing the identification plaque on the cabinet with the type used for Express Lanes cabinets and modifying or replacing the lock so it uses the same keys as the other Express Lane equipment cabinets or service panels. Coordinate with the Concessionaire, to obtain information on existing locks.

- Where a new splice pedestal cabinet is provided for VDOT fiber that is removed from a cabinet transitioned to 95 Express Lanes, provide a new cabinet ID plaque as required in Section 810. Adjust the size of the plaque as needed to accommodate the size of the splice pedestal cabinet provided. Cabinet ID shall be as directed by the Engineer.
- Where an existing VDOT equipment cabinet is being converted to a splice through point only, provide a new cabinet ID plaque as required in Section 823. Cabinet ID shall be as directed by the Engineer.
- Salvaged VDOT equipment shall be returned to NRO ITS Maintenance at the NROIC Facility at 8010 Mason King Court, Manassas, VA 20109.
- Salvaged Express Lanes equipment shall be returned to Transurban Maintenance Facility at 10109 Giles Run Road, Lorton VA 22079. All returned equipment shall be coordinated with and approved by 95 Express Lanes.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 700—GENERAL
(OPITZ PROJECT TMS)**

July 15, 2020

Section 700 – General is amended as follows:

700.05 (a) is amended to replace the fourth sentence with the following:

Ground rods shall include a No. 6 bare, solid copper conductor connected to the ground rod by a clamp or exothermic weld. If that connection is not inside a cabinet or building, exothermic welding must be used. If the Plans show a larger ground wire, use the size on the Plans.

700.05 (e) is amended to add the following:

If there is a gap between the base plate and a foundation containing conduits, then wrap a strip of stainless-steel hardware cloth around the gap to keep rodents out. The hardware cloth shall extend from the top of the concrete to the top of the base plate but shall not protrude above the base plate. The hardware cloth shall have ¼" mesh and shall be held in place by a stainless steel band around the base plate. The ends of the strip shall overlap by at least six inches.

700.05 (h), seventh paragraph is replaced by the following:

Use the same type of sealant for conduits containing communication cables. At the top of occupied conduits in cabinets and pole bases, use a wad of copper wool or mesh stuffed a minimum of six inches into the conduit, blocking the path of rodents. During conduit installation, plug ducts as soon as they are installed and only remove the plug to join sections together or to pull cable through the duct. Plug the duct immediately after completing the pull. When installing conduit or cable to or through any cabinet, junction box, or manhole, ensure that all ducts are plugged, not just the ones in which work was performed.

For existing communications junction boxes replace stainless steel toggle bolts with washers and wing nuts (large enough to completely cover the openings) in communications junction boxes manhole hook openings, blocking the path of rodents.

700.05 (h), tenth paragraph, is replaced by the following:

Non-metallic VDOT conduits with non-metallic cable (fiber optic) within shall be equipped with a No. 8 locator wire.

Non-metallic Express Lanes conduits with non-metallic cable (fiber optic) shall be locatable at all times. Where Express Lanes fiber optic cable is installed in a common trench and where VDOT locator wire is already installed in the same trench, a locator wire shall not be required in the Express Lanes conduits. Where Express Lanes non-metallic cables are installed and conduit system diverges from the common trench, a locator wire shall be installed.

Where a locator wire is required to make the conduit run locatable, the wire shall be an insulated #8 AWG stranded copper wire. The insulation shall not be green in color.

700.05 (h) 2 is amended to include the following:

When boring, provide a means of collecting and containing drilling fluid/slurry that returns to the surface, such as vacuum truck or slurry pit, or a method approved by the Engineer. Provide measures to prevent drilling fluids from entering storm sewer systems. Prevent drilling fluid/slurry from accumulating on or flowing onto sidewalks, other pedestrian walkways, driveways, or streets. Immediately remove any slurry that is inadvertently deposited on pedestrian walkways. Transport waste drilling slurry from the site and dispose of it. Do not allow slurry to enter wetlands or waterways. Protect wetlands and

waterways using appropriate soil erosion control measures approved by the Engineer.

700.05 is amended to add the following:

- (l) **Blocked or Damaged Conduits:** If cable is to be installed into an existing conduit and the conduit is found to be blocked or damaged, clear the obstructions or repair the damage prior to installing cabling in existing conduits.

Conduit requiring cleaning shall be identified in writing by the Contractor. Once the Engineer provides approval for the cleaning, the Contractor shall clean the conduit. This cleaning shall be conducted in the presence of the Engineer's representative. Blockages shall be cleared by first rodding the conduit. Then, a mandrel having a diameter of at least 80 percent of the inside diameter of the conduit shall be pulled back through the conduit run. Finally, install a pull tape and plug the ends if cable will not be installed immediately.

If the blockage cannot be cleared or the conduit is crushed, propose a solution for the Engineer's approval.

- (m) **Cable Labeling:** Label every new or reinstalled cable or wire immediately upon installation. Label the cables at every point of access, including manholes, junction boxes, and termination points.

Cables for ITS Communications and Power

Cables and wires shall be labeled using the three-part ID system used for existing cables. The cable ID shall be the same at every point where the cable is labeled, from one termination or splice point to the other. The first part of the ID identifies the type of cable. The second part of the ID is the ID of a cabinet or other location where the cable is terminated or spliced. For example, 48SMF-B078 denotes a fiber optic cable with 48 single mode fiber strands that enters cabinet B078. The third part of the ID is a number assigned sequentially to differentiate between cables that have the first two parts of the ID the same. For example, 24SMF-B097-1 and 24SMF-B097-2 would be two different fiber optic cables, each made up of 24 single mode fiber strands that originate (or terminate) in Cabinet B097. Every communication cable should have a different ID. Power conductors in the same circuit, running together between the same two points, should have the same ID. Ensure that the labels accurately reflect as-built conditions.

Cables for Roadway Lighting

Cable label material and procedures shall be identical to that for ITS cables. Cable IDs shall identify the service panel, circuit number, and phase conductor.

- (n) **Textile Innerduct:** Innerduct shall be installed in all 4" Express Lanes and VDOT communications conduits that have cables installed as part of the project unless noted on the plans. Spare conduits and 2" communications conduits shall not have innerduct installed. In conduits between equipment cabinets and the nearest junction box or manhole, innerducts shall be omitted.

Arrange for the manufacturer of the innerduct to provide on-site training in the installation of this product. Only personnel who have been trained by the manufacturer are allowed to supervise the installation.

Use the swivels and grips recommended by the manufacturer.

Unless this project installs three strips of textile innerduct in a conduit, install a pull tape into the conduit on top of the innerduct, so that another innerduct can be pulled into the conduit if needed in the future.

Anchor the innerduct at the feed end before pulling cables into it, so the cables don't drag the innerduct into the conduit. To anchor, make a slit near the seam, pass a length of pull tape through the slit and tie it to the innerduct. Then tie the other end of the tape to a fixed object.

- (o) **Wall Penetrations:** To install conduit into junction boxes and manholes with reinforced concrete walls, enter through the bottom if the bottom is open. Otherwise, use existing knockouts or conduit stubs. If none of those options are available, drill, cut, or chisel a hole through the wall without cracking the concrete. Use a rebar detector to mark the location of reinforcing steel prior to making the hole. If the spacing of the rebar permits, make the holes without damaging the reinforcing steel. After the conduit has been installed, scrub the perimeter of the hole with water, apply an approved bonding agent to concrete, and grout the gap between the conduit and the wall. Use non-shrink grout.
- (p) **Cleaning Junction Boxes:** Pump out standing water, clear all silt, debris, and foreign matter to the satisfaction

of the Engineer. Remove and dispose of debris. Should additional silt, debris, or water accumulate in the box between the original cleaning and final inspection, remove them at no additional cost to the Concessionaire.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 703—TRAFFIC SIGNALS
(OPITZ PROJECT TMS)**

July 15, 2020

Section 703 – Traffic Signals is amended as follows:

703.02(f) Detectors is amended to include the following:

6. **Microwave Vehicle Detector:** For both permanent and temporary detection, provide a Wavetronix SmartSensor HD. The detector shall include mounting hardware, device server, sealant, cable, Category 5E jumpers, power supply, and a surge protection module in the main cabinet. If the detector cable passes through a Type 1 cabinet, provide a second surge protection module in that Type 1 cabinet. All these items shall be recommended by, and supplied by, the detector manufacturer. If multiple detectors are connected to a single cabinet, each must be installed with separate communications cables, device servers, and surge protectors. Multiple detectors may share a single power supply.

Type 1 cabinets house a surge protection module at the structure supporting the detector. These cabinets also provide a place where a technician can plug in a laptop computer and calibrate the detector while observing traffic. The cabinets shall be small aluminum NEMA 3R enclosures with a DIN rail and, mounted to the DIN rail, a surge protector supplied by the detector manufacturer. The protector shall have an EIA-232 connector for the technician's laptop. Equip the cabinet with a lock that uses the same key as the other Express Lanes cabinets in this project. Provide a cabinet ID plaque per the requirements of Section 810. Cabinet IDs shall be as shown on the plans or as provided by the Engineer.

Detector cables shall be labeled in each equipment cabinet with the detector it servers and the destination cabinet ID. For cabinets serving multiple detectors, clear identification of the detector shall be provided. For example, identify detectors for ramps versus detectors for mainline express lanes.

703.03(g) Installing Detectors is amended to include the following:

6. Microwave Vehicle Detectors for both temporary and permanent installations must be installed in accordance with the manufacturer's recommended procedure for side-fired installation. Note that the recommended mounting height is relative to the road surface, not the base of the pole. Installation may be done by the Contractor's forces but must be checked by the manufacturer's representative and adjusted as recommended by the manufacturer's representative.

Installation includes connecting the detector to surge protection, power, and communication, aiming it, and setting operating parameters. Use EIA-485 communication and set the communication rate to 9.6kbps unless otherwise directed by the manufacturer and the Integrator.

If mounted on a metal pole or post, the Type 1 cabinets must be grounded to the pole or post that must, in turn be grounded. Use #6 AWG wire or an equivalent bonding strap between the cabinet and post.

Set up shall include speed calibration using measured reference speeds. Present evidence satisfactory to the Engineer that the speed measuring device used for detector calibration has been proven accurate. Provide all equipment, such as a radar gun, software, laptop computer, tools, and cables, needed for the set up work.

Develop test procedures in accordance with manufacturer recommended procedures and satisfactory to the Engineer. The tests shall include confirmation of the accuracy of counts and average speed in each lane. Both results shall be within ten percent of independently measured values during a continuous period in which at least 100 vehicles are counted unless a lower count is approved by the Engineer or

System Integrator representative on-site. Conduct the test in the presence of the Engineer's representative. When the detector passes the test, deliver the values of all parameters to the Engineer in printed or computer-readable form, along with the test report. For detectors monitoring a reversible lane, this test procedure shall be applied separately for each direction of traffic flow. Provide a table in the plans illustrating microwave detector lane coverage for Express Lanes and General Purpose Lanes where applicable.

7. **Microwave Vehicle Detector Reconfiguration:** At the temporary and permanent locations installed by the Contractor as part of the project, microwave vehicle detectors shall be set up as if they were new when shifts in traffic lanes warrant reconfiguration. Active detectors shall monitor traffic lanes as defined by the current maintenance of traffic lane arrangement or the permanent lanes as defined by the plans or construction operations. After all lanes are in their final configuration and carrying traffic, check the detector's operation and adjust the setup parameters as necessary to match existing conditions. Then test the detector using the same acceptance test as for those provided in this project. After it passes the test, give the Engineer a written or computer-readable copy of all the setup parameters along with the test report.

**COPNSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 800—SUMMARY OF WORK
(OPITZ PROJECT TMS)**

[NOT USED]

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 813—UNINTERRUPTIBLE POWER SUPPLY
(OPITZ PROJECT TMS)**

July 15, 2020

813.01 – General.

All work related to the installation and testing of Opitz Project UPS shall be in compliance with the requirements of the provisions set forth in this section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 802 of the 2020 Edition of the VDOT Road and Bridge Specifications.

Provide Uninterruptible Power Supplies (UPS) at locations as shown on plans. The UPS assembly shall provide complete non-interruptible power protection, voltage regulation, and surge and spike protection for all ITS devices and communications equipment powered by it. The UPS shall instantly transfer the cabinet to the battery back-up mode in the event the main AC power source goes offline.

- (a) **Express Lanes Configuration:** UPS shall be installed at the last DMS cabinet location before entering the Express Lanes. The UPS shall have an uninterruptible power supply (UPS) that supports the equipment in the event of a power outage for at least 1 hour. For Hub Sites install one UPS as shown on the plans and supports the equipment in the event of a power outage for at least 1 hour.

813.02 – Materials.

- (a) The Inverter/UPS shall be ZincFive UPStealth 170 Inverter/Controller with Simple Network Management Protocol. The 170 UPStealth Inverter/Controller shall be configured to match the power requirements of the traffic cabinet. Provide one USB port and one Ethernet RJ-45 connector for Category 5/6 copper wire connections. The Battery Panels shall be the Living-Hinge Battery type Panels which are designed for easy installation by sliding between the cabinet rack and the outside shell of the cabinet. Provide one 500W Battery Panel for each UPS installed.

813.03 – Construction.

- (a) The UPS shall be a commercially available package containing all wiring connectors, software, mounting brackets, and cables. The UPS assembly shall consist of a UPS with batteries, surge suppression, LED status indicators for "On-line," "Battery On," "Replace Battery," and "Overload," customizable output relays and input contacts, and network management cards (IP addressable).

813.04- Procedures

(a) **Installation:**

1. Install the UPS, power and wiring in accordance with the manufacturer's recommendations. The UPS shall be rack mounted below the controller in the DMS Cabinet.
2. Ground the UPS in accordance with the manufacturer's recommendations.
3. Label all cables at both ends, indicating the particular device it serves.
4. Set the operating parameters as directed by the System Integrator, including IP address, and location.

(b) **Testing:**

Acceptance Testing: Develop a test plan and procedures that demonstrate proper operation of the UPS under full load conditions and demonstrate the expected operating performance and uptime. The plan shall include all tests recommended by the manufacturer. When the plan is satisfactory to the Engineer, conduct the testing in accordance with the plan and prepare a test report. Provide any software and equipment needed to conduct the tests.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 814—CAMERA SYSTEM
(OPITZ PROJECT TMS)**

July 15, 2020

814.01 – General.

All work related to the installation and testing of Opitz Project closed circuit television (CCTV) shall be in compliance with the requirements of the provisions set forth in this section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 803 of the 2020 Edition of the VDOT Road and Bridge Specifications.

Provide CCTV cameras, poles, mounting hardware, cables, and surge protection for surveillance and automatic incident detection (AID) as indicated in the plans.

814.02 – Materials.

- (a) **Express Lanes surveillance camera Assembly:** shall be COHU Costar Electronics Model 4260HD-Rise Series Positioner with cables, power supplies, and mounting hardware recommended by the manufacturer. It shall use NTCIP communication.
- (b) **Express Lanes AID camera assembly** shall be COHU Electronics Model 3430 Series Fixed Barrel AID camera with cables, power supplies, and mounting hardware recommended by the manufacturer. It shall use NTCIP communication.
- (c) **Camera Pole**

- 1. **General:** Pole shall be a galvanized steel pole and shall comply with Section 226 of VDOT Standard Specifications and the Plans. Some camera pole foundations shall be built in accordance with designs in the Plans and others shall be designed by the Contractor. Regardless of who designs the foundation, poles of the same length shall be interchangeable unless the Engineer approves an exception. If the design requires a pole height greater than 50 feet, the Contractor shall provide a camera-lowering device.
- 2. **Design:** Design the pole and, if indicated on the Plans, the foundation. Submit the design to the Engineer for approval, including a structural analysis and calculations sealed by a professional engineer registered in Virginia. The structural calculations shall be based on soil samples from each proposed pole location. The design shall be adequate for a pole with two surveillance cameras, two AID cameras, and two detectors. The structural analysis shall use the procedures and parameters in the 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals to demonstrate that:
 - The foundation meets all the requirements of the AASHTO *Standard Specifications*.
 - The horizontal deflection of the top of the pole does not exceed 1/2 inch in a 30 mph wind.

The anchor bolts shall be designed in accordance with the 2001 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Do not construct or order the pole and foundation until the drawings and calculations are approved.

- 3. **Hand-holes** shall have steel frames with gasketed galvanized steel covers and captive stainless steel attachment screws. Finish handholes smoothly and neatly without rough edges. Handhole covers shall be connected to the pole with rustproof chain that connects the inside of the cover to an attachment point inside the pole, just below the handhole. The chain shall be long enough to permit the cover to dangle 6 inches below the handhole opening.
- 4. **Cable access holes** at the elevation of the AID cameras and Detectors shall be embedded two-inch galvanized steel couplings. Each shall be fitted with a weatherhead or a raintight removable plug, depending on whether the hole is used.

5. **Identification tag:** The pole shall have an identification tag permanently attached in accordance with the requirements for identification tags set forth in Section 700.04(e). The tag shall state the length of the pole.
6. **Cable support:** Provide hooks securely fastened to the inside of the pole wall for cable grips. See the Plans.
7. **Air Terminal:** Provide a solid copper rod, 0.75 inches in diameter. The length of the rod shall be such that it projects 5 feet above the top of the camera. At the points where the rod bolts to the pole, use a conductive joint compound to minimize galvanic corrosion of the dissimilar metals.

814.03 – Procedures.

(a) Installation.

1. All conductors shall run continuously from the camera to the cabinet, with no splicing or connections along the way.
2. Camera cables shall be installed in junction boxes with a nominal slack length of 15 feet.
3. Inside the pole, support every cable with a cable grip hung from a hook inside the pole.
4. Install the surveillance camera such that when the camera is commanded to the factory default home position, the camera is pointed approximately north.
5. Pressurize the cameras with dry nitrogen to the pressure recommended by the manufacturer.

(b) Setup:

1. Set the camera operating parameters as directed by the Integrator. This includes the IP addresses. Video from the surveillance and AID cameras shall be sent using multicast.
2. Aim the AID cameras in accordance with the initial layouts provided in the plans. Then, verify them in the field with the support of the AID vendor. Adjust the cameras as recommended by the AID system vendor.

(c) Acceptance Testing: Develop a test plan and procedures that tests every camera function. Test plans shall include all tests recommended by the camera manufacturer. When the plan is satisfactory to the Engineer, conduct the testing in accordance with the plan and prepare a test report. The tests shall be conducted at the field equipment cabinets and shall include the following:

- All diagnostic tests recommended by the manufacturer and all self-tests of which the equipment is capable.
- Visual inspection for manufacturing and installation defects.
- Local operation of all CCTV equipment, exercising the iris and focus controls while observing the video picture on a laptop. For surveillance cameras, also check pan, tilt, and zoom.
- Verification that the camera enclosure is at proper pressure and maintains that pressure over time.
- Demonstration of camera sensitivity at low light levels.
- Demonstration of pan/tilt speed and extent of movement.
- Demonstration that the Preset test to ensure camera consistently goes to the proper preset position and that the presets have been properly titled.
- Demonstration that the sectors have been properly titled.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 815—DYNAMIC MESSAGE SIGNS
(OPITZ PROJECT TMS)**

July 15, 2020

815.01 – General.

All work related to the installation and testing of Opitz Project DMS shall be in compliance with the requirements of the provisions set forth in this Section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 804 of the 2020 Edition of the VDOT Road and Bridge Specifications.

Provide dynamic message signs (DMS) as shown on plans.

815.02 – Materials.

(a) **Signs:** Provide two models of DMS:

1. **TYPE 2:** Provide Daktronics Model VF-2420-64x192-20-RGB complete with a Daktronics Model VFC controller (or successor model recommended by the sign vendor) and any other accessories needed for safe, effective operation.
2. **TYPE 2A:** Provide Daktronics Model VF-2420-96x288-20-RGB complete with a Daktronics Model VFC controller (or successor model recommended by the sign vendor) and any other accessories needed for safe, effective operation

Cables: Provide cables between the DMS and the controller cabinet as recommended by the manufacturer, except that fiber optic cables must be listed as round drop cable on the last edition of the Rural Utility Service List of Materials Acceptable for Use on Systems of USDA Rural Development Telecommunications Borrowers. It shall be round, dielectric cable with a single core and shall contain at least two spare fibers. All cables including patch cables and pigtailed shall meet EIA/TIA telecommunications standards. Fiber Optic cable between the DMS and controller cabinet shall be terminated in a wall mounted patch panel in both the DMS and controller cabinet.

815.03 – Procedures.

(a) **Installation:**

1. Install the sign and controller in accordance with the manufacturer's recommendations. The controller goes in the equipment cabinet on or near the sign support structure.
2. After installing the cables running from the controller cabinet to the sign, terminate copper cables on terminal blocks and provide surge protection meeting the requirements of Section 801. In the equipment cabinet, terminate fiber optic cables in small, DIN rail-mounted interconnect centers that provide no openings through which a mouse can pass. Use jumpers to connect the interconnect center to the equipment. Terminate fibers in the sign in an interconnect center recommended by the sign manufacturer and connect fibers to the sign communication panel using jumpers. Fan-out kits and field termination of fibers in the cabinet and the sign are prohibited.
3. Configure the controller with a network address and other parameters in accordance with a plan provided by the system integrator.

(b) **Brightness Adjustments:** Adjust the sign and controller to achieve 16 or more brightness levels appropriate for the particular sign and set up the lighting conditions for which each brightness level will be used. The Engineer's representative will observe the operation of the sign under a variety of lighting conditions. Make changes requested by the Engineer until the brightness adjustments are approved by the Engineer.

(c) **Acceptance Testing:** For Express Lanes signs, develop a test plan and procedures that demonstrates

proper operation of the sign. The plan shall include all tests recommended by the manufacturer. When the plan is satisfactory to the Engineer, conduct the testing in accordance with the plan and prepare a test report. Provide any software and equipment needed to conduct the tests. Testing must include the following:

1. **At the DMS site:**

- Visual inspection for manufacturing and installation defects.
- All tests recommended by the manufacturer and all self-tests of which the equipment is capable.
- DMS housing ventilation system.
- Restart of DMS controller following loss of power.
- Verification of contents of non-volatile, changeable memory following loss of power.
- Operation of stored messages and schedule.
- Functionality of each pixel.
- Automatic dimming.
- For gate signs, proper response to control signals from the gate controller.

2. **At the HOT-OC:** Demonstrate that the sign operates properly under the control of the HOT-OC's central software. Confirm proper operation in the field during the testing.

- Acceptance of properly addressed messages.
- Message selection command and response.
- Immediate message command and response.
- Parameter download command and response.
- Parameter upload command and response.
- Time broadcast command.
- Reporting of high temperature.
- Detection and reporting of errors.
- After final acceptance of the installation and operation of each DMS, capture the sign configuration files and provide them to the System Integrator.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 816—FIBER OPTIC COMMUNICATION
(OPITZ PROJECT TMS)**

July 15, 2020

816.01 – General.

All work related to the installation and testing of Opitz Project Fiber Optic Communication shall be in compliance with the requirements of the provisions set forth in this Section. In addition to these Supplemental Specifications, the Contractor shall adhere to the applicable requirements of Section 808 of the 2020 Edition of the VDOT Road and Bridge Specifications.

816.02 – Materials.

- a) **Fiber optic cable** shall be loose tube, single mode, metallic single-armored cable. The cable shall meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-2006 and GR-20-CORE and have a tensile rating of at least 600 lbs. The cable sheath shall have length markings in feet and shall indicate that the unit of measure is feet. The cable shall have an operating temperature range of -40° F to 157° F.

All fibers shall be suitable for transmission using both 1310 nm and 1550 nm wavelengths. Attenuation shall not exceed 0.35 dB/km and 0.25 dB/km for 1310 nm and 1550 nm signals, respectively. Cables shall be constructed with twelve fibers per tube.

Armored cables without an inner jacket shall have an armor layer applied directly over the water swellable tape and cable core. The armor shall be a corrugated steel tape, plastic-coated on both sides for corrosion resistance, and shall have an overlapping seam. The outer jacket shall be applied over the corrugated steel armor tape.

- (b) **Number of Fibers:**

Fiber optic cables shall be provided as shown on the plans with the number of fibers as follows:

XPL Trunk – 36 fibers: Install trunk and distribution cables in separate conduits. (Trunk shall be installed in primary 4" conduit)

XPL Distribution – 36 fibers (except where noted on the plans: Install trunk and distribution cables in separate conduits. (Distribution shall be installed in spare 4" conduit)

VDOT Trunk – New installations – 48 fibers

VDOT Trunk – Replace/Relocate – Replace in kind, to be verified in the field

VDOT Distribution – New installations – 36 fibers

VDOT Distribution – Replace/Relocate – Replace in kind, to be verified in the field

- (c) **Connectors** shall be LC compatible, with ceramic ferrules unless otherwise approved for specific manufacturer device connections. They shall be suitable for use in traffic cabinets and shall be designed for single mode fibers. The connector loss at terminal equipment shall not exceed 1 dB. All connectors in VDOT and new Express Lanes cabinets shall be Ultra Polished Connectors (UPC).
- (d) **Rack-Mounted Interconnect Center:** Provide a Corning Cable Systems Model CCS-03U interconnect center or approved equal, with enough connector panels and splice trays to accommodate all the terminations and splices made at its location. Splice trays shall be 0.2 inches high, made of aluminum with clear plastic covers, designed for outdoor use. Each shall accommodate 24 or more fusion splices in heat-shrink sleeves. All trays shall have a black powder coat finish. The trays shall have both

perforations for cable ties and crimpable metal tabs for buffer tube strain relief.

All Express Lanes splices shall be in cabinets or pedestals as shown on the plans. Underground splices will not be permitted unless approved by the Engineer.

- (e) **Pigtails** shall be factory-made, buffered, and strengthened with aramid yarn to reduce the possibility that accidental mishandling will damage the fiber or connection. Pigtails shall be yellow. They must use LC type of connectors unless otherwise specified. Each must contain one fiber. Length shall suffice to provide two feet of slack after installation.
- (f) **Jumpers** shall meet the requirements for pigtails, but shall have a connector on each end. The second connector shall be as specified in Sections 808,809 and 810 except where a different connector is required for compatibility with the equipment to which the jumper connects. Length shall suffice to provide approximately three feet of slack after installation.
- (g) **Splice Enclosures (where approved by the Engineer)** shall be suitable for underground installation in manholes and junction boxes. Splice enclosures shall meet the standards of Telcordia GR-771. The splice closure shall allow for splicing of fibers within uncut cables. The splice closure shall be installed with all necessary splice trays and accessories to support up to 72 splices. The splice closure shall be wall mountable inside a junction box or manhole.
- (h) **Ground Kits** shall be provided for the bonding and grounding of armored cable, splice enclosures, and interconnect centers (i.e., patch panels). The kits at a minimum shall include armor ground clamps, bonding jumpers, and connectors; and shall be in accordance with the cable manufacturers' recommendations, NEC, and industry standards.

816.03 – Procedures.

- (a) **Fiber Optic Cable Installation:** Use installation techniques that do not degrade the optical and mechanical characteristics of the fiber. Do not violate the minimum bend radius or maximum tension during installation or afterwards.

When pulling cable, use a clutch device or breakaway swivel to ensure the allowable pulling tension is not exceeded.

Use a lubricant recommended by the cable manufacturer to facilitate pulling the cable. After the cable has been installed, wipe the exposed cable in each junction box, manhole, or cabinet clean of cable lubricant with a cloth.

For proposed cables, store 20 feet of slack in every intermediate manhole or junction box. If multiple fiber cables pass through the junction box or manhole, store 20 feet of slack for each. At cabinet locations, where cable runs from the junction box directly to an equipment cabinet, store 30 feet of slack cable in the junction box. Additionally, treat the cable returning from the cabinet to the junction box as a separate cable, and store 30 feet of slack for it. Store slack cable neatly on the walls of the junction box or manhole using racking hardware acceptable to the Engineer. Store one loop of cable in the base adapter of ground mounted cabinets. Ensure the cable is supported and neatly organized in the cabinet base.

Seal the fiber optic cable ends to prevent the entry of water.

- (b) **Splicing:** Before splicing, use an optical loss test set to collect the data needed to demonstrate that the splice is acceptable. See the section on testing, below.

All fibers, including spares, shall be spliced to provide continuous runs. Splices shall be allowed only in equipment or splice cabinets unless otherwise shown on the plans or approved by the Engineer. If the connection diagrams in the plans indicate that the splices are to be housed in existing splice enclosures or interconnect centers, provide additional splice trays or other hardware as required to make the splices.

All splices shall be made using a Sumitomo FastCat Type-39 or Quantum Q101 fusion splicer or approved equivalent. Average splice loss for both 1310 and 1550 nm wavelengths shall not exceed 0.1 dB, and no single splice may have a loss above 0.2 dB. Any splice with a loss exceeding 0.2 dB shall be remade until its loss falls below 0.2 dB. Provide all equipment and consumable supplies.

Use a separate splice tray for each buffer tube color, unless that would require more trays than the existing splice enclosure can hold. If there are too few existing trays in the enclosure, provide additional trays. Provide the same type of trays as the existing ones.

Protect each splice in a heat-shrink sleeve.

- (c) **Termination:** Terminate fibers by splicing them to pigtails. For each pigtail, label the corresponding position on the patch panel with the cable ID and fiber number. Label the pigtail with the fiber number. All labeling must be legible and done with indelible markings.
- (d) **Jumper management:** Use latching cable rings to guide and protect bundles of jumpers between the interconnect center and equipment. Affix the rings to wall of the cabinet or a vertical member of the equipment rack. Label the jumpers at each end, assigning each jumper a unique letter of the alphabet.
- (e) **Bonding and Grounding:** Bond and ground the fiber optic cable armor and other metallic components of splice enclosures and interconnect centers (i.e., patch panels) at each cable splice and cable termination location. In addition, bond and ground the cable armor at intermediate pull box locations (i.e., boxes used as cable pull points between cable splices and terminations) where required. Perform the work in accordance with the cable manufacturers' recommendations, NEC, and industry standards.
- (f) **Testing:** Test the fiber after installation, including all splicing and terminations, is complete. Note, however, that this test procedure involves measuring the optical loss of existing fiber before splicing to it. For each fiber optic link, including spare fibers, determine whether the optical loss is within the limits permitted by these specifications. A link is a continuous segment of fiber between one connector (or unterminated end) and another connector (or unterminated end). When testing links that do not have connectors on both ends, use a mechanical splice to attach a pigtail to the unterminated fiber for the duration of the test.
- (g) **System Cutover:** The existing 95 Express Lanes Trunk and Distribution fiber shall remain in place during construction and after the new OPITZ trunk and distribution becomes active. The Contractor shall coordinate with the Concessionaire's Engineer for transitioning the existing new communications infrastructure and the proposed Traffic Management System devices to the existing 95 Express Lanes communications network segment. All work authorizations shall be coordinated and approved by the Concessionaire.

Before taking the measurements, provide evidence satisfactory to the Engineer that a power meter and light source test set produces accurate results at both 1310 nm and 1550 nm wavelengths. This can be a demonstration that the set correctly measures the loss of a test fiber whose loss is known.

For each fiber link, follow this procedure:

1. If the link includes existing fiber cable, use an optical loss test set (power meter/light source) to measure and record the optical loss over that portion of the link before it is spliced to new fiber.
2. Calculate the maximum allowable loss for the completed link, both at 1310 nm and at 1550 nm. Use the following formula:

$$\begin{aligned} \text{Maximum link loss} = & \\ & \text{Measured loss over existing cable portion} + \\ & (\text{New fiber length in km}) \times (0.35 \text{ for } 1310 \text{ nm and } 0.25 \text{ for } 1550 \text{ nm}) + \\ & (\text{Number of fusion splices}) \times (0.1) + \\ & (\text{Number of mechanical splices [for temp. connection]}) \times (0.3) + \\ & (\text{Number of connections}) \times (1.0) \end{aligned}$$

Provide this calculation to the Engineer along with the test results.

3. Use the test set (power source/light meter) whose calibration has been approved by the Engineer to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the Engineer or his representative to witness these tests.
4. If the measured loss exceeds the calculated maximum, use an optical time domain reflectometer and other test equipment to troubleshoot the link. Take whatever corrective action is required, including cable replacement, to achieve a loss less than the calculated maximum. Such corrective actions shall be

at no additional cost.

5. Prepare a diagram showing all of the links tested in this project. For the portions installed in this project, show the equipment cabinets, splices, and pigtails. On each line representing a link, show the maximum allowable loss and the actual loss. The actual loss shall be the one measured after all corrective actions have been taken. Submit 10 copies of this diagram to the Engineer, along with the calculations for the maximum allowable losses.

At each bonding and grounding location test the installation to demonstrate that the installation is in accordance with cable manufacturer recommendations, NEC, and industry standards. Prior to performing the tests, submit a test procedure to the Engineer for approval.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 817—ETHERNET SWITCHES
(OPITZ PROJECT TMS)**

July 15, 2020

817.01 – General.

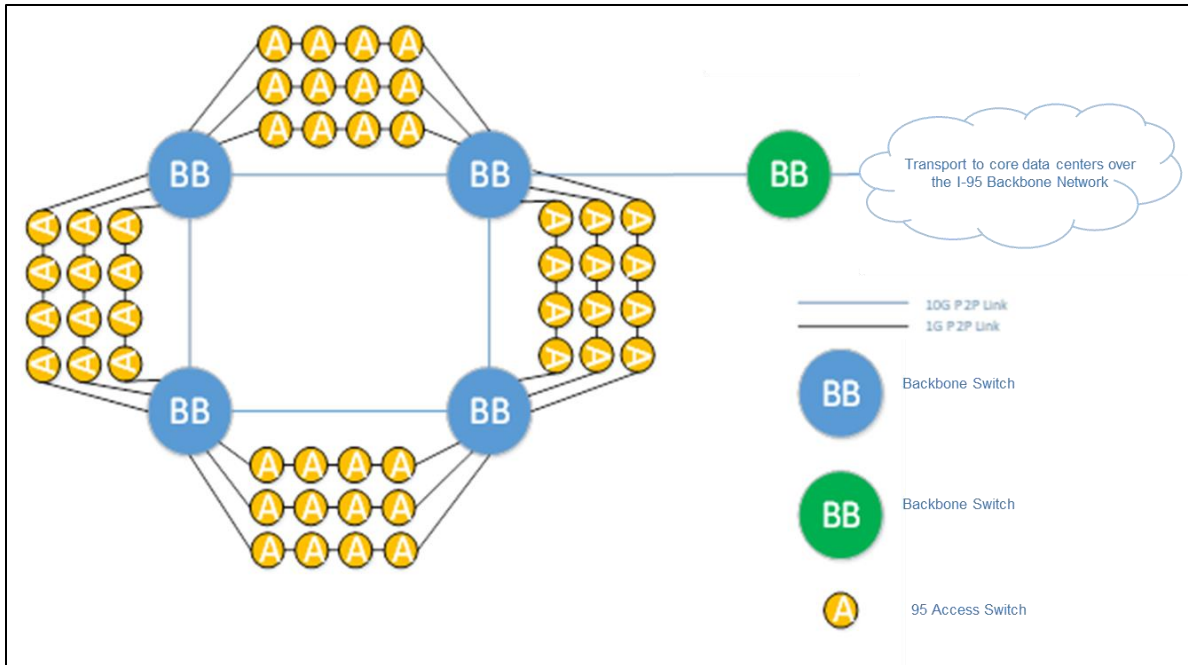
All work related to relocating or modifying existing networks or the installation of new networks shall be in compliance with the requirements of the provisions set forth in this section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of section 809 (Access) and 810 (Backbone) of the 2020 Edition of the VDOT Road and Bridge Specifications.

This work entails expansion of a wide area network connecting proposed roadside equipment to the HOT-OC. It also entails modifying the Concessionaire's existing network by adding proposed cabinets and transferring some cabinets from the existing Express Lanes Southern Terminus network. The connection diagrams in the plans show the communication equipment to be provided in each cabinet and how the equipment connects to the fiber optic cables.

- (a) **Express Lanes Network Topology:** The Express Lanes network is built over two cables, a trunk cable and a distribution cable. The trunk (backbone) cable runs directly from one toll location or hub site to the next. It is used for backbone network control data as well as transport of endpoint traffic. Endpoint traffic originates from distribution and backbone connected devices, onto and off of the network. The backbone uses 10 Gigabit Ethernet communications and is built over a single fiber pair between each backbone switch.

The distribution cable generally runs parallel to the backbone cable in the same duct bank. Instead of running directly between tolling points or hub sites, it is run into and out of each roadside cabinet and tolling point that it passes. A distribution link built over this cabling infrastructure connects the equipment in the roadside cabinets to the 10 Gbps backbone. Where possible, distribution links connect to separate tolling points on either side of a given link. The distribution links operate at 1 Gbps. The roadside cabinets are not all connected to the same pair of fibers in the distribution cable; multiple pairs are used so that no more than seven (7) access switches are on any pair running between adjacent tolling points. Access switches shall be connected as shown on the plans. Also, cabinets at generators are on a separate pair of fibers from other cabinets so that communication to the generators is maintained even when neither the generator nor the power company is supplying power. (If the generator cabinets, which have battery backup power, were on the same fibers as cabinets without battery backup, then the cabinets without power would interrupt communication between the generator cabinet and the HOT-OC.) Similarly, cabinets connected to generator power are always on separate fibers from cabinets that do not have generator power.

The Express Lanes Network diagram below illustrates the topology to be used, it is representative and does not reflect the actual number of Access or Backbone Switches. Each line represents a pair of fibers. The circles containing A are roadside cabinets containing access switches. The circles containing BB are tolling points (or the EOC) containing Backbone switches. The network shall be configured as a 'IP to the edge' solution. Each access switch will have a set of local virtual local area networks (VLANs), and associated switched virtual interface (SVI), to be assigned per-port depending on the connected endpoint service. Each endpoint will use the local SVI as their designated IP gateway which will be advertised into the network via Open Shortest Path First (OSPF). Inter-access switch, backbone to backbone, and access to backbone switch, communication will be established via point-to-point (P2P) routed links.



Express Lanes Network Topology

(b) **Express Lanes Network Operation:** The operation of the network shall be as follows. When a packet is sent from the operations center computer, it travels around the backbone ring until it reaches a tolling point or hub site that connects to the pair of distribution fibers serving the destination equipment. Then the switch in the Technical Shelter or Hub Site transfers the packet from the backbone to the distribution cable, where it continues on to its ultimate destination. If a cable cut or switch failure interrupts the usual path between the operations center and the destination equipment, the switches use the OSPF protocol to route data packets around the break.

817.02 – Materials.

- (a) **General:** Along with each switch, provide all required licenses, mounting hardware, power supplies, SFP transceivers, cables, jumpers, and connectors needed to connect the switch to power, communication cables, and neighboring devices. Access switches installed in roadside cabinets shall use LC optical connectors and be mounted on DIN rail. Backbone switches shall use LC optical connectors and be rack-mountable.
- (b) **Backbone switches (existing) for the Express Lanes communication network** are Cisco C9500-16X-A with the C9500-NM-8X expansion module at the tolling points. Provide enough SFP optical transceivers to accommodate all the fiber connections shown on the plans. Ensure that the transceivers are recommended by the switch manufacturer and have sufficient optical power to communicate reliably with the adjacent switches on the ring. Transceivers shall use two fibers. Provide three SFP transceivers with RJ-45 connectors for Category 5/6 copper wire connections. Any remaining SFP ports shall be blank. Note: Existing backbone switches to remain for this project. The Contractor shall coordinate with 95 Express Lanes for approval before connections and modifications are made.
- (c) **Backbone switches for the HOT-OC** will not be required by the Contractor. The Express Lanes existing Backbone core switch stack will integrate the proposed network segments.
- (d) **Access switches for the Express Lanes communication network** shall be Cisco Model IE-4000-8T4G-E and will include the IP Services feature set. Provide enough SFP optical transceivers to accommodate all the fiber connections shown on the plans. Ensure that the transceivers are recommended by the switch manufacturer and have sufficient optical power to communicate reliably with the adjacent switches on the ring. Transceivers shall use two fibers. All available ports on the IE-4000-8T4G-E model not utilized for fiber optic connections shall be populated with SFP transceivers with RJ-45 connectors for Category 5/6

copper wire connections.

(e) **Device servers for Express Lanes communication network** shall meet the following requirements:

1. The number of serial ports shall be sufficient to provide a separate port for each serial device in the cabinet, except where the connection diagrams show multiple devices sharing the same serial port.
2. The device server and its power supply shall have an operating temperature range of -31 degrees to +165 degrees F and an operating humidity range of 5 % to 90 %.
3. The device server shall be managed via SNMP and also a web browser in addition to any specific applicable vendor software.
4. The device server must automatically resume normal operation after a power outage or irregularity.
5. Every serial port shall be switchable among EIA-485, EIA-422, and EIA-232 communication.
6. Provide DIN rail mounting.

Device servers for microwave vehicle detectors are not applicable to this section. See Section 703.

817.03 – Construction.

- (a) Obtain the IP addresses, VLAN setup, and multicast route information from the System Integrator for all devices to be added to the Express Lanes network. Obtain the same information from the Engineer for any proposed or relocated VDOT devices.
- (b) Configure equipment for initial installation such as setting IP addresses, IGMP snooping for switches, multicast routes for cameras, and VLAN setup in switches. Configure the switches to support multicasting of the surveillance and AID video and to direct multicast video to the HOT-OC, not to devices in roadside cabinets. If the switches are capable of filtering out video that is not being used at the operations center, implement that feature.
- (c) Connect the switches to the equipment and fibers as shown on the connection diagrams in the plans.
- (d) Configure the network to operate in accordance with the description in Section 809 and 810 respectively. Configure the 10 Gigabit ports between Backbone switches as trunk ports, carrying the trunked VLANs between the Backbone switches.
- (e) After the acceptance testing described in Section 816 is complete and all communication equipment is operational, capture the configuration files from each Access switch, backbone switch, and device server in a computer readable file. Store this data on two identical CDs or DVDs pertaining to VDOT equipment and two other identical CDs or DVDs pertaining to Express Lanes equipment. Organize the data to facilitate quick access when needed for maintenance. Deliver the discs to the Engineer's representative.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 818 - REVERSIBLE ROADWAY GATES
(OPITZ PROJECT TMS)**

July 15, 2020

818.01—General.

This work involves modifying the existing reversible roadway gate system to match the proposed roadway design and provide new gate groups at new ramps to and from the reversible roadway. Together with the existing gates at other entrances and exits, the gates in this project must operate as part of a system remotely controlled by the Concessionaire from the Express Lanes Operations Center (HOT-OC). The work requires careful planning and coordination to keep the reversible roadway safe and to comply with the operational restrictions of the Contract. Work shall be in accordance with the requirements of the Turnover Plan and all related addenda and the provisions provided herein.

The work entails the following:

Provide gates at locations as shown on the plans.

818.02—Existing Gate System.

This section describes the operation of the existing gate system. The existing gate groups and new gate groups installed as part of the project shall be consistent with this existing operation unless specifically noted otherwise or approved by the Concessionaire. Each entrance to the reversible roadway along I-95 is equipped with a Model 170E gate controller, a set of closely spaced gates, and a few dynamic message signs in advance of the entrance. Each of these sets of gates is remotely controlled by the TMS computer in the HOT-OC. Communication is via the Express Lanes fiber optic network.

(a) The gate system incorporates several features called “interlocks” that are intended to promote safety.

- An interlock among all the gate sets attempts to ensure that no gate set may open unless all gates allowing traffic in the conflicting direction are closed. Whenever all gates allowing traffic to flow southbound are closed, the central computer sends an “OK to open” message to the northbound gate controllers and vice versa. A gate controller will normally not open its gates if it has not received the “OK to open” message. However, this interlock can be disabled by a switch in the gate controller cabinet, a feature that is helpful during maintenance and snow removal.
- Gate controllers also communicate with traffic signal controllers at certain locations. The gate controller will not close its gates unless the traffic signal controller confirms that it is omitting the display that allows vehicles to turn onto the ramp. This interlock applies regardless of whether the gate is under local or remote control. The gate controller will not raise the gates unless the traffic signal controller confirms that it is omitting any displays that conflict with the displays directing traffic onto the ramp.

(b) **Inputs:** There are 39 inputs to each gate controller, some of which may not be used at a particular location.

INPUT NAME	FUNCTION	NUMBER
Local/Remote switch	Tells the controller whether to respond to commands from the computer in the HOT-OC or commands from the control panel in the gate controller cabinet.	1
Open/Off/Close Switch	Indicates whether a technician at the gate controller cabinet wants the controller to open the gate set, close it, or leave it in its present condition.	2
Gate Interlock Bypass Switch	Indicates whether a technician at the gate controller cabinet wants the gate set to be able to open despite other gate sets being open in the opposing direction.	1
Gates Ready Sensor	Indicates whether any gates in the set have one of these conditions: housing door open, motor overload, hand crank engaged, no power, or switched to manual control in the gate housing. These conditions preclude the controller from sending commands to any gate.	1
Gate Open Sensor	Indicates that an individual gate is fully open	12
Gate Closed Sensor	Indicates that an individual gate is fully closed	12
Required Status Confirmation	Indicates whether something that is supposed to happen before a gate set closes has happened. Two of the inputs are normally used for traffic signal phase omits and the rest for indications that DMSs are displaying "CLOSED" warnings.	6
Expected Status Confirmation	Indicates whether something that was supposed to happen after a gate set opens has happened. These inputs are normally used for indications that DMSs are displaying "OPEN" messages.	4

(c) **Outputs:** There are 28 outputs from each gate controller, some of which may not be used at a particular location.

OUTPUT NAME	FUNCTION	NUMBER
Open Command	Signals an individual gate to open	12
Close Command	Signals an individual gate to close	12
Prepare to Close Command	Signals connected devices to change to the condition used for gate closures. Two of the outputs are normally used to signal individual traffic signal controllers to omit a left turn phase. The third is normally used to signal all connected DMSs to post the "CLOSED" message.	3
Gates Open Announcement	Signals connected devices to change to the condition used for open gates. Normally used to signal all connected DMSs to post the "OPEN" message.	1

The two traffic signal phase omit outputs are intended for applications where two separate phases are to be omitted at different times. Where two traffic signals are tied to the same gate controller, and only one phase within each controller is to be omitted at identical times, a single control signal is sent to both simultaneously when the gate controller is about to close the gates, so only one gate controller output is used for this purpose.

Similarly, even though there may be four signs tied to the gate controller, a single control signal is sent to all of them simultaneously to command them to display the open message, so only one controller output is required for this purpose. The same is true of the signal commanding the signs to display the closed message.

Some gate sets are equipped with a beacon in advance of the first gate. This beacon is controlled by the gate controller

so that it is lit when the gates are closed and dark when the gates are open. If construction does not require an existing beacon to be moved, maintain its current operation. If the beacon cannot remain in its present location, remove and dispose of it. Do not install beacons at locations that do not already have them.

(d) **Gate Controller Operation:** The gate controller receives commands to open and close from two sources:

- A three-position (open/off/close) switch in the gate controller's cabinet; and
- Commands sent from the TMS computer in the HOT-OC.

If the local/remote switch in the cabinet is in the remote position, as it normally is, the controller ignores the position of the open/off/close switch in the cabinet and responds to commands from the TMS computer. Otherwise, it responds to the open/off/close switch and does not act on the commands from the TMS computer.

When the controller receives a command to open its gates, it does so only if two conditions exist:

- The TMS computer has sent it a message within the last five seconds indicating that it is safe to open the gates. That message is not sent if gates are open in the opposing direction. This condition does not apply if the gate interlock bypass switch is in the bypass position.
- The gate ready input indicates that all the gates are in normal condition and under the controller's control.

If these conditions are met, the controller commands the most downstream gate to open. When the input from the gate indicates that it is fully open, the controller waits the prescribed amount of time (a configuration parameter) and then opens the next gate. This process continues until all the gates have been opened in sequence, ending with the most upstream gate.

If the controller does not receive a signal that a gate has fully opened within 20 seconds of the controller's sending it the open command, the controller reports a gate failure.

Once all the gates are open, the gate controller stops sending the phase omit signal to the associated traffic signals. It also sends the command to display the open message to all dynamic message signs connected to it. The controller reports a failure if it does not receive the appropriate response signal from all the traffic signal controllers and signs. In order for no failure to be reported, a signal controller must respond within four minutes and the dynamic message signs within ten seconds.

When the gate controller receives a command to close gates, it follows the reverse process. If under local control, it begins by sending the dynamic message signs the command to display the closed message and waits for each of the signs to confirm that they are displaying that message. If any sign fails to respond properly within ten seconds, the controller reports the failure and does not proceed with closing the gates.

If the ramp entrances are controlled by traffic signals, the controller sends the traffic signal controllers a command to omit the phase that allows vehicles to enter the ramp. If any signal fails to confirm within four minutes that it is skipping the phase, the controller reports the failure.

The controller does not begin closing the gates until all of the following conditions apply:

1. The signs are all displaying the closed message, if the gates are under local control.
2. The signals are omitting the phase that gives access to the gates, if the ramp has a signal.
3. The programmed delay has passed since posting the closed message on the signs.
4. The programmed delay has passed since the traffic signal controllers reported that they were omitting the phase.

If those conditions have been met, the gate controller commands the upstream gate to close. When the first gate is

closed, the controller waits the programmed interval and then closes the next gate. If the inputs from a gate indicate that it has not closed within 20 seconds of receiving the command from the gate controller, the controller reports the gate failed and continues to close the gates.

The controller continuously monitors the gate position sensors and automatically sends the appropriate open or close command to restore a gate to its proper position. When the sensors indicate that a gate has been out of position for more than 30 seconds, the controller reports a gate failure.

818.03—Materials.

(a) **Gate controllers** shall be Model 170E controllers with sufficient random access memory (RAM) to operate the existing gate controller software. Controllers shall be equipped with Model 412C program modules, complete with erasable programmable read-only memory (EPROM) and 170 Ethernet Card for communicating with the network.

The EPROM shall be of the same type as is used in the existing gate controllers. The controllers shall be on the Caltrans Transportation Electrical Equipment Specifications (TEES) Qualified Products List (QPL).

(b) **Isolator modules** shall be Model 252 isolators on the TEES QPL.

(c) **Output modules** shall use two socket-mounted relays to send 120 VAC signals to the gates, signaling them to open and close. (The relays do not carry the power to run the gate motors.) Relays shall include light-emitting diodes indicating that the corresponding input or output is active. They shall be mechanically held into their sockets so that they do not vibrate loose. Connection points on the modules must be labeled and use keyed connectors to minimize the risk of erroneous connections. Shop drawings and circuit diagrams must be approved by the Engineer before manufacturing.

(d) Technician Control Panel:

1. The panel shall use LEDs to show the current status of each gate. For each gate, there shall be a column of three LEDs. A green LED shall be illuminated when the gate is fully open. A red LED shall be illuminated when the gate is fully closed. The red and green LEDs shall be controlled by the output of the Model 252 isolators monitoring the “open” and “closed” status signals from the gate. An orange LED shall flash when the gate does not send a “gate ready” status signal. Label the rows and columns to avoid misinterpretation. Do not install LEDs on the panel for nonexistent gates.
2. Circuitry on the panel shall consolidate the status information arriving from the gates, sending a “gates ready” input to the controller only if every gate reports that it is ready.
3. The panel shall pass the open and closed status information from the Model 252 isolators to the controller.
4. The panel shall have two key switches with keys matching those in the Concessionaire’s existing gate control panels. One switch shall control the remote/local input to the controller. The other shall control the interlock bypass input.
5. The panel shall have a three-position switch for use when the gate set is under local control from the control panel. The positions shall be labeled “OPEN”, “OFF”, and “CLOSE” and they shall control the open and close inputs to the controller. When the switch is in the “OFF” position, the control panel shall send neither an “OPEN” nor a “CLOSE” input to the controller.
6. Shop drawings and circuit diagrams must be approved by the Engineer before manufacturing.

(e) **Accessory Equipment:** Provide enough input files to hold the number of isolators required at the location. They shall be supplied by a manufacturer on the TEES QPL. Provide a power distribution assembly #3 on the TEES QPL. Provide mounting hardware, cables, and any other item needed to render the equipment operational and safe.

(f) **Gates** shall have the following features when installed new for the project. Should it be determined that existing

gates must be replaced during the course of construction or relocation, the gates and any components shall be field verified and matched in kind.

1. Three-phase, 480 VAC, half horsepower motors. Lower voltages for heater, lights, and GFI receptacle shall be generated by a 1.5 KVA step-down transformer inside the housing. Note that some existing gates in the project use 120 volt motors and three-phase 480 volt motors. In the event that one of these must be replaced, provide a gate with the same type of motor as is in the existing gate group.
2. All gates shall be semaphore type gates unless otherwise noted on the plans. Vertical movement gates shall have aluminum housings. Horizontal movement gates shall have hot-dipped galvanized steel housings.
3. Warning lights on gate arm shall be red, 12 volt LED lights, a minimum of three inches in diameter. Provide lights on each arm as shown on the details. Wire the lights to flash together when the arm is in motion, to burn steady when the gate is fully closed, and to be off when the gate is fully open.
4. The doors to the gate housing shall have CCL locks utilizing keys identical to those for other Express Lanes cabinets or as specified by the System Integrator. Replace door locks on existing gate housing as needed.
5. Gate housings shall be ventilated through louvers in the doors on the side of the housings. Louvers shall include a replaceable filter.
6. An external auto/manual local control switch that can be locked within an external aluminum housing to allow for local, motorized control of the gate.
7. Wiring and control systems shall be compatible with the connection diagrams in the Plans.
8. Wiring shall ensure that the "gate ready" signal is interrupted by:
 - Housing door open.
 - Hand crank engaged.
 - Motor overload.
 - Loss of power.
 - Switched to manual control.
9. Semaphore (vertical movement) gates shall be B&B Roadway Model VW-4 or a modified VW-4 with a reverse counterweight mechanism as noted on the plans.
10. Swing (horizontal movement) gates shall be B&B Roadway Model HW-4, modified to have a door on one side only. The layout of the internal equipment shall be such that all installation and maintenance activities can be performed through that one side. Note that not all of the swing gates will have the door on the same side. At each location, provide a gate with a door on the side most accessible by a technician (generally on the opposite side of barrier or guardrail). Housings shall also include a maintenance access door on the top of the housing.

(g) **Gate arms** shall be manufactured by B&B Roadway and shall be 4-inch square 6005-T5 aluminum tubing unless the manufacturer recommends a different arm for the particular gate receiving the arm. Gate arms shall be constructed with colors and retroreflective sheeting in accordance with the most current version of the MUTCD. The MUTCD option for diagonal striping shall be applied.

818.04—Procedures.

(a) **Installation:** Install the gates as recommended by the manufacturer and as shown in the plans. Take care to construct the foundation so that the gate arms are level and at the proper elevation above the pavement. Select the gate arm length based on the actual location of the gate housing and the pavement markings.

1. Gate foundations shall be installed as shown on the plans.
2. Gate arms shall be installed as shown on the plans.
3. Offset brackets for gate arms will not be accepted unless approved by the 95 Express Lanes Engineer.

(b) **Firmware:** Obtain a PROM chip with VDOT’s gate controller firmware from the Concessionaire. Copy the firmware onto new PROM chips and install them in the Model 412C program modules of each proposed gate controller.

(c) **Modifications to Existing Gate Controller Cabinets:** In addition to any work called for on the plans, do the following:

1. Add input modules, output modules, terminal blocks, and any other required items if gates have been added.
2. Add contact closure interfaces to control dynamic message signs whose controllers are not at the same location as the gate controller. Only provide enough to connect to the signs that will remain at the end of the project.
3. Replace the existing control panel with one meeting the requirements of 802.03(d) and change the controller’s configuration parameters to indicate the proper number of gates. Whenever the controller’s configuration is changed, contact the Concessionaire’s system manager in advance, and also immediately after the change, to ensure that the central computer’s database matches the information in the controller.
4. If the number of associated dynamic message signs or traffic signals changes, change the controller’s configuration parameters to indicate the proper number of signs and signals. Whenever the controller’s configuration is changed, contact the Concessionaire’s system manager in advance, and also immediately after the change, to ensure that the central computer’s database matches the information in the controller.

(d) **Control wiring** between the gate controller and each gate shall be IMSA 19-1 cable containing seven 14 AWG conductors. Use the colors for the functions indicated:

COLOR	FUNCTION
Black	120 VAC hot for status from gate
White	Gate ready status from gate
Red	Close command from controller
Green	Open command from controller
Orange	Open status from gate
Blue	Closed status from gate
White with black tracer stripe	Common for commands from controller

For every gate set where work is performed, check to make sure that the control wiring follows this convention. If it doesn’t, reconnect the wires to bring it into compliance. If existing control cables do not correspond to the colors listed in this provision, apply permanently fixed colored tabs/labels such that the color coding is clearly discernible.

(e) **Acceptance Testing:** Develop a test plan and submit it to the Engineer. It shall include:

- Visual inspection to confirm good workmanship and compliance with the approved submittals.
- Demonstration of proper operation of the gates under local isolated control including both manual hand cranking of the gates and local motorized control at the gate housing and technical panel in the cabinet. Tests shall include all recommended tests by the gate manufacturer.
- Demonstration of proper operation of the gates under local control, including proper communication with the associated dynamic message signs and traffic signals.
- Demonstration of proper operation under the control of the Concessionaire’s central software where applicable for existing gate groups that will be transitioned and under the HOT-OC’s central software.

- All testing shall be coordinated with the Concessionaire as required by the Turnover Plan.

(f) **Integration:** As proposed gate sets are ready for incorporation into the EXPRESS- OC's system, provide the Concessionaire with the information necessary to integrate the proposed gates into the TMS. Program the gate controllers with the addresses and other parameters stipulated by the System Manager. Assist in testing and troubleshooting during the integration process.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 819—GENERATOR ASSEMBLIES
(OPITZ PROJECT TMS)**

July 15, 2020

819.01 – Description.

All work related to the installation and testing of Generator Assemblies shall be in compliance with the requirements of the provisions set forth in this Section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 801.03(f) of the 2020 Edition of the VDOT Road and Bridge Specifications.

Provide and test backup power generator assemblies at the electrical service panels shown on the plans. Generator sites shall include service panel telemetry stations that include a cabinet, remote terminal unit, and DC power system that shall be used for generator assembly monitoring and control.

819.02 – Materials.

- (a) **Generator** shall be a Cummins Power Generation spark-ignited set fueled by liquid propane. It shall produce three-phase, four-wire, 277/480 volt AC power and have at least the capacity shown on the plans. Each generator shall be equipped with:
- A vaporizer for the fuel.
 - A battery, battery charger, and battery heater to ensure cold weather starts. The battery charger shall have status outputs (including low battery alarm) compatible with the PowerCommand PCC500 system.
 - A coolant heater to ensure cold weather starts.
 - A Level II (F173-2) sound-attenuating, weather protective enclosure.
 - Heavy duty air cleaner.
 - A full set of sensors, status outputs, and control inputs compatible with the PowerCommand PCC500 system.
- (b) **Automatic transfer switch** shall be a Cummins Power Generation Model OTPC with programmed open transition and Level 2 PowerCommand control. The capacity shall be as recommended by the manufacturer for the associated generator. The switch shall have a locking interface panel for monitoring and setting up the switch and also a full set of sensors, status outputs, and control inputs compatible with the PowerCommand PCC500 system.
- (c) **Remote monitor** shall be a Cummins Power Generation PowerCommand PCC500 (SNMP) PowerCommand PCC500 or successor product. The device shall permit remote monitoring and control, including starting and stopping the generator and switching the transfer switch. It shall include mounting hardware and all cables, modules and accessories needed to perform all remote monitoring and controlling functions that the generator, transfer switch, and battery charger allow. The device shall incorporate a web server and all remote functions shall be performed via a web browser.
- (d) **Generator communication cabinet** shall be suitable for mounting on the rails of the service panel. It shall be a locking aluminum NEMA 3R cabinet large enough to hold the uninterruptible power supply battery (see below) and the following DIN rail-mounted equipment: uninterruptible power supply; remote monitor (PowerCommand PCC500 PowerCommand PCC500); Ethernet switch, fuse block, and remote terminal unit. The cabinet shall have screened, filtered intake vents in the rear floor and screened, downward-facing exhaust vents in the overhang above the door. It shall have one or more thermostat-controlled fans capable of moving a total of 100 cubic feet per minute. It shall have a light bar consisting

of at least 12 white LEDs positioned to illuminate the equipment. Both the fan and light bar shall be at the top of the cabinet and both shall be powered by 24 VDC. The lights shall be on when the door is open and off when it is closed.

(e) **Telemetry power system** for the PowerCommand PCC500, the Ethernet Switch, cabinet light, cabinet fan, and the remote terminal unit shall consist of the following:

- A power supply with a three-phase 480 VAC input and a 20 amp, 24 VDC output. The power supply shall mount on DIN rail or other suitable mounting bracket for the cabinet and have an operating temperature range of at least -25° C to +70° C. The power supply shall be mounted inside the service panel breaker cabinet.
- A DC uninterruptible power supply (UPS) that is able to produce at least 10 amps at 24 VDC. The UPS shall store power in two batteries rated at 12 volts, 14 ampere-hours. The UPS shall have an operating temperature range of -25° C to +60° C. The UPS shall have alarm contacts for loss of input power and low battery. The batteries shall be sealed, maintenance-free, and have a built-in lifting strap. The operating temperature range of the batteries shall be -40° C to +70° C.
- A fuse block that distributes the power from the UPS to five appropriately fused 24 VDC circuits, one for the Ethernet switch, one for the remote terminal unit, one for the fan, one for the light, and one for the PowerCommand PCC500. The fuse block shall be modular with the modules on DIN rail. Each module shall have a label and each shall have a fuse carrier that can be rotated out of its normal position to interrupt the circuit without interrupting other circuits.
- An inverter to power the PowerCommand PCC500. The input shall be 24 VDC and the output shall be 120 VAC, pure sine wave. The operating temperature range shall be -15° C to +55°C.

(f) **Remote terminal unit** shall be Moxa ioLogik E4200 that shall be configured as directed by the System Integrator to send status information to the HOT-OC. The RTU shall include input modules to monitor the status of the DC UPS and issue an SNMP trap to the central computer when alarm conditions begin or end. It shall also include input modules to monitor the fuel level in the tank and issue traps when the level drops below set levels.

The RTU shall be as used for the 95 HOV/HOT lanes project for propane tank monitoring. Coordinate with the System Integrator for specific model information. Otherwise, the RTU shall accommodate the necessary number of input and output modules that could monitor up to 200 inputs. Provide one module to monitor all the contact closures from the UPS and another to monitor the 4-20 milliamp signal from the fuel level sensor. The RTU shall have modules available (but not provided) for analog voltage inputs (0-10 V), and analog and digital outputs.

The device shall include a web server that permits setup and troubleshooting using only a web browser.

(g) **Fuel tank** shall be a 500 gallon horizontal ASME tank. Equip it with all features and fittings needed for safe operation and compliance with codes and the requirements of the propane delivery service. It shall have supports for mounting the tank on a concrete pad and a belly valve for feeding liquid propane to the generator. Equip the tank with two devices that measure the amount of liquid propane in the tank. One shall indicate the level visually on an indicator on the tank. It shall not require power and shall be calibrated in gallons or percent full. The other device shall produce a 4-20 mA signal and shall require no other power than that provided by the input module of the remote terminal unit. Both devices shall resist impact, temperature extremes, corrosion, moisture, and bright sunlight. A single sensor with both a visible indicator and a 4-20 mA output is acceptable.

(h) **Fuel line** carrying the liquid propane to the generator shall be installed underground and shall be in compliance with pertinent codes and the recommendations of the generator manufacturer. Include fittings.

(i) **Vaporizer** kit for conversion of an existing Cummins generator from propane vapor to liquid propane fuel. This must be recommended by Cummins and installed by a contractor approved by Cummins.

819.03 – Procedures.

- (a) **Generator assembly installation.** Ensure that all aspects of the site, equipment, and installation comply with NFPA 58 and pertinent state and local codes. Coat the threads of all fittings with a compound suitable for propane.
1. **Generator.** Design and construct a reinforced concrete pad and mount the generator and transfer switch in accordance with the generator manufacturer's recommendations. Prior to construction, submit the proposed pad design, including concrete strength, to the Engineer for approval. Provide fuel, power, and control connections in accordance with the manufacturer's recommendations. For existing generators to be reused, equip the generator with a vaporizer and fuel lines so that it uses a liquid propane fuel supply.
 2. **Fuel tank.** Design and construct a reinforced concrete pad for the propane tank and the fuel line from the tank to the generator. Ensure that the bottom of the tank is at least as high as the vaporizer at the generator. Prior to construction, submit the proposed pad and fuel line designs to the Engineer for approval. Include the raceway for the connection between the fuel sensor and the remote terminal unit. Install the tank level on the pad and make the connections to the fuel line, electrical ground, and remote terminal unit. Do not put propane into the tank yet.
 3. **Telemetry system.** Install all elements of the PowerCommand and fuel level monitoring systems, including connections to power and the fiber optic communication network. At locations that already have service panel telemetry cabinets, use those cabinets and equipment. In those locations, connect the PowerCommand and inverter to the existing DC UPS and Ethernet switch. At those locations, also connect the fuel sensor to the existing RTU, providing an additional 4-20 mA module if needed. At all locations, set up the generator for automatic tests at a frequency provided by the Concessionaire. Set up SNMP traps in the remote terminal unit to notify the HOT-OC when alarm conditions involving the DC UPS begin and end. Set up traps to notify the operations center when the fuel tank is 25 % full and 10 % full. Configure the Telemetry System to provide the following data via SNMP: generator status (run/stop), ATS status (utility/generator), and utility power (on/off).
 4. **Code Inspection.** Inform the Engineer when all site work, propane work, and electrical work has been completed, so that the Engineer can arrange for inspection by the authority having jurisdiction. Be present at the inspection, providing information and assisting in the inspection as requested by the inspector. Correct all deficiencies found by the inspector.
 5. **First Fill.** When the site passes the inspection, vacuum purge the tank and fill it to the regulatory limit. However, use the filling of the tank as an opportunity to test the accuracy of the visual and electronic indications of the fuel level. If the two fuel level sensors are not within 10% or if they don't correspond to the amount of propane that has been dispensed, stop the filling process, empty the tank, and fix the fuel level sensing devices.
- (b) **Acceptance testing.** Develop a test plan for the generator assembly and submit it to the Engineer for approval. Incorporate every test recommended by the manufacturer of each component including the generator, propane tank, remote terminal unit, and telemetry system. Include a visual inspection. Demonstrate proper operation in response to a power outage and to a power restoration. Demonstrate remote monitoring of the generator, fuel tank, and DC UPS over the fiber optic communication network. Demonstrate remote control of generator operation. Demonstrate that the light and fan in the generator communication cabinet work, and that the cabinet shows no evidence of leaks. Revise the test plan until it is satisfactory to the Engineer. Then conduct the tests in the presence of the Engineer's representative.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 820
(OPITZ PROJECT TMS)**

[NOT USED]

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 821
(OPITZ PROJECT TMS)**

[NOT USED]

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 822
(OPITZ PROJECT TMS)**

[NOT USED]

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR
SECTION 823—CABINET ASSEMBLIES
(OPITZ PROJECT TMS)**

July 15, 2020

823.01 – General.

All work related to the installation and testing of Cabinet Assemblies shall be in compliance with the requirements of the provisions set forth in this Section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 703 and 801.04(a) of the 2020 Edition of the VDOT Road and Bridge Specifications.

This section governs all cabinets furnished in this project except Type 1 cabinets.

823.02 – Materials.

(a) General Requirements applicable to all cabinets:

1. All VDOT cabinets shall have door locks equipped with the VDOT's standard tumbler lock Number 9R48773. Provide a total of ten (10) keys.
2. All Express Lanes cabinets shall have locks from CCL Security similar to the locks on VDOT cabinets. They shall be keyed to match cabinet locks provided on the I-95 HOV/HOT Lanes project. Provide a total of 30 keys.
3. Provide an engraved plaque on the front door, displaying the cabinet ID indicated on the plans. Characters shall be at least 4 in. high with a minimum stroke width of 0.4 in unless smaller characters are required to fit the ID on one line. The plaque shall be made of multilayered plastic. Plaques on Express Lanes cabinets shall have a black surface over a white interior.
4. The connection to ground must be bare, solid AWG # 6 copper wire. For multiple cabinets on a single foundation, bond each ground bus bar using a solid AWG #6 copper wire and bond one of the bus bars to the grounding electrode.
5. All cabinets shall have a natural aluminum or stainless steel finish, free from blemishes. All seams shall be continuously welded and ground smooth.
6. Fasteners must be stainless steel.
7. Cabinets shall have sunshields on all four sides and the top, except that no shield is required on the back of Type 3 cabinets. Also, where two or more cabinets are mounted side-by-side, no sun shield is required on facing sides.
8. Shall support a removable standard 19" EIA rack.
9. Provide mounting panels for terminal blocks, surge protectors, and other small items on both sidewalls.
10. Provide terminal blocks for all conductors entering the cabinet. Except for blocks used for coaxial cable, the blocks shall be the barrier type with nickel-plated brass screw terminals and solid backs. Each terminal shall be clearly and permanently labeled on a contiguous surface using silk screening or other approved method. Terminal blocks for conductors carrying more than 60 volts must be covered by a clear acrylic shield.
11. Provide an interior fluorescent light above each door. Each door shall have a door switch controlling the light. In cabinets with two doors, both lights shall light when either door is opened.
12. Provide a duplex ground fault interrupt outlet for use by technicians. If several cabinets are mounted

side-by-side, only one must have a convenience outlet.

13. Provide a thermostatically controlled fan that moves 100 CFM through vents at the top of the cabinet. The air intake shall be through louvers in the door, and the air shall pass through a replaceable filter as it enters the cabinet.
14. If the cabinet receives 480-volt power, provide a step-down transformer to convert it to 120-volt power. All transformers shall be designed for outdoor use. The transformer shall be inside cabinets unless noted on the plans. Transformers at cabinets supplying dynamic message signs shall have center-tapped secondaries, producing 120/240-volt power. Other transformers shall produce only 120-volt power.
15. In each cabinet with a transformer, provide a panel or DIN rail-mounted, two-pole main breaker on the primary side of the transformer. Base the capacity of the breaker on the rating of the transformer. The breaker shall be a UL489 listed.
16. In each cabinet, provide a 120 VAC main breaker and branch circuit breakers, all DIN rail mounted.

The breakers shall be UL489 listed. The main breaker shall be rated at 25 amps unless the load requires a larger rating. Branch circuits shall have 15 amp breakers unless the load requires a larger breaker. One or more branch circuits shall serve the communication and traffic management equipment in the equipment cabinet. Connect that circuit to the second stage of the surge suppressor and to the equipment. A second branch circuit shall power auxiliary devices in the equipment cabinet, such as the fan, heater, light, and GFI outlet.

17. In cabinets serving dynamic message signs or gates, provide a multi-pole breaker to cut off power to the sign or gates. Power running from the transformer secondary or incoming power terminal block to this breaker shall bypass the 120 VAC breakers in the cabinet.
18. Before buying any cabinets, provide shop drawings, layout drawings, catalog cuts, and schematics for the Concessionaire's approval. The layout drawings shall be dimensioned drawings showing the proposed location of all equipment for each cabinet. The drawings shall demonstrate that all the equipment will fit and that all controls, connections, convenience outlet, and other service points are readily accessible for use and maintenance. They should also demonstrate that incoming conductors reach surge suppressors as soon as they enter the cabinet. Layout all cabinets that have the same equipment in the same way and submit a single drawing for all like cabinets. Revise the layout as instructed by the Engineer and resubmit the drawings until they are accepted.

(b) **Ground-Mounted Cabinets:** The cabinets shall be Model 334C cabinets on the Caltrans Transportation Electrical Equipment Specifications (TEES) Qualified Products List (QPL). Acceptable equivalent products must meet one of the following conditions: 1) previously approved for use on the I-95 HOV/HOT Lanes Project or 2) references provided from agency where cabinet has been used for similar purpose and found suitable by the Concessionaire. No input panel, input file, C1 harness, or power distribution assembly is required, except for gate controller cabinets. Police panels are not required. Provide bolts, nuts, washers, and lock washers to secure the cabinet to the base adapter.

(c) **Base Adapters for Ground-Mounted Cabinets:** The base adapter has two functions. It raises the cabinet 12" above the foundation, making it easier for a technician to work in the lower part of the cabinet. In addition, it provides a raceway between adjacent cabinets on the same foundation. Base adapters shall be as follows:

1. The base adapter shall be a hollow aluminum box 12 inches high, 30 inches wide, and 30.25 inches deep (the same depth as the cabinet). It shall have a cutout opening centered in the top, 15 inches wide and 21 inches deep, matching the opening in the bottom of the cabinet. It shall have a similar cutout on the bottom, directly below the top cutout. Around the top cutout shall be four punched holes that match the anchor bolt holes in the cabinet. Around the bottom cut out shall be four punched holes that match the anchor bolts in the foundation.
2. Construct the adapter so that it does not sag under the weight of the fully loaded cabinet. Any internal members must not obstruct cables going from the cabinet to adjacent cabinets, nor to the conduits below.
3. Construct the adapter of the same material used for the cabinet and give it a matching finish.

All seams shall be continuously welded and ground smooth.

4. Provide anchor bolts, nuts, washers, and lock washers to secure the base adapter to the foundation.

- (d) **Type 2 Cabinets:** The cabinets shall be Model 336A. If no vendors for this cabinet available, provide a Model 336A from a vendor of Model 332 or Model 334 cabinets. Equivalent products will be allowed per the requirements for Ground Mounted cabinets. No input panel, input file, output file, C1 harness, or power distribution assembly is required, except for gate controller cabinets. Police panels are not required.

823.03—Procedures.

- (a) **Ground-Mounted Cabinet Installation:** Apply a coat of silicone sealant to the bottom of the cabinet immediately before bolting it to the base adapter. Ensure that the cabinet is plumb, using shims if necessary, and ensure that it is properly aligned with the front edge of the base adapter.
- (b) **Type 2 Cabinet Installation:** Securely fasten the cabinets to their supporting structures using mounting brackets. Ensure that conduits enter the cabinet only from the bottom. Bond the cabinets to the support structure, if metal, and the support structure to a ground rod. If the support structure is not metal, run a # 6 solid copper ground wire from the cabinet to a ground rod.
- (c) **Testing:** Develop a proposed test procedure for the cabinets and submit it to the Engineer for approval. It shall include visual inspection, testing of lights, fan, and power outlets. It shall also include a test in which each branch circuit is shorted to the ground bus bar to confirm that the breaker trips. Revise the proposed test procedure until it is acceptable to the Engineer.

Provide all equipment and personnel needed to safely conduct the tests. Arrange for the Engineer's representative to witness the tests. Give the Engineer a report documenting the result of every visual inspection and test. Include a summary indicating whether the cabinet passed every test. The cabinet must pass every test to be accepted.

If the cabinet fails, correct the problems and arrange for a new test. If the test of the breakers reveals breakers that do not trip, the resistance to ground is too high; lower the resistance by adding more ground rods and improving the connections in the ground system.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 824—COMMUNICATION SYSTEM TESTING
(OPITZ PROJECT TMS)**

July 15, 2020

Section 824.01 – Procedures.

(a) **Objectives:** Test the constructed communication system to confirm the following:

1. All 95 Express Lanes roadside equipment to be relocated or modified in this project communicates normally with the HOT-OC.
2. All VDOT roadside equipment that was provided in this project communicates normally with a test computer at the communication node to which the roadside equipment reports.
3. All Express Lanes equipment communicates normally with the HOT-OC central computer.
4. Tested communication channels operate at the data rates and error rates anticipated, based on the components used in the channel.
5. Communication over the Express Lanes network continues normally despite a single cable cut or switch failure anywhere on the network.

(b) **When to Test:**

1. **Express Lanes network:** Conduct the tests when the entire network is complete and all communication and traffic management equipment is in its final configuration. Test existing Express Lanes fiber at cabinets installed on the 95 Express Lanes project when modifications to the cabinet are made as part of the Opitz Project.

(c) **How to Test Express Lanes Cabinets:**

1. Arrange for the tests to be witnessed by the Engineer's representative.
2. Do the following at each cabinet to be tested, proceeding sequentially around the network from cabinet to cabinet. If testing reveals a problem, such as an improperly configured switch, that can be fixed immediately, fix it and retest. If a distribution ring has an even number of cabinets, only one of the two middle cabinets need be subjected to the communications tests.
 - a. Use software on the test computer at the HOT-OC to communicate bi-directionally with the traffic management equipment in the cabinet. If the cabinet is a CCTV cabinet, display the video.
 - b. Disconnect the switch at the cabinet under test from one pair of optical fibers and confirm that any interruption in communication lasts only a few seconds. Use switch manufacturer console interface to test the communication channel for throughput, latency, frame loss, and back-to-back frames. Reconnect the pair of fibers and confirm that any communication lapse lasts only a few seconds.
 - c. Repeat the previous step with the other pair of fibers connected to the switch.
 - d. If the cabinet under test is at the midpoint of a distribution ring, turn off the power to the Backbone switch at one of the Backbone switches that is on the distribution ring. Confirm that any communication lapse lasts only a few seconds. Repeat communications tests. Power up the Backbone switch. Confirm that any communication lapse lasts only a few seconds.
 - e. If the second Backbone switch in the distribution ring is also in a IRU (rather than the

HOT-OC), repeat the previous step with the second Backbone switch.

Note: All testing shall be coordinated with and approved by the 95 Express Lanes Engineer.

(d) **Acceptance and Corrective Action:**

1. Prepare a table containing all the data collected during the testing: whether the equipment performed as expected; duration of communication lapses during faults and restorations, and the communications test results. Display this data in a way that facilitates comparisons among the communication channels. Supplement the table with graphs if that makes the data easier to understand.
2. Highlight test results that are significantly different from the rest. For each such anomaly, identify possible causes. Investigate and correct anomalies caused by defects in materials or workmanship.
3. When all the defects have been fixed, retest the corrected communication channels in the presence of the Engineer's representative. Conduct any additional tests the Engineer's representative requests to demonstrate that the actions taken to correct the anomalies have not impaired the performance of other communication channels.

(e) **Documentation:** Submit the table and graphs described above, but with both the original and final test results. For each anomaly corrected, identify the corrective action taken. Submit proposed fixes and corrective actions of defects for approval prior to commencing work.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 825—WIRING AND SURGE PROTECTION
(OPITZ PROJECT TMS)**

July 15, 2020

825.01 – General.

All work related to the installation and testing of Wiring and Surge Protection shall be in compliance with the requirements of the provisions set forth in this section. In addition to these Supplemental Specifications, the Contractor shall adhere to the applicable requirements of Section 801 of the 2020 Edition of the VDOT Road and Bridge Specifications.

825.02 – Wiring.

- (a) Protect personnel from accidental contact with dangerous voltages.
- (b) In equipment cabinets and housings, every conductor, except conductors contained entirely within a single piece of equipment, must terminate either in a connector or on a terminal block. Provide connectors and terminal blocks where needed.
- (c) Within equipment cabinets, use wire saddles to keep wiring, including fiber optic pigtails, out of the way of service activities. Ensure that any removable assembly can be removed without disturbing wiring that is not associated with the assembly being removed.
- (d) Do not install conductors carrying 120 volt AC power or greater in the same wiring harness as conductors carrying lower voltage control or communication signals.
- (e) Equipment and wiring shall be arranged so that the distance between each conductor's point of entry and the surge protector shall be as short as possible, and the protector shall be located as far as possible from electronic equipment. All wiring between the surge protectors and the point of entry shall be free from sharp bends.
- (f) At locations where modifications to existing wiring is required, the Contractor shall note deficiencies or code violations and bring to the attention of the Engineer.
- (g) Phase taping of electrical conductors shall not be permitted. Electrical conductors shall have a continuous phase colored jacket between connection and termination points. Neutral conductors shall have a continuous white or gray colored jacket between connection and termination points. Ground conductors shall have a continuous green colored jacket between connection and termination points.
- (h) Cable reducing compression adapters shall be used at circuit breaker locations where oversized cable is used to reduce voltage drop on long runs or where neutral conductors are upsized for power quality. Compression adapters shall contain insulating covers supporting termination of Class B 600 V conductors. Compression reducing terminal adapters shall meet Underwriters Laboratories (UL) standards and listings and additional associated standards.
- (i) Provide 2 feet of electrical wiring slack at every junction box. Electrical wiring shortage or excessive amounts of wiring will not be accepted.

825.03 – Surge Protection.

- (a) **General:** All ungrounded conductors entering or leaving any equipment cabinet shall be equipped with surge protectors. For purposes of this section, multiple cabinets on a single foundation are considered a single cabinet.

- (b) **Microwave vehicle detector cables** shall be protected by surge protectors recommended by, and supplied by, the detector manufacturer. At locations where multiple detectors or sensors are used, a separate surge protector shall be used for each power and communication circuit to the detectors.
- (c) **Other low-voltage signal pairs** shall be protected by protectors meeting the following requirements:
 1. The protectors shall suppress a peak surge current of up to 10K amps.
 2. The protectors shall have a response time less than five nanoseconds.
 3. The protector shall clamp the voltage between the two wires at a voltage that is no more than twice the peak signal voltage, and clamp the voltage between each wire and ground at 50 volts or less.
 4. It shall be possible to replace the protector using only common hand tools.
- (d) **Cables carrying power** from an equipment cabinet to a camera or other external device shall be protected by grounded metal oxide varistors of appropriate voltages. All metal oxide varistors used for surge protection shall be 0.79 in. in diameter or larger. Power-Over-Ethernet (POE) equipment shall be protected by Ethernet Extender's Enable-IT 265LP or approved equal.
- (e) **Main AC power** shall be protected by a protector that is UL 1449 listed and bears the UL label. If the main power uses a step down transformer at the cabinet or toll point, then the surge protector shall be on the primary side of the transformer, on the load side of the main breaker. If the voltage on the primary side of the transformer is 480 volts, the surge suppressor shall be designed to protect three phases and the neutral, even though only two phases are used.

The surge protector shall have the following characteristics:

- For each phase, the sum of the line-to-neutral and line-to-ground surge capacities shall be at least 80 kA.
- It shall be a Type 1 surge protective device with a tested normal current (I_n) of 20 kA.
- The short circuit current rating shall be 200 kA.
- Depending on the voltage of the lines being protected, the voltage protection ratings and maximum continuous voltage shall be as follows:

	277/480 V WYE	120/240 V SPLIT
Line-to-neutral voltage protection rating	1200 V	700 V
Line-to-ground voltage protection rating	1200 V	700 V
Neutral-to-ground voltage protection rating	1200 V	600 V
Line-to-line voltage protection rating	2000 V	1000 V
Maximum continuous operating voltage (line-to-neutral)	320 V	150 V

- The protector shall be in the equipment cabinet for the electronics being protected.
- Its operating temperature range shall be -25° C to 60° C
- The protector shall have one or more status LEDs giving a visual indication when any suppression element has failed.
- The protector shall have a ten year warranty.

**CONSTRUCTION PROJECT
SPECIAL PROVISION FOR**

**SECTION 826—NETWORK BOOT BAR
(OPITZ PROJECT TMS)**

813.01 – General.

All work related to the installation and testing of Opitz Project Network Boot Bars (NBB) shall be in compliance with the requirements of the provisions set forth in this section. In addition to these Supplemental Specifications, the Contractor shall adhere to applicable requirements of Section 802 of the 2020 Edition of the VDOT Road and Bridge Specifications.

- Provide NBB's at locations as shown on plans. The NBB is a smart network cabinet power strip, which shall instantly reboot, start or stop roadside equipment in cabinets and shall provide complete non-interruptible power protection, voltage regulation, and surge and spike protection for all ITS devices and communications equipment powered by it.
- **Express Lanes Configuration:** NBB shall be installed in all ITS cabinets as shown on the plans. The NBB shall be installed in the cabinet where all ports are viewable and accessible.

813.02 – Materials.

- The Network Boot Bar shall be Digital Loggers Web Power Switch 7 with Simple Network Management Protocol. The NBB shall be configured to match the power requirements of the ITS cabinet. The NBB shall be connected to the network access switch. Port assignments for the network access switch and NBB will be provided by 95 Express. Provide necessary cables and power cords for connecting roadside equipment.

813.03 – Construction.

- The NBB shall be a commercially available package containing all wiring connectors, software, mounting brackets, and cables.

813.04 -Procedures

(a) Installation:

1. Install the NBB, power and wiring in accordance with the manufacturer's recommendations. The NBB shall be rack mounted in the ITS Cabinet per the approved rack layout elevations.
2. Ground the NBB in accordance with the manufacturer's recommendations.
3. Label all cables at both ends, indicating the particular device it serves.
4. Set the operating parameters as directed by the System Integrator, including IP address, port assignments and location.

(b) Testing:

Acceptance Testing: Develop a test plan and procedures that demonstrate proper operation of the NBB under full load conditions and demonstrate the expected operating performance. The plan shall include all tests recommended by the manufacturer. When the plan is satisfactory to the Engineer, conduct the testing in accordance with the plan and prepare a test report. Provide any software and equipment needed to conduct the tests.

Sustainability
Special Provisions

SUSTAINABILITY SPECIAL PROVISIONS

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1. Sustainability Performance Requirements

The following section describes the minimal sustainability requirements to be completed by the Contractor for the project.

- (a) The Concessionaire has established a goal to achieve at minimum a Verified Award rating as recognized by the Envision Sustainable Infrastructure Rating System of the Institute for Sustainable Infrastructure (ISI).
- (b) The Contractor shall prepare a monthly sustainability report. This report will include:
 - (i) Analysis of performance against project sustainability targets
 - (ii) Analysis of performance against Envision credit targets, including monitoring results
 - (iii) Any sustainability innovations implemented on the project
- (c) The Contractor shall prepare and submit each year, by April 30 for review in accordance with the Contract, an annual sustainability report which demonstrates the Contractor's performance in economic, social, environmental and governance areas over the last Financial Year.
- (d) The following paragraphs indicate minimal requirements for specific credit under each Envision categories. It is mandated that all regulatory requirements will be respected.

1.1 Quality of Life

- (a) The Contractor shall meet all health and safety regulations and laws for operation.
- (b) In reference to QL1.3, with the goal of attaining a Conserving level of achievement, the Contractor shall commit to monitoring and improving the health and safety of onsite construction operations, with a health, safety and security plan that requires internal documentation that tracks health and safety performance and corrects deficiencies or promotes best practices during construction. This includes:
 - (i) Implementation by the Contractor of safety and/or security competency training for all field personnel, providing minimum training requirements for health and safety programs. Proof of action is required with documentation.
 - (ii) A specific site and project security plan, including physical security and information security when appropriate. Proof of action is required with documentation.
 - (iii) Programs to promote health and well-being provided by the Concessionaire and Contractor. Examples include health screenings or workshops. Proof of action is required with documentation.
- (c) In reference to QL1.6, with the goal of attaining a Conserving level of achievement, the Contractor shall implement a construction management plan to address the temporary inconveniences associated with construction, informed by stakeholder engagement. The construction management plan shall include robust feedback mechanisms and performance monitoring and reporting for construction impacts. The construction management plan shall address the following types of construction impacts:
 - (i) Noise
 - (ii) Safety/wayfinding

(iii) Access/mobility

(iv) Lighting

1.2 Leadership

- (a) In reference to LD2.1, with the goal of attaining an Enhanced level of achievement, the Contractor shall provide an Envision Sustainability Specialist (ENV SP) with experience in linear infrastructure projects to be part of the management team. The Envision Sustainability Specialist will be responsible for the following:
- (i) coordinate implementation of the project sustainability requirements;
 - (ii) communicate the project sustainability requirements to the construction team through methods such as daily briefings, subcontractor orientations, and/or on-site field training sessions; and,
 - (iii) conduct monthly review meetings with the Concessionaire regarding the sustainability performance of the project.
- (b) In reference to LD3.2, with the goal of attaining an Enhanced level of achievement, the Contractor shall include training programs for local skill development, including identifying skill or capability gaps, and then developing training programs for the local workforce that specifically target the identified gaps.

1.3 Resource Allocation

- (a) In reference to RA1.1, with the goal of attaining an Improved level of achievement, the Contractor shall reduce materials use through materials avoidance and reduction strategies and minimize construction materials volumes through construction planning and construction methods. At least 5% of all project materials, supplies, and equipment shall meet the sustainable procurement policy/program requirements. The Contractor shall prepare calculations and provide documentation showing that the percentage of the total project materials by cost, weight, or volume meet the 5% goal. Documentation shall include the following:
- (i) Inventory for all materials being tracked for sustainable procurement practices, including a description of the material and the manufacturer or supplier of the material, along with evidence of the disclosure requirements.
 - (ii) material/supplier tracking forms and/or spreadsheets, and
 - (iii) receipts/invoices.
- (b) In reference to RA1.2, with the goal of attaining an Improved level of achievement, the Contractor shall reuse construction and demolition waste where practicable. At least 5% of all project material shall be recycled material, including materials with recycled content and/or reused existing structures or materials. The Contractor shall prepare calculations and provide documentation showing that the percentage of the total project materials by weight, volume, or cost meet the 5% goal. Documentation shall include the following
- (i) Total quantity of materials used on the project by weight, volume, or cost
 - (ii) Inventory of specifications for materials containing recycled product, with the name of the project, the name of the manufacturer, weight, volume, or cost of the material, and the percentage of recycled content (either post-industrial or post-consumer)

- (iii) Calculations of percentage of reused or recycled materials by weight, volume, or cost
 - (iv) Inventory of existing materials or structures that have been used.
- (c) In reference to RA1.4, with the goal of attaining a Conserving level of achievement, the Contractor shall develop and implement a construction waste management plan and provide documentation that the construction management plan was implemented. The Contractor shall ensure that at least 95% of inert and non-hazardous construction waste, excluding spoil, and at least 95% of office waste is recycled or alternatively beneficially reused. The Contractor shall prepare calculations and provide documentation showing that the percentage of the total project materials by cost, weight, or volume meet the 95% goal. Documentation shall include the following:
- (i) Description of each type/category of construction and demolition materials generated, location of receiving agent, and quantity of waste diverted in weight (tons) or volume (cubic yards/meters)
 - (ii) Calculations of total waste reduction measures and percentage of materials diverted to recycling or reuse
- (d) In reference to RA1.5, with the goal of attaining an Improved level of achievement, the Contractor shall reuse at least 30% of excavated material from on site or source or reuse 100% of fill and excavated material from within 25 miles of the site. Documentation of earthwork sources and calculations shall be provided.
- (e) In reference to RA2.2, with the goal of attaining an Enhanced level of achievement, the Contractor shall participate in a project team planning review to identify and analyze options for reducing energy consumption during construction. The Contractor shall implement at least two (2) energy reduction strategies. Strategies that meet the requirement are described in the Envision: Sustainable Infrastructure Framework, Version 3, Guidance Manual.
- (f) In reference to RA3.3, with the goal of attaining an Enhanced level of achievement, the Contractor shall identify and analyze options to minimize potable water consumption by conducting planning reviews. The Contractor shall implement at least three strategies to conserve potable water. Strategies that meet the requirement are described in the Envision: Sustainable Infrastructure Framework, Version 3, Guidance Manual.

1.4 Natural World

- (a) In reference to NW2.4, with the goal of attaining a Superior level of achievement, the Contractor shall prepare spill and leak prevention and response plans.
- (b) In reference to NW3.4, with the goal of attaining an Enhanced level of achievement, the Contractor shall include in its construction management plan best practices that shall be followed to prevent the unintentional introduction of invasive species to the site.
- (c) In reference to NW3.5, with the goal of attaining an Enhanced level of achievement, the Contractor shall limit the area disturbed by development activities and restore 95% of the post-construction vegetated areas with the appropriate soil, structure, and function to support healthy plant and tree growth.

1.5 Climate and Resilience

None are applicable to the Contractor

PRINCE WILLIAM COUNTY CONTRACT SPECIAL PROVISIONS
for
PRINCE WILLIAM COUNTY

Item **CONTRACT SPECIAL PROVISIONS**

- CSP-25 STAMPED PATTERN ON CONCRETE MEDIANS.
- CSP-26 ARCHITECTURAL FINISH, CONCRETE FORM LINERS AND COLOR STAIN COATING FOR RETAINING WALLS AND BRIDGE/STRUCTURES.
- CSP-27 ARCHITECTURAL FINISH, CONCRETE FORM LINERS AND COLOR STAIN COATING.

CONTRACT SPECIAL PROVISIONS

CSP-25 STAMPED PATTERN ON CONCRETE MEDIANS.

All Proposed Concrete Medians on the project shall be stamped and colored concrete where indicated on the approved plans. The intent of the stamped concrete treatment is to provide an appearance of conventional red brick. The stamped pattern shall be a brick paver type with a basket weave pattern. The Contractor's construction methods for providing the stamped and colored concrete shall be submitted to the Concessionaire for review and approval prior to construction, and test panels for the stamped and colored concrete treatment areas shall be provided to the Concessionaire for review and approval. Sign foundations, when required, shall be formed up before this work is performed.

CSP-26 ARCHITECTURAL FINISH, CONCRETE FORM LINERS AND COLOR STAIN COATING FOR RETAINING WALLS AND BRIDGE/STRUCTURES.

Concrete bridge elements and retaining walls shall receive Architectural Treatments in accordance with the Special Provision for Architectural Finish, Concrete Form Liners and Color Stain Coating. Aesthetic treatments on elements within the clear zone that are not otherwise protected shall not exceed maximum relief guidelines given in VDOT Structure and Bridge Volume V Part 2, Chapter 25. Architectural finish is not depicted on the approved Plans and shall be included in Contractor's shop drawing submittals for approval prior to construction.

CSP-27 ARCHITECTURAL FINISH, CONCRETE FORM LINERS AND COLOR STAIN COATING (CPSR RAIL ON OPITZ BOULEVARD BRIDGE)

1.1 GENERAL

A. Description

Construction of textured and colored formed concrete surfaces using simulated stone masonry form liners, and color stain system designed to duplicate the appearance of natural stone. The work covered by this special provision consists of constructing textured surfaces on formed reinforced concrete surfaces as indicated on the Plans and in this Special Provision. The Contractor shall furnish all materials, labor, equipment, and incidentals necessary for the construction of simulated rock face using simulated stone masonry form liners and a compatible concrete coloring system.

B. Quality Assurance

Manufacturer of simulated stone masonry molds: Five years experience making stone masonry form liners to create formed concrete surfaces to match natural stone shapes and surface textures.

Pre-Installation Meeting: Schedule conference with manufacturer(s) representative to assure understanding of simulated stone masonry use, color application, requirement for construction of mockup, and to coordinate the work.

Source Limitations for Form-lined Concrete: Concrete form liners, form release agent, concrete stain, and application of concrete stain to be provided by one source with resources to provide technical assistance and products of consistent quality in appearance and physical properties without delaying the work to all associated manufacturer's, contractors, and sub-contractors.

C. Submittals

Sample Panel: Within 30 days of receiving the general contract Contractor is required to submit a 24" x 24" sample of the simulated stone masonry finish. Sample is to demonstrate the finish for this project. Approval of sample panel is required by the Engineer.

Shop Drawings: Plan, elevation and details to show overall pattern, joint locations, form tie locations, and end, edge and other special conditions.

Samples: Form ties, sample and description, showing method of separation when forms are removed.

D. Job Conditions

Environmental requirements: Apply color stain when the ambient temperatures is between 50 and 100 degrees F. Consult manufacturer if conditions differ from this requirement.

Schedule color stain application with earthwork and back-filling of any wall areas making sure that all simulated stone texture is colored to the minimum distance below grade. Delay adjacent plantings until color application is completed. Coordinate work to permit coloring applications without interference from other trades.

Design and pattern of the concrete surface shall follow the manufacturer's standard drawing. Patterning of simulated stone masonry shall appear natural and non-repeating. Seam lines or match lines caused from two of more form liners coming together will not be apparent when viewing final wall.

2.1 CONCRETE FORM LINERS

The materials used in construction of the architectural treatment shall comply with VDOT 2020 Road and Bridge Specifications for concrete materials and form work. Simulated stone form liners shall be used at locations designated on the Plans to receive an architectural finish. The Contractor shall submit samples to the Engineer for approval.

2.2 PRE-QUALIFIED SUPPLIERS

Available suppliers: Subject to compliance with requirements, suppliers offering products that may be incorporated into the Work include, but are not limited to, the following:

Hunt Valley Contractors, Inc.
3705 Crondall Lane
Owings Mills, MD 21117
Telephone: (410) 356-9677
<http://www.huntvalleycontractors.com/>

Greenstreak
3400 Tree Court Industrial Boulevard
St. Louis, Missouri 63122
Telephone: (800) 325- 9504
<http://www.greenstreak.com/>

Symons Corporation
200 E. Touhy Avenue
Des Plaines, Illinois 60018
Telephone: (847)298-3200
<http://www.symons.com/index.htm>

2.3 MATERIALS

A. Simulated Stone Finish Form Liners

Simulated stone form liners shall be used which will result in the finish detail indicated in the special provisions and approved by the Engineer. Samples shall be submitted by the Contractor for approval

by the Engineer. Simulated stone form liners shall be a high quality re-usable product manufactured of high strength urethane, which attaches easily to the forming system and shall not compress more than 0.021' when poured at a rate of 10 vertical feet per hour. Single use form liners will not be acceptable for this project. The liners shall be capable of withstanding anticipated concrete pour pressures without leakage causing physical or visual defects. The liners shall be removable without causing concrete surface deterioration.

Form oil shall be a nonstaining petroleum distillate free from water, asphaltic and other insoluble residue or equivalent product. The Contractor is cautioned that the approved form oil shall be worked into all areas, especially pattern recesses. Form stripping methods and patching materials shall be compatible with the color system and be submitted to the Engineer for approval.

B. Form Release Agent

Form release agent shall be a non-staining petroleum distillate free from water, asphaltic and other insoluble residue, or equivalent product. Form release agents shall be mutually compatible with the color system to be applied.

C. Form Ties.

When form or wall ties are used which result in a portion of the tie permanently embedded in the concrete, the Contractor shall submit the type of form ties to the Engineer for approval prior to use in this work.

D. Color Stain

Color stain system application: Manufacturer or manufacturer's authorized representative.

2.4 CONSTRUCTION

A. Shop Drawings

Prior to beginning any work for the concrete to receive the simulated stone finish, working drawings representing the full size of the unit shall be provided for the simulated stone form liner pattern. The working drawings shall be drawn at a scale sufficient to show the detail of all stone and joint patterns, and the layout of the finish pattern.

The working drawings shall be submitted to the Engineer for approval.

B. Sample Panel

Once the representative working drawings have been approved, the Contractor shall then provide and erect on site a 10'-0" high x 12'-0" long x 8 in. thick sample panel for the stone masonry form liner patterns. The sample panel shall be unreinforced, vertically cast, and shall be constructed with all materials including form or wall ties proposed for use for constructing the simulated stone masonry finish. Approval of the texture, size, joint dimension, stone size of the sample panel is required from the Engineer at least 30 days prior to starting construction of the structure. Approval of hand applied color to the sample panel is required from the Engineer at least 30 days prior to starting coloration of the structure. The sample panel shall show the simulated stone form liner patterns for the project. Sample panels deemed unacceptable by the Engineer shall be removed from the project and replaced by additional sample panels at no additional cost.

The location of the sample panel shall be readily visible from the proposed work where possible and placed as approved by the Engineer. The sample panel approved by the Engineer shall remain on the site as a basis for comparison for the work constructed on the project. All work constructed on the project shall duplicate this sample panel in form, architectural surface treatments, and appearance (texture, size, joint dimension and stone size). The Contractor shall dispose of the sample panel at the completion and acceptance of all work pertaining to the simulated stone finishes as determined by the Engineer.

C. Architectural Finish

Simulated stone form liners shall be installed, prepared, stripped, handled or otherwise utilized in conformance with the manufacturer's recommendations, or as directed by the Engineer. The simulated stone form liners shall be capable of withstanding anticipated concrete pour pressures without leakage causing physical or visual defects. The simulated stone form liners shall be removable without causing concrete surface deterioration or weakness in the substrate. Form release agents, form stripping methods and patching materials, as well as related construction shall be mutually compatible with special surface finish and color system to be applied.

Liner butt joints shall be carefully blended into the approved pattern and be removed during finishing of the final concrete surface. Visible vertical or horizontal seams or conspicuous form marks created by butt joining the stone form liners will be cause for rejection. Form tie holes shall be placed in the grout pattern joints. The ties shall be designed so that all material in the device to a depth of at least 1 in. behind the concrete face (bottom of grout pattern joint) can be disengaged and removed without spalling or damaging the concrete. The tie holes shall be finished in conformance with standard concrete practices and acceptable to the Engineer. All patching material shall match the color and appearance of the cast concrete surface.

At corners of walls, no plain concrete shall be visible. Simulated stone formliner shall wrap around corners.

D. Form Liner Preparation

Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall

be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be accepted by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

E. Form Liner Attachment

Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a 1/4" seam. Blend form liner butt joints into the stone pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the stone pattern. Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system. The Contractor shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless directed by the Engineer, installation and removal of form liners shall not be permitted if the technical representative is not present.

Form stripping and related construction shall avoid creating defects in finished surface.

Where stone texture is to continue across top of wall, a finish to achieve a continuity of the formed pattern must be done by hand when concrete is being poured. Hand carve and emboss the wet, pliable concrete, aligning rustication joints with those in the formed pattern. Great care must be taken to achieve intended relief and texture as per the Engineer's direction.

Where an expansion joint must occur at a point other than at mortar or rustication joints, such as at the face of concrete texture that is to have the appearance of stone, the manufacturer for proper treatment of expansion material shall be consulted.

F. Form Release

Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner material and the concrete coloring system and in accordance with this Special Provision. Form release agent should be worked into all areas, especially pattern recesses.

G. Finishing

All form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns should be continuous without visual disruption. Honeycomb or air bubbles on the face of the wall greater than 3/8" shall be parged before staining commences.

Reinforced concrete shall be finished in accordance with the VDOT 2020 Road and Bridge except that curing of concrete should be done to accommodate the application of coloring and surface finish treatment.

H. Grout pattern joints

Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

3.1 COLOR STAIN COATING

A. Description

This work shall consist of furnishing and applying color stain coating in accordance with this provision and in conformity with the details and locations indicated on the plans. Color stain coating shall be integrally colored to provide a natural looking array of browns, greens, grays, and tans.

B. Materials

Color stain coating shall conform to the following, unless otherwise approved:

Sherwin William’s color binder:

Gray: SW 6241 Aleutian

Brown: SW 6110 Steady Brown

Tan: SW 6115 Totally Tan

Tan at joints: SW 9094 Playa Arenosa

Gray/Brown Mix: SW 6241 Aleutian and SW 6110 Steady Brown

3.2 DETAILED REQUIREMENTS

A. Locations

Except as otherwise specified on the plans, the color stain coating shall be applied to all concrete surfaces which have the stone pattern. Copings, parapets, overhangs, decks, barriers, etc. shall NOT have the color stain coating applied unless otherwise specified on the plans.

B. Procedures

The concrete stain coating shall be applied in accordance with the manufacturer's recommendations, except as otherwise specified. The color surface color coating shall not be applied until all concrete placement operations for the particular structure have been completed. The concrete surface shall be clean, free of any curing agents, form release agents, foreign substances, or signs of efflorescence at the time of application.

All work shall be performed by experienced workmen familiar with concrete finishing work and with the materials specified. Surfaces not to be treated shall be protected from splatter.

Materials shall be delivered to the job site in sealed containers bearing the manufacturer's labels. Materials shall be mixed and applied in accordance with the manufacturer's printed instructions of which two copies shall be furnished the Engineer.

All Simulated Stone surfaces that are to be stained and any patching that has been done in these areas shall be at least 30 days old.

Clean surface prior to application of stain materials to assure that surface is free of latency, dirt, dust, grease, efflorescence, paint, or other foreign material, following manufacturer's instructions for surface preparation. Do not sandblast. Preferred method to remove latency is pressure washing with water, minimum 3000 psi (a rate of three to four gallons per minute), using fan nozzle perpendicular to and at a distance of one or two feet from surface. Completed surface shall be free of blemishes, discoloration, surface voids, and unnatural form marks.

C. Protection

Where exposed soil or pavement is adjacent which may spatter dirt or soil from rainfall, or where surface may be subject to over spray from other processes, provide temporary cover of completed work.

4.1 INCLUDED WORK

All work for the development and preparation of shop drawings, the furnishing of all form liners, the construction and finishing of the test panel, the services of the manufacturer's representative, the application of the simulated stone form liner finish including application of color stain coating, and all labor, equipment, and incidentals necessary to complete the work as specified above and in the plans shall be included for the pertinent walls.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SPECIFICATIONS
SECTION 109.09 – PAYMENT FOR MATERIAL ON HAND

When requested in writing by the Contractor, payment allowances may be made for materials secured for use on the project and required to complete the project. Such material payments will be made for only those actual quantities of materials identified in the Contract, approved change orders, or otherwise authorized and documented by the Engineer based on delivery tickets, bills of lading, or paid invoices. All such payments shall be in accordance with the following terms and conditions:

- a) **Structural Steel or Reinforcing Steel:** An allowance of 100 percent of the cost to the Contractor for structural steel or reinforcing steel materials secured for fabrication not to exceed 60 percent of the Contract price may be made when such material is delivered to the fabricator and has been adequately identified for exclusive use on the project. The provisions of this section for steel reinforcement will only apply where the quantity of steel reinforcement is identified as a separate and distinct bid item for payment. An allowance of 100 percent of the cost to the Contractor for superstructure units and reinforcing steel, not to exceed 90 percent of the Contract price, may be made when fabrication is complete. Prior to the granting of such allowances, the materials and fabricated units shall have been tested or certified and found acceptable to the Concessionaire and shall have been stored in accordance with the requirements specified herein. Allowances will be based on invoices, bills, or the estimated value as approved by the Engineer and will be subject to the retainage requirements. For the purposes of this section fabrication is defined as any manufacturing process such as bending, forming, welding, cutting or coating with paint or anti-corrosive materials which alters, converts, or changes raw material for its use in the permanent finished work.
- b) **Other Materials:** For aggregate, pipe, guardrail, signs and sign assemblies, and other nonperishable material, an allowance of 100 percent of the cost to the Contractor for materials, not to exceed 90 percent of the Contract price, may be made when such material is delivered to the project and stockpiled or stored in accordance with the requirements specified herein. Prior to the granting of such allowances, the material shall have been tested and found acceptable to the Concessionaire. Allowances will be based on invoices, bills, or the estimated value of the material as approved by the Engineer and will be subject to the retainage provisions.
- c) **Excluded Items:** No allowance will be made for fuels, form lumber, falsework, temporary structures, or other work that will not become an integral part of the finished construction. Additionally, no allowance will be made for perishable material such as cement, seed, plants, or fertilizer.
- d) **Storage:** Material for which payment allowance is requested shall be stored in an approved manner in areas where damage is not likely to occur. If any of the stored materials are lost or become damaged, the Contractor shall repair or replace them at no additional cost to the Concessionaire. Repair or replacement of such material will not be considered the basis for any extension of Contract time. If payment allowance has been made prior to such damage or loss, the amount so allowed or a proportionate part thereof will be deducted from the next progress estimate payment and withheld until satisfactory repairs or replacement has been made.

When it is determined to be impractical to store materials within the limits of the project, the Engineer may approve storage on private property or, for structural units and reinforcing steel, on the manufacturer's or fabricator's yard. Requests for payment allowance for such stored material shall be accompanied by a release from the owner or tenant of such property or yard agreeing to

permit the removal of the materials from the property without cost to the Commonwealth. The Concessionaire must be allowed access to the materials for inspection during normal business hours.

- e) **Materials Inventory:** If the Contractor requests a payment allowance for properly stored material, he shall submit a certified and itemized inventory statement to the Engineer no earlier than 5 days and no later than 2 days prior to the progress estimate date. The statement shall be submitted on forms furnished by the Concessionaire and shall be accompanied by supplier's or manufacturer's invoices or other documents that will verify the material's cost. Following the initial submission, the Contractor shall submit to the Engineer a monthly-certified update of the itemized inventory statement within the same time frame. The updated inventory statement shall show additional materials received and stored with invoices or other documents and shall list materials removed from storage since the last certified inventory statement, with appropriate cost data reflecting the change in the inventory. If the Contractor fails to submit the monthly-certified update within the specified time frame, the Engineer will deduct the full amount of the previous statement from the progress estimate. At the conclusion of the project, the cost of material remaining in storage for which payment allowance has been made will be deducted from the progress estimate.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SOLDIER PILE RETAINING WALLS

December 20, 2018

1.0 DESCRIPTION

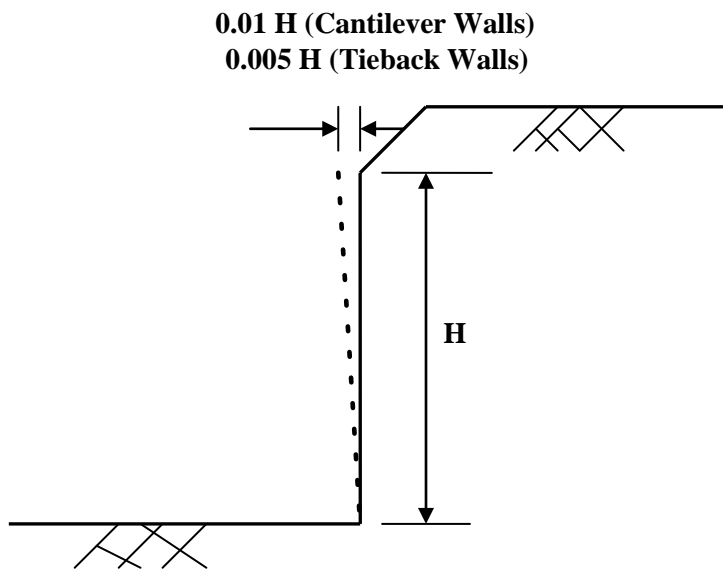
This work shall consist of furnishing and constructing Soldier Pile Retaining Wall Systems in accordance with this Special Provision and with the lines, grades and dimensions shown on the Plans and the working drawings prepared by the Contractor's specialty wall designer or supplier as reviewed by the Engineer.

A soldier pile retaining wall is a wall system composed of steel soldier piles placed in prebored holes encased in concrete, with or without tiebacks; timber lagging between the soldier piles to temporarily support lateral soil loading (for top down construction); tieback or deadman anchors, when needed, to provide lateral support of the retaining wall and additional restraint for deep seated slope stability; a permanent concrete structural wall facing attached to the soldier piles; and safety fencing along the top of the finished wall (when required or indicated).

2.0 DESIGN PARAMETERS

A The soldier pile retaining walls and drilled shafts shall be designed and constructed in accordance with the AASHTO LRFD Bridge Design Specifications, FHWA-NHI-07-071 "Earth Retaining Structures Reference Manual", and the Specifications except as otherwise noted herein. Soil parameters for design shall be as shown on the plans and described in the geotechnical report for the proposed wall. Walls shall be designed to have less than:

1. For cantilever walls, $0.01H$ of movement at the top of the wall portion retaining fill or soil (H) under the design loads, and
2. For walls with tiebacks, $0.005H$ of movement at the top of the wall portion retaining fill or soil (H) under the design load as depicted in the sketch below:



- B. Sound barrier walls mounted on soldier pile walls shall be designed in accordance with the AASHTO *Guide Specifications For Structural Design of Sound Barriers*, 1989 with 1992 and 2002 Interims, the Special Provisions for Sound Barrier Walls / Architectural Finishes dated June 14, 2018, and the Specifications except as otherwise noted herein. All references in the Guide Specifications to “an industry recognized design specification” shall not apply. In addition, the following design requirements shall apply:
1. Sound barrier walls shall conform to the Contract.
 2. The sound wall panel weight and post spacing shall be coordinated with the supporting retaining wall. Unless otherwise approved by the Engineer, the sound wall post shall be an extension of the soldier pile. Soldier pile extension shall be achieved through the use of a longer soldier pile and no splicing or any other form of connection shall be permitted to attach sound wall post to soldier pile.
 3. The wall shall be designed such that the finish profile of the top panels shall be as uniform in height as possible when traversing a grade.

The vertical posts shall be proportioned to have a maximum deflection of no more than $h/240$ due to wind load, where “h” is the cantilever height (in feet) of the post from the top of the wall portion retaining fill to the top of the sound barrier wall. The maximum deflection due to wind does not include the maximum threshold movement related to soil pressures behind the walls noted in section 2.0.A herein. The unbraced length of the post for design shall not be less than “h” unless both flanges are sufficiently braced to allow a reduction of the unbraced length of the section. Post design shall account for all holes needed for connections. (This paragraph is intended as a clarification of the design specifications. It is not intended to imply additional requirements other than those already specified in the AASHTO specifications.) Finished posts shall be plumb within the tolerance specified by the wall system supplier. Plumbness shall be measured after the retaining wall portion of the structure has been excavated or backfilled to its full height.

3.0 SUBMITTALS

3.1 Working Drawings

Before fabrication or construction, the Contractor shall submit for review one original and six copies of each working drawing and design calculations for the soldier pile retaining walls. All sheets of this submittal shall include the seal of a Professional Engineer holding a valid license to practice engineering in the Commonwealth of Virginia. Working drawings shall include the wall designation(s) shown in the plans. Materials shall be identified in accordance with the Specifications naming conventions.

Working drawings shall provide details required for the successful prosecution of the work and for all components of the soldier pile wall and drilled shaft foundation details, including:

1. Detailed sequence of construction.
2. Details of construction and installation of soldier piles and fabricated items including but not limited to materials specifications, drilled shafts (including drilled shaft length and diameter), and methods of joining, fastening, centering of pile during installation and anchoring.

3. Aesthetics: A color photo of a previously constructed wall with similar appearance or rendering shall be provided to show the proposed final aesthetic appearance of the wall. The photo shall depict the surface texture, color of the panels, and CIP finish. Details of exposed piles or encapsulated piles shall be shown. Where anchors will be used, provide illustration showing connections. Provide detail of coping or transition elements at the top of the wall and at transitions between retaining wall and noise wall sections when used. If tiebacks are used, anchorages shall be hidden from view in a manner acceptable to the Engineer.
4. Details of prefabricated sheet drains (if proposed) and weephole drain pipes including details showing installation at the exposed soil face, the interface of the drainage composite with weep holes, attachment of the drainage composite to the soldier pile wall, and all other details needed for installation.
5. Reinforcement for permanent cast-in-place concrete fascia wall.
6. Reinforcement and lifting hooks for precast concrete face panels.
7. Soldier pile installation records as specified herein.
8. A Manufacturer's Material Safety Data Sheet (MSDS) shall be submitted for each product, when applicable.
9. Details of the design and construction of the temporary working bench.
10. Details of the method of tieback or deadman anchor connection installation.
11. Anchor design and anchor connection detail to the soldier pile.
12. Corrosion Protection Details.
13. Instrumentation monitoring plan and manufacturer's instrumentation information: Walls retaining more than 20-feet of earth constructed in a top down method or if specified on the working drawings or Plans shall be monitored for horizontal and vertical movement during excavation. Wall monitoring (horizontal and vertical movement) shall be performed weekly as a minimum and the data shall be plotted time versus movement. Monitoring targets shall be attached to the pile heads after the piles are installed, and baseline readings of the targets shall be read before more than 3 feet of excavation occurs. Monitoring can conclude one (1) week after the final wall excavation is reached. A contingency plan shall be developed and submitted for review if movements during construction reach or exceed the threshold levels described below. The contingency plan shall utilize the following thresholds for action:
 - A. If horizontal movement at the top of the wall reaches 80% of the maximum allowable value, increase movement monitoring frequency to 3 times weekly and provide data to Engineer the same day for evaluation.
 - B. If horizontal movement at the top of the wall reaches 100% of the maximum allowable value, stop wall backfilling activities and consult the Engineer for potential remedial action. The contingency plan shall provide the actions the wall builder will take in the event the threshold values are exceeded.

14. Details indicating how all existing utilities and/or structures behind, in front of, or crossing the wall will be protected from damage during shaft and wall installation and post construction of the wall.
15. Calculations assessing the following:
 - global stability of the retaining wall (if design deviates from parameters noted below)
 - lateral wall movement
 - structural capacity of the piles/posts and lagging/concrete facing based on loading (including wind and/or impact loads on barrier and/or sound wall if applicable)
 - design of shaft embedment depth and spacing to satisfy global stability, bending resistance, shear and axial effects
 - confirmation that adequate axial resistance is provided at the embedment depths
 - evaluation of deflections and settlement behind wall, and
 - stability of the face of excavation

Global stability feasibility analyses have been performed by the geotechnical engineer of record during the development of the Plans. These analyses are based on the soil parameters stated in the Plans and in the geotechnical reports associated with this work and are based on 2-foot diameter drilled shafts and post spacing and shaft depths which vary to achieve minimum factors of safety. To meet global stability requirements: A) proposed drilled shaft lengths shall be equal to or greater than the minimum drilled shaft length as stated in the Plans and geotechnical reports, and B) the shaft (post) spacing shall be no greater than that stated in the Plans and geotechnical reports. The Contractor shall determine the final drilled shaft spacing, diameter, length, tip elevations, and deflections of the walls and depict them in the working drawings.

Unless noted otherwise on plans or in the geotechnical report, if the Contractor proposes a wall design using a shaft spacing greater than shown on the plans or in the geotechnical report, a drilled shaft diameter less than 2-feet, or a shaft depth less than shown on the plans or stated in the geotechnical report, a global stability analysis shall be performed by the Contractor and submitted to the geotechnical engineer of record for review. This global stability analysis shall be performed using the soil parameters in the approved geotechnical report or as shown on the plans to establish the minimum shaft embedment depth to provide a minimum factor of safety of 1.5. Failure surfaces that intersect the pile shall be analyzed assuming that the pile is not present. If the factor of safety is less than 1.5, then the design shall be modified to require an increase in the resisting force such that the factor of safety is at least 1.5. The pile shall be embedded below this failure surface a sufficient depth to provide the passive resistance necessary to raise the factor of safety to 1.5 or greater.

The geotechnical engineer of record or his designee shall observe the excavation of the shafts to verify soil meets or exceeds the parameters indicated in the geotechnical report and used in the wall design.

3.2 Subcontractor Qualifications

At least fifteen days before commencing soldier pile wall construction, the soldier pile retaining wall system specialty subcontractor shall submit documentation of qualifications for soldier pile walls greater than 20-feet in height (height of the retaining portion of wall for combined sound/retaining walls), having shaft diameters greater than 3-feet, or having tiebacks as noted below:

1. The specialty subcontractor (including the subcontractor's drillers) shall submit a list containing at least (3) projects with similar construction completed within the last (3) years. For each project, the Contractor shall include with this submittal, at a minimum: (1) name of client contract, address, and telephone number; (2) location of project; (3) contract value; [scheduled completion date and actual completion date for the project] and (4) work performed.
2. Resumes of the specialty subcontractor's superintendents/foremen shall be submitted to the Engineer for review prior to the start of construction for the subject wall. Only those individuals designated as meeting the qualification requirements shall be used for the project. The specialty subcontractor cannot substitute for any of these individuals without written approval of the Engineer. The Engineer shall approve or reject the specialty subcontractor's qualification and staff within fifteen working days after the receipt of the submission. Construction shall not be started on any soldier pile wall system until the specialty subcontractor qualifications have been approved by the Engineer.
3. Installation of tiebacks for soldier pile retaining walls shall be performed under the supervision of a superintendent/foreman with at least 3 years experience in design and construction of permanent tie-back structures. Further, the specialty subcontractor's foremen and drill operators shall have at least 3 years of experience installing tiebacks. Resumes of these individuals shall be submitted with the subcontractor's qualifications submittal.

3.3 Shaft Drilling Sequence Plan Submittal

The Contractor shall develop a shaft drilling sequence plan, approved concrete mix design, sequence of operations, sequence of excavation, details of slurry operations (if necessary), and submit for review by the Engineer at least 10 working days before starting production shafts. Shaft drilling sequence plan shall also include the methods to be used for both the dry placement of concrete and for the wet placement concrete, how the reinforcing cage (if used) and the WF or H-pile are to be supported during shaft installation, and the excavation procedure to be used for the installation of the lagging and/or wall panels.

4.0 MATERIALS

- A. Steel piles for soldier pile walls shall be steel members conforming to Section 403 of the Specifications and ASTM A 572 Grade 50 or Grade 36 (as required by the design), and shall be of the types and sizes indicated on the working drawings. Where this specification refers to "H-pile", it is implied that either H or WF sections may be employed for the post elements as required by the design. The post size required for a given wall will be shown in the Working Drawings. Steel piles shall be galvanized in accordance with Section 233 of the Specifications.
- B. Reinforcing bars shall conform to Section 223 of the Specifications and Structure and Bridge Instructional and Informational Memorandum S&B-81 requirements.
- C. Shear studs shall be as specified in Section 407 of the Specifications.
- D. Geosynthetics shall conform to Section 245 of the Specifications.
- E. PVC pipe placed as part of the wall drainage system shall conform to Section 232 of the Specifications.

- F. Tiebacks: The Contractor shall select the tie-back type and shall determine the anchor length. The tie-back tendon shall be sized so the design load does not exceed 60 percent of the guaranteed ultimate tensile strength of the tendon and the maximum test load does not exceed 80 percent of Guaranteed Ultimate Tensile Strength (GUTS) of the tendon. The minimum unbonded length of the tendon and the minimum anchor length shall not be less than that shown on the working drawings.
1. Corrosion Protection: The tie-backs for this project shall be fully encapsulated, double corrosion-protected tie-back tendons.
 - a. A minimum of 1/2 inch of grout cover shall be provided over the bare prestressing steel in the anchor length.
 - b. The unbonded length of the tendon shall be sheathed in a plastic tube. The annular space between the sheath and the prestressing steel shall be filled with a corrosion inhibitor.
 - c. A steel or plastic trumpet shall be used to provide a transition from the bearing plate to the corrosion protection over the unbonded length. One end of the trumpet shall be attached to the bearing plate and a tight-fitting seal between the trumpet and the unbonded length protection shall be provided at the other end. Corrosion inhibitor or cement grout shall be used to fill the trumpet.
 2. Tie-back tendons may be either shop or field fabricated from steel conforming to the requirements herein. Tendons shall be fabricated from single or multiple elements of the following:
 - a. Steel bars conforming to ASTM Designation A722, "Uncoated High Strength Steel Bars for Prestressed Concrete."
 - b. Seven-wire strand conforming to ASTM Designation A416, "Uncoated Seven-Wire Stress Relieved Strand for Prestressed Concrete."
 - c. Compact seven-wire strands conforming to ASTM Designation A779, "Uncoated Seven-Wire Compacted, Stress-Relieved Steel Strand for Prestressed Concrete."
 3. Tieback anchorages shall be capable of developing 95 percent of the guaranteed minimum ultimate tensile strength (GUTS) of the tie-back tendon.
 4. Bearing plates shall be fabricated from hot-rolled plates manufactured to ASTM A-709 Grade 36 or 50 (as required by design) and shall be galvanized. The bearing plate shall be fabricated from steel plate conforming to the requirements herein and sized so the bending stress in the plate does not exceed 0.75 times the yield strength of the steel at the tie-back design load or 0.95 times the yield strength of the steel at the maximum tie-back test load.
 5. Steel couplers shall be capable of developing 125 percent of GUTS of the tieback tendon.
 6. Centralizers shall be fabricated from material that is not detrimental to the tieback tendon. Wood centralizers shall not be used. The centralizer shall be able to support the tendon in the drill hole and position the tendon so a minimum of 1/2 inch of grout cover is provided.
 7. Smooth polyethylene (PE) tubes used only for bond breakers may be made from low or medium-density plastic. Smooth polypropylene (PP) tubes used for sheaths and bond

breakers shall be made from Grade 11 26S00 D resins conforming to ASTM D4101. The plastic material shall be resistant to aging by ultraviolet light.

8. The corrosion inhibitor shall remain ductile and free from cracks and shall not become fluid over the anticipated range of temperatures encountered during fabrication, transport, storage, and while in service. The inhibitor shall be impervious to moisture and air and shall be a self-healing film and displace water. The corrosion inhibitor shall have a reserve alkalinity for long-term acid neutralization. The chlorides, nitrates, and sulfides present in the inhibitor shall not exceed the following limits:
 - a) Chlorides - 10 ppm as determined by ASTM D512, "Test Method for Chloride Ion in Water."
 - b) Nitrates - 10 ppm as determined by ASTM D992, "Test Method for Nitrate Ion in Water."
 - c) Sulfides - 10 ppm as determined by APHA, "Test Methods, Sulfides in Water."
 9. Polyvinyl chloride (PVC) trumpets shall be made from Type 1, Schedule 40, Grade PVC 1120 pipe conforming to ASTM D 1785. The plastic material shall be resistant to aging by ultraviolet light.
 10. Steel trumpets shall be made from pipe or tube conforming to ASTM A53 for pipe.
 11. Grout shall conform to Section 218 of the Specifications.
 12. Tieback anchorage bearings, angle plates, holes, and all other aspects of such shall be prefabricated, including the soldier pile post modifications, and galvanized after fabrication.
- G. Bearing Pads (if required) shall conform to Section 237 of the Specifications.
- H. Drainage Composite (if required): The drainage composite shall have a minimum flow rate of 10 gallons per minute per foot at a hydraulic gradient of 0.1, in accordance with ASTM D-476. The drainage panel shall consist of geotextile bonded to both sides of the panel (core). Drainage Composite shall be selected from the Materials Division Approved Products List 63.
- I. Porous Backfill shall conform to Section 204 of the Specifications.
- J. Temporary Wood Lagging: shall be in accordance with FHWA-IF-99-015 "Ground Anchors and Anchored Systems" and as specified in the Working Drawings.
- K. Fencing shall conform to Section 242 of the Specifications. Railing shall be in accordance with VDOT Standard HR-1.
- L. Fasteners: Bolts and nuts and other associated hardware shall conform to ASTM A325 and shall be galvanized in accordance with ASTM A153. The size of bolts and nuts shall be as shown on the working drawings.
- M. Sound Barrier Walls (See Section 2.0 B as well):
1. Sound barrier walls mounted on soldier pile retaining walls shall consist of sound absorptive precast concrete panels constructed in accordance with Sections 404 and 405 of the Specifications, except that patching of panels will not be allowed without the prior

written approval of the Engineer. Absorptive finish for sound walls shall be from the approved VDOT list.

2. Base panels shall be a minimum height of 2 feet.
3. Post flanges and panels shall overlap at least 1-1/2 inches after installation.
4. Spacer blocks\wedges will not be permitted.
5. The face of the panel on the roadway side of the barrier shall fit tightly against the post flange for the full height of the panel after installation.

N. Precast Concrete Face Panels (If Required)

1. Concrete for precast panel units shall be Class A4 conforming to Section 217 of the Specifications.
2. Reinforcing steel, lifting devices and connection plates shall be set in place to the dimensions and tolerances shown in the working drawings prior to casting.
3. The Contractor or Contractor's supplier shall furnish facilities and shall perform all necessary sampling and testing in an expeditious and satisfactory manner. Panels shall not be set in the wall until control cylinder tests exceed 85 percent of the 28 day design strength requirements. Precast concrete producer shall be on VDOT's Approved list of Precast Suppliers.
4. Concrete lagging panels shall be cast on a flat area with the front face being formed. The panels should have a plain concrete finish unless noted otherwise in the Plans. The concrete in each unit shall be placed without interruption and shall be consolidated by the use of an approved vibrator, supplemented by such hand tamping as may be necessary to force the concrete into the corners of the forms and to prevent the formation of stone pockets or cleavage planes. Clear form oil of the same manufacture shall be used throughout the casting operation.
5. Panel units shall be cured in accordance with Section 404.03(k) of the Specifications. Any panel concrete placement which does not reach specified design compressive strength within 28 days will be rejected as determined by concrete control cylinders.
6. The forms shall remain in place for at least 20 hours or until control cylinder tests indicate that the concrete has attained at least 30 percent of the 28-day design requirement in accordance with Section 404.03(j) of the Specifications.
7. Panel units shall be manufactured to the following tolerances:
 - Squareness, as determined by the difference between two diagonals, shall not exceed 1/2 inch.
 - Surface irregularities on finished surfaces measured on a length of 10 feet shall not exceed 1/4 inch.
 - All other dimensions within 3/16 inch.

8. Panel units will be subject to rejection because of failure to meet any of the requirements specified above. In addition, any of the following defects will be sufficient cause for rejection:

- Defects that indicate imperfect molding.
- Defects such as chipped or broken concrete.
- Defects indicating honeycombed or open-textured concrete.

Any proposed repair procedures shall be reviewed by the Engineer prior to use.

9. The date of manufacture and piece mark shall be clearly scribed on the rear face of each panel unit.

10. All panel units shall be handled, stored, and shipped in such manner as to eliminate the danger of chipping, cracking, fracturing and excessive bending stresses. Panel units shall be removed from casting beds by an acceptable industry recognized picking point method. Panel units in storage shall be supported on firm blocking.

O. All Concrete mixes shall have a Engineer approved mix design.

5.0 WALL AND FOUNDATION ASPECTS

5.1 Equipment

A. Equipment shall be of the proper type and capacity for the proposed work and shall be maintained in good operating condition. The equipment used in excavation and drilling operations shall have adequate capacity including power, torque, and down thrust to excavate a hole of the maximum diameter shown on the working drawings.

B. When the material encountered cannot be drilled using conventional earth augers with soil or rock teeth, drilling buckets, and over reaming tools; the Contractor shall provide special drilling equipment including but not limited to: rock core barrels, rock tools, air tools, and other equipment as necessary to construct the drilled shaft excavation to the size and depth required.

C. When applicable, the Contractor shall provide equipment that produces a stable slurry suspension and provides mechanical agitation, shall provide a temporary pipeline or other safe methods to transport slurry, and shall provide equipment that removes sand and detrimental quantities of excavated material from the slurry.

5.2 Temporary Steel Casing

Temporary Steel Casing as required to ensure that caving will not occur during construction of the drilled shaft shall have the following properties:

A. Minimum outside diameter equal to outside diameter of the soldier pile shaft.

B. Smooth metal, true and straight, and watertight.

C. Fabricated of sufficient strength to withstand handling stresses, concrete pressure and surrounding earth or fluid pressures.

- D. Temporary steel Casing (shells) shall conform to ASTM A 252, Grade 2, having a minimum wall thickness of 1/2 inch.
- E. Temporary casing shall be removed immediately after placement of drilled shaft concrete.

5.3 Concrete for Soldier Pile Drilled Shafts

Concrete for drilled shafts shall conform to Section 217 of the Specifications, except as modified below:

- A. Concrete for encasement of soldier piles below the bottom of the open cut excavation shall be Class A3 (unless higher strength is required by design as indicated in the working drawings). Lean concrete (150 psi at 28 days) shall be used for encasement of piles above the bottom of the open excavation. The concrete shall be properly placed and cured; dense and sound; and free of cracks, major spalls and surface depression.
- B. Only one brand of cement shall be used and cement of the same brand from different mills shall not be mixed or used in concrete except by written permission of the Engineer.
- C. The maximum size of coarse aggregates for soldier pile encasement shall not exceed 1 inch. Light weight aggregates will not be permitted.
- D. Workability shall be such that vibrating or rodding will not be required to consolidate the concrete. At time of placing, slump shall be within the range of 5 to 7 inches. An approved high-range water reducer or high-range water reducing retarder may be used to attain the slump required. These admixtures shall conform to AASHTO M194, Type F, or G, respectively and be from the Materials Division Approved Products List. If Type F is used, a compatible approved retarder shall also be used in the quantity recommended by the manufacturer. The high-range admixture, at a dosage rate not to exceed 40 percent of the original amount, may be used to retemper the concrete, provided the elapsed time for placing concrete does not exceed that indicated in Section 217 of the Specifications.

5.4 Slurry Properties and Testing for Drilled Shaft Construction

A. Slurry Properties

Slurry shall be a stable suspension of mineral or polymer in potable water. The Contractor shall be responsible for and shall modify the slurry mix as required to maintain a stable suspension at all times. Polymer slurry shall be a suspension of powdered polyacrylamide or vinyl polymer, with the density, viscosity, pH and sand content outlined in the tables below. The Engineer may require the Contractor to adjust the range of slurry properties when field trials show that modifications are appropriate to achieve the final constructed drilled shaft. Attapulgite mineral slurry may be used for sites with brackish or saline water, and shall conform to the range of values in the table below. Fluid loss in an open excavation shall be limited to a drop in the slurry level of no greater than one inch per hour per 20 feet of excavation depth, and at any excavation depth, no more than 2 feet total in a 24-hour period.

Perform the following tests on the slurry supplied to the drilled shaft excavation and at different depths within the drilled shaft (use a slurry sampler). The Contractor's slurry management plan shall include detailed provisions for controlling the quality of the slurry, including tests to be performed, the frequency of those tests, the test methods, and the maximum and/or minimum property requirements that must be met to ensure that the slurry

functions as intended in the subsurface conditions at the construction site and with the construction methods that are to be used. The slurry management plan shall include a set of the slurry manufacturer's written recommendations. The frequency of slurry testing is described in Section 5.4.B. Ensure that the results are within the ranges stated in the table below:

1. Density shall be measured at 68°F by the Mud density balance, Test Method FM 8-RP13B-1.
2. Viscosity shall be measured by the Marsh Cone Method, Test Method FM 8-RP13B-2.
3. Sand Content by Test Method FM 8-RP13B-3
4. pH shall be measured by Electric pH meter or pH indicator paper strips by Test Method FM 8 RP13B-4.

Mineral Slurry Properties:

Property (Units)	At Time of Slurry Introduction (c, d)	Before Placing Concrete In Drilled Shaft	Test Method
Density in Fresh Water (pcf) ^(a)	64 to 69	64 to 75	Density Balance
Viscosity (sec per quart)	28 to 45	28 to 45	Marsh Cone
pH	7 to 11	7 to 11	pH paper or meter
Sand Content (%) ^(b)	4 maximum	4 maximum	Retained on 200 Sieve

(a) Increase density values by two pounds per cubic foot (pcf) in salt water.

(b) At time of concreting, sand content at any point in the drilled shaft excavation shall not exceed 4 percent (by volume) as determined by the American Petroleum Institute sand content test.

(c) Mixing time shall be a minimum of 10 minutes.

(d) Storage time to allow hydration shall be a minimum of 6 hours.

Polymer Slurry Properties:

Property (Units)	At Time of Slurry Introduction (g, h)	Before Placing Concrete In Drilled Shaft	Test Method
Density in Fresh Water (pcf) ^(e)	63 to 67	63 to 67	Density Balance
Viscosity (sec per quart) ^(f)	50 minimum	50 minimum	Marsh Cone
PH	8 to 11	8 to 11	pH paper or meter

Sand Content (%) ⁽ⁱ⁾	1 maximum	1 maximum	Retained on 200 Sieve
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- (e) Increase density values by two pounds per cubic foot (pcf) in salt water.
- (f) Maximum viscosity by Marsh Cone method shall be in accordance with Manufacturer's recommendations.
- (g) Mixing time shall be a minimum of 15 minutes for polymer slurry.
- (h) Storage time to allow hydration shall be a minimum of 2 hours for polymer slurry.
- (i) Sand content at any point in the drilled shaft excavation shall not exceed 1 percent (by volume) as determined by the American Petroleum Institute sand content test.

B. Slurry Testing

Slurry Testing shall include the following tests, as a minimum: Density test (API 13B-1, Section 1), viscosity test (Marsh funnel and cup, API-13B-1, Section 2.2 or approved viscometer), pH test (pH meter, litmus paper), and sand content test (API sand content kit, API 13B-1, Section 5) as outlined in Section 4.4.4.

Tests should be performed when the slurry temperature is above 40 degrees Fahrenheit.

Tests to determine density, viscosity and pH value shall be performed during the shaft excavation to establish a consistent working pattern. A minimum of four sets of tests shall be made during the first 8 hours of slurry use. When the results show consistent behavior the testing frequency may be decreased to one set every four hours of slurry use.

The Contractor shall ensure that a heavily contaminated slurry suspension, which could impair the free flow of concrete, has not accumulated in the bottom of the shaft. The Contractor shall take slurry samples using a sampling tool approved by the Engineer before placing concrete in any shaft excavation. Slurry samples shall be extracted from the base of the shaft and at intervals not exceeding 10 feet up the slurry column in the shaft, until two consecutive samples produce acceptable values for density, viscosity, and pH.

When any slurry samples are found to be unacceptable, the Contractor shall take whatever action is necessary to bring the slurry within specifications requirements. Concrete shall not be placed until the slurry in the hole is resampled and tests results produce acceptable values.

Reports of all tests required above signed by an authorized representative of the Contractor, shall be furnished to the Engineer on completion of each drilled shaft.

5.5 Existing Conditions

A. Contractor shall perform a preconstruction survey of all structures and utilities within 2H from the soldier pile wall, where "H" is the cantilever height of the post from the top of foundation to the top of the portion of the wall retaining fill. The preconstruction survey

should document the condition of the adjacent structures and utilities prior to construction and identify any areas, if any, to be monitored during construction.

- B. Existing ground line elevations shall be established and verified by the Contractor prior to submitting working drawings. The Contractor shall remove and dispose of all above ground obstructions such as trees and other clearing and grubbing items unless otherwise directed by the Engineer.
- C. The Contractor shall adjust foundations to avoid conflicts with pipes or utilities. Wall panel lengths may be shortened or lengthened so that foundation locations may be adjusted to avoid conflicts and clear existing pipes, utilities and other underground obstructions. The Contractor shall modify the design of wall foundations where foundations may conflict with the limits of proposed or existing rights-of-way or where foundation designs may leave a portion of the foundation exposed above the finished ground line. Such conflicts and proposed modifications shall be reviewed with the Engineer before installation.
- D. The Contractor's foundation designs shall be in accordance with the soil parameters provided in the associated project geotechnical reports and plans. Soil friction angle and strength of soils shall be used when designing foundations and shall be in accordance with the values stated in the approved geotechnical report or as shown on the Plans. Foundations shall be designed in accordance with Section 4 Foundations, of the AASHTO Standard Specifications for Highway Bridges.

5.6 Sequencing and Scheduling

- A. Installation of the walls shall be coordinated with the slope drainage, slope flattening, and other trades.
- B. Excavating, installation of steel soldier piles, and placement of concrete encasement shall be scheduled so that each excavated shaft is poured within 12 hours after excavation of pile unless otherwise approved by the Engineer. Steel soldier pile and concrete shall be placed immediately after excavation bottom is approved by the Engineer.
- C. Vibration and excessive wheel loads shall not be permitted within the immediate vicinity of any excavated shaft. Maintain shaft excavation stability at all times.
- D. The pile installation sequence shall be determined by the Contractor, subject to the approval of the Engineer. However, no pile excavation shall be made within a clear distance of 16 feet from an open pile shaft, nor within a clear distance of 8 feet from a pile which had its concrete encasement in place for less than 12 hours.

5.7 Excavation for Soldier Piles

- A. The prebored holes shall be drilled to the diameter and minimum depths as shown on the working drawings.
- B. Excavation Alignment
 - 1. Before commencing excavation, locate the design center of each pile excavation by survey and the use of offset stakes and intersecting string lines. Preserve the stake

locations until the pile construction has been completed and accepted. Strings, may be removed as required by work.

2. Drilled shaft shall be constructed such that the center of the drilled shaft, at the top of the drilled shaft, is no more than 3 inches from the location indicated in the working drawings. Drilled shafts shall be within 2 percent of the plumb deviation for the total length of the drilled shaft or as indicated in the working drawings.

C. Drilling Procedure

1. The driller shall observe the drilling rate and resistance as the boring of each hole is advanced, and shall record the relative drilling rate.
2. The soil parameters provided in the geotechnical reports and plans for the wall design shall be verified by the geotechnical engineer of record or his qualified representative. If site conditions indicate weaker soil conditions than indicated in the report, revised parameters shall be provided by the geotechnical engineer of record to the Contractor's specialty wall designer to evaluate and modify the design as needed.
3. Drilled shafts shall be advanced with flight, bucket and coring augers capable of drilling soil, cobbles, boulders, and rock, or other approved drilling tools, through whatever materials are encountered, to the dimensions and elevations shown in the working drawing submittal.
4. A partially excavated shafts shall not be left open overnight unless stable or suitable support or casing is provided.
5. Regardless of construction methods used, the bottom of the excavation shall be cleaned of loose material, using a bucket auger or any other technique approved by the Engineer.
6. Material excavated from the drilled shafts may be used as backfill if it conforms to specifications for a given application. Any excess material shall be disposed of by the Contractor.
7. Any sloughing or other loose material shall be machine or hand cleaned from the shaft before placing H-piles or reinforcing steel and concrete.
8. To ensure adequate concrete cover for reinforcing steel (if used), spacers of a type approved by the Engineer shall be used to center the reinforcing in the shaft. The H-piles shall be centered within the drilled shaft per the tolerances relative to plan location of the posts as outlined within. When required, a minimum of five (5) spacers or other acceptable non-corrosive spacing devices shall be evenly spaced around the circumference of the reinforcing steel cage at sufficient intervals. These intervals shall not exceed 5 feet in length along the drilled shaft excavation. When the size of the longitudinal reinforcing steel exceeds 1-inch diameter, the spacing may be increased but shall not exceed 10 feet.
9. Inspection of the drilled shaft will typically be done by the Engineer or their representative via "top hole" means of examining shaft diameter and length with a weighed tape. If there is reason to believe the shafts are caving before concrete placement, the Contractor shall provide all assistance that may be required for the Engineer to inspect post foundations.

D. Temporary Casing

1. The bored holes shall be cased when required to prevent collapse of overburden and control seepage water.
2. Temporary casing, when required, shall be installed and shall remain in the place through the cleaning operations of the prebored holes, and shall be withdrawn as the concrete is placed.
3. Casing shall be full depth if down hole inspection is required.
4. Extraction of temporary casing shall begin only after sufficient concrete has been placed in the shaft to achieve a minimum height differential, between the bottom of the casing and the top of concrete, of 5 feet. Maintain the differential until the concrete achieves finish elevation.

E. Groundwater Control

1. The Engineer shall immediately be notified when groundwater is encountered.
2. If groundwater is encountered during excavation operations, pumping of water from the pile excavation will be permitted during construction, subject to the Engineer's prior approval, provided that the groundwater does not deteriorate the excavation walls or cause bottom heaving or ground settlement.
3. If groundwater intrusion endangers the security of the excavation or adjacent property or structures, or exceeds reasonable pumping capacity, such groundwater control measures shall be taken as may be required.

F. Cleaning of Prebored Holes

1. After the holes have been bored to the proper depth, loose or broken rock, earth, or debris, including water, shall be removed from the bottom sides of the hole by approved methods acceptable to the Engineer. Bottom surfaces shall be flat and level.

5.8 Placement of Steel Soldier Pile

- A. For soldier piles requiring anchors, bearing and transfer plates shall be attached at the anchor location, as shown on the working drawings. All plate attachments shall be made in the shop before applying the pile coating.
- B. The steel soldier piles shall be placed in the pre-bored holes to the lengths shown on the working drawings.
- C. The steel soldier piles shall be placed and maintained in the center of the prebored hole, within the tolerances relative to plan location of the posts as outlined herein. The flange of the steel core member shall be aligned parallel to the future excavation line.
- D. The steel soldier piles shall be furnished and installed full length. Splices shall not be used unless otherwise approved by the Engineer.

- E. Steel soldier piles damaged during transportation, handling or installation which cannot be rebuilt, extended, or encased, to the satisfaction of the Engineer, or which do not meet these specifications after being placed, shall be removed.
- F. Steel soldier pile spacing shall be 1" +/- from plan location and shall not exceed 1:140 from the vertical (for vertical piles) or as specified on the working drawings.
- G. Cutting Off Steel Soldier Piles
 - 1. All cuts shall be perpendicular to the axis of the pile.
 - 2. All cut surfaces shall be galvanized in the field with a zinc rich paint on the Materials Division Approved Products List 13.
- H. Rebuilding or Extending Steel Soldier Piles
 - 1. For the pile installations where the Engineer determines that the depth of the pre-bored holes must be extended beyond the depth shown on the plans to obtain a non-yielding foundation for the pile, and where the length of the furnished pile is inadequate for the deepened hole, an extension of the steel soldier pile or a replacement pile shall be provided.
 - 2. The length of the extension shall be as necessary to extend the soldier pile to the bottom of the pre-bored hole, while maintaining the tieback openings at the levels shown on the plans.
 - 3. The extensions shall be of the same section size and weight per linear foot as the soldier pile to which it is spliced.
 - 4. Splicing details shall be as shown on the working drawings.
 - 5. The splice shall develop the full strength of the pile section being welded. Use an approved jig to keep the pile sections straight during welding.
 - 6. Welding shall be done by welders qualified in accordance with AWS D1.1
 - 7. Inspection and non-destructive testing of welded joints shall be performed in accordance with Section 407 of the Specifications.
 - 8. Field galvanization of the welded area should occur before placing pile.
 - 9. If shaft reinforcing steel is specified in the specialty contractor's design and the hole is extended, the reinforcing steel cage shall be extended to the base of the hole.

5.9 Placement of Concrete Encasement

- A. Steel soldier piles shall be encased with concrete as shown on the working drawings.
- B. Water inflow rate into the bottom of the drilled shaft will determine the concrete placement procedure. If it is less than 1/4 inch vertical rise in hole per minute, the concrete placement will be considered in the dry; if it is more than 1/4 inch vertical rise in hole per minute, it will be considered wet. Any water pumped by the Contractor to dewater the excavation

shall be adequately filtered prior to discharge. Concrete for encasement shall be placed in accordance with Section 404 of the Specifications and the following:

1. Dry Placement of Concrete

- a. Before placing the concrete, the shaft shall be dry, such that the flow of concrete around the H-pile can be visually examined during placement.
- b. If water accumulates in the pre-bored holes after cleaning and approval and before concrete encasement, the water shall be removed by approved methods, or alternatively the concrete shall be placed at the bottom of the hole below the accumulated water using tremie methods. Except for concreting by the tremie method, the total height of water in the bottom of the excavation shall not exceed 2 inches at the time of concrete placement.

2. Wet Placement of Concrete

- a. The water level shall be static in the excavation before placing concrete under water or as directed by the Engineer. Placing concrete through a tremie shall be in accordance with Section 404.03(f) of the Specifications, unless modified herein.
- C. Concrete delivery into the drilled shaft shall be within the time frames specified in Section 217 of the Specifications and this technical specification. In no case will the delivery be so fast as to trap air, slurry, water, fluids, soil, or any other deleterious materials in the vicinity of the H-pile and the annular zone between the H-pile and the excavation walls.
- D. A minimum of 3" of concrete cover shall be provided for reinforcing steel and a minimum of 1" of concrete cover shall be provided for H-piles at any location along the shaft.
- E. The temporary casing shall be removed as specified in herein. During extraction of the casing prevent upward movement of the steel soldier pile.
- F. Soldier piles shall be temporarily supported until drilled shafts concrete has set at least 12 hours.

5.10 Soldier Pile Logs

A record shall be kept, on an approved form, for each soldier pile installed including as a minimum:

1. Pile number, location, final top and bottom elevations of steel soldier pile and cast-in-place concrete encasement.
2. Final location of pile axis and variation from design location.
3. Pile plumbness.
4. Drilled shaft diameter and any variations in diameter with depth.
5. Date and time of start and completion of pile shaft excavation and concreting.
6. Elevation of water table during excavation.

7. Size of steel soldier pile and location of splices.
8. Concreting data including design mix, volume placed, and method of placement.
9. Other documentation as may be dictated by construction conditions including problems encountered, and delays.

5.11 Temporary Wood Lagging

Wood lagging between soldier piles shall be installed in accordance with the dimensions and details shown on the working drawings. Maximum exposed vertical face of excavation without wood lagging installed is 5 feet. Excavation shall not be started until the foundation concrete reaches the 28 day compressive strength. The lagging shall be placed from the top down as soon as possible after excavation to minimize erosion of materials into the excavation and installed in a manner that will not damage the pile coating. Coating damaged by lagging installation or in any other way shall be repaired by the Contractor in accordance with the coating manufacturer's instructions. The Contractor should incorporate measures to prevent soil loss through the lagging.

5.12 Precast Concrete Panels (when Specified)

- A. The foundation for the precast concrete lagging panels shall be graded level. Concrete within the flanges of the piles shall be chipped to provide a level surface for the panels to bear. Shims or buildups shall consist of concrete or stainless steel block. The full width of the panel and shall not exceed 6-inches in height. The foundation shall be compacted in accordance with Section 303 of the Specifications and graded to a relatively smooth and uniform surface before wall construction.
- B. Precast concrete lagging panels shall be placed as backfill placement proceeds. As fill material is placed behind a panel, the panels shall be maintained in their vertical position. Horizontal alignment tolerance shall not exceed 3/4-inch when measured along a 10-foot straightedge. The overall vertical tolerance of the wall (plumbness from top to bottom) shall not exceed 1:140 of wall height.
- C. Precast panels may not be cut unless approved by the Engineer and they are cut in accordance with the manufacturer's recommendations and the cut edges result in adequate concrete cover over the reinforcing steel. Cut panel ends shall be coated with epoxy EP-5. The Contractor shall ensure that precast panels fit between the H-piles.
- D. Placement of precast panels shall not commence before the Drilled Shafts and panels have obtained 85% of the 28-day concrete strength (f'c).
- E. Precast concrete panels and soldier pile flange shall overlap at least 2-1/2 inches after installation. The face of the panel on the exposed side shall fit tightly against the pile flange for the full height after installation. Spacer blocks/wedges will not be permitted.

5.13 Cast-in-Place Concrete Facing (when Specified)

- A. During or after excavation in front of the soldier pile retaining wall, attach the Shear studs to the exposed flange of the soldier piles at the locations and spacing shown on the working drawings. The face of the pile flange to which the Shear studs are attached shall be free of coating for a width of 4 inches extending from 2 inches above the top stud to 2 inches below the bottom stud.

- B. Concrete formwork shall conform to Section 404 of the Specifications.
- C. Reinforcement shall be placed in accordance with Section 406 of the Specifications and as detailed in the working drawings.
- D. Concrete for the CIP concrete facing shall be mixed, placed and cured as specified in Section 404 of the Specifications.
- E. The concrete finish for the cast-in-place facing shall be in accordance with Section 404 of the Specifications, unless noted otherwise on the contract plans or working drawings.

5.14 Installation of Weep Holes and Drainage Composite (when Specified)

- A. Drainage behind the wall shall be accommodated by porous backfill and weep holes as shown in the plans. Alternatively, a drainage composite may be used in lieu of porous backfill.
- B. The drainage composite shall be installed against the lagging board or permanent facing and soldier pile face before installing concrete fascia wall; and at the locations and to the dimensions shown on the plans and/or working drawings. The drainage composite panels shall be lapped in accordance with the manufacturer's instructions and as shown on the approved working drawings.
- C. PVC weephole drain pipes shall be installed before constructing the CIP concrete fascia wall. The drain pipes shall be securely held in the proper position, and shall have sufficient length to extend entirely through the concrete facing.
- D. There shall be free communication of water from the drainage composite to the drain pipe which shall not be clogged or impeded by concrete operations, and shall be protected against clogging from the migration of soil particles.
- E. The installation of the drainage composite and weephole drain pipes shall be in accordance with the details and procedures shown on approved working drawings and in strict accordance with the manufacturer's instructions.
- F. The exposed end of the weephole drain pipe shall be flush with the exposed surface of the concrete facing and connected to a standard EW-12.

5.15 Concrete Deadman (when Specified)

- A. Concrete deadman shall be constructed at the location and in accordance with the dimensions and details shown on the working drawings.
- B. Concrete formwork shall conform to Section 404 of the Specifications.
- C. Concrete for deadman anchors shall be mixed, placed, and cured in conformance with Section 404 of the Specifications.
- D. Reinforcing steel shall be in accordance with Section 223 of the Specifications.

5.16 Sound Barrier Walls on Soldier Pile Walls (when Specified)

- A. Panel orientation for the sound walls shall be such that panels are free-draining to prevent moisture buildup and possible corrosion or deterioration of the panel.
- B. A graded ditch or similarly functional drainage shall be provided behind the wall to control and dispose of roadway and slope drainage. The sound barrier posts and bottom of precast wall panels shall be designed in consideration of the additional load created by the ditch slope where it rests against the wall. Drainage design shall not create sound leaks.
- C. Once installed, the edges of stacked panels shall be neat and sides that mate together shall be straight and true so as not to permit sound penetration. Irregularities at panel edges that appear broken, ragged or chipped to the extent that a gap appears once they are stacked will be cause for rejection. When panels are stacked, horizontal joints shall be aligned to create continuous horizontal lines; however, foundations may be adjusted within the limits established herein to provide for the continuous horizontal alignment of joints. Horizontal joints formed where panels mate together and false or dummy joints (if present) must match in appearance and alignment.

5.17 Tiebacks for Soldier Pile Walls (when Specified)

A. Tieback Capacity

1. The Contractor shall install tie-backs that will develop the tie-back design load indicated on the working drawings in accordance with the testing subsection herein.

B. Tieback Tendons

1. Tendons shall be handled and stored in such a manner as to avoid damage or corrosion. Damage to the tie-back tendon as a result of abrasions, cuts, nicks, welds, and weld splatter will be cause for rejection by the Engineer.
2. Prestressing steel shall be protected from dirt, rust, and deleterious substances. A light coating of rust on the steel is acceptable on tendons which are to be grouted. If heavy corrosion or pitting is noted, the Engineer shall reject the affected tendons. If there is a question about the extent of the corrosion, the Contractor may select an independent testing laboratory subject to the approval of the Engineer and test samples of the tendon to determine if the prestressing steel meets the minimum mechanical properties of the appropriate ASTM specification. If the steel fails to meet the ASTM specification requirements, the Contractor shall replace the damaged tendons. Testing shall be at the Contractor's expense.
3. Centralizers shall be securely attached to the tendon in the anchor length only and their center spacing shall not exceed 10 feet. In addition, the lower centralizer shall be located a maximum of 5 feet from the bottom of the anchor length.
4. The unbonded length of the tendon shall be sheathed with a plastic tube conforming to the requirements herein. The sheath is used to provide corrosion protection and shall have a minimum wall thickness of: 60 mils Polyethylene/Polypropylene or 30 mils PVC. The annular space between the tendon and sheath shall be completely filled with a corrosion inhibitor conforming to the requirements herein. The ends of pulled-on sheaths shall be sealed with ultra-high molecular weight PE tape or heat-shrinkable tubing. The ends of extruded sheaths do not require a separate sealing means. The sheath can also function as the bond breaker.

5. The trumpet shall have an inside diameter equal to or larger than the hole in the bearing plate furnished by the tendon supplier. The trumpet shall be long enough to accommodate movements of the structure during testing and stressing.
6. For strand tendons, the Contractor shall consult the tendon supplier to determine the minimum length trumpet required making a transition from the diameter of the tendon in the unbonded length to the diameter of the tendon at the anchor head. A watertight seal shall be provided between the trumpet and the unbonded length corrosion protection. If grout is used to fill the trumpet, then the seal is temporary and it acts as a grout form. If corrosion inhibitor is used to fill the trumpet, then the seal is permanent and it shall be fabricated from Buna-N synthetic rubber or functionally approved equal.

C. Installation of Tiebacks

The Contractor shall select the drilling method and the grouting procedure used for the installation of the tie-back. The minimum drill hole diameter shall be 1 inch larger than the diameter of the anchor, or 4 inches, whichever is greater. Core drilling, rotary drilling, percussion drilling, auger drilling, or driven casing may be used. The tie-back angle shall be within plus or minus 3 degrees of that shown on the plans.

If water is used in the drilling operation, the Contractor shall control and dispose of the water in a manner that is not harmful to the site or adjacent property.

The Contractor shall use care in handling and storing the tendons at the site. The Contractor shall examine the tendon for damage before inserting a tendon in the drill hole. If the sheathing has been damaged, it can be repaired with ultra-high molecular weight PE tape. The tape shall be spirally wound around the tendon so as to completely seal the damaged area. The pitch of the spiral shall ensure a double thickness at all points.

Anchor grout shall have a water/cement ratio between 0.35 and 0.50. Admixtures, except expansive additives, will be permitted and shall be mixed in accordance with the manufacturer's recommendations. The grouting equipment shall include a mixer capable of producing a grout free of lumps and non-dispersed cement. A positive displacement grout pump shall be used. The pump shall be equipped with a pressure gage to monitor grout pressures at the pump. The pressure gage shall be capable of measuring pressures of at least 150 psi or twice that of actual grout pressures used by the Contractor. The grouting equipment shall be sized to enable the tie-back to be grouted in one continuous operation. Mixing and storage times shall not cause excessive temperature build in the grout. The mixer shall be capable of continuously agitating the grout.

Anchor grout shall be injected from the lowest point of the tie-back. The grout may be placed using grout tubes, casing, or drill rods. The grout may be placed before or after inserting the tendon. The quantity of the grout and the grout pressures shall be recorded. The grout pressures and grout takes shall be controlled to prevent excessive heave in cohesive soils or fractured rock.

The Contractor shall prevent the grout column from contacting the wall or the trumpet. After stressing the tie-back, the void at the top of the unbonded length shall be filled with grout or grease. The tie-back shall remain undisturbed for at least 72 hours.

D. Tieback Testing and Stressing

Each tie-back shall be **proof tested**, except those that are subjected to the more rigorous performance test or extended creep test. The maximum test load shall not exceed 80 percent of the guaranteed ultimate tensile strength of the tendon. The test load shall be simultaneously applied to the entire tendon.

Testing shall not be performed until the grout has cured for at least 72 hours. The tie-back testing equipment shall consist of:

1. A dial gage accurate to 0.001 inch to measure the tie-back movement.
2. A hydraulic jack and pump to apply the test load. The jack and pressure gage shall be calibrated as a unit. The pressure gage shall be graduated to a minimum of 10 psi increments or 5% of the design tieback design load, whichever is less. The hydraulic pump shall be capable of raising the load from one load increment to another in less than 60 seconds

A minimum of 10% of the tiebacks, but not less than 3 per wall, shall be **performance tested**. The performance test shall be made by incrementally loading and unloading the tie-back in accordance with the following schedule. The movement of the tendon shall be measured and recorded to the nearest 0.001 inch with respect to an independent fixed referenced point at the alignment load and each increment of load. The test load shall be monitored with a pressure gage.

Tie-back Performance Test Schedule

Load	Total Movement	Residual Movement
AL		
0.25p	S _{t1}	
AL		S _{r1}
0.25 p		
0.50 p	S _{t2}	
AL		S _{r2}
0.25 p		
0.50 p		
0.75 p	S _{t3}	
AL		S _{r3}
0.25 p		
0.50 p		
0.75 p		
1.00 p	S _{t4}	
AL		S _{r4}
0.25 p		
0.50 p		
0.75 p		
1.00 p		
P	S _{t5}	
AL		S _{r5}
0.25 p		
0.50 p		
1.75 p		
1.00 p		
1.20 p		
1.33 p	S _{t6} (Test load)	
	S _{tn} (Readings during load hold)	
Adjust to lock-off load		
	p = Tie-back design load	
	AL = Alignment load	

The proof test shall be performed by incrementally loading the tie-back in accordance with the following schedule. The movement of the tendon shall be measured and recorded to the nearest 0.005 inch with respect to an independent fixed reference point at the alignment load and each increment of load. The test load shall be monitored with a pressure gage.

Tie-back Proof Test

Load	Total Movement
AL	S _{t0}
0.25 p	S _{t1}
0.50 p	S _{t2}
0.75 p	S _{t3}
1.00 p	S _{t4}
1.25 p	S _{t5} (Test Load)
	S _{t6} (Readings during load hold)

Adjust to lock-off load

p = Tie-back design load

AL= Alignment load

The tie-back tendon may be completely unloaded prior to lock-off, if circumstances warrant. Final stressing then does not require further movement readings.

The test load in the performance and proof test shall be held for 10 minutes. The total movement with respect to a fixed reference shall be measured and recorded at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between 1 minute and 10 minutes exceeds 0.04 inch, the test load shall be held for an additional 50 minutes. The total movements shall be recorded at 15, 20, 25, 30, 45 and 60 minutes. At load increments other than the test load, the load shall be held just long enough to obtain the movement reading.

Upon completion of the tie-back test, the load shall be reduced to the lock-off load specified by the wall designer, and transferred to the permanent stressing anchorage. After transferring the load to the stressing anchorage and prior to removing the jack, an initial lift-off reading shall be made. The load determined shall be within 10 percent of the specified lock-off load. If the load is not within 10 percent of the specified lock-off load, the stressing anchorage shall be reset and another initial lift-off reading shall be made.

If the wall designer, based upon their interpretation of the available geotechnical information, believes that there is a reasonable likelihood that the anchor bond zone will be located in soils with Liquid Limits (LL) greater than 50 and Plasticity Indices (PI) greater than 20, at least one tie-back per wall greater than 100 feet in length shall be subject to an **extended creep test** in accordance with FHWA publication Geotechnical Engineering Circular #4 – Ground Anchors and Anchored Systems, section 7.4.4. Walls with lengths less than 100 feet are not subject to this testing requirement.

A tie-back test is acceptable if:

1. The total elastic movement measured in a performance test exceeds 80 percent of the theoretical elastic elongation of the unbonded testing length.
2. The total movement obtained from a proof test, measured between 50 percent of the design load and the test load exceeds 80 percent of the theoretical elastic elongation of the free-stressing length for this respective load range.
3. The creep rate does not exceed 0.08 inch per log cycle of time during the load hold of the performance, proof or extended creep test.
4. The initial lift-off reading shows a tie-back load within 5 percent of the specified lock-off load.

If tie-backs do not meet the acceptance criteria during testing, the Contractor shall modify the design or construction procedures, subject to review and approval of the Engineer. These modifications may include, but not be limited to, reducing the tie-back design load by increasing the number of tie-backs, modifying the installation methods, increasing the anchor length, or regrouting the tieback.

After the Engineer has accepted the tie-back, the portion of the tendon protruding beyond the stressing anchorage may be cut. Cutting shall be done in accordance with the tendon supplier's instructions.

E. Records

The Contractor shall provide the Engineer with the following records:

1. As-built drawings showing the location of the tie-backs, total tie-back length, anchor length, and unbonded length shall be submitted 2 weeks after completion of the tie-back installation.
2. Steel and grout certifications and mill reports prior to incorporating these materials in the work.
3. Grouting records indicating the cement type, grout compressive test results, quantity injected, and the grout pressures shall be submitted once a week.
4. Tie-back test results shall be submitted once a week.

VIRGINIA DEPARTMENT OF
TRANSPORTATION SPECIAL PROVISION FOR
**Quality Assurance/Quality Control (QA/QC) for the Construction of
Deep Foundation Systems**

December 20, 2018

I. DESCRIPTION

This work shall consist of all material, equipment, labor, and services necessary to perform all operations of the QA/QC for the construction of deep foundation systems in accordance with these Special Provisions, the details and dimensions shown on the Plans, and the Contract Documents. Deep foundation systems referenced herein are defined exclusively as either drilled shafts or driven piles. Other methods of deep foundation construction (including, but not limited to, auger-cast piles and micropiles) may be used subject to the Engineer's approval; however, the QA/QC requirements for methods other than drilled shafts or driven piles are beyond the scope of this document.

II. SUPPORTING DOCUMENTS

Implementation of this Special Provision requires a complete understanding of the following documents:

**“VDOT SPECIAL PROVISION FOR
DRILLED SHAFTS USING SELF-CONSOLIDATING CONCRETE**

1. “Special Provision for Drilled Shafts”
2. “Special Provision for Drilled Shafts Using Self-Consolidating Concrete”
3. “Special Provision for Thermal Integrity Profiling (TIP) of Drilled Shafts
4. “Special Provision for Dynamic Pile Testing for End Bearing Piles”
5. Section 403 of the VDOT Road and Bridge Specifications

III. DRILLED SHAFTS

A. **Demonstration Shafts** (also known as “Test Shafts,” “Technique Shafts,” or Trial Shafts)

Demonstration shafts shall be constructed to determine if the methods, equipment, and procedures proposed by the Contractor are adequate to produce drilled shafts that meet the requirements of the project. All demonstration shafts (and load tests performed on demonstration shafts, if required) shall be completed to the satisfaction of the Geotechnical Engineer prior to commencement of the construction of production shafts. The location of the demonstration shaft(s) shall be shown on the plans and is subject to the approval of the Geotechnical Engineer. Demonstration shafts shall be considered non-production shafts and shall be located at least 25 ft. (horizontally) from all proposed foundation systems. The diameter of the demonstration shaft shall be the same as that of the production shafts used on the project. The depth of the demonstration shaft shall be extended a minimum of 10 feet below the lowest plan tip elevation of the production shafts estimated on the plans, except for shafts on which load testing will be performed. If a load test will be performed on a demonstration shaft, the tip elevation shall be the same as the estimated tip elevation of the closest production shaft. Steel reinforcement and concrete shall be placed within the test shaft in the same manner as that proposed for the production shafts.

Frequency:

For bridges having five (5) spans or less and if the entire bridge footprint will be constructed within the same geologic formation, at least one (1) demonstration shaft shall be installed per bridge for each drilled shaft size proposed for the structure. For bridges having greater than five (5) spans but less than fifteen (15) spans, at least two (2) demonstration shafts shall be installed per bridge for each drilled shaft size proposed for the structure. For bridges having fifteen (15) spans or more, at least three (3) demonstration shafts shall be installed per bridge for each drilled shaft size proposed for the structure. If multiple demonstration shafts will be constructed, they shall be well spaced across the site of the structure.

Regardless of the size of the bridge, if the footprint of the structure is known to span multiple geologic formations, at least one (1) demonstration shaft for each geologic formation shall be installed. If the Contractor intends to use more than one method of construction (i.e., slurry construction for some shafts and temporary casing for others), at least one (1) demonstration shaft shall be utilized for each method of construction.

Note that for dual structures (parallel bridges situated in close proximity to each other), while these bridges are considered to be two individual structures, for the purposes of the paragraphs above, they can be considered to be a “single” bridge. [For example, if two parallel, three-span structures will be supported on drilled shafts having a 60-inch diameter, and these bridges are founded within the same geologic formation, one (1) demonstration shaft, having a diameter of 60 inches, is required.]

Acceptance:

A demonstration shaft will be deemed acceptable if the results all of the test procedures performed on the shaft during, and subsequent to, construction are determined to be acceptable. The required testing procedures are described below.

If, based on the test results, a demonstration shaft is deemed unacceptable, the Contractor shall revise his methods and/or equipment, and a subsequent demonstration shaft shall be constructed in the same general area to determine if the corrective measures were adequate. The subsequent demonstration shaft shall be tested for acceptance in the same manner as the previous shaft.

B. Concreting Curves

Frequency:

During concrete placement of all demonstration shafts and production shafts, the Geotechnical Engineer shall plot the theoretical and actual concrete volume curves. This information shall be submitted to the QAM no later than 48 hours after the concrete placement of each shaft has been completed. If unexpected occurrences are observed during concrete placement (such as the actual volume deviating from the theoretical volume by more than 10%, for example), the Contractor shall conduct CSL testing and shall determine whether the shaft is acceptable.

Acceptance:

No acceptance/rejection of the concreting curves will be made. This information will be used as an indicator as to the quality of the concrete in the shaft.

C. Crosshole Sonic Logging (CSL)

CSL is a nondestructive testing method performed on completed drilled shafts. It provides a method for evaluating the integrity of the drilled shaft concrete. All shafts (demonstration shafts and production shafts) shall be equipped with CSL tubes as described in the Special Provision for Drilled Shafts.

Frequency:

All demonstration shafts shall be CSL tested. All non-redundant shafts shall be CSL tested. (A typical example of a non-redundant shaft is the case in which a single drilled shaft supports a single pier column. The failure of a non-redundant shaft, by definition, will likely result in the failure of the entire substructure unit and the structure itself.)

On projects that utilize redundant shafts (several shafts arranged in a group), the first two (2) production shafts (of each size) constructed for each bridge shall be CSL tested. Furthermore, a minimum of 20% of the total number of production shafts shall be CSL tested for each structure. The CSL testing shall be equally spaced (in time and location) across the structure. The Contractor shall be prepared to perform additional CSL testing as deemed necessary by the Geotechnical Engineer and/or the QAM. Additional CSL testing will be required if field observations seem to indicate that concrete contamination has occurred.

Acceptance:

Acceptable CSL tests will be defined as those for which there is essentially no signal distortion throughout the entire length of the shaft, and the signal velocity is reduced by no more than 10% of that of sound concrete. If the CSL test results indicate that the aforementioned criteria have not been met, the Contractor and the Geotechnical Engineer shall propose remedial procedures to the QAM. If the Contractor and the Geotechnical Engineer feel that, in spite of marginal or poor CSL results, the drilled shaft is adequate, the Contractor shall propose alternative integrity testing to the QAM in an attempt to demonstrate that the shaft is acceptable. Some of these alternatives may include the use of other appropriate methods of non-destructive testing, coring the entire length of the shaft, or some other method acceptable to the QAM.

D. Thermal Integrity Profiling (TIP)

Thermal Integrity Profiling (TIP) uses the heat generated by curing cement (hydration energy) to assess the quality of drilled shafts. Drilled shafts shall be tested using the Thermal Wires Method.

Frequency:

The same frequency used for CSL testing shall be used for TIP testing. The same shafts that are CSL-tested shall be TIP-tested.

Acceptance:

The Contractor and the Geotechnical Engineer shall use the TIP results in conjunction with the CSL results to evaluate the integrity of the shaft. If it is determined that the shaft has not been constructed in accordance with the Special Provisions, the Contractor shall propose alternative integrity testing to the QAM in an attempt to demonstrate that the shaft is acceptable. Some of these alternatives may include the use of other appropriate methods of non-destructive testing, coring the entire length of the shaft, or some other method acceptable to the QAM.

E. Load Testing

Load testing in this case shall be assumed to refer to the axial, compressive static load test as defined in Section 403 of the Road and Bridge Specifications. If a project requires either lateral or tensile load testing, the Contractor shall follow the procedures outlined in the latest versions of ASTM D3966 and ASTM D3689, respectively.

In lieu of traditional static load testing, the Contractor may perform Osterberg load tests or Statnamic load tests, provided the required test load can be applied to the shaft using the alternative test method. If the Contractor is considering either the Osterberg or Statnamic methods, a detailed submittal of the proposed procedure shall be provided to the QAM for review and approval.

Frequency:

A minimum of one (1) load test shall be performed for each shaft size for each bridge on the project. For bridges having more than 30 shafts, two (2) load tests shall be performed for each shaft size. If multiple load tests will be performed, they should be located, generally, at opposite ends of the structure. The load tests shall be performed on non-production demonstration shafts, unless, based on the criteria above, the number of required load tests exceeds the number of demonstration shafts. If this occurs, additional load tests can be performed on production shafts, provided approval has been given by the QAM.

Acceptance:

A load test will be considered acceptable if it satisfies the required deflection and load carrying requirements cited in the Special Provisions, the Plans and the Specifications, as determined by the Geotechnical Engineer. If, for a specific project, modifications to these deflection criteria are deemed necessary, the Contractor shall submit these modifications to the QAM for approval.

IV. DRIVEN PILES

A. Wave Equation Submittals

Frequency:

The Contractor shall submit Wave Equation models to the QAM in accordance with the requirements set forth in the Specifications. One (1) model for each pile size and loading

condition for each structure shall be submitted. Additionally, all proposed hammers and all distinctly differing subsurface conditions shall be modeled with individual wave equation models. It is preferable to submit drivability models, which evaluate the pile capacity, driving resistance and driving stresses throughout the entire depth of penetration.

Acceptance:

No driving tests shall be performed until the Geotechnical Engineer and the QAM have reviewed and approved the Wave Equation models. Acceptance will be based on the requirements stated in the Specifications.

Driving Tests

Frequency:

When prestressed concrete piles are used for foundation support, the Contractor shall perform all driving tests prior to ordering production piles. A minimum of one (1) driving test per substructure unit shall be performed. If a substructure unit is greater than 100 ft. in width, two (2) driving tests per substructure unit shall be performed. When two driving tests are used within the same substructure unit, they shall be spaced as far apart as practical. Note that, when parallel structures are proposed, as was noted in *Section III. A.* (See above), they can effectively be defined as a single structure for purposes of this Special Provision.

Driving test piles shall be cast at least 10 ft. longer than the production piles they are supposed to represent, in order to provide some contingency length.

It is permissible for the Contractor to drive test piles in production pile locations and, provided they are successfully installed, these piles can be used as production piles. However, if the test pile is not successfully installed (or if the pile is broken or damaged during installation), the Contractor shall remove the test pile from the production pile location.

When steel piles are used and it is anticipated that the pile tips will be driven to competent rock, driving tests generally need not be performed. However, if the pile tips are expected to bear on/within weathered rock or if steel piles will be used predominantly as friction piles, driving tests are required. In all cases in which dynamic pile tests are utilized, driving test piles (one for each dynamic pile test) shall be used.

The following table summarizes the minimum driving test quantities when steel piles are used for structural support:

Condition	Required Quantity of Driving Tests
1. Pile tips driven to competent rock (overburden contains no boulders or buried obstructions, and typical pile loads are used)	No driving tests required, unless Dynamic Testing is performed.
2. Pile tips driven to competent rock (overburden likely contains boulders or buried obstructions)	One (1) driving test per substructure unit.
3. Pile tips driven to/into weathered rock (particularly where the soil overburden gradually transitions to weathered rock)	One (1) driving test placed at alternating substructure units (e.g., Abutment A, Bent 2, Bent 4, etc.)
4. Steel piles used as friction piles	One (1) driving test per substructure unit.

Acceptance:

The results of the driving test work will be used to help determine production pile lengths, anticipated driving resistances, and potential driving problems. No acceptance/rejection of the driving tests will be made.

B. Dynamic Pile Tests

Frequency:

When prestressed concrete piles are used, dynamic pile tests shall be performed on at least 50% of the driving test piles, with a minimum of one (1) dynamic test per each pile size used for each structure. When multiple dynamic tests are performed, they shall be spaced equally across the site of the structure. Copies of the dynamic test reports shall be submitted to the QAM within five (5) days of completion of the field work.

With respect to steel piles, referring to the table above, if conditions #2, #3 or #4 are applicable, at least 50% of the driving test piles shall be dynamically tested.

If Condition #1 is applicable, no dynamic pile testing is required. However, if the piles are required to carry a higher load than is typically used, dynamic testing shall be utilized to estimate pile capacity and driving stresses. For Condition #1 where a higher than typical load will be used, a minimum of 5% of the production piles shall be designated as "driving test" piles and shall be dynamically tested.

Acceptance:

A dynamic pile test will be deemed acceptable if the required pile capacity is achieved per the requirements of the Specifications or the "Special Provision for Dynamic Pile Testing for End Bearing Piles." Also, an acceptable dynamic pile test is one in which the allowable stresses are not exceeded during the initial driving and restrike operations.

D. Load Testing

Load testing in this case shall be assumed to refer to the axial, compressive static load test as defined in Section 403 of the Specifications. Load tests need not be performed for driven piles, provided an appropriate level of dynamic pile testing is performed. Exceptions to this rule, if required, will be clearly indicated in the contract.

In lieu of the traditional static load testing, the Contractor may perform Osterberg load tests or Statnamic load tests, provided the required test load can be applied to the pile using the alternative test method. If the Contractor is considering either the Osterberg or Statnamic methods, a detailed submittal of the proposed procedure shall be subject to the prior review and approval of the Geotechnical Engineer and the QAM.

If a project requires either lateral or tensile load testing, the Contractor shall follow the procedures outlined in the latest versions of ASTM D3966 and ASTM D3689, respectively.

V. MEASUREMENT AND PAYMENT

All QA/QC is integral to the relevant work package that is part of the lump sum contract price. There is no separate payment for QA/QC. All items that do not satisfy the criteria stated herein shall be submitted to the Concessionaire for acceptance. In the event the Concessionaire accepts an item, the QAM will document the basis of acceptance. The Contractor and the Concessionaire will negotiate an appropriate adjustment in the contract price, warranty, or other specific requirements or adjustments that are appropriate.

**VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
MECHANICALLY STABILIZED EARTH WALLS
(CONCRETE PANEL FACING)**

February 2, 2017

1.0 DESCRIPTION

This work shall consist of furnishing and constructing Mechanically Stabilized Earth (MSE) Walls in accordance with these specifications and in reasonably close conformity with the lines, grades, dimensions, and design shown on the plans or established by the Engineer. This specification is intended to cover MSE walls utilizing discrete concrete panel facing as approved by VDOT Structure and Bridge Division.

2.0 SUBMITTALS

The Contractor shall submit working drawings, shop plans, and design calculations, signed and sealed by a Virginia Registered Professional Engineer, to the Engineer for review by the Department. The Contractor shall allow 30 days from the day the submittals are received by the Department for review and approval. Fabrication or any wall construction shall not begin prior to the approval of the design, working drawings and shop plans. Approval of the Contractor's working drawings and shop plans shall not relieve the Contractor of any of his responsibility under the contract for the successful completion of the work.

2.1 Working Drawings and Shop Plans

The working drawings and shop plans shall reflect all information needed to fabricate and erect the walls including:

- a. Elevations at the top of wall at all the horizontal and vertical break points and at interval not exceeding 50 feet along the wall;
- b. Elevations at the top of leveling pad step breaks;
- c. Elevation of the finished grade in front of the wall;
- d. The number, size, type, length, and details of the soil reinforcing elements in each design section;
- e. The locations and sizes of all pipes and utilities that will be penetrating the wall face or within the soil reinforced mass;
- f. Typical cross-section or cross-sections showing the elevation relationship between ground conditions and proposed grades;
- g. Details for construction of wall around obstructions (i.e. drainage facilities, utilities, overhead sign footing, piles, drilled shafts) within the reinforced backfill;
- h. Details pertaining to coping, parapets, railing, as required by the contract plans;

- i. Shape, dimension, and designation of wall panel;
- j. Details of the architectural or finish treatment supplied.

2.2 Design Calculations

The proposed design shall satisfy the design parameters and requirements in the plans and in the special provisions. Complete design calculations shall include the most critical geometry and loading combination for each design section that exist during construction and at the end of construction.

3.0 MATERIALS

The Contractor shall make arrangements to purchase or manufacture the facing elements, metallic reinforcing mesh or strips, geosynthetic geogrids or geostrips, connection devices, joint materials, and all other necessary components. Material not conforming to this section of the specifications shall not be used without the written consent from the Engineer.

3.1 Reinforced Concrete Face Panels

Concrete for face panel units shall be Class A4 conforming to the requirements of Section 217 of the Specifications except that the maximum water/cement ratio shall be 0.47.

Panel steel reinforcement shall meet the requirements of Section 223 of the Specifications. If corrosion resistant reinforcing (CRR) steel is required, adequate separation between CRR steel and metallic connection devices and lifting device shall be provided.

Panel steel reinforcement, connection devices, and lifting devices shall be set in place to the dimensions and tolerances shown on the plans prior to casting.

3.1.1. Testing and Inspection

The Contractor or his supplier shall furnish facilities and shall perform all necessary sampling and testing in an expeditious and satisfactory manner. Panels will be considered acceptable for placement in the wall when control cylinder tests exceed 85% of 28 day design strength requirements.

3.1.2. Casting

Concrete panels shall be cast on a flat area; the front face of the form at the bottom and the back face at the upper part. Galvanized connection devices shall be set on the rear face. The concrete in each unit shall be placed without interruption and shall be consolidated by the use of an approved vibrator, supplemented by such hand-tamping as may be necessary to force the concrete into the corners of the forms and prevent the formation of stone pockets or cleavage planes. Clear form oil of the same manufacture shall be used throughout the casting operation.

3.1.3. Curing

Panel units shall be cured in accordance with the requirements of Section 404.03 (k) of the Specifications. Any panel concrete placement that does not reach specified design strength within 28 days will be rejected as determined by concrete control cylinders.

3.1.4. Removal of Forms

The forms shall remain in place for a minimum of 20 hours or when control cylinder tests indicate that the concrete has attained at least 20% of the 28-day design requirement in accordance with the requirements of Section 404.03 (j) of the Specifications.

3.1.5. Concrete Finish and Tolerances

Unless otherwise shown on the plans, concrete surface for the front face shall be a Class 1 finish conforming to the requirements of Section 404 of the Specifications or as detailed on the plans and a uniform surface finish on the rear face. Rear face of the panel shall be screeded to eliminate open pockets of aggregate and surface distortions in excess of 1/4 inch.

3.1.6. Tolerances

All panel units shall be manufactured within the following tolerances:

- Lateral position of connection devices within 1 inch.
- All other panel dimensions within 3/16 inch.
- Squareness, as determined by the difference between the two diagonals, shall not exceed 1/2 inch.
- Surface irregularities on smooth formed surfaces measured on a length of 5 feet shall not exceed 1/8 inch. Surface irregularities on textured-finish surfaces measured on a length of 5 feet shall not exceed 5/16 inch.

3.1.7. Rejection

Panel units will be subject to rejection because of failure to meet any of the requirements specified above. In addition, any of the following defects will be sufficient cause for rejection:

- Defects that indicate imperfect molding.
- Defects such as chipped or broken concrete.
- Defects indicating honeycombed or open texture concrete.
- Color variations on the front face of panel due to excess form oil or other reason.

3.1.8. Marking

The date of manufacture, production lot number, and piece mark shall be clearly scribed on the rear face of each panel unit.

3.1.9. Handling, Storage and Shipping

All panel units shall be handled, stored and shipped in such manner as to eliminate the danger of chipping, cracks, fractures and excessive bending stresses. Panel units shall be removed from casting beds by an approved four-point pick up method. Panel units in storage shall be supported on firm blocking to protect the panel connection devices and the exposed exterior finish.

3.2 Steel Soil Reinforcing and Connection Devices

3.2.1 Metallic Reinforcing Strips

Reinforcing strips shall be hot rolled or cold formed from bars or coil to the required shape and dimensions. Their physical and mechanical properties shall conform to ASTM A-36, ASTM A-572 Grade 65, or ASTM A-1011 Grade 65. Galvanization for reinforcing strips shall conform to the requirements of ASTM A-123 and the minimum coating thickness shall be 2 oz/sf (or 3.4 mils).

3.2.2 Metallic Reinforcing Mesh and Bar Mats

Reinforcing mesh shall be shop fabricated of cold drawn steel wire conforming to the requirements of ASTM A-82 and shall be welded into the finished mesh fabric in accordance with the requirements of ASTM A-185, except that, the minimum average shear stress of the weld shall be at least 35,750 psi. The reinforcing mesh manufacturer shall provide certification that the minimum average weld shear strength is adequate for the proposed design and provides a reasonable safety factor.

Galvanization shall be applied after the mesh is fabricated and conform to the requirements of ASTM A-123 and the minimum coating thickness shall be 2 oz/sf (or 3.4 mils). Any damage to the galvanizing shall be repaired in accordance with the requirements of Section 233 of the Specifications.

3.2.3 Tie Strips/Lug

Tie strips/lug shall be shop fabricated of hot rolled or cold formed steel conforming to the requirements of ASTM A-570, Grade 50 or ASTM A-1011 Grade 50. Galvanization shall conform to ASTM A-123 and the minimum coating thickness shall be 2 oz/sf (or 3.4 mils).

3.2.4 Fasteners

Bolts and nuts shall conform to the requirements of ASTM A-325, ASTM A-449, or ASTM A-563 and shall be galvanized in accordance with ASTM A-153 and minimum coating thickness of 2 oz/sf (or 3.4 mils).

3.2.5 Connection Devices

Connection loop shall be fabricated of cold drawn steel wire conforming to the requirements of ASTM A-82 and welded in accordance with the requirements of ASTM A185. Connector bars shall be fabricated of cold drawn steel wire conforming to the requirements of ASTM A-82 and galvanized in accordance with ASTM A-123.

All connection devices shall be galvanized in accordance with the requirements of ASTM A-123 or approved equal and minimum coating thickness shall be 2 oz/sf (or 3.4 mils).

3.3 Geosynthetic Soil Reinforcing and Connection Devices

3.3.1 Geogrids

Geogrids shall be structural geogrids formed by uniaxially drawing a continuous sheet of high density polyethylene material. Geogrids shall be a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil or rock. Structure of geogrid reinforcement shall be

dimensionally stable and able to retain its geometry under manufacture, transport and installation.

3.3.2 Geostrips

Geostrips shall be structural geostrips made of high-tenacity polyester fibers with linear low-density polyethylene coating. Geostrips shall have high resistance to deformation under sustained long-term design load and shall also be resistant to ultraviolet degradation, to damage under normal installation practices and to all forms of biological and /or chemical degradation.

3.3.3 Delivery, Storage, and Handling

The Contractor shall check the geosynthetic soil reinforcement upon delivery to assure that the proper grade and type of material has been received. Rolled geosynthetic soil reinforcement shall be stored in accordance with the manufacturer's recommendations. During all period of shipment and storage, geosynthetic soil reinforcement shall prevent wet cement, epoxy and like materials from coming in contact with and affixing to the geosynthetic soil reinforcement.

3.3.4 Connection Devices

Connection devices, such as bars, pins, plates etc, shall consist of non-degrading polymer and be made for the express use with the geosynthetic soil reinforcements supplied.

3.4 Joint Materials

3.4.1. Joint Cover

If required, cover all joints between panels on the back side of the wall with a geotextile meeting the requirements for drainage fabric as specified in Section 245. Use adhesive approved by the manufacturer to attach the geotextile to the panel. The minimum width and lap shall be 12 inches.

3.4.2. Bearing Pads

Provide in horizontal joints between panels preformed EPDM (Ethylene Propylene Diene Monomer) rubber pads conforming to ASTM D-2000 Grade 2, Type A, Class A with a minimum Durometer Hardness of 70, or HDPE (High Density Polyethylene) pads with a minimum density of 0.946 g/cm³ (or 59.06 lb/ft³) in accordance with ASTM 1505.

3.4.3 Joint Filler

If required, provide flexible foam strips as recommended by wall manufacturer for filler for vertical and inclined joints between panels, and in horizontal joints where pads are used, where indicated on the plans.

3.5 Select Backfill Material

Select backfill material used in the structure volume shall be reasonably free from organic material, shale or other poor durability particles and otherwise deleterious materials. The backfill shall conform to the following grading as determined by AASHTO T-27:

Sieve Size	Percent Passing
4" [†]	100
No. 40	0 - 60
No. 200	0 - 15

[†] The maximum soil particle size for polymeric geosynthetic soil reinforcement shall be 3/4 inch unless full scale installation damage tests are conducted in accordance with ASTM D5818.

The Plasticity Index (P.I.) of the backfill material as determined by AASHTO T-90 shall not exceed 6.

Backfill material shall exhibit an angle of internal friction of not less than 34 degrees, as determined by the standard Direct Shear Test, AASHTO T236, on the portion finer than the #10 sieve, using a sample of the material compacted to 95 percent of AASHTO T99, Methods C or D with oversized correction, at optimum moisture content. No testing is required for material containing VDOT #57 aggregates or larger Open-Graded Coarse Aggregates in VDOT Road and Bridge Specifications.

Backfill material shall have a magnesium sulfate soundness loss of less than 30 percent after four cycles.

Additionally, the backfill material shall conform to the following electrochemical requirements:

- For metallic soil reinforcements:

Requirements	AASHTO Test Methods
a) pH range between 5.0 and 10.0	T289
b) Resistivity greater than 3,000 ohm-cm	T288
c) Chlorides less than 100 ppm	T291
d) Sulfates less than 200 ppm	T290
e) Organic Content less than 1%	T267

If resistivity is greater or equal to 5000 ohm-cm, the chlorides and sulfates requirements may be waived.

- For geosynthetic soil reinforcements:

Polyolefin Polymer (Polypropylene and High Density Polyethylene):

Requirement	AASHTO Test Methods
a) pH range between 3.0 and 11.0	T289

Polyester polymer:

Requirement	AASHTO Test Methods
a) pH range between 3.0 and 9.0	T289

The Contractor shall perform analysis tests for each source of material and shall perform such additional tests to assure conformance whenever the character of the select backfill material changes. All tests shall be performed by laboratories that are AASHTO Materials Reference Laboratory (AMRL) accredited.

The Contractor shall furnish the Engineer a Certificate of Compliance certifying the furnished select backfill materials comply with the aforementioned requirements. Test results performed by the Contractor necessary to assure contract compliance shall also be furnished the Engineer.

3.6 Cast-In-Place Concrete

Concrete for leveling pads and wall top coping shall be Class A3 conforming to the requirements of Section 217 of the Specifications.

3.7 Moment Slab Reinforcing Steel

Corrosion resistant reinforcing (CRR) steel meeting the requirements of Section 223 of the Specifications shall be used in moment slab and shall be the same type of CRR steel specified for parapet as shown on plans.

3.8 Coping Reinforcing Steel

Class I corrosion resistant reinforcing steel meeting the requirements of Section 223 of the Specifications shall be used in coping.

4.0 CONSTRUCTION REQUIREMENTS

4.1 Wall Excavation

Wall excavation shall be unclassified in accordance with the requirements of Sections 506 and 401 of the Specifications and shall be performed in reasonably close conformity to the limits and construction stages shown on the plans.

4.2 Foundation Preparation

The foundation for the structure shall be graded level for a width equal to or exceeding the length of reinforcement or as shown on the Plans. Prior to wall construction, the foundation shall be compacted in accordance with the embankment requirements of Section 303.04 (h) of the Specifications and graded to a relatively smooth and uniform surface. Any foundation soils found to be unsuitable shall be removed and replaced with select backfill as per Materials of these specifications.

At each panel foundation level, an unreinforced concrete leveling pad shall be provided as shown on the plans. Leveling pads shall be level within 1/8 inch per pad or per 100 feet, whichever is greater. The pad shall be cured a minimum of 12 hours before placement of wall panels.

4.3 Wall Erection

Precast concrete panels shall be placed vertically with the aid of a crane or other suitable equipment. For erection, panels shall be handled by means of a lifting device set into the upper edge of the panels. Panels shall be placed in successive horizontal lifts in the sequence shown on the plans as backfill placement proceeds. As fill material is placed behind a panel, the panels shall be maintained in vertical position by means of temporary wooden wedges placed in the joint at the junction of the two adjacent panels on the external side of the wall. External bracing may also be required for the initial lift. Vertical tolerances (plumbness) and horizontal alignment tolerance shall not exceed 3/4 inch when measured along a 10-foot straight edge. The maximum allowable lateral offset at any panel joint shall be 3/4 inch. The overall vertical tolerance of the wall (plumbness from top to bottom) shall not exceed 1/2 inch per 10 feet of wall height.

4.4 Select Backfill Placement

The placement of the select backfill material shall closely follow the erection of each lift of panels. At each reinforcing element level, backfill shall be roughly leveled before placing and attaching

reinforcement to the panel. Unless otherwise shown on the plans, reinforcement shall be placed normal to the face of the wall. The maximum lift thickness shall not exceed 8 inches loose and shall closely follow panel erection. The Contractor shall decrease this lift thickness if necessary to obtain the specified density.

Backfill shall be compacted to 95% of the maximum density as determined by AASHTO T-99 Methods C or D with oversized correction. For backfill containing VDOT #57 aggregate or larger Open-Graded Coarse Aggregates in VDOT Road and Bridge Specifications, density test is not required but each lift shall be compacted until there is no visible evidence of further densification. A minimum of four passes with a heavy roller shall be used. For applications where spread footings are used to support bridge or other structural loads, the top 5 feet below the footing elevation shall be compacted to 100 percent AASHTO T-99. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill material shall have a placement moisture content equal to the optimum moisture content. Moisture content may be up to 2 percentage points less than optimum moisture content.

Prior to placement of any backfill, geosynthetic soil reinforcement shall be pulled taut to remove slack. The backfill shall be placed in a manner that geosynthetic soil reinforcement remains taut. Tracked construction equipment shall not operate directly on geosynthetic soil reinforcement. A minimum fill thickness of 6 inches over the geosynthetic soil reinforcement is required prior to operation of tracked vehicles. Rubber tired equipment may pass over the geosynthetic soil reinforcement at speeds less than 10 mph. Sudden braking and sharp turning shall be avoided.

At the end of each day's operations, the Contractor shall shape the last level of backfill as to permit runoff of rainwater away from the wall face. Backfill compaction shall be accomplished without disturbance or distortion of reinforcing elements and panels. Compaction adjacent to the backside of the wall in a strip 3 feet wide shall be achieved using mechanical hand tampers. No compaction density tests are required within 3 feet from the back face of wall.

4.5 Cast-In-Place Concrete

Concrete work for leveling pads and wall top coping shall be performed in accordance with the requirements of Section 404 of the Specifications.

5.0 MEASUREMENT AND PAYMENT

Mechanically Stabilized Earth (MSE) walls will be paid for as Retaining Structure at the contract unit price per square foot on a plan quantity basis as shown on the contract drawings. This price shall include excavating; temporary shoring when not specified on the wall plans or in the proposal as a separate pay item; furnishing and installing concrete footing; leveling pads; face panels; copings and moment slabs; masonry; reinforcing steel; steel or geosynthetic soil reinforcements, select backfill material; backfilling; compaction; joint materials; riprap to fill temporary excavation, including all work necessary outside the retainage area shown on the plans; and disposing of unsuitable or surplus material offsite or, where permitted by the Engineer, onsite.

Payment will be made under:

Pay Item	Pay Unit
Retaining Structure	Square foot

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
**DISMANTLING AND REMOVING EXISTING STRUCTURES OR REMOVING PORTIONS OF
EXISTING STRUCTURES**

December 20, 2018

413.01 – Description is amended to include the following:

The Contractor's dismantling operations shall be according to a method approved by the Engineer. The Contractor shall submit the following to the Engineer for review and approval before beginning demolition:

- (a) Existing structure demolition plan which shall include, but is not limited to proposed equipment, demolition, debris containment, and debris removal methods, protection methods for the proposed structure and waterway, disposal and transportation permits, proposed debris disposal location, and proposed dust control and water/runoff control.
- (b) Calculations verifying that the existing girders are structurally adequate and sufficiently stable to support the proposed demolition operations plan and sequence. Calculations shall include, but are not limited to, the following:
 - 1. The effects to the structure of operating equipment during demolition activities.
 - 2. Structure impact loads during removal activities.

12-20-18 (SPCN)

General Notes For Alternate Retaining Wall Plans

These are suggested wordings for notes that are regularly or occasionally needed. Where these notes are fully applicable, there may be no need to change their wording. They should be changed, however, or other notes added, wherever they are not adequate.

Notes should line up with the GENERAL NOTE on the Alternate Retaining Wall Plan.

Notes in the single parentheses indicate alternate wordings to be selected by the designer. Notes in the double parentheses (*(italics)*) are explanations and instructions to the designer. Skip a line between paragraphs.

Specifications:

Construction: Virginia Department of Transportation
Road and Bridge Specifications, 2007.

Design: AASHTO Standard Specifications for Highway Bridges, 1996; 1997 and 1998 Interim Specifications; and VDOT Modifications.
(Structure(s) is (are) designed for Seismic Performance Category B).
((Use note only when designing for Seismic Performance Category B. Do not show note when designing for Seismic Performance Category A.)) ((Use when structure is designed for ASD))

AASHTO LRFD Bridge Design Specifications, 4th Edition, 2007; 2008 Interim Specifications; and VDOT Modifications *((Use when structure is designed for LRFD))*

Standards: Virginia Department of Transportation
Road and Bridge Standards, 2008.

These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.

The minimum design life of MSE wall shall be (75-year) (100-year).

The maximum allowable foundation bearing pressure shall be _____ tons/sq. ft.
((Add table if allowable bearing pressure varies along wall alignment.))

The anticipated MSE wall total settlement is _____ inches and differential settlement is _____. *((Add table if settlement varies along wall alignment.))*

Vertical slip joints shall be placed in the wall at intervals not to exceed _____ ft. between Stations _____ and _____.

Prior to wall construction, the foundation shall be compacted with a smooth wheel vibratory roller. The drums of the roller should be ballasted and each pass of the roller should overlap one half the width of the previous pass. The roller shall make at least ten passes over the proposed wall foundation zone. No density test will be required. Any foundation soils found to be unsuitable shall be removed and replaced with select material Type I minimum CBR of 30. *((Use note where marginal foundation conditions exist or zones of unsuitable material maybe encountered.))*

The minimum required depth of undercut shall be _____ ft. between Stations _____ and _____. *((Add table if undercut depth varies along wall alignment.))*

Remove unsuitable or unstable foundation material below the bottom of the wall and replace with select material prior to wall construction. Compact the foundation area according to the VDOT Specifications.

The estimated required depth of unsuitable material to be removed is shown on the plans. The lateral limits of excavation are dependent on the depth at a particular location below the wall. Additional localized excavation may be required depending on the site conditions at the time of construction.

Rustication treatment shall be _____. Forms and liners shall be approved by the Engineer.

Concrete surface coating shall be _____, similar to Federal Standard Color No. _____.

Minimum panel design thickness is _____ inches. Thickness of concrete must increase to accommodate any architectural surface finish that may be specified.

An impervious membrane shall be placed below the pavement and just above the first row of reinforcement to intercept any flows containing deicing chemicals. The membrane shall be sloped to drain away from the facing to an intercepting longitudinal drain outletted beyond the reinforced zone. *((Used when the extensive use of deicing chemical may cause accelerated corrosion problems))*.

A geotextile shall be used as a separator between the mechanically stabilized earth mass and the subbase. *((Used where the potential for the subbase migration into an oversized selected material may occur))*.

Epoxy coated reinforcement steel shall be used in (copings) (facing panels) (parapets) (moment slabs) (traffic barriers) and_____. ((*Epoxy coated steel is required in area of heavy salt or chemical spray*)).

(Coping) (Parapet) (Barrier) (Moment slab) (Piles) (Paving) shall not be placed until_____days after wall completion have elapsed.

The selected wall supplier will submit a detailed design and shop drawings for approval.

Provide drainage details such as perforated pipe underdrain and/or drainage blanket based upon field conditions. For wall installation at stream crossing, provide adequate drainage so the difference between streambed and saturated backfill is not greater than what is considered in the design.

All panel types and other related elements shall be detailed on shop drawings.

Guidelines for Preparation of Alternate Retaining Wall Plans (Page 1 of 3)

Notes To Designer:

1. Review road plans and cross-sections to estimate approximate wall location, height and length of reinforced soil mass.
 - a) Check that the entire wall (including the reinforced mass) is located within the right-of-way (R/W). If the wall is outside the R/W limits, determine if it is feasible to acquire additional R/W or underground easement.
 - b) Check if any utilities or obstructions located within the reinforced soil mass can be adequately accommodated within the requirements and limitations of the proposed systems allowed for construction.
2. Review the geotechnical information [geotechnical reports, boring logs (geology sheets), laboratory test data, etc.] and estimate the location of the proposed bearing stratum.
3. Perform bearing capacity calculations to determine the maximum allowable soil bearing capacity at the estimated bearing stratum. **The maximum allowable soil bearing pressure must be stated on the plans.**
4. Determine the anticipated loading condition (level backfill, level backfill with traffic surcharge, sloping backfill, or sloping backfill with traffic surcharge, etc.).
5. Calculate the maximum bearing pressure that the wall will impose on the soil. If the maximum bearing pressure imposed by the wall is less than the maximum allowable soil bearing capacity calculated in Step 3, the bearing pressure requirements are satisfied.
6. Perform settlement calculations to determine total and differential settlements. In addition to the magnitude of settlement, an estimate of the time-rate of settlement shall be performed. Wick drains, surcharge loading, or some other method of ground improvement may be required to limit post wall construction settlements to an acceptable amount. Check the angular distortions to determine if they appear to be within allowable limits according to AASHTO. Depending on the amount of anticipated settlement, the designer shall implement one of the following actions:

Settlement \leq 2 inches.	No action required.
Settlement up to 4 inches and longitudinal differential settlement less than 1%	No action required.
Settlement up to 4 inches and longitudinal differential settlement greater than 1%	Slip joints to be placed at appropriate intervals in order to limit the longitudinal differential settlement to less than 1%
Settlement \geq 4 inches.	Requires approval from State Structure and Bridge Engineer.

Estimated settlements along the wall shall be shown in the plans. Method of payment (if any) for additional square footage of wall created by the settlements should be addressed in the contract documents.

Requirements for Preparation of Alternate Retaining Wall Plans (Page 2 of 3)

Notes To Designer (Cont.):

- Evaluate whether a waiting period for installing coping, parapet, barrier, moment slab, piles, paving etc. is required after wall completion.
7. Calculate factors of safety with respect to overturning, sliding, and global stability for the applicable loading conditions. If the factors of safety are greater than required, the overall stability requirements are satisfied.
 8. Evaluate the site for potentially deleterious environmental factors such as corrosive groundwater, seepage forces, stray currents, etc. which may adversely affect the wall.

If all of the external stability issues described above (bearing pressure, settlement, overturning, sliding and global stability requirements) are satisfied, alternate walls may be used at this location. If any of the above is not satisfied, ground modification or a different type of retaining wall may be required.

9. If an alternate wall is feasible, determine the wall geometry (stationing and offsets).
10. Determine the top-of-wall elevations at intervals not exceeding 50 ft. This can be accomplished using roadway information such as road plans, profiles, cross-sections, and the like. The top of wall shall be either the top of coping or the top of the moment slab (whichever is applicable).
11. Determine the bottom-of-wall elevations at the same locations (stations) that the top-of-wall elevations were found in Step 10. Check that there is adequate embedment at the toe of the wall in accordance with AASHTO and that the embedment satisfies global stability requirements. The bottom of wall shall be taken to be the top of the leveling pad.
12. Check that the top and bottom elevations of the wall determined in Steps 10 and 11 are within the limits assumed in Step 1. If not, recalculate the bearing capacity, settlement, and the factors of safety with respect to overturning, sliding, and global stability to be sure that the external stability of the wall is adequate.
13. Draw the Elevation View (or "Three-Line Drawing") showing the top of wall, bottom of wall, and the approximate finished grade adjoining the front face of the wall. Show the locations of all pipes and utilities that will be penetrating the wall or behind the panels, so the selected alternate wall company can design for those conditions.
14. Draw the Plan View. Show stationing, offsets, boring locations, and all pipes and utilities in the vicinity of the wall.
15. If required, rustication treatment and details shall be included on the drawings.

Requirements for Preparation of Alternate Retaining Wall Plans (Page 3 of 3)

Notes To Designer (Cont.):

16. Draw Typical Sections for all significantly different wall sections. For each section, show the limits of payment, the required slope in front of the wall, the required slope of the backfill, and all special loading conditions. The limits of payment shall be shown to extend from the top of the wall (top of coping or moment slab) to the bottom of the wall (top of the leveling pad).
17. Calculate the surface area of the wall based on top and bottom wall elevations and show this quantity on the plans (Square Feet, Plan Quantity Item). When required, the traffic barrier/parapet shall be listed as a separate payment item (Linear Feet, Plan Quantity Item).
18. The plans shall clearly indicate whether some method of ground improvement is required and the manner in which the Contractor will be paid for this work. If overexcavation and replacement is required, these items shall be listed as separate payment items [Undercut Excavation, (Cubic Yards)] and [Select Material Type I, Minimum CBR of 30 (tons)]. The estimated limits of undercut and backfilling shall be indicated on the Elevation View and the Typical Sections.
19. List the approved wall companies with their addresses and telephone numbers on the plans so the Contractor can contact them to request bids. Some projects have geometric constraints (e.g., walls that wrap around bridge abutments) that preclude the use of some wall systems. Wall systems that cannot conform to the geometrics of the project shall not be included on the plans as an allowable wall system.
20. Include the boring logs (Geology Sheets) in the plans.
21. Place appropriate General Notes on the Plans.

**VIRGINIA DEPARTMENT OF TRANSPORTATION SPECIAL PROVISION FOR
ARCHITECTURAL FINISH, CONCRETE FORM LINERS AND COLOR STAIN
COATING**

April 29, 2021

1.0 GENERAL

A. Description

This work shall consist of developing, furnishing and placing simulated stone masonry by means of concrete form liners and color stain coating designed to duplicate closely the appearance of the natural stone (size, shape, color range and variation, texture, pattern and relief), in accordance with these specifications and the Contract.

The Contractor shall furnish all materials, labor, equipment, and incidentals necessary for the construction of simulated stone masonry on all exposed, vertical faces of concrete retaining walls, abutment walls, and sound barrier walls as specified in the Contract.

B. Design Requirements

Patterning of simulated stone masonry shall appear natural and non-repeating. Seam lines or match lines caused from two or more molds coming together will not be apparent when viewing final wall. Final coloration of cast stone concrete surface shall be in accordance with the Contract. A sample and mockup are required, as described elsewhere in this Special Provision. Upon approval by Engineer, the mockup shall serve as quality standard for the project.

C. Submittals

Sample Panel: The Contractor is required to submit a 24" by 24" sample of the simulated stone masonry finish. Sample is to demonstrate the finish described in 1 A. and 1 B. above. Any sample panel that is not accepted by the Engineer is to be removed and a new sample panel is to be produced at no additional expense to the Concessionaire. Approval of sample panel is required by the Engineer. After the acceptance of the completed structure(s), the Contractor shall dispose of the sample panel(s). **Shop Drawings:** Plan, elevation, and details to show overall pattern, joint locations, form tie locations, and end, edge, corners, and other special conditions. Shop drawings shall indicate the specific form liner arrangement that exactly correlates to the position that each form liner will be used on the proposed structure(s). The form liners shall be patterned to produce a continuous coursed stone pattern without obvious repetition of the pattern. Shop drawing shall be of sufficient scale to show the detail of all stone and joint patterns, and the layout of the finish pattern. The size of the sheets used for the shop drawings shall be 22" x 34".

If necessary, the shop drawings shall be revised by the Contractor at no additional expense, until the proposed form liner patterns and arrangement receive the approval of the Engineer. Shop drawings shall be reviewed and accepted prior to fabrication of form liners. **Samples:** Form ties, sample and description, showing method of separation when forms are removed.

D. Quality Assurance

Manufacturer of simulated stone masonry molds: Installer shall be trained in manufacturer's special techniques in order to achieve realistic surfaces. The Engineer shall approve the pattern, color, and texture of the sample walls prior to proceeding with the work. The Engineer shall also approve the finished product.

Pre-Installation Meeting: Schedule conference with manufacturer(s) representative to assure understanding of simulated stone masonry, molds use, color application, requirements for construction of mockup, and to coordinate the work.

E. Job Conditions

Environmental requirements: Apply color stain when ambient temperatures is between 50 and 100 degrees F. Consult manufacturer if conditions differ from this requirement.

F. Sequencing

Schedule color stain application with earthwork and backfilling of any wall areas making sure that all simulated stone texture is colored to the minimum distance below grade. Delay adjacent plantings until color application is completed. Coordinate work to permit coloring applications without interference from other trades.

2.0 CONCRETE FORM LINERS

2.1 MATERIALS

The materials used in construction of the architectural treatment shall comply with VDOT Road and Bridge Specifications for concrete materials and form work. Form liners shall be used at locations designated on the Plans or as noted in the Contract to receive an architectural finish.

A. Simulated Masonry Form Liners

Form liners shall be a high quality re-usable product manufactured of high strength urethane that attaches easily to conventional forming systems and shall not compress more than 1/4 inch when poured at a rate of 10 vertical feet per hour. Single use form liners will not be acceptable for this project. The simulated stone form liners shall be capable of withstanding anticipated concrete pour pressures without leakage or without causing physical or visual defects. The liners shall be removable without causing concrete surface deterioration or weakness in the substrate.

The pattern for architectural treatments shall be in general compliance with the Contract. Any variation in the length of the form liner modules shown on the approved drawings shall be accommodated by field adjusting (splicing in a matching textured liner or removing a segment and blending the joint) of the form liner without impacting the overall appearance of the pattern or individual stones. Any field adjustment shall be done within the body of the stones and not allow joints to line up between modules.

B. Form Release Agent

Form release agent shall be a non-staining petroleum distillate free from water, asphaltic and other insoluble residue, or equivalent product. Form release agents, form stripping methods, and patching materials shall be mutually compatible with the simulated stone masonry and with the color stain system to be applied to the surface.

C. Form Ties

Form ties shall be made of either metal or fiberglass. Using metal ties, which result in a portion of the tie permanently embedded in the concrete, shall be designed to separate at least one inch back from finished surface, leaving only a neat hole that can be plugged with patching material.

When form or wall ties are used that result in a portion of the tie permanently embedded in the concrete, the Contractor shall submit the type of form ties to the Engineer for approval prior to use in this work.

D. Color Stain

Concrete surface coatings shall be from the Concessionaire's current list of approved surface color coatings. The base color of the coating for the bridges shall be AMS Standard 595-36492 or as approved by the Engineer.

The coloring agent shall be a penetrating stain mix, compatible color finish designed for exterior application on new or old concrete with field evidence of resistance to moisture, alkali, acid, mildew, mold and fungus discoloration or degradation, sunlight and weathering.

2.2 CONSTRUCTION

A. Mockup

The Contractor shall provide, and erect on site, a mockup of the form liner patterns and coloration. The location of the mockup shall be readily visible from the proposed work where possible and placed as approved by the Engineer. The mockup shall be constructed on site a minimum of six weeks prior to the construction of concrete elements to be architecturally treated. The mockup shall measure 50 sq. ft., or larger, if needed to adequately illustrate the pattern or texture selected.

The mockup shall be unreinforced, vertically cast, and shall be constructed with all materials including form or wall ties proposed for use for constructing the simulated stone masonry finish. After concrete work on mockup is completed and cured for a minimum of 28 days, and after surface is determined to be acceptable for coloring, apply color stain system.

Any mockup deemed unacceptable by the Engineer shall be removed from the project and replaced by additional mockup at no additional cost to the Concessionaire. The Contractor shall dispose of the mockup at the completion and acceptance of all work pertaining to the simulated stone finishes as determined by the Engineer.

B. Architectural Finish

Simulated stone form liners shall be installed, prepared, stripped, handled or otherwise utilized in conformance with the manufacturer's recommendations, or as directed by the Engineer.

C. Form Liner Preparation

Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

D. Form Liner Attachment

Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a 1/4" seam.

If the pattern selected has molds connecting through the middle of the stones, carefully

remove the seam line created by abutting molds. Match the texture and shape of the surrounding stone, avoiding visible seams or mold marks.

Wall ties shall be coordinated with the form liner system. Generally, place form ties at thinnest points of molds (high points of finished wall). Neatly patch the remaining hole after disengaging the protruding portion of the tie so that it will not be visible after coloring the concrete surface.

Where an expansion joint must occur at a point other than at mortar or rustication joints, such as at the face of concrete texture that is to have the appearance of stone, the manufacturer for proper treatment of expansion material shall be consulted.

E. Form Release

Form release agent shall be applied in accordance with the manufacturer's recommendations. Form release agent should be worked into all areas, especially pattern recesses.

F. Finishing

Reinforced concrete shall be finished in accordance with the VDOT Road and Bridge Specifications, except that curing of concrete should be done to accommodate the application of coloring and surface finish treatment. Finished texture and pattern shall be continuous without visual disruption to the satisfaction of the Engineer.

Form liner butt joints shall be carefully blended into the approved pattern and finished off to the final concrete surface. No visible vertical or horizontal seams or conspicuous form marks created by butt joining form liners will be allowed.

All form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities.

Liquid curing compound shall not be used on concrete surfaces that are to receive penetrating color stain.

3.0 COLOR STAIN COATING

A. Locations

The color stain coating shall be applied at locations in accordance with the Contract.

B. Procedures

The concrete stain coating shall be applied in accordance with the manufacturer's recommendations, except as otherwise specified.

All concrete surfaces that are to be stained and any patching that had been done in these

areas shall be at least 30 days old.

Clean surface prior to application of stain materials to assure that surface is free of latency, dirt, dust, grease, efflorescence, paint, or other foreign material, following manufacturer's instructions for surface preparation prior to application of color stain. Do not sandblast. Preferred method to remove latency is pressure washing with water, minimum 3000 psi (a rate of three to four gallons per minute), using fan nozzle perpendicular to and at a distance of one or two feet from surface. Completed surface shall be free of blemishes, discoloration, surface voids, and unnatural form marks.

All work shall be performed by experienced workmen familiar with concrete finishing work and with the materials specified. Surfaces not to be treated shall be protected from splatter. Any areas lacking a uniform appearance (consistent with the approved sample) shall be recoated to the satisfaction of the Engineer.

Materials shall be delivered to the job site in sealed containers bearing the manufacturer's labels. Materials shall be mixed and applied in accordance with the manufacturer's printed instructions of which two copies shall be furnished the Engineer.

C. Protection

Where exposed soil or pavement is adjacent which may spatter dirt or soil from rainfall, or where surface may be subject to over spray from other processes, provide temporary cover of completed work.

D. Job Conditions

Environmental requirements: Apply color stain in accordance with the manufacturer's specifications.

E. Schedule color stain application with earthwork and backfilling of any wall areas making sure that all simulated stone texture is colored to the minimum distance below grade. Coordinate work to permit coloring applications without interference from other trades.

SP109-000100-03

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
ASPHALT MATERIAL PRICE ADJUSTMENT

September 6, 2019

All asphalt material contained in the attached master listing of eligible bid items and designated by pay items in the contract will be price adjusted according to the provisions as set forth herein. Other items will not be adjusted, except as otherwise specified in the Contract. If new pay items which contain asphalt material are established by Change Order, they will not be subject to Price Adjustment unless specifically designated in the Change Order to be subject to Price Adjustment.

Each month, the Department will publish an average state-wide PG 64S-22 f.o.b. price per ton and an average PG 64E-22 f.o.b. price per ton developed from the average terminal prices provided to the Department from suppliers of asphalt cement to contractors doing work in Virginia. The Department will collect terminal prices from approximately 12 terminals each month. These prices will be received once each month from suppliers on or about the last weekday of the month. The high and low prices will be eliminated and the remaining values averaged to establish the average statewide price for the following month. The monthly state-wide average price will be posted on the Construction Division website on or about the first weekday of the following month. In the event the average prices were to change by 10 percent or more of the Base Index during the middle of the month the Contractor can submit a letter to the Department and supplier that provides evidence of the difference in price. Upon receipt of the letter consideration will be given to extend additional adjustments as deemed necessary.

This monthly statewide average price will be the Base Index for all contracts on which bids are received during the calendar month of its posting and will be the Current Index for all asphalt placed during the calendar month of its posting. In the event an index changes radically from the apparent trend, as determined by the Engineer, the Department may establish an index which it determines to best reflect the trend.

The amount of adjustment applied will be based on the difference between the contract Base Index and the Current Index for the applicable calendar month during which the work is performed. The quantity of asphalt cement for asphalt concrete pavement to which adjustment will be applied will be the quantity based on the percent of asphalt cement shown on the appropriate approved job mix formula.

Adjustment of any asphalt material other than PG 64S-22 and PG 64E-22 will be based on the indexes for PG 64S-22.

The quantity of asphalt emulsions to which adjustment will be applied will be the quantity based on 65 percent residual asphalt.

Price adjustment will be shown as a separate entry on the monthly progress estimate; however, such adjustment will not be included in the total cost of the work for progress determination or for extension of contract time. Price adjustment will be calculated using the same units as the corresponding Pay Items in the Contract.

Any apparent attempt to unbalance bids in favor of items subject to price adjustment or failure to submit required cost and price data as noted hereinbefore may result in rejection of the bid proposal.

VIRGINIA DEPARTMENT OF TRANSPORTATION
**MASTER LISTING OF
 ASPHALT MATERIAL ITEMS ELIGIBLE FOR PRICE ADJUSTMENT**

ITEM	DESCRIPTION	UNITS	SPECIFICATION
10062	Asphalt-Stab. Open-Graded Material	Ton	313
10415	Prime Coat	Gal	311
10416	Liquid Asphalt	Gal	311 312
10417	Tack Coat	Gal	310
10418	Liquid Asphalt	Gal	314
10420	Blotted Seal Coat Ty. B	SY	ATTD
10422	Blotted Seal Coat Ty. C	SY	ATTD
10423	Blotted Seal Coat Ty. C-1	SY	ATTD
10424	Blotted Seal Coat Ty. D	SY	ATTD
10426	NS Blotted Seal Coat	SY	ATTD
10598	NS Asphalt Concrete	Ton	315
10603	Asphalt Concrete Ty. SM-19.0A	Ton	315
10604	Asphalt Concrete Ty. SM-19.0D	Ton	315
10605	Asphalt Concrete Ty. SM-19.0E (76-22 or 64E)	Ton	315
10606	Asphalt Concrete Ty. SM-9.5	Ton	315
10607	Asphalt Concrete Ty. SM-12.5A	Ton	315
10608	Asphalt Concrete Ty. SM-12.5D	Ton	315
10609	Asphalt Concrete Ty. SM-12.5E (64E-22)	Ton	315
10610	Asphalt Concrete Ty. IM-19.0A	Ton	315
10611	Asphalt Concrete Ty. IM-19.0D	Ton	315
10612	Asphalt Conc. Base Cr. Ty. BM-25.0	Ton	315
10613	Asphalt Concrete Ty. BM-37.5	Ton	315
10614	Asphalt Concrete Ty. IM-19.0E (76-22 or 64E)	Ton	315
10635	Asphalt Concrete Ty. SM-9.5A	Ton	315
10636	Asphalt Concrete Ty. SM-9.5D	Ton	315
10637	Asphalt Concrete Ty. SM-9.5E (64E-22)	Ton	315
10638	Asphalt Conc. Ty. BM-25.0D+0.8	Ton	ATTD
10639	Asphalt Concrete Ty. SM-19.0	Ton	315
10642	Asphalt Concrete Ty. BM-25.0A	Ton	315
10643	Asphalt Concrete Ty. BM-25.0D	Ton	315
10644	Asphalt Concrete Ty. SM-9.0A	Ton	315
10645	Asphalt Concrete Ty. SM-9.0D	Ton	315
10646	Asphalt Concrete Ty. SM-9.0E	Ton	315
10647	Asphalt Concrete Ty. SM-4.75A	Ton	315
10648	Asphalt Concrete Ty. SM-4.75D	Ton	315
10649	Asphalt Concrete Ty. SM-4.75E	Ton	315
10650	Stone Matrix Asphalt SMA-9.5(64H-22)	Ton	317
10651	Stone Matrix Asphalt SMA-9.5(64E-22)	Ton	317
10652	Stone Matrix Asphalt SMA-12.5(64H-22)	Ton	317
10653	Stone Matrix Asphalt SMA-12.5(64E-22)	Ton	317
10654	Stone Matrix Asphalt SMA-19.0(64H-22)	Ton	317
10655	Stone Matrix Asphalt SMA-19.0(64E-22)	Ton	317
10701	Liquid Asphalt Coating	SY	ATTD
12505	Asphalt Concrete Curb Backup Material	Ton	315

ITEM	DESCRIPTION	UNITS	SPECIFICATION
13240	Asphalt Concrete Sidewalk	Ton	504
16110	Emul. Asph. Slurry Seal Type A	SY	ATTD
16120	Emul. Asph. Slurry Seal Type B	SY	ATTD
16130	Emul. Asph. Slurry Seal Type C	SY	ATTD
16144	Latex Mod. Emul. Treat. Type B	Ton	ATTD
16145	Latex Mod. Emul. Treat. Type C	Ton	ATTD
16146	Latex Mod. Emul. Treat. Rutfilling	Ton	ATTD
16161	Modified Single Seal	SY	ATTD
16162	Modified Double Seal	SY	ATTD
16249	Nontracking Tack Coat	Gal.	ATTD
16250	Liquid Asphalt Matl. CMS-2 (Mod)	Gal	ATTD
16251	Liquid Asphalt Matl. CMS-2	Gal	ATTD
16252	Liquid Asphalt Matl. CRS-2	Gal	ATTD
16253	Liquid Asphalt Matl. CRS-2H	Gal.	ATTD.
16254	Liquid Asphalt Matl. RC-250	Gal	ATTD
16256	Liquid Asphalt Matl. RC-800	Gal	ATTD
16257	NS Liquid Asphalt Matl.	Gal	ATTD
16260	Liquid Asphalt Matl. CRS-2L	Gal	ATTD
16301	Liq.Asph. Rumble Strip Coating	SY	315
16325	NS Asphalt Concrete	Ton	N/A
16326	Asphalt Concrete Ty. SM-4.75A	Ton	315
16327	Asphalt Concrete Ty. SM-4.75D	Ton	315
16328	Asphalt Concrete Ty. SM-4.75E	Ton	315
16330	Asphalt Concrete Ty. SM-9.0A	Ton	315
16331	Asph. Conc. Ty. SM-9.0D	Ton	315
16332	Asph. Conc. Ty. SM-9.0E	Ton	315
16335	Asphalt Concrete Ty. SM-9.5A	Ton	315
16337	Asph. Conc. Ty. SM-9.5ASL (Spot Level)	Ton	315
16340	Asphalt Concrete Ty. SM-9.5D	Ton	315
16342	Asph. Conc. Ty. SM-9.5DSL (Spot Level)	Ton	315
16345	Asphalt Concrete Ty. SM-9.5E (64E-22)	Ton	315
16350	Asphalt Concrete Ty. SM-12.5A	Ton	315
16352	Asph. Con. Ty. SM-12.5ASL (Spot Level)	Ton	315
16355	Asphalt Concrete Ty. SM-12.5D	Ton	315
16357	Asph. Con. Ty. SM-12.5DSL (Spot Level)	Ton	315
16360	Asphalt Concrete Ty. SM-12.5E (64E-22)	Ton	315
16362	Asphalt Concrete Ty. SM-19.0A	Ton	315
16363	Asphalt Concrete Ty. SM-19.0D	Ton	315
16364	Asphalt Concrete Ty. SM-19.0E (76-22 or 64E)	Ton	315
16365	Asphalt Concrete Ty. IM-19.0A	Ton	315
16366	Asph. Conc. Ty. BM-25.0D+0.4	Ton	ATTD
16367	Asph. Conc. TY. BM-25.0D+0.8	Ton	ATTD
16370	Asphalt Concrete Ty. IM-19.0D	Ton	315
16371	Asphalt Concrete Ty. IM-19.0E (76-22 or 64E)	Ton	315
16373	Asphalt Concrete Ty. IM-19.0A (T)	Ton	315
16374	Asphalt Concrete Ty. IM-19.0D (T)	Ton	315
16377	Asphalt Concrete Ty. BM-37.5	Ton	315

ITEM	DESCRIPTION	UNITS	SPECIFICATION
16378	Thin Hot Mix Asphalt Concrete	Ton	ATTD
16379	Asphalt Concrete Ty. IM-19.0T	Ton	315
16383	Scratch/Level Type I	Ton	ATTD
16384	Scratch/Level Type II	Ton	ATTD
16390	Asphalt Concrete Ty. BM-25.0A	Ton	315
16392	Asphalt Concrete Ty. BM-25.0D	Ton	315
16393	Asph. Conc. Patch Ty. IM-19.0A	Ton	ATTD
16394	Asph. Conc. Patch Ty. IM-19.0D	Ton	ATTD
16395	Asphalt Concrete Ty. BM-25.0A (T)	Ton	315
16396	Asph. Conc. Ty. BM-25.0D+0.4 T	Ton	315
16397	Asphalt Concrete Ty. BM-25.0D (T)	Ton	315
16400	Stone Matrix Asphalt SMA-9.5(64H-22)	Ton	ATTD
16401	Stone Matrix Asphalt SMA-9.5(64E-22)	Ton	ATTD
16402	Stone Matrix Asphalt SMA-12.5(64H-22)	Ton	ATTD
16403	Stone Matrix Asphalt SMA-12.5(64E-22)	Ton	ATTD
16404	Stone Matrix Asphalt SMA-19.0(64H-22)	Ton	ATTD
16405	Stone Matrix Asphalt SMA-19.0(64E-22)	Ton	ATTD
16410	NS Asph. Conc. Ty. SM-	Ton	ATTD
16412	NS Asph. Conc. Ty. IM-	Ton	ATTD
16414	NS Asph. Conc. Ty. BM-	Ton	ATTD
16416	NS Asph. Conc. HP Ty.	Ton	ATTD
16420	Asph. Conc. Patch Ty. SM-12.5A	Ton	ATTD
16421	NS Asph. Conc. Patch Ty. SM-	Ton	ATTD
16422	NS Asph. Conc. Patch Ty. IM-	Ton	ATTD
16423	NS Asph. Conc. Patch Ty. BM-	Ton	ATTD
16490	Hot Mix Asphalt Treatment	Ton	ATTD
16500	Surf.Preparation & Restoration Type I	Ton	ATTD
16502	Surf.Preparation & Restoration Type II	Ton	ATTD
16504	Surf.Preparation & Restoration Type III	Ton	ATTD
16543	Cold Central Plant Recycling Material	Ton	ATTD
62195	NS Asphalt Concrete Overlay	Ton	315
62196	NS Asphalt Concrete	Ton	315
63000	NS Asphalt Concrete Overlay	Ton	315
63001	NS Asphalt Concrete	Ton	315
67201	NS Asphalt Concrete Overlay	Ton	315
67210	NS Asphalt Concrete	Ton	315
68240	NS Asphalt Concrete	Ton	315

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
OPTIONAL ADJUSTMENT FOR FUEL

July 1, 2015; Reissued July 12, 2016

The Department will adjust monthly progress payments up or down as appropriate for cost changes in fuel used on specific items of work identified in this provision. The Department will provide a master listing of standard bid items eligible for fuel adjustment on its website.

Included with this proposal is a listing of standard bid items the Department has identified as eligible for fuel adjustment on this project(s) as well as the respective fuel factors per pay unit for those items. Only items on this listing will be eligible for adjustment. The fuel usage factor for each item is considered inclusive of all fuel usage. Generally, non-standard pay items are not eligible for fuel adjustment.

The listing of eligible items applicable to this particular project is shown on Form C-21B "Bid Items Eligible for Fuel Adjustment" included with the bidding documents. The Bidder may choose to have fuel adjustment applied to any or all eligible items on this project's listing by designating the items for which the fuel adjustment will apply. The Bidder's selection of items for fuel adjustment may not be changed once he has submitted Form C-21B to the Department.

In order to be eligible for fuel adjustment under this provision, the apparent lowest responsive and responsible Bidder shall clearly identify on Form C-21B those pay items he chooses to have fuel adjustment applied on. Within 21 days after the receipt of bids the apparent successful Bidder shall submit his designated items on Form C-21B to the Contract Engineer. Items the successful Bidder chooses for fuel adjustment must be designated by writing the word "Yes" in the column titled "Option" by each bid item chosen for fuel adjustment. The successful Bidder's designations on Form C-21B must be written in ink or typed, and signed by this Bidder to be considered complete. Items not properly designated or left blank on the Bidder's C-21B "Bid Items Eligible for Fuel Adjustment" form may be not considered for adjustment. If the apparent successful Bidder fails to return his Form C-21B within the timeframe specified, items will not be eligible for fuel adjustment on this project.

The monthly index price to be used in the administration of this provision will be calculated by the Department from the Diesel fuel prices published by the U. S. Department of Energy, Energy Information Administration on highway diesel prices, for the Lower Atlantic region. The monthly index price will be the price for diesel fuel calculated by averaging each of the weekly posted prices for that particular month.

For the purposes of this provision, the base index price will be calculated using the data from the month preceding the receipt of bids. The base index price will be posted by the Department at the beginning of the month for all bids received during that month.

The current index price will be posted by the Department and will be calculated using the data from the month preceding the particular estimate being vouchered for payment.

The current monthly quantity for eligible items of work selected by the Contractor for fuel adjustment will be multiplied by the appropriate fuel factor to determine the gallons of fuel to be cost adjusted. The amount of adjustment per gallon will be the net difference between the current index price and the base index price. Computation for adjustment will be made as follows:

$$S = (E - B) QF$$

Where; S = Monetary amount of the adjustment (plus or minus)

B = Base index price

E = Current index price

Q = Quantity of individual units of work

F = Appropriate fuel factor

Adjustments will not be made for work performed beyond the original contract time limit unless the original time limit has been changed by an executed Work Order.

If new pay items are added to this contract by Work Order and they are listed on Department's master listing of eligible items, the Work Order must indicate which of these individual items will be fuel adjusted; otherwise, those items will not be fuel adjusted. If applicable, designating which new pay items will be added for fuel adjustment must be determined during development of the Work Order and clearly shown on Form C-10 Work Order. The Base Index price on any new eligible pay items added by Work Order will be the Base Index price posted for the month in which bids were received for that particular project. The Current Index price for any new eligible pay items added by Work Order will be the Index price posted for the month preceding the estimate on which the Work Order is paid.

When quantities differ between the last monthly estimate prepared upon final acceptance and the final estimate, adjustment will be made using the appropriate current index for the period in which that specific item of work was last performed.

In the event any of the base fuel prices in this contract increase more than 100 percent (i.e. fuel prices double), the Engineer will review each affected item of work and give the Contractor written notice if work is to stop on any affected item of work. The Department reserves the right to reduce, eliminate or renegotiate the unit price for remaining portions of affected items of work.

Any amounts resulting from fuel adjustment will not be included in the total cost of work for determination of progress or for extension of contract time.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 200 – GENERAL

SECTION 200 – GENERAL of the Specifications is amended as follows:

Section 200.04 – Acceptance Procedures for Aggregates is amended to replace the fourth paragraph with the following:

The No. 10 sieve shall be the dividing sieve for soils, select material, aggregate subbase material, and aggregate base material. The No. 8 sieve shall be the dividing sieve for asphalt concrete aggregates. That portion of the total aggregate retained on the sieves is defined as *coarse aggregate*, and that portion passing the sieves is defined as *fine aggregate*. Soundness tests will be performed according to the requirements of AASHTO T 104 without regard to these definitions of fine and coarse aggregate. Fine and coarse aggregates for hydraulic cement concrete are distinguishable by their conformity to the series of grading requirements specified in Sections 202 and 203, respectively, except that lightweight aggregate is specified in Section 206.

Section 200.06 – Technician and Batcher Certification is renamed **Technician Certification** is amended to replace the first paragraph with the following:

When the Contract requires a type of technician defined by this Section, the Contractor shall use a person certified by the Department. The Department will either certify technicians upon a candidate's satisfactory completion of an examination or recognize third-party certifications as described herein. The Contractor shall ensure their technician is able to prove their certification status upon demand.

Section 200.06(e) – Concrete Batcher is deleted.

Section 200.06(h) – Concrete Field Technician is replaced with the following:

Concrete Field Technician: A Concrete Field Technician provides quality control of placement operations for hydraulic cement concrete in accordance with applicable requirements. The Department will recognize ACI Concrete Field Testing Technician Grade I, Washington Area Council of Engineering Laboratories (WACEL) Concrete I, or National Institute for Certification in Engineering Technologies (NICET) Construction Materials Testing Level II for Concrete for this certification.

Section 200.06(j) – Aggregate Properties Technician is deleted.

Section 200.06(m) – Soils and Aggregate Compaction Technician is inserted as follows:

Soils and Aggregate Compaction Technician: A Soils and Aggregate Compaction Technician conducts density, moisture content, and depth checks of soil placement and aggregate lifts during construction, including stabilized lifts. The Technician also monitors application rates of stabilizing chemicals used in soil and aggregate lifts in the field. The Department will recognize NICET Construction Materials Testing Level II for Soils for this certification.

Section 200.06(n) – Cold Asphalt Recycling – Plant Technician is inserted as follows:

Cold Asphalt Recycling – Plant Technician samples Cold In-place Recycling (CIR) or Cold Central Plant Recycling (CCPR) material during production and is capable of conducting any tests necessary to put the CIR equipment and CCPR plant into operation.

Section 200.06(o) – Cold Asphalt Recycling – Field Technician is inserted as follows:

Cold Asphalt Recycling – Field Technician provides quality control testing and inspection of the placement of CIR and CCPR materials.

Section 200.06(p) – Full Depth Reclamation (FDR) Technician is inserted as follows:

Full Depth Reclamation (FDR) Technician provides quality control testing, inspection of the placement of FDR, samples FDR material during production, and is capable of conducting any tests necessary to put the FDR equipment into operation.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 202—FINE AGGREGATE

SECTION 202—FINE AGGREGATE of the Specifications is revised as follows:

Section 202.02 – Materials is amended by inserting the following:

Lightweight aggregate can also be used as a fine aggregate and shall conform to Section 206.

Section 202.03(e) – Deleterious Material is replaced with the following:

Deleterious Material: The amount of deleterious material in sands shall be not more than the following:

Material	% by Weight	AASHTO Test Method
Clay lumps	0.25	T 112
Shale, mica, coated grains, soft or flaky particles	1.0	T 113
Organic material	0	T 21
Total material passing No. 200 sieve by washing ^{1,2}		T 11 and T 27
For use in concrete subject to abrasion	3	
For other concrete	5	

¹In the case of stone sand, if the material passing the No. 200 sieve is dust of fracture, essentially free from clay and shale, the percentages shown for use in concrete subject to abrasion and in other concrete may be increased to 5% and 7%, respectively.

²In the case of blends of stone sand and natural sand, provided the natural sand contains no greater than 3% passing the No. 200 sieve for use in concrete subject to abrasion and no greater than 5% for other concrete, then the stone sand limits of 5% and 7% shall apply to the blend.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 203 – COARSE AGGREGATE

SECTION 203 – COARSE AGGREGATE is amended as follows:

Section 203.02 – Materials is amended by replacing the first paragraph with the following:

Coarse aggregate shall consist of crushed stone, crushed slag, crushed or uncrushed gravel, or lightweight aggregate. Coarse aggregate shall be clean, hard, tough, and durable pieces free from: adherent coatings and deleterious amounts of friable, thin, elongated, or laminated pieces; soluble salts; or organic materials.

Section 203.02(e) – Lightweight coarse aggregate is inserted as follows:

Lightweight coarse aggregate shall conform to Section 206.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 204 – STONE FOR MASONRY, RIPRAP, POROUS BACKFILL, AND GABIONS

SECTION 204 – STONE FOR MASONRY, RIPRAP, POROUS BACKFILL, AND GABIONS of the Specifications is amended as follows:

Section 204.02(c) – Porous backfill is replaced with the following:

Porous backfill shall be No. 78 or 8 aggregate, at least Grade B. Crushed glass meeting the gradation requirements specified in Section 203.02(d) may be directly substituted for No. 78 and 8 aggregates. Lightweight aggregate conforming to Section 206 for coarse aggregate and meeting the 3/4-inch or 1/2-inch grading in AASHTO M 195 may be directly substituted for No. 78 and 8 aggregates.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 206 – LIGHTWEIGHT AGGREGATE

SECTION 206 – LIGHTWEIGHT AGGREGATE is replaced by the following:

206.01 – Description

These specifications cover lightweight aggregate used in the production of hydraulic cement concrete, internally cured concrete using pre-wetted lightweight aggregate, and asphalt surface treatment.

206.02 – Detail Requirements

Lightweight aggregate shall consist of clay, shale, or slate expanded through a sintering or rotary kiln.

The requirements for normal weight aggregate and concrete shall apply to lightweight concrete when a reduced density is specified or when internally-cured concrete (where a portion of the fine aggregate is replaced with pre-wetted lightweight fine aggregate) is specified, except for the following:

- (a) **Lightweight aggregate used in hydraulic cement concrete** shall conform to AASHTO M 195 and the following requirements.
1. **Grading:** Gradation for fine and coarse aggregates shall conform to AASHTO M 195. Tests to verify conformance shall be performed in accordance with AASHTO T 27.
 2. **Soundness:** Soundness for fine aggregate shall conform to the freeze and thaw requirements of Table II-2. Soundness for coarse aggregate shall conform to the freeze and thaw requirements of Table II-4. Soundness shall be tested in accordance with AASHTO T 103.
 3. **Void Content:** Void content requirements for fine aggregate shall not apply to lightweight aggregate.
 4. **Deleterious Material:** The amount of deleterious material in fine aggregate shall conform to Section 202 for stone sand. The amount of deleterious material in coarse aggregate shall conform to Section 203.
 5. **Abrasion Loss:** Abrasion loss for coarse aggregate shall conform to the Grade A requirements in Table II-5.
 6. **Flat and Elongated Particles:** Coarse aggregate shall conform to Section 203.
- (b) **Lightweight aggregate used for asphalt surface treatment** shall conform to AASHTO M 195 except that Sections 3, 6, and 8 will not apply. Grading shall conform to Table II-3 except that the maximum percentage by weight of material passing the No. 8 sieve shall be 16% and passing the No. 16 sieve shall be 9%.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATION
SECTION 210 – ASPHALT MATERIALS

SECTION 210 – ASPHALT MATERIALS of the Specifications is amended as follows:

Section 210.04(e) – Thin Hot Mix Asphalt Concrete Overlay tack coat is inserted as follows:

Thin Hot Mix Asphalt Concrete Overlay tack coat shall conform to the following:

Test on Emulsion	Method	Min	Max
Viscosity at 77° F, SSF	AASHTO T 59	20	100
Sieve Test ¹ , %	AASHTO T 59	—	0.05
24 hour storage stability ² , %	AASHTO T 59	—	1
Residue from distillation at 400° F ³ , %	AASHTO T 59	63	
Oil portion from distillation ml of oil per 100g emulsion			2
Demulsibility, % 35 ml 0.02 N CaCl ₂ or 35 ml 0.8% dioctyl sodium sulfosuccinate	AASHTO T 59	60	

¹The sieve test is waived if successful application of the material has been achieved in the field.

²After standing undisturbed for 24 hours, the surface shall show no white, milky colored substance, but shall be a smooth homogeneous color throughout.

³AASHTO T59 with modifications to include a 400° F +/- 10° F maximum temperature to be held for a period of 15 minutes.

Test on Residue From Distillation	Method	Min	Max
Elastic Recovery ¹ , %	AASHTO T 301	60	—
Penetration @ 77° F, 100 g, 5 sec. dmm.	AASHTO T 49	60	150

¹With exception that the elongation is 20 cm and the test temperature is 50° F.

VIRGINIA DEPARTEMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 211 – ASPHALT CONCRETE

SECTION 211 – ASPHALT CONCRETE of the Specifications is amended as follows:

Section 211.01 – Description is replaced with the following:

Asphalt concrete shall consist of a combination of mineral aggregate and asphalt material mixed mechanically in a plant specifically designed for such purpose.

An equivalent single-axle load (ESAL) will be established by the Engineer, and SUPERPAVE mix types may be specified as one of the types listed as follows:

Mix Type ¹	Equivalent Single-Axle Load (ESAL) Range (millions)	Minimum Asphalt Performance Grade (PG) ²	Nominal Maximum Aggregate Size ³
SM-4.75A	0 to 3	64S-16	No. 4
SM-4.75D	3 to 10	64H-16	No. 4
SM-4.75E	3 to 10	64E-22	No. 4
SM-9.0A	0 to 3	64S-16	3/8 in
SM-9.0D	3 to 10	64H-16	3/8 in
SM-9.0E	Above 10	64E-22	3/8 in
SM-9.5A	0 to 3	64S-16	3/8 in
SM-9.5D	3 to 10	64H-16	3/8 in
SM-9.5E	Above 10	64E-22	3/8 in
SM-12.5A	0 to 3	64S-16	1/2 in
SM-12.5D	3 to 10	64H-16	1/2 in
SM-12.5E	Above 10	64E-22	1/2 in
IM-19.0A	Less than 10	64S-16	3/4 in
IM-19.0D	10 to 20	64H-16	3/4 in
IM-19.0E	20 and above	64E-22	3/4 in
BM-25.0A	All ranges	64S-16	1 in
BM-25.0D	Above 10	64H-16	1 in

¹SM = Surface Mixture; IM = Intermediate Mixture; BM = Base Mixture

²**Minimum Asphalt Performance Grade (PG)** is defined as the minimum binder performance grade for the job mixes as determined by AASHTO T170 or AASHTO M332.

³**Nominal Maximum Aggregate Size** is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

Asphalt concrete shall conform to the requirements for the mix type designated on the plans or elsewhere in the Contract for use.

At the Contractor's option, an approved Warm Mix Asphalt (WMA) additive or process may be used to produce the asphalt concrete (AC) mix type designated.

Table II-12A – Standard Deviation is renamed **Aggregate Properties** and is replaced with the following:

TABLE II-12A
Aggregate Properties

Mix Type	Coarse Aggregate Properties	Fine Aggregate
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	CAA		ASTM D4791 F & E (5:1) % by weight	Properties	
	1 fractured face	2 fractured faces		SE	FAA
SM-4.75A				40% min	40% min
SM-4.75D				45% min	45% min
SM-4.75E				45% min	45% min
SM-9.0 A	85% min.	80% min.	10% max. ¹	40% min.	40% min.
SM-9.0 D	85% min.	80% min.	10% max. ¹	45% min.	45% min.
SM-9.0 E	95% min.	90% min.	10% max. ¹	45% min.	45% min.
SM-9.5 A	85% min.	80% min.	10% max. ¹	45% min.	45% min.
SM-9.5 D	85% min.	80% min.	10% max. ¹	45% min.	45% min.
SM-9.5 E	95% min.	90% min.	10% max. ¹	45% min.	45% min.
SM-12.5 A	85% min.	80% min.	10% max. ¹	45% min.	45% min.
SM-12.5 D	85% min.	80% min.	10% max. ¹	45% min.	45% min.
SM-12.5 E	95% min.	90% min.	10% max. ¹	45% min.	45% min.
IM-19.0 A	85% min.	80% min.	10% max. ¹	45% min.	45% min.
IM-19.0 D	95% min.	90% min.	10% max. ¹	45% min.	45% min.
IM-19.0 E	95% min.	90% min.	10% max. ¹	45% min.	45% min.
BM-25.0 A	80% min.	75% min.	10% max. ¹	45% min.	45% min.
BM-25.0 D	80% min.	75% min.	10% max. ¹	45% min.	45% min.

¹10 percent measured at 5:1 on maximum to minimum dimensions

Table II-13 – Asphalt Concrete Mixtures: Design Range is replaced with the following:

TABLE II-13
Asphalt Concrete Mixtures: Design Range

Mix Type	Percentage by Weight Passing Square Mesh Sieves										
	1 1/2 in	1 in	3/4 in	1/2 in	3/8 in	No. 4	No. 8	No. 16	No. 30	No. 50	No. 200
SM-4.75 A,D,E				100 ¹	95-100	90-100		30-55			6-13
SM-9.0 A,D,E				100 ¹	90-100	90	47-67				2-10
SM-9.5 A,D,E				100 ¹	90-100	58-80	38-67		23		2-10
SM-12.5 A,D,E			100	95-100	90	58-80	34-50		23		2-10
IM-19.0 A,D,E		100	90-100	90	--	--	28-49		max		2-8
BM-25.0 A,D	100	90-100	90	--	--	--	19-38				1-7
C (Curb Mix)			max.	100	92-100	70-75	50-60		28-36	15-20	7-9

¹A production tolerance of 1% will be applied to this sieve regardless of the number of tests in the lot.

Table II-14 – Mix Design Criteria is replaced with the following:

TABLE II-14
Mix Design Criteria

Mix Type	VTM (%) Production	VFA (%) Design	VFA (%) Production	Min. VMA (%)	Fines/Asphalt Ratio	No. of Gyrations N Design
SM4.75A ^{2,4}	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50
SM4.75D ^{2,4}	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50

SM4.75E ^{2, 4}	3.0-6.0	70-75	70-80	16.5	1.0-2.0	50
SM-9.0A ^{1,2}	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0D ^{1,2}	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.0E ^{1,2}	2.0-5.0	75-80	70-85	17.0	0.6-1.3	50
SM-9.5A ^{1,2}	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5D ^{1,2}	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-9.5E ^{1,2}	2.0-5.0	75-80	70-85	16.0	0.7-1.3	50
SM-12.5A ^{1,2}	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5D ^{1,2}	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
SM-12.5E ^{1,2}	2.0-5.0	73-79	68-84	15.0	0.7-1.3	50
IM-19.0A ^{1,2}	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
IM-19.0D ^{1,2}	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
IM-19.0E ^{1,2}	2.0-5.0	69-76	64-83	14.0	0.6-1.3	50
BM-25.0A ^{2,3}	1.0-4.0	67-87	67-92	13.0	0.6-1.3	50
BM-25.0D ^{2,3}	1.0-4.0	67-87	67-92	13.0	0.6-1.3	50

¹Asphalt content should be selected at 4.0% air voids for A & D mixes, 3.5% air voids for E mix.

²Fines-asphalt ratio is based on effective asphalt content.

³Base mix shall be designed at 2.5% air voids. BM-25A shall have a minimum asphalt content of 4.4% unless otherwise approved by the Engineer. BM-25D shall have a minimum asphalt content of 4.6% unless otherwise approved by the Engineer.

⁴ Asphalt content shall be selected at 5.0 percent air voids.

Section 211.03(d)8 – For surface mixes is replaced with the following:

For surface mixes, permeability test data shall be submitted in accordance with VTM 120 using either single point verification or the regression method for each surface mix having a different gradation. The specimen height shall be one inch for SM-4.75 mix types. If the average of the permeability results from the single point verification method exceeds 150×10^{-5} cm/sec, or if the regression method predicts a permeability exceeding 150×10^{-5} cm/sec at 7.5% voids, the Contractor shall redesign the mixture to produce a permeability number less than 150×10^{-5} cm/sec.

Section 211.04(a) – Types SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete is renamed **Types SM-4.75A, SM-4.75D, SM-4.75E, SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete** and replaced with the following:

Types SM-4.75A, SM-4.75D, SM-4.75E, SM-9.0A, SM-9.0D, SM-9.0E, SM-9.5A, SM-9.5D, SM-9.5E, SM-12.5A, SM-12.5D, and SM-12.5E asphalt concrete shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate; slag or stone screenings; or a combination thereof combined with asphalt cement. For all surface mixes, except where otherwise noted, no more than 5% of the aggregate retained on the No. 4 sieve and no more than 20% of the total aggregate may be polish-susceptible. At the discretion of the Engineer, SM-9.5AL or SM-12.5AL may be specified and polish susceptible aggregates may be used (without percentage limits). Unless Type C (curb mix) is specified by the Engineer in the Contract, SM9.0, SM-9.5, and SM-12.5 mix types are acceptable for use in the construction of asphalt curbing.

Section 211.04(e) – Type SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete is renamed **Type SM-4.75, SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete** and amended to replace the first paragraph with the following:

Type SM-4.75, SM-9.5, SM-12.5, IM-19.0 and BM-25.0 asphalt concrete may be designated E (polymer modified), or stabilized (S). Asphalt concrete mixtures with the E designation may not be stabilized.

Table II-15 – Process Tolerance is replaced with the following:

**TABLE II-15
Process Tolerance**

Tolerance on Each Laboratory Sieve and Asphalt Content: Percent Plus and Minus													
No. Tests	Top Size¹	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 200	A.C.
1	0.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	5.0	2.0	.60
2	0.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	4.3	3.6	1.4	0.43
3	0.0	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	3.3	2.8	1.1	0.33
4	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	2.5	1.0	0.30
5	0.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	2.7	2.2	0.9	0.27
6	0.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	2.4	2.0	0.8	0.24
7	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.3	1.9	0.8	0.23
8	0.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.1	1.8	0.7	0.21
12	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.7	1.4	0.6	0.17

¹Defined as the sieve that has 100% passing as defined in Table II-13.

Section 211.09 – Adjustment System is amended by replacing the first paragraph and following table with the following:

If a lot of material does not conform to the acceptance requirements of Section 211.08, the Department will determine adjustment points as follows:

**Adjustment Points for Each 1% the Gradation Is Outside the
Process Tolerance Permitted In Table II-15**

Sieve Size	(Applied in 0.1% increments)
1 1/2 in	1
1 in	1
3/4 in	1
1/2 in	1
3/8 in	1
No. 4	1
No. 8	1
No. 16	1
No. 30	2
No. 50	2
No. 200	3

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
MASSIVE CONSTRUCTION HYDRAULIC CEMENT CONCRETE (“MASS CONCRETE”) OPERATIONS

March 19, 2020

I. DESCRIPTION

This work shall consist of furnishing and placing hydraulic cement concrete for massive cast-in-situ concrete bridge components, which shall be any concrete element designated on the plans as mass concrete. If the plans do not address mass concrete, then any concrete element for which the smallest dimension according to the Plans exceeds 5 feet shall be designated mass concrete. This shall include footings, drilled shaft caps, piers, abutments, and other work that meet this criterion. Work shall be performed in accordance with this Special Provision, the Plans, and as directed by the Engineer.

Unless otherwise specified, the 28-day compressive strength (f_c) used in the design calculations and specified in Table II-17 of the Specifications shall be attained in 56 days instead of 28 days.

II. DEFINITIONS

Match-Cured. A process where concrete test specimens are cured at the same temperature as the product by monitoring the concrete temperature in both the product and the test specimens and applying heat to the test specimens to match the temperature of the concrete.

III. MATERIALS

1. Mass Concrete shall contain at least 30% Class F fly ash or at least 65% blast-furnace slag, measured by mass of cementitious materials, but not both.
2. High-early-strength (Type III) cement, calcium chloride, and accelerating type admixtures shall not be used.
3. A retarding admixture may be allowed, if approved by the Engineer, for the following conditions: to prevent cold joints due to the quantity of concrete placed, to permit re-vibration of the concrete, to offset the effects of high concrete temperature, or to reduce the maximum temperature and rate of temperature rise. The admixture shall be pretested with job materials under job conditions, to include approximate dimensions.
4. The Class of Concrete used in mass concrete placements shall conform to Table II-17 of the Specifications and shall not be higher quality than Class A4 General unless specified otherwise on the Plans.

IV. PROCEDURES

1. **ACI Specifications.** This work shall be performed in accordance with the following ACI publications, except as modified by this Special Provision:
 - A. “Guide to Mass Concrete”, ACI 207.1R.
 - B. “Report on Thermal and Volume Change Effects on Cracking of Mass Concrete”, ACI 207.2R.
 - C. “Control of Cracking in Concrete Structures”, ACI 224R.
 - D. “Specifications for Structural Concrete”, ACI 301, Section 8.
2. **Submittals**

The Contractor shall submit the following to the Engineer for review and approval according to the procedures in Section 105.10(c) of the Specifications.

- A. **Working Drawings.** Describe the intended concrete placing sequence in the mass concrete components. Indicate proposed locations of all temperature sensors.
- B. **Shop Drawings.** Show reinforcing steel to be placed in the elements if different size, spacing, or depth of reinforcing bars to be used than those given in the Plans.
- C. **Placement Plans.** For each proposed concrete mix design, the following information shall be submitted:
- (1) **Methods.** Describe the methods to be used to construct the mass concrete components within the criteria set forth herein. Include graphics that illustrate the dimensions of proposed mass concrete placements. Mass concrete placements shall be laid out to minimize surface area for a given volume. Individual placements that combine elements considered mass concrete and non-mass concrete shall not be permitted.
 - (2) **Design calculations** prepared to document that the methods chosen to install the mass concrete components are in accordance with the ACI publications referenced above as modified by this Special Provision. Calculations shall include:
 - A table of calculated peak temperatures for the range of expected air, concrete, and soil or ground (if applicable) temperatures at time of placement.
 - A calculation of maximum temperature differences within the element during the curing period.
 - A calculation of time to peak temperature.
 - A curve of maximum allowable temperature difference vs. concrete strength for each element under consideration, calculated for the allowable crack widths shown on the Plans. The Contractor shall use allowable crack widths shown in Table 4.1 of ACI 224R when not shown on the Plans. At the Engineer's discretion, this analysis can be waived for elements where all of the following conditions are met:
 - the smallest dimension is less than 10 ft.
 - at least 40% Class F Fly Ash or at least 75% granulated iron blast-furnace slag cement is used in the concrete mix
 - the total maximum cementitious content is 600 lbs/yd³ except with Self-Consolidating Concrete.
 - Insulation requirements for the forms and exposed portions of the concrete to keep the thermal differences within allowable limits.
 - A calculation of the time to reach the peak temperature difference, as well as the estimated time to cool to the allowable differential temperature specified in Section IV-4C.
 - (3) **Mix design** showing proportions and sources for all components, and results of strength tests of sample cylinders. Mix designs shall also include the heat of hydration of the cementitious materials in the mix, as well as the thermal expansion coefficient of the concrete in accordance with AASHTO T 336 if the allowable temperature difference curve will be used.
 - (4) **Admixtures.** Catalogue information on any admixtures proposed to be added to the concrete mix.
 - (5) **Temperature control.** Proposed methods to reduce concrete temperatures and temperature differentials, such as pre-cooling of concrete or insulation. Internal cooling pipes shall not be permitted.
- D. All submittals must be signed and sealed by a Professional Engineer licensed to practice engineering in the Commonwealth of Virginia.

3. Placing

The maximum temperature of the concrete for mass components when deposited shall be 95°F. The minimum temperature limit of the concrete for mass components when deposited shall be 50°F.

4. Curing and Protection

- A. The minimum curing period shall be 7 Days. Curing methods shall be in accordance with Section 404 of the Specifications, and shall not result in temperature differentials exceeding the limits in Sections IV-2C(2) and IV-4C. With the Engineer's approval, the forms may be stripped prior to the end of the curing period, provided the curing continues for the remaining time.
- B. The maximum allowable temperature in any portion of the mass concrete shall be 160°F for slag cement mixes and fly ash mixes, in the prescribed proportions. The Engineer may direct that concrete which has exceeded these temperatures be removed, or otherwise mitigated, at no cost to the Department.
- C. The maximum allowable thermal gradient between the core and skin temperatures of a placement is limited to 35°F.
- D. Temperature sensors shall be installed in each mass concrete pour and placement. A pair of two temperature sensors (a primary and backup), shall be at the centroid of the placement, or wherever the point of expected maximum temperature is anticipated. If there is any doubt as to the location of the predicted maximum temperature, then additional temperature sensors shall be placed as required or as directed by the Engineer.
- E. For elements cast on the ground or in a horizontal position such as footings, slabs, or pier caps: in addition to the pair of temperature sensors located at the point of maximum temperature, one pair each of temperature sensors shall be cast 3 inches from the surface and each pair of temperature sensors shall be vertically in line with the temperature sensors placed at the centroid as required by Section IV-4D. The temperature sensors pairs located at the elevations of the top and bottom mats shall have the same concrete cover as the reinforcing mats in those locations.
- F. For elements cast in a vertical position such as columns and walls: in addition to the temperature sensors located at the point of maximum temperature, one pair each of temperature sensors on the north face and on the south face shall be cast in line with the temperature sensors cast at the centroid. These temperature sensors shall be located in the same vertical plane as the reinforcing steel mats and shall have the same concrete cover as the reinforcing mats.
- G. The Engineer may direct that additional temperature sensors be placed if the area of maximum thermal gradient cannot be readily determined.
- H. Both temperature sensors from each pair shall be connected to a data logger or other recording device. The data logger shall record the temperatures at each temperature sensor at least once every hour from the time the temperature sensor is covered with concrete until 3 days after the peak temperature is reached, or as directed by the Engineer. The data logger shall have a printed tape or electronic data storage capability. The Engineer may discontinue monitoring of mass concrete elements deemed to be similar to previously monitored elements and placed under similar temperature conditions.
- I. To determine concrete strength for stripping and allowable thermal differences, the Contractor shall use Match-Cured cylinders. A separate analysis shall be provided for each approved mass concrete design mix.
- J. Match-Cured cylinders shall follow the coolest surface temperature sensor in the placement. Sufficient number of cylinders shall be cast to allow an accurate plot of the strength development of the concrete. At a minimum, 9 pairs of cylinders shall be cast, with two cylinders each broken at the end of 1, 2, 3, 4, 5, 6, 7, 10, and 14 days. Additional cylinders shall be cast if it is anticipated that the concrete will not reach peak temperature until after 10 days from the placement.

K. The forms may be stripped when the concrete strength is high enough (as determined by the Match-Cured cylinders) to withstand the anticipated thermal difference between the core temperature and the 48-hour average air temperature, or as directed by the Engineer. In no event will form stripping be allowed before the surface concrete reaches at least 80 percent of its design strength. After form stripping, concrete shall be protected from freezing temperatures for 48 hours by the use of insulating blankets or other methods approved by the Engineer.

5. Remedial Measures

If temperature differentials are exceeded and cracking occurs or if other damage is evident, the Contractor shall core or otherwise test the concrete elements as directed by the Engineer to determine the extent of damage.

The Contractor shall submit a proposed remediation plan for the approval of the Engineer. The Engineer may direct that all or a portion of the damaged or unacceptable concrete be removed and replaced without additional compensation.

For concrete left in place, all cracks widths over 0.2 mm shall be epoxy injected. Epoxy bonding compounds shall be in accordance with Section 243 of the Specifications. All ports and mastic compound shall be removed from portions of the structure that will remain visible when construction is complete.

All remedial work required, including coring and crack sealing, shall be incidental to the unit bid price for Concrete (Class).

V. MEASUREMENT AND PAYMENT

Measurement and payment will be in accordance with Section 404 of the Specifications. All work required to install mass concrete bridge components as specified herein shall be considered incidental to the work required in Section 404 of the Specifications and will not be measured for separate payment.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 217 – HYDRAULIC CEMENT CONCRETE

SECTION 217 – HYDRAULIC CEMENT CONCRETE of the Specifications is amended as follows:

Section 217.02(c) – Fine aggregate is replaced with the following:

Fine aggregate shall conform to Section 202 for Grading A or Section 206.

Section 217.02(d) – Coarse aggregate is replaced with the following:

Coarse aggregate shall conform to Sections 203 or 206 for the class of concrete being produced.

Section 217.02(m) – Lightweight aggregate is inserted as follows:

Lightweight aggregate shall conform to Section 206.

Section 217.07 – Proportioning Concrete Mixes is replaced with the following:

The Contractor is responsible for having a certified Concrete Plant Technician available during batching operations, and a certified Concrete Field Technician present during placing operations.

The Contractor shall have at least one certified Concrete Field Technician on the project for single or multiple incidental concrete placements. The Contractor shall have at least one certified Concrete Field Technician present at each site during the placement of pavements, bridge decks, bridge piers and abutments, box culverts, and any placement of 50 or more cubic yards.

The certified Concrete Field Technician shall provide control over methods used for discharging, conveying, spreading, consolidating, screeding, finishing, texturing, curing, and protecting the concrete. Deficiencies in conformance to specification requirements and good concreting practices shall be corrected by or under the direction of the certified Concrete Field Technician as soon as they begin to occur.

The concrete producer shall plan batching operations so that delays do not occur because of the absence of certified personnel.

Concrete shall be proportioned to secure the strength and durability required for the pavement or the part of the structure in which it will be used.

The Contractor shall submit concrete mixture designs conforming to the Specifications for the class of concrete specified for the Engineer's approval prior to the start of concrete mixing operations.

The Contractor shall furnish and incorporate a water-reducing and retarding admixture in bridge deck concrete and in other concrete when conditions are such that the initial set may occur prior to completion of approved finishing operations. The two admixtures shall not be used together in the same concrete batch unless tests indicate the admixtures are compatible in accordance with Section 215.02(b). If the Engineer elects to waive the requirement to have both admixtures, the Contractor may supply and incorporate only a water-reducing admixture, in lieu of having both the water-reducing and retarding admixtures normally required in the bridge deck concrete, to provide the required slump without exceeding the maximum water/cement ratio. The Contractor shall demonstrate to the Engineer that use of the admixture will not cause segregation.

Concrete shall be air entrained. The air content shall conform to Table II-17.

Except for latex hydraulic cement concrete, concrete mixtures shall be developed and verified by any one of the following three options listed below.

The mix designs as determined by the respective option below shall be valid provided there is no change in sources of aggregate, chemical admixtures, mineral admixtures, or hydraulic cement. All concrete mixtures shall contain the minimum amount of mineral admixtures or combination thereof expressed as a percent of the total cementitious materials in accordance with Section 217.02(a). All quantities of materials shall be weighed in accordance with tolerances specified in Section 217.04. The quantities of coarse and fine aggregates used in concrete production shall not deviate by more than $\pm 5\%$ by weight from the batch weights of the approved mix design.

When low permeability concrete is specified, two 4 X 8 inch specimens shall be molded from concrete representing the proposed mix design and tested in accordance with VTM 112 to validate conformance. For trial batches, the tested permeability value shall be considered satisfactory provided it is 500 coulombs less than the specified maximum value for the class of concrete specified.

(a) Option 1 – Prescriptive Method:

Mix proportions for normal, heavy weight, and lightweight concrete shall be established by the methods described in ACI 211 on an absolute volume basis for the respective aggregate size. The mix design shall conform to Table II-17 or other parts of the Contract for the class and type of concrete indicated. Aggregate properties obtained from the aggregate producer shall be used for design purposes.

Once the proposed mix design has been established, the Contractor or their concrete supplier shall produce one 3-cubic yard production verification batch using the same type of equipment intended for use in supplying concrete to the Department. The proposed mix design will be considered acceptable provided that the plastic properties of the concrete are within the Department's specification limits for the given class of concrete. Strength tests of the verification batch must equal or exceed f'_c for the intended class of concrete.

(b) Option 2 – Trial Batch Mix Design Method:

The minimum cementitious content requirement in Table II-17 will be waived provided that the maximum water-cementitious ratio requirement of Table II-17 is met for the respective class of concrete. The required grading for fine and coarse aggregate will be waived provided the coarse aggregate meets the nominal maximum size as required in Table II-17 for the respective class of concrete.

The Contractor shall prepare a minimum of 3 trial concrete batches with differing cementitious materials contents over a range anticipated to encompass the design strength, f'_c , plus overdesign, and water-cementitious ratios encompassing the range permitted for the classes of concrete being evaluated. Trial batches may be produced in either small scale laboratory batches or truck batches with a minimum batch volume of 3 cubic yards each.

The plastic properties of the trial concrete batches shall meet the requirements for consistency and air content in Table II-17 and meet the additional requirements listed below:

- The concrete temperature of the trial batches, as batched and sampled, shall be a minimum of 68°F.
- Air content of the trial batches shall be within a range of -1.0 to +1.5 percentage points of the median design air content for the classes of concrete being evaluated.

- Slump of the trial batches shall be within ± 1 inch of the maximum slump permitted for the class of concrete.

Three 4 X 8 inch test specimens shall be molded from each batch, cured in accordance with ASTM C31 for acceptance specimens, and then compression tested at an age of 28 days. The strength results of these tests shall be plotted on a graph to establish the relationship between the water-cementitious ratio and the compressive strength. Alternately, the relationship can be established between the cementitious content and the compressive strength. The design water-cementitious ratio, or design cementitious content, can then be derived from the graph to satisfy the required design strength plus an appropriate overdesign to be designated as f'_{cr} . The required cementitious materials content determined from these tests can be interpolated from the established graph. If desired, the design water-cementitious ratio or cementitious content can be determined from a polynomial regression analysis of the plotted strength data.

Test results from prior trial concrete batches are acceptable for use if they represent the same material sources proposed for the Department work, meet the requirements for trial concrete batches as stated above and are less than 18 months old.

The required cementitious content to satisfy the strength requirement for the respective class of concrete shall be determined in accordance with either of the two following procedures:

1. When the concrete production facility has sufficient data to establish a production standard deviation ("s"), as described in Section 217.07(d). The cementitious content required to meet the design strength requirement, f'_{cr} , then the f'_{cr} shall be based upon the following equation:

$$f'_{cr} = f'_c + 3s$$

2. When the concrete production facility does not have a production standard deviation established the cementitious content required to meet the design strength requirement, f'_{cr} , then the f'_{cr} shall be based upon the following equation:

$$f'_{cr} = f'_c + 1700 \text{ psi.}$$

Once the proposed mix design has been established, the Contractor shall produce one 3-cubic-yard production verification batch using the same type of equipment intended for use in supplying concrete to the Department. The proposed mix design will be considered acceptable if and only if the plastic properties of the concrete are within the Department's specification limits for the given class of concrete. Strength tests of the verification batch must equal or exceed f'_c for the intended class of concrete. The requirement for a production verification batch will be waived when the trial batching is performed –with truck batches.

(c) Option 3 - Documented Field Experience Method:

The minimum cementitious content requirement in Table II-17 will be waived provided that the maximum water-cementitious ratio requirement of Table II-17 is met for the respective class of concrete. The required grading for fine and coarse aggregate will be waived provided the coarse aggregate meets the nominal maximum size as required in Table II-17 for the respective class of concrete.

An existing concrete mixture shall be considered acceptable for use if the Contractor has a satisfactory test record of pervious field experience as described in Section 217.07(d), and that the proposed concrete mixture meets the following requirements:

1. The water cementitious ratio of the proposed concrete mixture is less than or equal to the maximum water cementitious ratio specified for the respective class of concrete.
2. The documented average strength, f'_{cr} , equals or exceeds the design compressive strength f'_c for the respective class of concrete in accordance with the following equation: $f'_{cr} = f'_c + 3s$.
3. The proposed concrete mixture contains the same aggregate sources, supplementary cementitious materials type, and admixture type as those used to establish the previous field experience test record.
4. The consistency (slump) and air content are within the specification limits for the respective class of concrete.

(d) Documentation of Previous Field Experience or Production Standard Deviation(s)

An acceptable test record to document previous field experience or to establish a production facility standard deviation shall represent a minimum of 30 consecutive compressive strength tests results, encompass a production period of at least 45 days and test data not more than 18 months old. A test record of less than 30 tests, but not less than 15 tests, shall be permitted provided a modification factor is applied to the production facility sample standard deviation as shown below:

Multiply Standard Deviation by Modification Factor	
Number of Test	Modification Factor
15	1.16
20	1.08
25	1.03
30	1.00

The test record may be based on non-Department projects if documentation of the sources of concrete strength test results accompanies the submittal.

For latex hydraulic cement content, the dry weight ratio of cement/fine aggregate/coarse aggregate shall be 1:2.5:2. With the Engineer's approval a maximum adjustment of 10 percent may be made in aggregate weights to compensate for grading changes and variable specific gravity.

The Contractor shall adjust batch quantities during the course of the work to compensate for changes in workability caused by differences in the characteristics of aggregates and cements permitted within the specification requirements. Such adjustments shall be made only by the Contractor and shall not change the yield.

If concrete cannot be obtained with the required workability or consistency or within the maximum design water content with the materials furnished, the Contractor shall make changes to secure the desired properties subject to the limiting requirements specified in Table II-17 and the Engineer's approval. The Contractor shall use a fine aggregate having a void content of less than 50.5 percent, except when lightweight fine aggregate is used. When the void content of the fine aggregate is more than 50.5 percent and the concrete does not have the desired properties, in lieu of changing the fine aggregate, the Contractor may take one or more of the following actions:

- Use a water-reducing admixture.
- Increase the cement content.
- Change the source of coarse aggregate.
- In hot weather, add ice or otherwise reduce the temperature to increase the workability.

- Submit other recommendations to the Engineer for approval.

The Contractor shall make trial batches under the observation of the Engineer to verify that concrete of the required workability and consistency is obtained within the specified water content when any of the actions is exercised. At least one trial batch shall be made with the concrete temperature at approximately 90°F to verify that the concrete mixture has sufficient workability and consistency without exceeding the specified water content. The concrete mixture shall be redesigned when the fineness modulus of the fine aggregate changes more than 0.2 from the original design and the concrete does not have the desired properties. Costs incurred because of adjustments of concrete mixture designs and for trial batches shall be borne by the Contractor with no additional compensation being made.

Section 217.08 – Acceptance is replaced with the following:

- (a) **Hydraulic cement concrete sampling:** For the purpose of acceptance testing for consistency, air content, density (unit weight), and preparation of specimens for strength testing or permeability testing, hydraulic cement concrete shall be sampled from the mixing/delivery unit in accordance with ASTM C172, except the sample shall be permitted to be taken after discharge of a minimum of two cubic feet of concrete from the delivery vehicle. The two cubic feet discharged shall not be used as part of the test sample or in the Work. The Contractor shall provide a receptacle conforming to ASTM C31 for the Department's use in obtaining the sample. Additional (but not alternate) points of sampling may be required by the Engineer when deemed necessary.
- (b) **Air and Consistency Tests:** Air and consistency tests will be performed by the Department prior to discharge of concrete into the forms to ensure that specification requirements are consistently being complied with for each class of concrete supplied. If either determination yields a result that is outside of the allowable range for air content or consistency, the Engineer will use the following procedure:
1. The Engineer will immediately perform a recheck determination. If the results confirm the original test results, the load will be rejected.
 2. The Contractor's representative will be immediately informed of the test results.
 3. The Contractor shall notify the concrete producer of the test results through a pre-established means of communication.

The Engineer may perform any additional tests deemed necessary and reject all remaining material that fails the tests.

Entrained air content will be determined in accordance with ASTM C231 or ASTM C173. Acceptance or rejection will be based on the results obtained from these tests.

A mixture that contains the minimum amount of water consistent with the required workability shall be used. Consistency will be determined in accordance with ASTM C143. The Engineer will not allow adding cement to loads previously rejected for excessive water content or unsatisfactory consistency.

- (c) **Strength Tests:** The 28-day compressive strengths (f'_c) specified in Table II-17 are the strengths used in the design calculations. The Engineer will verify design strengths by tests made during the progress of the work in accordance with ASTM C31 and ASTM C39. The use of ASTM C42 will be at the Engineer's discretion. If the 28-day design compressive strength (f'_c) test results do not conform to the strength requirements specified in Table II-17, the Contractor shall take immediate steps to adjust the mixture design. In addition, the Engineer may require removal of or corrective measures be applied to any concrete that does

not meet the requirements of Table II-17. If the concrete cylinder strength, f_{cyl} , is less than the specified compressive strength found in Table II-17, the criteria in Table II-17A shall apply. The Department will not assess a calculated penalty less than \$500. However, the Contractor shall have the right to remove and replace concrete failing to meet specifications at the Contractor's cost.

Before concrete is placed, the Contractor shall provide a storage chamber at his expense for temporary storage of the Department's concrete cylinders. The Contractor shall be responsible for maintaining the chamber so that the concrete test cylinders are kept in a continuously moist condition and within a temperature range of 60°F to 80°F. The chamber shall be equipped with a continuously recording thermometer accurate to $\pm 2^\circ\text{F}$ for the duration of concrete cylinder curing. The Contractor shall provide the data from the continuously recording thermometer within time frames as approved by the Engineer. The chamber shall be located in an area where the test cylinders will not be subject to vibration and shall be of sufficient size or number to store, without crowding or wedging, the required number of test cylinders as determined by the Contractor based on his plan of operations. The Engineer will approve the location of the chamber prior to its placement.

When use of high-early-strength hydraulic cement concrete is required, it shall conform to Table II-17 except that the 28-day compressive strength requirement shall be obtained in 7 days. The Contractor may use up to 800 lbs/yd³ of Type I, Type II or Type III cement to produce high-early-strength concrete.

- (d) **Concrete Temperature** shall be measured in accordance with ASTM C1064.
- (e) **Density (Unit Weight)** of freshly mixed concrete will be measured, when required by the Engineer, in accordance with ASTM C138.
- (f) **Quality Assurance for Low Permeability Concrete:**

1. **General**

The Contractor shall prepare and cast test specimens on at least two trial batches using job materials, with permissible combination of cementitious materials, for testing by the Department for permeability and strength at least 5 weeks before the field application. The permeability samples shall be cylindrical specimens with a 4-inch diameter and at least 4-inches in length. Cylinders will be tested at 28 days in accordance with VTM 112. The test value shall be the result of the average values of tests on two specimens from each batch. Permeability values obtained from trial batches shall be 500 coulombs below the maximum values specified in Table II-17 to be acceptable.

2. **Acceptance Tests:**

For each set of cylinders made for compressive strength tests, two additional cylinders shall be made for the permeability test. The Department will be responsible for making and testing all permeability test specimens.

If the average permeability test result is at most the value for the specified class of concrete in Table II-17, then full payment will be made for the lot the average permeability test result represents. However, if the average permeability test result exceeds the coulomb value in Table II-17, the percent reduction in payment for that lot of concrete shall be calculated by multiplying 0.005 by each coulomb above the coulomb value in Table II-17 by the concrete item Contract unit price times the number of cubic yards or cubic meters of concrete in the lot. The reduction in price will not exceed 5 percent of the concrete item Contract unit price. The Engineer will reject any concrete with a coulomb value that exceeds the maximum required in Table II-17 by 1000

coulombs. However, bridge deck concrete with any coulomb value exceeding the maximum required value by over 1000 coulomb may be accepted by the Engineer at 95 percent of the Contract unit price if the concrete in question has the required strength, meets the other specification requirements and the Contractor applies, at his own expense, an approved epoxy concrete overlay to the top of the entire deck. In such cases deck grooving will not be required. The Engineer will not allow the placement of epoxy overlays over latex overlays. The Contractor shall make the adjustment to the roadway grade as required by the Engineer at the Contractor's expense.

Similarly, concrete in abutments and pier caps with coulomb value exceeding the maximum required in Table II-17, by more than 1000 coulomb may be accepted at 95 percent of the Contract unit price if it has the required strength, meets the other specification requirements and the Contractor applies, at his own expense, one coat of epoxy Type EP 3B and one coat of epoxy EP 3T in conformance with Section 243.02, on top of the pier caps or abutment seats.

(g) Bond Strength for Silica fume concrete, latex-modified concrete and very-early-strength latex-modified concrete overlays:

The Contractor shall perform the bond strength testing in accordance with VTM 92 at a minimum age of 7 days; when scheduling the lane closure for testing, the inconvenience to the public shall be minimized. The bond strength shall be at least 150 psi; otherwise the substrate concrete shall fail at a depth of at least 0.5 inch over at least 50% of the test area. A minimum of one test result (based upon the average of three test specimen results) shall be conducted on each placement.

Table II-17A - Price Reduction or Action Taken due to f'_{cyl} not meeting the specification value f'_c listed in Table II-17 is replaced with the following:

Condition^{1,2}	Concrete is a Pay Item	Concrete is <u>Not</u> a Pay Item
f'_{cyl} is greater than or equal to 98% f'_c	A ³	A ³
f'_{cyl} is greater than or equal to 90% f'_c and less than 98% f'_c	B ⁴	C ⁵
f'_{cyl} is less than 90% f'_c	D ⁶	D ⁶
f'_{cyl} is not available due to the Contractor's inappropriate handling and storage of specimens in accordance with ASTM C31	D ⁶	D ⁶

¹ f'_c is the 28-day design compressive strength requirement found in Table II-17.

² f'_{cyl} is the actual average tested strength of the standard-cured concrete cylinder made and tested in accordance with ASTM C31 and ASTM C39.

³A = full payment

⁴B = pay reduction = $\left[\frac{(f'_c - f'_{cyl})}{f'_c}\right] \times \text{Contract unit price for concrete per yd}^3 \times \text{number of yds}^3 \text{ the concrete represents}$ or \$500, whichever is greater.

⁵C = pay reduction = $\left[\frac{(f'_c - f'_{cyl})}{f'_c}\right] \times 5 \times \text{Contractor's invoice price for concrete per yd}^3 \times \text{number of yds}^3 \text{ the concrete represents}$ or \$500, whichever is greater.

⁶D = The Contractor shall submit an investigative plan stamped by a Professional Engineer holding a valid license to practice engineering in the Commonwealth of Virginia outlining how the Contractor shall demonstrate that the in-place concrete meets the structural strength requirements for the design. The Engineer will not permit any reduction in concrete strength below $0.9f'_c$ for barriers, parapets, railings, etc. The Engineer will approve the investigative plan for all other applications prior to the execution of the investigation. All costs associated with this investigation shall be borne by the Contractor. After the investigation is completed, the Contractor shall submit a report to the Engineer showing the results of the Professional Engineer's analysis, testing and conclusions as well as any recommended actions proposed by the Contractor to be taken with the concrete that did not meet the strength requirements. The Department retains all rights to determine if the action proposed with regard to the concrete in question is acceptable. If the Department concurs with the proposed action and the concrete meets the structural strength requirements of the design and remains in place, any price reduction will be taken by Method B if the concrete is a pay item or Method C if the concrete is not a pay item. If the concrete does not meet the structural requirements of the design, the concrete shall be removed and replaced at no cost to the Department.

Section 217.11 – Self-Consolidating Concrete (SCC) is replaced with the following:

When specified or designated on the Plans, SCC shall be designed as the Class of Concrete specified in Table II-17 and conform to all the requirements herein except as outlined below. Combined aggregate grading and Viscosity Modifying Admixture (VMA) may be used. The VMA shall conform to ASTM C494, Type S. Synthetic fibers from the Department's Approved List 35 may be added to control cracking. Shrinkage-reducing admixture may be added to control shrinkage if approved by the Engineer. The maximum size of aggregate shall not be larger than: 3/4-inch; 1/5 the narrowest dimension between the sides of the forms; 1/3 the slab depth; and 3/4 of the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons or ducts.

The Contractor shall furnish the Engineer a mix design for the SCC which is proportioned according to the project specific criteria for compressive strength, air content, slump flow, VSI, J-Ring value, and segregation factor. The maximum water-cementitious materials ratio shall be 0.45 unless otherwise approved by the Engineer. The Contractor shall use the same components in the trial batches as are to be used in the project including: coarse and fine aggregates; water; source and type of cement; supplementary cementitious materials; and admixtures, including any site-added admixtures intended to be used.

- (a) **Slump flow** shall be measured in accordance with ASTM C1611, Procedure B. The slump flow shall be 26 ± 3 inches, and there shall be no visible segregation of the mix in the spread. The slump flow shall be compared to the slump flow with the J-ring in accordance with ASTM C1621.
- (b) **Visual Stability Index (VSI)** Rating in accordance with ASTM C1611 shall not exceed 1.
- (c) **J-Ring Flow** as measured by ASTM C1621 shall not be more than 2 inches different from slump flow.

- (d) **Stability (performed on trial batches)** of the concrete shall be determined in the laboratory prior to approval of the SCC mixture using test method ASTM C1610. Concrete mixtures shall have a maximum static segregation (segregation factor) of 15%.
- (e) **Permeability (if specified) and Strength Test Specimens** shall be sampled in accordance with Section 217.08(c) and fabricated in accordance with ASTM C1758.

Section 217.12 – Low Shrinkage Class A4 Modified Concrete is replaced by the following:

Low shrinkage Class A4 modified concrete shall be either Normal or Lightweight, as specified on the Plans.

- (a) **Normal weight:** The cementitious materials content shall be less than 600 pounds per cubic yard. High-early-strength hydraulic cement concrete as described in Section 217.08(b) shall not be used.

The 28 day drying shrinkage shall be less than 0.035% based on average of three specimens when tested in accordance with ASTM C157. Specimens shall be moist-cured for 7 days prior to testing for drying shrinkage. A Shrinkage Reducing Admixture (SRA) shall be used unless the 28 day drying shrinkage is < 0.035% without the admixture. A fixed amount of SRA dosage can be used without additional drying shrinkage testing if approved by the Engineer.

The Contractor, at his expense, shall prepare a minimum 3-cubic-yard trial batch of the mix at least 5 weeks before the proposed start date of production. The trial batch will be used to verify compliance with the shrinkage requirements listed herein and the minimum compressive strength, permeability, air void content, and slump listed in Table II-17. The Contractor shall prepare the trial batch with the same equipment to be used on the project. The Contractor shall obtain the services of a Department-approved independent laboratory to perform the trial batch testing. Test results shall be furnished to the Engineer for review and approval. The Engineer will not authorize the Contractor to proceed with production of low shrinkage Class A4 modified concrete for the work required by the Contract until the test results verify conformance with the requirements stated herein.

- (b) **Lightweight:** Use lightweight concrete with lightweight aggregates in conformance with AASHTO M 195.

The maximum cementitious materials content shall be 650 lbs/yd³. All other requirements shall conform to those listed in Table II-17 for Low Shrinkage Class A4 Modified concrete.

Maximum density of freshly mixed lightweight concrete, when tested in accordance with ASTM C138, shall be 120 lbs/ft³, or as specified on the plans.

Section 217.13 – Latex-modified Concrete, Very-Early Strength (LMCVE), for Bridge Deck Overlays is replaced with the following:

LMCVE shall conform to the requirements of Section 217 and Table II-17 except as modified herein.

Cement shall be approximately 1/3 calcium sulfoaluminate (C4A3S) and 2/3 dicalcium silicate (C2S) or other hydraulic cement that will provide a Latex-Modified Concrete that meets the physical requirements indicated in this section.

The LMCVE shall contain a minimum 658 lbs/yd³ of rapid hardening cement, 15% styrene butadiene latex by weight of cement, water not to exceed a water-cement ratio of 0.40, and aggregates as proposed by the Contractor for the mixture. The compressive strength minimum shall be 2500 psi at 3 hours and 3500 psi at 24 hours. Compressive strength specimens shall be

cured in the molds in the same environment as the in-place LMCVE they represent. Specimens shall remain undisturbed at the site for 2 hours and shall be transported to the testing lab for testing.

Prior to placing overlay the Contractor shall calibrate the mobile concrete mixers. Once the mixers are calibrated, the mixtures shall be sampled and tested for slump and air content. The Contractor shall prepare and test specimens to demonstrate that the concrete mixture shall obtain a compressive strength of at least 2500 psi within 3 hours at the curing temperatures in which the overlay will be placed, and a compressive strength of at least 3500 psi at an age of 24 hours. All trial batching and preparatory work prior to placing LMCVE shall be at the Contractor's expense. During the placement of the overlay the Contractor shall take samples for testing for compressive strength. Permeability, slump and air content measurements will not be required, but may be performed by the Engineer.

Section 217.15 – Lightweight Concrete is inserted as follows:

Lightweight aggregate shall be proportioned for incorporation into the mix in accordance with AASHTO M 195. Prior to producing concrete for a project, the lightweight aggregate shall be in a moisture condition such that the total moisture exceeds the absorbed moisture by a minimum of one percentage point.

The air content for lightweight concrete will be measured by the Department in accordance with ASTM C173.

The fresh lightweight concrete density shall be a maximum 120 lbs/ft³ unless noted otherwise on the Plans and determined in accordance with ASTM C138. If specified in the Contract, the equilibrium density of the hardened concrete shall be determined in accordance with ASTM C567.

When the lightweight aggregate is used to provide internal curing, when concrete will be delivered by pumping, or when otherwise required by the Engineer, the aggregate shall be pre-wetted to obtain an absorbed moisture content equal to at least the 24-hour absorption as determined by AASHTO T 84 or T 85. In lieu of testing, the Engineer may allow use of a minimum absorbed moisture content equal to the recommendation of the lightweight aggregate manufacturer or as known by the concrete supplier through previous experience to provide the desired performance.

If no previous experience is available for the field performance of the lightweight aggregate, the Contractor shall perform freeze/thaw resistance testing of the hardened concrete mixture on a trial batch in accordance with ASTM C666. The minimum durability factor shall be 90%. This information shall be provided to the Engineer for approval prior to the placement of lightweight concrete.

At least two weeks prior to the initial placement of lightweight concrete, a pre-pour meeting be held with the Contractor, Subcontractors, the concrete producer, and the lightweight aggregate supplier to discuss the production of the lightweight concrete and the placement operations. On the first day of production, the lightweight aggregate manufacturer's representative shall be at the batch plant and/or at the project site to provide technical assistance.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 223 – STEEL REINFORCEMENT

SECTION 223 – STEEL REINFORCEMENT of the Specifications is amended as follows:

Section 223.02(a)3 – Welded wire fabric is replaced with the following:

Welded wire fabric shall conform ASTM A1064. When used in continuously reinforced hydraulic cement concrete pavement wire fabric shall be deformed, furnished in flat sheets, and shall conform to ASTM A497, high yield of 70,000 psi.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 226 – STRUCTURAL STEEL

SECTION 226 – STRUCTURAL STEEL of the Specifications is amended as follows:

Section 226.02(c) – Anchor Bolts is replaced with the following:

Anchor bolts shall conform to AASHTO M 314 or ASTM F1554.

1. **Anchor bolts for general use** shall be Grade 36. Nuts and washers shall conform to ASTM A563 and ASTM F844 respectively. Threads shall be coarse series.
2. **High-strength anchor bolts** shall conform to ASTM F1554, Grade 55 or AASHTO M314, Grade 55, with supplemental requirements of S1. Nuts and washers shall conform to ASTM A563, Grade DH and ASTM F436 respectively.
3. **Galvanization** of steel anchor bolts, nuts, and washers shall conform to ASTM A153.
4. **Anchor bolts for railings** shall conform to (c)1 herein, and shall be hot-dipped galvanized.

Section 226.02(h) – High-Strength Bolts, Nuts, Washers, and Direct Tension Indicators is renamed **High-Strength Bolts** and replaced with the following:

High-Strength Bolts shall conform to ASTM F3125 Grade A325 Type 1, unless specified otherwise. Nuts, Washers, and Direct Tension Indicators (DTIs) shall conform to specifications appropriate for the grade and type of bolt according to the table below. All nuts shall be Heavy Hex, and all washers shall be Hardened.

High-Strength Bolts	Nuts	Washers	DTIs
ASTM F3125, Grade A325, Type 1 ¹	ASTM A563, Grade DH	ASTM F436	ASTM F959
ASTM F3125, Grade A325, Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959
ASTM F3125, Grade A490, Type 1	ASTM A563, Grade DH ASTM A194, Grade 2H	ASTM F436	ASTM F959
ASTM F3125, Grade A490, Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959
ASTM A449, Type 1 ¹	ASTM A563, Grade DH	ASTM F436	ASTM F959
ASTM A449 Type 3	ASTM A563, Grade DH3	ASTM F436	ASTM F959

¹All bolts conforming to ASTM F3125, Grade A325, Type 1 or ASTM A449, Type 1 and their nuts, washers, and DTIs shall be galvanized.

1. Bolts, nuts, and washers conforming to ASTM F3125 Grade A490 shall not be galvanized. High-strength bolts used with unpainted weathering steel shall conform to ASTM F3125 Grade A325, Type 3; ASTM A449, Type 3; or, when specified, ASTM F3125 Grade A490, Type 3. All use of high-strength bolts conforming to ASTM A449 shall be approved, in writing, by the Engineer. ASTM A449 bolts shall conform to the rotational capacity testing requirement in ASTM F3125 Grade A325 and these Specifications.
2. The maximum hardness for bolts conforming to ASTM F3125 Grade A325 shall be 33Rc. The maximum tensile strength for such bolts shall be 150 kips per square inch for bolts 1 inch or less in diameter and 120 kips per square inch for larger bolts.

3. High-strength fasteners (plain and coated) shall pass a rotational-capacity test as detailed in VTM 135.
 - a. Bolts shall be proof-load tested in accordance with ASTM F606, Method I. Full-size bolts shall be wedge tested in accordance with ASTM F606. Nuts shall be proof-load tested in accordance with ASTM F606. Galvanized bolts shall be wedge tested after galvanizing. Galvanized nuts shall be proof-load tested in accordance with ASTM F606 only after overtapping, galvanizing, and lubricating operations are completed.
 - b. Galvanized bolts, nuts and washers shall be hot-dipped galvanized in accordance with ASTM A153. The Contractor may use mechanically galvanized bolts, nuts, and washers that conform to ASTM B695, Class 50 if the bolts are to be topcoated with paint.

When galvanized nuts conforming to ASTM A563 are specified, the amount of over-tapping may be less than specified; however, all nuts in each lot shall be over-tapped by the same amount. Galvanized nuts shall be lubricated in accordance with ASTM A563 using a lubricant sufficiently tinted so as to be readily visible.

Galvanized bolts, nuts, and washers shall have the galvanization measured for thickness. Measurements for bolts shall be taken on the wrench flats or top of the bolt head. Measurements for nuts shall be taken on the wrench flats.

When galvanized washers are specified, hardness testing shall be performed after galvanizing. The coating shall be removed prior to testing.

- c. All bolts, nuts, and washers shall be furnished with a marking that readily identifies their manufacturer. The Contractor shall provide the Engineer with an example of such marking and the manufacturer's certification for each bolt, nut, and washer supplied to the project. The Contractor shall ensure that two samples from each rotational capacity lot, each sample consisting of one bolt, nut, washer, and DTI (if used on the project), are submitted to the Department for testing, and are accompanied by all documentation.

Documentation shall indicate the results of all tests and processes performed on the hardware, the name of the testing facility, address where the tests were performed and the date of testing. Test results of bolts and nuts shall also indicate the lot number of the product. Bolts, nuts, and washers from different rotational-capacity lots shall not be shipped in the same container. In addition, shipping containers shall be marked with the rotational-capacity test lot number of the product supplied.

Section 226.02(i) – Steel Plate is inserted as follows:

Steel plate shipped to the project site as plate shall have the direction of roll indicated on the plate to provide direction to the field for cutting along the appropriate axis when making components in the field. The plate shall be blast cleaned to either SSPC SP-6 or SP-10 finish and have an arrow painted along the direction of roll with the letters "DOR" above it using an inorganic zinc rich primer from the Department's Approved List 13.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 237 – STRUCTURE BEDDING MATERIAL AND BEARING PADS

SECTION 237 – STRUCTURE BEDDING MATERIAL AND BEARING PADS of the Specifications is amended as follows:

Section 237.02(a) – Elastomeric Bearing Pads is amended by replacing the fourth paragraph with the following:

Material having a nominal durometer hardness of 70 and 50 shall be used for nonlaminated pads and laminated pads, respectively. Test samples shall be prepared from finished pads. Samples of each thickness will be taken from 1 full-size pad from each shipment of 300 pads or less, with 1 additional pad for each additional increment of 300 pads or fraction thereof. Samples shall comply with the following physical requirements when tested in accordance with the ASTM methods designated.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 245 – GEOSYNTHETICS AND LOW PERMEABILITY LINERS

SECTION 245 – GEOSYNTHETICS AND LOW PERMEABILITY LINERS of the Specifications is amended as follows:

Section 245.03(a) – Geotextile Fabric for Use in Silt Fences is amended by replacing the second paragraph with the following:

The geotextile shall comply with the requirements of AASHTO M288, Table 8, Temporary Silt Fence Property Requirements, for grab strength and ultraviolet stability.

Section 245.03(c) – Geotextile Fabric for Use in Drainage Systems (Drainage Fabric) is amended by replacing the third paragraph with the following:

The geotextile shall comply with the requirements of AASHTO M288 Table 1-Geotextile Strength Property Requirements, Class 2, for grab strength.

Section 245.03(d) – Geotextile for Use in Stabilization is replaced with the following:

Geotextile for Use in Separation and Stabilization: Separation geotextiles are used as a permeable layer to separate fine-grained subgrades and aggregate base or subbase. Stabilization geotextiles are used in saturated or unstable conditions to provide the functions of separation and reinforcement.

1. Subgrade Separation Fabric:

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 70 sieve
Permittivity	ASTM D4491	Min. 0.1 sec ⁻¹

The geotextile shall comply with the requirements of AASHTO M288 Table 1-Geotextile Strength Property Requirements, Class 2, for grab strength, tear strength, and puncture strength. Only nonwoven geotextiles shall be used as subgrade separation geotextiles.

2. Subgrade Stabilization Fabric:

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D4751	Max. No. 70 sieve
Permittivity	ASTM D4491	Min. 0.1 sec ⁻¹

The geotextile shall comply with the requirements of AASHTO M 288 for strength property requirements, Table 1, Class 1, for grab strength, tear strength, and puncture strength. Geotextiles used for subgrade stabilization shall be woven or nonwoven.

3. Embankment Stabilization Fabric Up to 6 Feet High:

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve
Seam strength	ASTM D 4632	90% specified grab strength

The geotextile shall comply with the requirements of AASHTO M288 Table 1, Class 1 for grab strength, tear strength, and puncture strength.

Section 245.03(e) – Prefabricated Geocomposite Pavement Underdrain is replaced with the following:

Prefabricated Geocomposite Pavement Underdrain: Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment and shall have a thickness of not less than 3/4 inch. Outer surfaces shall be smooth to prevent excessive wear of bonded filter fabric.

Physical Properties	Test Method	Requirements
Compressive strength panel vertical strain and core area change	ASTM D1621/ D2412/D6364	Min. 40 psi at 20% deflection after 24 hrs at 0 deg F and at 125 deg F
Water flow rate (after 100 hr at 10 psi and normal confining pressure gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width for 12-in specimen length

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over both sides of the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

Section 245.03(h) – Dewatering Bag is replaced with the following:

Dewatering Bag: A nonwoven geotextile sewn together to form a bag that can be used in lieu of a de-watering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

Physical Property	Test Method	Requirements
Grab strength @ Elongation >50%(CRE/Dry)	ASTM D4632	Min. 250 lb (min)
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D6241	Min. 150 lb
Permittivity	ASTM D4491	Min. 1.2 sec-1
UV resistance	ASTM D4355	Min. 70% at 500 hr
AOS	ASTM D4751	Max. 100 sieve

Section 245.03(i)1 – Paving Fabric, Type I & II is replaced with the following:

Paving Fabric, Type I & II: All paving fabrics shall meet the requirements of the table below.

Property	Test Method	Type I	Type II
Mass per unit area, min (oz/yd ²)	ASTM D5261	4.5	4.1
Grab Tensile Strength, min (lbs.)	ASTM D4632	120	101
Grab Tensile Elongation, min (%)	ASTM D4632	50	50
Melting point, min (°F)	ASTM D276	320 ¹	320 ¹

¹320 is the softening/melt point of polypropylene.

Section 245.03(i)2 – Paving Mat; Type I, II, and III is replaced with the following:

Paving Mat; Type I, II, and III: Materials used for paving mat shall be a hybrid of two or more of the following material types: fiberglass, polyester, or polypropylene. Paving mat shall meet the requirements of the table below.

Property	Test Method	Type I	Type II	Type III
Tensile Strength, min (lbs)	ASTM D5035 (2C-E)	280	140	45
Ultimate Elongation, max (%)	ASTM D5035 (2C-E)	5	5	5
Melting Point, min (°F)	ASTM D276	320 ¹	320 ¹	320 ¹
Mass/Unit Area, min (oz/yd ²)	ASTM D5261	7.0	4.0	4.0

¹320 is the softening/melt point of polypropylene, which is lower than either polyester or fiberglass.

Section 245.03(i)3 – Paving Grid: Type I, II, & III is replaced with the following:

Paving Grid: Type I, II, & III: Materials used for paving grids shall be comprised of fiberglass and shall meet the requirements of the table below. Some paving grids are self-adhesive and some require nails for installation. Tack coat required for the installation of the overlay shall be specified with the paving grid. Refer to manufacturer's recommendations for tack coat type and application rate.

Property	Test	Type I	Type II	Type III
Tensile Strength, min (lbs/in) ¹	ASTM D6637, Method A, modified ²	560 x 1,120	560	280
Aperture size, min (in)	Calipered	0.5	0.5	0.5
Elongation, max (%)	ASTM D6637 Method A	3	3	3
Mass per area, min (oz/yd ²)	ASTM D5261	16	10	5.5
Melting Point, min (°F) (fabric component – if applicable)	ASTM D276	420 ³	420 ³	420 ³

¹For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions

²Tensile Strength shall be converted to and reported in lbs/in.

³420 is the softening/melt point of fiberglass.

Section 245.03(i)4 – Composite Paving Grids: Type I, II, & III is replaced with the following:

Composite Paving Grids: Type I, II, & III: Composite paving grids shall consist of a fiberglass, polyester, or polyvinyl alcohol (PVA) paving grid integrated with a nonwoven geotextile and meet the requirements of the table below.

Property	Test	Type I	Type II	Type III
Tensile Strength, Min (lbs/in) ¹	ASTM D6637, Method A, modified ²	560 x 1,120	560	280
Aperture size, Min (in)	Calipered	0.5	0.5	0.5
Elongation, Max (%)	ASTM D6637 Method A	5	5	10
Mass per area, Min (oz/yd ²)	ASTM D5261	16	10	5.5
Melting Point, Min (°F) (fabric component)	ASTM D276	320 ³	320 ³	320 ³

¹For Type I, machine and cross direction respectively. Strengths for Type II and III are in both directions.

²Tensile Strength should be converted to and reported in lbs/in.

³320 is the assumed softening/melt point of PVA. See Section 318.03 for more on placement temperature.

Section 245.03(i)5 – Pavement Repair and Bridge Deck Waterproofing Strip Membrane is replaced by the following:

Pavement Repair and Bridge Deck Waterproofing Strip Membrane: Materials used for strip membranes shall be comprised of composite self-adhering rubberized asphalt attached to a paving fabric, a paving mat, or a paving grid and meet the requirements of the table below.

Property	Test Method	Type I
Strip Tensile Strength, min (lbs/in)	ASTM D882	50
Puncture Resistance, min (lbs)	ASTM E154	200
Permeance-Perms, max	ASTM E-96 Method B	0.05
Pliability - 1/4" Mandrel 180 ⁰ Bend at -25 °F	ASTM D146	No cracks in fabric or rubberized asphalt

VIRGINIA DEPARTMENT OF TRANSPORTATION
 2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 246 – PAVEMENT MARKING

SECTION 246 – PAVEMENT MARKING of the Specifications is amended as follows:

Section 246.03(g) – Temporary Pavement Marking Materials is replaced with the following:

Temporary Pavement Marking Materials other than paint shall consist of Type D, Class III, removable, wet reflective tape and Type E removable black, non-reflective tape. Determination of conformance will include, but not be limited to, the evaluation of test data from AASHTO's NTPEP or other VDOT Test Facilities.

1. Wet Reflective, Removable Tape (Type D, Class III):

Wet reflective, removable tape shall be a durable, retro-reflective pliant material consisting of a mixture of polymeric materials, pigments, and glass beads (reflective optics) evenly distributed throughout its cross-sectional area and embedded into the surface. This tape shall be suitable for use on both asphalt and hydraulic cement concrete surfaces and shall be selected from VDOT's Approved List 17.

a. **Initial Approval** - Maintained retroreflectivity (dry and wet), color (including luminance), and adhesive bond rating shall conform to the following requirements after the material has been installed on the test deck for 90 days:

(1) **Maintained Dry Retroreflectivity:** The dry photometric quantity to be measured is the coefficient of retroreflected luminance (R_L) in accordance with ASTM E1710 for 30-meter geometry when measured in the skip line or centerline areas.

Coefficient of Retroreflected Luminance (R_L) (mcd/ft²/fc) Dry Retro Removable Tape-Type D, Class III

Color	Initial	90 Days In-Service
White	250	150
Yellow	200	100

(2) **Maintained Wet Retroreflectivity:** The wet photometric quantity to be measured is the coefficient of retroreflected luminance (R_L) in accordance with VTM 124 (Visual Evaluation or ASTM E2177, Recovery Method) when measured in the skip line or centerline areas.

Coefficient of Retroreflected Luminance (R_L) (mcd/ft²/fc) Wet Retro Removable Tape-Type D, Class III

Color	Initial	90 Days In-Service
White	150	100
Yellow	125	75

(3) **Day and Nighttime Color and Luminance (Y%):** According to ASTM D6628.

(4) **Adhesive Bond Rating:** The average adhesive bond rating (from transverse and longitudinal lines) shall be 3 or higher according the NTPEP Work Plan.

- (5) **Skid Resistance:** The initial skid resistance shall be at least 45 BPN when tested according to ASTM E303, if available.
- (6) **Thickness:** Per the manufacturer's recommendation.
- (7) **Adhesion:** No line shall be displaced, torn or missing.

b. **Batch Testing:**

Wet reflective, removable tape batch testing will be performed **by** on samples obtained from the point of manufacture or from the field in accordance with the Materials Division's Manual of Instructions. Test results shall be compared against the following specifications and requirements:

- (1) **Retroreflectivity:** Refer to initial requirements
- (2) **Day and Night Color and Luminance:** Refer to initial requirements
- (3) **Thickness:** Refer to initial requirements
- (4) **Width:** The width shall be no less than the nominal width and no greater than 1/8" of the nominal width.
- (5) **Length:** The length shall be no less than the length stated on the manufacturer's packaging.
- (6) **Skid Resistance:** Refer to initial requirements.

2. **Removable Black, Non-Reflective Tape (Type E):**

Removable black, non-reflective tape shall be a durable, pliant material consisting of a mixture of polymeric materials, pigments and a friction material evenly distributed throughout its cross-sectional area and embedded into the surface. Removable black, non-reflective tape shall be suitable for use on asphalt concrete pavement surfaces, and shall be selected from the VDOT's Approved List 17.

- a. **Initial Approval** - Maintained adhesive bond rating shall conform to the following requirements after the material has been installed on the test deck for 90 days:
 - (1) **Adhesive Bond Rating:** The average adhesive bond rating (from transverse and longitudinal lines) shall be 3 or higher according to the NTPEP Work Plan.
 - (2) **Skid Resistance:** The initial skid resistance shall be at least 45 BPN when tested according to ASTM E303, if available.
 - (3) **Thickness:** Per the manufacturer's recommendation.
 - (4) **Adhesion:** No line shall be displaced, be torn or missing.

b. **Batch Testing**

Black removable, non-reflective tape batch testing will be performed **by** on samples obtained from the point of manufacture or from the field in accordance with the Materials

Division's Manual of Instructions. Test results shall be compared against the following specifications:

- (1) **Skid Resistance:** Refer to initial requirements
- (2) **Thickness:** Refer to initial requirements
- (3) **Width:** The width shall be no less than the nominal width and no greater than 1/8" of the nominal width.
- (4) **Length:** The length shall be no less than the length stated on the manufacturer's packaging.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
PIPE REHABILITATION

November 7, 2016

I. DESCRIPTION

This work shall consist of the rehabilitation of existing storm water, surface water pipe culverts, and sanitary sewer lines by the method or methods specified at the designated locations described in the Contract in accordance with the requirements of this provision and as directed by the Engineer. All references to the AASHTO LRFD Bridge Design Specifications herein refer to the specific version in use by VDOT Structure and Bridge Division at the time of submittal.

II. MATERIALS - GENERAL REQUIREMENTS

1. **Cement grout** shall conform to Section 218.03(b) or (d) of the Specifications, or be a lightweight cellular foamed concrete of at least 30 pcf unit weight and 100 psi 28-day compressive strength, with foaming agent meeting ASTM C869.
2. **Method A pipe rehabilitation - Corrugated steel pipe** used as pipe liners for Method A pipe rehabilitation shall conform to Section 232.02 of the Specifications and shall be 10 gage with 3-inch by 1-inch angular corrugations. Corrugated steel pipe used as liners shall be manufactured by QC/QA producers on the VDOT Materials Division's Approved Products List.
3. **Method B pipe rehabilitation - Flexible pipe liners** used for Method B pipe rehabilitation shall be from the VDOT Materials Division's Approved Products List, List No. 38. Liner systems may be subject to limitations for use as specified herein, by site-specific limitations for those locations listed in the Contract or as shown on the List No. 38 for the specific liner type. Where such is the case, the Contractor shall use only that type or those types that the Department has specified for the specific location listed in the Contract, and which are not limited by restrictions stated in List 38. The Contractor shall furnish the Engineer information, services, or other requirements as detailed in List 38 for all materials used for pipe rehabilitation systems specified in the Contract.
4. **Method C pipe rehabilitation - Smooth-wall steel pipe** used as liners used for Method C pipe rehabilitation shall conform to Section 232.02(c)5 of the Specifications.

III. METHOD B LINER REQUIREMENTS

Method B pipe liners shall be one or more of the following categories as designated in the Contract:

1. **Category A - Cured-In-Place Pipe (CIPP)** - The Contractor shall submit design calculations demonstrating the liner system conforms to the requirements of this Section.

The liner system shall conform to Drainage Manual, Chapter 8, Section 8.3.6.7 - Table A, "Flexible Liner (Method B) Type Selection Guidelines for Category A systems," and shall follow ASTM F1216 Appendix X1.2.2, "Fully Deteriorated Gravity Pipe Conditions." Design calculations shall provide groundwater table elevation at crown of pipe. Design calculations shall use a HL-93 traffic loading, which may be ignored after 8 feet of cover, except for multiple barrel rehabs, where it shall continue indefinitely. Assume the total wet unit weight of soil is 120 pcf, or 135 pcf when saturated. Use a factor of safety of $N = 2.0$.

Modulus of soil reaction for design shall be as follows:

Cover (ft)	Modulus ¹ (ksi)
0-5	1.8
>5-10	2
>10-30	2.2
>30-60	2.6
>60	2.8

¹Based on VDOT pipe installation standards

Any voids around exterior of host pipe shall be filled, or the design assumptions will be considered invalid.

The design shall specify the method for installation and curing, individual components, tube type (whether reinforced or non-reinforced), manufacturer name and type of resin including catalyst, and the volume of resin required to achieve proper impregnation and curing. The Contractor shall include lot numbers and expiration dates of all supplied components. The liner system shall have an impermeable inner and outer plastic film or plastic pre-liner to promote complete polymerization, prevent resin migration and loss, and prevent contamination of the interior of the finished product.

The liner system shall conform to the following requirements, verified through testing:

CATEGORY A - CIPP		
Property	Test Procedures	Physical Requirement
Tensile strength at yield	ASTM D-638	3,000 psi
Modulus of elasticity	ASTM D-790	200,000 psi
Flexural strength	ASTM D-790	4,000 psi

2. **Category B - Fold and Form flexible liners** - The Contractor shall submit design calculations demonstrating the liner system conforms to the requirements of this Section.

The liner system shall conform to Drainage Manual, Chapter 8, Section 8.3.6.7 - Table A, "Flexible Liner (Method B) Type Selection Guidelines for Category B systems," and shall follow ASTM F1947 Appendix X1.2.2, "Fully Deteriorated Design Condition;" or ASTM F1867 Appendix X1.2.3, "Fully Deteriorated Design Condition." Design calculations shall provide groundwater table elevation at crown of pipe. Design calculations shall use a HL-93 traffic loading, which may be ignored after 8 feet of cover, except for multiple barrel rehabs, where it shall continue indefinitely. Assume the total wet unit weight of soil is 120 pcf, or 135 pcf when saturated. Use a factor of safety of N = 2.0.

Modulus of soil reaction for design shall be as follows:

Cover (ft)	Modulus ¹ (ksi)
0-5	1.8
>5-10	2
>10-30	2.2
>30-60	2.6
>60	2.8

¹Based on VDOT pipe installation standards

Any voids around exterior of host pipe shall be filled, or design assumptions will be considered invalid.

3. **Category C - High Density Polyethylene (HDPE), Polyvinylchloride (PVC) or Polypropylene (PP) Slip Liners** - The Contractor shall submit design calculations demonstrating the liner system conforms to the requirements of this Section.

The liner system shall conform to Drainage Manual, Chapter 8, Section 8.3.6.7 - Table A, "Flexible Liner (Method B) Type Selection Guidelines for Category C systems," and shall follow AASHTO LRFD Bridge Design Specifications, Section 12 . Spirally wound liners shall meet ASTM F1697 and F1741. The Contractor shall provide Standard Dimension Ratio (SDR) and outside diameter of pipe, for solid wall pipe; and outside diameter, inside diameter, diameter to centroid of wall, moment of inertia, and gross and effective areas of wall, for corrugated or profile wall pipe. Design calculations shall provide groundwater elevation at crown of pipe. Design calculations shall use a HL-93 traffic loading, which may be ignored after 8 feet of cover, except for multiple barrel rehabs where it shall continue indefinitely. Assume the total wet unit weight of soil is 120 pcf, or 135 pcf when saturated.

Constrained soil modulus for design shall be as follows:

Cover (ft)	Modulus* (ksi)
0-5	1.8
>5-10	2
>10-30	2.2
>30-60	2.6
>60	2.8

*Based on VDOT pipe installation standards

Long term modulus shall be used for stiffness computation. The following factors shall be used in the design calculations:

Factor	Value
Shape	3.0
Live Load Distribution	1
Deflection Lag	1.5
Bedding	0.1
Installation	1.5
Poisson's ratio of soil	0.3
Earth load modifier	1.05
Live load modifier	1.0
Manning's number for open channel	
Smooth interior PVC	0.011
Smooth interior HDPE and PP	0.012

Maximum deflection, deflection needed in any computations, and service long-term tension strain limit shall be 5 percent for PE, and either 5 percent or 3.5 percent for PVC depending on cell class as per AASHTO LRFD Bridge Design Specifications, Table 12.12.3.3.1, and 3.5 percent for PP.

Any voids around exterior of host pipe shall be filled, and the annular space between host pipe and liner pipe shall be fully grouted, or the design assumptions will be considered invalid.

- 4. Category D - Spray-On liners** - The Contractor shall submit design calculations demonstrating the liner system conforms to the requirements of this Section.

The liner system shall conform to Drainage Manual, Chapter 8, Section 8.3.6.7 - Table A, "Flexible Liner (Method B) Type Selection Guidelines for Category D systems." Because of the variety of spray-on liners available, several design options may be used. Design options, as described herein, are based on AASHTO LRFD Bridge Design Specifications, Section 12. For cementitious liners, design shall follow that for concrete pipe using D-load test data from manufacturer. For other liners (i.e., polyurea, epoxy, etc.), design shall be guided similarly to fiberglass pipe (high modulus material) or simply as plastic pipe if flexural modulus or ring bending strain results are not satisfactory.

A. **Cementitious liner shall be treated similarly as fiberglass pipe (this method is based on the AASHTO LRFD Bridge Design Specifications, Section 12, for fiberglass pipe).**

The flexibility factor for fiberglass pipe shall be determined in accordance with AASHTO LRFD Bridge Design Specifications, Article 12.12.3.6, but with the modulus replaced by flexural modulus, and the flexibility factor shall be limited as specified in Article 12.5.6.3 therein. Follow AASHTO LRFD Bridge Design Specifications Section 12.12.2.2 for deflection, except replace modulus with flexural modulus (ksi) and drop the “ $e_{sc}D$ ” term.

Factored long term strain due to flexure shall be less than or equal to $0.9 \times S_b$ (S_b is ring bending strain). Factored buckling strain demand shall be less than or equal to $0.7 \times$ nominal strain capacity for buckling demand, computed per Eqn. 12.12.3.10.1e-2, except replace modulus with flexural modulus and soil resistance factor shall be 1.0. Factored buckling strain shall be:

$$\epsilon_{bck} = \frac{(13.65 \times H_c + 1.75 \times P_L)r}{M_f \times A}$$

Where:

H_c = Height of Cover in feet

r = radius of liner to centroid in inches

M_f = Flexural modulus (ksi)

A = Cross sectional area of liner (in^2/in)

P_L = Live load (psi) determined from Article 12.6.1 of the AASHTO LRFD Bridge Design Specifications

Flexural modulus shall be determined from pipe stiffness tests and per Appendix 2 of ASTM D2412, and shall be at least 1,200 ksi. Long term ring bending strain, S_b , shall be determined in accordance with ASTM D5365 and results extrapolated to both 50 years and 75 years, and shall be at least 0.006.

It is recognized that for a spray-on product, obtaining specimens for *flexural modulus and ring bending strain tests would require special formwork at a fabrication facility. Similarly, as is done for watertight joint testing*, these tests may be done and witnessed by a PE and a report submitted, which may then be used as proof of results without having to perform the tests for each future project, as long as materials and processes have not changed. Application thicknesses not tested may be interpolated by a method satisfactory to the Department. Extrapolation beyond thicknesses tested will not be permitted on the thin side, and will only be permitted for thicker applications by satisfactory statistical data.

Design calculations shall provide groundwater table elevation at crown of pipe. Design calculations shall use a HL-93 traffic loading, which may be ignored after 8 feet of cover, except for multiple barrel rehabs, where it shall continue indefinitely. Assume the total wet weight of soil is 120 pcf, or 135 pcf when saturated. Use a factor of safety of $N = 2.0$.

Modulus of soil reaction for design shall be as follows:

Cover (ft)	Modulus* (ksi)
0-5	1.8
>5-10	2
>10-30	2.2
>30-60	2.6
>60	2.8

*Based on VDOT pipe installation standards

The following factors shall be used in the design calculations:

Factor	Value
Shape	3.0
Live Load Distribution	1
Deflection Lag	1.5
Bedding	0.1
Installation	1.5
Poisson's ratio of soil	0.3
Earth load modifier	1.05
Live load modifier	1.0

Maximum deflection and deflections needed in any computations shall be 5 percent.

Any voids around exterior of host pipe shall be filled, or design assumptions will be considered invalid.

B. Other liner types treated similarly as fiberglass pipe

Any other liner types being treated similarly as fiberglass pipe shall follow the same requirements as for cementitious liner treated similarly as fiberglass pipe, outlined in Paragraph A, herein.

C. Other liner types treated same as plastic (HDPE, PVC, or PP) pipe

Any other liner types being treated similarly as plastic pipe shall follow AASHTO LRFD Bridge Design Specifications, Section 12, for thermoplastic pipe, and the requirements of Paragraph 3 herein.

IV. GENERAL PROCEDURES

The Contractor shall submit site specific working drawings (and supporting calculations) to the Engineer for the rehabilitation method selected by the Contractor from the allowable methods cited for each location listed in the Contract at least 1 week prior to the start of pipe rehabilitation operations. Working drawings shall be prepared and submitted according to the requirements herein and Section 105.10 of the Specifications.

The Contractor shall also furnish to the Engineer a certification of suitability for the proposed rehabilitation system to provide the necessary hydraulic capacity and structural strength required to support the anticipated total load and hydrology at the site of rehabilitation. This certificate of suitability shall be determined from an analysis that has been signed and sealed by a Professional Engineer holding a valid license to practice engineering in the Commonwealth of Virginia. Such certification shall cover all design data and supporting calculations for the planned rehabilitation methodology and materials. In addition to the Professional Engineer's certification of the structural strength to support the anticipated total load, a load rating shall be submitted. The load rating calculations shall be in accordance with VDOT Structure and Bridge Division requirements.

All work and equipment shall be contained within the existing right-of-way. In the event the Contractor deems a temporary construction easement necessary due to the selected method or product chosen by the Contractor, the Contractor shall obtain such additional easement for the Contractor's convenience at no additional cost to the Department.

The Contractor shall maintain all lanes of traffic at all times in accordance with the Contract unless otherwise directed by the Engineer. This maintenance of traffic shall include temporary detours if required by the Contractor's method of operations to facilitate construction where permitted by the locality and the Department. When temporary detours are required, the Contractor shall design and construct

temporary detours in accordance with Section 105.14 and Section 512 of the Specifications, and Standard GS-10 of the Standard Drawings.

The Contractor shall notify the Engineer at least 48 hours prior to the initiation of rehabilitation operations at each location.

In the event the selected method of rehabilitation requires disturbing existing surfaces or disturbs existing surfaces, these surfaces shall be restored in kind to their original pre-construction conditions after rehabilitation operations have been completed. The cost thereof shall be included in the price bid for Pipe Rehabilitation for the specified location.

The Contractor shall obtain all required OSHA confined space entry permits where these are required by the Contractor's operations and the scope of work in the Contract. The Contractor shall schedule and arrange the work so as not to be delayed by the acquisition of the proper permits.

The Department has performed an inspection of the existing pipes in each location listed in the Contract to determine the extent and nature of each pipe's deterioration or damage so as to designate the allowable methods of rehabilitation for the pipe at that specific site. Using the information collected from this inspection, the Department has determined, through its engineering analysis, the best practical methods of rehabilitation for each respective site (location) taking into account site specific conditions such as installation working space for the various types of liners, hydraulic capacity before and after rehabilitation, height of cover, soil density, and loading conditions, among other criteria. The Contractor shall determine how he plans to perform the work from the allowable methods and categories for each specified location or site indicated in the Contract. Regardless of the final method selected, the Contractor shall provide the Engineer documentation of the Contractor's proposed procedures, materials, equipment, incidentals, and resources the Contractor plans to use to ensure successful rehabilitation of the existing pipes to assist the Engineer in monitoring the Contractor's operations. The Contractor will not be permitted to substitute a different method or category, if designated, than that or those specified for the location described in the Contract.

The Contractor shall clear the existing pipe of any debris, protrusions higher than 1/2 inch, and any other potential obstructions prior to the start of rehabilitation efforts. The Contractor shall then thoroughly clean and prepare the host pipe prior to the liner installation. Cleaning shall conform to the recommendations or instructions of the liner manufacturer, producer, or supplier of the methodology planned for use. In the absence of such recommendations, the Contractor shall submit his proposed method for cleaning and preparing the host pipe for the Engineer's review and acceptance. A copy of the proposed cleaning methodology and materials shall be provided to the Engineer at least two working days prior to beginning the work at that location.

Contractor Pre-Installation Inspection – The Contractor shall perform a pre-installation visual or video inspection at the designated location of each pipe shown in the Contract not later than 1 week after cleaning the host pipe at that location. This visual or video inspection shall be conducted in accordance with the requirements of this specification and VTM 123 to verify pre-rehabilitation conditions. The inspection shall be performed in the presence of the Engineer. Video inspections shall be clearly labeled on the recording media with the actual time, date, and location of the pipe inspected. A copy of the video inspection shall be furnished to the Engineer prior to the start of rehabilitative construction. The cost of pre-Installation Inspection will be considered incidental to the cost of the rehabilitation. In the event the Contractor's inspection shows the method of rehabilitation the Contractor had selected from the allowable methods is no longer viable at that location (as verified by the Engineer), the Contractor shall select another allowable method, if specified, from those designated in the Contract. If no other method is designated, or if other methods of rehabilitation are also now deemed impracticable at that location, further work will be determined in accordance with Section 104.03 of the Specifications.

V. PROCEDURES FOR APPROVED METHODS

The following methods of pipe rehabilitation are approved by the Department; however, not all methods may be appropriate for each individual location shown in the Contract. The Contractor shall consult the Contract to determine the methods (and categories if designated) that are permitted per the designated location. Individual methods shall conform to the criteria specified.

1. PIPE LINER METHODS

- A. **Method A - Corrugated steel pipe liner** shall be rehabilitation by insertion of a rigid corrugated steel pipe liner through an existing host pipe (36" diameter or larger corrugated or concrete pipe). Where required, pipe shall be joined by the use of coupling bands of an internal expansion type that shall provide a leak-proof joint after grouting.

Expansion devices shall be installed above the mid-point of the pipe. After the Engineer approves installation and alignment of the liner within the host pipe, the Contractor shall fully grout the annular space between the existing pipe and the liner with cement grout meeting Section II-1 herein. Prior to grouting, the annular space shall be adequately sealed at each end. Plug holes required for injection of grout shall be satisfactorily plugged and sealed following the grouting operation.

- B. **Method B - Flexible pipe liner** shall be rehabilitation by the insertion of a flexible pipe liner into a host pipe. Method B rehabilitation, as indicated in the Contract, shall be accomplished by the use of the following categories of liner:

- Category A – Cured-In-Place Pipe (CIPP)
- Category B – Fold and Form flexible liners
- Category C – High Density Polyethylene (HDPE), Polyvinyl chloride (PVC), or polypropylene PP slip liners
- Category D – Spray-On liners

Installation and curing requirements of pipe sections for the various flexible pipe liners shall be according to the manufacturer instructions for the specific product as applicable. Joints shall meet the requirements of Section 30 of the AASHTO Bridge Construction Specifications and leak resistance as defined in AASHTO PP 63-09.

The Contractor shall furnish all information for the liner system the Contractor proposes to use to include, as applicable, individual components of the system, tube type (whether reinforced or non-reinforced), manufacturer name, type of resin including catalyst and proprietary chemicals, and the volume of resin required to achieve proper impregnation and curing, and installation instructions. All components of the system, including lot number and expiration date, shall be as recommended by the manufacturer for the specific system proposed for use. The Contractor shall submit such documentation and instructions from the manufacturer to the Engineer at least 3 working days prior to the start of installation to verify compliance with the requirements of this paragraph. The various categories of flexible liners shall conform to the following:

- (1) **Method B, Category A – Cured-In-Place Pipe (CIPP) liner method.** The Cured-In-Place Pipe liner system shall be designed, fabricated, and installed in such a manner as to result in a maintained, full contact, tight mechanical fit to the internal circumference of the host pipe for its entire length. The installation shall adhere to the cure times and temperatures stipulated in the manufacturer's recommended installation and cure specifications. The finished product shall be free of de-lamination, bubbling, rippling, or other signs of installation failure.

Pulled-in-place liner installation must be accomplished without significant liner twisting or stretching during installation. At no time shall the pulling force for liner installation exceed that established by the liner manufacturer.

All Cured-In-Place Pipe installations shall be performed in the dry. The Contractor shall consider the cost to accommodate this requirement as incidental to the cost of the installation.

Curing for styrene-based, epoxy-based, and vinyl ester-based CIPP may be accomplished by water, steam, or ultraviolet light and shall be according to the liner manufacturer's instructions.

The Contractor shall submit preconstruction installation and cure specifications (to include site specific cure time and temperature calculations) and design calculations (stamped by a licensed Professional Engineer) to the Engineer a minimum of 3 working days prior to the proposed start of the liner installation.

The Contractor shall place an impermeable sheet or other impermeable device immediately upstream and downstream of the host pipe prior to liner insertion to capture any possible raw resin spillage during installation. During and after installation the Contractor shall promptly remove and properly dispose of any waste materials. Where the pulled-in-place method of installation is used, the Contractor shall install a semi-rigid plastic slip sheet over any interior portions of the host pipe that could tear the outer film and any significant voids in the host pipe. The Contractor shall ensure there is no loss of impermeability of the inner and outer plastic films or pre-liner during installation. The Contractor shall promptly repair any pinholes or tears in the plastic films or pre-liner before proceeding with the installation. Where such damaged areas cannot be repaired, the Contractor shall promptly replace the impermeable plastic films or pre-liner before proceeding with the installation.

The Contractor shall not perform work without oversight of the Engineer or Inspector for the duration of the installation.

The Contractor shall monitor temperature via a minimum of three thermocouples on the outer surface of the liner (one each at the upstream and downstream ends and one approximately mid-length of the host pipe) and automatically log cure time-temperature data with a print-out from the data logger and provide such information to the Engineer.

The Contractor shall obtain and comply with all discharge-related permits, including air, water, and wastewater treatment (i.e. Publicly Owned Treatment Works). For any discharge to a Publicly Owned Treatment Works (POTW), the Contractor shall obtain advanced written approval from the receiving facility for acceptance of effluent waste before repair work can start and shall provide such documentation of the POTW discharge approval to the Engineer prior to the start of the installation.

The Contractor shall capture and properly dispose of all cure water or steam condensate and be responsible for the proper transportation and off-site disposal of process residuals. The Contractor shall provide disposal documentation from the receiving facility to the Engineer. The Contractor shall comply with all the requirements of the POTW receiving the discharge.

The Contractor shall thoroughly rinse the cured lined pipe with clean water and capture and properly dispose of rinse water prior to re-introducing flow.

For styrene-based CIPP and vinyl ester-based CIPP, the Contractor shall employ the services of a qualified independent environmental services laboratory or environmental

consultant to collect the samples specified below. The Contractor shall submit a completed Form C-9A to the recipients specified on the form within 4 weeks after completion of rehabilitation.

Water samples shall be collected within 3 feet of the pipe ends both before rehabilitation, and within one week after the pipe liner has cured in accordance with applicable monitoring requirements listed in 40 CFR Part 136. If samples cannot be collected from within 3 feet of the pipe ends, the Contractor shall collect them from as close to the pipe ends as possible. If water is not available to sample, samples of rinse water shall be used for the analyses. For all CIPP liners, water samples shall be analyzed for total organic carbon using EPA 9060a, chemical oxygen demand using EPA 410.3, temperature, and pH. Temperature and pH shall be determined on site using applicable methods listed in 40 CFR Part 136. For styrene-based liners, water samples shall also be analyzed for styrene using USEPA SW 846 Method 8260. Styrene concentrations in water samples shall not exceed 2.5 mg/L. For vinyl ester-based liners, samples shall also be analyzed for diallyl phthalate, which shall not exceed 0.4 mg/L. The Contractor shall submit a completed Form C-9A to the recipients specified on the form within 4 weeks after completion of the rehabilitation. Form C-9A is available from the VDOT website.

It shall be the Contractor's responsibility to report and take appropriate corrective actions to contain and remediate any release of contaminants from cured-in-place process materials, effluent or condensate into the environment in accordance with applicable local, state or federal regulations and the Contract. The cost for such remediation shall be at the Contractor's expense.

- (2) **Method B, Category B - Fold and form flexible liners** shall be installed in accordance with the requirements of ASTM F1216, ASTM F2019, ASTM F1743, or ASTM D5813 (as applicable) or as recommended by the liner manufacturer.
- (3) **Method B, Category C - High Density Polyethylene (HDPE), Polyvinyl chloride (PVC), or polypropylene (PP)** slip liners shall be installed in accordance with the requirements of AASHTO M326 or in accordance with ASTM F1698 as applicable, or as recommended by the liner manufacturer. Cement grout used for filling the annular space shall meet Section II-1 herein.
- (4) **Method B, Category D - Spray-On cementitious and polyurea liners** shall be installed in accordance with the liner material manufacturer's instructions, and the Contract.

The Contractor shall perform all installations in the dry. The Contractor shall thoroughly rinse the lined pipe with clean water and capture and properly dispose of rinse water prior to re-introducing flow. The Contractor shall install a temporary curtain at the outlet and inlet to prevent overspray during installation. The Contractor shall reinstate water flow no sooner than 24 hours following installation.

- (a) **For cementitious spray-on liners**, the Contractor shall prevent the escape of any rinse water from the lined pipe or otherwise capture it until the Contractor can either: pump it to a container for proper transportation and off-site disposal; or continuously monitor the pH of the rinse water until the pH is less than 9, whereupon the Contractor may release it.
- (b) **For polyurea spray-on liners**, the Contractor shall employ the services of a qualified independent environmental services laboratory or environmental consultant to collect the samples specified below.

Water samples shall be collected within 3 feet of the pipe ends both before rehabilitation, and within one week after the pipe liner has cured in accordance with applicable monitoring requirements listed in 40 CFR Part 136. If samples cannot be collected from within 3 feet of the pipe ends, they shall be collected from as close to the pipe ends as possible. If water is not available to sample, samples of rinse water shall be used for the analyses. Samples shall be analyzed for total methylene diphenyl diisocyanate (MDI), methylenedianiline (MDA), and total cyanide. Concentrations of MDI and MDA in water samples shall not exceed 1,000 mg/L and 39 mg/L respectively. Water characterization for chemical oxygen demand (COD) using EPA 410.3 and total nitrogen (TN) concentrations using EPA 351.2 shall also be conducted. The Contractor shall submit a completed Form C-9A to the recipients specified on the form within 4 weeks after completion of rehabilitation. Form C-9A is available from the VDOT website.

It shall be the Contractor's responsibility to report and take appropriate corrective actions to remediate any water quality alteration resulting from the lining materials in accordance with applicable local, state or federal regulations. The cost for such remediation shall be at the Contractor's expense.

- C. **Method C – Smooth wall steel pipe liner** shall be rehabilitation by the insertion of a smooth wall steel pipe into the existing host pipe. Where required, liner pipe shall be joined by butt welds in accordance with AWWA C-206.

The Contractor shall fully grout the annular space between the existing host pipe and the steel liner with cement grout meeting Section II-1 herein. The annular space between the existing pipe and the smooth wall steel liner shall not exceed 3 inches at any given point, unless otherwise approved by the Engineer. Prior to grouting, the annular space shall be sealed at each end of the host pipe. Holes required to facilitate injecting grout shall be plugged and sealed following grouting operations. In order to ensure stability during placement, the wall thickness of the liner shall not be less than 1/2 inch.

2. **POST INSTALLATION INSPECTION OF FLEXIBLE LINERS** – The Contractor shall perform a post-installation inspection on all flexible liners installations in accordance with Section 302.03(d) of the Specifications and Virginia Test Method (VTM) 123. To be acceptable, the finished liner shall be continuously intact, fit snug tight against the host pipe over its entire length, and be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination.

In the event a post inspection of the installation reveals a tight fit of the liner was not achieved in localized areas of the host pipe (comprising less than 20 percent of the pipe length), the annular space between the liner and the host pipe shall be filled with a resin mixture or a non-shrink cementitious grout as specified by the manufacturer that is compatible with the liner system at no cost to the Department.

Where a tight mechanical fit was not achieved on more than 20 percent of the host pipe's length, the annular space shall be filled as designated herein; however, the Contractor will not be allowed to continue with his methodology of installation or the liner system used until the Contractor can demonstrate to the Engineer that the Contractor's choice of liner system, installation methods or operations have been remedied to the extent that they can consistently result in a continuous snug tight mechanical fit between the installed liner and the host pipe for the full length of the host pipe. All such remedial efforts shall be at the Contractor's expense. Further failure to perform a proper installation may result in the disallowance of the use of that liner system and an adjustment in the cost or non-payment of the failed installations depending on the severity of the failure. Adjustment or nonpayment of the installation will be at the sole discretion of the Engineer.

In the event the post installation inspection is not conducted until all or most of the locations in the Contract permitting this methodology have been performed, and the inspection reveals a tight fit between host pipe and liner has not been achieved on 25 percent or more of the host pipe's length or the finished liner is not free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination, then an adjustment in the cost or non-payment of the failed installations maybe made by the Engineer depending on the severity of the failure.

The cost of the post installation inspection will be considered incidental to the cost of the liner installation.

VI. MEASUREMENT AND PAYMENT

Pipe rehabilitation will be measured and paid for in linear feet of pipe for the size, method, and category (if specified) as detailed in the Contract. At locations shown in the Contract where multiple methods are permitted, the Contractor may select from any of the methods specified (subject to the limitations described herein) however, if only one method is specified, this will be the only method permitted by the Department at that location. This price shall include pre installation visual or video inspection; cleaning and preparation of the host pipe; furnishing and installing the liner including coupling and expansion devices; cement grout; design and shop drawing preparation; furnishing and installing liner and all components of the liner system; capturing any discharges or releases during installation or curing operations; obtaining any local POWT, local, state, or federal permits required to perform the work; furnishing any documentation or fees required for effluent or condensate disposal; all testing and sampling including furnishing reports and post installation visual or video inspections for flexible liners; and waste disposal costs.

Prices for pipe rehabilitation shall also include clearing debris and obstructions; excavating when not designated as a separate pay item attributable to this specific work; sheeting; shoring; dewatering; disposing of surplus and unsuitable material; providing backfill material and backfilling; compaction, and restoring existing surfaces.

Payment will be made under:

Pay Item	Pay Unit
Pipe Rehabilitation (Size, Method, Category)	Linear Foot

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 305 – SUBGRADE AND SHOULDERS

SECTION 305 – SUBGRADE AND SHOULDERS of the Specifications is amended as follows:

Section 305.02 – Materials is replaced with the following:

- (a) **Materials** may consist of material in place, treated material in place, or imported material. Imported material may be borrow material, select material, or other material as shown on the plans or specified in the Contract.

Materials other than regular excavation or borrow material that are shown on the Plans or specified in the Contract shall conform to the applicable requirements of these Specifications.

- (b) **Geotextile** materials used for subgrade stabilization or separation shall conform to Section 245.03(d).

Section 305.03(d) – Geotextile (Subgrade Stabilization) is renamed **Geosynthetics** and replaced with the following:

Geosynthetics includes Geotextile used for subgrade separation or stabilization, and geogrid.

1. **Subsurface preparation:** Before placing the geotextile, geogrid, or combination of both, prepare the subgrade in accordance with Sections 304 and 305. Separation and stabilization geotextiles shall not be placed when weather conditions, in the judgement of the Engineer, are not suitable to allow placement of geotextiles or cover materials. These include wet or snowy conditions, rainfall, temperatures below freezing, frost, or excessively windy conditions.
2. **Geotextile or geogrid placement.** Place geogrid on top of geotextile when both are shown at the same elevation in the Plans. Place the geosynthetic in the direction of traffic. Geosynthetic shall be smooth and free of wrinkles and folds. Placement by dragging the geosynthetic across the finished surface will not be allowed. On curves, the geotextile may be folded or cut to conform to the curve. The fold or overlap shall be in the direction of traffic and held in place by pins, staples or piles of aggregate subbase or base materials. Overlap in the direction of construction. Overlap at least 24 inches at the ends and sides of adjoining sheets or sew the joints according to the Manufacturer's recommendations. Do not place longitudinal overlaps below anticipated wheel loads or joints. Hold the geosynthetic in place with pins, staples, or piles of aggregate subbase or base materials.

Replace or repair geosynthetic that is torn or punctured. Remove the damaged area and place a patch of the same type of geosynthetic overlapping 36 inches beyond the damaged area or sew a seam around the entire perimeter of the damaged area.

3. **Initial layer placement and compaction:** Place initial layer in accordance with Sections 308 and 309.

If during placement of the geosynthetic, the equipment causes subgrade rutting in excess of 2 inches, end dump the backfill material onto the geotextile or geogrid from the edge of the geosynthetic or from previously placed cover material. Do not operate equipment directly on the geosynthetic. Spread the end-dumped pile of cover material maintaining the minimum specified lift thickness over the geosynthetic. Avoid sudden stops, starts, or turns of the construction equipment. Fill ruts from construction equipment with additional cover material. Do not blade material down to remove ruts. If rutting continues to exceed 2 inches during

placement, decrease the construction equipment size, decrease the equipment weight, or increase the first lift thickness as directed by the Engineer.

Compact in accordance with Sections 308 and 309. Do not use sheepsfoot or studded compaction equipment. Compact the cover material with pneumatic-tire or non-vibratory smooth drum rollers.

Tracked equipment shall not be operated directly on top of geosynthetic. Rubber-tire equipment may pass over the geosynthetic if the geosynthetic is not damaged by the equipment (causing excessive rutting, 2 inches or greater); the Contractor shall specifically avoid sudden braking or sharp turning, and shall maintain low speed.

4. **Subsequent layer placement and compaction.** Place and compact subsequent layers in accordance with Sections 308 and 309.

Section 305.04 – Measurement and Payment is amended by replacing the tenth paragraph with the following:

Geotextile will be measured in square yards, complete-in-place. Overlaps and seams will not be measured for separate payment. The accepted quantity of geotextile will be paid for at the contract square yard price. This price shall include furnishing, placing, lapping, and seaming material.

Section 305.04 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Geotextile (Subgrade stabilization)	Square yard

The following pay items are inserted:

Pay Item	Pay Unit
Geotextile (type)	Square yard

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SECTION 315.05(c) PLACING AND FINISHING is modified by replacing the third paragraph with the following:

The longitudinal joint in one layer shall offset that in the layer immediately below by approximately 6 inches or more. The joint in the wearing surface shall be offset 6 inches to 12 inches from the centerline of the pavement if the roadway comprises two traffic lanes. The joint shall be offset approximately 6 inches from the lane lines if the roadway is more than two lanes in width. The longitudinal joint shall be uniform in appearance. On all roads except secondary routes, if the offset for the longitudinal joint varies from a straight line more than 2 inches in 50 feet on tangent alignment, or from a true arc more than 2 inches in 50 feet on curved alignment, the Contractor shall seal the joint using a water-proof sealer at no cost to the Department. The Contractor shall recommend a sealant and installation procedure to the Engineer for approval before proceeding. On all roads except secondary routes, if the offset for the longitudinal joint varies from a straight line more than 3 inches in 50 feet on tangent alignment, or from a true arc more than 3 inches in 50 feet on curved alignment, the Engineer may reject the paving. The Engineer will not require offsetting layers when adjoining lanes are paved in echelon and the rolling of both lanes occurs within 15 minutes after laydown.

1-18-17 (SPCN)

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 315 – ASPHALT CONCRETE PLACEMENT

SECTION 315 – ASPHALT CONCRETE PLACEMENT of the Specifications is amended as follows:

Section 315.04(b)2 – When the base temperature is between 40 degrees F and 80 degrees F is renamed **When the base temperature is between 40°F and 80°F** and replaced with the following:

When the base temperature is between 40°F and 80°F the Contractor shall use Table III-2 to determine the minimum laydown temperature of the asphalt concrete mixes. At no time shall the base temperature for base (BM) and intermediate (IM) mixes be less than 40°F. At no time shall the laydown temperature for base (BM) and intermediate (IM) mixes be less than 250°F.

The minimum base and laydown temperatures for surface mixes (SM) shall never be less than the following:

PG Binder/Mix Designation	Percentage of Reclaimed Asphalt Pavement (RAP) Added to Mix	Minimum Base Temperature	Minimum Placement Temperature
PG 64S-22 (A)	<=25%	40°F/50°F ^{1,2}	250°F/270°F ^{1,2}
PG 64S-22 (A)	>25%	50°F ²	270°F ²
PG 64H-22 (D)	<=30%	50°F ²	270°F ²
PG 64E-22 (E)	<=15%	50°F ²	290°F ²
PG 64S-22 (S)	<=30%	50°F ²	290°F ²

¹Minimum base temperature 50°F and placement temperature 270°F for SM-4.75 mixes regardless of WMA use.

²For SM-4.75 mixes, the temperatures are the minimum base temperature and placement temperature regardless of WMA use.

The Contractor shall employ a MTV during the placement of SM-4.75 mixtures when the ambient or base temperature is between 50°F and 60°F.

Section 315.05(b) – Conditioning Existing Surface is amended by replacing the second paragraph with the following:

When specified in the Contract, before placement of asphalt concrete, the Contractor shall seal longitudinal and transverse joints and cracks by the application of an approved crack sealing material in accordance with Section 322 .

Section 315.05(d) – Compacting is amended by inserting the following after the seventh paragraph:

For SM-4.75 mixes, breakdown rolling shall be accomplished with steel wheel rollers with a minimum weight of 10 tons. SM-4.75 mixes shall receive at least three breakdown roller passes before intermediate and finish rolling.

Table III-3 – Density Requirements is replaced with the following:

**TABLE III-3
Density Requirements**

Mixture Type	Min. Control Strip Density (%) ¹
SM-9.5A, 12.5A	92.5

SM-9.5D, 12.5D	92.5
SM-9.5E, 12.5E	92.5
IM-19.0A, IM-19.0D, IM-19.0E	92.2
BM-25.0A, BM-25.0D	92.2

¹The control strip density requirement is the percentage of Theoretical Maximum Density (TMD) of the job-mix formula by SUPERPAVE mix design or as established by the Engineer based on two or more production maximum theoretical density tests.

Table III-4 – Payment Schedule for Lot Densities is renamed **Payment Schedule for Control Strips** and replaced with the following:

TABLE III-4
Payment Schedule for Control Strips

% TMD	% of Payment
Greater than 96.5	95
92.2 ¹ /92.5 ² – 96.5	100
90.0-92.1 ¹ /92.4 ²	90
88.0-89.9	80
Less than 88.0	75

¹For IM and BM mixes only.

²For SM mixes only.

Table III-4A – Payment Schedule for Method A Lot Densities is inserted as follows:

TABLE III-4A
Payment Schedule for Method A Lot Densities

% TMD	% of Payment
Greater than 96.5	95
92.2 ¹ /92.5 ² – 96.5	100
90.0 – 92.1 ¹ /92.4 ²	90
88.0 – 89.9	80
Less than 88.0	75

¹For Intermediate and Base Mixes only.

²For Surface Mixes only.

Table III-4B – Payment Schedule for Method B Lot Densities is inserted as follows:

TABLE III-4B
Payment Schedule for Method B Lot Densities

% of Target Control Strip Density	% of Payment
Greater than 102.0	95
98.0 to 102.0	100
97.0 to less than 98.0	95
96.0 to less than 97.0	90
Less than 96.0	75

Table III-5 – Payment Schedule for Surface, Intermediate and Base Courses is replaced with the following:

TABLE III-5
Payment Schedule for Surface, Intermediate and Base Courses (Not sufficient quantity to perform density roller pattern and control strip)

% TMD	% of Payment
Greater than or equal to 92.2 ¹ /92.5 ²	100

90.0-92.1 ¹ /92.4 ²	90
88.0-89.9	80
Less than 88.0	75

¹The minimum TMD percentage for Intermediate and Base Mixes

²The minimum TMD percentage for Surface Mixes

Table III-6 – Payment Schedule for Surface, Intermediate and Base Courses is replaced with the following:

TABLE III-6
Payment Schedule for Surface, Intermediate and Base Courses
(Asphalt Patching)

% TMD	% of Payment
Greater than or equal to 91.5	100
90.2-91.4	95
88.3-90.1	90
Less than or equal to 88.2	75

Section 315.05(e) – Density is replaced with the following:

Density will be determined in accordance with Method A for all interstate and limited access routes, and for primary and secondary routes with an ADT of at least 2,000 and at least 20' in width. Method B will be used for all other routes. Control Strips will not use Method A or B, but will use the methods described in Section 315.05(e)1a.

1. The Contractor shall perform roller pattern and control strip density testing on surface, intermediate, and base courses in accordance with VTM 76. The Contractor shall have a certified Asphalt Field Technician II perform all density testing.

Density shall be determined with a thin-lift nuclear gauge conforming to VTM 81 or from the testing of plugs or cores taken from the roadway where the mixture was placed. Density test locations shall be marked and labeled in accordance with VTM 76. When acceptance testing is performed with a nuclear gauge, the Contractor shall have had the gauge calibrated within the previous 12 months by an approved calibration service. In addition, the Contractor shall maintain documentation of such calibration service for the 12-month period from the date of the calibration service. The required density of the compacted course shall not be less than 98.0 percent or more than 102.0 percent of the target control strip density.

Nuclear density roller pattern and control strip density testing shall be performed on asphalt concrete overlays placed directly on surface treatment roadways and when overlays are placed at an application rate less than 125 pounds per square yard, based on 110 pounds per square yard per inch, on any surface. In these situations, the Engineer will not require sawed plugs or core samples and the minimum control strip densities as specified in Table III-3 will not be required. The required density of the compacted course shall not be less than 98.0 percent or more than 102.0 percent of the target control strip.

The Engineer will divide the project into “control strips” and “test sections” for the purpose of defining areas represented by each series of tests.

- a. **Control Strip:** Control strips shall be constructed in accordance with the Specifications and VTM 76.

The term *control strip density* is defined as the average of 10 determinations selected at stratified random locations within the control strip.

The Contractor shall construct one control strip at the beginning of work on each roadway and shoulder course and on each lift of each course. The Engineer will require the Contractor to construct an additional control strip whenever a change is made in the type or source of materials; whenever a significant change occurs in the composition of the material being placed from the same source; or when there is a failing test strip. During the evaluation of the initial control strip, the Contractor may continue paving operations, however, paving and production shall be discontinued during construction and evaluation of any additional control strips. If two consecutive control strips fail, subsequent paving operations shall not begin or shall cease until the Contractor recommends corrective actions to the Engineer and the Engineer approves the Contractor proceeding with the corrective actions. If the Contractor and the Engineer mutually agree that the required density cannot be obtained because of the condition of the existing pavement structure, the target control strip density shall be determined from the roller pattern that achieves the optimum density and this target control strip density shall be used on the remainder of the roadway that exhibits similar pavement conditions.

Either the Engineer or the Contractor may initiate the construction of an additional control strip at any time.

The length of the control strip shall be approximately 300 feet and the width shall not be less than 6 feet. On the first day of construction or beginning of a new course, the control strip shall be started between 500 and 1,000 feet from the beginning of the paving operation. The Contractor shall construct the control strip using the same paving, rolling equipment, procedures, and thickness as shall be used for the remainder of the course being placed.

The Contractor's Asphalt Field Level II Technician shall take one reading at each of 10 stratified random locations. No determination shall be made within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of any application width for base mixes. The average of these 10 determinations shall be the control strip density recorded to the nearest 0.1 pound per cubic foot. The minimum control strip density shall be determined in accordance with VTM 76.

The control strip shall be considered a lot. If the control strip density conforms to the requirements in Table III-3, the Engineer will consider the control strip to be acceptable and the control strip density shall become the target control strip density.

If the Engineer determines that the control strip requirements in Table III-3 cannot be met due to in-situ pavement conditions, Method 'B' will be used for acceptance and payment and density adjustments will be waived.

Otherwise, if the density does not conform to the requirements specified in Table III-3, the tonnage placed in the control strip and any subsequent paving before construction of another control strip will be paid for in accordance with Table III-4. The Contractor shall take corrective action to comply with the density requirement specified in Table III-3.

- b. **Test section (lot):** For the purposes of both contractor quality control and for determining acceptance, the Engineer will consider each day's production as a lot unless the paving length is less than 3,000 feet or more than 7,500 feet, regardless of the method of acceptance (Method A or B). When paving is less than 3,000 feet, that day's production will be combined with the previous day's production or added to the next day's production to create a lot as described below.

The standard size of a lot will be 5,000 feet (five 1,000-foot sublots) of any pass 6 feet or greater made by the paving train for the thickness of the course. If the Engineer approves, the lot size may be increased to 7,500 feet with five 1,500-foot sublots when the

Contractor's normal daily production exceeds 7,000 feet. Pavers traveling in echelon will be considered as two passes. When a partial lot occurs at the end of a day's production or upon completion of the project, the lot size will be redefined as follows:

- If the partial lot contains one or two sublots, the sublots will be added to the previous lot.
- If the partial lot contains three or four sublots, the partial lot will be redefined to be an entire lot.

The Contractor shall test each lot for density by taking a nuclear density gauge reading from two random test sites selected by the Engineer within each subplot. When saw plugs or cores are used to determine acceptance, a single test site per subplot will be selected by the Engineer. Test sites will not be located within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of any application width for base mixes.

The Engineer will compare the average of the subplot density measurements to the target nuclear density, or for plugs and cores, to the target percent of theoretical maximum density achieved on the control strip to determine the acceptability of the lot. The Contractor shall immediately notify the Engineer and institute corrective action if two consecutive sublots produce density results less than 98% or more than 102% of the target control strip density.

Density testing for acceptance will not be performed on areas too thin or irregular to test accurately, such as open-graded friction courses, and wedge-and-leveling courses. Areas that are difficult to compact due to subgrade support or space limitations, including but not limited to crossovers and gore areas, will be placed in accordance with Section 315.05(e)2.

For purposes of density determination, acceptance, and payment, Main Pavement is defined to include travel lanes, shoulders 6 feet or greater, turn lanes, ramps, and acceleration/deceleration lanes.

(1) Method 'A' (plugs or cores)

Any pay adjustment will only be applied to Main Pavement.

The Contractor shall perform acceptance testing for density for each subplot by obtaining one plug, defined as a sawed 4-inch by 4-inch specimen, or one 4-inch-diameter core, at a single random test site selected by the Engineer. More than one plug or core can be taken if the original sample is damaged.

The sub-lot site shall be marked as described in VTM 76. The bulk specific gravity of the plugs or cores shall be determined in accordance with VTM 6. The density of the plugs or cores shall be determined in accordance with VTM 22, except that the daily Rice values obtained by the contractor for the mix will be used for calculating percent density (instead of using the 5-day running average as noted in VTM 22).

Plugs or cores shall be taken from the pavement and bulked in the presence of the Engineer unless otherwise approved. The Department reserves the right to have the plugs or cores bulked on the project site. In the event of any uncertainty around the bulking procedures or results, the Department further reserves the right to re-bulk the samples. The Contractor will have the right to witness the re-bulking. The Contractor

will be responsible for maintaining the cores until approved for disposal by the Department.

The Contractor shall number subplot test sites sequentially per lot, mark these on the pavement, fill them with the paving mixture, and compact them prior to the completion of each day of production.

The Contractor shall clean and straighten any irregular edges before filling and compacting. Liquid tack material shall be applied so it visibly covers all plug or core hole surfaces (sides, bottom, etc.). Hot mix asphalt paving mixture available on the same day of paving, or other permanent patching material as approved by the Engineer, shall be placed into the plug or core hole and compacted with a 10-pound weighted hand tool or greater compactive effort with rollers or other equipment available on-site and approved by the Engineer.

The tonnage of each lot for the pay adjustment will be based on the lot's width and length and the mixture application rate as designated in the Contract or as revised by the Engineer. Payment will be made in accordance with Table III-4A.

If a minimum of 80% of each test section lot's core/plug samples is no lower than 92.5% of TMD for Surface Mixes and 92.2% of TMD for Intermediate and Base Mixes and the lot average results in 100% payment, then the Engineer will increase the unit bid price for AC mixture by 5%. BM-25.0D+0.4 and BM-25.0D+0.8 shall not be eligible for five percent pay increase.

Longitudinal joints shall also be tested for density using a nuclear density gauge at each test site in the subplot. For surface and intermediate mixes, the edge of the gauge shall be placed within 4 inches of the joint. For base mixes, the edge of the gauge shall be placed within 6 inches of the joint. The Contractor shall not place the gauge over top of the joint. The joint density value shall be recorded. The Contractor shall report to the Engineer and institute corrective action if a single longitudinal joint density reading is less than 95% of the target control strip density. The Engineer will not use the values obtained from the joint readings in payment calculation. The Contractor shall furnish the test data developed during the day's paving to the Engineer by the end of the day's operations.

(2) Method 'B' (nuclear gauge)

Any pay adjustment will only be applied to Main Pavement.

The Contractor shall test each lot for density by taking a nuclear density gauge reading from two random test sites selected by the Engineer within each subplot. Test sites will not be located within 12 inches of the edge of any application width for surface and intermediate mixes or within 18 inches of the edge of any application width for base mixes.

The Engineer will compare the average of the subplot density measurements to the target nuclear density, or for cores, to the target percent of theoretical maximum density achieved on the control strip to determine the acceptability of the lot. Once the average density of the lot has been determined, the Engineer will not allow the Contractor to provide additional compaction to raise the average. The Contractor shall immediately institute corrective action if two consecutive sublots produce density results less than 98% or more than 102% of the target control strip density.

Longitudinal joints shall also be tested for density using a nuclear density gauge at each test site in the subplot. For surface and intermediate mixes, the edge of the gauge shall be placed within 4 inches of the joint. For base mixes, the edge of the gauge shall be placed within 6 inches of the joint. The Contractor shall not place the gauge over top of the joint. The joint density value shall be recorded. The Contractor shall report to the Engineer and institute corrective action if a single longitudinal joint density reading is less than 95 percent of the target control strip density. The Engineer will not use the values obtained from the joint readings in payment calculation. The Contractor shall furnish the test data developed during the day's paving to the Engineer by the end of the day's operations.

The tonnage of each lot for the pay adjustment will be based on the lot's width and length and the mixture application rate as designated in the Contract or as revised by the Engineer. Payment will be made in accordance with the requirements of Table III-4B.

(3) Verification, Sampling, and Testing (VST)

The Engineer at any time on any project may perform lot density verification testing regardless of whether Method A or B is being used for density acceptance. Lot density verification is performed by testing plugs or cores. The Contractor shall be responsible for taking plugs or cores for testing. The Engineer will perform verification testing of the plugs or cores.

On surface, intermediate, and base mixes, the Contractor shall take two plugs or cores per VST lot at locations selected by the Engineer. If the Engineer determines the density of the plugs or cores does not conform to the requirements for the lot in question or the same payment percentage determined by the Contractor's testing for that lot, then the Contractor may request additional sampling to be invoked. The Contractor shall take one additional plug or core from the remaining sublots. Payment for that lot, based on the results of the initial two plugs or cores or referee procedure, will be in accordance with the Table III-4A for Method A on the basis of the percentage of the theoretical maximum density or Table III-4B for Method B on the basis of the percentage of the control strip bulk density achieved.

2. **Surface, intermediate, and base courses** not having a sufficient quantity of material to run a roller pattern and control strip, and unique sections defined on the Plans or within the Contract that are 3,500 feet or less and at least 6 feet in width shall be compacted to a minimum density of 92.5% for surface mixes or 92.2% for intermediate and base mixes as determined in accordance with VTM 22. The Contractor shall be responsible for cutting cores or sawing plugs for testing by the Department. One plug or core shall be obtained within the first 500 feet of small quantity paving and every 1000 feet thereafter for testing by the Department. Plug or core locations shall be randomly selected by the Engineer. If the density is determined to be less than the minimum, the Engineer will make payment in accordance with Table III-5.

Any section in which a mixture (e.g., SM-9.0) is being placed at an application rate of less than 125 pounds per square yard (based on 110 pounds per square yard per inch) that does not have a sufficient quantity of material for a roller pattern and control strip shall be compacted by rolling a minimum of three passes with a minimum 8-ton roller. The Engineer will not require density testing.

For asphalt patching, the minimum density of 91.5% of the maximum theoretical density will be determined in accordance with VTM 22. The Contractor is responsible for cutting cores or sawing plugs. One set of cores or plugs shall be obtained within the first 20 tons of patching material and every 100 tons thereafter for testing by the Contractor or the Department. The Engineer will randomly select plug or core locations. If the density is less than the 91.5%,

payment will be made on the tonnage within the 20 or 100 ton lot in accordance with Table III-6.

Section 315.05(g) – Rumble Strips is replaced with the following:

Rumble Strips: This work shall consist of constructing rumble strips or rumble stripes on mainline shoulders or centerlines of highways by cutting concave depressions into existing asphalt concrete surfaces as shown on the Standards Drawings and as directed by the Engineer. Rumble stripes are defined as edgeline or centerline rumble strips with permanent longitudinal pavement markings subsequently installed within the rumble strip grooves.

Rumble strips and rumble stripes shall be installed in accordance with the RS-Series Standard Drawings. The Contractor shall demonstrate to the Engineer the ability to achieve the desired surface regarding alignment, consistency, and conformity with these Specifications and the Standard Drawings before beginning production work on mainline shoulders or centerlines. The test site shall be approximately 25 feet longitudinally at a location mutually agreed upon by the Contractor and Engineer.

Pavement markings for rumble stripes shall be applied after the grooves have been cut. The grooves shall be thoroughly cleaned and the surface prepared before pavement marking application, in accordance with the Standard Drawings and Section 704. Overspray of pavement marking materials shall not extend more than one inch beyond the lateral position of the pavement marking line shown in the RS-Series Standard Drawings.

Rumble strips shall not be installed on shoulders of bridge decks, in acceleration or deceleration lanes, on surface drainage structures, or in other areas identified by the Engineer.

Waste material resulting from the operation shall be removed from the paved surface and shall be disposed of in accordance with Section 106.04.

Section 315.05(i) – Coating designed surface cuts is inserted as follows:

Designed Surface Cuts are roadway features installed by cutting or grinding into a road surface, for example, Rumble strips, rumble stripes, and plastic inlaid marker grooves.

Designed Surface Cuts shall be coated with liquid asphalt coating (emulsion) when the Designed Surface Cuts are being cut into an existing asphalt surface (i.e. more than one year since placement); when new Designed Surface Cuts are being cut into the pavement surface in conjunction with a surface treatment, latex emulsion, or slurry seal pavement operation; or when the proposed plant mix surface is less than one inch deep.

Liquid asphalt coating (emulsion) shall not be used when Designed Surface Cuts are being cut into new pavement, or being cut in conjunction with plant mix paving operations where the proposed plant mix surface is one inch or greater in depth.

When liquid asphalt coating (emulsion) is required, the Contractor shall coat the entire rumble strip area with the liquid asphalt coating (emulsion) using a pressure distributor following the cutting and cleaning of the depressions of waste material. For rumble strips installed on the shoulder, the approximate application rate shall be 0.1 gallons per square yard. For centerline rumble stripes and plastic inlaid marker grooves, the approximate application rate shall be 0.05 gallons per square yard. The application temperature shall be between 160 degrees F and 180 degrees F. For shoulder rumble strips and plastic inlaid marker grooves, overspray shall not extend more than 2 inches beyond the width of the cut depressions and shall not come in contact with pavement markings.

If liquid asphalt coating (emulsion) is applied before installation of the plastic inlaid marker, then the bottom of the plunge cut shall be protected during liquid asphalt coating (emulsion) application so as to avoid inhibiting the ability of the marker epoxy to bond to the bottom of the plunge cut. If the liquid asphalt coating (emulsion) is applied after the plastic inlaid marker has been installed, then the retroreflector shall be protected during the liquid asphalt coating (emulsion) application to prevent the coating material from dirtying or damaging the retroreflector, with the protection removed after the coating has been completed.

Section 315.08 – Measurement and Payment is amended by replacing the third paragraph with the following:

Liquid Asphalt Cement, when a pay item, will be measured in tons in accordance with Section 109.01 except that transporting vehicles shall be tare weighed before each load. When used in the mixture, the weight will be adjusted in accordance with the percentage of asphalt indicated by laboratory extractions.

Section 315.08 – Measurement and Payment is amended by deleting the sixth paragraph.

Section 315.08 – Measurement and Payment is amended by replacing the tenth paragraph with the following:

Liquid asphalt coating will be measured in square yards and will be paid for at the Contract square yard price. This price shall include cleaning Designed Surface Cuts before application of the coating, furnishing and applying coating , and protection of all retroreflectors.

Section 315.08 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Liquid asphalt coating (Rumble strips)	Square yard
Rumble Strip (Asphalt)	Linear foot

The following pay items are inserted:

Pay Item	Pay Unit
Liquid asphalt coating (type)	Square yard
Rumble Strip (shape, pavement type)	Linear foot

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 316 – HYDRAULIC CEMENT CONCRETE PAVEMENT

SECTION 316 – HYDRAULIC CEMENT CONCRETE PAVEMENT of the Specifications is amended as follows:

Section 316.06 – Measurement and Payment is amended by inserting the following:

Corrosion resistant reinforcing steel used in Bridge Approach Slabs will be measured in pounds and will be paid for at the Contract pound price for the class and grade of steel designated. This price shall include fabricating, shipping, furnishing, and placement in the locations shown in the Plans.

Section 316.06 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are inserted:

Pay Item	Pay Unit
Corrosion resistant reinforcing steel (class, grade) bridge approach slab	Pound

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 319 – THIN HOT MIX ASPHALT CONCRETE OVERLAY

SECTION 319 – THIN HOT MIX ASPHALT CONCRETE OVERLAY of the Specifications is inserted as follows:

319.01 – Description

This work shall consist of the production and placement of a Thin Hot-Mix Asphalt Concrete Overlay (THMACO) according to the Plans, Specifications, and as directed by the Engineer.

319.02 – Materials

- (a) **Asphalt cement** shall be a performance graded asphalt (PG) 64V-28 conforming to AASHTO M 332 and Section 210 or as designated by the Engineer
- (b) **RAP:** Recycled asphalt pavement material will not be permitted.
- (c) **Coarse aggregate** shall conform to Section 203 or as directed by the Engineer. Water Absorption when tested according to AASHTO T 85 shall be at most 2%. Material retained on the No. 4 sieve and larger sieves shall conform to the following when tested according to ASTM D4791:

Flat & Elongated Ratio	Maximum Content
3:1	25%
5:1	10%

- (d) **Fine aggregate** shall conform to Section 202, except for grading, which shall be tested according to AASHTO TP 33 (Method A) with a value of at least 45% and a sand equivalent value of at least 50 when tested according to AASHTO T 176.
- (e) **Mineral filler** shall conform to Section 201.
- (f) **Fiber additive** when required shall be cellulose or mineral fiber approved by the Engineer based on supplier's certification of properties and documentation of success in similar applications in hot mix asphalt.
- (g) **Antistripping additive** shall be used. It may be hydrated lime or a chemical additive from the Department's Approved List 7 or a combination of both. The approved chemical additive shall be added at a rate of not less than 0.30% by weight of the total asphalt content of the mixture. The mixture shall produce a tensile strength ratio (TSR) of at least 0.80 for the design and production tests. The TSR shall be determined according to AASHTO T 283, including a freeze-thaw cycle (4-inch specimens compacted with a Marshall Hammer or 3.5 by 6-inch specimens when compacted with a gyratory compactor); except that the 16-hour curing time requirement and the 72 to 96-hour storage period will not be enforced by the Department. Design tests shall use the same materials that are to be used in the production mix and shall be conducted in a laboratory approved by the Department.

When a chemical additive is used, it shall be added to the asphalt cement prior to the introduction of the asphalt cement into the mix. Any chemical additive or particular concentration of chemical additive found to be harmful to the asphalt material or that changes the original asphalt binder performance grade (PG) shall not be used.

- (h) **Hydrated lime** shall conform to ASTM C977. Hydrated lime shall be added at a rate of at least 1% by weight of the total dry aggregate.

A separate bin or tank and feeder system shall be provided to store and accurately proportion the dry or slurried lime into the aggregate. The lime and aggregate shall be mixed by pugmill or other Department approved means to achieve a uniform lime coating of the aggregate before entering the drier. If lime is added in dry form, the aggregate shall contain at least 3% free moisture. The Department will not permit the stockpiling of lime treated aggregate.

The feeder system shall be controlled by a proportioning device, which shall be accurate to within ± 10 percent of the specified amount. The proportioning device shall have a convenient and accurate means of calibration. A flow indicator or sensor shall be provided with the proportioning device and interlocked with the plant controls, aggregate feed, or weigh system, such that production of the mixture shall be consistently maintained and, if there is a stoppage of the lime feed, interrupted.

The method of introducing and mixing the lime and aggregate shall be subject to approval by the Engineer before beginning production.

319.03 – MIX FORMULA

The Contractor shall submit for the Engineer's approval, a job mix formula within the following design ranges of percent passing each sieve size as noted:

Sieve Size	Percent By Weight Passing Square Mesh Sieves	Production Tolerance (Single Test)
1/2 in	100	-2
3/8 in	85-100	± 5
#4	25-40	± 4
#8	19-32	± 4
#16	15-23	± 3
#30	10-18	± 3
#50	8-13	± 3
#100	6-10	± 2
#200	4-7	± 1
Asphalt Content, %		Production Tolerance (Single Test)
5.0 – 5.5 ¹		± 0.2

¹Target asphalt content shall result in a minimum film thickness of 9 microns.

In addition to the job mix submittal, the Contractor shall submit ignition furnace calibration data according to VTM 102 and aggregate property test results prepared by an approved testing laboratory for the aggregate components or aggregate blend.

Job mixes outside the above design range will be considered by the Engineer based on mix performance documented by the supplier to eliminate or minimize flushing or visual deficiencies and may include changes to gradation, asphalt content or the use of fibers. The Engineer may require limited production of less than 300 tons for verification of an acceptable mix, before the Engineer's approval of the job mix.

319.04 – SURFACE PREPARATION

Before beginning paving operations, the existing pavement surface shall be cleaned of all accumulated dust, mud, vegetation or other debris, which may affect the bond of the THMACO by the Contractor.

Pavement cracks or joints 1/4-inch or more in width shall be cleaned and filled with a sealant material conforming to Section 322.04. Quantities and payment will be according to Section 322.

Pavement markers, thermoplastic pavement marking and tape pavement markings shall be removed before beginning paving operations. Pavement irregularities greater than 1 inch in depth shall be filled with a material designated in the Contract or approved by the Engineer. Payment for the material will be according to Section 315.

Utility structures shall be protected and referenced before paving for location and adjustment (when necessary) after paving at no cost to the Department.

319.05 – Tack Coat

Unless otherwise directed in the contract, two options for placing the tack coat are available.

- (a) **Option 1:** A tack coat of asphalt emulsion conforming to Section 210(e) or other emulsion approved by the Engineer shall be applied before placement of the asphalt concrete. The tack coat shall be placed within 10 seconds of placing the THMACO unless otherwise directed by the Engineer. At no time should any part of the paving machine come into contact with the tack coat before the overlay is applied. The emulsion shall be uniformly applied with a paver spray bar, except hand spray equipment may be used in areas inaccessible to the paver spray bar as directed by the Engineer; inaccessible areas are exempt from the 10-second criterion. The emulsion asphalt shall be applied at a temperature recommended by the supplier at a starting rate of 0.25 gallons per square yard ± 0.02 unless otherwise approved by the Engineer.
- (b) **Option 2:** An hot-applied Non-Tracking tack coat conforming to Section 310 and listed on Approved List 50.1A shall be applied before placement of the THMACO. The tack coat shall be uniformly applied with a spray bar paver or a mechanical distributor, except hand spray equipment may be used in areas inaccessible. The tack coat shall be applied at a temperature recommended by the supplier at a residual rate of 0.14 gallons per square yard ± 0.02 unless otherwise approved by the Engineer.

319.06 – Placement of Hot Mix Asphalt

The application rates of the overlay shall range from 80 pounds per square yard to 85 pounds per square yard in order to result in a 3/4-inch compacted lift thickness.

The thin lift of hot mix asphalt shall be placed by a paver designed for the placement of thin lifts as designated in the contract. The asphalt mix shall be delivered to the paver hopper at a temperature of 315°F $\pm 15^\circ\text{F}$ measured in the paver hopper. The paver shall be capable of placing the asphalt mix at a speed of 30 feet per minute. When the base temperature is 50°F or above, placement of the asphalt concrete wearing course will be permitted.

319.07 – Compaction

Two steel double drum rollers weighing no less than 10 tons shall perform compaction of the asphalt mix. No less than two passes shall be completed before the surface temperature of the asphalt has reached 185°F.

319.08 – Acceptance

The Contractor shall perform gradation and asphalt cement content tests on one sample taken in a random manner approved by the Engineer from each 500 tons of production. The material will be considered acceptable for gradation and asphalt content, if the results obtained are within the tolerance allowed from the job mix formula in the above table. Material represented by test results outside the tolerance may be removed and replaced with acceptable material by the Contractor at no additional cost to the Department at the discretion of the Engineer.

Should visual examination by the Engineer reveal that the material in any load, or portion of the paved roadway is contaminated, segregated, or flushed with asphalt cement, that load, or portion of the paved roadway may be rejected without additional sampling of the material.

319.09 – Warranty

The Contractor shall provide a one-year warranty from the date of final acceptance on all THMACO surfaces. The Department will periodically monitor the overlay surface installed throughout the warranty period for compliance and acceptability. The Contractor shall repair any area that fails before the end of the warranty period and shall do so within 14 days after Department notification unless otherwise directed by the Department. Failure of the THMACO surface is defined as the loss of adhesion of the material to the underlying layer resulting in a pothole greater than 1 square foot of area (delamination). The Engineer shall notify the Contractor of the date for the warranty inspection at the end of the warranty period and the Contractor shall be present at the inspection.

319.10 – Measurement and Payment

Thin hot mix asphalt concrete will be measured in tons and paid for at the contract unit price per ton, which shall include warranty, tack coat, surface preparation (except crack and joint sealing), all materials, additives, labor and equipment as described herein to install and complete the work.

Crack and joint sealing will be paid according to Section 322.

Payment will be made under:

Pay Item	Pay Unit
Thin Hot Mix Asphalt Concrete	Ton

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 320 – BM-25.0D WITH INCREASED ASPHALT CONTENT

SECTION 320 – BM-25.0D WITH INCREASED ASPHALT CONTENT of the Specifications is inserted as follows:

320.01 – Description

This work shall consist of supplying, testing and installing asphalt concrete base with additional asphalt binder. BM-25.0D with additional asphalt binder content (BM-25.0D+0.4 and BM-25.0D+0.8) shall conform to all of the requirements of a standard BM-25.0D in Section 211 except as provided herein.

Construction and Acceptance of one or more courses of asphalt concrete consisting of BM-25.0D+0.4 or BM-25.0D+0.8 asphalt concrete base shall be according to BM-25.0D in Section 315 and the density specified herein.

320.02 – Materials

Materials shall conform to Section 211 and 315.02.

320.03 – Job Mix Formula

The mixes shall conform to all of the requirements of a standard BM-25.0D in Section 211 except as noted herein.

An equivalent single axle load (ESAL) will be established by the Engineer and the mix types may be specified as one of the types listed in Table III-7.

**TABLE III-7
Mix Design Requirements**

Mix Type	Equivalent Single Axle Load (ESAL) Range (millions)	Final Asphalt Performance Grade (PG)	NMA ¹
BM-25.0D (+0.4 and +0.8)	All ranges	64H-16	1"

¹Nominal Maximum Aggregate Size (NMA) is defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

To determine the asphalt binder content for the BM-25.0D plus additional asphalt binder, an approved BM-25.0D conforming to Section 211 will be used to determine the optimum asphalt binder content and aggregate gradations. While the optimum asphalt binder content for the BM-25.0D will be selected at 2.5% in accordance with Section 211, the initial asphalt binder content for the BM-25.0D+0.4 or BM-25.0D+0.8 will be selected using the 3.5% air voids. The additional asphalt binder (0.4% or 0.8%) will be added to the initial asphalt binder content at 3.5% air voids in order to establish the design asphalt binder content.

During production the BM-25.0D+0.4 and BM-25.0D+0.8 mixes shall be controlled according to Table III-8.

**TABLE III-8
Production Criteria**

Mix Type	VTM Production (%)	VFA (%)	Min. VMA (%)	Fines/Asphalt Ratio	Number of Gyration	
					N Design	N Initial

BM-25.0D+0.4	1.0 – 4.0	67 – 92	12.0	0.6 – 1.3	65	7
BM-25.0D+0.8	0.5 – 3.5	67 – 92	12.0	0.6 – 1.3	65	7

The Laboratory mixing temperature shall be 310°F to 320°F and the compaction temperature shall be 295°F to 300 °F for both testing and design.

Field correction factor. The field correction factor is determined by subtracting the bulk specific gravity of the aggregate from the effective specific gravity of the aggregate determined at the JMF asphalt binder content achieved.

**TABLE III-8A
Recommended Performance Grade of Asphalt Binder**

Mix Type	Percentage of Reclaimed Asphalt Pavement (RAP) in Mix	
	%RAP < 25.0	25.0 ≤ %RAP ≤ 35.0
BM-25.0D (+0.4 and +0.8)	PG 64H-22	PG 64S-22

320.04 – Testing

When asphalt binder is extracted and recovered according to AASHTO T 170, the recovered asphalt binder shall meet the required grade specified in Table III-7.

320.05 – Acceptance and Adjustment

Acceptance and adjustments shall be according to BM-25.0D in Section 211.08 and 211.09.

320.06 – Density

Density shall be determined in accordance with Section 315.05(e). The minimum density requirements for BM-25.0D+0.4 and BM-25.0D+0.8 are shown in Table III-9.

**TABLE III-9
DENSITY REQUIREMENTS**

Mixture Type	Minimum Control Strip Density (%) ¹
BM-25.0D+0.4	94.0
BM-25.0D+0.8	96.0

¹The control strip density requirement is the percentage of theoretical maximum density of the job mix formula by SUPERPAVE® mix design or as established by the Engineer based on two or more production maximum theoretical density tests.

320.07 – Measurement and Payment

BM-25.0D+0.4 and BM-25.0D+0.8 will be measured in tons and paid for at the Contract ton price. This price shall include all materials and labor specified in Section 315 as modified in this Section for asphalt concrete base.

Payment will be made under:

Pay Item	Pay Unit
Asphalt Concrete Base Course Type BM-25.0D+0.4	Ton
Asphalt Concrete Base Course Type BM-25.0D+0.8	Ton

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 321 – TRENCH WIDENING

SECTION 321 – TRENCH WIDENING of the Specifications is inserted as follows:

321.01 – Description

This work shall consist of installing asphalt into a constructed trench to widen shoulders and travel lanes in accordance with the Plans and Specifications and as directed by the Engineer.

321.02 – Material

- (a) **Materials** shall conform to Section 211.02 and 315.02.
- (b) **Trench widening material** IM-19.0A shall be used for IM-19.0A(T) and IM-19.0D shall be used for IM-19.0D(T). Where BM-25.0(T) is designated, either BM-25.0A or BM-25.0D shall be used by the Contractor.

321.03 – Placement Limitations

The Contractor shall not place asphalt concrete mixtures when weather or surface conditions are such that the material cannot be properly handled, finished, or compacted. The surface upon which asphalt mixtures is to be placed shall be free of standing water, dirt, and mud and the base temperature shall conform to Section 315.04.

321.04 – Procedure

- (a) **Trench Widening Route Types:** The minimum lift density as determined according to VTM 22 is based on the type of trench widening as defined below and specified in the Contract. Where trench widening is 2 feet in width compaction may be performed with small single drum walk-behind rollers or other mechanical means acceptable to the Engineer.
1. **Type 1: Paved Shoulder Only** shall be installed on routes where the widening will serve as a paved shoulder and will not be subjected to constant traffic. The painted edge line will not be on the trench widening. The minimum density requirement will not be enforced for this type of trench widening. Steel double drum rollers weighing at least 8 tons shall perform compaction of the asphalt concrete. At least five passes shall be completed.
 2. **Type 2: Widened Travel Lane and Paved Shoulder** shall be installed on routes where the widening will serve as a wider travel lane and paved shoulder that will be subjected to traffic. The widening will not include removal of existing travel lane pavement, i.e., inside the edge line marking. The painted edge line will be on the trench widening. The minimum density applies to this type of trench widening.
 3. **Type 3: Repaired Travel Lane and Paved Shoulder** shall be used on routes where the widening will include a portion of the existing travel lane, serve as a paved shoulder and will be subjected to traffic as a part of the travel lane. The widening will include removal of existing pavement, i.e., inside the edge line marking. The painted edge line will be on the trench widening. The minimum density applies to this type of trench widening.
- (b) Trench widening routes shall be widened by trenching on one or both sides of the existing roadway and placing Trench Widening Material in accordance with the width and depth specified for that route.

Any remaining material, after final grading, shall be classified as excess material, and will be disposed of according to Section 106.04 of the Specifications or as directed by the Engineer.

The trench shall be shaped to have vertical sides with the width, depth and type specified in the Contract (2-foot minimum to 6-foot maximum width); be free of excess material; and shall be tacked against the existing pavement side before Trench Widening Material is placed.

The Contractor shall ensure that disruption to driveways, entrances, mailboxes, and intersections are minimized and that precautions are taken to ensure that roadway drainage does not pond on the roadway surface.

321.05 - Acceptance

Where density requirements apply, the Contractor is responsible for cutting cores or sawing plugs for density testing. One set of plugs or cores per course of material shall be obtained within the first 500 feet and every 2,500 feet thereafter of the trench widening route for testing by the Contractor or the Department. Core and plug locations shall be randomly selected within each section. If the density achieved is less than 91.5% of the maximum theoretical density for the Type 2 or 3 trench widening routes, payment adjustment will be made on the actual tonnage within the 500- or 2,500-foot lot according to Table III-6.

321.06- Measurement and Payment

Asphalt Concrete Type BM-25.0(T), IM-19.0A(T) or IM-19.0D(T) will be measured in tons and will be paid for at the Contract ton price. This price shall include furnishing and placing the Trench Widening Material, trenching, tack, grading and disposing of excess material.

Payment will be made under:

Pay Item	Pay Unit
Asphalt Concrete Type BM-25.0(T)	Ton
Asphalt Concrete Type IM-19.0A(T)	Ton
Asphalt Concrete Type IM-19.0D(T)	Ton

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 322 – ASPHALT SURFACE PREPARATION AND OVERLAY

SECTION 322 – ASPHALT SURFACE PREPARATION AND OVERLAY of the Specifications is inserted as follows:

322.01 – Description

This work shall consist of preparation of existing pavement before resurfacing, and placement of asphalt concrete overlay pavement courses on existing paved roadway surfaces. This work shall be performed in accordance with Sections 211 and 315, Sections 248 and 317 where Stone Matrix Asphalt (SMA) is specified, and as specified herein. Where pavement planing is required it shall be performed in accordance with Section 515 and as specified herein. This work is applicable only to the routes or areas designated to be overlaid in the Contract and as authorized by the Engineer.

322.02 – Materials

- (a) **Asphalt concrete** shall conform to Section 211. Stone Matrix Asphalt (SMA) shall conform to Section 248.
- (b) **Asphalt for Tack Coat** shall conform to Section 210 and shall be applied in accordance with Section 310.
- (c) **Type A Crack Sealant** shall be a hot-poured modified asphalt rubber with granulated crumb rubber and latex plasticizers and shall conform to ASTM D6690. The proportions of the materials, by weight, shall be up to 80% asphalt and up to 25% crumb rubber.
- (d) **Type B Crack Sealant** material shall consist of PG 64H-22 and polyester fibers from the Department's Approved List 32. The Contractor shall provide the PG 64H-22 suppliers data for heating. Fibers shall not exceed 5% by weight. Fiber loading will be determined at the project site in order to minimize the need for over banding as described. The fiber loading shall be approved by the Engineer before use.
- (e) **Type C Crack Sealant** material shall consist of PG 64H-22 and polyester fibers from the Department's Approved List 32 at 5% by weight. The Contractor shall provide the PG 64H-22 suppliers data for heating.
- (f) **Crumb rubber** shall be 100 percent vulcanized rubber and conform to the following gradation requirements:

Sieve	Percent Passing
No. 10	100%
No. 40	0-40%

322.03 – Equipment

Equipment for furnishing and placing asphalt concrete overlay shall conform to Section 315. Equipment for furnishing and placing Stone Matrix Asphalt (SMA) shall conform to Section 317. Pavement planing equipment shall conform to Section 515.

Proper crack sealing equipment must be used for the specific material listed according to the manufacturer's recommendations for the Sealant specified. The equipment for hot applied sealant compounds shall be a melting kettle of double boiler, indirect heating type, using oil as a heat-transfer medium. The kettle shall

have an effective mechanically operated agitator, a re-circulation pump and shall be equipped with a positive thermostatic temperature control which shall be checked for calibration before beginning work. The unit shall be capable of maintaining the specified mixing temperature within 10°F. Manufacturer's recommendations for mixing and application temperatures shall be followed with the latter being measured at the nozzle of the applicator wand. Overheating or direct heating of the sealant material will not be permitted. The hoses, connectors and applicator wand shall all be insulated.

322.04 – Sealing Cracks in Asphalt Concrete Surfaces or Hydraulic Cement Concrete Pavement

Type A crack sealant materials shall be used on pavements which will not be overlaid with asphalt concrete within one year. Type B crack sealant material shall be used to fill cracks in pavements that will be overlaid with asphalt concrete within one year. Type C crack sealant shall be used when routing, cleaning, and sealing cracks in asphalt concrete surfaces that may or may not be overlaid within one year. The Contract will designate which sites are to use each material. Cracks ranging in width from 1/8 inch to 1-1/2 inches shall be sealed. Cracks that exceed 1-1/2 inches are not included for crack sealing.

The sealant shall not be placed when the ambient or pavement temperatures fall below 45°F, or when moisture is present in the crack to be sealed.

Before sealing, cracks shall be thoroughly cleaned as approved by the Engineer using an oil free hot air blasting heat lance capable of a velocity of 3000 fps at 300°F. Cracks shall be cleaned such that all dirt, debris, moisture and other foreign materials that will prevent bonding of the sealant are removed to a minimum depth of 1 inch. All foreign material (i.e., dirt, grass, rocks) shall be removed from the pavement to prevent re-contamination of the crack. Cracks shall be completely dry before sealing. Any crack not meeting the approval of the Engineer shall be re-cleaned and dried.

The sealant shall be pumped directly into the crack from the heater-melter unit at the temperature specified by the manufacturer immediately following the cleaning of each crack. Cracks shall be sealed using the methods herein as approved by the Engineer.

- (a) **Type A crack sealant** shall be installed from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface, and the sealant shall overlay the crack at the pavement surface leaving a maximum "over-banded" appearance of 1-inch wide on each side of the crack. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch. For this method of sealing, the applicator wand shall be equipped with a shoe that will produce the extruded over-band as well as completely fill the crack.
- (b) **Type B crack sealant** shall be installed from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface. The sealant may overlay the surface on each side of the by no more than 1/2 inch or leave a no "over-banded" appearance. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch. For this method of sealing, the applicator wand shall be equipped with a shoe that will minimize the extruded over-band as well as completely fill the crack.
- (c) **Type C crack sealant:** Before sealing, the cracks shall be routed to a minimum depth of 1 inch and to a minimal width of 1/2 inch. Cracks shall be filled from the bottom up in a continuous manner such that the crack is completely filled level with the pavement surface, and the sealant shall overlay the crack at the pavement surface leaving a no "over-banded" appearance. The material shall not continue to flow beyond these limits once a crack is sealed. The height of the sealant above the pavement surface shall not exceed 1/8 inch.

Before starting each day's operation, the applicator wand and hose shall be heated in accordance with the equipment manufacturer's recommendations and the material in the heater-melter unit re-circulated.

The applicator wand shall be returned to the mixing unit and the sealant material re-circulated immediately upon completion of each crack sealing.

Any crack in hydraulic cement concrete pavement which cannot be filled due to the sealant draining into a large void, shall be plugged with a suitable material (i.e. backer rod) approved by the Engineer before the project, and then filled. After being plugged, recleaning of the crack may be required before filling with sealant.

The Contractor shall measure and record the temperature of the material on 2-hour intervals during the heating and application of the crack sealing material. For Type A material, the material shall never be heated over 420°F. For Type B and C material, the material shall not be heated above 375°F. Any material heated above these temperatures shall be discarded (i.e. all material in the heater-melter unit) at no expense to the Department. Additionally, if the material becomes lumpy or has poor flow at elevated temperature, then the material shall be discarded (i.e. all material in the heater-melter unit) at no expense to the Department.

Traffic shall be kept off the pavement surface until the crack sealant has cured to the point it will not track or be distorted by traffic. The Contractor shall replace, at his or her expense, any sealant that pulls out within 96 hours after opening the pavement to traffic.

322.05 – Asphalt Concrete Scratch/Leveling Course Before Resurfacing

Scratching or leveling a crack sealed, scabbed or distorted pavement surface (milled or unmilled) shall be done using the appropriate asphalt mixes in areas designated by the Engineer. Scratching and leveling shall only be applicable to the routes or areas designated to be overlaid in this contract and where the Engineer has authorized the limits. Scratching and leveling shall be completed before the overlay paving operation.

- (a) **Scratch/level Type I** is a localized scratch and level of the pavement, including crack sealed, distorted or scabbed areas, making up no more than 50% of the surface area to be overlaid in each distinct paving site or location on the Contract.
- (b) **Scratch/level Type II** is a widespread scratch and level of the pavement, including crack sealed, distorted or scabbed areas, making up more than 50% of the surface area to be overlaid in each distinct paving site or location on the Contract.

For surfaces that will receive a direct overlay, the Engineer will designate the limits of surface area for scratch/leveling course to be installed before beginning the work. For pavements that are milled, the Engineer will identify and designate the limits of surface area for scratch/leveling course to be placed as the work progresses in accordance with Section 105.03.

Areas designated for scratch/leveling course shall be thoroughly cleaned before applying tack coat.

A tack coat shall be applied to all exposed surfaces of the area which will receive asphalt material according to Section 310.

Asphalt concrete scratch or leveling material shall be the surface mix asphalt designated in the contract or as approved by the Engineer. SMA shall not be used as a scratch/leveling course material. Limestone mixes (L) may be used in leveling courses when approved by the Engineer.

Asphalt material shall be placed in a lift of no more than 2 inches in depth; typical lifts are approximately 1 inch in depth. Asphalt may be placed with variable depth thickness as necessary for leveling. After each lift, it shall be compacted with equipment according to Section 315.03(c) using a minimum of 3 passes of a minimum 8 ton roller. Density testing will not be required. Care shall be taken to ensure the surface of the finished repaired area conforms to the grade of the surrounding pavement.

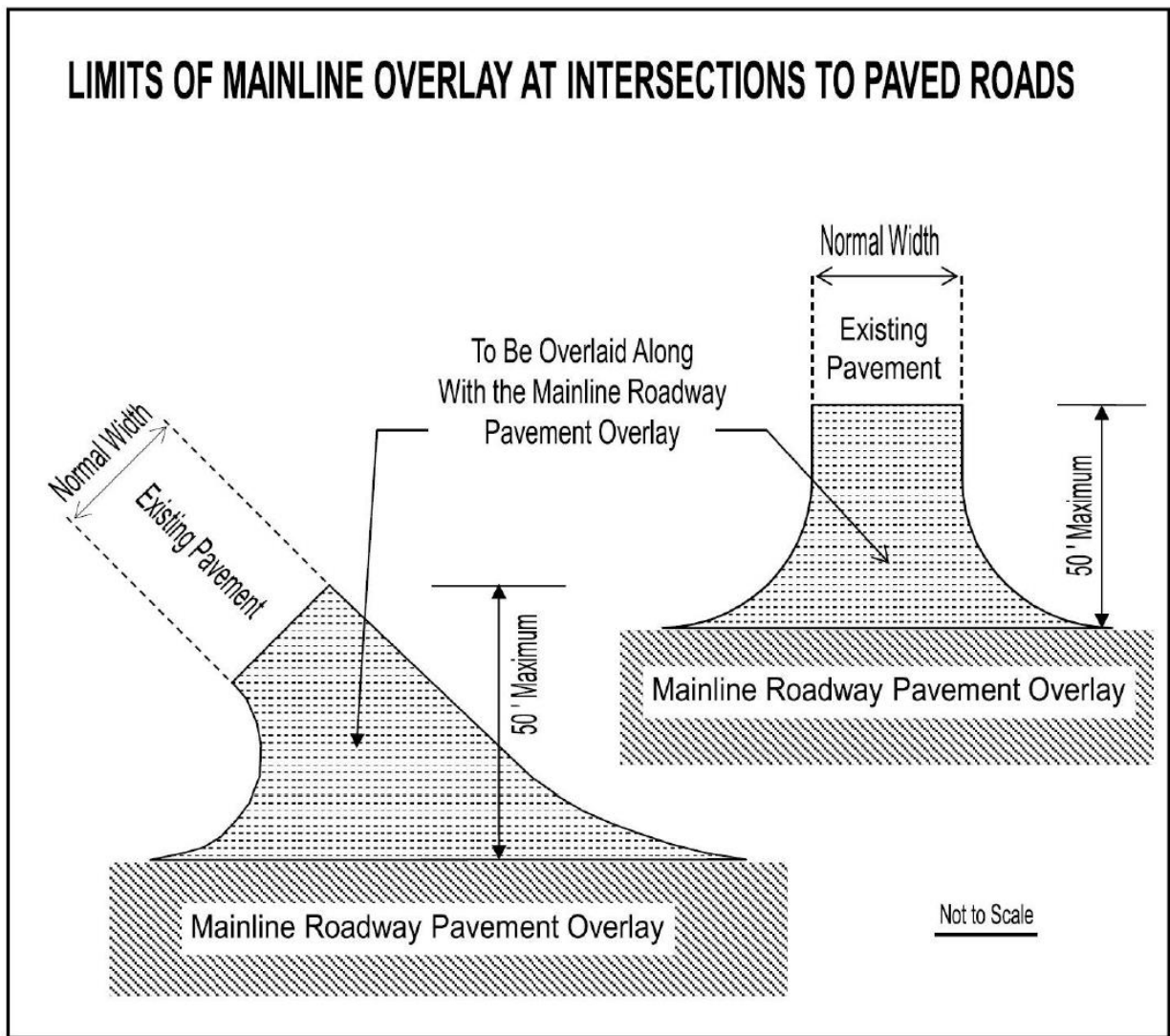
Scratching and leveling shall be completed before the overlay or resurfacing. If a scratch or level placement fails before overlay, the Contractor will be responsible for removing and replacing the failed material at no cost to the Department.

322.06 – Limits of Mainline Overlay at Intersections to Paved Roads

The Contractor shall overlay the intersecting paved road from the edge of pavement of the mainline roadway pavement overlay to a point that includes the entire radius of the intersecting paved road according to Figure III-10. This distance from the edge of pavement of the mainline roadway pavement overlay shall not exceed 50 feet measured according to Figure III-10.

On curb and gutter sections where planing is required for the mainline roadway overlay, planing shall also be required on the intersecting paved road area before these areas are overlaid.

FIGURE III-10
Limits of Mainline Overlay at Intersections to Paved Roads



Asphalt concrete overlay pavement placed on existing paved roadway surfaces that intersects the mainline roadway pavement overlay shall be constructed using a method approved by the Engineer, which shall include the cutting back to expose the course. The approved method shall provide a smooth transition

between new pavement and existing pavement. Such tie-ins shall conform to Section 315.05(c) except that all joints at tie-in locations shall be tested using a 10-foot straightedge according to Section 315.07(a).

322.07 – Placement of Asphalt Concrete Overlays

Placement of Asphalt Concrete Overlays shall conform to Section 315 and the requirements herein. Where pavement planing is required it shall be performed according to Section 515. No placement of an overlay or deck planing will be permitted on a bridge deck without the prior written approval of the District Bridge Engineer.

Limitations of operations for placing asphalt concrete overlays shall be according to Section 108.02, the Contract requirements, and as specified herein.

Before beginning paving overlay operations the Contractor shall clean accumulated dust, mud, or other debris that may adversely affect the bond of the new overlay from the existing pavement surface to the satisfaction of the Engineer. The cost for cleaning and surface preparation shall be included in the bid price for the asphalt concrete.

Sealing pavement cracks or joints and filling pavement irregularities greater than 1 inch deep using approved materials and specified procedures herein will be performed by the Engineer ahead of the Contractor's operations or included in the work performed by the Contractor. When such corrective work is performed by the Contractor, the work will be paid for as designated by the specific pay items in the Contract.

The Contractor shall remove thermoplastic and tape pavement markings and raised pavement markers before performing paving overlay operations. Thermoplastic and tape pavement markings shall be at least 90 percent eradicated so as not to interfere with bonding of pavement overlay or the transfer of the existing marking thickness up through the overlay. This work shall be performed in accordance with Sections 512 and 704 except as otherwise permitted herein.

The Contractor shall protect and reference utility structures before paving in order to locate or adjust these structures, if necessary, after paving operations are completed. The protection and referencing of utility structures shall be at no cost to the Department.

Temporary transverse pavement-wedge tie-ins shall be constructed where pavement overlay operations are temporarily halted as allowed or required herein, in Section 315, elsewhere in the Contract, or by the Engineer. Each temporary tie-in shall be no less than 3 feet in length for every inch of depth of overlaid pavement and shall consist of a mix that is suitable as a surface mix asphalt to provide a smooth transition between the installed overlay and existing pavement or bridge deck. Such temporary tie-ins shall be constructed before the overlaid pavement is opened to traffic.

Final transverse pavement tie-ins shall be constructed to provide a smooth transition between newly overlaid pavement and existing pavements, bridge decks, and existing pavement underneath bridge overpasses. Such tie-ins shall conform to Standard Drawing ACOT-1 or Section 315.05(c) as applicable, except that all joints at tie-in locations shall be tested using a 10-foot straightedge in accordance with Section 315.07(a). When planing is necessary at tie-ins to existing pavement or bridge decks to obtain the required overlay depth specified in the Contract, the existing pavement shall be planed according to the ACOT-1 Standard or the requirements herein.

No pavement overlay shall decrease the vertical clearance under a bridge. In situations where the pavement under the overpass cannot be planed in direct proportion to the overlay to be placed, the new pavement is to be tied down to the existing pavement under the overpass at least 75 feet from the outer edges of the bridge overpass according to Standard Drawing ACOT-1.

The ACOT-1 Standard for asphalt concrete overlay transitions shall apply when there is at least 1 inch of grade change between the finished asphalt concrete overlay surface and the existing pavement surface and where any of the following conditions exist:

- Bridge decks or bridge overpasses are located within the project site to receive the overlay.
- The Contractor has to tie-in the top course of asphalt concrete overlay to an existing hydraulic cement concrete pavement surface.
- The Contractor has to tie-in the top course of the asphalt concrete overlay to an existing asphalt concrete pavement surface and planing is included in the Contract as pay item.

When tying in the top course of the asphalt concrete overlay to an existing asphalt concrete pavement surface and there is no pay item in the Contract for planing, the asphalt concrete overlay tie-in shall conform to Section 315.07(a).

Rideability pay adjustments will not apply to the first 105 feet (0.02 of a mile) measured from the line of the tie-in.

If an emergency or an unforeseen circumstance such as equipment failure or breakdown occurs during the Contractor's operations that prevents the Contractor from squaring up the overlaid surface on adjacent lanes before a weekend, a holiday or a temporary shutdown, any additional signage, traffic control devices, or markings or markers required to protect the traveling public shall be provided at the Contractor's expense.

The Contractor shall ensure positive drainage is provided for all overlaid surfaces according to Section 315.05(c).

(a) Roadways with Posted Speed Limit of 55 Mph or Greater

The Contractor shall install asphalt concrete overlays to the depths specified for the specific routes identified in the Contract. Where asphalt concrete is being overlaid by 2 inches or less on roadways carrying traffic, the Contractor shall have the option of squaring up the overlay operation at the end of each workday or squaring up all travel lanes, excluding shoulders, before the weekend. Shoulders shall be squared up within 48 hours after the weekend unless required sooner elsewhere in the Contract, and before continuing mainline paving. All lanes including shoulders must be squared up before holidays or any temporary shutdowns.

Where overlays of more than 2 inches are being placed, the Contractor must square up the overlay operation at the end of each workday. This requirement shall apply to travel lanes and shoulders.

Asphalt concrete pavement overlay operations shall be performed in only one travel lane at a time. Under no circumstance will the Contractor be allowed to overlay a portion of the width of a travel lane, ramp, or loop and leave it exposed to traffic.

Where uneven pavement joints exist either transversely or longitudinally at the edges of travel lanes due to the overlay operations, the Contractor shall provide advance warning signage and traffic control devices for the scope of the overlay operation the Contractor is performing according to the details provided in the Contract. The cost for the advance warning devices and signage shall be included in the cost of other appropriate items. Temporary pavement markings and markers required as a result of staging such operations will be measured and paid for according to Section 512 and 704.

Ramps, exits, and turn lanes are to be paved in such a manner that a longitudinal joint with a surface elevation of 1 inch or more between the existing pavement and the overlay (where the overlay is the higher of the two elevations) will not be left for vehicles to cross within the posted speed limits in a "run-on" situation. Ramps, exits, and turn lanes are to be paved to the extent that the joint crossed by traffic

is traversed at an angle close to 90 degrees (perpendicular), or the ramp, exit and turn lane shall be squared up with the adjacent mainline lane at the time of installation.

Only approved mixes that have been verified according to Section 211.03(f) and have met the requirement for roller pattern density shall be placed on limited access roadways.

(b) All Other Roadways

Where asphalt concrete is being overlaid to a height of 2 inches or less on roadways carrying traffic, the Contractor shall have the option of squaring up the overlay operation at the end of each workday or squaring up all lanes including shoulders at least once every 4 consecutive workdays, excluding weekends. All lanes including shoulders must be squared up before weekends, holidays, or any temporary shutdowns.

Where overlays of more than 2 inches are being placed on roadways carrying traffic the Contractor shall square up the overlay operation at the end of each workday. This requirement shall apply to travel lanes and shoulders.

Asphalt concrete pavement overlay operations shall be performed in only one travel lane at a time. Under no circumstance will the Contractor be allowed to overlay a portion of the width of a travel lane, ramp, or loop and leave it overnight.

Where uneven pavement joints exist either transversely or longitudinally at the edges of travel lanes due to the overlay operations, the Contractor shall provide advance warning signage and traffic control devices at his expense according to the details provided in the Contract for the scope of overlay operation he is performing.

322.08 – Measurement and Payment

Crack Sealant/Filler for cracks or joints will be measured by the pound using either the Conversion Approach or the Direct Measurement Approach. For the Conversion Approach, the Engineer, or an appointed representative, shall measure the amount of material in the heater-melter unit at the beginning of the day. For the Direct Measurement approach, the Contractor shall provide the Engineer the certified weight of the heater-melter unit at the beginning and end of each day. During the day's operation, the Engineer will log all additional material added to the heater-melter unit. The Engineer will determine the pounds of material applied for payment purposes. No payment will be made for waste or unused material.

When using the Conversion Approach, the Contractor shall use a calibrated measuring rod to determine the actual quantity of material in gallons and shall be converted to pounds taking consideration for the temperature of the material at the time of placement. A chart or other approved conversion method furnished by the sealant material manufacturer or supplier shall be used to perform the conversion from gallons to pounds.

Crack Sealant/Filler Type A and Type B will be measured in pounds and paid for at the Contract pound price. This price shall be full compensation for providing the sealant and filler, complete-in-place, including cleaning and sealing the cracks and for all tools, labor, equipment, materials and incidentals related fully completing the installation.

Crack Sealant/Filler Type C will be measured in pounds and paid for at the Contract pound price. This price shall be full compensation for providing the sealant and filler, complete-in-place, including routing, cleaning, and sealing the cracks and for all tools, labor, equipment, materials and incidentals related fully completing the installation.

Asphalt Concrete, including overlay at intersections to paved roads, will be measured and paid for in accordance with Section 315.

Stone Matrix Asphalt, including overlay at intersections to paved roads, will be measured and paid for in accordance with Section 317.

When the Proposal has a Pay Item corresponding to scratching/leveling in the Schedule of Items then that Pay Item will include the work designated in the corresponding Pay Item Definition below and be paid at the price designated by the Bidder. If the Proposal has no Pay Item for scratching/leveling as described herein, that work shall meet the descriptions herein and will be measured and paid for as described herein.

Scratch/Leveling Course Type I will be measured in tons of asphalt material and paid for at the rate of two times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Scratch/Leveling Course Type II will be measured in tons of asphalt material and paid for at the rate of one and one-half times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Payment will be made under the following, when included in the "Schedule of items",

Pay Item	Pay Unit
Crack Sealant/Filler (Type)	Pound
Scratch/Level (Type)	Tons

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 323 – ASPHALT PATCHING OF EXISTING FLEXIBLE AND RIGID PAVEMENT AND SHOULDERS

SECTION 323 – ASPHALT PATCHING OF EXISTING FLEXIBLE AND RIGID PAVEMENT AND SHOULDERS of the Specifications is inserted as follows:

323.01 – Description

This work shall consist of repairing specified sections of existing flexible, rigid or composite pavements by removing all or part of the defective materials in the sections and replacing them with asphaltmix paving material. The locations of the repairs will be specified in the Contract or directed by the Engineer.

Partial Depth Hydraulic Cement Concrete (HCC) Patching shall consist of the removal of areas of unsound HCC pavement material to a depth of no more than 50 percent of the maximum pavement thickness and replacement with asphalt concrete as specified in the Contract document and as directed by the Engineer. The pavement thickness is defined as the thickness of the HCC.

Shoulder Patching shall consist of the removal of specified areas of the full thickness of the pavement section in the shoulder only to the top of the base material (bound or un-bound) and replacement with asphalt concrete as specified in the Contract or as directed by the Engineer.

323.02 – Materials

(a) **Asphalt concrete mixtures** shall conform to Section 211.

(b) **Tack coat** shall conform to Section 310.

323.03 – Equipment

Saw cutting equipment shall be capable of sawing neat vertical faces along the patch boundaries. The use of a carbide-toothed wheel saw shall not be permitted for sawing the patch boundaries in rigid pavements. A carbide-tipped wheel saw may be used for additional saw cuts provided that a minimum 3-inch clearance from the sawed boundary is maintained.

Material in the areas identified for shoulder patching may be removed by a milling machine, backhoe, or other excavating equipment as approved by the Department.

Equipment for furnishing and placing asphalt concrete overlay shall conform to Section 315.

323.04 – Procedures

Asphalt patches shall be placed in accordance with Section 315. The existing pavement shall be removed with a minimum disturbance to the aggregate base material and the faces of the remaining pavement shall be cut to a smooth, vertical face without ragged edges.

The existing pavement shall be removed by milling, grinding, saw cutting or any other approved method to the specified depth for the full perimeter of the designated area. The Contractor shall clean this area of any debris or loose particles before applying tack. Tack coat shall be applied to surface and vertical faces of exposed asphalt concrete at a rate of 0.2 gallon per square yard. Exposed base aggregate shall be primed with tack coat at an application rate of 0.4 gallon per square yard. Where HCC is encountered on bitumen over concrete composite pavements before reaching the specified depth, the depth of the patch shall then be limited to the

top elevation of the HCC. Before applying the patch, the bottom of the excavation of all patches shall be cleaned of all loose and foreign materials and stabilized by hand or mechanical tamping.

HCC pavement to be removed shall be sawed along the transverse and longitudinal boundaries, including the lane and shoulder/lane joints as shown on the Plans or as directed by the Engineer. Additional saw cuts inside the patch boundaries will be permitted to facilitate the concrete removal operation. During the removal operations, utmost care shall be exercised to minimize disturbance and damage to the reinforcing steel, and the adjacent pavement and shoulder. Before applying the patch, the bottom of the excavation of all patches shall be cleaned of all loose and foreign materials.

Manual placement will be permitted for installation of the asphalt concrete, when approved by the Engineer. Control strip and pavement profile measurements will not be required. Density shall conform to Section 315.05(e). Variation between surfaces at the run on and run off joints shall not be more than 1/4 inch when tested with a 10-foot straight edge. When the surface of the asphalt patch will also be the final riding surface, that surface shall conform to the tolerances in Section 315.07(a). The Contractor shall correct humps and depressions exceeding the specified tolerance or the defective work shall be removed and replaced with new material.

The existing pavement materials that are removed shall be hauled away from the repair site immediately, and disposed of properly by the Contractor in accordance with Section 106.04.

Minimum and maximum lift thickness for patching with Superpave asphalt concrete mixes shall be maintained during construction of the patches in conformance with the following:

SUPERPAVE ASPHALT CONCRETE LIFT THICKNESS (PATCHING)			
NMAS (mm)	MINIMUM (in)	MAXIMUM (in)	RECOMMENDED (in)
9.0	0.75	1.5	1.0
9.5	1.25	2.0	1.5
12.5	1.5	2.0	1.75
19.0	2.0	3.0	2.0
25.0	2.5	4.0	3.0

Patching and surface preparation shall be completed before the overlay or resurfacing. If an Asphalt Patch fails before overlay, the Contractor will be responsible for removing and replacing the failed patch at no cost to the Department.

323.05 – Measurement and Payment

Payment for all patching will be adjusted for density in accordance with Section 315.05(e) and Table III-6.

Partial Depth HCC Patching will be measured in square yards and will be paid for at the Contract square yard price for the mix and depth specified. This price shall be full compensation for furnishing materials and installing pavement patches complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work.

Shoulder Patching will be measured in square yards and will be paid for at the Contract square yard price for the mix and depth specified. The payment shall be full compensation for furnishing materials and installing pavement patches on the shoulder complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work.

Travel Lane Patching will be measured in tons and will be paid for at the Contract ton price for the mix specified. The payment shall be full compensation for furnishing materials and installing pavement patches in the travel lanes complete in place. The work shall include, but not be limited to supplying materials, saw cutting, milling, grinding, removing and disposing of existing material, the cost to haul and place asphalt concrete, and all labor, equipment, tools, supervision, fuel and incidentals necessary to complete the work. **Liquid asphalt tack or prime** will not be measured for separate payment and the cost to furnish and apply the liquid asphalt shall be included in the bid price for patching.

When Surface Preparation and Restoration is a Pay Item, that Pay Item will include the work designated in the corresponding Pay Item Definition below and be paid at the Contract price. Otherwise, that work shall meet the descriptions herein and will be measured and paid for as described herein.

Surface Preparation and Restoration Type I is a localized disintegration of the pavement, including distorted areas, no more than 5 inches in depth and no more than 20 square feet in surface area. Surface Preparation and Restoration Type I will be measured in tons of asphalt material and paid for at the rate of three times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Surface Preparation and Restoration Type II is a localized disintegration of the pavement, including distorted areas, no more than 5 inches in depth and more than 20 square feet in surface area. Surface Preparation and Restoration Type II will be measured in tons of asphalt material and paid for at the rate of four times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Surface Preparation and Restoration Type III is a localized disintegration of the pavement more than 5 inches in depth with limits of the surface area as defined by the Engineer. Surface Preparation and Restoration Type III will be measured in tons of asphalt material and paid for at the rate of five times the Contract ton price of the mix types of asphalt authorized by the Engineer. This price shall include removing and disposing of unsuitable material, preparing the area, furnishing and applying tack coat, furnishing and applying asphalt material, and compaction.

Payment will be made under:

Pay Item	Pay Unit
Partial Depth PCC Patching (Asphalt Patch Mix Type and Depth)	Square Yard
Shoulder Patching (Shoulder Mix Type and Depth)	Square Yard
Travel Lane Patching (Patch Mix Type)	Ton
Surface Preparation and Restoration (Type)	Ton

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
CLEARING AND GRUBBING AT BRIDGE APPROACHES

February 28, 2018

I. DESCRIPTION:

This work shall consist of clearing and grubbing at the future sites of bridge approaches in accordance with Section 301 of the Specifications, except as modified by this Special Provision. Clearing and Grubbing shall be performed prior to embankment construction in the vicinity of all bridge abutments, regardless of the height of the embankment fill and the height of the select backfill that will be placed behind the abutment.

II. PROCEDURES:

The Contractor shall remove stumps, vegetation, trees, brush, roots, perishable material and nonperishable, manmade objects (e.g., fences) in the vicinity of all proposed bridge abutments. Complete clearing and grubbing shall be conducted in advance of embankment fill placement in all areas where embankment fill will underlie the select backfill behind abutments.

All wet, loose, soft or disturbed soils that are present after clearing and grubbing operations are performed shall be removed or otherwise improved in accordance with Section 303 of the Specifications prior to embankment construction.

Clearing and grubbing shall be performed from the front toe of the embankment to the point behind the select backfill (see Longitudinal Limits in Figure 1). The lateral (transverse) limits of the clearing and grubbing shall extend from right toe-of-slope to left toe-of-slope.

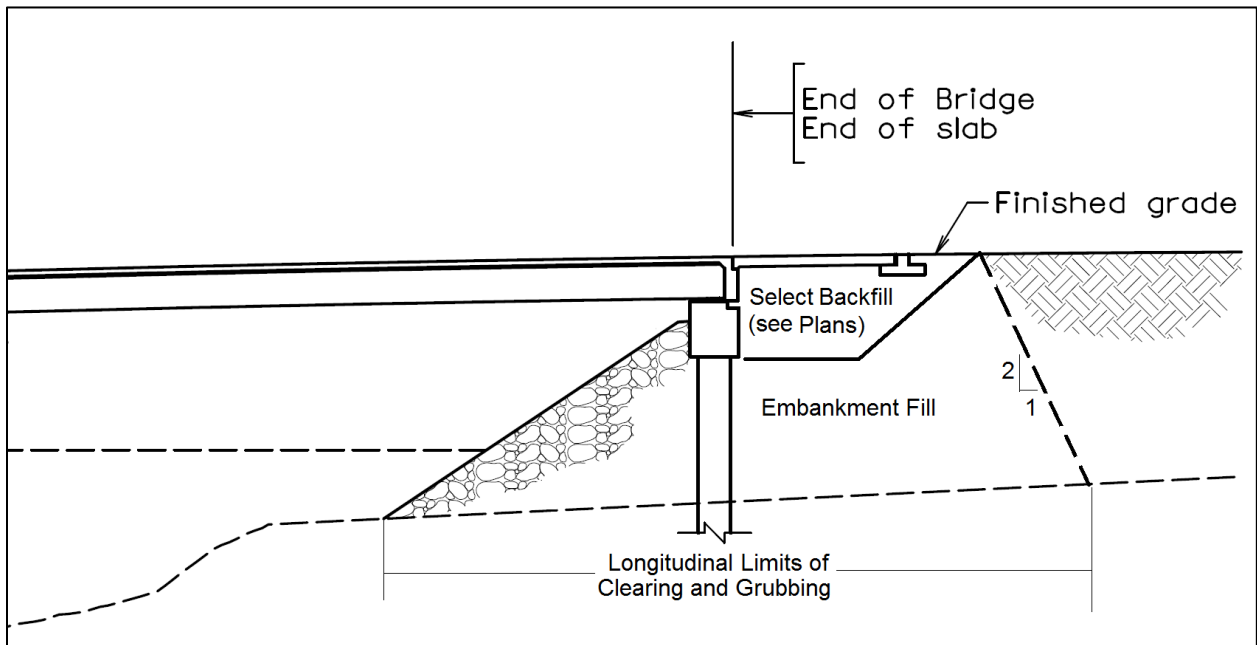


Figure 1
Limits of Clearing and Grubbing in the Vicinity of Bridge Abutments
Not to scale

III. MEASUREMENT AND PAYMENT:

Measurement and Payment for this work will be included as part of the project's overall Clearing and Grubbing pay item in accordance with Section 301 of the Specifications. No separate payment will be made.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 401—STRUCTURE EXCAVATION

SECTION 401 – STRUCTURE EXCAVATION of the Specifications is amended as follows:

Section 401.03(i) – Backfilling is amended by replacing the second and third paragraphs with the following:

The Contractor shall use select backfill material behind all abutments. The Department will include a detail indicating the limits (zone) of the select backfill in the Plans. The Contractor shall compact the material in accordance with Sections 305 and 303. The top surface of the backfill material shall be neatly graded.

The earthen fill around the perimeter of the select material zone in abutments, wingwalls, and retaining walls shall be placed in horizontal layers not more than 6 inches in loose thickness and then compacted at $\pm 20\%$ of optimum moisture content to a density of at least 95% as compared to the Theoretical Maximum Density. The Department will perform tests in accordance with VTM 10 to verify compliance with density requirements determined in accordance with VTM 1 or VTM 12. The Contractor shall place and compact the backfill in front of units in horizontal layers to the same elevation as the layers behind units until the final elevation in front is reached as the work progresses. Backfill in front of units shall be placed and compacted in horizontal layers to the same elevation as the layers behind units until the final elevation in front is reached. Backfill shall be placed in a manner to prevent wedging action against the concrete. The Contractor shall modify slopes bounding excavation for abutments, wingwalls, or retaining walls to lock in adjacent backfill material by stepping or serrating the existing soils. The Engineer will not permit jetting of the fill behind abutments, wingwalls, or retaining walls.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 405 – PRESTRESSED CONCRETE

SECTION 405 – PRESTRESSED CONCRETE is amended as follows:

Section 405.02(i) – Fully or partially embedded steel attachments to the prestressed concrete members is renamed to **Fully or partially embedded steel attachments** and replaced with the following:

Fully or partially embedded steel attachments to the prestressed concrete members shall be stainless steel when using stainless-steel or carbon-fiber-reinforced-polymer strands. When using carbon-steel strands, these same steel attachments shall be galvanized in accordance with Section 233.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 406 – REINFORCING STEEL

SECTION 406 – REINFORCING STEEL of the Specifications is amended as follows:

Section 406.04 – Measurement and Payment is amended to replace the second paragraph with the following:

Corrosion resistant reinforcing steel will be measured in pounds and will be paid for at the Contract pound price for the class and grade of steel designated. This price shall include fabricating, shipping, furnishing, and placement in the locations shown in the Plans.

Section 406.04 – Measurement and Payment amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Reinforcing steel	Pound
Welded wire fabric	Pound
Corrosion resistant reinforcing steel, (Class)	Pound

The following pay items are inserted:

Pay Item	Pay Unit
Reinforcing steel (item)	Pound
Welded wire fabric (item)	Pound
Corrosion resistant reinforcing steel (Class, grade, item)	Pound

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 407 – STEEL AND OTHER METAL STRUCTURES

SECTION 407 – STEEL AND OTHER METAL STRUCTURES of the Specifications is amended as follows:

Section 407.04 – Fabrication Procedures is amended by replacing the seventh, eighth, and ninth paragraphs with the following:

The Contractor shall furnish a complete mill analysis showing chemical and physical results from each heat of steel for all units prior to fabrication. Before cutting, pieces of steel other than steel conforming to ASTM A709, Grade 36, that are to be cut to smaller-sized pieces shall be legibly marked with the ASTM A6 specification identification color code or the material specification designation. The identification color code of the latest system adopted under ASTM A6 shall be used to identify material. Any markings that indicate direction of roll shall be transferred to each new piece before cutting the new piece from the larger plate.

If requested by the Engineer, the Contractor shall furnish an affidavit from the fabricator certifying that the fabricator has marked and maintained the identification of steel in accordance with these specifications throughout the fabrication operation.

Section 407.06(c) – Assembly of Structural Connections Using High-Strength Bolts is amended by replacing the first paragraph with the following:

Assembly of Structural Connections Using High-Strength Bolts: Field connections shall be made with high-strength bolts 7/8-inch in diameter fabricated in accordance with ASTM F3125, Grade A325 unless otherwise specified. The Engineer will give consideration to the substitution of adequately designed welded connections if requested in writing by the Contractor.

Section 407.06(c)1 – Bolts, nuts, and washers is replaced with the following:

Bolts, nuts, and washers: Bolts, nuts, and washers shall conform to Section 226 and shall each be from one manufacturer on any one structure unless otherwise approved by the Engineer. In addition, each bolt, nut, and washer combination, when installed, shall be from the same rotational-capacity lot. Prior to installation, the Contractor shall perform a field rotational-capacity test on two nut, bolt, and washer assemblies for each diameter and length in accordance with VTM 135. Bolts fabricated in accordance with ASTM F3125, Grade A490 and galvanized bolts fabricated in accordance with ASTM F3125, Grade A325 shall not be reused. Retightening previously tightened bolts, which may have been loosened by the tightening of adjacent bolts, shall not be considered a reuse. Other bolts may be reused only if approved by the Engineer. Threads of plain (uncoated) bolts shall be oily to the touch when installed. Galvanized nuts shall be lubricated by lubricant containing a visible dye. Threads of weathered or rusted bolts shall be cleaned of loose rust, scale, and debris and relubricated. Lubricant shall be as recommended by the fastener manufacturer.

Section 407.06(c)3 – Installation is amended by replacing the second paragraph with the following:

When bolts fabricated in accordance with ASTM F3125, Grade A490 are used with steel having yield points less than 40 kips per square inch, hardened washers shall be installed under the nut and bolt head.

Section 407.06(c)3 – Installation is amended by replacing the eighth paragraph with the following:

The required minimum bolt tension is equal to 70% of specified minimum tensile strengths of bolts rounded to the nearest kip as specified in ASTM F3125 for Grades A325 and A490. *Snug*

tight is defined as the tightness attained when a power wrench begins to impact solidly or when the bolts are firmly hand tightened with a spud wrench such that the complete area of the connecting surfaces are brought into firm contact with each other. Snug tightening shall progress systematically from the most rigid part of the connection to the free edges, and then the bolts of the connection shall be retightened in a similar systematic manner as necessary until all bolts are simultaneously snug tight and the connection is fully compacted.

Section 407.06(c)3b – Direct Tension Indicators (DTI) is amended by replacing the first paragraph with the following:

Direct Tension Indicators (DTI): Direct tension indicator washers shall be used for all high strength bolts, and installation shall be in accordance with Section 407.06(c)3; however, the indicator washer shall not be considered a substitute for the required hardened washer under the turned element. The indicator washer may be considered a substitute for the hardened washer required under the unturned element when bolts conforming to ASTM F3125, Grade A490 are used with steel conforming to ASTM A709, Grade 36. Direct tension-indicator washers shall not be painted or coated with any epoxy or similar material prior to installation. The normal installation shall consist of the load indicator washer being placed under the unturned bolt head or unturned nut. However, if conditions require installation under the turned bolt portion, a hardened flat washer or nut face washer shall be fitted against the tension-indicating protrusions. Tension-indicating washers shall not be substituted for the hardened washers required with short-slotted or oversized holes but may be used in conjunction with them.

Table IV-3 – Bolt Tension is replaced with the following:

Bolt Size	Required Min. Bolt Tension (lb.)	
	Grade A325 Bolts	Grade A490 Bolts
1/2	12,000	15,000
5/8	19,000	24,000
3/4	28,000	35,000
7/8	39,000	49,000
1	51,000	64,000
1 1/8	56,000	80,000
1 1/4	71,000	102,000
1 3/8	85,000	121,000
1 1/2	103,000	148,000

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 410—RAILINGS AND PARAPETS

SECTION 410—RAILINGS AND PARAPETS of the Specifications is amended as follows:

410.04 – Measurement and Payment is amended to replace the first and second paragraphs with the following:

Railings, Parapets, and Bridge Median Barriers will be measured in linear feet along their face, including terminal walls, without deductions for breaks or interruptions. Railings, Parapets, and Bridge Median Barriers will be paid for at the Contract linear foot price for the type specified. This price shall include constructing, fabricating, and furnishing materials shown on the Plans including, but not limited to: rails, rail posts, post bearing pads, anchor assemblies, sleeves, grounding materials, reinforcing steel, conduits, junction boxes, and concrete; and any painting and galvanizing.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 412 – WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES

SECTION 412 – WIDENING, REPAIRING, AND RECONSTRUCTING EXISTING STRUCTURES of the Specifications is amended as follows:

Section 412.03(b)6 – Concrete superstructure surface repair is amended by replacing the second paragraph with the following:

The Contractor shall place 2 x 2-W1.4 x W1.4 welded wire fabric over the entire patch area where 2 inches or more of existing concrete is removed. The welded wire fabric shall be tied to reinforcing steel where possible. If reinforcing steel is not exposed or if the steel has a spacing greater than 18 inches, the welded wire fabric shall be anchored to expansion bolts at least 3/8 inch in diameter, which the Contractor shall place along the edges of the patch. The expansion bolts shall be spaced not more than 18 inches apart and shall be embedded at least 2 inches into the concrete. The minimum thickness of repair material over reinforcing steel, including expansion bolts and welded wire fabrics, shall be 2 inches unless otherwise specified.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
GUARDRAIL TERMINAL SITE PREPARATION

October 2, 2020

I. DESCRIPTION

This work shall consist of preparing run-on guardrail terminal sites in accordance with the Plans, Specifications, and Standard Drawings, and as directed by the Engineer.

II. MATERIALS

Aggregate Material shall be No. 21A or No. 21B conforming to Section 208 of the Specifications.

III. PROCEDURES

Guardrail terminal sites shall be prepared in accordance with Sections 301, 303, 305 and 505 of the Specifications and in accordance with the Standard Drawings. Site preparation requirements for the NCHRP-350 compliant GR-6, GR-7, or GR-9 terminals and the GR-MGS-2 terminal are included in the Standard Drawings for each terminal.

The type of site preparation required will be denoted on the Plans. The types are defined as follows:

- **Guardrail terminal site preparation (minor)** will be required for sites where minimal grading is required to provide the site preparation detailed in the Standard Drawing for the proposed terminal. The existing sites closely conform to the details in the Standard Drawings and require approximately 6 tons or less of aggregate base material (Type I or II, No. 21A or 21B) to prepare the terminal site.
- **Guardrail terminal site preparation (4-ft moderate)** will be required for sites where the Plans require GR-MGS2 terminals to be installed using the "limited use site preparation requirements" of Standard GR-MGS2, requiring a four-foot level bench area as measured from the face of the GR-MGS2 rail to the hinge point. These sites should require approximately between 6 and 16 tons of aggregate base material (Type I or II, No. 21A or 21B) to prepare the terminal site.
- **Guardrail terminal site preparation (6-ft moderate)** will be required for sites where the Plans require GR-MGS2 terminals to be installed using the "site preparation requirements" of Standard GR-MGS2, requiring a six-foot level bench area as measured from the face of the GR-MGS2 rail to the hinge point. These sites should require between 16 and 35 tons of aggregate base material (Type I or II, No. 21A or 21B) to prepare the terminal site as required on the Plans.

The quantity range of aggregate base material listed above is intended to show scope and scale of the amount of grading work that could be needed to establish the site prep. In addition to, or in place of aggregate base material, borrow material may be used for grading sites, if approved by the Engineer. Guardrail terminal sites shall be fertilized and seeded in accordance with Section 603 of the Specifications with the seed mixes and fertilizer applied at the rates detailed in the Plans or as directed by the Engineer.

IV. MEASUREMENT AND PAYMENT

Guardrail terminal site preparation will be measured in units of each per site and will be paid for at the Contract each price. This price shall include clearing and grubbing; excavating; backfilling holes; placing fill material; benching existing slopes; all required erosion and siltation control measures; and

restoring site including fertilizing and seeding. The cost of mobilizing equipment and material shall be included in the Guardrail terminal site preparation price.

Aggregate base material used for terminal site preparation, and for shoulder restoration for the guardrail runs downstream of the terminal will be measured in tons and paid for at the Contract ton price. This price shall include furnishing, delivering, placing, compacting, and grading the material; and removing and disposing of surplus, tracked, and spilled material resulting from the Contractor's operations.

Borrow excavation used for terminal site preparation, and for shoulder restoration for the guardrail runs downstream of the terminal will be measured in cubic yards in accordance with Section 303.06(a)2 of the Specifications and will be paid for at the Contract cubic yard price. This price shall include furnishing, delivering, placing, compacting, and grading the material; and removing and disposing of surplus, tracked, and spilled material resulting from the Contractor's operations.

Payment will be made under:

Pay Item	Pay Unit
Guardrail Terminal Site Preparation (Type)	Each
Aggregate Base Material (Type and No.)	Ton
Borrow excavation	Cubic yard

CONTRACTOR MAINTENANCE OF TEMPORARY MARKINGS – The second, third, and fourth paragraphs of Section 512.03(k)3 of the Specifications will also apply to Sections 512.03(k)1 and 512.03(k)2 of the Specifications.

6-13-17 (SPCN)

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
INSTALLATION OF “WORK ZONE NO HANDHELD COMMUNICATION DEVICES” SIGNS

March 18, 2020

I. Description

This work shall consist of installing temporary signs stating “Work Zone No Handheld Communication Devices” (R16-V3) in all work areas on limited access highways and other locations shown on the Plans or directed by the Engineer.

II. Materials

R16-V3 sign material shall conform to Section 512 of the Specifications.

III. Procedure

R16-V3 Graphic Layout shall conform to Figure 1. The Contractor shall install the R16-V3 sign in all work areas on limited access highways, entrance ramps adjacent to these work areas or adjacent to a R16-V3 sign location, and other locations shown on the Plans or directed by the Engineer.

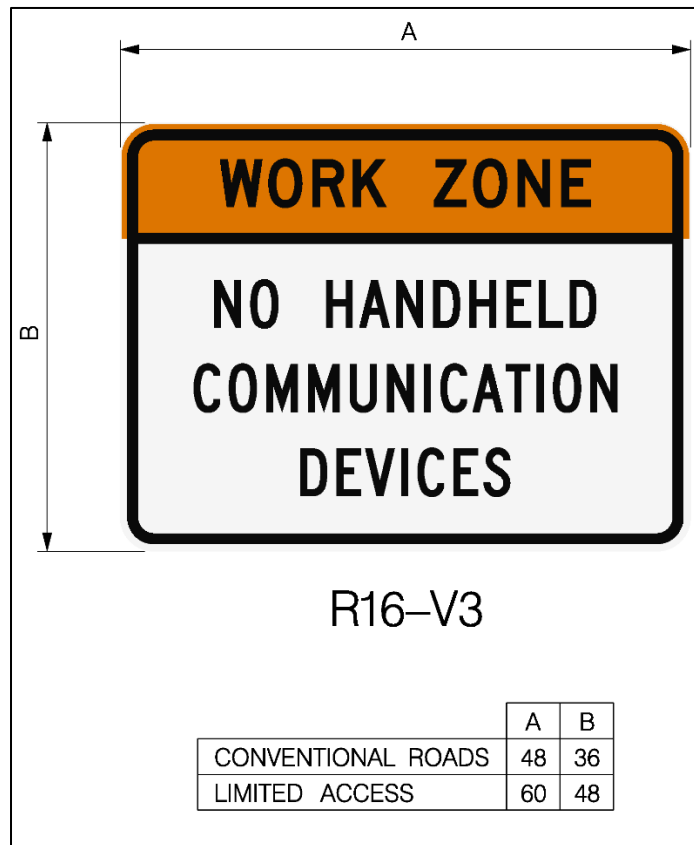


Figure 1: Work Zone No Handheld Communication Devices (R16-V3) Sign

The Contractor shall use the 60-inch x 48-inch R16-V3 sign on limited access highways and the 48-inch x 36-inch R16-V3 sign on all other roadways. The R16-V3 sign shall be the first sign seen by an approaching driver and be at least 500 feet in advance of the next temporary (construction) sign.

IV. **Measurement and Payment**

R16-V3 signs will be measured and paid for as **Temporary (construction) signs** in accordance with Section 512 of the Specifications.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 512 – MAINTAINING TRAFFIC

SECTION 512 – MAINTAINING TRAFFIC of the Specifications is amended as follows:

Section 512.02(f) – Temporary (Construction) signs is replaced with the following:

Temporary (Construction) signs shall have retroreflective sign sheeting in accordance with Sections 247 and 701.

Sign substrates for rigid temporary signs and temporary overlay panels shall be fabricated of either aluminum at least 0.080-inches thick, conforming to Section 229.02(a); 0.4-inch-thick corrugated polypropylene; 0.4-inch-thick corrugated polyethylene plastic; or 0.079-inch-thick aluminum/plastic laminate as approved by the Engineer. Sign substrates shall be smooth, flat, and free of metal burrs or splinters.

Sign substrate materials for signs mounted on drums, Type 3 barricades, and portable sign stands shall be as specified below and shall be the same material that was used when the device was approved in accordance with National Cooperative Highway Research Program (NCHRP) Report 350 or MASH.

Sign Substrates for Type 3 Barricades and Portable Sign Stands

Rollup sign

0.4 inch thick corrugated polypropylene or polyethylene plastic

0.079 inch thick aluminum/plastic laminate

Sign Substrates for Drums

0.4 inch thick corrugated polypropylene or polyethylene plastic

Section 512.03 – Procedures is amended by replacing the sixth and seventh paragraphs with the following:

The Contractor shall correct ineffective or unacceptable work zone traffic control devices immediately unless allowed otherwise by the Contract.

The color of Automated Flagger Assistance Device trailers, arrow board trailers, portable traffic control signal trailers, ITS trailer equipment, and portable changeable message sign trailers and sign frames shall be either Virginia highway orange (DuPont Color No. LF74279 AT or color equivalent) or federal yellow. The back traffic facing trailer frame, where the signal and brake lights are located, shall be fully covered with 2 inch high retroreflective sheeting conforming to Section 247.02(c). The sheeting shall have alternating 11 inch wide vertical red stripes and 7 inch wide vertical white stripes.

The Contractor shall locate, remove, and dispose of all existing asphalt-embedded Snowplowable Raised Pavement Marker (SRPM) castings which lie within a travel lane that has been shifted during construction for three months or longer. The cavity left by the removal of the existing marker shall be cleaned of debris, filled with an approved mix design for resurfacing or material found on the Department's Approved List 78, and compacted before shifting traffic.

Section 512.03(a) – Temporary (Construction) Signs is replaced with the following:

Temporary (Construction) Signs: The Contractor shall furnish, install, remove, relocate, and maintain temporary signs and sign panels necessary for prosecution of the work. Installation shall

be in accordance with Section 701. The Contractor shall also furnish and install those signs not listed in the *VWAPM* that may be required by the Engineer.

Signs shall be fabricated in accordance with the *MUTCD* and *VWAPM*. If the Contractor proposes a sign message not included in the Plans, *VWAPM*, or *MUTCD*, then the Contractor shall submit a sign fabrication detail to the Engineer for approval before fabrication.

The Contractor shall relocate, cover, uncover, remove, and reinstall existing signs that conflict with the signs needed for maintenance of traffic. Covering of existing signs shall be accomplished in accordance with Section 701.03(d).

The Contractor shall ensure an unrestricted view of sign messages. The Contractor shall furnish and install flags for temporary signs, as directed by the Engineer; however flags will not be required for use on portable sign supports.

Sign location, lateral placement, and mounting height shall conform to the *VWAPM*, the *MUTCD*, the Contract, and as directed by the Engineer. The Contractor shall furnish all sign supports and hardware for use with temporary signs.

When the sign sequence is not provided in the plans, either by illustration or reference to a typical traffic control figure in the *VWAPM*, the Contractor shall submit a sketch of his proposed sign sequence to the Engineer for approval before installation.

Temporary signs shall be mounted using wooden post supports, square tube sign post supports, or portable sign stands, except where noted otherwise on the Plans. Portable sign stands shall not be used longer than three consecutive days (72 continuous hours). Wooden and square tube post installations shall be in accordance with Standard Drawing WSP-1.

Portable sign stands manufactured on or before December 31, 2019 may be used if they are in good working condition, conform to NCHRP Report 350 Test Level 3 or MASH, and are a product shown on the Department's Approved Lists for NCHRP-350 or MASH Approved Products. Portable sign stands manufactured after December 31, 2019 shall conform to MASH and shall be a product shown on the Department's Approved List for MASH Approved Products. The Contractor shall submit a certification letter stating the brands and models of portable sign stands to be used along with a copy of the certification letters indicating compliance with NCHRP Report 350 Test Level 3 or MASH.

Portable sign stands shall include decals, stenciling, or some other durable marking system that indicates the manufacturer and model number of the stands. Such marking shall be of sufficient size so it is clearly legible to a person in a standing position.

The Contractor shall erect, maintain, move, and be responsible for the security of sign panels and shall ensure an unrestricted view of sign messages for the safety of traffic.

Section 512.03(g)2b(1) – Drums is replaced with the following:

Drums shall be round or partially round; made from plastic; have a minimum height of 36 inches; have a cross-sectional width no less than 18 inches in any direction; have a closed top; and shall conform to the *VWAPM*. Drums shall be designed to allow for separation of ballast and drum upon vehicular impact but not from wind and vacuum created by passing vehicles. The base of the unit height shall not exceed 5 inches. Two-piece drums may have a flared drum foundation, a collar not exceeding 5 inches in height and be of suitable shape and weight to provide stable support. One-piece drums that comply with these requirements may be used.

Section 512.03(g)2b(3) – Direction indicator barricades is deleted.

Section 512.03(h) –Traffic Barrier Service is replaced with the following:

Traffic Barrier Service shall be of sufficient length to provide anchorage and protection of traffic and personnel in work areas.

The Contractor shall begin continuous progressive prosecution of the work protected by the barrier once the barrier is in place until its completion. If the Contractor ceases to continuously prosecute such work, the Engineer may cause the Contractor to discontinue operations in other areas on the project and concentrate work efforts behind the traffic barrier service until that work is completed. The Contractor shall remove the traffic barrier service when the Engineer determines work is completed to the extent that traffic barrier service is no longer required.

While performing work activities, workers and equipment shall remain behind the protection of the traffic barrier service except as approved by the Engineer. Work outside traffic barrier service protection shall only proceed under the protection and direction of approved traffic control devices or flagger service to safeguard workers and traffic in advance of and at the point the traffic barrier service is opened for ingress or egress adjacent to the travel lane. The Engineer will not permit any equipment extending into an open travel lane.

Barrier openings for access to the work area may be provided only along tangent sections or along curved sections on the inside of traffic and shall be limited to the minimum length required for equipment access. The Contractor shall delineate and maintain normal pavement alignment at the barrier opening with Type D pavement marking.

Repairs to traffic barrier service shall match existing barrier so that positive connections can be maintained.

Delineators and barrier panels shall have reflectorized sheeting conforming to Section 247, shall be from the Department's Approved List 23, and shall be installed on traffic barrier service in accordance with the VWAPM.

The Contractor shall maintain the structural integrity of the barrier and its alignment while it is in use and shall maintain any associated warning lights, barrier delineators, barrier panels, and other devices in functional, clean and visible conditions at all times.

1. **Guardrail barrier service and terminal treatments** shall be installed in accordance with Section 505 except that the offset distance shall be as specified by the Engineer. The Contractor may be permitted to reuse guardrail or its hardware used for traffic barrier service guardrail for permanent installation provided the guardrail material is acceptable to the Engineer and conforms to Section 505 and the Standard Drawings for such guardrail. Marred galvanized surfaces shall be repaired in accordance with Section 233. Terminal treatments shall be permanently identified with a device specific Manufacturers' identification number by stamping or marking with a durable weather resistant material in accordance with § 33.2-274.1 of the Code of Virginia.
2. **Traffic barrier service** (concrete or longitudinal steel) shall be installed in accordance with the Plans and Standard Drawings or as directed by the Engineer, who will design according to Appendix A of the VWAPM. When traffic barrier ends at guardrail, fixed object attachment methods for construction zone shall be used to connect the barrier to the guardrail. Installation shall include additional guardrail posts and attachments as required. The traffic barrier, at a minimum, shall be tapered with the end of the barrier located behind the adjacent guardrail

post in accordance with the VWAPM. Barrier connections shall be snug to prevent motion between sections.

Traffic barrier service used as a parapet shall be anchored as shown on the Plans or Section 500 of the Standard Drawings. Anchor holes in bridge decks shall be drilled with a rotary impact drill or other approved equipment that will limit damage to the deck. Anchor holes shall be located to avoid cutting reinforcing steel. Upon removal of the parapet, anchor holes shall be cleaned and filled with Type EP-4 or EP-5 epoxy mortar conforming to Section 243.

The Department will not permit the use of concrete traffic barrier service for permanent installations on bridge structures.

Traffic barrier service sections manufactured on or before December 31, 2019 and successfully tested to NCHRP 350 or MASH 2009 may be used until December 31, 2029, if they are in good working condition, and are a product shown on the Department's Approved Lists for NCHRP-350 or MASH Approved Products. Traffic barrier service sections manufactured after December 31, 2019, and all products in use after December 31, 2029, shall conform to MASH 2016 or its successor, and shall be from the Department's Approved List for Provisionally Approved MASH Products. All traffic barrier service runs shall be interlocking barrier of the same design or type.

The Contractor shall visually inspect all traffic barrier service shipped to a project before placing it in use. Concrete barrier sections shall be structurally sound with no concrete missing along the top, bottom, sides, or end sections of the barrier; no through cracks; and no exposed rebar. The Contractor shall promptly remove any traffic barrier service found by the Contractor or Engineer to be unacceptable due to inadequate structural integrity or functionality and replace the concrete barrier service at no cost to the Department.

Concrete barrier service shall be cleaned or coated sufficiently to afford good visibility and uniformity of appearance.

The Engineer will review and must approve the layout and anchorage method for job specific applications before the barrier is authorized for installation.

With the approval of the Engineer, the Contractor may use additional traffic barriers for his convenience but at his own expense.

Section 512.03(i) – Impact Attenuator Service is replaced with the following:

Impact Attenuator Service: The Contractor shall install impact attenuator service at locations shown on the Plans or designated by the Engineer. An object marker for temporary impact attenuator shall be installed on the attenuator according to the details shown in the Standard Drawings. The object marker for impact attenuator service shall have reflective sheeting conforming to Section 247 featuring alternating diagonal black and orange 3 inch stripes sloping downward at an angle of 45 degrees in the direction vehicular traffic is to pass. Impact attenuators shall be permanently identified with a device specific Manufacturers' identification number by stamping or marking with a durable weather resistant material in accordance with § 33.2-274.1 of the Code of Virginia.

Impact Attenuator Service not shown on the Plans may be used at the request of the Contractor for the Contractor's convenience at the Contractor's expense.

All impact attenuator service shall be reviewed and approved by the State Location and Design Engineer before installation.

Impact Attenuators manufactured on or before December 31, 2019 and successfully tested to NCHRP 350 or the MASH 2009 may continue to be used until December 31, 2029. Impact Attenuators manufactured after December 31, 2019 shall meet MASH 2016 and shall be from the Department's Approved List for Provisionally Approved MASH Products.

Section 512.03(j)2c – Equipment is replaced with the following:

12 inch aluminum or polycarbonate traffic signal head sections with backplates mounted in the vertical display arrangement. Signal head sections may be mounted in the horizontal display arrangement when approved by the Engineer. Signal head sections and backplates shall conform to Section 238.

Section 512.03(k) – Temporary (Construction) Pavement Markings is replaced with the following:

Temporary (Construction) Pavement Markings shall be installed at locations shown on the Plans, the *VWAPM*, and as directed by the Engineer. Temporary pavement markings shall conform to Section 704 and be selected from the Department's Approved List 17. Temporary pavement markings are classified as Type A or B (temporary markings), Type D, Class III (removable tape), and Type E (non-reflective black removable tape).

The Contractor shall install temporary pavement markings in accordance with the manufacturer's recommendations, except that if the manufacturer's recommendation for material thickness and quantity of beads is less than that used when the material was tested by the NTPEP, the minimum product application rates shall conform to the NTPEP approved test rates for the specific marking. The Contractor shall furnish a copy of the manufacturer's installation recommendations, including the NTPEP data for product thickness and glass bead quantities to the Engineer.

The Contractor shall maintain the temporary pavement markings and shall correct any deficient markings by reapplying markings as directed or needed. The Department considers deficient any temporary pavement markings that provide inadequate guidance to motorists due to inadequate retroreflectivity, color qualities, or adherence to the pavement. The Engineer will make a visual nighttime inspection of all temporary pavement markings to identify areas where markings have inadequate retroreflectivity. Other deficient qualities may be identified by visual inspection at any time.

Markings that no longer adhere to the pavement, and may cause guidance problems for motorists, or are inadequately retroreflective as determined by the Engineer shall be replaced by the Contractor, with the following exceptions:

- Reapplication of skip line temporary pavement markings is not required unless the pavement marking does not adhere or inadequate retroreflectivity qualities are present for at least two consecutive skip lines.
- Reapplication of centerline (except skip lines) or edge line temporary pavement markings is not required unless the pavement marking does not adhere or inadequate retroreflectivity qualities are present for a continuous section of at least 70 feet.
- Reapplication of transverse markings is not required unless the pavement marking does not adhere or inadequate retroreflectivity qualities are present for a continuous section of at least 3 feet.

The Contractor may take retroreflectivity readings to counter visual observations by the Engineer as the basis for replacement of temporary pavement markings. These measurements shall be taken within 48 hours after the Contractor has been notified of the visual determination by the

Engineer of deficient markings. The Engineer will grant additional time to the Contractor when inclement weather prevents accurate measurement of the temporary pavement markings.

The Contractor shall brush any form of debris from the marking before taking the retroreflectivity readings. Retroreflectivity measurements shall be taken in the presence of the Engineer using Contractor furnished equipment conforming to ASTM E1710. A copy of the operating instructions for the reflectometer shall be furnished to the Engineer before taking the measurements. The Contractor shall calibrate and operate the equipment in accordance with the manufacturer's instructions. The photometric quantity to be measured is the coefficient of retroreflected luminance (RL), which shall be expressed as millicandelas per square foot per footcandle (mcd/sf/ftc). Measurements shall be taken at three random locations within each area of markings that are suspected of being inadequately retroreflective. When the length of the questionable visually inspected area is greater than 1 mile, the Contractor shall take measurements at three locations per mile segment or portion thereof. Measurements for all lines shall be taken in the middle of the line horizontally. Measurements for skip lines shall be taken in the middle of their length. Measurements for transverse lines shall be taken outside of the wheel path locations. The Engineer will designate the locations along the line segments where the measurements shall be taken. The Contractor shall make a log of the measurements and their locations and provide a copy to the Engineer. When the average of the three readings for an area is below 100 mcd/sf/ftc, the Contractor shall reapply the markings as indicated.

Temporary (construction) pavement markings found in need of reapplication in accordance with these requirements shall be reapplied by the Contractor at no additional cost to the Department, with the following exceptions:

- Type D markings that have been under traffic for more than 180 days and requires reapplication will be paid for at the contract unit price when reapplied, unless the manufacturer's warranty coverage is still applicable.
- Markings damaged by the Department's snow removal or other maintenance and construction operations will be paid for at the contract unit price.

Deficient temporary pavement markings shall be replaced in the time specified in Section 704 for the maximum duration of unmarked roads.

Eradication for reapplication of Type A or B pavement markings is not required if allowed by the marking manufacturer, if the existing marking is well adhered and the total thickness of the existing and reapplied marking combined will not exceed 40 mils. If not well adhered, 90 percent of the existing markings shall be eradicated before reinstallation of the markings.

Existing Type D markings that are deficient (no longer retaining sufficient retroreflectivity) shall be removed before reapplication of new Type D, Class III markings.

1. **Temporary Type A or B pavement markings** shall be used where the roadway is to be resurfaced before changes in the traffic pattern or where pavement is to be demolished and traffic patterns will not change before demolition.
2. **Type D, Class III pavement markings** shall be used on final roadway surfaces or in areas where traffic patterns are subject to change before pavement is resurfaced, unless otherwise specified in the Contract.

On non-final pavement surfaces, the Contractor may install Type A or B pavement markings when the surface temperature of the pavement is below the manufacturer's minimum application temperature for a Type D pavement marking. In such cases, the Contractor shall select a Type A or B product known to perform the best under those temperature conditions.

When a Type A or B pavement marking is used instead of a Type D pavement marking due to the surface temperature being below the manufacturer's minimum application temperature, the Contractor will be paid at the contract unit price for Type D pavement marking. This shall include the Type A or B marking and any necessary eradication of the Type A or B pavement marking.

3. **Type D, Class III contrast pavement markings** shall be used for all longitudinal temporary pavement markings on bridge decks and hydraulic cement concrete riding surfaces if all of the following are met:

- The road has a speed limit of 45 MPH or greater.
- The hydraulic cement concrete riding surface in question is at least 300 feet in length.
- The temporary markings are planned for at least 15 days of use.

Type D, Class III contrast markings are not required for any markings that are parallel to and within two feet of existing guardrail or other longitudinal barrier.

4. **Type E pavement markings** shall be used to cover existing markings in accordance with paragraph (l) herein.
5. **Temporary pavement markers** shall be installed with temporary pavement markings in accordance with paragraph (m) herein.

Section 512.03(l) – Eradicating Pavement Markings is replaced with the following:

Eradicating Pavement Markings: Markings that may conflict with desired traffic movement, as determined by the Engineer, shall be eradicated as soon as practicable: either immediately before the shifting of traffic or immediately thereafter and before the conclusion of the workday during which the traffic shift is made. Work shall be done in accordance with Section 704 except as noted herein.

The Contractor shall perform eradication by grinding, blasting, or a combination thereof. Blasting may be performed using water blasting, sand blasting, hydroblasting (combination of sand and water), or shot blasting. Water blasting and hydroblasting shall be done with equipment that includes a vacuum recovery system and capability to adjust the water pressure.

The Contractor may submit other methods for eradication for the Engineer's approval; however, the Department will not permit obscuring existing pavement markings with black paint or asphalt as a substitute for removal or obliteration. The Contractor shall minimize roadway surface damage when performing the eradication. The Contractor shall repair the pavement if eradication of pavement markings results in damage to or deterioration of the roadway presenting unsafe conditions for motorcyclists, bicyclists, or other road users. Pavement repair, when required, shall be performed using a method approved by the Engineer.

The Contractor shall ensure workers are protected in accordance with Section 107.17 when eradicating pavement markings.

The Contractor shall vacuum or collect the eradication residue (removed markings, debris, and water) during and immediately after the eradication operation. Dust shall be collected during the entire operation. The Contractor shall ensure that no debris enters inlets or waterways.

Eradication residue from the removal of any pavement markings is considered to be a nonhazardous waste material and shall be disposed of in a properly permitted waste disposal facility in accordance with applicable state and federal laws and regulations. The Department does

not require Contractor testing of the eradication residue for the eight Resource Conservation Recovery Act metals.

When markings are removed for lane shifts, transitions, or other areas or conditions required in the VWAPM, 100% of the pavement marking shall be removed.

Type E pavement markings may be used to cover existing markings instead of eradication on asphalt concrete surfaces. The Contractor shall use this material to cover markings as indicated in the Plans or as directed by the Engineer. Type E pavement marking shall be applied in accordance with the manufacturer's recommendations. Type E markings shall not be adhered to the pavement for more than 120 days. Type E markings shall not be used on HCC surfaces or bridge decks.

When eradicating symbols and messages, the entire theoretical box bounding the outermost limits of the markings shall be uniformly eradicated.

Eradication of 24" lines shall be considered nonlinear marking eradication.

Section 512.03(m) – Temporary Raised Pavement Markers is replaced with the following:

Temporary Raised Pavement Markers shall be installed with temporary pavement markings where required by the VWAPM and where directed by the Engineer. Temporary raised pavement markers shall not be used with Type E markings.

Temporary raised pavement markers shall be installed at the spacing required by the VWAPM, and as shown on Standard Drawing PM-8. . The Contractor may install two one-way markers instead of each two-way marker at no additional cost to the Department.

Temporary raised pavement markers shall be installed with a hot applied bitumen adhesive, except epoxy may be used on hydraulic cement concrete roadways and non-final surfaces of asphalt concrete roadways. Pavement damage caused by removing markers shall be repaired in kind by the Contractor at no additional cost to the Department.

The Contractor shall replace damaged, ineffective, or missing temporary raised pavement markers upon notification by the Engineer at no additional cost to the Department. Markers damaged by the Department's snow removal operations or other maintenance and construction operations, however, will be paid for at the contract unit price.

Section 512.03(p) – Construction (Temporary) Pavement Message and Symbol Markings is replaced with the following:

Construction (Temporary) Pavement Message and Symbol Markings shall be the color, shape, and size required by the MUTCD, Standard Drawing PM-10, and the Plans. The Contractor shall install message and symbol markings in accordance with MUTCD, Section 704 the VWAPM, and the Standard Drawings.

Temporary pavement message and symbol markings shall be installed and maintained using the material specified on the Plans in accordance with Section 512.03(k).

Pavement message/symbol markings shall be installed at locations shown on the Plans and at locations designated by the Engineer.

Temporary pavement message markings shall be maintained in accordance with Section 512.03(k). Retroreflective measurements conforming to Section 512.03(k) shall be taken out of the

wheel path locations. The pavement message/symbol marking shall be replaced when the average of the three readings for the symbol/message is below 100 mcd/sf/ft.

Section 512.03(q) – Type 3 Barricades is replaced as follows:

Type 3 Barricades: Type 3 barricades shall conform to NCHRP Report 350, Test Level 3, or MASH. Type 3 barricades shall be selected from those shown on the Department's Approved Lists for NCHRP 350 or MASH Approved Products. The Contractor shall provide a certification letter stating the brands and models of Type III barricades from the list proposed for the project. Instead of using Type 3 barricades on the listing, the Contractor may use other brands and models, if he submits a copy of the FHWA acceptance letter indicating the proposed substitutes complies with NCHRP Report 350, Test Level 3, or MASH before use.

Type 3 Barricades shall be installed and ballasted in accordance with the VWAPM.

Section 512.03(r) – Truck-mounted or trailer mounted attenuators is replaced as follows:

Truck-mounted or trailer-mounted attenuators (TMAs): Truck-mounted and trailer-mounted attenuators manufactured on or prior to December 31, 2019 may be used if they are in good working condition, conform to Test Level 3 of NCHRP Report 350 or MASH, and are a product shown on the Department's Approved Lists for NCHRP-350 or MASH Approved Products. TMAs manufactured after December 31, 2019 shall conform to MASH Test Level 3 and shall be a product shown on the Department's Approved List for MASH Approved Products.

The Contractor shall submit catalog cuts/brochures of the TMA and a copy of the certification letter documenting NCHRP 350/MASH compliance of the specific TMA before their use on the project. TMAs shall be permanently identified with a device-specific manufacturers' identification number by stamping or marking with a durable weather resistant material in accordance with § 33.2-274.1 of the Code of Virginia.

The weight of the support vehicle shall be as recommended by the manufacturer of the Truck/Trailer-mounted attenuator. The Contractor shall provide a copy of the manufacturer's recommendations to the Engineer, a copy of the original weigh ticket for the support vehicle, and a self-certification letter stating the support vehicle has not been altered since the original weight ticket was issued. The weigh ticket shall contain adequate information to identify the ticket with the applicable support vehicle. A copy of the self-certification and weigh ticket shall be available in the support vehicle at all times and upon request.

Additional weight may be added to the support vehicle to achieve the range recommended by the manufacturer of the Truck/Trailer-mounted attenuator provided the total weight is properly balanced without overloading any one axle, and is within the Gross Vehicle Weight Recommendation of the support vehicle. The added weight shall be securely attached to the support vehicle to prevent movement during an impact or movement of the vehicle. The additional weight and attachment method shall be self-certified by the Contractor and a copy of the self-certification letter shall be with the support vehicle at all times or a final stage manufacturer's certification sticker may be placed on the inside door of the altered vehicle.

The Truck/Trailer-mounted attenuator shall be no less than 72 inches wide and no more than 96 inches wide. There shall be no additional devices such as signs, lights, and flag holders attached to the Truck/Trailer-mounted attenuator except those that were tested on the Truck/Trailer-mounted attenuator and provided by the manufacturer of the Truck/Trailer-mounted attenuator.

The support vehicle shall have at least one vehicle warning light functioning while in operation in accordance with the VWAPM. When allowed by the VWAPM, an electronic arrow operated in the

caution mode may be used with the vehicle warning light. When installing and removing lane closures on a multilane roadway as well as when performing mobile operations, the support vehicle shall be equipped with both vehicle warning lights and an arrow board.

The support vehicle shall be operated and parked in accordance with the manufacturer's recommendations.

If the Truck/Trailer-mounted attenuator is impacted, resulting in damage that causes the unit to be ineffective, all work requiring the use of the Truck/Trailer-mounted attenuator shall cease until such time that repairs can be made or the Contractor provides another acceptable unit.

Section 512.03(s) – Portable Changeable Message Signs is amended to replace the second and third paragraphs with the following:

The sign shall be capable of sequentially displaying at least 2 phases of 3 lines of text each with appropriate controls for selection of messages and variable off-on times. Trailer-mounted PCMS shall be capable of displaying 3 lines of 8-character 18-inch text in a single phase, and vehicle-mounted PCMS shall be capable of displaying 3 lines of 8-character 10-inch text in a single phase. Each character module shall at a minimum use a five wide by seven high pixel matrix. The message shall be composed from keyboard entries.

Access to PCMS control mechanisms shall be physically locked at all times when deployed to deter message tampering.

The message shall be legible in any lighting condition. Motorists should be able to read the entire PCMS message twice while traveling at the posted speed.

The sign panel support shall provide for an acceptable roadway viewing height that shall be at least 7 feet from bottom of sign to crown of road.

Section 512.03(w) – Portable Temporary Rumble Strips (PTRS) is replaced as follows:

Portable Temporary Rumble Strip (PTRS):

A PTRS may be made of rubber or recycled rubber. It shall have a recessed, raised or grooved design to prevent movement and hydroplaning. PTRS color shall be in accordance with the VWAPM.

A PTRS shall consist of interlocking or hinged segments of equal length that prevent separation when in use. The combined overall usable length of the PTRS shall be between 10 feet 9 inches and 11 feet. The width of the PTRS shall be 12 to 13 inches. PTRS shall be between 5/8 inch and 1.0 inch in height. The weight of each roadway strip shall be between 100 and 120 pounds. The leading and departing edge taper shall be between 12 and 15 degrees.

Each roadway length of the PTRS shall have either a minimum of one cutout handle in the end of the rumble strip, or an interlocking segment which can be used as a handle for easy deployment or removal.

The manufacturer of the PTRS shall provide a signed affidavit that states the PTRS is able to withstand being run over by an 80,000 pound vehicle and retain its original placement with minor incidental movement of 6 inches or less during an 8 hour deployment. Incidental movement of the PTRS shall be parallel with other rumble strips in an array but shall not move so that its placement compromises the performance and safety of the other rumble strips, workers or the traveling public.

The PTRS shall be installed in accordance with manufacturers installation instructions, without the use of adhesives or fasteners.

PTRS Placement shall be in accordance with the VWAPM.

Section 512.04 – Measurement and Payment is amended to replace the thirteenth paragraph with the following:

Impact attenuator service will be measured in units of each and will be paid for at the Contract each price for the type specified. This price shall include installing, maintaining, and removing impact attenuator and object marker. Impact attenuators used with barrier openings for equipment access will not be measured for separate payment but the cost thereof shall be included with other appropriate items. When impact attenuator service is moved to a new location, as directed or approved by the Engineer, the relocated terminal will be measured for separate payment. Payment for impact attenuator service will not be made until the work behind the corresponding barrier service is actively pursued.

Section 512.04 – Measurement and Payment is amended to replace the twentieth paragraph with the following:

Eradication of existing nonlinear pavement markings will be measured in square feet based on a theoretical box defined by the outermost limits of the nonlinear pavement markings as defined in Standard Drawing PM-10. Nonlinear pavement markings shall include but not be limited to, arrows, images, symbols, and messages. Eradication of existing nonlinear pavement markings will be paid for at the contract unit price per square foot. This price shall include removing nonlinear pavement markings, cleanup, and disposing of residue.

Section 512.04 – Measurement and Payment is amended to replace the 29th paragraph with the following:

Portable Temporary Rumble Strip (PTRS) Array will be measured in Days per array and will be paid for at the Contract Day price. An Array shall consist of three rumble strips. This price shall include installing, maintaining, removing devices when no longer required, and relocating throughout the day.

Section 512.04 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Portable temporary rumble strip	Each

The following pay items are inserted:

Pay Item	Pay Unit
Portable temporary rumble strip array	Day

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
COLD PLANING (MILLING) ASPHALT CONCRETE OPERATIONS

July 12, 2016

I. DESCRIPTION

This provision shall govern cold planing (milling) asphalt concrete operations in preparation for pavement repair and/or pavement overlay. Cold planing of asphalt concrete pavement shall be performed according to Section 515 of the Specifications and the requirements herein.

II. GENERAL PROCEDURES

The Contractor is permitted to perform either regular pavement planing or performance pavement planing to the Contract specified depth or as directed by the Engineer in order to provide a uniform sound substrate prior to paving roadways designated in the schedules according to Section 315 of the Specifications, the requirements herein, or elsewhere in the Contract.

A. Regular and Performance Planing

The following general conditions apply to either type of cold pavement planing:

Limitations of operations for planing shall be performed according to Section 108.02 of the Specifications, other Contract specific requirements, and as specified herein.

Where the depth of planing designated in the Contract or directed by the Engineer is 2 inches or less, the Contractor shall have the option of planing the abutting lane or shoulder on alternate days or squaring up the planing operation at the end of each work shift. However, abutting lanes or shoulders shall be planed and squared up regardless of planing depth prior to holidays or any temporary shutdowns.

Where the depth of planing designated in the Contract or directed by the Engineer is greater than 2 inches in the Contract, the Contractor shall square up the planing operation at the end of each workday or plane adjacent lanes including abutting shoulders within the same day for the length of that day's planing operation.

The Contractor will not be permitted to plane a portion of the width of a travel lane, ramp, loop or shoulder and leave it unpaved and open to traffic. Abutting shoulders may also be planed during single and multiple lane planing operations. Planing operations shall be planned and performed to maintain positive drainage according to Section 315.05(c) of the Specifications.

In the event an emergency or an unforeseen circumstance such as equipment failure or breakdown occurs during the Contractor's operations and such emergency or unforeseen circumstance within his control prevents the Contractor from squaring up the planed surface on adjacent lanes prior to a holiday or temporary shutdown, any additional signage, traffic control devices or temporary markings or markers required to protect the traveling public shall be the Contractor's responsibility and at his expense.

Where uneven pavement joints exist either transversely or longitudinally at the edges of travel lanes, the Contractor shall provide advance warning signage and traffic control devices to inform the traveling public according to the details provided in the Contract for the scope of operation he is performing. The cost for such advance warning signage and traffic control devices shall be included in the cost of other appropriate items

Where appropriate according to Contract requirements and site specific conditions, the existing asphalt concrete layers shall be planed to permit the transition of the top course of the asphalt concrete overlay according to the details of the ACOT-1 Standard. Any sub-courses termination may be notched into the existing pavement or blended with the next course of pavement.

B. Performance Planing Only Limitations:

When the Contractor elects to performance plane on roadways specified to be planed to a depth of 2 inches or less, the Contractor shall performance plane only that amount of pavement which can be paved back within the time allowance specified herein for completion of planing the roadway or portion of roadway. The Contractor is required to perform pavement surface testing as specified in Section 515.04 of the Specifications to verify the Contractor has achieved the acceptable surface texture specified in that Section prior to opening the performance planed surface to traffic. Additional traffic control devices and signage required for the extended pave back time allowance specified herein for performance planing operations versus the traffic control devices required for the pave back operations for regular pavement planing operations specified herein shall be at the Contractor's expense.

III. ROADWAY CLASSIFICATION LIMITATIONS

The following restrictions, based on the type of roadway, shall apply:

A. All Interstates and other Limited Access Roadways including Ramps and Loops posted at 55 Mph or Greater

1. Regular planing and performance planing in multiple lanes

The Contractor shall plan, execute and maintain pavement planing operations to avoid trapping water on the roadway. On roadways with a combination of 3 or 4 lanes and shoulders (i.e. 2 travel lanes and 1 or 2 shoulders in one direction) where the travel lanes and shoulders will not be completely planed to drain prior to the start of paving operations, planing shall be performed so that water will not pond on the travel surface. When the Contract does not include the removal of the shoulder at the specific roadway planing location, the Contractor shall cut drainage outlets through the shoulder at locations the Engineer designates (excluding curb and gutter sections) for those portions of the planed roadway that are to be opened to traffic. The Contractor shall restore the shoulders to their original grades once paving operations are completed, unless otherwise directed by the Engineer. The cost for cutting and restoring roadway shoulders shall be included in the price bid for other items of work.

On roadways with a combination of 5 or more lanes and shoulders (i.e. 3 or more travel lanes and 2 shoulders in one direction), the extent to which the interior lanes shall be planed will be such that the planed portions can be repaved within the work-zone time limits unless provisions are made to mitigate the ponding of

water (i.e., milling adjacent lane(s) and shoulders or cutting drainage outlets through the shoulder).

Ramps and exits shall be planed in such a manner that an even longitudinal joint (elevation difference of greater than 1 inch) is not left for vehicles to cross within the posted speed limits in a "run on" situation. To prevent this, the Contractor can plane ramps and exits to the extent that the joint line between new and existing pavement crossed by traffic is traversed at an angle close to ninety (90) degrees per the ACOT-1 Standard for temporary transverse joints or can perform tapered planing along the ramp/exit longitudinal joint to provide a smooth transition for vehicles to cross, or can square up ramp or exit pavement with the adjacent mainline lane at the time of installation.

The following additional restrictions will apply to roadways where **regular pavement planing** is applicable:

- The Contractor will be limited in the case of regular pavement planing, whether in a single lane or multiple lane operation, to only that amount of pavement that can be paved back within 24 hours of completion of planing that roadway or portion of roadway.
- The Contractor shall pave all roadways, ramps and loops planed during the week before that weekend.
- On roadways with a combination of 4 or more lanes and shoulders (i.e. 2 or more travel lanes and 2 shoulders) in one direction, all travel lanes must be paved back before the weekend. Up to two thousand five hundred (2,500) feet of shoulder may be planed and left over the weekend provided the portion of planed shoulder left unpaved over the weekend is paved within 24 hours after the end of the weekend period.

The following additional restrictions will apply to roadways where **performance pavement planing** is planned by the Contractor:

- Performance planing may be performed in multiple lanes across the entire widths of the lanes up 4 miles of travel lane unless otherwise stated in the Contract. Performance planed travel lanes surfaces must be paved back within 96 hours from the end of the performance planing operation
- Where the Contractor decides to performance plane multiple lanes, the Contractor shall be responsible for furnishing and installing advance warning signage and traffic control devices to inform the traveling public according to the details provided in the Contract. Temporary pavement markings and markers used for lane demarcation on performance planed surfaces will be according to Section 704.04 of the Specifications and the *Special Provision for SECTION 704—PAVEMENT MARKINGS AND MARKERS* included in the Contract. The cost for such warning devices and advance signage required by multiple lane planing operations shall be included in the cost of other appropriate items unless otherwise specified in the Contract by a specific pay item(s) for separate payment.

B. Non-Limited Access Roadways with an ADT of 10,000 or Greater (Traffic Group XV and above) and a Posted Speed Limit of 45 Mph or Greater

1. Regular planing and performance planing in multiple lanes

The Contractor shall plan and proceed with the pavement planing operation to avoid trapping water on the roadway. On roadways with a combination of 3 or 4 lanes and shoulders (i.e. 2 travel lanes and 1 or 2 shoulders) in one direction where the travel lanes and shoulders will not be completely planed prior to the start of paving operations, planing operations shall be performed so water will not pond on the travel surface. When the Contract does not include the removal of the shoulder, the Contractor shall cut drainage outlets through the shoulder at locations the Engineer designates, excluding curb and gutter sections, for those portions of the planed roadway that are to be opened to traffic. The Contractor shall restore the shoulders to their original grades once paving operations are completed, unless otherwise directed by the Engineer. The cost for cutting and restoring the roadway shoulder shall be included in the price bid for other items of work.

On roadways with a combination of 5 or more lanes and shoulders (i.e. 3 or more travel lanes and 2 shoulders in one direction), the extent of pavement planing on the interior lanes shall be such that the planed surface can be repaved within the timeframe of the work-zone time limits unless provisions are made to mitigate the ponding of water (i.e. planing adjacent lane(s) to mitigate the ponding of water).

The following additional restrictions will apply to roadways where **performance pavement planing** is planned by the Contractor:

- Performance planing may be performed in multiple lanes across the entire widths of the lanes up a total of 4 miles of travel lane unless otherwise stated in the Contract.
- Performance planed travel lane surfaces must be paved back within 10 days from the start of the performance planing operation.
- Where the Contractor decides to performance plane multiple lanes, the Contractor shall be responsible for furnishing and installing advance warning signage and traffic control devices to inform the traveling public according to the details provided in the Contract. The cost for such warning devices and advance signage required by multiple lane planing operations shall be included in the cost of other appropriate items unless otherwise specified in the Contract by a specific pay item(s) for separate payment. Temporary pavement markings required by such operations will be handled according to Section 704.04 and the *Special Provision for **SECTION 704—PAVEMENT MARKINGS AND MARKERS*** included in the Contract.

The following additional restrictions will apply to roadways where **regular pavement planing** is applicable:

- The Contractor will be limited whether in a single lane or multiple lane operation, to only that amount of pavement that can be paved back within 24 hours of completion of planing that roadway or portion of roadway.
- The Contractor shall pave all roadways that have been regular planed during the week before that weekend.
- On roadways with a combination of 4 or more lanes and shoulders (i.e. 2 or more travel lanes and 2 shoulders in one direction), all travel lanes must be paved back before the weekend. Up to two thousand five hundred (2,500) feet of shoulder may be planed and left over the weekend provided the

portion of planed shoulder left unpaved over the weekend is paved within 24 hours after the end of the weekend period.

C. All Other Roadways

1. Regular Pavement Planing (single or multiple lanes)

If the Contractor elects to perform regular pavement planing the Contractor will be permitted to leave up to two miles of travel lane open to the traveling public provided such planing (milling) is performed across the entire lane width. This same total length restriction will apply in cases where multiple-lane regular pavement planing is permitted in the Contract or allowed by the Engineer. The Contractor will be limited in the case of regular pavement planing, whether in a single lane or multiple lane operation, to only that amount of pavement that can be paved back within 96 hours of completion of planing that roadway or portion of roadway.

2. Performance Pavement Planing

When the Contractor elects to performance plane roadways specified to be planed to a depth of 2 inches or less, the Contractor shall plane only the amount of pavement that can be paved back within 14 calendar days of completion of planing that roadway or portion of roadway. The Contractor is required to perform pavement surface testing as specified in Section 515.04 of the Specifications to verify the Contractor has achieved the acceptable surface texture prior to opening the performance planed surface to traffic. The additional traffic control devices and signage required for the 14 calendar day pave back operation allowance for performance planing operations shall be at the Contractor's expense.

Temporary pavement markings required by such operations will be handled according to Section 704.04 and the *Special Provision for **SECTION 704—PAVEMENT MARKINGS AND MARKERS*** included in the Contract.

Roadways on which the roadway edges (i.e. edge milling) are to be planed shall be paved back within 10 days from the completion of the planing operation.

IV. MEASUREMENT AND PAYMENT

Measurement and payment will be according to Section 515.05 of the Specifications.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 520 – WATER AND SANITARY SEWER FACILITIES

April 14, 2020

Section 520 – Water and Sanitary Sewer Facilities is amended as follows:

Section 520.02(r) – Flowable backfill is inserted as follows:

Flowable backfill shall conform to Section 249 and 509.

Section 520.03 Procedures is amended to replace the first paragraph with the following:

The Contractor shall be responsible for anticipating and locating underground utilities and obstructions in accordance with Section 105.08. In areas where the utility owner's specifications conflict with the Contract, the utility owners' specifications shall govern

Section 520.03 – Procedures is amended to replace the fourth paragraph with the following:

The Contractor shall abandon existing water and sewer lines and appurtenances and manholes not required in the completed system as directed by the Engineer. Abandoned materials shall become the property of the Contractor, unless otherwise noted on the plans, upon satisfactory replacement with the new installation. The Contractor shall clean abandoned pipe that is not removed of debris and plug it with Class A3 concrete at open ends if the utility is less than 8 inches inside diameter. If the abandoned pipe is 8 inches inside diameter or greater, the Contractor shall clean the pipe of debris and fill it entirely with Class A3 concrete or flowable backfill.

Section 520.06 – Measurement and Payment is amended by inserting the following after the fifteenth paragraph:

Concrete will be measured in cubic yards and will be paid for at the Contract cubic yard price. This price shall include furnishing and placing of concrete not included in other pay items, and installing plugs.

Flowable Backfill will be measured and paid for in accordance with Section 509.

Section 520.06 – Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay item is removed:

Pay Item	Pay Unit
Flowable Backfill	Cubic Yard

PROTECTION OF BAT SPECIES — If bats are observed roosting on a structure, the Contractor shall immediately notify the Engineer and suspend work in the immediate vicinity of the bats until authorized to continue.

1-17-18 (SPCN)

ABATEMENT OF ASBESTOS CONTAINING MATERIALS - The Contractor shall abate the Asbestos Containing Materials (ACM) identified in the Abatement Table below in accordance with the Special Provision for Asbestos Removal for Road Construction Demolition Projects.

Abatement				
Structure Number	NESHAP Category	Description	Condition	Quantity

11-5-18 (SPCN)

DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
REMOVAL OF ASBESTOS FROM BRIDGE STRUCTURES

September 12, 2017

I. GENERAL

1. Description of Work:

This Special Provision applies to the removal of asbestos containing materials (ACM) from bridge structures scheduled for demolition, renovation, reconstruction, or replacement. The Contractor is hereby advised that the bridge structures identified in the Plans may contain asbestos. The Contractor shall assume that any ACM contain asbestos in a quantity sufficient to be a health hazard when disturbed or found in a degraded state or friable condition.

Where asbestos inspection results indicate the presence of ACM, the Contractor shall employ a licensed asbestos abatement firm and a licensed project designer to conduct asbestos abatement and project design activities, respectively, on bridge structures, as appropriate. The firms shall furnish all labor, materials, supplies, and equipment necessary to legally remove and dispose of ACM identified in the asbestos inspection report and as-built construction plans as required by Federal and State regulations. For renovation projects, only the ACM identified in the asbestos inspection report that will be removed or disturbed as part of the renovation shall be removed. All quantities are estimates. The Contractor shall be responsible for ascertaining the exact amount of material to be removed and removing it in accordance with the provisions herein.

Where no asbestos inspection report is available or where asbestos removal from any bridge appurtenance that will be re-occupied (e.g. bridge tender's office) is required, the Contractor shall comply with requirements found elsewhere in the Contract.

2. Contract Limitations

- A. An asbestos abatement firm is not eligible to perform work on projects if asbestos abatement activities were or will be performed by individuals or firms with an employer/employee relationship or financially affiliated with the asbestos inspection firm performing inspection activities.
- B. An asbestos abatement firm is not eligible to perform asbestos abatement activities if the asbestos sample analyses were performed by individuals or firms with an employer/employee relationship or financially affiliated with the laboratory performing sample analysis.

3. Definitions and Abbreviations:

All definitions and abbreviations used in this Special Provision are consistent as defined under OSHA; the USEPA Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP); the Virginia Department of Labor and Industry (DOLI); the Virginia Department of Professional and Occupational Regulation (DPOR); and the Virginia Department of Environmental Quality (VDEQ).

II. WORK PRACTICES

1. Regulations

- A. The Contractor and its subcontractors shall comply with all applicable EPA, OSHA, VDEQ, DOLI, and DPOR regulations, and shall follow all applicable EPA and DOLI/OSHA workplace guidelines. EPA workplace guidelines include, but are not limited to: Parts I and II of EPA guideline document 560/5-85-024, "Guidance for Controlling Asbestos Containing Materials in Buildings"; EPA regulations 40 CFR 61 Subparts A and M; and "*Demolition Practices Under the Asbestos NESHAP*" (TRC Environmental Corporation Work Assignment No. IA2-19). OSHA workplace guidelines include, but are not limited to, any currently applicable OSHA compliance directives or instructions. In any instance of conflict between the DOLI and OSHA requirements, the DOLI requirements shall take precedence. Any "de minimus" quantity exemptions that are provided in the aforementioned references shall not apply to VDOT asbestos removal activities.
- B. The asbestos abatement firm is required to maintain at the job site copies of EPA, VOSH/OSHA, and applicable state and local government regulations regarding the handling of ACM.
- C. The firms and their employees shall be licensed to perform asbestos activities in accordance with DPOR requirements.

2. Notifications

- A. The Contractor shall make all required notifications at least 20 days prior to beginning removal of ACM. Pursuant to 40 CFR 61.145(b), the Contractor shall also provide the requisite ten day demolition notification irrespective of minimum quantity or other exclusions. The Contractor shall also provide written notice to the Engineer prior to work being performed. Notifications shall be submitted to the DOLI and the EPA Region III, Land and Chemical Division according to Section 107.01 of the Specifications.
- B. The 20 day notification is only required for the removal of Regulated Asbestos Containing Materials (RACM). RACM are friable asbestos material; Category I non-friable ACM that has become friable; Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; and Category II non-friable ACM that has a high probability of becoming crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation. If any Category I or Category II non-friable ACM becomes friable during removal, the Contractor shall stop work and make all notifications.

3. Competent Person:

- A. The asbestos abatement firm shall have a "competent person" present at all times while work on this contract is in progress. The competent person shall be thoroughly familiar and experienced with asbestos removal and related work; shall monitor and enforce the use of all safety procedures and equipment; and shall be knowledgeable of all National Institute for Occupational Safety and Health, EPA, OSHA, DPOR, DOLI, and VOSH requirements and guidelines.
- B. The competent person shall have a valid asbestos supervisor's license issued by the DPOR in accordance with the provisions of VA § 54.1-500 et seq.

4. Additional Contractor Responsibilities

- A. The Contractor shall select a landfill approved for disposal of friable ACM and for disposal of non-friable ACM by the USEPA and appropriate state.

- B. The abatement firm and its employees performing work under this Specification have been trained in the proper procedures to follow in case of an emergency.
- C. The abatement firm and its employees performing work under this Special Provision have an established medical surveillance program in compliance with 29 CFR 1926.1101 and a written respirator program in compliance with 29 CFR 1910.134.
- D. Copies of Material Safety Data Sheets are obtained for any chemical solvents that will be used.

5. Materials, Work Areas, and Support Equipment

- A. Personnel of other trades not engaged in the removal of asbestos materials shall be excluded by the Contractor from areas where there is potential exposure to airborne concentrations of asbestos; the abatement firm shall erect appropriate signage and barricades.

All air handling equipment, if required, shall arrive at the job site in a clean (uncontaminated) condition and shall be compliant with ANSI 29.2.

- B. The abatement firm is responsible for providing all equipment necessary to access areas containing ACM.
- C. The abatement firm shall provide appropriate decontamination facilities and shall be responsible for providing any necessary electrical and water sources and disposal of all contaminated materials.
- D. Work areas shall be prepared in accordance with 40 CFR 61 Subpart M; other applicable EPA guidance; 29 CFR 1926.1101; and any currently applicable OSHA compliance instructions.

6. ACM Management

- A. All RACM shall be removed prior to demolition or renovation.
- B. Any Category I or Category II non-friable ACM present during demolition, renovation, post-demolition, or post-renovation subject to sanding, grinding, cutting, crushing, breaking, or abrading shall be removed and disposed as RACM.
- C. Category I and Category II non-friable ACM, that are not in poor condition and cannot be removed prior to demolition or renovation, shall be separated from the demolition debris. Alternatively, the entire debris mass shall be considered Category I or Category II non-friable ACM in good condition and shall be handled accordingly.
- D. Category I non-friable ACM that is not in poor condition before demolition, but where the structure and the ACM can be expected to burn as a result of explosive demolition, shall be treated as RACM; and therefore, shall be removed from the structure before demolition.
- E. All Category II ACM found in or on structures scheduled for explosion shall be removed before such demolition.
- F. Asbestos Cement (A/C) pipe shall not be ground, broken, crushed, sawed, abraded, or handled in a manner which would cause asbestos material to become friable or airborne. Saw-cutting will only be allowed provided that specifically designed saws equipped with high efficiency particulate air filtered vacuums are used. Cuts shall be continuously sprayed with amended water during cutting. The water shall be

collected and filtered or disposed of properly. With the approval of the Engineer, A/C pipe that will be removed and that is encased in concrete, such as end walls, shall be cut flush with the concrete surface. With approval of the Engineer, the Contractor may pump grout into the buried lines that are no longer in service to maintain the structural bearing capacity of the area. No on-site burial of crushed A/C pipe shall be allowed.

7. Cleanup

- A. All work areas shall be cleared of all construction debris and left in a neat and orderly condition.
- B. All visible accumulations of asbestos material and debris shall be removed, and all surfaces within the work area shall be wet cleaned.
- C. Sealed drums or equipment used in the work area shall be cleaned and subsequently removed from the work areas.
- D. If the results of the air or surface dust samples indicate that contamination has occurred as the result of Contractor negligence or poor work practices, the Contractor shall clean the site at no additional cost to the Department. In addition, the Contractor shall be liable for any damage claims or other legal actions brought against VDOT, its employees, or brought by VDOT or any persons exposed to such contamination.
- E. The Contractor shall be held responsible for the cost of re-inspections if the work is determined to not be substantially complete.

8. Disposal of Asbestos Waste

The abatement contractor shall remove, transport, and dispose of the ACM from the job site in accordance with all federal and state regulations and this Special Provision. The Contractor shall be responsible for generating and maintaining a waste shipment record in accordance with applicable local, state, federal, and disposal facility requirements; and shall provide a copy to the Engineer for the Department's records.

All asbestos waste, scrap, debris containers, asbestos contaminated clothing, and equipment that may produce airborne concentrations of asbestos fibers shall be collected and placed in sealed and properly labeled, 6 mil impermeable bags. Sealed impermeable bags of asbestos waste shall be temporarily stored in asbestos waste containers (drums, trailers, etc.). Uncontaminated containers may be recycled.

III. SUBMITTALS

1. Pre-Work Submittals

Before commencing work, the Contractor shall submit to the Department two copies of the required notifications submitted to the Asbestos Clerk, DOLI.

2. Work/Post-Work Submittals

The Contractor shall submit to the Department:

- A. Copies of licenses for the firms and employees performing work under this Specification.
- B. Within 35 days of depositing a load of ACM waste from this project to the designated landfill, the Contractor shall submit a copy of the certificates of disposal from the

landfill to the Department. All acceptable waste manifests and certificates of disposal shall be submitted to the Department before any payments are made to the Contractor for this work.

IV. SITE INSPECTION

The Department (or its representative) reserves the right to inspect all asbestos abatement operations at any time. If any aspect of the work is found inconsistent with this special provision, a stop work order will be issued and operations will be immediately suspended. Until the inconsistency is corrected, any standby time and costs for corrective actions shall be at the Contractor's expense.

V. MEASUREMENT AND PAYMENT

Where the Department has provided an asbestos inspection report, **asbestos removal** will be paid for at the Contract lump sum price per structure. This price shall include removal and disposal of all ACM, and submission of required documentation.

Where the Department has not provided an asbestos inspection report, payment for removal and disposal of all ACM will be made under Section 109.05 of the Specifications.

Payment will be made under:

Pay Item	Pay Unit
Asbestos Removal (Structure No.)	Lump sum

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SECTIONS
SECTION 700 – GENERAL

SECTION 700 – GENERAL of the Specifications is amended as follows:

Section 700.03 – General Requirements is amended by replacing the second paragraph with the following:

The design of traffic control device and ITS device structures and foundations shall conform to AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (LTS-6), 2013 with 2015 and 2019 interims*, as modified elsewhere in the Contract.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 701 – TRAFFIC SIGNS

SECTION 701 – TRAFFIC SIGNS of the Specifications is amended as follows:

Section 701.02 Materials is amended as follows:

Section 701.02(a)1 – Overhead Permanent Signs is replaced with the following:

Overhead Permanent Signs (signs attached to sign structures which overhang travel lanes) shall use ASTM D4956 Type XI sheeting.

Table VII-1A – Reflective Sheeting is replaced with the following:

TABLE VII-1A Reflective Sheeting	
Background Color of Sign	Sheeting Type¹
White	ASTM D4956 Type XI
Red	ASTM D4956 Type XI
Fluorescent Yellow	ASTM D4956 Type XI ²
Fluorescent Yellow-Green	ASTM D4956 Type XI ³
Green	ASTM D4956 Type XI
Black	ASTM D4956 Type XI
Purple	ASTM D4956 Type XI
Brown	ASTM D4956 Types IV, IX, or XI
Blue	ASTM D4956 Types IV, IX, or XI

¹The following signs may use ASTM D4956 Types IV, IX, or XI, regardless of color: Pushbutton education signs (R10-series signs mounted adjacent to pedestrian pushbuttons), Signs erected on bikeways physically separated from adjacent roads, R7- or R8-series parking restriction signs located on non-limited-access highways, D10-series Reference Location Signs (mile markers) and Intermediate Reference Location Signs, and Post-mounted street name signs.

²The yellow portions of all signs shall be fluorescent yellow.

³All temporary and permanent warning signs related to school zones, pedestrians, or bicyclists (including associated supplemental plaques) shall use fluorescent yellow-green sheeting where required by the VA Supplement to the MUTCD unless otherwise specified on the Plans.

Section 701.02(b) – Sign panel rivets is replaced with the following:

Sign panel rivets shall be fabricated in accordance with Standard Drawing SPD-1.

Section 701.03 Procedures is amended as follows:

Section 701.03 (a) 3 Letters, numerals, arrows, symbols, borders, and other features of the sign message is amended to include the following:

- (e) **Type L5 - Digital Printing:** Features of the sign message shall be created with transparent and opaque durable inks, using the materials, equipment, and fabrication processes recommended by the sheeting manufacturer. Digitally applied colors shall present a smooth surface, free from foreign material, and all messages and borders shall be clear

and sharp. Digitally printed signs shall have at least 70% of the retroreflective minimum values shown in Section 247 for their type and color. Digitally printed signs shall meet the daytime color, nighttime color, and luminance, requirements of ASTM D4956. No variations in color or overlapping of colors will be allowed.

All digitally printed signs shall be comprised of an integrated engineered match component system from the sheeting manufacturer. The integrated engineered match component system shall consist of retroreflective sheeting, durable inks, and clear overlay film all from the same manufacturer applied to the substrate.

The digital sign fabricator shall be certified within the last 12 months by the sheeting manufacturer to produce an engineered-match component traffic control sign product. The Contractor shall provide documentation of this certification before starting digital printing sign fabrication. The submittal shall also include documentation that the manufacturer will warrant digitally printed signs fabricated by the sign fabricator in accordance with Section 247.03.

After printing, all digitally printed permanent and temporary traffic signs shall have an integrated engineered match component clear protective overlay recommended by the sheeting manufacturer applied to the entire face of the sign.

Section 701.03(f)2 – Inventory Sheet is replaced with the following:

Inventory Sheet. The Contractor shall provide an .xlsx formatted file to the Engineer, using a sign inventory template provided by the Engineer. The file shall include the information required above for the label, as well as the following:

- Route no.
- Project UPC no. (if applicable).
- Station or milepost information.
- Lane designation.
- *MUTCD*, if applicable and if denoted on the plans.
- Sign message.
- Sign width.
- Sign height.
- Sheeting Manufacturer
- Sheeting Type
- Sign fabricator company name

The cost of preparing and submitting the .xlsx formatted file shall be included with the cost of the sign panel pay items.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
MAST ARM HANGER ASSEMBLY STD SM-3 AND SMD-2

May 25, 2016; Issued July 12, 2016

I. Description

This work shall consist of furnishing and installing mast arm signal hanger assembly (Standard SM-3) and mast arm sign hanger assembly (Standard SMD-2) for new or relocated signals and signs on mast arms and replacing existing hanger assemblies.

II. Definitions

The following terms are used as follows in this special provision:

1. **Mast Arm Hanger Assembly (Complete):** An inclusive mast arm hanger assembly that consists of the main mount, swivel plate, mounting system, mounting tube, and miscellaneous hardware items.
2. **Mast Arm Hanger Assembly (Components):** Main mount, swivel plate, mounting system and miscellaneous hardware items (washers, screws, bolts, or nuts).
3. **Main Mount:** The bracket component that mounts against the mast arm signal pole. Once installed, this component is fixed and is not adjusted.
4. **Swivel Plate:** The bracket component(s) that mate to the main mount. The swivel plate can be adjusted along multiple axis to allow the signal mounting tube to be positioned at different angular orientations. The mounting tube is connected to the swivel plate.
5. **Mounting System:** Stainless steel cables which connect the main mount and mast arm signal pole.
6. **Mounting Tube:** The bracket component that holds the signal head assembly, camera, or sign panel bracing to the swivel plate.
7. **Miscellaneous items:** Other components of the hanger assembly not listed above, including but not limited to: tie back, or tether clamps which fasten the cable to the mounting tube; mounting arms; cover plates; hardware (washers, screws, bolts, or nuts); caps; and seals.
8. **Special Tools:** Unique tools identified by a specific item or product number in the manufacturer's installation instructions

III. Materials

As used below: XX, XXX or xx refers to stainless steel cable length, which shall be determined by the Contractor for the specific mast arm diameter at each installation location; YY or yy refers to the mounting tube length for sign panels, which shall be determined by the Contractor for the specific sign height at each location; ## refers to the channel width, which shall be determined by the Contractor for the specific sign width at each location.

1. **Mast Arm Signal Hanger Assembly (Components) for Relocation or Maintenance Replacement – Signals**

Mast arm hanger components (main mount, swivel plate, mounting system, and associated miscellaneous items) used for signal relocation or maintenance replacement of signal hanger assemblies shall be of the following or approved equal:

Table 1: MAST ARM SIGNAL HANGER ASSEMBLY (COMPONENTS) FOR RELOCATION OR MAINTENANCE REPLACEMENT - SIGNALS	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AB-3055-XX-SS-PNC
Traffic Hardware & Design	CAN-BRAC, Model CBL-VUB-2CXX-9
General Traffic Equipment Corp.	RM - MAC - XX
Cost Cast, Inc.	Cost Cast Item # 1816-A-CXX
Sky Bracket	SKYBRACKET, Model SS-SBCXX-SCK-VA

2. Mast Arm Signal Hanger Assembly (Complete) - Signals

Complete Mast Arm Hanger Assemblies used for new signals, relocated signals or maintenance replacement of signal hanger assemblies shall be of the following or approved equal:

Table 2: MAST ARM SIGNAL HANGER ASSEMBLY (COMPLETE) – SIGNALS (New Signals, Relocated Signals Or Maintenance Replacement)	
1-SECTION HEAD HANGER ASSEMBLY (IN LINE)	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AG-0125-1-XX-SS-PNC
Traffic Hardware & Design	CAN-BRAC, Model CBL-VUN1-T24-2Cyy-9
General Traffic Equipment Corp.	RM-1000C-XX-1
Cost Cast, Inc.	Cost Cast Item # 1816-G-CXX-24
Sky Bracket	SKYBRACKET, Model SS-SBCXX-18-VA
3-SECTION HEAD HANGER ASSEMBLY (IN LINE)	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AG-0125-3-XX-SS-PNC
Traffic Hardware & Design	CAN-BRAC, Model CBL-VUN1-T46-2Cyy-9
General Traffic Equipment Corp.	RM-1000C-xx-3
Cost Cast, Inc.	Cost Cast Item # 1816-G-CXX-48
Sky Bracket	SKYBRACKET, Model SS-SBCXX-46-VA
4-SECTION HEAD HANGER ASSEMBLY (IN LINE)	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AG-0125-4-XX-SS-PNC
Traffic Hardware & Design	CAN-BRAC, Model CBL-VUN1- T58-2Cyy-9
General Traffic Equipment Corp.	RM-1000C-xx-4
Cost Cast, Inc.	Cost Cast Item # 1816-G-CXX-60
Sky Bracket	SKYBRACKET, Model SS-SBCXX-60-VA
5-SECTION HEAD HANGER ASSEMBLY (CLUSTER)	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AG-0138-XX-SS-PNC
Traffic Hardware & Design	CBL-VUN2-14-T37-2CXX-9
General Traffic Equipment Corp.	RM-5C-5000C-xx
Cost Cast, Inc.	Cost Cast Item # 1816-G-CXX-5X
Sky Bracket	SKYBRACKET, Model SS-SBCXX-SCB-46-VA

3. Mast Arm Sign Hanger Assembly (Components) for Relocation or Maintenance Replacement – Signs

Mast Arm Hanger Assembly components (main mount, swivel plate, mounting system, and associated miscellaneous items) used for sign relocation or maintenance replacement of sign hanger assemblies shall be of the following or approved equal:

Table 3: MAST ARM SIGN HANGER ASSEMBLY (COMPONENTS) FOR RELOCATION OR MAINTENANCE REPLACEMENT - SIGNS	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AB-3055-XX-SS-PNC 1-Bracket per 16 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Traffic Hardware & Design	CBS-HU-Exx-2Cyy-3 1-Bracket per 20 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
General Traffic Equipment Corp.	RM-MAC-XX 1-Bracket per 15 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Cost Cast, Inc.	Cost Cast Item # 1816-A-Cxx 1-Bracket per 16 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Sky Bracket	SKYBRACKET, Model SS-SBCXX-SCK-VA 1-Bracket per 13 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Xcessories Squared	PAX2PC30-XXX and PASCL316-XXXX 1-Bracket per 10 Sq. Ft. of sign panel spaced per manufacturer's installation instructions

4. **Mast Arm Sign Hanger Assembly (Complete) - Signs**

Complete Mast Arm Hanger Assemblies used for new signs, relocated signs or maintenance replacement of sign hanger assemblies shall be of the following or approved equal:

Table 4: MAST ARM SIGN HANGER ASSEMBLY (COMPLETE) – SIGNS (New Signs, Relocated Signs Or Maintenance Replacements)	
MANUFACTURER	MODEL
Pelco Products, Inc.	Galaxy, Model AG-0142-XX-XX-SS-PNC Galaxy, Model AG-0144-XX-XX-SS-PNC 1-Bracket per 16 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Traffic Hardware & Design	CAN-BRAC, Model CBS-HU-Exx-2Cyy-3 1-Bracket per 20 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
General Traffic Equipment Corp.	SMA - 3000 – XX 1-Bracket per 15 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Cost Cast, Inc.	Cost Cast Item # 1816-N-CXX-YY 1-Bracket per 16 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Sky Bracket	SKYBRACKET, Model SS-SBXX-SBK-XXTK-##-VA 1-Bracket per 13 Sq. Ft. of sign panel spaced per manufacturer's installation instructions
Xcessories Squared	PAX2PC30-XXX and PASCL316-XXXX 1-Bracket per 10 Sq. Ft. of sign panel spaced per manufacturer's installation instructions

IV. Procedures

All work shall be accomplished according to the manufacturer's installation instructions. Only the tools, special tools, and anti-seize lubricants specifically noted in the manufacturer's installation

instructions shall be used. If the Contractor deviates from the manufacturer's installation instructions, the Contractor shall provide documentation from the manufacturer authorizing such deviations, including the use of alternate tools.

If a bolt tightening sequence is not specified in the manufacturer installation instructions, bolts shall be tightened in an alternating pattern for even compression.

If a main mount with fully tightened bolts requires adjustment that necessitates loosening of the main mount bolts, the mounting system and associated hardware for the mounting system (washers, screws, bolts or nuts) shall be replaced at no additional cost to the Department.

1. **Tools:** If maximum torque values are provided in the manufacturer's installation instructions, a calibrated torque wrench shall be used to verify that torque has not been exceeded. The Contractor shall calibrate torque wrenches in accordance with torque wrench manufacturer recommendations at the interval recommended by the torque wrench manufacturer. The torque wrench calibration testing lab shall be ISO, or ANSI accredited for instrument calibration.

If special tools are identified in the manufacturer's instructions as being either required or recommended for installation the Contractor shall furnish no less than one set of tools to the Engineer per ten mast arm hanger assemblies or portion thereof, unless otherwise specified in the contract documents.

2. **Packaging:** All required components of each hanger assembly, except the mounting tube, shall be packaged as one set. The mounting tube may be packaged separately. If special tools are required, or recommended, they may be packaged separately. Under no circumstances shall the parts from multiple assemblies be mixed.
3. **New Signal or Sign Installations:** A Mast Arm Hanger Assembly (Complete) shall be used - see Table 2 for signals and Table 4 for signs.

The Mast Arm Hanger Assembly (Complete) may be attached to the mast arm and all bolts tightened to final tightness before lifting and placing the mast arm onto the signal pole (i.e. on the ground- attached to the mast arm prior to installation of the mast arm).

4. **Relocate Existing Mast Arm Hanger Assemblies for Signals or Signs:** Existing Mast Arm Hanger Assemblies (main mount, swivel plates, mounting systems and all associated miscellaneous items) that are in service before the commencement of any project shall not be relocated on the same mast arm or reused on a different mast arm.

The initial relocation of each existing signal or sign from its location at commencement of the project (Location A) to a new location on a mast arm (Location B) may be accomplished using one of the following at the new location on a mast arm:

- a. A new Mast Arm Hanger Assembly (Complete) – see Table 2 for signals and Table 4 for signs or
- b. New Mast Arm Hanger Assembly (Components) – see Table 1 for signals and Table 3 for signs. Existing mounting tubes, cover plates, tie backs, and tether clamps may be reused if they are compatible with the new components;

Subsequent relocations of the signal or sign from Location B to another location may be accomplished by the Contractor using one of the following at the new location on a mast arm:

- a. A new Mast Arm Hanger Assembly (Complete) – see Table 2 for signals and Table 4 for signs; or

- b. New Mast Arm Hanger Assembly (Components) – see Table 1 for signals and Table 3 for signs. Existing mounting tubes, cover plates, tie backs, and tether clamps may be reused if they are compatible with the new components; or
 - c. New mounting system. The existing hanger assembly equipment installed for the initial relocation from Location A to Location B may be reused.
5. **Modify Existing Hanger Assembly:** Modifying an existing mast arm hanger assembly at the same location on a mast arm shall be accomplished in accordance with the following:
- New Mast Arm Hanger Assembly (Components) – see Table 1 for signals and Table 3 for signs. Existing mounting tubes, cover plates, tie backs and tether clamps may be reused if they are compatible with the new components;
6. **Remove Existing Hanger Assembly:** Removing and disposing of an existing hanger assembly or components shall be in accordance with Section 510 of the Specifications.
7. **Prosecution of Work:** The Contractor shall prosecute work in accordance with Section 703.03 of the Specifications.

While performing this work, if the Contractor discovers any mechanical or electrical problems with the signals, or discovers any problems that require immediate repair, the Contractor shall log each problem by intersection and signal head and advise the Engineer immediately. The Engineer will instruct the Contractor how to proceed.

The Contractor shall exercise caution during prosecution of work to prevent damage to any existing wiring, or signal component. If the Contractor damages any existing wiring, or signal equipment, repair and replacement shall be at no additional cost to the Department.

V. Reporting

For each mast arm hanger assembly (Complete or Components) installed, the Contractor shall submit the attached Mast Arm Bracket Installation Report form to the Engineer. The form shall also be submitted to the Department's email hangerassemblies@vdot.virginia.gov.

Hard copy submission of the Mast Arm Bracket Installation Report to the Engineer shall not substitute for reporting to the required email address. The Mast Arm Bracket Installation Report shall be submitted within 7 business days of mast arm hanger assembly installation.

By submitting the report, the Contractor certifies that the mast arm hanger assembly installation was accomplished in strict conformance with these specifications.

Reporting will not be measured for separate payment but shall be considered incidental to the mast arm hanger assembly work.

VI. Warranty

The Contractor shall furnish a manufacturer warranty for the Complete Mast Arm Hanger Assembly or installed components to cover defects for a minimum of three years from the date of installation. The warranty shall include providing replacements, within 10 calendar days of notification, for defective parts and equipment at no additional cost to the Department. When the warranty normally given by the manufacturer is longer than three years, the manufacturer's normal warranty shall be furnished.

VII. Measurement and Payment

Mast Arm (Type) Hanger Assembly (Standard) will be measured in units of each for the standard and type specified to be paid for at the contract unit price per each. This price shall include furnishing and installing Mast Arm Hanger Assembly (Complete), including the main mount, swivel plate, mounting system, mounting tube, miscellaneous items, reporting, and special tools (when required).

Remove Existing Traffic Signal Head Assembly will be measured in units of each and will be paid for at the contract unit price per each. Signal head assembly is defined as one or more traffic signal head sections (vehicular or pedestrian) assembled as one unit. This price shall include disconnecting the signal head assembly from existing conductor cables, removing the signal head assembly and backplate, removing and disposing of hanger assembly, and removing all associated mounting equipment, hardware, and accessories. If the traffic signal head assembly is to be reinstalled, the price also shall include reconnecting signal cables. When designated in the contract for salvage or if salvage is directed by the Engineer, this price shall include storing, protecting, and delivering to a designated Department facility.

Relocate Existing Mast Arm (Signal or Sign) will be measured in units of each and will be paid for at the contract price per each. This price shall include removing and relocating an existing traffic sign, signal head, or pedestrian signal head from an existing to proposed location, disconnecting and reconnecting conductor cables, adjusting or relocating conductor cables, removing and disposing or salvaging the existing mast arm hanger assembly, installing a new Mast Arm Hanger Assembly (Complete) or installing new Mast Arm Hanger Assembly (Components) and relocating or replacing existing miscellaneous items.

When relocation of signals or signs is accomplished when maintenance of the traffic signal is the responsibility of the Contractor as specified in Section 512 for the items Modify Signal or Temporary Traffic Control Signal, relocating existing mast arm hanger assemblies for signals or signs will not be measured separately and the cost thereof shall be included in the contract unit price of Modify Signal or Temporary Traffic Control Signal.

Modify Existing Mast Arm Hanger Assembly (Type) will be measured in units of each and will be paid for at the contract price per each. This price shall include removing an existing traffic sign, signal head, or pedestrian signal head from the existing hanger, furnishing new hanger assembly components, disconnecting and reconnecting conductor cables, removing, salvaging, and disposing of existing mast arm hanger assembly components, installing new Mast Arm Hanger Assembly (Components) and reusing or replacing existing miscellaneous items.

Payment will be made under:

Pay Item	Pay Unit
Mast Arm (Type) Hanger Assembly (Standard)	Each
Remove Existing Traffic Signal Head Assembly	Each
Relocate Existing Mast Arm (Signal or Sign)	Each
Modify Existing Mast Arm Hanger Assembly (Type)	Each

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
REPLACEMENT OF LOOP DETECTORS

March 16, 2017

I. Description

Loop Detectors shall be installed in accordance with the Section 703. Installation of loop detectors shall be performed in the presence of the Engineer.

II. Materials

Loop detector cables shall be No. 14 AWG stranded copper in accordance with Section 238. Loop sealant shall be from the Pre-Approved Traffic Control Device Listing.

New loop detectors shall be of the same size, configuration and locations as existing loop detector(s) unless otherwise indicated.

III. Procedures

When replacement of loop detectors is included in the Contract, the Contractor will be required to install new loop detector items either within the planed surface prior to the placement of new surface mix, or through the finished riding surface.

Loop detectors shall be installed at the depth specified in the TD-Series Standard Drawings for loop detectors installed in the planed surface or final riding surface, as applicable.

When an existing loop detector is taken out of service by the Contractor's planing operation, the Contractor shall have the new loop detector items installed and operational 96 hours after being taken out of service, unless otherwise stated in the Contract. In no case shall any loop detector be out of service for more than 96 hours. If the Contractor chooses to install new loop detector items through the final riding surface, all loop detector items shall be installed and operational within 96 hours after completion of the paving operations in the affected intersection.

The Contractor shall notify the Engineer at least 72 hours prior to planing at locations that contain loop detectors.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
INLAID PAVEMENT MARKERS

August 26, 2019

I. **Description**

This work shall consist of furnishing and installing inlaid pavement markers in accordance with the Contract and manufacturer's installation instructions. Snow-plowable raised pavement markers conforming to Section 704.03(d)1 of the Specifications shall not be used in the Work.

II. **Materials**

1. **All components** of the inlaid pavement marker shall be listed on the Department's Approved List 22.
2. **Retroreflectors** shall conform to ASTM D4383. The color and directional properties (one-way or two-way) of retroreflector lenses shall conform to Standard Drawing PM-8.
3. **HOLDERS** shall be made of polycarbonate plastic that are nominally 4.75 inches wide (excluding breakaway tabs), can hold retroreflectors from the Department's Approved List 22 under Inlaid Pavement Markers, comes with two breakaway positioning tabs, and will hold the retroreflector just below the pavement surface when installed with the breakaway positioning tabs resting on the pavement surface.

III. **Procedure**

The Contractor shall furnish the manufacturer's recommendations for adhesives and installation procedures to the Department before installing the markers.

1. **Location and Spacing**

The Contractor shall not install markers on bridge decks.

The edge of the groove shall be at least 2 inches from pavement joints and cracks, ensuring that the finished line of markers is straight in accordance with the tolerance for pavement markings specified in Section 704.03 of the Specifications. Offset from the longitudinal joint shall take precedence over straightness of the line of markers.

2. **Installation**

Retroreflectors shall be affixed to holders, using an adhesive from the Department's Approved List 22 (Inlaid Pavement Markers) prior to installation.

The Contractor shall cut tapered grooves and plunge cuts into the concrete or final course of asphalt. Grooves and plunge cuts shall be at the dimensions specified in Figure 1, unless specified otherwise in the manufacturer's installation instructions. The groove length may be shortened to 54 inches on sharp curves if approved by the Engineer.

Tapered grooves and plunge cuts shall be cut using diamond blades that can accurately control the groove dimensions, resulting in smooth uniform tapers and smooth groove bottoms and ensuring the pavement does not tear or ravel. The Contractor shall remove all dirt, grease, oil, loose or unsound layers, and any other material from the groove which would reduce the bond of the adhesive. Pavement surfaces shall be maintained in a clean and dry condition until the marker is placed.

Holders shall be installed in the same shift as grooving.

The epoxy adhesive shall be thoroughly mixed until it is uniform in color, and applied in accordance with the manufacturer's installation instructions. The Contractor shall partially fill the plunge cut with sufficient epoxy adhesive such that the epoxy adhesive bed area is equal to the bottom area of the holder. The Contractor shall then set the holder in the epoxy adhesive such that the breakaway tabs are resting on the road surface, the holder is centered in the cut, and then fill in additional epoxy adhesive if necessary so the entire perimeter of the holder is completely surrounded in epoxy, with the epoxy level with the edge of the holder in accordance with the manufacturer instructions.

The Contractor shall remove all adhesive and foreign matter from the face of the retroreflector or replace the retroreflector if adhesive and foreign matter cannot be removed. The marker shall be replaced if it is not properly positioned and adhered in the plunge cut.

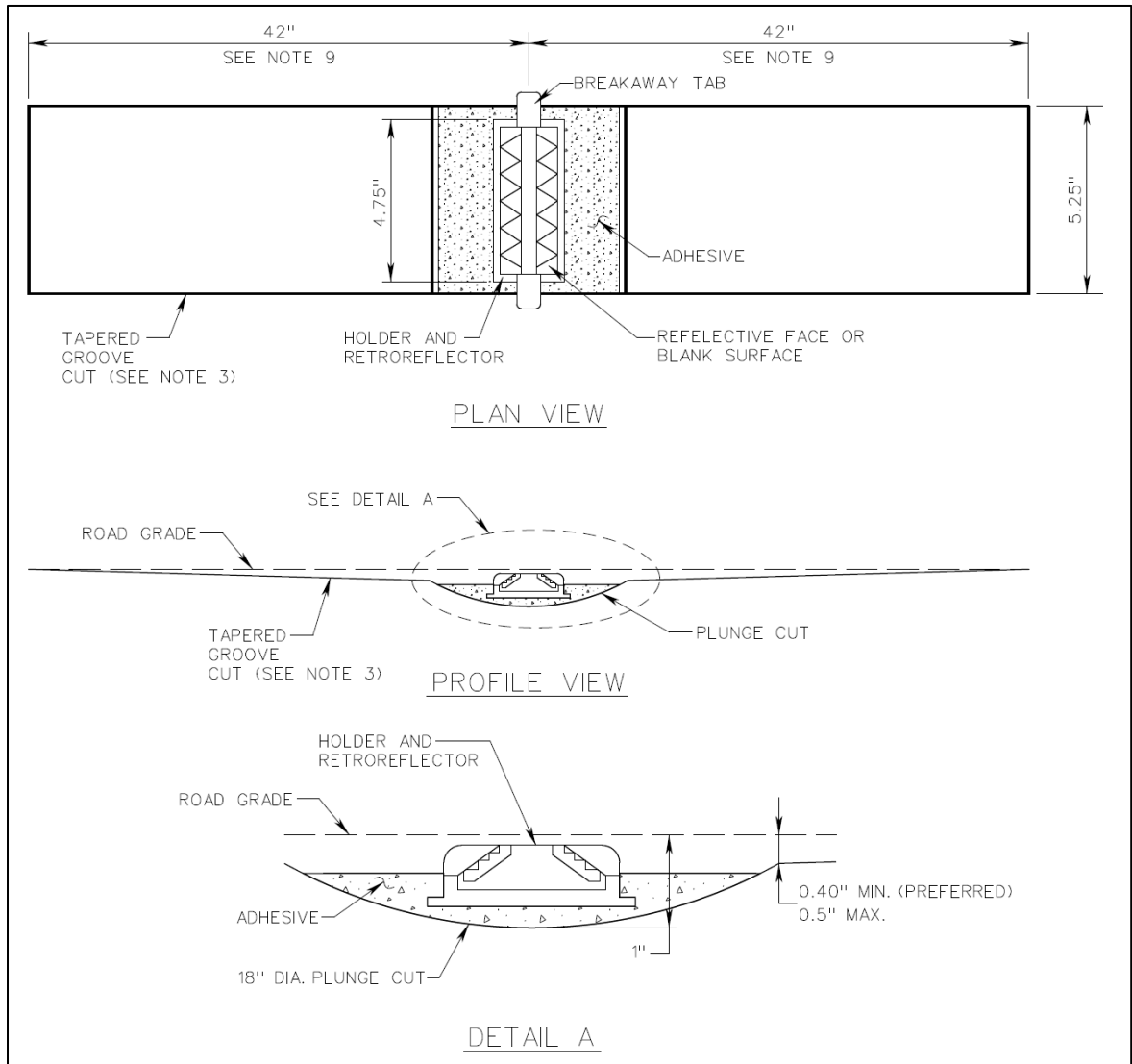


Figure 1: Installation of Inlaid Pavement Marker

IV. Measurement and Payment

Inlaid Pavement Marker will be measured in units of each and will be paid for at the Contract each price. This price shall include surface preparation, furnishing, installing, retroreflectors, pavement cutting, adhesives, and holder.

Payment will be made under:

Pay Item	Pay Unit
Inlaid Pavement Marker (type pavement)	Each

VIRGINIA DEPARTMENT OF TRANSPORTATION
2020 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS
SECTION 704 – PAVEMENT MARKINGS AND MARKERS

SECTION 704 – PAVEMENT MARKINGS AND MARKERS of the Specifications is amended as follows:

Section 704.02 – Materials is amended to replace the first paragraph with the following:

For Type B, Class VI pavement marking materials that are to be applied to latex emulsion or slurry seal surfaces, the selected Type B, Class VI manufacturer shall be a manufacturer that approves and warrants their product for application on that type of surface.

Section 704.03 – Procedures is amended to replace the fourth through tenth paragraph with the following:

If the Contractor cannot have permanent pavement markings installed within the time limits specified, the Contractor shall install and maintain temporary pavement markings within the same time limits at no additional cost to the Concessionaire until the permanent pavement markings can be installed. Installation, maintenance, and removal or eradication of temporary pavement markings shall be according to Section 512.

The Contractor may mark the locations of proposed permanent markings on the roadway by installing premarking materials. Premarkings may be accomplished by installing removable tape, chalk, or lumber crayons, except pavement markings such as stop lines, crosswalks, messages, hatching, etc., shall be premarked using chalk or lumber crayons. Premarkings for yellow markings may be white or yellow. Premarkings for other colors shall be white.

When tape is used as a premarking material, premarking shall consist of 4-inch by 4-inch-maximum squares or 4-inch-maximum diameter circles spaced at 100-foot minimum intervals in tangent sections and 50-foot minimum intervals in curved sections. At locations where the pavement marking will switch colors (e.g., gore marking) the ends of the markings may be premarked regardless of the spacing.

When the Contractor uses chalk or lumber crayon as a premarking, the entire length of the proposed pavement marking may be premarked.

Premarkings shall be installed so their installation will not affect the adhesion of the permanent pavement markings. When removable tape is used as the premarking material and the lateral location of such premarkings to location of the final pavement markings exceeds 6 inches, the tape shall be removed at no additional cost to the Concessionaire.

The Contractor shall exercise caution and protect the public from damage while performing pavement marking operations. The Contractor shall be responsible for the complete preparation of the pavement surface, including, but not limited to, removing dust, dirt, loose particles, oily residues, curing compounds, concrete laitance, residues from eradication, and other foreign matter immediately before installing pavement markings. The pavement surface shall be clean and dry at the time of pavement marking installation and shall be tested in accordance with VTM 94 before permanent installation, with the VTM 94 test results noted on Form C-85. The Contractor shall provide the equipment indicated in VTM 94 that are needed to perform the moisture test before application.

Section 704.03 – Procedures is amended by replacing the thirteenth paragraph with the following:

Non-truck mounted equipment shall be regulated to allow for calibration of the amount and type of material applied.

Section 704.03 – Procedures is amended to replace the eighteenth paragraph with the following:

Glass beads and retroreflective optics shall be applied at the rate specified herein or as specified in the VDOT's Approved List for the specific pavement marking product. Beads and optics shall be evenly distributed over the entire lateral and longitudinal surface of the marking. The Contractor shall apply beads to the surface of liquid markings with a bead dispenser attached to the applicator that shall uniformly dispense beads simultaneously on and into the just-applied marking. The bead dispenser shall be equipped with a cut-off control synchronized with the applied marking material cut off control so that the beads are applied totally on the marking. Beads shall be applied while the liquid marking is still fluid, resulting in approximately 60% embedment in the marking's surface. Beads installed on crosswalks and stop lines on roadways with curbs only (no gutter) may be hand applied for two feet at the end of each line next to the curb with 100 percent of the beads embedded 50% to 60% into the marking's surface.

Section 704.03(a)1 – Type A markings is replaced with the following:

Type A markings shall be applied in accordance with the manufacturer's installation instructions. When applying atop existing pavement markings, the existing marking shall first be swept or eradicated to the extent necessary to ensure that the surface of the existing marking is clean, chalk free (not powdery), and well adhered.

Glass beads and retroreflective optics shall be applied to the entire surface of the marking at the minimum rate of 6 pounds per gallon of paint, unless specified otherwise in the VDOT's Approved List 20 for the selected pavement marking product.

Section 704.03(a)2 – Type B markings is amended to replace the third paragraph with the following:

Non-truck mounted equipment for application of thermoplastic material shall include an extrude die with a burner, temperature controller, agitator, and mechanical bead applicator to allow for the correct amount of material to be applied..

Section 704.03(a)2a – Thermoplastic (Class I) is amended to replace the fourth paragraph with the following:

Thermoplastic shall not be applied over existing pavement markings of materials other than paint or thermoplastic, unless the existing marking is 90 percent worn away or eradicated. When applying thermoplastic over existing paint or thermoplastic, the existing marking shall first be swept or eradicated to the extent necessary to ensure that the surface of the existing marking is clean, chalk free (not powdery), and well adhered.

Section 704.03(a)2b – Preformed thermoplastic (Class II) is amended to replace the first and second paragraphs with the following:

Preformed thermoplastic (Class II) material shall be installed in accordance with the manufacturer's installation instructions. A primer or sealer manufactured by or recommended by the preformed thermoplastic manufacturer shall be applied to all hydraulic cement concrete surfaces and to asphalt concrete surfaces in accordance with the manufacturer's installation instructions.

Preformed thermoplastic shall not be applied over existing pavement markings of materials other than paint or thermoplastic, unless the existing marking is 90 percent worn away or eradicated. When applying preformed thermoplastic over existing paint or thermoplastic, the existing marking

shall first be swept or eradicated to the extent necessary to ensure the surface of the existing marking is clean, chalk free (not powdery), and well adhered.

Section 704.03(a)2f – Polyurea (Class VII) is amended by replacing the second paragraph with the following:

Polyurea marking material shall be applied at a wet film thickness of 20 mils (± 1 mil). Glass beads and retroreflective optics shall be applied at the rate specified in the VDOT's Approved List 74 for the specific polyurea product.

Section 704.03(b) – Pavement messages and symbols markings is amended to replace the second paragraph with the following:

Surface temperature at time of application shall be in accordance with manufacturer's installation instructions. If the installation instructions do not specify minimum surface temperature, then the markings shall not be installed unless the surface temperature at time of application is 50°F or higher. Surface temperature requirements shall not be considered met if the temperature is forecasted to drop below the minimum within two hours of application. The Contractor may heat the pavement for a short duration to dry the pavement surface and bring the surface temperature to within the allowable temperatures for pavement marking installation, at no extra cost to the Concessionaire. Heat torch temperatures shall not exceed 300°F. The Contractor shall monitor pavement temperature to ensure it does not rise above 120°F at any time. Any damage to the pavement shall be promptly repaired at no extra cost to the Concessionaire.

Message and symbol markings include, but shall not be limited to, those detailed in Standard Drawing PM-10.

The sizes and shapes of symbols and characters shall match the size and shape specified in Standard Drawing PM-10 or elsewhere in the Contract. Hand-drawn or "stick" symbols or characters will not be allowed.

Table VII-3 is replaced with the following:

**TABLE VII-3
Pavement Markings**

Type	Class	Name	Film Thickness (mils)	Pavement Surface	Application Limitations	Appr. List No.
A		Traffic paint	15 \pm 1 when wet	AC HCC	May be applied directly after paving operations	20
B	I	Thermoplastic Alkyd	90 \pm 5	AC HCC	May be applied directly after paving operations	43
	I	Thermoplastic Hydrocarbon	90 \pm 5 when dry	AC HCC	Do not apply less than 30 days after paving operations	43
	II	Preformed Thermoplastic	120-130	AC HCC	Manufacturers installation instructions	73
	III	Epoxy resin	20 \pm 1 when wet	AC HCC	Manufacturers installation instructions	75
	IV	Plastic-backed preformed Tape	60 - 120	AC HCC	Manufacturer's installation instructions	17
	VI	Patterned preformed Tape	20 min ¹ 65 min ²	AC HCC	(Note 4)	17
	VII	Polyurea	20 \pm 1	AC HCC	Manufacturer's installation instructions	74

D	III	Wet Reflective Removable tape	(Note 3)	AC HCC	Temporary pavement marking	17
E		Removable black tape (Non-Reflective)	(Note 3)	AC	Temporary pavement marking for covering existing markings	17

¹Thinnest portion of the tape's cross section.

²Thickest portion of the tape's cross section.

³In accordance with manufacturer's installation instructions.

⁴In accordance with the manufacturer's installation instructions, except that Type B, Class VI markings on new plant mix asphalt surfaces shall be inlaid into the freshly installed asphalt surface and not surface-applied.

Section 704.03(d)1 – Snowplowable raised pavement markers is replaced as follows:

Snow-plowable raised pavement markers shall not be used.

Section 704.03(d)2 – Raised Pavement Markers is renamed **Nonplowable Raised Pavement Markers** and is replaced with the following:

Nonplowable raised pavement markers shall be bonded to the surface in accordance with the manufacturer's installation instructions. The bonding material shall be from the Department's Approved List 22 for the specific marker.

Section 704.04—Measurement and Payment is amended by revising the Pay Item Table as follows:

The following pay items are removed:

Pay Item	Pay Unit
Pavement message marking (Message)	Each or Linear Foot

The following pay items are inserted:

Pay Item	Pay Unit
Pavement message marking (Message, Type or class material)	Each or Linear Foot

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
LIGHT EMITTING DIODE (LED) LUMINAIRES

July 27, 2018

I. **Description**

This work shall consist of furnishing and installing LED luminaires for roadway lighting systems (conventional poles, wall mounted, high mast, and overhead sign lighting) not including tunnel lighting, in accordance with this Special Provision, as shown on the Plans, and as directed by the Engineer.

II. **General Requirements**

The luminaire shall be designed and assembled by the same manufacturer. The luminaire manufacturer shall be ISO 9001 certified or with a documented quality management system of equal stringency and shall have at least five years of experience in manufacturing LED roadway luminaires.

The Independent laboratory used for the luminaire testing shall be on OSHA's current list of Nationally Recognized Testing Laboratories (NRTLs). The testing laboratory shall be located within the continental United States or Canada.

The luminaire shall be UL listed or have a documented quality management system of equal stringency. The luminaire shall be DesignLights Consortium (DLC) listed or Energy Star certified.

III. **Materials**

All electrical and electronic components of the luminaire shall be compliant with Restriction of Hazardous Substances (RoHS) Directives.

All electrical and electronic components of the luminaire shall meet IEEE C62.41.1, IEEE C62.41.2, and ANSI C136.2 requirements.

The luminaire shall include quick connect/disconnect plugs between separate electrical and electronic components. Wiring within the electrical enclosure shall be NFPA 70/ NEC compliant.

The luminaire shall use a barrier-type terminal block with three line-side wire connectors (including a ground terminal) for power connection to the luminaire. All terminal positions shall be clearly identified. Each connector shall accept only one conductor and accommodate #8 through #12 AWG wire.

The luminaire operating temperature shall include the range of -40°F (-40°C) to 104°F (40°C), with no lumen de-rating from -4°F (-20°C) through 77°F (25°C). The luminaire shall have a passive cooling method (heat sink).

The contact surface between dissimilar metals shall be in accordance to the Section 700 of the Specifications.

1. **Luminaire Housing** shall be constructed of aluminum alloy, die-cast or extruded with minimum shell thickness of 0.050 inches (50 mils). Other materials may be used if proven to have equal or greater strength, ultraviolet and corrosion resistance, and are approved by the Engineer.

Bolts, studs, nuts, set screws, washers, and rivets shall be furnished as commercial items suitable for the application and in accordance with the manufacturer's instructions.

Exposed hardware on the housing including cover and latch shall be stainless steel, zinc, or steel with a zinc alloy electroplate and chromate top coat. Other materials may be used if proven to have equal or greater strength, ultraviolet and corrosion resistance, and are approved by the Engineer.

The housing shall include a corrosion resistant polyester powder coat with a minimum of 2 mil nominal thickness. The finish shall exceed a rating of 8 according to ASTM D1654 after 1000 hours of the salt (fog) testing in accordance with ASTM B117.

If non-metallic materials are used for the housing, the coating may not be required if approved by the Engineer and provided the surface of the housing can demonstrate equal or greater strength, and ultraviolet resistance. The testing procedure shall be in accordance with ASTM G154 or G155.

The housing shall be constructed as one integral piece (with the exception of the high mast luminaire). The electrical and the optical compartment shall not be connected using bolts or any other separable means.

The luminaire housing shall protect the interior against dust, solid objects, and moisture.

The housing shall be designed to allow water shedding and resist the build-up of debris and icicles.

The housing shall have an exterior label stating "LED" and wattage in accordance with ANSI C136.15 and must be visible from the ground.

The housing color shall be gray unless otherwise specified on the Plans.

2. **Optical Assembly** shall be completely sealed and the ingress protection (IP) shall be rated IP66 or higher.

The LED assembly shall have a minimum L70 of 100,000 hours at the specified LED drive current and ambient temperature of 77°F (25°C) based on a minimum of 10,000 hours of data per IES LM-80 and the IES TM-21.

The optical assembly shall have a color rendering index (CRI) of at least 70

Polymer refractive materials shall be UV-inhibited high impact plastic and lens shall be high-impact borosilicate glass or UV-stabilized acrylic. Other materials may be used if proven to have equal or greater strength, ultraviolet and corrosion resistance, and are approved by the Engineer.

3. **Driver** shall be secured inside the housing and suitable for use in wet locations.

The driver shall have a dimming control signal of 0 to 10V in accordance with IEC 60929.

The driver shall be rated for operation and storage within an ambient temperature range of -40°F (-40°C) to 104°F (40°C) of the luminaire.

The driver shall be UL listed and shall meet FCC electrical interference emission and immunity requirements.

The driver shall conform to the following performance requirements:

- Rated life of 100,000 hours minimum at an ambient temperature of 77°F (25°C).
 - Power factor of 0.9 or higher, with total harmonic distortion of 20% or less at full load.
 - Minimum efficiency of 90% at maximum load and a minimum efficiency of 85% for the driver operating at 50% power
 - Accommodate input voltages of 120V – 277V or 347V – 480V.
 - Have thermal overload protection mechanism.
4. **Surge Protection Device (SPD)** shall be an integral part of the luminaire and the LED power supply. The SPD shall be Type 4 in accordance with UL 1449.

The SPD shall be rated at minimum 10KV/5KA surge level.

The SPD shall operate with no performance degradation within an ambient temperature range of -40°F (-40°C) to 104°F (40°C) of the luminaire, 0-95% Relative Humidity (RH), non-condensing.

5. **Warranty**

The luminaire shall be warranted by the manufacturer for a minimum of 10 years from date of installation against any failure resulting from materials, and defects.

Failure is defined as one or more of the following:

- Significant light output reduction from more than 10% of the LED packages
 - Moisture inside the optical assembly
 - Lens discoloration
 - Driver failure
 - Presence of other conditions that do not meet specifications.
6. **Additional criteria** shall be applied to specific type of luminaires as indicated below:
- A. **Conventional Pole-mounted Luminaire**
- (1) Shall have a system efficacy of at least 100 lumens/watt.
 - (2) Weight shall not exceed 50 pounds.
 - (3) Effective projected area (EPA) of maximum 3 square feet.
 - (4) Shall conform to the requirements of ANSI C136.31 for vibration and be rated at least 3G.
 - (5) The optical assembly shall be rated correlated color temperature (CCT) of 3000 or 4000 Kelvin (K) in accordance with ANSI C136.37.

- (6) Shall include a prewired 7-pin twist lock ANSI C136.41-compliant receptacle and a rain-tight shorting cap.
- (7) Shall be designed to slip-fit onto a nominal 2-inches inside diameter or 2-3/8-inches outside diameter tenon and allow for an insertion of at least 3-1/2 inches, with internal barrier preventing over-insertion of the tenon.
- (8) Shall include clamp with minimum four appropriate size bolts in accordance with the manufacturer's instructions, unless otherwise directed by the Engineer.
- (9) Shall include a leveling device for horizontal or vertical orientation.
- (10) The housing shall include a door that is easy to open and close, or remove and replace without requiring any tool.

B. Wall mounted Luminaire

- (1) Shall have a system efficacy of at least 70 lumens/watt.
- (2) Weight shall not exceed 30 pounds.
- (3) Conform to the requirements of ANSI C136.31 for vibration and be rated at least 1.5G
- (4) The optical assembly shall be rated CCT of 3000K or 4000K in accordance with ANSI C136.37.
- (5) Shall be equipped with 0 to 10V field-adjustable output module for dimming capabilities if required on the Plans or directed by the Engineer.
- (6) Shall be designed such that it can be mounted onto a vertical flat surface by means of at least three appropriate size bolts with approved chemical or mechanical anchors through the wall side of the housing, in accordance with the manufacturer's instructions, unless otherwise directed by the Engineer.
- (7) Shall include a wire entry for the incoming power on the top, bottom, back, or vertical sides as required on the Plans. Each entry shall be pre-manufactured and tapped for a standard conduit connection. Unused entries shall be properly closed with screw type plugs supplied by the manufacturer.
- (8) The housing shall include a door that is easy to open and close, or remove and replace without requiring any tool.

C. High Mast Luminaire

- (1) Shall have a system efficacy of at least 100 lumens/watt.
- (2) Weight shall not exceed 70 pounds.
- (3) EPA of maximum 3.1 square feet.
- (4) Conform to the requirements of ANSI C136.31 for vibration and be rated at least 3G
- (5) The optical assembly shall have a rated CCT of 3000K or 4000K in accordance with ANSI C136.37.

- (6) Shall include a prewired 7-pin twist lock ANSI C136.41 compliant receptacle and a rain-tight shorting cap.
- (7) Shall be adjustable and designed to slip-fit onto a mast arm mount from a nominal 1-1/4-inches to 2-inches inside diameter and 1-5/8-inches to 2-3/8-inches outside diameter tenon and allow for an insertion of at least 3-1/2 inches, with an internal barrier preventing over insertion of the tenon.
- (8) Shall include clamp with at least four bolts specified by the manufacturer unless otherwise directed by the Engineer.
- (9) The housing shall include a door that is easy to open and close, or remove and replace. The door may require a basic tool (such as a flat-tip or phillips screwdriver) to open and close.

D. Overhead Sign Lighting Luminaire

- (1) Shall have a system efficacy of at least 70 lumens/watt.
- (2) Weight shall not exceed 30 pounds.
- (3) EPA of maximum 0.75 square feet.
- (4) Conform to the requirements of ANSI C136.31 for vibration and be rated minimum 3G
- (5) The optical assembly shall be rated CCT of 3000K in accordance with ANSI C136.37.
- (6) Shall be equipped with 0 to 10V field-adjustable output module for dimming capabilities if required on the Plans or directed by the Engineer.
- (7) Shall be designed such that it can be installed onto one of the following types (as per the Standard Drawing OSS-1):
 - Retrieval system
 - Mounting Bracket
- (8) The housing shall include a door that is easy to open and close, or remove and replace without requiring any tool.

IV. Procedures

The Contractor shall securely install the luminaires at locations designated on the Plans, in accordance with the manufacturer's instructions.

Overhead sign lighting luminaires shall be installed as per the Standard Drawing OSS-1. If indicated on the Plans, the sign lighting luminaires shall be mounted on luminaire retrieval systems. The Contractor shall demonstrate the functionality of the luminaire retrieval system in the presence of the Inspector. Sign lighting luminaires to be installed without a luminaire retrieval system shall be attached to luminaire mounting brackets.

High mast luminaire and ring assemblies shall be installed and tested in accordance with Section 705. High mast luminaires shall be rotated to maximize illumination on the road and minimize illumination outside the right-of-way, as indicated on the Plans and as directed by the Engineer.

The Contractor shall perform testing of the electrical components in accordance with Section 705 of the Specifications.

V. Measurement and Payment

Conventional luminaire will be measured in units of each and will be paid for at the Contract unit price for the wattage and type specified. This price shall include the luminaire housing, slipfitter, optical assembly, drivers, terminal block, surge protection device, labeling, conductor cables to the termini at the base of the pole or junction box, 7-pin receptacle with shorting cap, photo electric control, adjustments, testing, warranty, and incidental hardware to complete the work.

Wall-mounted luminaire will be measured in units of each and will be paid for at the Contract unit price for the wattage and type specified. This price shall include the luminaire housing, mounting hardware, optical assembly, drivers, terminal block, surge protection device, labeling, conduit, conductor cables to the termini at the junction box, adjustments, testing, warranty, and incidental hardware to complete the work.

High mast luminaire will be measured in units of each and will be paid for at the Contract unit price for the wattage and type specified. This price shall include the luminaire housing, slipfitter, optical assembly, drivers, terminal block, surge protection device, labeling, conductor cables to the termini at the base of the pole or junction box, 7-pin receptacle with shorting cap, photoelectric control, adjustments, testing, warranty, and incidental hardware to complete the work.

High Mast Ring Assembly will be measured in units of each and will be paid for at the contract unit price for the number of luminaires to be installed at that location. This price shall include the luminaire ring, lowering device with head frame and assembly, winch assembly, electric drills, electric raise/lower unit, lowering cables, junction box with prewired terminal block, adjustments, testing and incidental hardware to complete the work.

Sign lighting luminaire will be measured in units of each and will be paid for at the Contract unit price for the wattage and type specified. This price shall include the luminaire housing, mounting hardware, optical assembly, drivers, terminal block, surge protection device, labeling, conduit, conductor cables to the termini at the safety switch or junction box at the base of the structure, 7-pin receptacle with shorting cap, photoelectric control, service entrance head, grounding lug, safety switch, contactor, adjustments, testing, warranty, and incidental hardware to complete the work.

Electrical service, if required, shall be measured in accordance with Section 700 of the Specifications.

Luminaire retrieval systems will be measured in units of each and will be paid for at the Contract unit price per each. This price shall include the luminaire retrieval system, adjustment, and testing.

Payment will be made under:

Pay Item	Pay Unit
Conventional luminaire (wattage and type)	Each
Wall mounted luminaire (wattage and type)	Each
High mast luminaire (wattage and type)	Each
High mast ring assembly (number of luminaires)	Each
Sign lighting luminaire (wattage and type)	Each
Luminaire retrieval system (structure)	Each

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
LANE CLOSURE COORDINATION (LCC)/LANE CLOSURE IMPLEMENTATION (LCI)

September 20, 2017

I. General Requirements

This work shall consist of coordinating and communicating lane closure operations through the local Transportation Operations Centers (TOC's). The Contractor shall coordinate lane closures in accordance with this Special Provision, and only implement lane closures with approval from the Department.

II. Training

The Contractor shall have individuals trained to input work-zone information into the Department's LCC/LCI system, currently LCAMS and VaTraffic, on a weekly basis and to update as needed. These individuals shall be able to speak, understand, read, and write English, and be able to operate a computer. No advanced computer skills are needed to use the LCAMS or VaTraffic systems. The Contractor shall have a computer with internet connectivity and email capability.

The Contractor shall contact the Regional TOC Work Zone Lane Closure (LCAMS/VaTraffic) Coordinator to initiate system access and schedule training, when necessary. The Department requires a 10 business-day notice to schedule classroom training for LCAMS. The Contractor's designated individuals shall complete the courses Introduction to VaTraffic, VaTraffic Reports, VaTraffic Planned Events, and VaTraffic Work Zones. LCAMS and VaTraffic training for the individuals shall be completed prior to the Notice to Proceed date.

III. Lane Closure Process

1. **Lane Closure Coordination Process.** All lane closures shall be entered as precisely as possible into the Lane Closure Advisory Management System (LCAMS) and VaTraffic no later than 8 AM on Thursday of the week prior to the planned lane closure, and updated as needed. For the purposes of this Special Provision, a week starts on Sunday. If this submission deadline changes (e.g., for weeks involving a holiday), the Engineer will notify the Contractor at least one week in advance. Final approval for the lane closure will be issued by the Engineer. All fields in LCAMS and VaTraffic must be properly filled out.
 - A. **Point of Contact.** The data fields labeled "Requesting Org POC" in LCAMS and "Point of Contact" in VaTraffic shall contain the name and email address of the person physically entering the request into LCAMS.
 - B. **Conflict Resolution.** LCAMS will identify and flag most conflicts, and will automatically assign priority as first-come, first-serve. The Contractor has the right to contact the higher-priority party and attempt resolution with them, provided the Contractor submits the final resolution to the Engineer no later than 5 PM on Thursday of the week prior to the planned lane closure. The Engineer will handle all unresolved conflicts between requests and other events according to the priorities listed below, with the highest priority item first. If some or all requests involved in the conflict are the same priority level, conflict resolution will be on a first-come, first-serve basis.
 - (1) **Emergency Work.** Work that if not done "will result" in damage to a motorist vehicle or infrastructure, or danger to public health and safety.

- (2) **Lower Priority Items Previously Delayed.** Work that while considered a lower priority, if perpetually delayed could result in severe consequences.
 - (3) **Urgent Work.** Work that if not done “*may result*” in damage to the motorist vehicle or infrastructure, or danger to public health and safety.
 - (4) **Contractual Obligated Work.** Work that is expected to be accomplished “*on-time, on-budget*”.
 - (5) **Weather Dependent Work.** Work that is dependent on the temperature and clear or dry conditions.
 - (6) **Routine Maintenance Work.** Work that is routine in nature that can be rescheduled and moved around, within limits, without undue risk.
- C. The request shall be supported by the Schedule of Record, and the Engineer may deny requests which are not. The Contractor will be allowed to request lane closures to accommodate potential weather delays.
- D. The Contractor may revise his entries in LCAMS and VaTraffic after the Thursday deadline subject to the approval of the Engineer and the conflict resolution requirements herein.
2. **Lane Closure Implementation Process.** The Contractor shall notify the Regional TOC no later than 15 minutes, but no earlier than 45 minutes, prior to installing the lane closure, or no later than 15 minutes prior to scheduled start time if lane closure is delayed or canceled. The Contractor shall notify the TOC and update VaTraffic of any changes in lane-closure impact during the execution of work. The Contractor shall notify the Regional TOC no later than 15 minutes after the lane is reopened to traffic.
 3. **Emergency Lane Closure.** If an Emergency Lane Closure is required, the Contractor shall coordinate directly with the TOC regarding the lane closure as soon as the location and size of the lane closure is known. An Emergency Lane Closure is defined as road work which could not have been anticipated and is required to protect the public from immediate, severe harm, and has a priority as defined by Section III-1B(1).

IV. Measurement and Payment

Lane closure coordination will not be measured or paid for separately, but the cost thereof shall be included in the price of other items.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
USE OF DOMESTIC MATERIAL

December 19, 2018

SECTION 102.05 PREPARATION OF BID of the Specifications is amended to include the following:

In accordance with the provisions of Section 635.410(b) of Title 23 CFR, hereinafter referred to as “Buy America”, except as otherwise specified, all iron and steel (including miscellaneous items such as fasteners, nuts, bolts and washers) to be permanently incorporated for use on federal aid projects shall be produced in the United States of America. This applies to any iron or steel item brought onto the project, regardless of the percentage of iron or steel that exists in the pay item or in the final form they take; however, electrical components (i.e., combination products such as signal controllers and similar products which are only sold as a unit) are not subject to Buy America provisions if the product as purchased by the Contractor is less than 50% steel and iron. “Produced in the United States of America” means all manufacturing processes occur in one of the 50 United States, the District of Columbia, Puerto Rico or in the territories and possessions of the United States. “Manufacturing processes” are defined as any process which alters or modifies the chemical content, physical size or shape, or final finish of iron or steel material (such as rolling, extruding, bending, machining, fabrication, grinding, drilling, finishing, or coating). For the purposes of satisfying this requirement “coating” is defined as the application of epoxy, galvanizing, painting or any other such process that protects or enhances the value of the material to which the coating is applied. Non-iron and non-steel materials used in the coating process do not need to be produced in the United States as long as the application of the coating occurred in the United States. The manufacturing process is considered complete when the resultant product is ready for use as an item in the project (e.g. fencing, posts, girders, pipe, manhole covers, etc.) or is incorporated as a component of a more complex product by means of further manufacturing. Final assembly of a product may occur outside of the United States of America provided no further manufacturing processes take place.

For the purposes of this provision, all steel or iron material meeting the criteria as produced in the United States of America will be considered as “Domestic Material.” All iron and steel items not meeting the criteria as produced in the United States of America will be considered “Non-Domestic Material.”

A minimal amount of “Non-Domestic” steel or iron material may be incorporated in the permanent work on a federal-aid contract provided that the cost of such materials or products does not exceed one-tenth of one percent of the Contract amount or \$2500, whichever is greater. The cost of the “Non-Domestic Material” is defined as its monetary value delivered to the job site and supported by invoices or bill of sale to the Contractor. This delivered-to-site cost must include transportation, assembly, installation and testing.

Buy America provisions do not apply to iron or steel products used temporarily in the construction of a project such as temporary sheet piling, temporary bridges, steel scaffolding, falsework or such temporary material or product or material that remains in place for the Contractor’s convenience.

Raw materials such as iron ore, pig iron, processed, pelletized and reduced iron ore, waste products (including scrap, that is, steel or iron no longer useful in its present form from old automobiles, machinery, pipe, railroad rail, or the like and steel trimmings from mills or product manufacturing) and other raw materials used in the production of steel and/or iron products may, however, be imported. Extracting, handling, or crushing the raw materials which are inherent to the transporting the materials for later use in the manufacturing process are exempt from Buy America.

Any items containing foreign source steel or iron billet shall be considered “Non-Domestic Materials.” Additionally, iron or steel ingots or billets produced in the United States, but shipped outside the United

States of America for any manufacturing process and returned for permanent use in a project shall be considered "Non-Domestic Materials."

Waivers:

The process for receiving a waiver for Buy America provisions is identified in 23 CFR 635.410(c). The Contractor shall not anticipate that any Buy America provisions will be waived.

Certification of Compliance:

The Contractor is required to submit a Certificate of Compliance prior to incorporating any items containing iron or steel items into the project. This shall be accomplished by the Contractor submitting the Form C-76 Certificate of Compliance to the Concessionaire when the items are delivered to the project site. The Certification of Compliance will certify whether the items are considered "Domestic Material" or "Non-Domestic Material" as referenced in this Special Provision. The certificate must be signed and dated by the Prime Contractor's Superintendent and include a Buy America Submittal Number. The Buy America Submittal Number is simply the Contractor's project specific sequential numbering system that will allow the Contractor and Concessionaire to track the total number of certificates provided and the individual items containing iron or steel associated with each certificate.

Supporting Documentation:

Supporting documentation to demonstrate compliance with Buy America provisions (such as mill test reports manufacturer/supplier certifications, etc.) shall be organized by Buy America Submittal Number and maintained by the Contractor from the date of delivery until three years after project acceptance. The Contractor may maintain this documentation electronically or in paper format.

The Concessionaire or FHWA may review the Contractor's supporting documentation to verify compliance with the Buy America provisions at any time. Supporting documentation shall be provided within five business days of the request. The burden of proof to meet the Buy America provisions rests with the Contractor. If the supporting documentation does not undeniably demonstrate to FHWA or the Concessionaire that the "Domestic Materials" identified in the Certificates of Compliance were produced in the United States of America, then the Concessionaire may deduct payment from moneys due the Contractor for the value of the iron and steel that did not meet the Buy America provisions.

EXHIBIT E

SAFETY REQUIREMENTS

- A. The Concessionaire and the Contractor recognize that in every circumstance, activity, and decision related to the Project, the safety of the public and Contractor, Concessionaire, and VDOT personnel is the primary concern. Ensuring and maintaining safety on the Project is paramount.
- B. The Contractor shall comply with the Virginia Occupational Safety and Health Standards adopted under the Code of Virginia and the duties imposed under the Code. Any violation of the requirements or duties that is brought to the attention of the Contractor or any other person shall be immediately corrected.
- C. Compliance with current construction safety and health standards and the Concessionaire's Safety requirements is a condition of the Project Contract and shall be made a condition of each subcontract entered into by the Contractor. The Contractor and any Contractor shall not require any worker employed in performance of the Work to place themselves in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to their health or safety, as determined under construction safety and health standards promulgated by the U.S. Secretary of Labor in accordance with the requirements of Section 107 of the Contract Work Hours and Safety Standards Act.
- D. The Contractor's designated Safety Manager shall be responsible for overall Project health and safety programs and shall have the necessary expertise and experience required to ensure compliance with applicable laws, the Contractor's safety program, and the Concessionaire's safety requirements. If for any reason, including a request from the Concessionaire related to performance, the approved Safety Manager must be replaced during the Contract term, the Contractor shall provide notice of such and seek formal approval of the replacement. The Contractor shall ensure this function is maintained during any transition period.
- E. The Contractor shall develop a Health, Safety and Security Plan. The Health, Safety and Security Plan will define the health, safety and security policies, procedures and activities required during the construction of the Project and will address:
- the health and safety policy for the Project;
 - the health and safety goals for the Project;
 - the health, safety and security roles and responsibilities of all positions on the Project;
 - the health and safety rules and regulations for the Project;
 - any unique safety requirements of the Concessionaire including incorporation and compliance with the Concessionaire **HSE Minimum Requirements, Attachment A;**

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- disciplinary processes for violation of project safety requirements and rules.
- site security plan and requirements;
- emergency procedures including coordination with local emergency responders and the Concessionaire during an emergency
- protection of the public
- documented procedures on meeting the health and safety requirements for the Contractor and its Contractors and suppliers;
- on-going tracking of efforts and corrective actions required and how they have been met;
- reporting and documentation mechanism;
- the requirements of this section

The Health, Safety and Security Plan must be submitted to the Concessionaire for review and comment prior to commencement of work. Compliance with the Health, Safety and Security Plan is a requirement of all subcontractors.

- F. The Contractor shall comply with the safety requirements listed below and the policies and procedures included in the Contractor's approved Health, Safety and Security Plan.
1. The Contractor shall ensure that the Health, Safety and Security Plan and associated policies and procedures are provided to all relevant personnel before such personnel are permitted access to the Project site or perform any Project Work.
 2. The Contractor shall ensure that all required safety training is properly conducted in a timely manner. At a minimum, foremen and above assigned to the Project shall have current CPR, First Aid, and AED certification.
 3. Specialized training (e.g., work zone safety, confined space, erosion and sediment control, energized lines, etc.) shall be provided to all relevant personnel if such training is required.
 4. Personal protective equipment (PPE) is anything used or worn by a person to minimize risk to the person's health or safety and includes a wide range of clothing and safety equipment. PPE requirements must be identified and the correct signage shall be put in place. The following PPE is the minimum that must be worn by all personnel and employees of the Contractor and any subcontractors at all site projects (outside general offices):
 - Head protection, hard hat, (with project induction sticker) as per 29 CFR 1910.135, 1926.100 and American National Standards Institute (ANSI) Z89.1 - American National Standard for Industrial Head Protection.
 - Eye protection with side shields or wrap around as per as per ANSI/ISEA Z87.1 (Z87+) - Standard for Occupational and Educational Eye and Face Protection Devices. Over-the-glasses safety glasses must be worn over prescription glasses if the wearer does not have prescription safety glasses.
 - Foot protection, safety-toed boots, as per as per ASTM F 2413 - Specification for Performance Requirements for Protective Footwear.
 - High visibility clothing; Class 3 high visibility shirt, vest or jacket as per ANSI/ISEA 107 - Standard for High-Visibility Safety Apparel and Headwear, are required at all times on the Project site or when on or near any roadway, whether or not protected by a concrete steel barrier. In addition, Type E pants are required whenever not protected by a concrete or steel barrier or when working in

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hours of darkness. Note: These must be worn over any other clothing such as rain coats.

- Hand protection, gloves; required at all times whenever outside of vehicle or heavy motorized equipment
- Shirt with sleeves of sufficient length to cover shoulders;
- Hearing protection, as per ANSI/ISEA S12.68, must be carried at all times and must be worn when working near areas where excessive noise is being generated, i.e. in a tunnel with live traffic.
- Respiratory protective equipment shall be worn whenever an individual is exposed to any item listed in the OSHA standards as needing such protection unless it is shown that the employee is protected by engineering controls.

All Concessionaire employees will follow the site PPE requirements. All Project team members will be required to maintain an adequate supply of PPE based on their roles, and to regularly inspect and replace PPE as needed. All damaged or worn PPE must be replaced immediately. No person may undertake any task using or wearing faulty PPE.

5. Standards and guidelines of the current Virginia Work Area Protection Manual shall be used when setting, reviewing, maintaining, and removing traffic controls.
 6. Flaggers shall be certified in accordance with the Virginia Flagger Certification Program.
 7. No person shall be permitted to position themselves under any raised load or between hinge points of equipment without first taking steps to support the load by the placing of safety bar or blocking.
 8. All Federal, State and local regulations pertaining to explosives shall be strictly followed.
 9. All electrical tools shall be adequately grounded or double insulated. Ground Fault Circuit Interrupter (GFCI) protection must be installed in accordance with the National Electrical Code (NEC) and current Virginia Occupational Safety and Health agency (VOSH). If extension cords are used, they shall be free of defects and designed for their environment and intended use.
 10. No person shall enter a confined space without training, permits, and authorization.
 11. Fall protection shall be required whenever an employee is exposed to a fall six feet or greater.
 12. When working near hot areas, such as road asphaltting, long sleeve cotton shirts and pants must be worn whether night or day.
 13. Explosives shall be purchased, transported, stored, used and disposed of by a Virginia State Certified Blaster in possession of a current criminal history record check and a commercial driver's license with hazardous materials endorsement and a valid medical examiner's certificate. All Federal, State and local regulations pertaining to explosives shall be followed. No explosives shall be used on the project without express written authorization from the Concessionaire and VDOT.
- G. If the Contractors' actions (or that of its subcontractors or suppliers) create an unsafe environment for the Contractor's workers, Concessionaire or VDOT personnel, or the travelling public, upon notification, the Contractor shall immediately stop operations in that location to identify the cause(s) and resolve the safety issues. All reports of unsafe

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behavior received by the Contractor will be promptly investigated and, where necessary, changes made to the personnel, construction methods or work zone protections.

H. If required by the Contractor's or any subcontractor's performance, or as requested, the Contractor shall conduct root cause analyses to determine those factors that are contributing to safety-related incidents and/or trends that are negatively affecting the performance of the work, the health and safety of workers, or the travelling public. In each instance, the Contractor shall identify and implement appropriate corrective actions.

I. Safety Reporting

The Contractor shall submit, monthly, a Safety Report that shall, at a minimum, include the following information:

- Total hours worked for the month;
- Total number of field personnel for the month;
- Total hours worked to date on the project;
- Number of near misses, first aid cases, OSHA Recordable Injuries, Lost Time (including number of days away from work) Injuries, and fatalities; with inclusion of all applicable rates;
- Number of utility strikes and instances of property damage;
- A summary of the number of hazards reported by the Contractor's employees, management staff, field supervisors, and subcontractors;
- Progress on any HSE related non-compliances / non-conformances identified from Concessionaire audits;
- a Safety Corrective Actions Register showing all actions for the month (not just from incident sources, i.e. audits and inspections), their corrective action type (e.g. elimination, administration, isolation, engineering) and their status (open or closed);
- Any notice of violations (NOV) received from regulatory agencies;
- A summary of all HSE training conducted, including attendance;
- A summary of all other notable health, safety, and security initiatives; and
- The minutes of HSE meetings held.

This information shall be provided for Direct Hire, Subcontract, and Total Labor on the Project. Information shall be provided for Current Month, Year-to-Date, and Project-to-Date.

Additionally, to assess the ongoing status of the Contractor's safety program, the Contractor on a monthly basis by no later than the third (3rd) business day of each month, must complete the monthly HSE report form provided by the Concessionaire (Monthly HSE Report Form) and provide the completed form to the Concessionaire in the manner directed by the Concessionaire. The Contractor agrees that by submitting each Monthly HSE Report Form to the Concessionaire, the Contractor represents and warrants for the benefit of the Concessionaire that the information contained in the Monthly HSE Report Form is true and correct; and no information requested in the Monthly HSE Report Form has been intentionally or knowingly omitted from the form.

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In the event Construction Contractor exceeds project HSE goals, Concessionaire will work with the Contractor to address the event through alignments, audits, workshops and corrective action plans.

L. Subcontractor Safety Qualification

The Contractor is responsible for implementing a process for evaluating potential subcontractors' safety performance prior to awarding contracts. The process must include requirements equal to or greater than the Concessionaire's HSE Contractor Qualification process. Subcontractor Safety Qualification documentation shall be made available to the Concessionaire upon request.

M. Substance Abuse Screening Program

The Contractor is responsible for implementing and complying with a substance abuse screening program including pre-assignment, random, post incident, and reasonable suspicion screening.

N. Safety Observation Program

The Contractor is responsible for developing and implementing a project-specific safety observation program, to include regular management site inspection visits.

O. HSE Incentive Program

The Contractor is responsible for implementing an HSE performance incentive program.

P. Project-Specific Safety Orientation

The Contractor is responsible for conducting a project specific safety orientation that addresses all the hazards and risks associated with the work. Any person wishing to gain access to the project work locations must be required to complete orientation prior to starting work. New or refresher orientation is required for new types of work and prior to any major changes in the work zone set-up associated with construction phasing or sequencing. The Orientation must include Concessionaire Lane Reversal Safety Awareness and Concessionaire Asset HSE Induction.

Q. OSHA 10-Hour Construction Safety Outreach Training

All Project personnel, including subcontractor personnel, must have completed OSHA 10-Hour Construction Safety Outreach Training. Construction Contractor is required to retain proof of training completion and make available to Concessionaire upon request.

R. Job Hazard Analysis (JHA)

The Contractor is responsible for assuring that all work to be performed on the project is conducted under a Job Hazard Analysis. The Contractor is also responsible for conducting regular and periodic reviews of job hazard analyses.

S. Daily Pre-Task Plan Program

The Contractor is responsible for assuring that all project tasks are conducted using a daily pre-task plan, which has been developed with the input of the workers required to

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perform the work and signed by the workers. The Contractor is also responsible for conducting audits of pre-task plans.

T. Safety Audits

The Contractor is responsible for implementing and following a formal safety audit program of the project on a predetermined schedule (at a minimum every six months). Concessionaire staff shall be invited to participate in any Contractor safety audits.

The Concessionaire shall have the right to conduct, or to nominate a third party to conduct on the Concessionaire's behalf (and at its expense), a health, safety and security audit of the Contractor to ensure that the Contractor complies with these requirements and the Project Health, Safety and Security Plan.

If an audit indicates any deficiencies or matters requiring attention, the Contractor shall promptly address all such items and deliver written confirmation to the Concessionaire describing the actions undertaken to address and correct such deficiencies.

U. Safety Leadership Team

The Contractor shall participate in and support the Safety Leadership Team established for the Project. The Safety Leadership Team will operate under a charter to provide strategic direction for continuing improvement of the Project's safety performance. The Safety leadership Team will meet monthly. The Safety Leadership Team shall be chaired by the Contractor's Project Manager and shall include senior representatives from the Contractor, Concessionaire, and VDOT.

Minimum attendance for the Safety Leadership Team meeting shall include:

- Concessionaire's Project or Construction Manager and Safety Representative
- Contractor's Project Manager, Construction Manager, and Safety Manager

The Safety Leadership team shall meet on at least a monthly basis to review the following:

- Safety performance KPIs, to assure they are suitable and remain suitable for the entire project;
- Analyses of trends or incidents, near misses, hazards, observations, and implement appropriate corrective actions;
- Status of corrective actions and Safety Leadership Team actions;
- Effectiveness of hazard and risk controls; and
- Innovative ideas and actions to improve Safety performance.
- Undertake project regular Safety Walks according to the Contractor's Safety Observation program to make and record health, safety and security observations (both positive and areas for improvement) with a view to discussing trends at the monthly meetings.

V. Project Safety Committee

The Contractor shall convene and maintain a Safety Committee comprising management representatives and representatives of key subcontractors and project activities (civil,

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structures, etc.), to promote direct communication between the workforce and management representatives. The Safety Committee will hold meetings at a minimum of once per month and undertake activities to promote continuing improvement of the project safety performance and culture. The Safety Committee will conduct regular site Safety Walks and provide input for the Safety Leadership Team meeting.

W. Authority to Access Permitting Process

The Contractor is required to comply with all Concessionaire requirements associated with Authority to Access permitting process, including but not limited to ensuring all project are “site ready” and authority to interface with existing Express Lines is granted through the Authority to Access process within the Concessionaire’s Permitted system.

Attachment A – HSE Minimum Requirements

HSE minimum requirements



HSE minimum requirements

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For more information:

Contact a member of the HSE team

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The Transurban Health, Safety and Environment (HSE) Minimum Requirements define the minimum requirements and controls to manage key HSE risks to protect the people who work for, or are performing work for Transurban, as well as the community, from injury, illness or harm.

They are applicable across all Transurban entities within Australia and North America. These minimum requirements aim to mitigate HSE risks, meet applicable legislative obligations and demonstrate due diligence. They are in addition to business unit, asset or project-specific processes.

The HSE minimum requirements are an internal resource document for Transurban and WestConnex employees to use as a reference tool.

Transurban “monitored” worksites

On sites or projects where Transurban does not have operational control, work is conducted under the relevant contractor’s Health, Safety and Environment Management System (HSE MS). In these circumstances, the Transurban HSE Minimum Requirements provide the benchmark for our HSE expectations of that contractor. The contractor may set higher or more stringent requirements and in those instances, Transurban will adopt the higher requirements as the HSE baseline.

Please note that all high risk tasks included in this document must be performed by a *competent person* as defined by local legislation. Definitions such as “*confined space*” and “*suitable warning devices*” may differ across the regions in which Transurban operates and may be defined in local requirements or guidance material (e.g. Codes of Practice).

Where the HSE Minimum Requirements refers to applicable or relevant standards, these standards may be different depending on geographical location. Contact your local HSE Advisor should you require information relating to standards.

Refer to *TU-HSE-MN-03 HSE Definitions and Explanations* for common HSE terms used throughout this document.



Confined spaces



Intent:

To eliminate the risk of fatalities, injuries and incidents arising from entering or working in confined spaces.

Requirements

1. Design and planning processes must consider the elimination of the need to enter a confined space.
2. Risk assessments and Safe Work Method Statements (SWMS) are to be documented for activities involving confined spaces.
3. Registers of confined spaces are to be maintained and provided to those who are required to work in proximity to, or enter a confined space.
4. Works in confined spaces are authorised by a permit, with the following required to be in place:
 - Documented rescue plans that are communicated and regularly reviewed with relevant personnel trained in the details of the rescue plan;
 - Necessary rescue equipment is worn at all times to facilitate rescue in the event of an emergency in line with the documented rescue plan;
 - Systems/equipment which are likely to modify the atmospheric or physical status of a confined space, identified, purged and/or confirmed to be isolated before entry;
 - Testing for atmospheric conditions utilising calibrated equipment is to be conducted prior to entry to a confined space;
 - A competent person shall be in place to continuously monitor atmospheric conditions, where atmospheric hazards are identified as a risk;
 - A suitably trained standby person to be located outside at all times when occupied – this person may have no other duties whilst the confined space activity is being conducted;
 - Effective two-way communication to be in place between the standby person and the confined space entrants
 - A method of activating an emergency response is to be maintained at all times whilst confined space work is being conducted; and
 - Signage displayed at each entry point for the full duration of works.

For more information:

Contact a member of the HSE team

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Ground disturbance and/or penetration



Intent:

To prevent harm and minimise risks to personnel required to undertake ground disturbance and penetration activities and to minimise environmental harm or damage.

Examples may include drilling and cutting into walls, ceilings, floors, bridges, tunnels, buildings and related infrastructure.

Requirements

1. Risk assessments and Safe Work Method Statements (SWMS) are to be documented for activities involving ground disturbance and penetration activities. If there is a potential impact to the environment, this is to be included in the risk assessment.
2. Utilities, services, natural or built environment and other civil structural considerations are required to be positively identified (e.g. potholing), located and marked using:
 - As-built drawings; and
 - Information obtained from applicable utility services or companies -
 - Australia – Dial Before You Dig;
 - USA – VA Utility Protection Service; or
 - Canada – Info-Excavation.
3. Drawings of service locations are to be provided to all parties involved in the activity prior to the work commencing.
4. Services should be isolated prior to breaking ground or penetration into structures. Where not possible, a detailed risk assessment must be undertaken.
5. A ground disturbance and penetration permit is required for all ground disturbance and penetration activities.
6. Refer to the *Transurban HSE Minimum Requirements for Excavations* as required.

For more information:

Contact a member of the HSE team

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Excavations



Intent:

To minimise environmental harm or damage, prevent harm and minimise risk to personnel required to undertake excavation activities and to minimise risks and impacts to members of the public or fauna.

Requirements

1. Risk assessments and Safe Work Method Statements (SWMS) are to be documented for activities involving excavations. If there is a potential impact to the environment, this is to be included in the risk assessment.
2. A ground disturbance and penetration permit is required for all excavation activities.
3. Excavations deeper than 1.5 metres (5 feet) must be benched, shored or battered to the relevant Standard.
4. Safe access and egress points from all excavations and trenches, for personnel and fauna, must be identified and monitored.
5. Barriers and cover plates shall be installed to prevent fauna, personnel or members of the public from accessing or falling into bored holes or open excavations.
6. Material disturbed during excavation must be contained in an appropriate, approved location to reduce the potential for collapse or unintended release.
7. Adequate erosion and sediment control measures are to be implemented to prevent sediment being released into drains and local waterways.
8. Excavation, batters and trenches are inspected by a competent person prior to each workday/shift, after rainfall or other events that may affect ground stability or introduce new hazards.
9. Refer to the *Transurban HSE Minimum Requirements for Confined Spaces and Ground Disturbance and Penetration* as required.

For more information:

Contact a member of the HSE team

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Cranes and lifting operations



Intent:

To prevent harm and minimise risks to personnel who participate in, operate or maintain cranes and lifting activities and to minimise risks to people around them and members of the public.

Requirements

1. Risk assessments and Safe Work Method Statements (SWMS) are to be documented for activities involving crane and lifting operations (i.e. Lift Plan). The SWMS must address all requirements of this HSE Minimum Requirement.
2. *Significant lifts* to have a documented lift study/plan developed by a suitably qualified engineer. A *significant lift* includes:
 - Any lift over 90% of the Manufacturers Rated Capacity (MRC);
 - Any lift over 20 tonne (22 ton);
 - Any lift involving multiple crane lifting (e.g. dual and tandem crane lifts);
 - Any lifts where energised power lines or exposed services (i.e. gas/water) are within the slew radius of the crane and lifting equipment;
 - A lift on, or over water;
 - A lift within a rail corridor; or
 - A lift occurring on a structure e.g. a bridge.
 - A lift where live traffic lanes are within the slew radius
3. Ground conditions must be assessed for stability by a competent person prior to any lifting operations being conducted.
4. Plant and equipment used for lifting must be fit for purpose and operated in accordance with original equipment manufacturers (OEM) specifications.
5. When lifting using an installed point/lug that point/lug must be engineer certified.
6. Up to date inspection records are maintained with no "open" safety-related deficiencies, in accordance with OEM and regulatory requirements.
7. A procedure shall be in place, which outlines the frequency of inspection, and the testing and tagging of lifting equipment and lifting gear by a competent person prior to use.
8. Outriggers are deployed in accordance with OEM specifications (no shortening of outriggers permitted).
9. Mobile cranes rated with a lifting capacity greater than 3 tonne (3.3 ton) must have limiting and indicating devices installed.
10. Crane operators and dogman/riggers must have two-way communication and a method of activating emergency response at all times.
11. The Manufacturers Rated Capacity (MRC) or Working Load Limit (WLL) must be clearly displayed on crane and lifting equipment.
12. The type and weight of loads are checked prior to a lift to confirm it is less than the minimum WLL of the lifting device.
13. No loads are to be lifted or suspended over people or live traffic.
14. Exclusion zones and associated procedures are to be established with signage for all lifts.
15. Non-conductible tag lines are to be established to guide loads.
16. Lifting devices and tag lines remain attached for loads capable of shifting until secured.

For more information:

Contact a member of the HSE team

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Working at height



Intent:

To prevent harm and minimise risk to personnel who may fall off an edge, object, structure, opening or sustain an injury from an object that may fall from one level to another.

Requirements

1. Design and planning processes must consider the elimination of the need to undertake work at height.
2. Risk assessments and Safe Work Method Statements (SWMS) are to be documented for work at height.
3. A secure working area of suitable design and strength must be established, including securely fastened flooring, railings or solid barriers; and toe boards or similar means to prevent personnel, tools and materials falling.
4. Where a secure working area is not reasonably practicable, fall arrest or fall restraint equipment must be used. The equipment must be fit for purpose and incorporate a full body harness attached to anchor points and/or safety lines designed to withstand the maximum dynamic load from all persons attached to the anchor point and/or safety line.
5. Fall arrest or fall restraint equipment must have lanyards and snap-hooks (carabiners) with a secondary locking mechanism and 100% tie-off must be achieved at all times.
6. A shock absorber must be incorporated when using fall arrest equipment.
7. A documented procedure shall be in place to ensure no person works alone when using fall arrest equipment.
8. Penetration covers, guardrails or grid mesh may only be removed if approved by an authorised permit.
9. A rescue plan is developed and communicated for immediate response to a person suspended in a harness to prevent suspension trauma.
10. Persons working in a boom type elevated work platform (EWP) must wear fall restraint equipment attached to an anchor point in the basket, unless when working over water where the risk of the work platform submerging beneath the water exists, creating the risk of the person being unable to exit from the platform in an emergency.
11. Secondary guarding devices e.g. guarding and interlocks, must be fitted to boom type EWPs in compliance with Standards to prevent crush or trap injuries.
12. A procedure shall be in place, which outlines the frequency of inspection, and the testing and tagging of equipment by a competent person prior to use.
13. Fall prevention shall be utilised on fixed ladders exceeding 75 degrees to the horizontal.
14. Portable ladders are not to be used. In circumstances where this is not possible, a risk assessment must be undertaken. Under no circumstances are portable ladders longer than 9 metres (29.5 feet) to be used.
15. Procedures are in place to protect personnel from falling objects (e.g. warning signs, tool lanyards, chin straps and exclusion zones).
16. Exclusion zones and associated procedures must be in place and communicated to those working in proximity to works at height.

For more information:

Contact a member of the HSE team

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Working near live traffic



Intent:

To prevent harm and minimise risks to personnel that are required to work near live traffic and to minimise risks to motorists, pedestrians, cyclists and other road users.

Working near live traffic includes roadways, roadsides and shoulders.

Requirements

1. Works design and planning processes must consider elimination of the need to undertake work near live traffic.
2. Transurban's position is not to cross live traffic. If the need to cross live traffic cannot be eliminated (e.g. recovery of debris or misplaced traffic management devices) then a specific risk assessment must be undertaken and provided to an authorised business unit, asset or project representative.
Note – exemptions are not intended to be applied to routine maintenance activities.
3. Risk assessments and Safe Work Method Statements (SWMS) are documented for work near live traffic.
4. Pre-start activities specific to the location including hazard identification, are undertaken and documented prior to works commencing.
5. Traffic Management Plans, Traffic Control Plans and Vehicle Movement Plans are to be developed by a competent person and reviewed by the authorised business unit, asset or project representative.
6. Traffic Control and Traffic Management Plans must identify the controls necessary to separate workers from traffic such as physical barriers, minimum separation distances and shadow vehicles.
7. Traffic management planning ensures that identified risk reduction controls are implemented and communicated to all relevant personnel.
8. Non-traffic control personnel are not permitted within work areas until required traffic controls are implemented.
9. Vehicles used for works on roads are fitted with suitable warning devices.
10. Mobile Works on motorways require a Truck Mounted Attenuator (TMA) to be used as a shadow or cover vehicle at all times when workers are on foot.
11. Incident management vehicles on a non-managed motorway used to protect an incident scene from motorists should consist of a TMA. If a TMA is not available then a documented risk assessment should be undertaken to determine if an approved alternative vehicle can be considered.
12. Refer to the Transurban TMA Guidelines as required.

For more information:

Contact a member of the HSE team

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Mobile plant operations



Intent:

To prevent harm and minimise risks to personnel that are required to operate or work in proximity to mobile plant.

Requirements

1. Risk assessments and Safe Work Method Statements (SWMS) are documented for activities involving mobile plant.
2. Pre-start inspections of mobile plant are conducted by a competent person to confirm they are fit for purpose prior to use.
3. Guarding and interlocks that comply with relevant Standards and regulatory requirements, are fitted in all mobile plant.
4. Where possible, mobile plant should have in-built technology controls for collision avoidance, fatigue management, visibility improvements and proximity notification for pedestrians, other plant, equipment and structures.
5. Mobile plant must be fitted with:
 - Lockable isolation points;
 - An amber flashing beacon;
 - A reversing alarm;
 - Suitable two-way radios;
 - Fire extinguishers; and
 - Any additional equipment that has been identified by a risk assessment for the application and use of the mobile plant.
6. Mobile plant is used only for its originally intended purpose and should not be modified unless undertaken by the original equipment manufacturer (OEM) or a suitably qualified third party provider. Modifications shall have engineering certificates and compliance plates.
7. Operational controls to minimise risk are defined in one or more of the following, with updates communicated to relevant personnel:
 - Traffic Management Plans;
 - Traffic Control and Vehicle Movement Plans;
 - Risk registers;
 - Standard Operating Procedures, SWMS; and/or
 - Pre-task risk assessments.
8. Exclusion zones and associated procedures that encompass the entire operating zone of the mobile plant must be in place and communicated to those working in proximity to the plant.
9. An effective and reliable means of two-way communication between the mobile plant operator and those controlling the work operations and maintaining exclusion zones is established.
10. A documented procedure is in place to ensure mobile plant and equipment is maintained on a periodic basis in accordance with or OEM and regulatory requirements. Deficiencies are recorded and safety related deficiencies are resolved before equipment is returned to operation.
11. Documented procedures must be in place to manage people and operating plant interactions. Where possible, physical barriers are to be used. Where not possible or a spotter is proposed, a detailed risk assessment must be undertaken.
12. Personnel operating mobile plant must hold and keep on them at all times, the required licence and competency for the type of mobile plant to be used.

For more information:

Contact a member of the HSE team

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Energy isolation



Intent:

To prevent and minimise risks for personnel required to isolate energy sources and to work on energy-isolated equipment.

Energy may include electrical, chemical, gravitational, mechanical (or kinetic) or stored energy including pneumatic, hydraulic, battery, spring loaded or gravitational.

Requirements

1. Risk assessments and Safe Work Method Statements (SWMS) are documented for activities involving energy isolation and tag out.
2. Hazardous energy sources are identified, de-energised and isolated prior to working on equipment and/or systems.
3. Isolation points are clearly identified, labelled, lockable and fully maintained to prevent inadvertent energisation or de-energisation.
4. Energy sources and equipment are treated as live unless confirmed to be de-energised by a competent person.
5. A permit authorised by a competent person is in place and communicated prior to work commencing on energy isolation activities or working on isolated equipment.
6. The permit identifies each isolation point and specifies test requirements for the presence of hazardous materials/stored energy.
7. A documented procedure shall be in place for lock out and tag out to ensure no person works alone when isolating energy sources and working in energy-isolated equipment.
8. Refer to the *Transurban Minimum Requirements for Electrical Work* as required.

For more information:

Contact a member of the HSE team

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Electrical work



Intent:

To prevent harm and minimise risks to personnel required to work on or near potentially hazardous electrical energy above 50 volts AC or 120 volts DC.

Requirements

1. Transurban's position is there should be no live electrical work. In circumstances where this is not possible, such as testing or commissioning, a risk assessment must be undertaken.
2. Risk assessments and Safe Work Method Statements (SWMS) are documented for activities involving the potential for contact with live conductors or equipment.
3. Electrical energy sources should be isolated. Where not possible, a detailed risk assessment must be undertaken. *Refer Transurban HSE Minimum Requirement - Energy Isolation.*
4. Electrical equipment must be compliant with applicable Standards and a procedure shall be in place which outlines the frequency of inspection, testing and tagging of all portable electrical equipment by a competent person prior to use.
5. Circuits and powered equipment must have Residual Current Device (RCD) protection.
6. Temporary electrical leads must be secured off the ground by insulated hooks and/or lead stands.
7. Live electrical circuits are identified prior to penetrations of surfaces (walls, flooring and roofing). *Refer HSE Minimum Requirements – Ground Disturbance and Penetration.*
8. Regulated safe working distances and exclusion zones are identified and maintained when working near live Overhead Line Equipment (OHLE), live electrical parts or on assets with known ARC flash energy potential.
9. Electrical works are installed, tested and certified in accordance with applicable Standards and regulations.
10. A testing and tagging regime of portable electrical equipment must be maintained by an appropriately trained and competent person.
11. Warning barricades, signage and flagging is installed to prevent damage to underground and overhead electrical services.
12. Access to high voltage rooms is restricted to trained and competent personnel (or persons accompanied by trained and competent personnel).
13. A documented procedure shall be in place to manage high and low voltage risks.

For more information:

Contact a member of the HSE team

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Driver and vehicle safety



Intent:

To prevent harm and minimise risks to personnel required to operate or maintain vehicles; and to minimise risks to motorists, pedestrians, cyclists and other road users.

Requirements

Vehicles

1. Servicing and maintenance of all vehicles must be conducted in accordance with the manufacturer's specifications. Any damage, faults or changes to the vehicle's condition affecting its roadworthiness or safe use must be reported and rectified. Vehicles must be taken out of service until rectifications are made.
2. Vehicles must be registered and fully insured.
3. Vehicles, including hire vehicles, are inspected prior to driving each day.
4. Loose equipment is securely restrained prior to driving a vehicle.
5. Vehicles should not be left unattended when the engine is running.
6. Vehicles must be parked in a fundamentally stable position i.e. in "park" with the handbrake fully engaged and engine switched off
7. Modifications, including attaching equipment, must comply with manufacturer's specifications, and applicable design rules and Standards. Vehicles should not be modified unless undertaken by the OEM or a suitably qualified third party

Drivers

1. The driver must have a blood alcohol concentration (BAC) of zero and not be impaired by fatigue, prescription medication or other drugs.
2. Drivers must:
 - Adhere to all applicable road rules, including speed limits;
 - Ensure all occupants are wearing a seatbelt;
 - Drive to environmental conditions including adjusting speed, increasing distance/gaps in rain or poor visibility (fog, glare and heavy rain) and use day time running lights at all times;
 - Not smoke in vehicles;
 - Not use a mobile phone whilst driving, unless hands free functionality is built into the vehicle and is operational. *It is recommend that drivers avoid phone use even in hands free mode.*
3. Where possible, drivers should reverse park to allow forward exiting.

Transurban drivers/vehicles

This minimum requirement must be read in conjunction with:

- Transurban Fleet Motor Vehicle Standard;
- Transurban & TQ Motor Vehicle Usage Policy and Procedures; and
- Transurban USA Motor Vehicle Usage Procedure.

EXHIBIT F

PRICE PROPOSAL

OPITZ BOULEVARD RAMP PROJECT PRICE PROPOSAL

Offeror shall summarize its total Proposal Price below in both numbers and words.

Opitz Boulevard Ramp Project Price Proposal Total: \$ 59,127,675.84
- from Table 1 -

Price Proposal Total in Writing:

Fifty nine million one hundred twenty seven thousand six hundred seventy five dollars and eighty four cents.

Shirley Contracting Company, LLC
OFFEROR


SIGNATURE

July 29, 2022
DATE

Michael E. Post
PRINTED NAME

CEO/Manager
TITLE

TABLE 1 - OPITZ BOULEVARD RAMP PROJECT PRICE PROPOSAL

PAY ITEM CATEGORY	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
MOBILIZATION	LS	1	N/A	\$ 2,985,500.00
CONSTRUCTION SURVEYING	LS	1	N/A	\$ 345,000.00
EARTHWORK	LS	1	N/A	\$ 1,007,685.00
PAVEMENT ITEMS	LS	1	N/A	\$ 6,118,423.90
CURB AND MEDIAN	LS	1	N/A	\$ 526,872.00
GUARDRAIL AND BARRIER	LS	1	N/A	\$ 1,671,068.00
RETAINING WALLS	LS	1	N/A	\$ 4,347,890.00
DEMOLITION	LS	1	N/A	\$ 651,532.20
EROSION & SEDIMENT CONTROL	LS	1	N/A	\$ 531,939.25
DRAINAGE & STORMWATER MANAGEMENT	LS	1	N/A	\$ 1,538,824.66
ROADSIDE DEVELOPMENT	LS	1	N/A	\$ 20,699.25
SIGNING	LS	1	N/A	\$ 4,350,000.00
PAVEMENT MARKING	LS	1	N/A	\$ 389,956.76
TRAFFIC SIGNALS	LS	1	N/A	\$ 835,000.00
LIGHTING	LS	1	N/A	\$ 1,375,000.00
TRAFFIC MANAGEMENT SYSTEM	LS	1	N/A	\$ 9,450,000.00
MAINTENANCE OF TRAFFIC	LS	1	N/A	\$ 3,051,828.32
BRIDGE AND STRUCTURES	LS	1	N/A	\$ 13,930,456.50
QA/QC	LS	1	N/A	\$ 6,000,000.00
PROJECT MANAGEMENT	LS	1	N/A	

Written Total: Fifty nine million one hundred twenty seven thousand six hundred seventy five dollars and eighty four cents	TOTAL	\$ 59,127,675.84
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SCHEDULE OF PAY ITEMS

This Schedule of Pay Items shall identify the total material quantities and costs of each proposed pay item for the Opitz Project using Item Codes and units of measure that are consistent with VDOT's list of Standard and Non-standard Item Codes. The values and quantities shall be clearly supported by the escrowed pricing documents.

VDOT Item Code ¹	Item Description	Fuel (F) or Price (P) Adjustment	Approximate Quantity	Units ¹	Unit Cost	Budgeted Cost (\$)	Pay Item Category from Table 1
00100	Mobilization		1.000	LS		\$ 2,765,000.00	Mobilization
	Owner Field Office		21.000	MON		\$ 220,500.00	Mobilization
00101	Construction Surveying		1.000	LS		\$ 345,000.00	Construction Surveying
00118	Regular Excavation		9722.000	CY		\$ 874,980.00	Earthwork
00110	Clearing and Grubbing (3 Areas)		1.350	Acre		\$ 81,000.00	Earthwork
00136	Import & Place Borrow		1149.000	CY		\$ 51,705.00	Earthwork
10628	Flexible Pavement Planing 0-2"		115501.000	SY		\$ 612,155.30	Pavement
10636	SM-9.5D	P	1260.000	Ton		\$ 170,100.00	Pavement
10609	SM 12.5E	P	14893.000	Ton		\$ 2,382,880.00	Pavement
10610	IM-19.0A	P	152.000	Ton		\$ 19,000.00	Pavement
10611	IM-19.0D	P	2201.000	Ton		\$ 275,125.00	Pavement
10611	IM-19.0D Buildup	P	600.000	Ton		\$ 78,000.00	Pavement
10643	BM-25.0A	P	12726.000	Ton		\$ 1,247,148.00	Pavement
12322	Asphalt Curb MC-3B	P	11578.000	Ton		\$ 347,340.00	Pavement
12505	Asphalt Curb Backup Material	P	65.000	Ton		\$ 10,725.00	Pavement
10700	Rumble Strip (I-95)		18111.000	LF		\$ 10,866.60	Pavement
10100	No. 21B Stone Base Aggregate		18267.000	Ton		\$ 949,884.00	Pavement
10013	Aggregate Base No. 21B CTA		152.000	Ton		\$ 15,200.00	Pavement
13220	Hydraulic Cement Sidewalk		342.000	SY		\$ 54,720.00	Curb & Median
13252	Generator Concrete Pad		206.000	SY		\$ 57,680.00	Curb & Median
10468	Concrete Cap Fill-#68 Stone		3852.000	Ton		\$ 223,416.00	Curb & Median
00118	Demo Curb & Gutter		1275.000	LF		\$ 30,600.00	Curb & Median
00118	Demo Concrete Flume		54.000	LF		\$ 5,940.00	Curb & Median
12030	CG-3		499.000	LF		\$ 31,936.00	Curb & Median
12700	CG-7		806.000	LF		\$ 56,420.00	Curb & Median
13108	CG-12		12.000	SY		\$ 25,200.00	Curb & Median
09185	PG-2A TY. B1		141.000	SY		\$ 22,560.00	Curb & Median
09185	PG-2A TY. E		25.000	SY		\$ 7,000.00	Curb & Median
21110	MS-1A Median (Opitz West)		114	SY		\$ 11,400.00	Curb & Median
13603	Impact Attenuator		3.000	EA		\$ 97,500.00	Guardrail & Barrier
13460	MB-7D		113.000	LF		\$ 12,995.00	Guardrail & Barrier
13461	MB-7E		1764.000	LF		\$ 458,640.00	Guardrail & Barrier
13462	MB-7F		3349.000	LF		\$ 485,605.00	Guardrail & Barrier
13485	MB-8A		293.000	LF		\$ 99,620.00	Guardrail & Barrier
13543	BPB-4 42" Barrier at MSE Walls		1298.000	LF		\$ 122,012.00	Guardrail & Barrier
13280	GR-MGS-1		1641.000	LF		\$ 62,358.00	Guardrail & Barrier
13281	GR-MGS-1A		3882.000	LF		\$ 213,510.00	Guardrail & Barrier
13285	GR-MGS-2		6.000	EA		\$ 24,000.00	Guardrail & Barrier
13287	GR-MGS-3		2.000	EA		\$ 4,000.00	Guardrail & Barrier
13288	GR-MGS-4		18.000	EA		\$ 25,200.00	Guardrail & Barrier
13392	GR-FOA-2		5.000	EA		\$ 17,500.00	Guardrail & Barrier
13394	GR-FOA-5		8.000	EA		\$ 34,400.00	Guardrail & Barrier
22643	FE-CL Ground Mounted		429.000	LF		\$ 13,728.00	Guardrail & Barrier

VDOT Item Code ¹	Item Description	Fuel (F) or Price (P) Adjustment	Approximate Quantity	Units ¹	Unit Cost	Budgeted Cost (\$)	Pay Item Category from Table 1
13539	RW-3 Wall		172.000	CY		\$ 133,300.00	Retaining Walls
68011	32" Parapet & Moment Slab At RW-3 Wall		118.000	LF		\$ 59,000.00	Retaining Walls
13565	Structural EX. RW-3		233.000	CY		\$ 23,300.00	Retaining Walls
13555	Post & Panel Wall		2183.000	SF		\$ 742,220.00	Retaining Walls
22645	2 FE-CL Vinyl		223.000	LF		\$ 8,920.00	Retaining Walls
64901	MSE Wall		22541.000	SF		\$ 3,381,150.00	Retaining Walls
24420	Demo Ex. Pavement		12358.000	SY		\$ 148,296.00	Demolition
10498	Sawcut Roadway Pavement 0-15"		11179.000	LF		\$ 31,301.20	Demolition
24502	Demo Impact Attenuator		2.000	EA		\$ 2,640.00	Demolition
24501	Demo Concrete Barrier		3425.000	LF		\$ 133,575.00	Demolition
24501	Demo Guardrail		10622.000	LF		\$ 26,555.00	Demolition
24501	Demo Storm Pipe (3 Ea. Runs)		131.000	LF		\$ 17,685.00	Demolition
24502	Demo Storm Structure		6.000	EA		\$ 13,200.00	Demolition
00529	Abandon 18" Storm Pipe (202 LF)-Flow Fill		14.000	CY GSF		\$ 7,560.00	Demolition
24500	Lagging in Girders For Safety (8 of 11 Bays)		30080.000			\$ 270,720.00	Demolition
27430	Erosion Control Maintenance Crew		182.000	Days		\$ 327,600.00	Erosion & Sediment Control
27504	Silt Fence TY. A		1691.000	LF		\$ 6,341.25	Erosion & Sediment Control
27541	Inlet Protection		41.000	EA		\$ 18,040.00	Erosion & Sediment Control
26270	Rip Rap Outlet Protection		87.000	Ton		\$ 22,620.00	Erosion & Sediment Control
27410	Rock Check Dam		18.000	EA		\$ 7,740.00	Erosion & Sediment Control
273128	EC-2 TY. 1 Matting		3463.000	SY		\$ 13,852.00	Erosion & Sediment Control
27325	EC-2 TY. 3 Matting		3666.000	SY		\$ 21,996.00	Erosion & Sediment Control
27400	VAC Truck Street Cleaning		91.000	Days		\$ 113,750.00	Erosion & Sediment Control
00588	UD-4		9642.000	LF		\$ 144,630.00	Drainage & Stormwater
00595	UD-4 Outlet		304.000	LF		\$ 9,761.44	Drainage & Stormwater
00596	EW-12		4.000	EA		\$ 4,293.00	Drainage & Stormwater
00588	CCTV Underdrain		10219.000	LF		\$ 31,781.09	Drainage & Stormwater
00588	CCTV Stormpipe		2878.000	LF		\$ 21,498.66	Drainage & Stormwater
01000	Test Pitting		5.000	Days		\$ 55,925.05	Drainage & Stormwater
01152	15" RCP (1 Ea.)		4.000	LF		\$ 4,470.04	Drainage & Stormwater
01182	18" RCP (28 Ea.) (2,416 Total Pipe LF)		2318.000	LF		\$ 327,116.16	Drainage & Stormwater
01242	24" RCP (8 Ea.) (880 Total Pipe LF)		852.000	LF		\$ 152,107.56	Drainage & Stormwater
01482	48" RCP (1 Run 56 LF)		50.000	LF		\$ 19,817.00	Drainage & Stormwater
06181	18" FES		1.000	EA		\$ 4,314.99	Drainage & Stormwater
06241	24" FES		1.000	EA		\$ 1,642.76	Drainage & Stormwater
00525	18" EW		1.000	EA		\$ 1,606.57	Drainage & Stormwater
06748	DI-2B L=6		1.000	EA		\$ 10,911.77	Drainage & Stormwater
06751	DI-2B L=12		1.000	EA		\$ 12,812.32	Drainage & Stormwater
06758	DI-2BB L=8		1.000	EA		\$ 11,867.82	Drainage & Stormwater
06759	DI-2BB L=10		1.000	EA		\$ 12,195.06	Drainage & Stormwater
06817	DI-3B L=4		1.000	EA		\$ 7,686.28	Drainage & Stormwater
06820	DI-3B L=10		1.000	EA		\$ 9,272.77	Drainage & Stormwater
06829	DI-3BB L=10		1.000	EA		\$ 9,622.76	Drainage & Stormwater
07506	DI-5		8.000	EA		\$ 63,861.04	Drainage & Stormwater
07508	DI-7 Grate A Ty. 1		1.000	EA		\$ 7,007.88	Drainage & Stormwater
08266	DI-10K TY. II L=16		1.000	EA		\$ 15,972.36	Drainage & Stormwater
08270	DI-10K TY. III L=4		3.000	EA		\$ 36,657.36	Drainage & Stormwater
08272	DI-10K TY. III L=8		2.000	EA		\$ 24,438.28	Drainage & Stormwater
08273	DI-10K TY. III L=10		4.000	EA		\$ 48,876.52	Drainage & Stormwater
08274	DI-10K TY. III L=12		2.000	EA		\$ 24,438.28	Drainage & Stormwater
08275	DI-10K TY. III L=14		4.000	EA		\$ 48,876.52	Drainage & Stormwater
08276	DI-10K TY. III L=16		6.000	EA		\$ 75,715.14	Drainage & Stormwater
08277	DI-10K TY. III L=18		1.000	EA		\$ 12,219.10	Drainage & Stormwater
01362	SWM-1 36" Diameter		1.000	EA		\$ 6,893.44	Drainage & Stormwater
09056	MH 1, 2		3.000	EA		\$ 36,035.64	Drainage & Stormwater
02110	Existing Pipe/Drainage Repairs Per Report		1.000	LS		\$ 139,500.00	Drainage & Stormwater
02110	Clean Existing Drainage to Outfalls		1.000	LS		\$ 145,000.00	Drainage & Stormwater

VDOT Item Code ¹	Item Description	Fuel (F) or Price (P) Adjustment	Approximate Quantity	Units ¹	Unit Cost	Budgeted Cost (\$)	Pay Item Category from Table 1
27001	Temp. Seeding		7527.000	SY		\$ 15,054.00	Roadside Development
27001	Perm. Seeding		7527.000	SY		\$ 5,645.25	Roadside Development
50108	Signing		1.000	LS		\$ 4,350,000.00	Signing
54032	TY. B CL. 1-4"		5479.000	LF		\$ 4,054.46	Pavement Marking
54037	TY. B CL. 1-8"		578.000	LF		\$ 924.80	Pavement Marking
54044	TY. B CL. II-6"		393.000	LF		\$ 1,768.50	Pavement Marking
54042	TY. B CL. II-24"		391.000	LF		\$ 6,647.00	Pavement Marking
54076	TY. B CL. VI-6"		42212.000	LF		\$ 253,272.00	Pavement Marking
54078	TY. B CL. VI-12"		4400.000	LF		\$ 39,600.00	Pavement Marking
54079	TY. B CL. VI-24"		860.000	LF		\$ 17,200.00	Pavement Marking
54079	TY. B CL. VI-4" Contrast		2047.000	LF		\$ 14,329.00	Pavement Marking
54080	TY. B CL. VI-6" Contrast		2179.000	LF		\$ 17,432.00	Pavement Marking
54081	TY. B CL. VI-8" Contrast		182.000	LF		\$ 1,820.00	Pavement Marking
54257	TY. B CL II-Message		3.000	EA		\$ 1,425.00	Pavement Marking
54257	TY. B CL II-Symbol		11.000	EA		\$ 3,300.00	Pavement Marking
54402	TY. B CL VI-Message		2.000	EA		\$ 1,700.00	Pavement Marking
54402	TY. B CL VI-Symbol		5.000	EA		\$ 3,100.00	Pavement Marking
54217	Inlaid Pavement Marker		632.000	EA		\$ 23,384.00	Pavement Marking
52000	Traffic Signals		1.000	LS		\$ 835,000.00	Traffic Signals
55505	Lighting		1.000	LS		\$ 1,375,000.00	Lighting
57010	Traffic Management System		1.000	LS		\$ 9,450,000.00	Traffic Management System
27275	Construction Entrance		6.000	EA		\$ 16,800.00	Maintenance of Traffic
24282	Maintenance of Traffic Crew		21.000	MON		\$ 1,344,000.00	Maintenance of Traffic
24272	Attenuator Truck		3696.000	HRS		\$ 103,488.00	Maintenance of Traffic
24281	Arrow Board		7392.000	HRS		\$ 33,264.00	Maintenance of Traffic
24282	Flagging Opitz		4000.000	HRS		\$ 124,000.00	Maintenance of Traffic
16515	Shoulder Milling		1066.000	SY		\$ 9,061.00	Maintenance of Traffic
16370	Temp. Full Depth Pavement (384 tons)	P	1066.000	SY		\$ 46,904.00	Maintenance of Traffic
24293	Traffic Barrier		21413.000	LF		\$ 1,036,007.00	Maintenance of Traffic
24278	Group 2 Channleizing Device		233.000	EA		\$ 20,970.00	Maintenance of Traffic
13710	Temp. Impact Attenuator		13.000	EA		\$ 169,000.00	Maintenance of Traffic
13277	Temp. Fixed Object Attachment		7.000	EA		\$ 4,900.00	Maintenance of Traffic
54430	Ty. 1-6" Contrast Pavemark		7410.000	LF		\$ 44,460.00	Maintenance of Traffic
54430	Ty. A-6" Pavemark		35744.692	LF		\$ 21,446.82	Maintenance of Traffic
54432	Ty. A-8" Pavemark		13920.000	LF		\$ 9,744.00	Maintenance of Traffic
54436	Ty. A-12" Pavemark		66.000	LF		\$ 99.00	Maintenance of Traffic
54570	Temp. One Way Pavemark		694.000	EA		\$ 5,552.00	Maintenance of Traffic
54576	Temp. Two Way Pavemark		210.000	EA		\$ 1,890.00	Maintenance of Traffic
24152	Type III Barricade		8.000	EA		\$ 2,400.00	Maintenance of Traffic
24160	MOT Sign Post		59.000	EA		\$ 1,475.00	Maintenance of Traffic
24160	MOT/Detour Signage		929.000	SF		\$ 37,160.00	Maintenance of Traffic
24160	Reset MOT/Detour Signage		3215.000	SF		\$ 9,645.00	Maintenance of Traffic
24430	Demo Full Depth Pavement		1125.000	SY		\$ 9,562.50	Maintenance of Traffic
64011	Structural Excavation		408.000	CY		\$ 65,280.00	Bridges and Structures
64015	Select Backfill (Abutment Zone)		386.000	CY		\$ 38,600.00	Bridges and Structures
64045	SOE For Abutments		281.000	SF		\$ 30,910.00	Bridges and Structures
64045	SOE at Piers (Ring)		2020.000	SF		\$ 101,000.00	Bridges and Structures
69030	Concrete A3-Substructure		192.000	CY		\$ 384,000.00	Bridges and Structures
68578	Backwall-Reconstruction		106.000	LF		\$ 77,380.00	Bridges and Structures
68578	Backwall reconstruction HES		84.000	LF		\$ 105,000.00	Bridges and Structures
68191	Bridge Seat Reconstruction		35.000	EA		\$ 105,000.00	Bridges and Structures
64101	Dynamic Pile Test		6.000	EA		\$ 19,200.00	Bridges and Structures
64759	Driving Test For 10" Steel Pile (6 Test Piles)		407.000	LF		\$ 89,540.00	Bridges and Structures
68180	Embedded Galvanic Annode		488.000	EA		\$ 24,400.00	Bridges and Structures

ATTACHMENT H

BUY AMERICA CERTIFICATE

The undersigned certifies on behalf of itself and all proposed subcontractors (at all tiers) that only domestic steel and iron will be used in the Project.

A. The Contractor shall comply with the Federal Highway Administration (“FHWA”) Buy America Requirements of 23 CFR 635.410, which permits FHWA participation in the Contract only if domestic steel and iron will be used on the Project. To be considered domestic, all steel and iron used and all products manufactured from steel and iron must be produced in the United States, and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes which protect or enhance the value of the material to which the coating is applied. This requirement does not preclude a minimal use of foreign steel and iron materials, provided the cost of such materials does not exceed 0.1% of the Contract Price.

B. A false certification is a criminal act in violation of 18 U.S.C. 1001. Should this Contract be investigated, the Concessionaire has the burden of proof to establish that it is in compliance.

C. At the Contractor’s request, the Department may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist. However, the Contractor certifies that it will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Department.

CONTRACTOR	Shirley Contracting Company, LLC
SIGNATURE	
NAME (Printed or Typed)	Michael E. Post
TITLE	CEO/Manager
DATE	July 29, 2022

EXHIBIT I

FORMS OF LIEN WAIVER

<u>Exhibit Description</u>	<u>No. of Pages</u>
Exhibit I-1 – Form of Contractor Interim Lien Waiver	2
Exhibit I-2 – Form of SubContractor Interim Lien Waiver	1
Exhibit I-3 – Form of SubContractor Final Lien Waiver	1
Exhibit I-4 – Form of Contractor Final Lien Waiver	2

paid and there is no known basis for filing of any liens, security interests, encumbrances or other claims in the nature of mechanics', labor or materialmen's liens or other similar liens arising out of or in connection with the performance by Contractor or any of the Subcontractors of the Work under the Contract Documents; and releases, assignments and waivers from all Subcontractors that would otherwise have had the right to place a lien or encumbrance with respect to and on the Project, the Project Right of Way and any and all interests and estates therein, and all improvements and Materials placed on the Site, for all services done and Materials furnished to the date hereof have been obtained in such a form as to constitute an effective defense against the assertion of all such liens and encumbrances under the law of the Commonwealth of Virginia, if and to the extent required under the Contract Documents.

The Commonwealth of Virginia may rely on this Interim Lien Waiver as a third-party beneficiary thereof.

Signed this ____ day of 20____.

[NAME OF CONTRACTOR]

By: _____

Name:

Title:

Subscribed and sworn to before me this ____ day of 20_____.

Notary Public in and for
Said County and State

otherwise have had the right to place a lien or encumbrance with respect to and on the Project, the Project Right of Way and any and all interests and estates therein, and all improvements and Materials placed on the Site, for all services done and Material furnished have been obtained in such a form as to constitute an effective defense against the assertion of all such liens and claims under the laws of the Commonwealth of Virginia.

Executed copies of all such releases, assignments and waivers obtained by Contractor and not previously delivered to Concessionaire are attached hereto.

The Commonwealth of Virginia may rely on this Final Lien Waiver as a third-party beneficiary thereof.

Signed this ____ day of 20____.

By: _____
Name:
Title:

Subscribed and sworn to before me this ____ day of 20_____.

Notary Public in and for
Said County and State

EXHIBIT J

FORMS OF PERFORMANCE AND PAYMENT BONDS

Exhibit Description

Exhibit J-1 – Form of Payment Bond

Exhibit J-2 – Form of Performance Bond

**EXHIBIT J-1
FORM OF PAYMENT BOND**

**BOND NO.
PENAL SUM: \$[●]**

KNOW ALL WHO SHALL SEE THESE PRESENTS:

THAT WHEREAS, the Commonwealth of Virginia, Department of Transportation, a state agency of the Commonwealth of Virginia (the “Owner”), has awarded to 95 Express Lanes LLC (the “Obligee” which term hereinafter includes its successors and assigns) a Comprehensive Agreement dated July 31, 2012 (the “Original Agreement”) to develop, design, build, finance, operate, and maintain the Interstate 95 HOV/HOT Lanes Project (the “Project”); and

WHEREAS, the Owner and the Obligee have entered into a First Amendment to the Original Agreement dated May 2, 2016 (the “First Amendment”) under which the parties agreed to add the “Southern Terminus Extension” to the Project; and

WHEREAS, the Owner and the Obligee have entered into an Amended and Restated Comprehensive Agreement (the “ARCA”) dated June 8, 2017 under which the Obligee would add approximately eight miles of high-occupancy toll lanes on Interstate 395 to the Project, and other significant related improvements on and around Interstate 395 (collectively, the “395 Project”); and

WHEREAS, the Owner and the Obligee have entered into a Second Amended and Restated Comprehensive Agreement (the “Second ARCA”) dated April 18, 2019 under which the Obligee would add approximately ten miles of high-occupancy toll lanes on Intertstate 95 from the Southern Terminus Extension to Fredericksburg (the “Fred Ex Project”)

WHEREAS, the Owner and the Obligee intend to enter into a Third Amended and Restated Comprehensive Agreement (the “Third ARCA”) under which the Obligee will add a new south-facing, reversible HOT ramp between existing Opitz Boulevard and the existing 95 Express (the “Opitz Project”); and

WHEREAS, the Obligee intends to enter into the Opitz Construction Contract (the “Construction Contract”) between the Obligee and [Contractor Name], as contractor (hereinafter, the “Principal”), bearing the date of [_____], for the performance of certain work defined within the Construction Contract as the “Opitz Work,” which Construction Contract, together with any and all changes, extensions of time, alterations, modifications, or additions thereto or to the work to be performed thereunder, shall hereafter be referred to as the “Contract;” and

WHEREAS, it is one of the conditions of the Third ARCA and the Contract that these presents shall be executed.

NOW THEREFORE, we, the undersigned Principal, and [_____] (the “Surety”, [and collectively, the “Co-Sureties”]) jointly and severally, bind ourselves, our heirs, executors, administrators,

successors, and assigns to the Obligee to pay for labor, materials, and equipment furnished for use in the performance of the Contract, which Contract is deemed a part hereof as if said Contract were fully set forth herein. [Any reference to the “Surety” in this Bond shall be read as a reference to the Co-Sureties and each of them on the basis of such joint and several liability.] **This Bond is in the amount of []**.

The following terms and conditions shall apply with respect to this Bond:

1. If the Principal promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Obligee and the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Contract, then the Surety and the Principal shall have no obligation under this Bond.
2. The Surety’s obligation to the Obligee under this Bond shall arise after the Obligee, or the Owner has promptly notified the Principal and the Surety (at the address described in Section 13) of claims, demands, liens, or suits against the Obligee, the Obligee’s property, or the Owner or its property, by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Contract, and tendered defense of such claims, demands, liens, or suits to the Principal and the Surety.
3. When the conditions of Section 2 have been satisfied, the Surety shall promptly and at the Surety’s expense defend, indemnify, and hold harmless the Obligee and the Owner against a duly tendered claim, demand, lien, or suit.
4. The Surety’s obligations to a Claimant under this Bond shall arise after the following:
 - a. Claimants, who do not have a direct contract with the Principal,
 - i. have furnished a written notice of non-payment to the Principal, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - ii. have sent a Claim to the Surety (at the address described in Section 13).
 - b. Claimants, who are employed by or have a direct contract with the Principal, have sent a Claim to the Surety (at the address described in Section 13).

5. If a notice of non-payment required by Section 4 is forwarded or otherwise provided by the Obligee or the Owner to the Principal that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 4.
6. When a Claimant has satisfied the conditions of Sections 4(a) or (b), whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - a. Send an answer to the Claimant, with a copy to the Obligee and the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - b. Pay or arrange for payment of any undisputed amounts.
7. The Surety's failure to discharge its obligations under Section 6(a) or Section 6(b) shall not be deemed to constitute a waiver of defenses the Surety or Principal may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 6(a) or Section 6(b), the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Obligee to the Principal under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By the Principal furnishing and the Obligee accepting this Bond, they agree that all funds earned by the Principal in the performance of the Contract are dedicated to satisfy obligations of the Principal and Surety under this Bond, subject to the Obligee's or the Owner's priority to use the funds for the completion of the Contract work.
10. The Surety shall not be liable to the Obligee, Claimants, or others for obligations of the Principal that are unrelated to the Contract. Neither the Obligee nor the Owner shall be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction within the Commonwealth of Virginia after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 4, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Obligee, or the Principal shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however, accomplished, shall be sufficient compliance as of the date received.
14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Principal and the Obligee shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 “Claim” means a written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials, or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Contract;
- .4 a brief description of the labor, materials, or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Contract;
- .6 the total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

15.2 “Claimant” means any subcontractor or supplier of any tier who furnishes labor, materials, or equipment for use in the performance of the Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Opitz Project is

located. The intent of this Bond shall be to include without limitation in the terms “labor, materials, or equipment” that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural, and engineering services required for performance of the Contract, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this at [_____] on this [_____] day of [_____] , 20[____].

PRINCIPAL (full legal name):

Address:

By: _____

Title:

Contact Name:

Phone: ()

SURETY (full legal name):

Address:

By: _____

Title:

Contact Name:

Phone: ()

[Note: If more than one surety, then add appropriate number of lines to signature block.]

[Note: A copy of a certificate that the Surety (or Co-Sureties) is (are) authorized to transact business in Virginia must be attached.]

[Note: The Bond shall be signed by authorized persons. Where such persons are signing in a representative capacity (e.g., an attorney-in-fact), but are not a member of the firm, partnership, or joint venture, or an officer of the legal entity involved, evidence of authority including the appropriate power of attorney documentation must be attached.]

EXHIBIT J-2
FORM OF PERFORMANCE BOND

BOND NO.
PENAL SUM: \$[●]

KNOW ALL WHO SHALL SEE THESE PRESENTS:

THAT WHEREAS, the Commonwealth of Virginia, Department of Transportation, a state agency of the Commonwealth of Virginia (the “Owner”), has awarded to 95 Express Lanes LLC (the “Obligee” which term hereinafter includes its successors and assigns) a Comprehensive Agreement dated July 31, 2012 (the “Original Agreement”) to develop, design, build, finance, operate, and maintain the Interstate 95 HOV/HOT Lanes Project (the “Project”); and

WHEREAS, the Owner and the Obligee have entered into a First Amendment to the Original Agreement dated May 2, 2016 (the “First Amendment”) under which the parties agreed to add the “Southern Terminus Extension” to the Project; and

WHEREAS, the Owner and the Obligee have entered into an Amended and Restated Comprehensive Agreement (the “ARCA”) dated June 8, 2017 under which the Obligee would add approximately eight miles of high-occupancy toll lanes on Interstate 395 to the Project, and other significant related improvements on and around Interstate 395 (collectively, the “395 Project”); and

WHEREAS, the Owner and the Obligee have entered into a Second Amended and Restated Comprehensive Agreement (the “Second ARCA”) dated April 18, 2019 under which the Obligee would add approximately ten miles of high-occupancy toll lanes on Interstate 95 from the Southern Terminus Extension to Fredericksburg (the “Fred Ex Project”)

WHEREAS, the Owner and the Obligee intend to enter into a Third Amended and Restated Comprehensive Agreement (the “Third ARCA”) under which the Obligee will add a new south-facing, reversible HOT ramp between existing Opitz Boulevard and the existing 95 Express (the “Opitz Project”); and

WHEREAS, the Obligee intends to enter into the Opitz Construction Contract (the “Construction Contract”) between the Obligee and [Contractor Name], as contractor (hereinafter, the “Principal”), bearing the date of [_____], for the performance of certain work defined within the Construction Contract as the “Opitz Work,” which Construction Contract, together with any and all changes, extensions of time, alterations, modifications, or additions thereto or to the work to be performed thereunder, shall hereafter be referred to as the “Contract;” and

WHEREAS, it is one of the conditions of the Third ARCA and the Contract that these presents shall be executed.

NOW THEREFORE, we, the undersigned Principal, and [_____] (the “Surety”, [and collectively, the “Co-Sureties”]) are firmly bound and held unto the Obligee as the “Obligee” in the penal sum

of [_____] Dollars (\$[_____]) good and lawful money of the United States of America for the payment whereof, well and truly to be paid to the Obligee, bind ourselves, our heirs, successors, executors, administrators, and assigns, jointly and severally, firmly by these presents. [Any reference to the “Surety” in this Bond shall be read as a reference to the Co-Sureties and each of them on the basis of such joint and several liability.]

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

If the Principal shall, in all things stand to and abide by and well and truly keep, perform and complete all covenants, conditions, agreements, and obligations under the Contract, including any and all amendments, supplements, and alterations made to the Contract as therein provided, on the Principal's part to be kept and performed at the time and in the manner therein specified, if the Principal shall indemnify and save harmless the Obligee, its directors, officers, employees and agents, as therein stipulated, and if the Principal shall reimburse upon demand of the Obligee any sums paid the Principal that exceed the final payment determined to be due upon completion of the Work (as defined in the Contract), then these presents shall become null and void; otherwise, they shall remain in full force and effect unconditionally, irrevocably and shall be non-cancellable.

The following terms and conditions shall apply with respect to this Bond:

1. The provisions of the Contract are deemed a part hereof as if said Contract were fully set forth herein. Capitalized terms not separately defined herein have the meanings assigned such terms in the Contract.

2. This Bond specifically guarantees the performance of each and every obligation of Principal related to the Work under the Contract, as they may be amended and supplemented, including, but not limited to, its liability for liquidated damages as specified in the Contract, but not to exceed the penal sum of this Bond.

3. The guarantees contained herein shall survive Final Completion (as defined in the Contract) of the Work called for in the Contract with respect to those obligations of Principal which survive Final Completion.

4. Whenever Principal shall be, and is declared by the Obligee to be, in default under the Contract, Surety shall promptly:

- a) with the consent of the Obligee, arrange for the Principal to perform and complete the Contract;
- b) complete the Work in accordance with the terms and conditions of the Contract, through its agents or through independent contractors; or
- c) obtain bids or negotiated proposals from qualified contractors acceptable to the Obligee for a contract for performance and completion of the Work, through a procurement process approved by the Obligee, arrange for a contract to be prepared for execution by Obligee and the contractor selected with the Obligee's

concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to the Obligee the amount of damages as described in Paragraph 6 of this Bond in excess of the unpaid balance of the Contract Price (as defined in the Contract) incurred by the Obligee resulting from the Principal's default; or

- d) waive its right to perform and complete, arrange for completion, or obtain a new contractor and, with reasonable promptness under the circumstances, pay the penal sum of the Bond to the Owner within 30 days of such waiver.

5. If Surety does not proceed as provided in Paragraph 4 of this Bond within 30 days of Surety's receipt of notice that the Principal has been declared to be in default by the Obligee, Surety shall be deemed to be in default on this Bond fifteen (15) days after receipt of an additional written notice from the Obligee to Surety demanding that Surety perform its obligations under this Bond, and such Obligee shall be entitled to enforce any remedy available to the Obligee.

6. If Surety elects to act under Subparagraph 4.a, 4.b, or 4.c above, then the responsibilities of Surety to the Obligee shall not be greater than those of the Principal under the Contract, and the responsibilities of the Obligee to Surety shall not be greater than those of Obligee under the Contract. To the limit of the penal sum of this Bond, but subject to commitment of the unpaid balance of the Contract Price, Surety is obligated without duplication for:

- a) the responsibilities of the Principal for correction of defective work and completion of the Work;
- b) additional legal, design, engineering, professional and delay costs resulting from Principal's default, and resulting from the actions or failure to act of Surety under Paragraph 4 of this Bond; and
- c) Liquidated damages and any other sums due and owing under the Contract.

7. No alteration, modification, or supplement to the Contract or the nature of the work to be performed thereunder, including without limitation any extension of time for performance, shall in any way affect the obligations of Surety under this Bond. Surety hereby waives notice of any such alteration, modification, or supplement, including changes in time, to the Contract.

8. Correspondence or claims relating to this Bond shall be sent to Surety at the following address: [_____]

9. No right of action shall accrue on this Bond to or for the use of any entity other than the Obligee or its successors and assigns.

10. [If multiple or co-sureties] The Co-Sureties agree to empower a single representative with authority to act on behalf of all of the Co-Sureties with respect to this Bond, so that the Obligee

will have no obligation to deal with multiple sureties hereunder. All correspondence from the Obligee to the Co-Sureties and all claims under this Bond shall be sent to such designated representative. The designated representative may be changed only by delivery of written notice (by personal delivery or by certified mail, return receipt requested) to the Obligee designating a single new representative, signed by all of the Co-Sureties. The initial representative shall be [____], whose contact information is [_____].

11. If any provision of this Bond is found to be unenforceable as a matter of law, all other provisions shall remain in full force and effect.

12. This Bond shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, without regard for conflicts of laws principles, and any action seeking enforcement of the Bond will be litigated exclusively in the courts of the Commonwealth of Virginia.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this at [_____] on this [_____] day of [_____], 20[____].

PRINCIPAL (full legal name):

Address:

By: _____

Title:

Contact Name:

Phone: ()

SURETY (full legal name)

Address:

By: _____

Title:

Contact Name:

Phone: ()

[Note: If more than one surety, then add appropriate number of lines to signature block.]

[Note: A copy of a certificate that the Surety (or Co-Sureties) is (are) authorized to transact business in Virginia must be attached.]

[Note: The Bond shall be signed by authorized persons. Where such persons are signing in a representative capacity (e.g., an attorney-in-fact), but are not a members of the firm, partnership, or joint venture, or an officer of the legal entity involved, evidence of authority including the appropriate power of attorney documentation must be attached.]

EXHIBIT [__]
FORM OF MULTIPLE OBLIGEE RIDER
(Performance Bond)

MULTIPLE OBLIGEE RIDER
(PERFORMANCE BOND)

This Multiple Obligee Rider (this “Rider”) is executed concurrently with and shall be attached to and form a part of Performance Bond No. [●] (hereinafter referred to as the “Performance Bond”).

WHEREAS, [●], a [●] (hereinafter called the “Principal”) entered into a written agreement bearing the date of [●], 20[●] (hereinafter called the “Contract”) with 95 Express Lanes LLC (hereinafter called the “Primary Obligee”) for the performance of design and construction work for the Opitz Project; and

WHEREAS, the Primary Obligee requires under the Contract that Contractor provide a performance bond and that the Commonwealth of Virginia Department of Transportation, a state agency of the Commonwealth of Virginia (“VDOT”) and (ii) [●], and collectively with VDOT, the “Additional Obligees”) be named as additional obligee(s) under the performance bond; and

WHEREAS, Principal and [●], a [●] duly organized and existing under and by virtue of the laws of the State of [●] and authorized to transact business as a surety within the Commonwealth of Virginia (the “Surety”) [and [●], and collectively, the “Co-Sureties”) have agreed to execute and deliver this Rider concurrently with the issuance of the Performance Bond, upon the conditions herein stated.

NOW, THEREFORE, the undersigned hereby agree and stipulate as follows:

1. The Additional Obligees are hereby added to the Performance Bond as named obligee(s).
2. The aggregate liability of the Surety (or Co-Sureties) under the Performance Bond to any or all of the Primary Obligee and the Additional Obligees, as their respective interests may appear, is limited to the penal sum of the Performance Bond, the Additional Obligees’ rights hereunder are subject to the same defenses Principal and/or Surety have against the Primary Obligee, and the total liability of the Surety shall in no event exceed the amount recoverable from the Principal by the Primary Obligee under the Contract.
3. The Surety shall not be liable under the Bond to the Primary Obligee, the Additional Obligees, or any of them, unless the Primary Obligee, the Additional Obligees, or any of them, shall make payments to the Principal (or in the case the Surety arranges for completion of the Contract, to the Surety) strictly in accordance with the terms of said Contract as to payments and shall perform all other obligations to be performed under said Contract at the time and in the manner therein set forth, as said Contract may be amended or modified from time to time.

4. The Surety may, at its option, make any payments under the Bond by check issued jointly to all of the obligees and delivered to VDOT at [address/wire instructions TBD].

5. An Additional Obligee may enforce the Performance Bond if such Additional Obligee has provided to the Surety written certification that such Additional Obligee has the right to enforce the Performance Bond under its direct agreement(s) between or among the Primary Obligee and Additional Obligees.

The Principal and the Surety (and Co-Sureties) have caused these presents to be duly signed and sealed this ____ day of _____, 20__.

PRINCIPAL (full legal name):

Address:

By: _____

Title:

Contact Name:

Phone: ()

SURETY (full legal name):

Address:

By: _____

Title:

Contact Name:

Phone: ()

[Note: Date of this Rider must be the same as the date of the Bond.]

[Note: If more than one surety, then add appropriate number of lines to signature block.]

EXHIBIT M

REQUIREMENTS FOR SERVICE COMMENCEMENT

Contractor will achieve Service Commencement when the conditions set forth in this exhibit have been satisfied (or Concessionaire, in its sole discretion, waives any such condition) and Concessionaire has delivered notice to that effect to Contractor in the form of the Service Commencement Certificate.

1. Contractor has provided a full and complete Notice of Service Commencement in accordance with the requirements in Section 5.2(a) of the Contract and this exhibit. Any such Notices shall include evidence that: a) all Construction Documentation has been approved by Concessionaire, b) all Work necessary for Service Commencement is complete or will be completed by the date(s) specified in the Notice, and c) that the conditions set forth in Subsections 2(a)–2(n) below have been achieved or will be achieved by the date(s) specified in the Notice. Any Work remaining at the time any such Notice is provided shall be specifically identified by type and location. Each Notice shall also include Contractor’s proposed Punch List for items to be completed following Service Commencement but prior to Final Completion.
2. Contractor has demonstrated and certified to Concessionaire in writing that the conditions set forth in subsections below meet the requirements of the Contract and have been satisfied for the Work as of the date of Contractor’s final Notice of Service Commencement.
 - a. Contractor has completed the Work in accordance with the Contract, such that the Work is in a physical condition that it can be used for normal and safe vehicular travel in all lanes and at all points of entry and exit, subject only to Punch List items;
 - b. all lanes of traffic (including ramps, interchanges, overpasses, underpasses, and other crossings) have been provided in accordance with the Contract and are in their final configuration and ready to be open to traffic;
 - c. all major safety features including, as required, shoulders, guard rails, striping and delineations, concrete traffic barriers, bridge railings, cable safety systems, metal beam guard fences, safety end treatments, terminal anchor sections and crash attenuators are installed and functional in accordance with the Contract;
 - d. all required illumination for normal and safe use and operation is installed and functional in accordance with the Contract;
 - e. all required signs and signals for normal and safe use and operation are installed and functional in accordance with the Contract;
 - f. the Traffic Management System equipment and safety features for TMS components are installed and functional in accordance with the Contract;

- g. the Contractor has completed the Level A and B Testing described in Exhibit B-4 of the Contract, and the TMS system is fully functional and ready for normal operations, having passed all demonstration and performance testing in accordance with the Contract requirements;
 - h. the need for temporary traffic controls or for lane closures at any time has ceased (except for any then required for routine maintenance, and except for temporary lane closures in accordance with and as permitted by a Concessionaire approved traffic management plan solely in order to complete Punch List items);
 - i. Contractor has provided to Concessionaire the training required to have been provided prior to Service Commencement, if any, as required by the Contract;
 - j. Contractor has received and delivered to Concessionaire copies of all Governmental Approvals necessary to construct and operate the Project and has satisfied all conditions and requirements thereof which must be satisfied before the Project can be lawfully opened for regular public use; that all such Governmental Approvals remain in full force and effect, and there exists no uncured material violation of the terms and conditions of any such Governmental Approval;
 - k. Any agreements between Contractor and third parties necessary to construct and operate the Project have been delivered to Concessionaire and remain in full force and effect, or have been terminated pursuant to the terms of the respective agreements;
 - l. Contractor has paid or caused to be paid to Concessionaire all amounts due and payable from Contractor to Concessionaire, including, but not limited to, lane closure penalties, in connection with this Construction Contract, including any applicable interest thereon (except such amounts subject to dispute in accordance with the dispute resolution procedures).
3. Concessionaire's determination that Contractor has satisfied the conditions precedent for achieving Service Commencement and issuance of the Service Commencement Certificate will be subject in all respects to compliance with the submittal and review procedures set forth in the Contract Documents.
4. Concessionaire's issuance of the Service Commencement Certificate will not constitute a waiver by Concessionaire of any then-existing breach of this Construction Contract by Contractor.
5. Service Commencement for Contractor will be achieved when Concessionaire determines based on Contractor's Notice(s) of Service Commencement and associated supporting documentation and Concessionaire's verification thereof, including VDOT approval, that the necessary conditions precedent have been satisfied. Concessionaire will then issue the Service Commencement Certificate and the date of the Service Commencement Certificate shall be the Service Commencement Date. Concessionaire will provide with its Service Commencement Certificate a list of any conditions associated with such approval (if required) and a Punch List of items to be completed to achieve Final Completion.

EXHIBIT N

REQUIREMENTS FOR FINAL COMPLETION

Contractor will achieve Final Completion when the conditions set forth in this exhibit have been satisfied (or Concessionaire, in its sole discretion, waives any such condition) and Concessionaire has delivered notice to that effect to Contractor in the form of the Final Completion Certificate.

1. Contractor has provided a full and complete Notices of Final Completion in accordance with the requirements in Section 5.2 (b) of the Contract and this exhibit. Any such Notice shall include evidence that the conditions set forth in Subsections 2(a)–2(h) below have been achieved or will be achieved by the date(s) specified in the Notice. Any Work remaining at the time any such Notice is provided shall be specifically identified by type and location.
2. Contractor has demonstrated and certified to Concessionaire in writing that the conditions set forth in subsections below meet the requirements of the Contract and have been satisfied for the Work as of the date of Contractor’s final Notice of Final Completion issued pursuant to Section 5.2 (b) of the Contract.
 - a. all the Work is complete;
 - b. all Punch List items related to the Work, including those identified in the Service Commencement Certificate issued by Concessionaire and any additional items subsequently added to the Punch List, have been completed and delivered to the satisfaction of Concessionaire;
 - c. all As-built documents, in accordance with Exhibit B-1, Section 3.18, have been submitted by Contractor and accepted or approved (to the extent approval is required) by Concessionaire;
 - d. all work that Contractor is obligated to perform for or on behalf of third parties has been accepted by such third parties;
 - e. Contractor has made all deliveries of all Work Product to Concessionaire required pursuant to the Contract.
 - f. Contractor has paid for all Work and required to achieve Final Completion by third parties that Contractor is obligated to pay (other than disputed amounts and amounts that are not yet due and payable); and
 - g. the Work is free and clear of all Liens, claims, security interests or encumbrances arising out of or in connection with the performance of the Work during the Construction Period;
3. Concessionaire’s determination that Contractor has satisfied the conditions precedent for achieving Final Completion and issuance of the Final Completion Certificate will be subject

in all respects to compliance with the submittal and review procedures set forth in the Contract.

4. Concessionaire's issuance of the Final Completion Certificate will not constitute a waiver by Concessionaire of any then-existing breach of the Contract by Contractor.
5. Final Completion for Contractor will be achieved when Concessionaire determines based on Contractor's Notice(s) of Final Completion and associated supporting documentation and Concessionaire's verification thereof, including VDOT approval, that the necessary conditions precedent have been satisfied. Concessionaire will then issue the Final Completion Certificate and the date of the Final Completion Certificate shall be the Final Completion Date.

EXHIBIT O

INITIAL BASELINE SCHEDULE

EXHIBIT O - INITIAL BASELINE SCHEDULE		THE 95 EXPRESS LANES OPITZ BOULEVARD PROJECT					SHIRLEY CONTRACTING COMPANY, LLC		07-28-22																															
Activity ID	Activity Name	Budgeted Total Cost	Dur	Start	Finish	Total Float	2022		2023					2024					2025																					
							J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
EXHIBIT O - INITIAL BASELINE SCHEDULE							\$59,127,675.84	595	05-31-22	10-13-24	0	10-13-24, EXHIBIT																												
OPTIZ BLVD - I-95 EXPRESS LANES							\$59,127,675.84	595	05-31-22	10-13-24	0	10-13-24, OPTIZ																												
SCHEDULE MILESTONES							\$135,000.00	867	05-31-22	10-13-24	0	10-13-24, SCHED																												
PROJECT MILESTONES							\$135,000.00	867	05-31-22	10-13-24	0	10-13-24, PROJE																												
MS-1000	ANTICIPATED NOTICE OF INTENT TO AWARD	\$0.00	0	05-31-22*		0	▶ ANTICIPATED NOTICE OF INTENT TO AWARD																																	
MS-1100	CONTRACT EXECUTION	\$0.00	76	05-31-22	08-14-22	0	■ CONTRACT EXECUTION																																	
MS-1200	NOTICE TO PROCEED	\$0.00	0	08-15-22		0	◆ NOTICE TO PROCEED																																	
MS-1250	START STAGE 1A WORK ON SLIP RAMP	\$0.00	0	11-15-22		0	◆ START STAGE 1A WORK ON SLIP RAMP																																	
MS-1300	COMPLETE CONTRACTOR MOT PLANS	\$0.00	0		11-15-22	105	◆ COMPLETE CONTRACTOR MOT PLANS																																	
MS-1350	START ITS / TMS FINAL TESTING/INTEGRATION - SLIP RAMP (LEVEL A)	\$0.00	0	06-19-23		0	◆ START ITS / TMS FINAL TESTING/INTEGRATION - SLIP RAMP (LEVEL A)																																	
MS-1400	START TMS CONTRACTOR PROGRAMMING/INTEGRATION - SLIP RAMP (LEVEL B)	\$0.00	0	08-01-23		0	◆ START TMS CONTRACTOR PROGRAMMING/INTEGRATION - SLIP																																	
MS-1450	OPEN PEDESTRIAN FACILITY ON OPITZ	\$0.00	0		07-14-23	367	◆ OPEN PEDESTRIAN FACILITY ON OPITZ																																	
MS-1500	OPEN NEW SLIP RAMP TO TRAFFIC	\$0.00	0		12-05-23	0	◆ OPEN NEW SLIP RAMP TO TRAFFIC																																	
MS-1550	START STAGE 1 WORK ON OPTIZ BLVD	\$0.00	0	11-15-22		20	◆ START STAGE 1 WORK ON OPTIZ BLVD																																	
MS-1600	START CONSTRUCTION OF REVERSIBLE T-RAMP	\$0.00	0	12-06-23		29	◆ START CONSTRUCTION OF REVERSIBLE T-RAMP																																	
MS-1650	START ITS / TMS FINAL TESTING/INTEGRATION - REVERSIBLE RAMP (LEVEL A)	\$0.00	0	02-01-24		0	◆ START ITS / TMS FINAL TESTING/INTEGRATION																																	
MS-1700	START TMS CONTRACTOR PROGRAMMING/INTEGRATION - REVERSIBLE RAMP (\$0.00	0	03-14-24		0	◆ START TMS CONTRACTOR PROGRAMM																																	
MS-1800	OPEN REVERSIBLE RAMP TO TRAFFIC	\$0.00	0		07-15-24	0	◆ OPEN REVERSIBLE RAMP																																	
MS-1900	SERVICE COMMENCEMENT DATE	\$0.00	0		07-15-24*	0	◆ SERVICE COMMENCEMEN																																	
MS-1950	COMPLETE BRIDGE WIDENING WORK	\$0.00	0		05-08-24	68	◆ COMPLETE BRIDGE WIDENING W																																	
MS-2000	FINAL INSPECTIONS / COMPLETE PUNCHLIST	\$135,000.00	90	07-16-24	10-13-24	0	■ FINAL INSPECTIO																																	
MS-2100	ADMINISTRATIVE END OF CONTRACT	\$0.00	0		10-13-24	0	◆ ADMINISTRATIVE																																	
MS-2200	FINAL COMPLETION DATE	\$0.00	0		10-13-24	0	◆ FINAL COMPLET																																	
DESIGN PHASE							\$0.00	119	05-31-22	11-15-22	67	▶ 11-15-22, DESIGN PHASE																												
CONCESSIONAIRE PLANS							\$0.00	0			0																													
CONTRACTOR PLANS							\$0.00	169	05-31-22	11-15-22	105	▶ 11-15-22, CONTRACTOR PLANS																												
DES-1000	PREPARE/SUBMIT 1ST SUBMISSION MOT PLANS	\$0.00	90	05-31-22	08-28-22	92	■ PREPARE/SUBMIT 1ST SUBMISSION MOT PLANS																																	
DES-1100	OWNER / VDOT REVIEW / COMMENT MOT PLANS	\$0.00	17	08-29-22	09-14-22	92	■ OWNER / VDOT REVIEW / COMMENT MOT PLANS																																	
DES-1200	COMMENT REPSONSES - 1ST SUBMISSION PLANS	\$0.00	20	09-15-22	10-04-22	92	■ COMMENT REPSONSES- 1ST SUBMISSION PLANS																																	
DES-1300	PREPARE SUBMIT FINAL MOT PLANS	\$0.00	25	10-05-22	10-29-22	92	■ PREPARE SUBMIT FINAL MOT PLANS																																	
DES-1400	OWNER / VDOT REVIEW / APPROVE FINAL MOT PLANS	\$0.00	17	10-30-22	11-15-22	105	■ OWNER / VDOT REVIEW / APPROVE FINAL MOT PLANS																																	
PERMITTING							\$0.00	182	05-31-22	11-28-22	92	▶ 11-28-22, PERMITTING																												
CONCESSIONAIRE PERMITTING							\$0.00	55	05-31-22	07-24-22	21	▶ 07-24-22, CONCESSIONAIRE PERMITTING																												
PRMT-1300	OWNER OBTAIN VDOT LUP - SLIP RAMP (IF REQUIRED)	\$0.00	55	05-31-22	07-24-22	21	■ OWNER OBTAIN VDOT LUP - SLIP RAMP (IF REQUIRED)																																	
CONTRACTOR PERMITTING							\$0.00	106	08-15-22	11-28-22	92	▶ 11-28-22, CONTRACTOR PERMITTING																												
PRMT-1200	CONTRACTOR OBTAIN DEQ PERMIT FOR LAND DISTURBANCE	\$0.00	60	08-15-22	10-13-22	0	■ CONTRACTOR OBTAIN DEQ PERMIT FOR LAND DISTURBANCE																																	
PRMT-1400	CONTRACTOR OBTAIN PW COUNTY PERMIT (IF REQUIRED)	\$0.00	30	10-30-22	11-28-22	92	■ CONTRACTOR OBTAIN PW COUNTY PERMIT (IF REQUIRED)																																	
PRMT-1500	CONTRACTOR OBTAIN VDOT LUP - BRIDGE AND REVERSIBLE RAMP (IF REQUIRE	\$0.00	30	10-30-22	11-28-22	92	■ CONTRACTOR OBTAIN VDOT LUP - BRIDGE AND REVERSIBLE RAMP (IF REQUIRED)																																	
STAKEHOLDER / ADJACENT PROJECT COORDINATION							\$0.00	0			0																													
MATERIAL PROCUREMENT							\$4,250,000.00	337	08-15-22	07-17-23	155	▶ 07-17-23, MATERIAL PROCUREMENT																												
ITS / TMS							\$2,000,000.00	260	08-15-22	05-01-23	232	▶ 05-01-23, ITS / TMS																												
MATL-1000	SUBMIT / APPROVE SHOP DRAWINGS	\$0.00	80	08-15-22	11-02-22	42	■ SUBMIT / APPROVE SHOP DRAWINGS																																	
MATL-1100	FABRICATE DELIVER ITS / TMS FOR SLIP RAMP	\$1,000,000.00	120	11-03-22	03-02-23	42	■ FABRICATE DELIVER ITS / TMS FOR SLIP RAMP																																	
MATL-1200	FABRICATE DELIVER ITS / TMS FOR REVERSIBLE RAMP	\$1,000,000.00	120	01-02-23	05-01-23	232	■ FABRICATE DELIVER ITS / TMS FOR REVERSIBLE RAMP																																	
SIGNAGE / SIGNALS / LIGHTING							\$1,000,000.00	337	08-15-22	07-17-23	125	▶ 07-17-23, SIGNAGE / SIGNALS / LIGHTING																												
MATL-1300	SUBMIT / APPROVE SHOP DRAWINGS	\$0.00	77	08-15-22	10-30-22	0	■ SUBMIT / APPROVE SHOP DRAWINGS																																	
MATL-1400	FABRICATE DELIVER SIGN/POLE STRUCTURES FOR SLIP RAMP	\$500,000.00	200	10-31-22	05-18-23	0	■ FABRICATE DELIVER SIGN/POLE STRUCTURES FOR SLIP RAMP																																	

■ Actual Work
 ■ Critical Remaining Work
 Summary
■ Remaining Work
 ◆ Milestone

EXHIBIT O - INITIAL BASELINE SCHEDULE		THE 95 EXPRESS LANES OPITZ BOULEVARD PROJECT					SHIRLEY CONTRACTING COMPANY, LLC		07-28-22																																													
Activity ID	Activity Name	Budgeted Total Cost	Dur	Start	Finish	Total Float	2022												2023												2024												2025											
							J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M														
MATL-1500	FABRICATE DELIVER MATERIALS FOR REVERSIBLE RAMP	\$500,000.00	200	12-30-22	07-17-23	125	FABRICATE DELIVER MATERIALS FOR REVERSIBLE RAMP																																															
STRUCTURAL STEEL / PILING		\$1,250,000.00	320	08-15-22	06-30-23	172	06-30-23, STRUCTURAL STEEL / PILING																																															
MATL-1600	SUBMIT / APPROVE SHOP DRAWINGS	\$0.00	80	08-15-22	11-02-22	172	SUBMIT / APPROVE SHOP DRAWINGS																																															
MATL-1700	FABRICATE DELIVER FOUNDATION / WALL PILING	\$250,000.00	120	11-03-22	03-02-23	175	FABRICATE DELIVER FOUNDATION / WALL PILING																																															
MATL-1800	FABRICATE DELIVER STRUCTURAL STEEL	\$1,000,000.00	240	11-03-22	06-30-23	172	FABRICATE DELIVER STRUCTURAL STEEL																																															
UTILITIES		\$100,000.00	376	05-31-22	06-10-23	372	06-10-23, UTILITIES																																															
PRIVATE UTILITY RELOCATIONS		\$0.00	280	05-31-22	03-06-23	105	03-06-23, PRIVATE UTILITY RELOCATIONS																																															
UTIL-1300	FINALIZE UTILITY RELOCATION PLANS / COORDINATE WITH UTILITY OWNERS	\$0.00	120	05-31-22	09-27-22	105	FINALIZE UTILITY RELOCATION PLANS / COORDINATE WITH UTILITY OWNERS																																															
UTIL-1400	RELOCATE EXISTING THIRD PARTY UTILITIES (TBD)	\$0.00	160	09-28-22	03-06-23	105	RELOCATE EXISTING THIRD PARTY UTILITIES (TBD)																																															
NEW UTILITY SERVICES		\$100,000.00	376	05-31-22	06-10-23	372	06-10-23, NEW UTILITY SERVICES																																															
POWER		\$90,000.00	320	05-31-22	04-15-23	428	04-15-23, POWER																																															
UTIL-2000	SUBMIT LOAD LETTERS / WORK ORDERS FOR NEW POWER SERVICES	\$0.00	30	05-31-22	06-29-22	142	SUBMIT LOAD LETTERS / WORK ORDERS FOR NEW POWER SERVICES																																															
UTIL-2100	DESIGN FOR POWER FEED TO PANEL H118A	\$30,000.00	60	06-30-22	08-28-22	142	DESIGN FOR POWER FEED TO PANEL H118A																																															
UTIL-2200	POWER COMPANY INSTALL METER / POWER SERVICE TO H118A	\$0.00	150	08-29-22	01-25-23	142	POWER COMPANY INSTALL METER / POWER SERVICE TO H118A																																															
UTIL-2300	DESIGN FOR POWER FEED TO PANEL H117A	\$30,000.00	90	06-30-22	09-27-22	298	DESIGN FOR POWER FEED TO PANEL H117A																																															
UTIL-2400	POWER COMPANY INSTALL METER / POWER SERVICE TO H117A	\$0.00	150	10-08-22	03-06-23	288	POWER COMPANY INSTALL METER / POWER SERVICE TO H117A																																															
UTIL-2500	DESIGN FOR POWER FEED FOR REVERSIBLE RAMP SIGNAL	\$30,000.00	120	06-30-22	10-27-22	448	DESIGN FOR POWER FEED FOR REVERSIBLE RAMP SIGNAL																																															
UTIL-2600	POWER COMPANY INSTALL METER / POWER SERVICE TO SIGNAL	\$0.00	150	11-17-22	04-15-23	428	POWER COMPANY INSTALL METER / POWER SERVICE TO SIGNAL																																															
COMM		\$10,000.00	300	08-15-22	06-10-23	372	06-10-23, COMM																																															
UTIL-2700	COORDINATE WITH VDOT / COMM COMPANY FOR SIGNAL COMM DESIGN	\$0.00	120	08-15-22	12-12-22	372	COORDINATE WITH VDOT / COMM COMPANY FOR SIGNAL COMM DESIGN																																															
UTIL-2800	INSTALL SERVICE FOR SIGNAL COMM AT REVERSIBLE RAMP	\$10,000.00	180	12-13-22	06-10-23	372	INSTALL SERVICE FOR SIGNAL COMM AT REVERSIBLE RAMP																																															
CONSTRUCTION		\$54,642,675.84	520	08-15-22	09-11-24	22	09-11-24, CONSTRUCTION																																															
GEN-1000	MOBILIZATION / SET UP FIELD OFFICE / LAYDOWN YARDS	\$2,985,500.00	45	09-06-22	11-07-22	0	MOBILIZATION / SET UP FIELD OFFICE / LAYDOWN YARDS																																															
GEN-1100	PRELIMINARY SURVEY / RECOVER CONTROL	\$20,000.00	30	10-04-22	11-14-22	0	PRELIMINARY SURVEY / RECOVER CONTROL																																															
GEN-1200	INSTALL PRELIMINARY MOT SIGNAGE / E&S CONTROLS	\$28,010.00	5	11-08-22	11-14-22	0	INSTALL PRELIMINARY MOT SIGNAGE / E&S CONTROLS																																															
GEN-1220	CLEAR AND GRUB / INSTALL ADDITIONAL E&S CONTROLS	\$75,000.00	7	11-15-22	11-23-22	91	CLEAR AND GRUB / INSTALL ADDITIONAL E&S CONTROLS																																															
GEN-1250	EROSION AND SEDIMENT CONTROL MAINTENANCE	\$477,933.00	450	11-15-22	09-04-24	27	EROSION AND SEDIMENT CONTROL MAINTENANCE																																															
GEN-1300	CONSTRUCTION SURVEY	\$325,000.00	450	11-15-22	09-04-24	27	CONSTRUCTION SURVEY																																															
GEN-1350	DAILY MOT NEEDS AND MAINTENANCE	\$2,520,857.00	450	11-15-22	09-04-24	27	DAILY MOT NEEDS AND MAINTENANCE																																															
GEN-1400	QA-QC	\$6,000,000.00	520	08-15-22	09-11-24	22	QA-QC																																															
RELOCATION OF EXIST. SB SLIP RAMP - STAGE 1A		\$9,675,505.00	263	11-15-22	12-05-23	0	12-05-23, RELOCATION OF EXIST. SB SLIP RAMP - STAGE 1A																																															
ROADWAY / MOT		\$2,807,359.00	180	11-15-22	08-07-23	68	08-07-23, ROADWAY / MOT																																															
SLIP-2700	SHIFT LANES INSTALL STAGE 1A MOT	\$84,029.00	15	11-15-22	12-07-22	0	SHIFT LANES INSTALL STAGE 1A MOT																																															
SLIP-2800	DEMO EXISTING ELEMENTS	\$95,759.00	15	12-08-22	01-05-23	0	DEMO EXISTING ELEMENTS																																															
SLIP-2900	INSTALL PERMANENT DRAINAGE - PH. 1	\$264,170.00	20	01-06-23	02-02-23	0	INSTALL PERMANENT DRAINAGE - PH. 1																																															
SLIP-3000	CUT / FILL ROUGH FINISH GRADE - PH. 1	\$95,759.00	15	02-03-23	02-23-23	5	CUT / FILL ROUGH FINISH GRADE - PH. 1																																															
SLIP-3100	INSTALL PERMANENT DRAINAGE - PH. 2	\$250,267.00	20	02-03-23	03-02-23	0	INSTALL PERMANENT DRAINAGE - PH. 2																																															
SLIP-3200	CUT / FILL ROUGH FINISH GRADE - PH. 2	\$127,679.00	20	03-03-23	03-30-23	0	CUT / FILL ROUGH FINISH GRADE - PH. 2																																															
SLIP-3300	PLACE SUB-BASE AGGREGATE	\$429,102.00	15	03-31-23	04-20-23	0	PLACE SUB-BASE AGGREGATE																																															
SLIP-3400	INSTALL UNDERDRAIN / ADJUST STRUCTURES TO GRADE	\$143,034.00	5	04-21-23	04-27-23	0	INSTALL UNDERDRAIN / ADJUST STRUCTURES TO GRADE																																															
SLIP-3450	FPS BARRIER WALL FOOTINGS	\$146,034.00	8	04-21-23	05-02-23	0	FPS BARRIER WALL FOOTINGS																																															
SLIP-3500	PAVEMENT SECTION	\$429,102.00	15	04-28-23	05-18-23	0	PAVEMENT SECTION																																															
SLIP-3600	BARRIER WALL / GUARDRAIL	\$456,356.00	25	05-19-23	06-23-23	73	BARRIER WALL / GUARDRAIL																																															
SLIP-3800	COMPLETE ROADWAY WORK AT OH SIGN FOUNDATION	\$286,068.00	10	07-25-23	08-07-23	68	COMPLETE ROADWAY WORK AT OH SIGN FOUNDATION																																															
ITS / TMS / LIGHTING		\$4,271,604.00	243	12-08-22	11-28-23	0	11-28-23, ITS / TMS / LIGHTING																																															
SLIP-1000	REMOVE EXISTING POLES AND EQUIPMENT	\$145,348.00	10	12-08-22	12-21-22	5	REMOVE EXISTING POLES AND EQUIPMENT																																															
SLIP-1400	INSTALL NEW LIGHT POLE FOUNDATIONS	\$218,022.00	15	02-24-23	03-16-23	15	INSTALL NEW LIGHT POLE FOUNDATIONS																																															
SLIP-1700	INSTALL LIGHTING CONDUIT / JB	\$218,022.00	15	03-17-23	04-06-23	15	INSTALL LIGHTING CONDUIT / JB																																															

█ Actual Work
 █ Critical Remaining Work
 Summary
█ Remaining Work
 ◆ Milestone

Monthly Payment Schedule and Cash Curve

Monthly Payment Schedule

Period Ending (Month)	Projected Monthly Total:	Projected Cumulative Total:
September 2022	\$ 1,579,886	\$ 1,579,886
October 2022	\$ 1,849,159	\$ 3,429,045
November 2022	\$ 1,072,060	\$ 4,501,105
December 2022	\$ 1,764,570	\$ 6,265,674
January 2023	\$ 3,884,786	\$ 10,150,460
February 2023	\$ 3,767,429	\$ 13,917,889
March 2023	\$ 2,465,257	\$ 16,383,147
April 2023	\$ 1,902,693	\$ 18,285,840
May 2023	\$ 4,029,892	\$ 22,315,732
June 2023	\$ 3,552,054	\$ 25,867,786
July 2023	\$ 3,865,526	\$ 29,733,312
August 2023	\$ 3,204,136	\$ 32,937,448
September 2023	\$ 2,935,529	\$ 35,872,977
October 2023	\$ 1,920,389	\$ 37,793,366
November 2023	\$ 1,805,221	\$ 39,598,587
December 2023	\$ 2,017,137	\$ 41,615,724
January 2024	\$ 1,550,779	\$ 43,166,503
February 2024	\$ 2,729,302	\$ 45,895,805
March 2024	\$ 2,720,752	\$ 48,616,557
April 2024	\$ 2,021,123	\$ 50,637,680
May 2024	\$ 2,310,147	\$ 52,947,827
June 2024	\$ 2,670,330	\$ 55,618,157
July 2024	\$ 1,921,350	\$ 57,539,507
August 2024	\$ 819,759	\$ 58,359,265
September 2024	\$ 447,958	\$ 58,807,223
October 2024	\$ 320,453	\$ 59,127,676
	\$ 59,127,675.84	

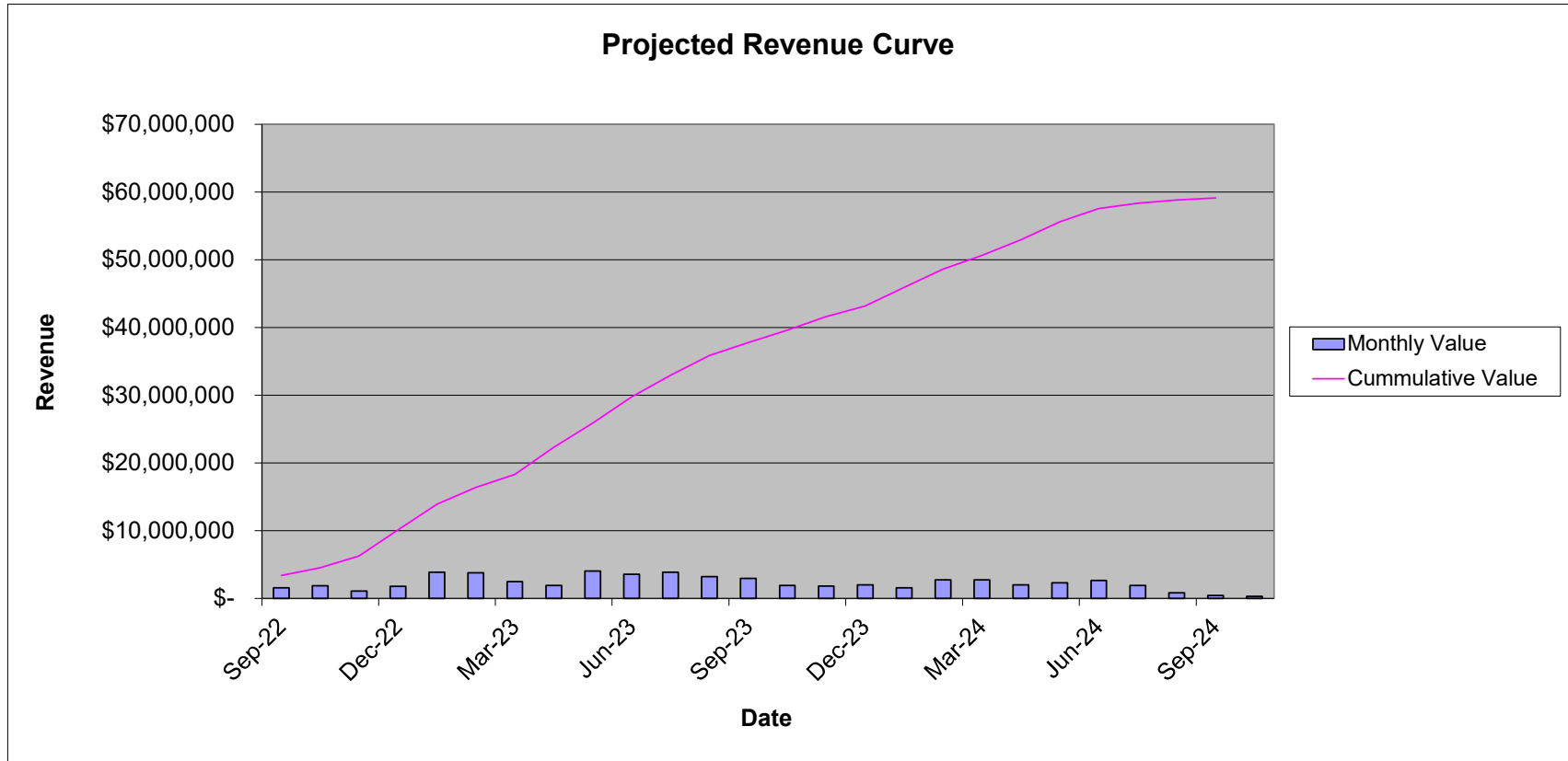


EXHIBIT Q

INSURANCE REQUIREMENTS

1. Definitions

Unless the context otherwise requires, capitalized terms and acronyms used in this Exhibit Q have the meanings set forth below and/or given in Exhibit A thereto.

Contractor and Subcontractor Required Coverages - The insurance coverages that Contractor and Subcontractors are required to provide at their own expense in compliance with the Contract.

Eligible Parties - Contractor and Subcontractors performing labor or services at the OCIP Project Site are eligible to be enrolled in the OCIP. Entities that perform installation for suppliers, temporary labor services, and leasing companies providing direct labor are also considered Eligible Parties. Concessionaire reserves the right to enroll or exclude any party at its sole discretion.

Enrolled Parties - Contractor and Subcontractors who have been awarded Work, and other parties who have met the OCIP enrollment requirements, and have received an OCIP certificate of insurance for the Project from the OCIP administrator.

Excluded Operations - Operations conducted away from the OCIP Project Site, as well as certain on-site activities including transport, pickup, delivery, or loading or unloading of materials, personnel, parts or equipment or any other items or persons to or from the OCIP Project Site by parties who do not otherwise work at the OCIP Project Site.

Excluded Parties – Subcontractors, vendors or suppliers specified in Section 3(b) who shall not be enrolled in the OCIP or covered by the OCIP policies.

Noncompliance – Contractor who fails to enroll any of its Eligible Parties of any tier or fails to obtain pricing net of insurance costs will be responsible for any resulting insurance charges to the Project.

Owner Controlled Insurance Program (OCIP) - A coordinated master insurance, safety and claim management program, under which Commercial General Liability and Excess Liability, are procured or provided on a project basis for Enrolled Parties for losses arising out of covered operations and completed operations at the OCIP Project Site.

OCIP Project Site - The premises where Work will be located, as more specifically described in the Contract. OCIP Project Site shall also mean any additional areas designated in writing by Concessionaire as required for performance of the Work. Subject to the notification and other requirements for off-site locations, the term “Site” shall also include (a) locations used for bonded storage of material for the Project approved by Concessionaire, and areas where activities incidental to the Project are being performed by Subcontractors covered by the General Liability policy included in the OCIP, but excluding any permanent locations of any covered contractor.

2. Contractors' and Subcontractor Responsibilities

Contractor and Subcontractors (all tiers that perform Work on the OCIP Project Site) are required to cooperate with Concessionaire, the OCIP administrator, and the OCIP insurance carrier(s) in all aspects of the OCIP operation and administration. Contractor's responsibilities include:

- (a) Including OCIP contract provisions and requirements in all tiered Subcontracts; every contractor is required to incorporate the OCIP Insurance provisions into their tiered subcontract(s).
- (b) Assisting in securing the required OCIP enrollment and/or payroll/premium information from their tiered contractors.
- (c) Notifying OCIP administrator of all Subcontracts awarded by completing the Notice of Subcontract Award on the MWrap Contractor Portal. (Instructions for MWrap are provided in the OCIP manual).
- (d) Attending all meetings, as required.
- (e) Maintaining and reporting payroll, receipts, labor-hours, or payments made to contractors as required by the OCIP.
- (f) Notifying Concessionaire and the OCIP administrator immediately of any insurance cancellation or non-renewal for Contractor and Subcontractor Required Coverages.
- (g) Completing and submitting to Contractor and OCIP administrator the following administrative forms within the time frames specified below:
 - 1. Notice of Subcontract Award, via MWrap Contractor Portal – Upon execution of tiered Subcontract and prior to starting Work on the OCIP Project Site.
 - 2. Insurance Safety and Claims Forms.
- (h) Enrolled Parties must complete a "Notice of Work Completion" using the MWrap Contractor Portal for each contract that has been completed on the OCIP Project Site. Once submitted the OCIP administrator will be notified and seek verification from the awarded contractor that the information submitted by Contractor and Subcontractors is correct and will request "final" contract value.
- (i) Contractor and Subcontractors of all tiers are responsible for insurance covering their property including rented, owned, leased or borrowed equipment and tools, and are responsible for reporting property damage claims to such property to their own insurance carrier.
- (j) For all OCIP Project Site third-party property damage claims under \$25,000, Contractor is responsible for administration, investigation and processing of these claims. These claims will not go through the OCIP. The Contractor shall also make payments to claimants at its reasonable discretion and after performing requisite and customary due diligence. For the avoidance of doubt, the Contractor shall not administer personal injury

claims. The Contractor will provide copies of all investigation and settlement documents to Concessionaire upon request.

1. In the event the Contractor makes payment to a claimant for a claim, Contractor may invoice Concessionaire for reimbursement of the payment amount(s) made to claimants. This invoicing will be separate and apart from the monthly payment application under the Contract and will be in a form agreed by the parties. Invoices may be submitted monthly; however, no monthly invoice shall be submitted for less than \$2,500. If reimbursements are due, invoices must be submitted no less than quarterly, regardless of amount.
 2. At its discretion, Concessionaire may assess up to \$25,000 per incident against Contractor and/or Subcontractors to cover the claim amount for any third-party property damage on the OCIP Project Site. Any assessment may be deducted from the aforementioned invoice(s). This discretionary assessment is not intended to be punitive but rather to encourage proactive, safe actions on the part of Contractor and its Subcontractors.
- (k) These requirements are applicable to Contractor and all tiers of Subcontractors that perform Work on the OCIP Project Site.
- (l) Certificates of insurance will be issued to each Enrolled Party by the OCIP administrator evidencing Commercial General Liability and Excess Liability coverages.

3. General Liability Owner Controlled Insurance Program

Concessionaire will provide an Owner Controlled Insurance Program (OCIP) for the Project. Contractor and all Subcontractors of every tier are required to participate as described below and in accordance with the Project's OCIP manual. Contractor agrees to be bound by the terms and conditions of the OCIP Policies and will require the same of all Subcontractors of every tier.

- (a) **Owner Controlled Insurance Program and Covered Entities** – Concessionaire will procure a General Liability Owner Controlled Insurance Program (OCIP) that will provide coverage for VDOT, Concessionaire, Contractor, and the eligible Subcontractors on the Project. Contractor and its contracting parties shall enroll in the Owner Controlled Insurance Program (OCIP). Participation in the OCIP Program is subject to several Contractor responsibilities' under the terms of the Contract. If Contractor or its contracting parties do not enroll in the OCIP Program before commencing work Contractor shall be in Noncompliance. Worker's Compensation and Employer's Liability, Automobile Liability, and Excess Liability for the Automobile Liability and Worker's Compensation and Employer's Liability coverages will continue to be the responsibility of Contractor and each Subcontractor to procure to provide coverage for its interests. Each enrolled party will be required to provide its own insurance for losses arising out of Excluded Operations, and will be required to report such claims to its own insurance carriers.
- (b) **Excluded Parties** – Vendors, suppliers, material dealers and others who solely furnish, transport, pick up, deliver, or carry materials, personnel, parts or equipment to or from

the OCIP Project Site will not be Enrolled Parties to the OCIP. The OCIP will not cover losses arising out of operations conducted away from the OCIP Project Site, nor will it cover certain on-site activities including transport, pickup, delivery, or loading or unloading of materials, personnel, parts or equipment or any other items or persons to or from the OCIP Project Site; by parties who do not otherwise work at the OCIP Project Site. Companies described below are not intended to be enrolled in the OCIP and will be enrolled in the OCIP only at Concessionaire's discretion:

1. Hazardous materials remediation, removal and/or transport companies and their consultants
 2. Any Subcontractor performing Structural Demolition (Structural Demolition is the moving or relocating of load bearing beams, columns, or walls)
 3. Architects, engineers, and soil testing engineers, and their consultants
 4. Vendors, suppliers, fabricators, material dealers, truckers, haulers, drivers and others who merely transport, pickup, deliver, or carry materials, personnel, parts or equipment or any other items or persons to or from the OCIP Project Site. However, if the parties have a Subcontractor who performs work at the OCIP Project Site they and their Subcontractor may be considered an eligible party
 5. Subcontractors, and any of their respective tiered Subcontractors, who do not perform any actual labor on the OCIP Project Site
 6. Building implosion Subcontractors including Subcontractors involved with blasting or the use of explosives.
- (c) **OCIP Coverage Amounts** – The OCIP coverages will be set forth in full in the respective policy forms, and the following description of such coverage is not intended to be all-inclusive, nor alter or amend any provision of the actual policies. In matters, if any, in which the said description may be conflicting with the actual policy language, the provisions of the insurance policies shall govern. Subject to the exclusions, limitations, terms and conditions of the policies, OCIP coverage shall be as follows:
1. **Commercial General Liability Insurance** in an “occurrence” form, with annual limits for all insureds combined of \$1,000,000 each occurrence limit; \$2,000,000 general aggregate limit and \$2,000,000 products/completed operations aggregate limit. A separate single limit shall apply to the entire five (5) year term beyond the expiration or cancellation date of the policy for the “completed operations extension” for all insureds combined as follows: \$1,000,000 each occurrence limit and \$2,000,000 Products-Completed Operations Aggregate Limit. Coverage shall apply to bodily injury and property damage for operations (including explosion, collapse and underground coverage), elevators, independent contractors, contractual liability for “insured contracts” and covered personal and advertising injury liability offenses.
 2. **Excess Liability Insurance** in an occurrence form such that the total shared annual limits for all insureds combined, including the completed operations

extension, shall not be less than \$50,000,000 each occurrence and \$50,000,000 annual aggregate limit.

3. The OCIP Policy includes the following terms:

- Products Completed Operations Extension for five (5) years or the Statute of Repose, whichever is less, after substantial completion of the Project.
- General Aggregate Limit reinstates annually.
- Products/Completed Operations Aggregate Limit applies once to entire completed operations term.
- Limits are shared among all Enrolled Parties.

4. Builder's Risk

Concessionaire shall obtain, pay for and maintain, from the Contract Execution Date until Final Completion of the Work, Builder's Risk insurance for the Project. The Builder's Risk insurance shall be on an "all risk" form (or equivalent policy) and shall include insurance against the perils of fire (with extended coverage) and physical loss or damage including, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, and excavation collapse, but not including insurance for the machinery, tools, or equipment used by Contractor in the performance of the Work, or coverage for underground/subsurface structures and conditions. Concessionaire shall add Contractor and its Subcontractors as additional insureds on the Builder's Risk Insurance policy.

Concessionaire shall include a waiver of subrogation against Contractor and its Subcontractors in the Builder's Risk Insurance policy. No limitations or requirements are imposed on Concessionaire with respect to the amount of the deductible(s) under the Builder's Risk Insurance policy. Contractor shall be responsible to pay, or otherwise satisfy, the deductible portion of any loss, claim or occurrence under the Builder's Risk Insurance policy that arises out of, or relates to, any act, omission, fault, default or negligence of Contractor or Contractor's employees, agents, Representatives, Subcontractors, or any other Person performing a portion of the Work by, through or under Contractor or Contractor's failure to fully and correctly perform its obligations under the Contract; provided, however, that Contractor's obligation to pay, or satisfy, the deductible portion of a loss, claim or occurrence under the Builder's Risk insurance policy shall not exceed Fifty Thousand Dollars (\$50,000) per deductible, per loss, claim or occurrence.

Contractor shall, at all times, comply with the terms of the Builder's Risk Insurance policy. In addition, Contractor shall be responsible for any losses, claims, damages, costs and expenses are not indemnified under the Builder's Risk Insurance policy due to Contractor's failure to perform its obligations under the Builder's Risk Insurance policy.

All insurance proceeds received by Concessionaire for any insured loss under the Builder's Risk Insurance Policy shall be paid into a separate insurance proceeds account and shall be held in trust for the purposes of distribution to Contractor and/or its Subcontractors, as applicable, as if they

were otherwise named as loss payees on the Builder’s Risk Insurance Policy, and in accordance with the Contract.

5. Contractor’s Pollution Liability Policy

Concessionaire shall obtain, pay for and maintain, from the Contract Execution Date until Final Completion, Contractor’s Pollution Liability insurance for the Project with limits not less than \$10,000,000 per Occurrence and in the aggregate. Concessionaire shall add Contractor and its Subcontractors as additional insureds on the policy, on a primary and non-contributory basis.

6. Contractor Required Coverage Amounts

Contractor shall provide the following coverages and file certificates of insurance with Concessionaire evidencing the coverages and limits below. The Employers Liability, Commercial General Liability and Commercial Automobile Liability limit requirement may be met by primary coverage or combination of primary and Umbrella/Excess Liability limits.

- (a) **Workers’ Compensation and Employer’s Liability Insurance**, with statutory workers’ compensation (Coverage A) limits and employer’s liability (Coverage B) limits of \$1,000,000 for each accident, \$1,000,000 for each employee, with a \$2,000,000 policy limit. If necessary, coverage shall be extended to cover any claims under the United States Longshoreman’s Act and Harbor Workers Act and Jones’ Act as may be appropriate for the Work.
- (b) **Automobile Liability Insurance**, with a limit of at least \$1,000,000 combined single limit for bodily injury and property damage covering all owned (if any), non-owned, hired or borrowed vehicles on-site or off.
- (c) **Commercial General Liability Insurance** for Excluded Operations with limits not less than:

Each Occurrence	\$1,000,000
General Aggregate	\$2,000,000
Products – Completed/ Operations Aggregate	\$2,000,000
Personal & Advertising Injury	\$1,000,000
Damage to Rented Premises (Each Occurrence)	\$50,000
Medical Expense Limit (any One Person)	\$5,000

- ISO Occurrence Form (CG 00 01 12/04) or equivalent
- Name 95 Express Lanes LLC, its parent, owners, subsidiaries and affiliate companies, their officers, agents, managers, employees, directors, Subcontractors, joint owners, VDOT, and Contractor as “Additional Insureds” on a primary and noncontributory basis, including both premises-operations coverage and products/completed operations coverage utilizing endorsements CG 2010 11/85 or equivalent ISO additional insured endorsements.
- Products/Completed Operations for five (5) years after substantial completion or the Statute of Repose, whichever is less.

- The Commercial General Liability Policy (General Aggregate) shall be endorsed to include CG-25-03 – Aggregate Limits of Insurance (per Project), or its equivalent.
- (d) **Umbrella/Excess Liability Insurance** in excess of the underlying limits noted above in Sections 6(a) and 6(b) for Employer’s Liability and Automobile Liability in the amount of: (a) \$50,000,000 per occurrence and \$50,000,000 in the annual aggregate.
- (e) **Architects/Engineers Professional Liability Insurance**, covering Contractor’s lead design engineer for acts, errors or omissions arising in connection with the Work for not less than: \$5,000,000 for any one claim and \$5,000,000 in the aggregate. Such insurance shall be maintained throughout the duration of any warranty period and for at least three years after the expiration of any warranty period. The policy coverage shall provide at least five (5) years of extended reporting. The retroactive date must coincide with or precede the first day that professional services are performed.

7. Subcontractor Required Coverage Amounts

Contractor shall file certificates of insurance with Concessionaire evidencing the coverages and limits below for all Subcontractors:

- (a) **Workers’ Compensation and Employer’s Liability Insurance**, with statutory workers’ compensation (Coverage A) limits and employer’s liability (Coverage B) limits of \$1,000,000 bodily injury by accident, each accident, and \$1,000,000 bodily injury by disease, each employee. Coverage will be extended, if needed, to cover any claims under the United States Longshore and Harbor Workers’ Compensation Act (33 U.S.C. §901 - §950) and the Jones Act (46 U.S.C. §30104).
- (b) **Commercial General Liability Insurance** for Excluded Operations with limits not less than:

Each Occurrence	\$1,000,000
General Aggregate	\$2,000,000
Products – Completed/Operations Aggregate	\$2,000,000
Personal & Advertising Injury	\$1,000,000
Damage to Rented Premises (Each Occurrence)	\$50,000
Medical Expense Limit (any One Person)	\$5,000

- ISO Occurrence Form (CG 0001 12/04) or equivalent
- Name Concessionaire (95 Express Lanes LLC), its parent, owners, subsidiaries and affiliate companies, their officers, agents, managers, employees, directors, Subcontractors, joint owners, VDOT, and Contractor as “Additional Insureds” on a primary and non-contributory basis, including both premises-operations coverage and products/completed operations coverage utilizing endorsements CG 2010 07/04 and CG 2037 07/04.

- Products/Completed Operations for five (5) years after substantial completion or the statute of repose, whichever is less.
 - The Commercial General Liability Policy (General Aggregate) shall be endorsed to include CG-25-03 – Aggregate Limits of Insurance (per project), or its equivalent.
- (c) **Automobile Liability Insurance**, with a limit of at least \$500,000 combined single limit for bodily injury and property damage covering all owned (if any), non-owned, hired or borrowed vehicles on-site or off.
- (d) **Umbrella/Excess Liability Insurance** in excess of the underlying limits noted above for employer’s liability, commercial general liability and automobile Liability in the amount of \$5,000,000 per occurrence and in the aggregate for contracts greater than \$500,000, and \$2,000,000 per occurrence and in the aggregate for contracts less than \$500,000.
- (e) **Professional Liability Insurance** (applicable only to Subcontractors rendering professional services, including, but not limited to, architects, engineers, traffic consultants, accountants, attorneys, etc.) with limits of at least \$1,000,000 per claim and in the aggregate. Such insurance will remain in full force and effect during the performance of such professional services and with an extended reporting period for two years after completion of such professional services.

8. Contractor and Subcontractor Insurances - General Requirements

Contractor shall ensure that all required insurances required contain the following provisions:

- (a) With the exception of Workers’ Compensation and Architect/Engineers’ Professional Liability insurance, Concessionaire shall be named as an additional insured on all policies. Each such policy shall also include the appropriate severability of interest and cross-liability clauses to allow one insured to bring claim against another insured party.
- (b) All insurance coverages shall be considered primary and non-contributory with regard to other insurances that might be available to Contractor or Concessionaire.
- (c) All insurers shall provide a waiver of subrogation against Concessionaire for any claims covered by insurances required herein.
- (d) Any inadvertent errors or omissions by Contractor in procuring the insurance required herein shall in no way prejudice the rights of Concessionaire to collect under such policies.
- (e) Any deductibles shall be the sole responsibility of Contractor.
- (f) Required insurances and coverage levels shall remain in full force and in effect for the duration required by the Contract. Contractor and all Subcontractors shall maintain the required insurances and coverage levels without interruption from the date of contract (or subcontract) award through the end of the warranty period.

- (g) No insurance coverage will be canceled, renewal refused, or materially changed unless at least thirty (30) days prior written notice is given to Concessionaire. In the case of non-payment of premiums, ten (10) days' notice, to Concessionaire and Contractor for any changes related to Contractor and Subcontractor Required Coverages.
- (h) Contractor shall file certificates of insurance with Concessionaire evidencing the coverages and limits described above within the times required by the Contract. All endorsements must be included with any certificates of insurance provided. The certificates shall be executed by approved insurance companies authorized to do business in Virginia with a minimum "Best Rating" of "B +" or greater, and shall cover the Work.
- (i) The insurance coverage limits shall not be construed to relieve Contractor or Subcontractor(s) of liability in excess of such coverage, nor shall it preclude Concessionaire from taking such actions as are available to it under any other provision of the Contract or otherwise in Law.
- (j) Concessionaire will provide certain insurances for the Project as described in Sections 3, 4 and 5 of this exhibit. Contractor shall exclude from its Contract Price, and cause Subcontractors of every tier to exclude from their Subcontract prices, costs (including insurance premiums, charges for deductible losses and any other expenses) for any coverages which are included in Concessionaire-provided OCIP, Builders Risk and Contractors Pollution Liability policies.
- (k) All Contract changes shall be priced exclusive (net) of insurance costs for Concessionaire-provided insurance coverages.

9. Insurance Closeout Process

Unless otherwise directed by Concessionaire, General Liability/Excess Liability coverage for operations under the OCIP will terminate at Final Completion. General Liability/Excess Liability coverage for completed operations will commence upon completion of the work according to the OCIP insurance policy provisions and will be provided for five (5) years or through the applicable statute of repose, whichever is less. Should a Contractor or a Subcontractor return to the OCIP Project Site for any reason after their coverage under the OCIP has ceased, Contractor or a Subcontractor is required to provide its own insurance coverage in compliance with Contractor and Subcontractor Required Coverage and must provide a certificate of insurance evidencing such coverage.

EXHIBIT S
MINOR CHANGE REQUEST FORM



95 Express Lanes Opitz Boulevard Ramp Project Contract Minor Change

1. Minor Change No: MC-XX

2. Initiated by: [Entity]

3. Subject Document: Plans Specifications Standards Other:

4. Reason for minor change:

5. Existing Requirements/Contract Provisions:

6. Minor Change proposed:

Supporting Documents Attached? No Yes [list supporting docs]

7. Agreement by Shirley Contracting Company:

Signature and Date:

8. Agreement by 95 Express Lanes:

Signature and Date:

9. Agreement by VDOT (if applicable):

Signature and Date: