

Attachment 3.4a

Geotechnical and Pavement Data Report



**GEOTECHNICAL AND PAVEMENT DATA REPORT
I-495 Express Lanes Project NEXT
Fairfax County, Virginia**

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1.0 INTRODUCTION

The purpose of this document is to present the results of the preliminary geotechnical investigation and to supplement the geotechnical investigation and design requirements contained in Chapter III of the VDOT Materials Division's Manual of Instructions for the 495 Express Lanes Northern Extension project (Project NEXT). This document also contains information relating to the project specific minimum pavement sections.

2.0 SITE AND PROJECT DESCRIPTION

The project site is located along the I-495 corridor in Fairfax County, Virginia between the Dulles Toll Road Interchange and the George Washington Parkway Interchange. The current roadway generally consists of three main travel lanes in both the northbound and southbound directions, separated by a small median area with a concrete barrier on each side. Paved shoulders are present on both the inside and outside of the NB and SB lanes. Heavily vegetated and/or wooded slopes separate the interstate from the surrounding urban areas along the alignment. Scott's Run Creek Crosses the alignment at approximate MP 44.2 and 45.2. Wetlands are present primarily between I-495 and Scotts Run to the east, and north and south of Old Dominion Drive fly-over bridge.

The project consists of improvements along the I-495 corridor between the Dulles Toll Road Interchange and the George Washington Parkway Interchange in Fairfax County, Virginia. The proposed improvements are summarized as follows:

- 495 Express Lanes Extension
 - Extend Express Lanes template northward from its current terminus to the GWP interchange by converting the two inner lanes of 495 NB and SB GP lanes. The inside paved shoulders will remain as-is. There will be a variable width inside shoulder and two 12-foot-wide Express lanes.
- 495 General Purpose (GP) Lanes Widening
 - Widen 495 NB and SB general purpose lanes to the outside to maintain existing number of travel lanes The widening generally includes the following roadway typical:
 - Four, 12-foot general purpose lanes
 - Eight to 14-foot wide outside shoulder
 - One to two auxiliary lanes are present between the general purpose lanes and outside shoulder at the DTR interchange, GWP Interchanges and Old Dominion Drive.
 - Widen existing 495 NB bridge over Scotts Run (bridge number EXT-W1)
 - Widen existing 495 SB bridge over Scotts Run (EXT-W2)

- 495 Overpass Bridge Replacements:
 - Replace 495 overpass bridge at Old Dominion Drive (EXT-N1)
 - Replace 495 overpass bridge at Georgetown Pike (EXT-N2)
 - Replace 495 overpass bridge at Live Oak Drive (EXT-N3) and realignment of Live Oak drive to the North
- Dulles Toll Road (DTR) Interchange
 - Widen DTR EB ramp to 495 NB GP (exit 18B) to two lanes
 - Widen existing 495 NB GP bridge over DTR EB ramp to 495 NB GP (DTR-W2)
 - Realign and Widen DTR EB ramp to 495 SB Express Lanes (exit 18A) to two lanes and then split lanes to provide access ramp to 495 NB Express Lanes
 - Construct flyover access ramp from DTR EB and DTR WB to 495 NB Express Lanes, which will include:
 - DTR EB to 495 NB Express Lanes flyover ramp over DTR EB and Dulles Airport Access Road (DTR-N1)
 - DTR to 495 NB Express Lanes flyover ramp over DTR WB and 495 NB GP (DTR-N2)
- George Washington Memorial Parkway (GWP) Interchange
 - Construct 495 NB Express Lanes to GWP flyover ramp over 495 NB GP (GWP-N2)
 - Construct GWP to 495 SB Express Lanes flyover ramp over 495 SB GP (GWP-N3)
- Auxiliary Lane
 - Construct auxiliary lane from GWP to GTP and 495 SB GP, which will include
 - GTP NW flyover ramp over GWP to 495 SB ramp (EXT-N4)

Figure 1 in Appendix A shows the general site vicinity of the project, bridge improvement locations, and mile post locations at several points along the alignment.

3.0 OBJECTIVE AND SCOPE

The objective of this preliminary geotechnical investigation is to collect, document, and report geotechnical data sufficient to support the preparation of 30% plans, Technical Requirements, and design-build bidding documents for Project NEXT. To accomplish these objectives, HDR completed the following general scope of services:

- Drilled 172 soil test borings to identify subsurface soil, rock, and water conditions in the vicinity of proposed improvements, including embankments, pavements, bridges, retaining walls, and storm water management ponds.
- Obtained 111 pavement cores within existing pavements at the project site.

- Assigned laboratory testing of selected soil and rock samples from the test borings to aid in soil classification and establishment of geotechnical engineering parameters for preliminary design.
- Completed a ground penetrating radar (GPR) survey along the alignment to evaluate the existing asphalt concrete pavement thickness
- Completed a joint condition survey and load transfer efficiency testing of the transverse pavement joints in the I-495 southbound lanes of the project corridor
- Completed analyses to develop recommended minimum pavement sections for the different areas of roadway improvements.
- Prepared this Geotechnical and Pavement Data Report to summarize the subsurface exploration and present the results of the field and laboratory testing programs, the recommended minimum pavement sections, and geotechnical considerations for design and construction.

4.0 GEOTECHNICAL EXPLORATIONS

4.1 Existing Geotechnical Data

HDR reviewed the following existing geotechnical data provided by VDOT within the general project extents:

- Geotechnical Engineering Report for I-495 Soundwall 13A Wall Investigation and Analyses, Project No. 0495-029-874, P101, C501, UPC No. 94944, dated November 11, 2011
- Geotechnical Data Report for I-495 Northern Section Shoulder Use Lane, Project No. 0495-029-123, P101, C501, UPC No. 105130, dated December 3, 2013

HDR considered the existing subsurface explorations when developing the preliminary subsurface exploration program and incorporated them, where possible. Approximate locations for selected previous explorations are shown on the boring location plans provided in Appendix A. Previous explorations outside the limits of proposed future improvements may not be shown.

4.2 Preliminary Geotechnical Investigation

HDR planned and executed a preliminary subsurface exploration program to collect geotechnical data in the vicinity of proposed project elements. Traditional soil test borings were used to obtain physical samples for visual/manual classification, laboratory testing, and observation of subsurface water levels. In some areas that were inaccessible to drilling equipment, hand augers were performed. The following sections provide details relative to the preliminary subsurface exploration program.

4.2.1 Soil Test Borings

HDR laid out the exploration program based on the proposed roadway alignment at the time of its exploration. Subsequent shifts or changes to the alignment or structure locations were accommodated in the field when possible. Boring depths were based on preliminary cut and fill depths available to HDR at the time, or anticipated foundation types for bridges and retaining walls. HDR presented a Geotechnical Exploration Plan (GEP) to the Northern VDOT District office on March 27, 2019 prior to commencing field work for comment and concurrence.

HDR's field exploration team for the project consisted of Connelly and Associates, Inc. (Connelly) and Soil and Land Use Technology, Inc. (SaLUT). Test borings were completed between mid-April and early August 2019. Table 4-1 provides a brief summary of the exploration team and the amount of soil drilling each firm completed.

Table 4-1 – Summary of Exploration Team and Completed Effort

| Driller | Office Location | Drilling Equipment / Method | Dates Onsite | Number of Test Borings Completed |
|-------------------------------------|-----------------|--|--------------------|----------------------------------|
| Connelly | Manassas, VA | Diedrich D-50 track mounted Hollow stem auger / rock core / hand auger | 4/16/19 to 8/09/19 | 75 |
| SaLUT | Glen Burnie, MD | Acker XLS track mounted Mobile B57 truck mounted Hollow stem auger / rock core | 4/16/19 to 7/31/19 | 97 |
| Total Explorations Completed | | | | 172 |

Table 4-2 summarizes the exploration program, broken down by the relative quantities completed for each of the proposed design elements (bridges, retaining walls, etc.).

Test borings were advanced using hollow stem auger drilling techniques. Standard Penetration Tests (SPT) with split-barrel spoon sampling of soils were conducted in accordance with ASTM D1556 using an automatic hammer. Typically, five 24-inch long SPT samples were collected in the upper 10 feet of each borehole and at five-foot intervals below a depth of ten feet. Test borings 19SWM-01 and 19SWM-04 were advanced using a hand auger due to difficult access conditions. Composite bag samples were collected at two foot intervals to depth of eight feet.

HDR staff monitored the drilling in the field, which included overall coordination of drilling activities, visual-manual classification of soil samples, preparation of field exploration logs, monitoring conformance with drilling and sampling criteria, and observation of general site conditions. Groundwater observations were typically made in open boreholes upon completion of drilling and prior to backfilling.

Pocket penetrometer tests were typically performed on cohesive soil samples at the time of sample collection. The results of the pocket penetrometer tests are shown on the exploration logs provided in Appendix B.

HDR collected 62 bulk soil samples from auger cuttings of the soil at test boring locations. HDR reviewed the collected samples and assigned a range of different laboratory tests on different samples, including classification, moisture-density relationship, California Bearing Ratio (CBR), resilient modulus (M_r), and direct shear. Refer to table A-7 in Appendix A for a summary of test results on bulk samples. Additionally, bulk sample locations are indicated on the applicable test boring logs in Appendix B and laboratory test results are provided in Appendix D.

Table 4-2 – Summary of Subsurface Explorations

| Exploration Purpose | Exploration Designation | Number of Explorations for Preliminary Investigation | Depth Range of Explorations | Total Footage | Approximate Frequency of Explorations |
|----------------------------------|---|--|-----------------------------|-------------------|---|
| Bridge | 19DTR-BRXX 19GTP-BRXX 19GWP-BRXX 19LOD-BRXX 19ODD-BRXX 19X-BRXX | 26 | 24 to 74 feet | 1,625 feet | 1 for 1 span structures 2 for > 2 spans structures |
| Retaining Wall | 19DTR-RWXX 19GWP-RWXX 19X-N-RWXX 19X-S-RWXX | 56 | 25 to 67 feet | 2,482 feet | 1 every 300 feet within interchanges 1 every 600 feet for mainline roadway widening to outside |
| 495 Roadway | 19X-NOS-PXX 19X-N-RW18A 19X-SOS-PXX | 50 | 6 to 15 feet | 424 feet | 1 every 600 feet |
| Storm Water Management | 19SWM-XX | 13 | 8 to 25 feet | 2,87 feet | 1 per location |
| Ramp/ Crossing Road/ Interchange | 19DTR-PXX 19GTP-E-PXX 19GTP-W-PXX 19GWP-PXX 19LOD-W-PXX 19ODD-E-PXX 19ODD-W-PXX | 27 | 6 to 9 feet | 200 feet | 1 every 600 feet |
| | Total Explorations | 172 | Total Footage | 5,018 feet | |

Notes:

1. Borings completed for Dulles Toll Road have "DTR" in designation.
2. Borings completed for Georgetown Pike have "GTP" in designation.
3. Borings completed for George Washington Memorial Parkway have "GWP" in designation.
4. Borings completed for Live Oak Drive have "LOD" in designation.
5. Borings completed for Old Dominion Drive have "ODD" in designation.
6. Approximate frequency of borings shown in table is "proposed" value. Actual spacing of borings in the field may vary depending on length of individual design elements and field conditions encountered at the time of exploration.
7. "XX" indicates two digit numeric identifier.

Test boring advanced through existing pavements were typically backfilled with compacted cuttings, a borehole plug, and pea gravel to a depth of approximately two feet below the pavement surface. The remaining two feet were backfilled with grout. Retaining Wall and Bridge test borings advanced through existing pavements were typically backfilled with compacted cuttings to a depth of 10 to 15 feet below the ground surface, followed by a borehole plug, and bentonite chips to a depth of approximately two feet below the pavement surface. The remaining two feet were backfilled with grout. Test borings advanced through unpaved areas were backfilled with auger cuttings.

HDR personnel laid out proposed exploration locations in the field using the GIS application, Collector, and a GPS receiver unit. Rice Associates surveyed test boring and pavement core locations and surface elevations after drilling was completed.

Station/Offset and Northing/Easting VDOT project coordinates are provided on the exploration logs. Survey data is referenced to North American Datum 1983 (NAD-83) State Plane Virginia (feet). The vertical datum is referenced to North American Vertical Datum 1988 (NAVD-88), also in feet. A summary of the soil test borings is provided in Table A-1 in Appendix A. Test boring logs are provided in Appendix B. As-drilled boring locations are shown on Figure 2 in Appendix A.

4.2.2 Pavement Cores

HDR completed 111 pavement cores within the project extents. The purpose of the pavement cores was to document the existing shoulder and travel lane pavement section thicknesses and composition. Table 4-3 summarizes how many shoulder and travel lane cores were collected in each pavement tie-in location.

Table 4-3 – Summary of Pavement Core Locations

| Pavement Location | Exploration Designation | Shoulder Cores | Travel Lane Cores |
|--|--|----------------|-------------------|
| Dulles Toll Rd Interchange | 19DTR-PXX | 3 | 1 |
| Old Dominion Drive | 19ODD-E-PXX 19ODD-W-PXX | -- | 2 |
| Georgetown Pike | 19GTP-E-PXX 19GTP-W-PXX 19GTP-BR15 | 1 | 9 |
| Live Oak Drive | 19LOD-W-PXX | -- | 2 |
| George Washington Memorial Parkway Interchange | 19GWP-XX | 3 | 4 |
| 495 Northbound Inside | 19X-NIS-PCXX | 5 | -- |
| 495 Northbound Outside | 19X-NOL-PCXX 19X-NOS-PXX | 26 | 6 |
| 495 Southbound Inside | 19X-SIS-PCXX | 11 | -- |
| 495 Southbound Outside | 19X-SOL-PCXX 19X-SOS-PCXX | 21 | 17 |
| | Total Cores | 70 | 41 |

The pavement section thickness data is summarized in Table A-4 in Appendix A, and logs with photographs of the pavement cores are provided in Appendix B. Pavement core locations are depicted on the boring location plans.

4.2.3 GPR Survey

Infrasense of Woburn, Massachusetts completed a ground penetrating radar (GPR) survey along the I-495 travel lane and shoulder pavements between September 16 and September 17, 2019. The GPR survey was conducted between the southern abutment of the American Legion Bridge on the north to approximate Station 560+00 (approximately 0.30 miles south of Lewinsville Road flyover) on the south. Data was not collected along the ramps. The purpose of the survey was to document the thickness of the existing asphalt concrete within the existing I-495 travel lanes and shoulders.

The results of the GPR survey dated October 17, 2019, as well as Figures C-1 and C-2 prepared by HDR summarizing asphalt thickness from pavement cores and the GPR data, are provided in Appendix C.

4.2.4 Pavement Joint Condition Survey and Testing

Pavement Technical Solutions (PTS), of Ashburn, Virginia completed a pavement joint condition survey along the I-495 Southbound travel lanes and shoulder pavements between April 23 and April 29, 2019. The joint condition survey was conducted from the south abutment to the American Legion Bridge on the north to approximate Station 590+65 (approximately 0.45 miles south of Old Dominion Drive) on the south in the southbound lanes only. The purpose of the survey was to locate and record the condition of reflective cracking exhibited in the asphalt concrete above existing joints in the underlying concrete pavement, when present, as well as record additional pavement distress that could potentially require separate repair during resurfacing.

PTS also conducted joint-load transfer efficiency testing on the pavement joints encountered along the inside two travel lanes of I-495 Southbound between April 30 and May 2, 2019. Testing was conducted using a Dynatest Model 8000 Falling Weight Deflectometer (FWD). Using the data collected, PTS performed a load transfer analysis in accordance with AASHTO methodology.

A letter report prepared by PTS dated October 15, 2019 is provided in Appendix C and includes the joint condition survey results, joint load transfer efficiency results, a summary of other observed pavement distress, and photographs of typical conditions. Note that all results in the PTS report are referenced to a “field marked baseline” that was temporarily used for field work on the project. Accordingly, HDR has prepared similar summary tables (Table C-1 and Table C-2) in Appendix C that references the joint locations to the design baseline shown in the RFP plans.

4.3 Design Phase Geotechnical Explorations

A design phase geotechnical investigation shall be performed by the design-builder in accordance with Chapter III of the VDOT Materials Division’s Manual of Instructions to investigate existing subsurface geotechnical conditions in the areas of the proposed improvements. A boring location plan must be approved by the Concessionaire and the Northern Virginia District Materials Engineer prior to initiation of the design geotechnical investigation. The final geotechnical engineering reports must be reviewed and approved by the Concessionaire and the Northern Virginia District Materials Engineer prior to initiation of construction activities.

5.0 LABORATORY TESTING

S&ME and SaLUT conducted laboratory testing on soil and rock samples (jar, bulk, and rock core samples) collected from the subsurface explorations. HDR personnel evaluated the field exploration logs and assigned specific samples for testing. Table 5-1 summarizes the assigned laboratory testing.

Table 5-1 – Summary of Assigned Laboratory Testing

| Laboratory Test | Specification Referenced | | | No. of Tests Assigned |
|-------------------------------------|--------------------------|-----------|--------|-----------------------|
| | VTM | AASHTO | ASTM | |
| Moisture Content | | T-265 | | 1363 |
| No. 200 Wash | 25 | T-11 | | 36 |
| Grain Size Analysis | 25 | T-88 | | 242 |
| Grain Size Analysis with Hydrometer | 25 | T-88 | D-422 | 13 |
| Atterberg Limits | 7 | T-89 / 90 | | 281 |
| Standard Proctor | 1 | T-99 | | 34 |
| California Bearing Ratio | 8 | T-193 | | 19 |
| Resilient Modulus | | T-307 | | 19 |
| Direct Shear | | T 236 | | 3 |
| Chloride Concentration | | T-290 | D-512 | 19 |
| Sulfate Concentration | | T-291 | D-516 | 19 |
| pH Test | | T-289 | D-4972 | 19 |
| Resistivity | | T-288 | G-57 | 19 |
| Consolidation | | T-216 | D-2435 | 1 |
| Unconfined Compression (Rock) | | | D7012 | 8 |

HDR used the following general criteria to assign specific laboratory testing:

- Natural moisture content tests were generally assigned to all jar soil samples, in accordance with the VDOT MOI, Chapter III.

- Standard Proctor, CBR and Resilient Modulus tests were typically assigned on bulk soil samples collected from at-grade or minimal cut roadway borings, based on the preliminary profile and cross section drawings available to us
- Direct shear tests on remolded samples were assigned on three of the bulk samples collected from proposed cut areas, based on the preliminary profile and cross section drawings available
- Unconfined Compression tests were assigned on rock cores at locations of anticipated bridge foundations
- Chloride Concentration, Sulfate Concentration, pH Test, and Resistivity were assigned on bridge boring samples collected from above and below the water table to determine corrosion potential for steel piles, proposed in the preliminary plans; also assigned on storm water management boring bulk samples collected to determine corrosion potential for the final designers selection of pipe type

A laboratory index table, indicating which testing was performed from each test boring, is provided in Table A-5 in Appendix A. Index testing (natural moisture content, Atterberg Limits, and fines content) results are shown on the test boring logs in Appendix B. A summary of laboratory test results is provided in Table A-6 in Appendix A. The laboratory test results are provided in Appendix D.

6.0 GEOLOGIC CONDITIONS

The following sections provide a description of the regional geologic setting, overburden soils, and anticipated geologic hazards within the project site.

6.1 Regional Geologic Setting

The project site is located within the Piedmont Physiographic Province. The Piedmont is the largest province in Virginia and lies between the Fall Line to the east and the mountains of the Blue Ridge province to the west. It contains deeply weathered bedrock of metamorphic origin with little solid rock at the surface. The Piedmont has gently rolling hills that flatten towards the Fall Line, the border between the Piedmont and Coastal Plain provinces. The westward side of the Piedmont province becomes only slightly more rugged when reaching the Blue Ridge province.

6.2 Project Site Overburden Soils and Bedrock

The following overburden soil and rock formations are described from oldest to youngest, and by project location from north to south based on published geologic sources. The published sources included primarily the USGS 1997 Geologic Map of the Falls Church, Fairfax, and Arlington Counties and the city of Falls Church, Virginia, and Montgomery County, Maryland; the 2017 Geologic Map of the Washington West 30' x 60' Quadrangle, Maryland, Virginia, and Washington

D.C.; and 1993 Geologic Map of VA. The mapped locations of soil and rock formations specified below relative to project site features (intersecting streams, roadways, etc.). A geologic map of the project is provided in Figure A-2 in Appendix A (USGS, 1997).

6.2.1 Sykesville Formation (€so)

The northern end of the project is underlain by the Sykesville Formation (€so) between the George Washington Parkway and Live Oak Drive. This formation generally consists of light to medium gray, medium grained sedimentary mélangé consisting of a heterogeneous suite of pebble- to boulder and larger-size olistoliths as well as schist and metagraywacke.

6.2.2 Mather Gorge Formation (€Zmp, €Zmg)

The project is underlain by the Mather Gorge Formation (Early Cambrian and/or Late Proterozoic) from Live Oak Drive south to the Dulles Toll Road Interchange. Locally, the Mather Gorge Formation consists of four metamorphic rock types, but within the project limits two types (€Zmp and €Zmg) are mapped according published sources.

- Schist (€Zmp) generally consists of light gray to gray to tan to red brown fine- to medium-grained silt and clay along with schist and greenish-gray phyllonite. This sediment contains interbedded quartz-rich schist and minor calc-silicate rock. It commonly is of metamorphic origin and is thinly bedded. The Mather Gorge Schist is located on the east side of 495 from Live Oak Drive to the DTR Interchange. It is also located on west side of 495 from Live Oak Drive to just south of Old Dominion Drive.
- Metagraywacke (€Zmg) generally consists of light to medium gray, yellowish to reddish brown-weathering, fine to medium grained, generally well-bedded metagraywacke and lesser schist. It also contain quartz lenses. It commonly is of metamorphic origin and has alternating, thin beds. The Mather Gorge Metagraywacke is located on the west side of 495 from Old Dominion to and including the west half of the DTR Interchange.

6.2.3 Alluvial Deposits (Qal)

Alluvial deposits exist along the stream channels and floodplain environments associated with Scotts Run, as well as other local tributary streams. Scotts Run crosses 495 NB and SB approximately 400 feet north of Old Dominion Drive and parallels 495 SB southward through the DTR Interchange. Alluvial deposits generally consist of gravelly sand, sandy gravel, silt, and clay, as well as organic matter. Alluvial soils are anticipated adjacent to Scotts Run and buried low lying areas or flood plains due to surrounding development and roadway construction.

6.2.4 Artificial Fill (af)

Artificial fill soils are present throughout the project associated with the original construction of the I-495 general purpose lanes, and DTR and GWP interchanges. The fills support the existing roadway grades where grade separations exist primarily at the interchanges or as required in lowland areas. Embankment fills mainly consist of native soils of variable gradation, which were removed and recompacted as fill.

6.3 Geologic Hazards

Geologic hazards exist within the project corridor that can have varying impacts on design and construction of a large-scale project. The geologic hazards that can impact the proposed construction are described below.

6.3.1 Compressible Soils

Compressible soil should be expected within the project extents and should be considered in the design of fill embankments, pipes and culverts, retaining walls, and shallow and deep foundations. Table A-2 in Appendix A summarizes locations where very soft to soft fine-grained soils and very loose coarse-grained soils were encountered in test borings conducted by HDR. Compressible soils may be present in other areas of the project site, as well, that are not summarized in Table A-2.

Compressible alluvial soils were encountered within and around existing wetlands and floodplains associated with Scotts Run. These soils were typically observed near the ground surface and are approximately 4 feet thick. Alluvial soils consist of very soft to soft, lean to highly-plastic fine grained soils (ML, MH, CL, CH) and sometimes contain organic materials. Highly-organic soils have been known to contribute to high secondary compression settlements (long-term movement under constant loading, after primary consolidation is complete) beneath fill embankments.

Results of one consolidation test from an undisturbed sample collected at boring 19X-N-RW04 at a depth of 15-17 feet are provided in Appendix D. It is the design-builder's responsibility to assess the impact of compressible soils on the proposed construction and account for this in their bids.

6.3.2 Corrosion Potential

Overburden soils within the project limits can have varying degrees of corrosion potential and long-term performance impacts on construction materials. Corrosion potential can exist in sands, clays/silts, and weathered rock. The existing acidity levels can negatively impact buried drainage structures and reduce the structural capacity of steel piles. Table 6-1 summarizes the results of corrosivity tests completed by HDR as part of its preliminary geotechnical investigation.

Table 6-1 – Summary of Corrosivity Test Results

| Boring | Depth (ft) | pH | Resistivity (ohm/cm) | Chloride Content (ppm) | Sulfate Content (ppm) |
|---|------------|-------|----------------------|------------------------|-----------------------|
| 19DTR-BR01 | 23 to 24.5 | 4.6 | 910 | 741.6 | ND |
| 19DTR-BR03 | 6 to 8 | 3.8 | 1,400 | 508.1 | ND |
| 19DTR-BR06 | 28 to 30 | 5.4 | 1,300 | 426.3 | ND |
| 19GTP-BR14 | 23 to 25 | 4.7 | 750 | 952.7 | 4.0 |
| 19GTP-BR16 | 6 to 8 | 5.1 | 5,400 | 32.7 | 7.9 |
| 19GWP-BR17 | 4.8 to 6.8 | 6.8 | 990 | 525.2 | 7.1 |
| 19GWP-BR19 | 33 to 34.9 | 5.1 | 4,500 | 86.6 | 2.2 |
| 19GWP-BR21 | 2 to 4 | 7.7 | 2,730 | 10 | 65 |
| 19GWP-BR23 | 5 to 7 | 4.9 | 1,360 | 450 | <10 |
| 19LOD-BR16 | 33 to 35 | 6.1 | 4,080 | 60 | <10 |
| 19ODD-BR07 | 18 to 20 | 6.0 | 1,410 | 505 | <10 |
| 19SWM-05 | 20 to 25 | 6.4 | 1,270 | 235 | 12 |
| 19SWM-07 | 20 to 25 | 5.7 | 3,500 | 30.7 | 9.8 |
| 19SWM-08 | 20 to 25 | 4.6 | 6,300 | 28 | 1.3 |
| 19SWM-11 | 15 to 20 | 6.6 | 1,230 | 190 | 12 |
| 19SWM-12 | 5 to 10 | 6.0 | 6,940 | <10 | 53 |
| 19SWM-14 | 10 to 15 | 5.7 | 2,200 | 85 | <10 |
| 19SWM-15 | 15 to 20 | 6.4 | 8,500 | 40.4 | 5.7 |
| 19X-BR11 | 28 to 30 | 5.5 | 7,100 | 40.5 | 2.3 |
| <i>AASHTO Criteria for Corrosion Potential Section 10.7.5</i> | | < 5.5 | < 2,000 ohm-cm | > 500 | > 1,000 |

Comparing the test results to corrosion potential criteria set forth in Section 10.7.5 of AASHTO LRFD Bridge Design Specifications (2017), potentially corrosive soils are identified at 12 test boring locations out of 19 tested. It is the design-builder’s responsibility to assess the impact of corrosive soils on the proposed construction and account for this in their bids. All structures in contact with on-site soils shall be designed to resist corrosion and to be functional for the design life indicated in the Contract Documents, unless specific testing determines that the soils are not currently or potentially acidic.

6.3.3 Fault Conditions

A north-south trending fault, known as the Plummers Island Thrust, is mapped on the north end of the project (USGS, 2017). The location of the fault is shown in figure A-2 in Appendix A. The Plummers Island Thrust cross the 495 NB/SB on the south side of the George Washington Parkway Interchange. This fault is the boundary of the Sykesville and Mather George Formations,

where the Mather George formation lies above (thrust over) the Sykesville formation. The Plummers Island Thrust fault is of Tertiary aged (>2 million years) or older and is low risk for seismic activity.

This fault and secondary splay faults are typically high angle or near vertical reverse faults with movement in the up and down directions. Typically the downthrown side of these northeast trending faults is to the east. The downthrown side of the faults (southeast) preserves thicker and more stratigraphic sections. The Mather George formation has a complex history of deformation due to faulting and metamorphism. Faults and folds within the formation can influence the rock quality and depth. Therefore subsurface conditions can vary significantly over a short horizontal distance as well as vertically in the vicinity of a fault zone.

7.0 SUBSURFACE CONDITIONS

The following sections summarize the results of the subsurface explorations completed at the project site. Specific observations, remarks, and comments are reflected on the exploration logs provided in Appendix B.

7.1 Subsurface Soil

HDR drilled 172 test borings as part of its preliminary subsurface exploration program for the 495 Express Lanes Northern Extension project. Depths of the test borings ranged from approximately 6 feet to 74 feet below existing ground surface. Subsurface strata along the alignment generally consisted of some combination of the following: Fill, Alluvium, Residuum, Intermediate Geomaterial (IGM), and rock.

- Fill or Possible Fill – Fill soils were typically identified in the field by the presence of non-native materials (crushed aggregate, asphalt fragments, rubble, etc.). Additionally, fill soils were identified in the field based on the existing topography in the vicinity of the test borings. Fill soils generally consisted of loose to very dense coarse-grained soils with varying amounts of silt and clay (SP, SP-SC, GC, GM, GP, GP-GM, SM, SC, SC-SM) and very soft to very hard fine-grained soils with varying amounts of sand and gravel (ML, MH, CL, CH).
- Alluvium – Alluvial soils were encountered predominately within the vicinity of Scott's Run Creek, and near the pond south of Old Dominion Drive. Alluvial soils were typically identified in the field by the presence of organic material, lower blow counts, and/or their vicinity to wetland features. Alluvium generally consisted of very loose to dense coarse-grained soils with varying amounts of silt and clay (SP, SC, SC-SM, SM, GC, GM, GP) and

soft to hard fine-grained soils with varying amounts of sand and gravel (ML, CL, CH). The color of the alluvial soils was generally shades of gray and/or brown.

- Residuum – Residual soils were typically identified in the field based on the presence of a relict rock texture, a resemblance to the native bedrock, and often contained mica and quartz. . Residual soils generally consisted of very loose to very dense sands with varying amounts of silt and clay (SC, SC-SM, SM) and soft to very hard fine-grained soils with varying amount of sand and gravel (CH, CL, CL-ML, MH, ML).
- Intermediate Geomaterial– IGM soils were identified as friable residual material with SPT N-values greater than 50 blows per 6 inches of penetration. Additionally, IGM soils were identified based on their position in the geologic sequence of the stratum. IGM soils generally consisted of dense to very dense coarse-grained soils with varying amounts of silt and clay (GM, GC, SC, SC-SM, SM) and very stiff to very hard clays and silts with varying amounts of sand and gravel (CH, CL, ML).
- Auger Refusal/Rock – Auger refusal was encountered in 26 of the test borings, at depths ranging from approximately 19 to 60 feet below ground surface. Rock was cored in 11 test borings to confirm its presence. Rock encountered was typically decomposed to moderately weathered Schist with quartz inclusions or fragments. Recovery ranged from approximately 40% to 100% and typically increased with depth. Rock quality designation (RQD) typically increased with depth and varied from approximately 8% to 88%. At test boring locations 19DTR-BR01, 19GWP-BR17, 19GWP-BR23, and 19GWP-BR27, the recovery and RQD decreased with depth. This is likely due to a deeper weathering profile, change in the rock type, or structurally controlled (faulting or folding) within the metamorphic environment.

Table A-2 in Appendix A summarizes selected subsurface conditions, including the presence of topsoil, suspected fill, alluvium, highly-plastic fine-grained material, very soft to soft fine-grained soils, very loose coarse-grained soils, IGM materials, and borings where auger refusal/rock were encountered.

7.2 Subsurface Water

Subsurface water was observed in 72 of the test boring explorations completed for this study at the time of drilling at depths ranging from approximately 7 feet to 60 feet below ground surface. The ground water table ranging from approximately 6 to 9 feet below ground surface was observed at five test borings along Scott's Run creek. Refer to Table A-2 in Appendix A for a summary of water level measurements made in the test borings at the time of drilling, after completion of drilling, and at least 24 hours after drilling (prior to backfilling).

In nine boreholes located in the vicinity of potential storm water management ponds, 1.25-inch diameter slotted PVC piezometers were installed to observe post-exploration water levels. The piezometers were generally installed to a depth of 25 feet and backfilled with auger cuttings. Table A-3 in Appendix A summarizes subsurface water level measurements in the piezometers. Refer to the exploration logs in Appendix B for specific observations of subsurface water at the exploration locations.

Note that water was introduced into the borehole as part of the drilling process during rock coring and may have influenced water level measurements made in those explorations (drilling methods are noted on the test boring logs). Subsurface water levels tend to fluctuate due to precipitation, season, temperature, site grading, and other factors that may be different from those prevailing at the time HDR completed its subsurface explorations.

8.0 PAVEMENTS

Construction of new pavement sections will be required in widened and reconstructed areas of the alignment, and some existing pavements will be milled and overlaid as part of the proposed site improvements. We anticipate flexible asphalt concrete pavements will be used in the new sections and overlays.

In general, the main travel lane pavements at the site in both the northbound and southbound directions consist of a composite section with asphalt concrete overlying Portland cement concrete slabs. On average, the concrete slabs are approximately 8 to 10 inches thick, and the overlying asphalt is 4 to 5 inches thick; however, the asphalt thickness varies considerably outside this range depending on a number of circumstances (location, lane, etc). For example, the minimum asphalt thickness observed was 3 inches and the maximum observed thickness was 33 inches.

The inside shoulders of both the northbound and southbound lanes are typically similar in composition to the main travel lanes, although the concrete slabs may be slightly thinner and asphalt thickness slightly higher to account for a tapered concrete slab. The outside shoulders of the southbound lanes are partial strength, and typically consist of asphalt concrete over subbase aggregate. Concrete was encountered in the SB outside shoulder between approximate Station 617 and 640. The northbound outside shoulder between approximate Station 605 to 701 was reconstructed to full strength in 2014 as part of the I-495 Northern Section shoulder use project, and generally consist of asphalt concrete over subbase aggregate.

The objectives of HDR's pavement evaluation for the project are:

- Evaluate existing pavement section composition and thickness at the site
- Calculate minimum pavement sections for new and widened areas

- Confirm the structural adequacy of existing sections for future use
- Determine areas of the existing pavements that will require additional pavement thickness or reconstruction to support future use

8.1 Existing Pavement Thickness

Pavement thickness information was collected by HDR at 157 locations, including in the test borings and pavement cores. Pavement cores were collected from 111 locations as shown in Table A-4 in Appendix A. The pavement section thickness data is summarized in Table A-4 in Appendix A. Specific observations related to the recovered cores are contained on the pavement core photographic logs provided in Appendix C. Table 8-1 summarizes the existing pavement thickness data for the I-495 travel lanes and shoulders, and includes observations from HDR pavement cores and the GPR survey.. Table 8-2 summarizes existing pavement thickness data for connecting roads and ramps.

Table 8-1: Existing Pavement Thickness – I-495 Travel Lanes and Shoulders

| I-495 Direction | Lane(s) | Proposed Construction | Typical Pavement Section AC = Asphalt Concrete PCC = Portland Cement Concrete | Comments |
|-----------------|------------------|-----------------------|--|---|
| Southbound | Outside Shoulder | Widening | <u>Approx. Sta 570+00 to 610+00</u> ~17 to 22 inches AC ~11 to 12 inches Aggregate <u>Approx. Sta 610+00to 653+00</u> ~3 to 5 inches AC ~7 to 14 inches PCC <u>Approx. Sta 6453+00 to 720+00</u> ~3 to 10 inches AC ~10 to 12 inches Aggregate | Mix of partial strength/full strength Some areas may require reconstruction |
| | Travel Lanes | Mill / Overlay | ~3 to 8 inches AC ~7 to 10 inches PCC | AC thickness varies considerably |
| | Inside Shoulder | None | ~3 to 13 inches AC ~4 to 12 inches PCC | AC thickness varies considerably |
| Northbound | Inside Shoulder | None | ~3 to 18 inches AC ~8 to 11 inches PCC | AC thickness varies considerably |
| | Travel Lanes | Mill / Overlay | ~7 to 14 inches AC ~8 to 11 inches PCC | AC thickness varies considerably |
| | Outside Shoulder | Widening | <u>Approx. Sta 560+00 to 583+00</u> ~5 to 10 inches AC ~6 to 10 inches PCC <u>Approx. Sta 583+00 to 701+00</u> ~16 to 20 inches AC > 6 inches Aggregate Subbase <u>Approx. Sta 701+00 to 720+00</u> ~5 to 7 inches AC ~10 inches PCC | Full strength, flexible AC section Reconstructed in ~2014 b/w approx. Station 583 and 701 |

Table 8-2: Existing Pavement Thickness – Ramps and Connecting Roadways

| Roadway | Location | Pavement Section Thickness Shoulder | Pavement Section Thickness Travel Lane |
|------------------------------------|--|--|---|
| Dulles Toll Road Interchange | On/Off Ramps - Travel Lanes and Shoulder | AC = 4.0" to 9.0", Avg = 6.5" <u>Aggregate = 13.0" to 14.0", Avg = 13.5"</u> Total = 18.0" to 22.0", Avg = 20.0" | AC = 15.5", Avg = 15.5" <u>Aggregate = 14.5", Avg = 14.5"</u> Total = 30.0", Avg = 30.0" |
| | Mainline | AC = 5.0" to 5.5", Avg = 5.3" <u>Aggregate = 4.0" to 12.0", Avg = 7.5"</u> Total = 9.3" to 17.0", Avg = 12.8" | No Cores Taken in Travel Lane |
| Old Dominion Drive | Mainline | No Cores Taken on Shoulders | AC = 7.0" to 12.0", Avg = 9.4" <u>Aggregate = 7.0" to 14.5", Avg = 10.3"</u> Total = 16.0" to 26.5", Avg = 19.7" |
| Georgetown Pike | On/Off Ramps - Travel Lanes and Shoulder | AC = 4.0" to 11.3", Avg = 7.2" <u>Aggregate = 4.0" to 12.0", Avg = 7.5"</u> Total = 12.0" to 20.5", Avg = 14.7" | AC = 3.0" to 11.0", Avg = 6.4" <u>Aggregate = 2.0" to 9.0", Avg = 4.5"</u> Total = 6.0" to 14.0", Avg = 10.9" |
| | Mainline | No Cores Taken on Shoulders | AC = 0.0" to 10.0", Avg = 5.8" PCC = 0.0" to 13.5", Avg = 5.1" <u>Aggregate = 6.0" to 15.0", Avg = 10.0"</u> Total = 18.0" to 24.5", Avg = 20.9" |
| Live Oak Drive | Mainline | No Cores Taken on Shoulders | AC = 3.5" to 6.0", Avg = 4.8" <u>Aggregate = 10.0" to 12.0", Avg = 11.0"</u> Total = 13.5" to 18.0", Avg = 15.8" |
| George Washington Memorial Parkway | On/Off Ramps - Travel Lanes and Shoulder | AC = 2.0" to 17.0", Avg = 6.9" CTA = 0.0" to 12.0", Avg = 1.3" <u>Aggregate = 0.0 to 12.5", Avg = 5.4"</u> Total = 2.0" to 27.0", Avg = 13.6" | AC = 0.0" to 16.5", Avg = 3.3" PCC = 7.0" to 9.5", Avg = 8.6" <u>Aggregate = 0.0" to 8.0", Avg = 1.6"</u> Total = 8.5" to 31.5", Avg = 13.5" |

8.2 Minimum Sections for New Pavement Construction

A summary table of preliminary traffic design parameters used to establish the minimum pavement sections for the I-495 Northern Extension project is included as Table 1 in Appendix E.

Table 8-3 below provides the minimum pavement sections for I-495 NB/SB General Purpose (GP) Lanes, I-495 NB/SB Express Lanes, Dulles Toll Road Interchange Ramps to I-495 NB Express Lanes, Old Dominion Drive, Georgetown Pike Mainline and Ramps, George Washington Memorial Parkway and Ramps, Balls Hill Road and Live Oak Drive. The pavement analyses and calculations were submitted to VDOT NOVA District for review and approval on August 30, 2019. The minimum pavement sections as presented in Table 8-3 below address comments and suggested revisions provided by VDOT on September 20, 2019.

Table 8-3: Summary of Recommended Minimum Pavement Sections for New Construction

| I-495 NB/SB GP Lanes (High-Side Widening Section) | | |
|---|--|-----------|
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0D+0.4 (high modulus, high binder PG64H-22) | 13.0 in. |
| 4-Cement Treated Aggregate (CTA) base | Cement Treated Aggregate Base Material, Type I, Size 21B | 10.0 in. |



| I-495 NB/SB GP Lanes (Low-Side Widening Section) | | |
|--|---|------------------|
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0D+0.4 (high modulus, high binder PG64H-22) | 13.0 in. |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B | 10.0 in. |
| Dulles Toll Road Interchange Ramps to I-495 NB Express Lanes (High-Side Widening Section) | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 12.0 in. |
| 4-Cement Treated Aggregate (CTA) base | Cement Treated Aggregate Base Material, Type I, Size 21B | 6.0 in. |
| Dulles Toll Road Interchange Ramps to I-495 NB Express Lanes (Low-Side Widening Section) | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 12.0 in. |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 14.0 in. |
| Old Dominion Drive | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0A | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 6.5 in. |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. |
| Georgetown Pike and adjoining Ramps, George Washington Memorial Parkway and adjoining Ramps | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SM-9.5D | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0D | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 6.5 in. |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. |
| Balls Hill Road | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. |
| 2-Base | Asphalt Concrete, Type BM-25.0A | 8.5 in. |
| 3-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. |
| Live Oak Drive | | |
| Layer | Material | Thickness |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0A | 2.0 in. |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 3.0 in. |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. |

8.3 Minimum Sections for Reuse of Existing Composite Pavements

HDR evaluated the structural adequacy of the existing main travel lane composite pavements for the proposed future traffic loading (refer to Appendix E, Table 1) in accordance with methodologies presented in the AASHTO 1993 Design of Pavement Structures. The analysis involves:

- Calculating the required concrete slab thickness to carry the design traffic loading
- Comparing the thickness of the required slab to the effective existing slab thickness to determine the deficiency
- Converting the concrete slab thickness deficiency to the required thickness of asphalt concrete
- Comparing the calculated required asphalt concrete thickness to the existing asphalt thickness to determine if a deficiency exists

In general, the average concrete slab thickness beneath the main travel lanes is approximately nine inches. Based on the analysis results for this average slab thickness, the minimum required asphalt concrete thickness overlying the concrete is approximately eight inches for I-495 GP Lanes and three inches for I-495 Express Lanes to meet the initial 12 year performance period.

As shown in Table 8-1, the existing asphalt thickness in the main travel lanes ranges from approximately 3 inches to 13 inches, and varies considerably depending on location. Accordingly, some areas of the proposed general purpose lanes which coincide with areas of existing composite pavements will require additional asphalt overlay thickness to meet the minimum design requirements. Refer to the GPR results provided in Appendix C existing asphalt concrete thickness at specific locations throughout the project alignment.

8.4 Drainage

The minimum pavement sections require that proper grading be maintained to direct surface water away from paved areas and to provide for efficient runoff from surrounding areas. Control of both surface and ground water is a critical consideration for design and construction with respect to the overall performance of the minimum pavement sections specified herein.

VDOT guidelines specify that edgedrains/underdrains be provided for all pavements with daily traffic volumes in excess of 1,000 vehicles per day. Therefore, standard UD-4 edgedrains will be required below the outer edge of shoulders for all pavements on this project. Modified UD-1 underdrains shall be provided in lieu of standard UD-4 edgedrains for pavement sub-drainage in areas of high ground water, springs, or cuts in excess of 15 feet; the modification consists of wrapping the aggregate with geotextile drainage fabric. Standard Combined Underdrain (CD-1) shall be provided at the lower end of cuts. Standard Combination Underdrain (CD-2) shall be provided at grade sags, bridge approaches, and at the lower end of undercut areas.

8.5 Pavement Requirements

Minimum pavement sections provided herein are for proposal preparation purposes only. The design-builder will be required to validate the adequacy of the minimum pavement sections and notify the Concessionaire of its findings during the Scope Validation Period. If the selected design-builder confirms that the minimum pavement sections are inadequate for actual design conditions, the design-builder shall notify the Concessionaire during the Scope Validation Period of the necessary changes, if any. Acceptable changes are limited to increasing the thickness of the base or subbase layers specified in Table 8-3 above. Any changes to the pavement sections specified in Table 8-3 must be approved by the Concessionaire and the VDOT District Materials Engineer. The design-builder will be responsible for the final design and construction of the pavements for this project in accordance with the Technical Requirements.

Pavement requirements are as follows:

- Minimum pavement sections for new pavement construction are provided in Table 8-3.
- In some areas of the project, the existing outside shoulders have previously been reconstructed and already meet the pavement thickness requirements shown in Table 8-3. The approximate extents of these areas are shown below:
 - I-495 Northbound, between Stations 583+00 and 701+00
 - I-495 Southbound, between Stations 192+50 and 209+50

The Design-Builder shall confirm these approximate extents based on their final validated pavement design. All existing underdrains that are impacted by the proposed construction shall be removed and replaced to the nearest available outlet.

- Where the proposed I-495 Express Lanes coincide with existing composite pavements, the minimum asphalt thickness overlying the concrete slabs shall be three inches.
- Where the proposed I-495 General Purpose Lanes coincide with existing composite pavements, the minimum asphalt thickness overlying the concrete slabs shall be eight inches.
- For existing composite pavements, the current asphalt thickness overlying the concrete slabs varies considerably, and some areas will require additional asphalt build-up or reconstruction to meet the minimum requirements.

- The minimum pavement designs are based upon the following criteria:
 - a) A minimum CBR of 5 to a depth of approximately three feet below subgrade elevation,
 - b) All new subgrade construction will have a minimum CBR of 5 for the borrow fill material,
 - c) All subgrade is compacted in accordance with the applicable sections of the Road and Bridge specifications and applicable special provisions and,
 - d) That all unsuitable materials (as defined in Section 9.2 of this report) at, or below, subgrade have been removed or modified in accordance with applicable sections of RFP documents.

8.6 Transverse Pavement Joints

Reflective cracking of asphalt concrete overlays on jointed concrete pavement is a common occurrence. Reflective cracking is generally not structural or load initiated; instead, it is typically caused by discontinuities (existing joints or cracks) in the layers underlying the asphalt concrete surface (in this case, the PCC pavement). Movement of the joints is caused by both by thermal and moisture changes. The movement causes the discontinuities to propagate up through the asphalt concrete surface and present as cracks.

Three types of joints were observed on Project NEXT and are described in Table 8-4. Details for saw-cutting and sealing of joints, as well as details for repair of Type 3 and Type 4 joints are shown on the Sheet 2C series of the RFP Conceptual Plans.

Table 8-4: Joint Types and Pavement Distress Mitigation Strategies

| Joint Type | Visual Description Criteria | Pavement Distress Mitigation Strategy Refer to details on Sheet 2C Series of RFP Conceptual Plans |
|------------|--|--|
| Type 1 | Typically characterized by single reflective crack over a joint having a width of 1/2" or less | Where mill and overlay is occurring, Type 1 locations only require saw-cutting and sealing after final surfacing. |
| Type 3 | Typically characterized by a primary reflective crack over a joint surrounded by greater than 1/2" of additional cracking | Removal and replacement of up to 4 inches of asphalt concrete overlying the joint to a minimum horizontal distance of 1 foot on each side of the observed distress. Use of a crack retardant fabric. Saw-cutting and sealing of the joint after final surfacing. |
| Type 4 | Typically characterized by one or more of the following: Previous utility crossing; previous repair over existing joint; open / degraded expansion joints; evidence of failed concrete slabs | Full-depth repair required, including removal of asphalt concrete, PCC slabs, and limited subgrade to a minimum horizontal distance of 2 feet on each side of the observed distress. Replacement with minimum 10 inches dense-graded aggregate underlying minimum 17 inches of asphalt concrete. |

The following sections provide details on joint condition surveys of the northbound and southbound lanes within the project extents. Joint repair requirements are discussed in Section 8.7.

8.6.1 I-495 NB GP Lanes (South of Old Dominion Drive)

No previous joint surveys or repairs have been conducted on the I-495 northbound General Purpose lanes between the southern project limits and the Old Dominion Drive overpass bridge (approximate Station 614+00 as shown on the RFP Conceptual Plans). It is anticipated that repairs will be required in this area.

8.6.2 I-495 NB Lanes (North of Old Dominion Drive)

VDOT conducted a study of the transverse pavement joints in the I-495 northbound lanes in November 2013 as part of the I-495 Northern Section Shoulder Use project. The joint study was conducted between Old Dominion Drive (approximate Station 614+00) and the south abutment to the American Legion Bridge. Based on field notes reviewed by HDR, VDOT identified approximately 365 joints within the study extents. Of those, approximately 24 joints were identified as requiring “full depth” repairs, which included removal of the surface asphalt and underlying concrete slabs, and replacement with full-depth flexible asphalt concrete pavement. Based on discussions with VDOT, the full-depth repair locations may have been where expansion joints were previously constructed in the pavement sections. The distance between the full depth repairs varies significantly, based on the field notes. HDR understands the full depth repairs were completed as part of the NB shoulder use project.

8.6.3 I-495 SB Lanes

HDR conducted a joint survey of the SB lanes in April 2019 between the south abutment to the American Legion Bridge on the north to approximate Station 590+65 (approximately 0.45 miles south of Old Dominion Drive) on the south. The summary tables in PTS’s report show that 566 transverse joints of varying distress length, width, and type were observed within the study extents. Table 8-5 provides a brief summary of the results.

Table 8-5: Summary of SB Lanes Joint Survey Results

| Joint Type | Number of Locations | Percent of Total | Range of Transverse Length (feet) | Observed Range of Crack/Distress Widths (inches) |
|------------|---------------------|------------------|-----------------------------------|--|
| Type 1 | 399 | 70% | 3 to 58 | Less than or equal to ½ |
| Type 3 | 167 | 30% | 3 to 70 | ¾ to 20 |
| Type 4 | 0 | 0% | N/A | N/A |

Additionally, HDR performed joint load transfer efficiency testing at 405 locations within the two inside travel lanes. The results indicate that approximately 67% of the tested joints exhibit “acceptable” load transfer efficiency (LTE); 30% exhibit “fair” LTE; and 3% exhibit “poor” LTE. The full results of the LTE testing are provided in Appendix C of this report.

It is noted that PTS did not observe full-depth “expansion joint” locations similar to those observed by VDOT in 2013. However, the joints may not be visible as a result of relatively recent asphalt overlays of the SB lanes.

8.7 Joint Repair Requirements and Estimated Quantities

Where the existing composite pavement is to be reused and resurfaced, transverse joint repairs shall be performed in accordance with the Section 3.8.4 of the Technical Requirements and the joint repair details shown on the Sheet 2C series of the RFP Conceptual Plans. After final resurfacing, all transverse joints, including those requiring Type 3 and 4 repairs, shall be saw cut and sealed in accordance with the VDOT Special Provision “Sawing and Sealing Joints in Asphalt Overlays Over Jointed Concrete Pavements,” dated February 27, 2019 and the joint repair details.

Repair requirements are broken out into the following project locations:

- I-495 SB General Purpose Lanes: The approximate joint location, distress width, distress length, and anticipated repair type are shown in tabular form on the Sheet 2C series of RFP Conceptual Plans. The joint repair locations and joint repair types shall be confirmed by the Design-Builder and approved by the Concessionaire prior to completing the repair work.
- I-495 NB General Purpose Lanes, North of Old Dominion Drive: Although repairs were previously made in this area, the Design-Builder shall evaluate the existing pavement conditions to determine if additional Type 3 or Type 4 repairs are required. Any additional joint repair locations and joint repair types shall be approved by the Concessionaire prior to completing the repair work.
- I-495 NB General Purpose Lanes, South of Old Dominion Drive: It is anticipated that repairs will be required in this area. The joint repair locations and joint repair types for this area of the project shall be determined by the Design-Builder and approved by the Concessionaire prior to completing any identified repair work.

The Design-Builder shall notify the Concessionaire and the VDOT Northern Virginia District Materials Engineer (DME) at least 48 hours in advance of each joint repair, so that the Concessionaire and DME can verify the correct repair locations on the pavement.

The locations of all transverse joints requiring repair in the southbound and northbound lanes shall be determined or confirmed and marked by the Design-Builder in the field prior to final resurfacing of all existing pavements. The Design-Builder shall confirm and/or identify the type, width, length, and if needed, depth of the repair, and with mutual agreement and direction from the Concessionaire’s on-site authorized representative, complete the repair.

Estimated number of joints and repair quantities are provided in Tables 8-6 and 8-7.

Table 8-6: Estimated Number of Joints by Project Area

| Direction | Joint Survey / Repair Information | Approximate Extents | Roadway Length | Average Joint Spacing ¹ | Estimated No. of Joints ² |
|-----------|---|--|----------------|------------------------------------|--------------------------------------|
| I-495 NB | No Joint Survey Data Available | Between Dulles Toll Road and Old Dominion Drive 566+00 to 614+00 | 4,800 ft | 29 ft | 166 |
| I-495 NB | Joint Survey completed by VDOT; repairs made previously | Between Old Dominion Drive and George Washington Memorial Parkway 614+00 to 703+00 | 8,900 ft | 29 ft | 307 |
| I-495 SB | Joint Survey Completed by Concessionaire; results provided in GDR | Between Southbound 495 Express Lanes Entrance and George Washington Memorial Parkway 592+00 to 701+00 | 10,900 ft | 29 ft | 376 |

¹ Total length of joint study divided by total number of joints observed. Actual spacing of transverse joints may be higher or lower than the average joint spacing shown.

² Actual number of transverse joints may be higher or lower than the estimated number of joints shown in this table.

Table 8-7: Estimated Joint Saw-cutting and Sealing and Joint Repair Quantities by Project Area

| Direction | Approximate Extents | Estimated No. of Joints | Saw-Cutting and Sealing of Type 1 Joints | Type 3 Repair | Type 4 Repair |
|--|---------------------|-------------------------|--|------------------|-----------------|
| | | | 70% ¹ | 23% ¹ | 7% ¹ |
| I-495 NB | 566+00 to 614+00 | 166 | 116 | 38 | 12 |
| I-495 NB | 614+00 to 703+00 | 307 | 284 ² | 18 ² | 5 ² |
| I-495 SB | 592+00 to 701+00 | 376 | 264 | 86 | 26 |
| No. of Joint Type Locations | | | 664 | 142 | 43 |
| Estimated Length of Joints (ft) (4 travel lanes + 1 shoulder) | | | 60 | 60 | 60 |
| Estimated Total Length (ft) | | | 39,840 | 8,500 | 2,600 |

¹ Distribution percentage of saw-cutting and sealing and joint repairs are approximate and based on available joint study data from NB and SB lanes. Actual numbers may be higher or lower.

² Type 3 and Type 4 joint repairs were previously made in NB lanes north of the Old Dominion Dr. Assume that 25% of distribution percentage for other areas may require repairs during NEXT construction. Saw-cutting and sealing of joints, which is included in Type 3 and 4 repairs, is required after final mill/overlay on all joints.

8.8 Temporary Pavement (Maintenance of Traffic)

The design-builder shall be responsible for any temporary pavement design. 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 Department for review. All temporary pavement shall

be completely removed once it is no longer in service. All temporary pavement designs for mainline or ramp pavements shall have a minimum 6 inches of asphalt concrete and a minimum 6 inches of plain aggregate (21B) and shall meet the following minimum design criteria.

- Design Life – 6 months minimum
- Reliability – 85% minimum
- Initial Serviceability – 4.2 minimum
- Terminal Serviceability – 2.8 minimum
- Standard Deviation – 0.49 minimum
- CBR value for subgrade soils determined by laboratory tests

9.0 GEOTECHNICAL CONSIDERATIONS FOR DESIGN AND CONSTRUCTION

9.1 Earthwork

Substantial amounts of earthwork construction will be required to grade the project site. Earthwork challenges that should be considered during design may include, but are not limited to, clearing and grubbing, topsoil stripping, ordinary and difficult excavation, subgrade preparation, subdrainage, compacted fill placement, retaining wall construction, embankment construction, widening of existing embankments, slope benching, removal and treatment of unsuitable materials, allowable cut and fill slope angles, and evaluation of stability and settlement in both design and construction for retained fills and non-retained fills. It will be the Design-Builder's responsibility to ensure that the stability and settlements of existing, widened, and new embankments have been designed to the tolerances specified in the RFP for this project.

Table A-2 in Appendix A summarizes selected observed subsurface conditions, including the presence of topsoil, suspected fill, alluvium presence, highly-plastic fine-grained soils, very soft to soft fine-grained soils, very loose coarse-grained soils, soils with refusal blow counts, and borings where auger refusal/rock was encountered.

9.1.1 Difficult Excavation

Cut slopes and walls with heights up to approximately 22 feet are proposed to accommodate the widening of I-495. Very dense and very stiff residual and IGM soils were encountered in test borings SWM-7, 19X-N-RW10 and 19LOD-BR16 within the proposed cut areas at depths between approximately 11 and 17 feet below existing ground surface. Difficult excavation into similar materials is anticipated at, but not limited to, the locations summarized herein:

- Adjacent to 495 NB between approximate stations 625+00 and 633+00 north of Scotts Run
- Adjacent to 495 SB between approximate stations 676+50 and 683+50 near Live Oak Drive flyover bridge

9.1.2 Subgrade Preparation and Reuse of Onsite Soils

For subgrades, it will be important to address appropriate methods for evaluation of subgrade suitability, and procedures for mitigating unsuitable subgrade materials. With respect to subdrainage, the design-builder shall identify areas where subdrainage is needed beyond that required by the standard VDOT specifications/special provisions and design the appropriate types of subdrainage. The design-builder shall evaluate the suitability of on-site soils for use as fill or backfill with respect to soil types, CBR values, and moisture contents.

Twenty-two bulk samples of soil collected from test borings within the proposed roadway alignment were tested in the laboratory for natural moisture content, classification, and Standard Proctor. Nineteen of these bulk samples were additionally tested for CBR and Resilient Modulus. The three bulk samples not assigned CBR and Resilient Modulus testing were collected from cut areas and were remolded and assigned a direct shear test. The test results are summarized in Table A-7 in Appendix A, and presented in Appendix D.

Moisture conditioning of the on-site soils should be anticipated and considered in design and construction of the project. The clay and silt soils will likely be difficult to compact if wet of optimum moisture content and/or during periods of wet weather due to their propensity to absorb and retain water. Fines content of the bulk samples ranged between approximately 30% and 75%, with an average of approximately 52%. It will be important that the design-builder address the potential impact that these soils could have on earthwork operations and how they should be treated during construction. As an alternative to aeration and/or mechanical drying, the design-builder may elect to use pelletized quick lime to dry soils that are excessively wet while incorporating effective dust control.

9.2 Unsuitable Materials

Unsuitable materials with respect to embankment fill, bedding for structures, and cut area subgrades directly beneath pavements are defined as any soils with one or more of the following properties:

- Greater than 50% passing the No. 200 sieve with a Liquid Limit greater than 50,
- Greater than 50% passing the No. 200 sieve with a Plasticity Index greater than 25,
- Classifies as CH, MH, OH and OL in accordance with the Unified Soil Classification System (USCS),

- Contains more than 5% by weight organic matter,
- A California Bearing Ratio (CBR) value less than 5 and/or a swell greater than 5% as determined from CBR testing in accordance with VTM-8.

Soils that are otherwise suitable, but are in a condition that is +/- 3% of optimum moisture content (i.e. saturated or very dry and/or very loose or very soft coarse/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 to an acceptable moisture content range that allows adequate compaction to meet project specifications.

Based upon the laboratory test results, available geologic/soils mapping, and local experience soils with CBR values less than 5 should be expected to be encountered on this project. Refer to Table A-2 in Appendix A for topsoil thickness measurements, subsurface water depth measurements, observations of very soft, soft or very loose soils, and highly-plastic fine-grained soils at test boring locations.

Where unsuitable soils are encountered in situ within 3 vertical feet of subgrade for pavements or minor structures, the following mitigation measures may be considered:

- Complete removal to a minimum of 2 feet horizontally beyond the outside edge of shoulder pavement or bedding limits and backfill with VDOT Select Material Type I Min. CBR 30; or
- Partial removal to a minimum of 3 feet on I-495, and 2 feet on secondary streets and ramps, vertically below final subgrade elevation, place a woven geotextile subgrade stabilization fabric, and backfill above the fabric with VDOT Select Material Type I Min. CBR 30; or
- Chemical stabilization of the unsuitable soils to a minimum depth of 12 inches below final subgrade.

Acceptable field evaluation methods to determine the extent (both lateral and vertical) of undercut typically include, but are not limited to: visual/manual classification of soils, test pit, hand auger, or SPT boring explorations, probe rods (including dynamic cone penetrometers), proof-rolling of subgrade with appropriately sized equipment, field CBR tests, or field moisture content determinations.

The final determination of unsuitable soil limits and quantities is the responsibility of the Design-Builder once the final detailed design subsurface investigation is completed. The Design-Builder should consider this when preparing their bid. Excessively soft/loose or saturated soils not located beneath and/or impacting the pavement subgrade may also be unsuitable based on the Design-Builder's investigation and analysis and must be removed to provide adequate support for embankments, structures or drainage items.

The Design-Builder's qualified geotechnical engineer must identify unsuitable materials and provide justification for the selected treatment method, or methods, to verify that there will be no adverse effect on the performance of embankments, structures or drainage items. Topsoil or other organic soils are also considered unsuitable for use in embankment fills 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 12 inches.

9.3 Storm Water Management Ponds

HDR completed 13 test borings for proposed storm water management pond locations, designated as "SWM" in Appendix A tables and figures. Depths of the test borings ranged from 8 to 25 feet beneath the ground surface. Piezometers were installed in 9 of the 13 SWM test borings to monitor post-exploration subsurface water depths. Table A-3 in Appendix A summarizes the piezometer water depth observations.

Issues to be considered during the design and construction of storm water ponds typically include, but are not limited to, side slope geometry and stability, permeability of the in-situ soil, and depth to subsurface water. When considering slope stability, the designer should consider a rapid drawdown condition (in addition to normal operating conditions) to account for temporary conditions immediately following large precipitation events.

9.4 Slope Design

Cut and fill slopes are proposed to support grade changes throughout the project. Cut slope heights range from approximately 3 to 15 feet, while fill slope heights range from approximately 3 to 28 feet. Cut and fill slopes shall be no steeper than 2H:1V; reinforced soil slopes steeper than 2H:1V will not be allowed on this project. Design considerations for embankment cut and fill slopes typically include, but are not limited to: global stability, settlement, impact to existing embankments, pavements, and structures, control of runoff and drainage, scour, and erosion control.

All cut and fill slopes shall be analyzed and designed in accordance with the most recent version of Chapter III of the VDOT Materials Division's Manual of Instructions. Critical slope slopes shall be designed to a factor of safety of 1.5 and non-critical slopes shall be designed to a factor of safety of 1.3. Critical slopes are defined as, any slope greater than 25 feet in height, supports a structure, or impounds water. Refer to Section 305.03 of VDOT Materials Division's Manual of Instructions for further design requirements, including the requirement for reliability assessments for the selection of soil parameters used in slope stability analyses. All cut and fill slopes shall be designed to be stable for the interim construction stages, for the end-of-construction condition, and for design-life conditions.

9.5 Bridge Foundations

Construction of new, replacement, or widened bridges will be required at 11 locations as part of the project. Based on subsurface conditions and knowledge of existing structures in the area, deep foundations should be anticipated for design and construction. Deep foundations usually consist of either driven piles or drilled shafts. Issues to be considered during the design and construction phases of the project for deep foundations typically include, but are not limited to: axial capacity, lateral capacity, negative shaft resistance, scour, settlement, group effects, drivability, load-testing programs, use of appropriate resistance factors in design, and protection of existing adjacent structures during construction. Additionally, if driven piles are selected, section loss due to corrosion should be considered, based on the laboratory testing results summarized in Section 6.3.2 of this report.

Existing bridge plans for the 495 NB GP bridge over Scott's Run Creek (EXT-W1) show that deep foundations were used in construction; however, shallow foundations may be a viable option for the bridge widening at Abutment A and Pier 1 based on proposed footing elevations that bear on IGM material. Additionally, at Abutment A, rock was encountered five feet below the proposed bearing elevation. Issues to be considered for design and construction of shallow foundations typically include, but are not limited to: bearing capacity, settlement, scour, dewatering, and temporary support of excavation. Regardless of scour protection, shallow foundations for bridge piers must extend below the design scour elevation.

Table 9-1 summarizes the test borings and subsurface conditions encountered within the vicinity of proposed bridge substructures.

Table 9-1 – Summary of Bridge Test Borings

| Bridge Designation | Construction | Sub-Structure | Test Borings Completed within Vicinity | Boring Depth (ft) | Auger Refusal Depth (ft) | Rock Encountered | Comments on Subsurface Conditions |
|---|--------------|---------------|--|-------------------|--------------------------|------------------|------------------------------------|
| DTR-N4 495 NB GP over DTR WB | Replacement | South Abut. | -- | -- | -- | -- | -- |
| | | North Abut. | 19DTR-BR6 | 70 | NE ¹ | -- | Very hard below 32 feet |
| DTR-N1 DTR EB flyover ramp to 495 XPL NB over DTR EB and DAAR | New | South Abut. | -- | -- | -- | -- | -- |
| | | Pier 1 | 19DTR-BR1 | 50 | 40 | X | Very dense/very hard below 13 feet |
| | | Pier 2 | -- | -- | -- | -- | -- |
| | | Pier 3 | 19DTR-BR2 | 60 | 45 | X | Very hard/very dense below 32 feet |
| North Abut. | | | | | | | |
| DTR-N2 495 XPL flyover ramp over 495 NB GP and DTR WB | New | South Abut. | -- | -- | -- | -- | -- |
| | | Pier | 19DTR-BR3 | 68 | NE ¹ | -- | Very dense below 47 feet |
| | | North Abut. | 19DTR-BR4a | 65 | 55 | -- | Very dense below 22 feet |
| EXT-N1 | Replacement | West Abut. | 19ODD-BR7 | 70 | NE ¹ | -- | Very hard below 52 feet |



| Bridge Designation | Construction | Sub-Structure | Test Borings Completed within Vicinity | Boring Depth (ft) | Auger Refusal Depth (ft) | Rock Encountered | Comments on Subsurface Conditions |
|---|--------------|---------------|--|-------------------|--------------------------|------------------------------|------------------------------------|
| Old Dominion Drive Overpass | | Pier 1 | -- | -- | -- | -- | -- |
| | | Pier 2 | -- | -- | -- | -- | -- |
| | | East Abut. | 19ODD-BR8, 19ODD-BR8a | 45, 70 | NE ¹ | | Very dense/very hard below 37 feet |
| EXT-W1 495 NB over Scotts Run Creek | Widening | South Abut. | 19X-BR09, 19X-N-RW8 | 29, 37 | 19, NE ¹ | X, -- | Very hard below 17 feet |
| | | Pier | -- | -- | -- | -- | -- |
| | | North Abut. | 19X-BR10 | 70 | 60 | X | Very hard below 32 feet |
| EXT-W2 495 SB over Scotts Run Creek | Widening | South Abut. | 19X-BR11 | 70 | NE ¹ | X | Very dense below 27 feet |
| | | Pier | -- | -- | -- | -- | -- |
| | | North Abut. | 19X-BR12 | 70 | NE ¹ | X (cored through 5' boulder) | Very hard below 34 feet |
| EXT-N2 Georgetown Pike Overpass | Replacement | East Abut. | 19GTP-BR13 | 69 | NE ¹ | -- | Very hard/very dense below 27 feet |
| | | Pier | -- | -- | -- | -- | -- |
| | | West Abut. | 19GTP-BR14 | 68 | NE ¹ | -- | Very dense below 42 feet |
| EXT-N4 GTP NW flyover ramp over GWP to 495 SB ramp | New | South Abut. | 19GTP-BR15 | 69 | NE ¹ | -- | Very hard/very dense below 37 feet |
| | | North Abut. | 19GTP-BR16 | 68 | NE ¹ | -- | Very hard/very dense below 32 feet |
| EXT-N3 Live Oak Drive Overpass | Replacement | East Abut. | 19LOD-BR15 | 68 | 48 | X | Very hard below 32 feet |
| | | Pier | -- | -- | -- | -- | -- |
| | | West Abut. | 19LOD-BR16 | 68 | NE ¹ | -- | Very hard below 42 feet |
| GWP-N3 GWP Flyover Ramp to over 495 SB | New | South Abut. | -- | -- | -- | -- | -- |
| | | Pier 1 | -- | -- | -- | -- | -- |
| | | Pier 2 | 19GWP-BR21 | 73 | NE ¹ | -- | Very dense below 62 feet |
| | | North Abut. | 19GWP-BR20 | 74 | NE ¹ | -- | Very hard below 62 feet |
| GWP-N2 495 NB XPL to GWP flyover ramp over 495 NB GP | New | South Abut. | 19GWP-RW11 | 50.5 | NE ¹ | -- | Very dense below 32 feet |
| | | Pier 1 | 19GWP-BR23 | 50 | 40 | X | Very dense below 32 feet |
| | | Pier 2 | 19X-N-RW22 | 48 | NE ¹ | -- | Very dense below 22 feet |
| | | North Abut. | -- | -- | -- | -- | -- |

¹ Not Encountered

9.6 Retaining Wall Foundations

Twenty nine retaining walls are proposed to support grade changes throughout the project associated with the roadway widening and construction of new bridge approaches. Walls required to support the roadway widening will be located in both fill and cut sections. Fill walls vary from

approximately 11 feet up to a maximum of 55 feet in height, and walls supporting cut sections vary from approximately 13 feet up to a maximum of 22 feet in height.

Design and construction considerations for cut walls typically include, but are not limited to: subsurface water levels and water pressures on the wall, drainage behind the wall, mitigation of corrosive soil environments, scour, anchoring requirements, embedment requirements, global stability, wall section determination, spacing and size of embedded elements, and design of facing elements.

Design and construction considerations for fill section retaining walls typically include, but are not limited to: subsurface water levels, drainage of the wall backfill, scour, evaluation of global and external stability (bearing capacity, sliding, overturning), total and differential settlement, confirmation of bearing requirements in field, and settlement monitoring.

Typical mitigation measures for settlement and stability concerns include the use of slip joints, lighter-weight fill materials, increasing the reinforcement strap lengths, or the use of ground improvement below the bearing elevation of the walls. Given that fill heights on the project may be up to approximately 55 feet, it is reasonable to assume that ground improvement above and/or beneath the bearing surface may be required in some instances to support the higher anticipated bearing pressures and driving loads.

10.0 LIMITATIONS

The information contained in this document has been prepared to facilitate preparation of the proposal for this project and should not be solely relied upon for the final design and construction of this project. A design level geotechnical investigation must be performed by the Design-Builder to verify and supplement the information included in this document. Design-Builders shall refer to the Contract for further information regarding the required investigations and identification, resolution, and responsibility for differing site conditions.

The data included in this report depict the subsurface soil, ground water, and existing pavement conditions at the specific locations where the borings were performed. These conditions may vary at other locations beyond, or between, these specific locations. Accordingly, the Concessionaire does not warrant or guarantee that the information provided on the logs, or in this report, can be projected as indicative of conditions beyond the limits of the borings, and any such projection is purely interpretive. In addition, the ground water levels recorded on the boring logs indicate the ground water conditions that existed at the time of the investigation. Ground water levels may vary considerably, with time, according to prevailing climate, rainfall, surface run-off, evaporation, construction and other factors.

The data are made available to bidders in order that they may have access to subsurface data identical to that which is possessed by the Concessionaire, and are not intended as a substitute

for personal investigation, interpretation and judgment by others. Also, the information contained herein represents borings that were performed by the Concessionaire and may not represent all of the borings performed on the project, particularly if consultant designers performed work under self-contained geotechnical/design contracts.

The minimum pavement sections and discussion of geotechnical considerations as presented in this report are based on the information revealed by the preliminary exploration. The Concessionaire has attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during subsequent site explorations and construction. The design-builder must perform additional test borings and laboratory testing to develop the design for this project and to meet the minimum requirements outlined in Chapter III of the current VDOT Material Division's Manual of Instructions and the current AASHTO LRFD Bridge Design Specifications, 2014 and VDOT Modifications.

The Concessionaire has endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project.

11.0 REFERENCES

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Commonwealth of Virginia, Department of Mines, Minerals and Energy, Division of Mineral Resources, Virginia Division of Mineral Resources, *Geologic Map of Virginia – Expanded Explanation*, 1993.

Virginia Department of Transportation (2011), *Geotechnical Manual for Structures-Chapter 9: Pile Foundations*.

Virginia Department of Transportation, *Manual of Instructions, Chapter III – Geotechnical Engineering*, January 2019.

Virginia Department of Transportation, *Road and Bridge Specifications*, 2016.



PROJECT NEXT

APPENDIX A

FIGURES AND TABLES

Figure 1: Site Vicinity Map

Figure 2: Geology Map

Figure 3: As-Drilled Boring Location Plan

Table A-1: Summary of Subsurface Explorations

Table A-2: Summary of Subsurface Conditions

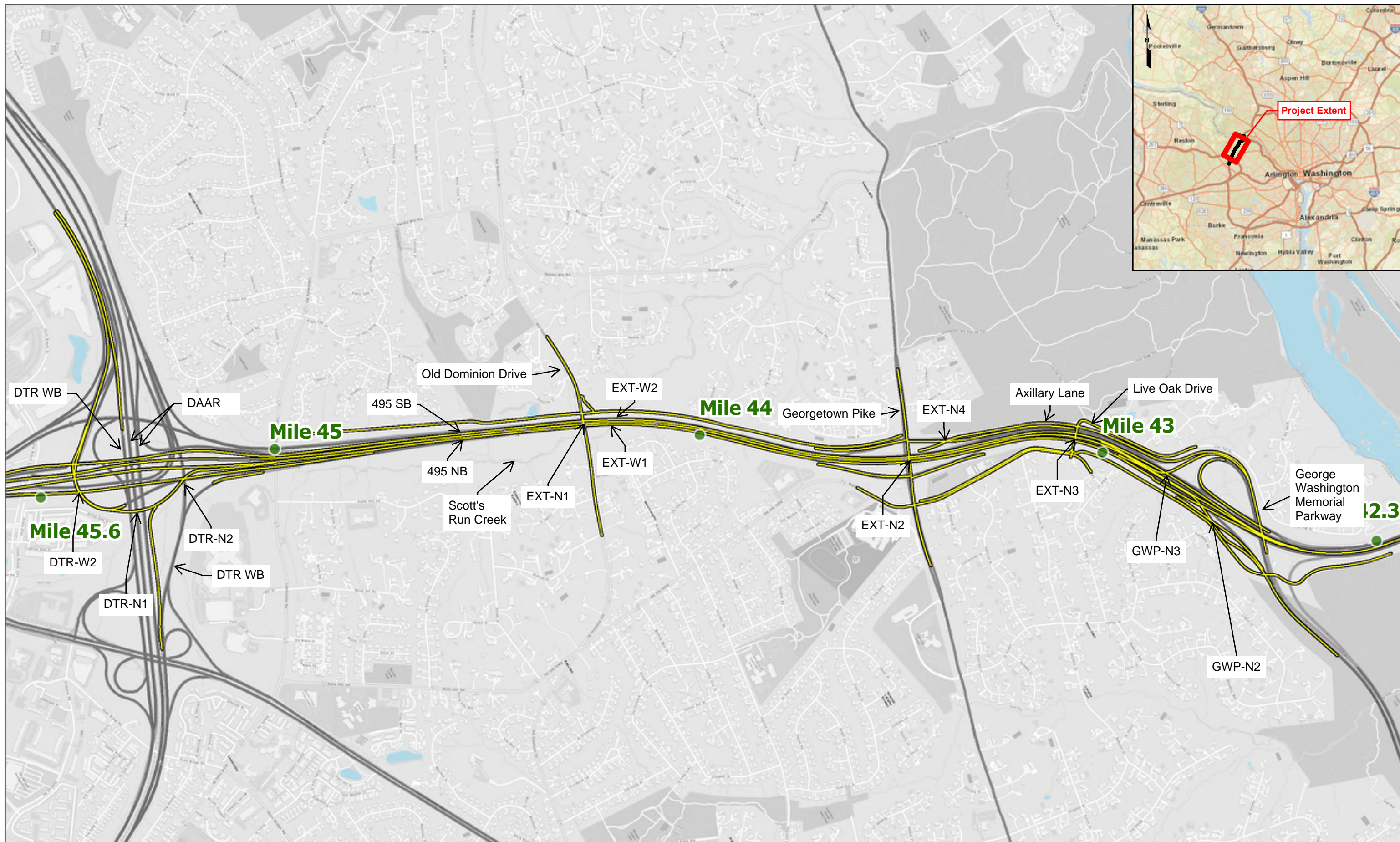
Table A-3: Piezometer Water Depth Observations

Table A-4: Summary of Pavement Thickness Data at Test Locations

Table A-5: Index of Laboratory Testing to Subsurface Explorations

Table A-6: Summary of Laboratory Testing Results

Table A-7: Summary of Bulk Sample Tests





Transurban

Project Alignment

Waterbodies

Mile Marker



DATA SOURCE: USGS Falls Church Quadrangle, 1997






NEXT 495 EXPRESS LANES

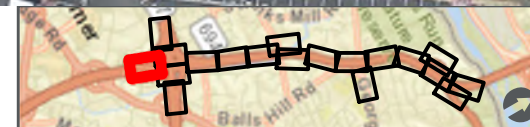
GEOLOGY MAP

FIGURE 2



LEGEND

- | | | | | | |
|---|----------------|---|-----------------------|---|-----------------------|
|  | Bridge Boring |  | Retaining Wall Boring |  | Existing Soil Borings |
|  | Roadway Boring |  | SWM Boring | | |



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

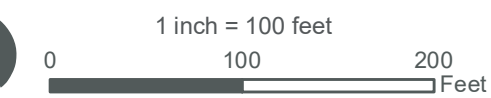
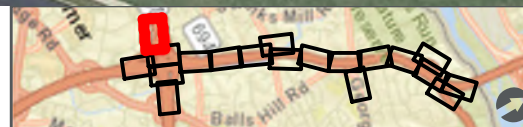
FIGURE 3

SHEET 1 OF 19



LEGEND

-  Bridge Boring
-  Retaining Wall Boring
-  Existing Soil Borings
-  Roadway Boring
-  SWM Boring



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

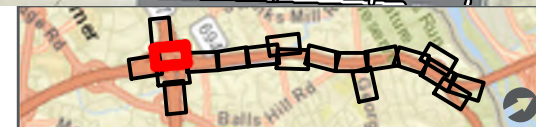
FIGURE 3

SHEET 2 OF 19



LEGEND

-  Bridge Boring
-  Retaining Wall Boring
-  Existing Soil Borings
-  Roadway Boring
-  SWM Boring



1 inch = 100 feet
 0 100 200 Feet

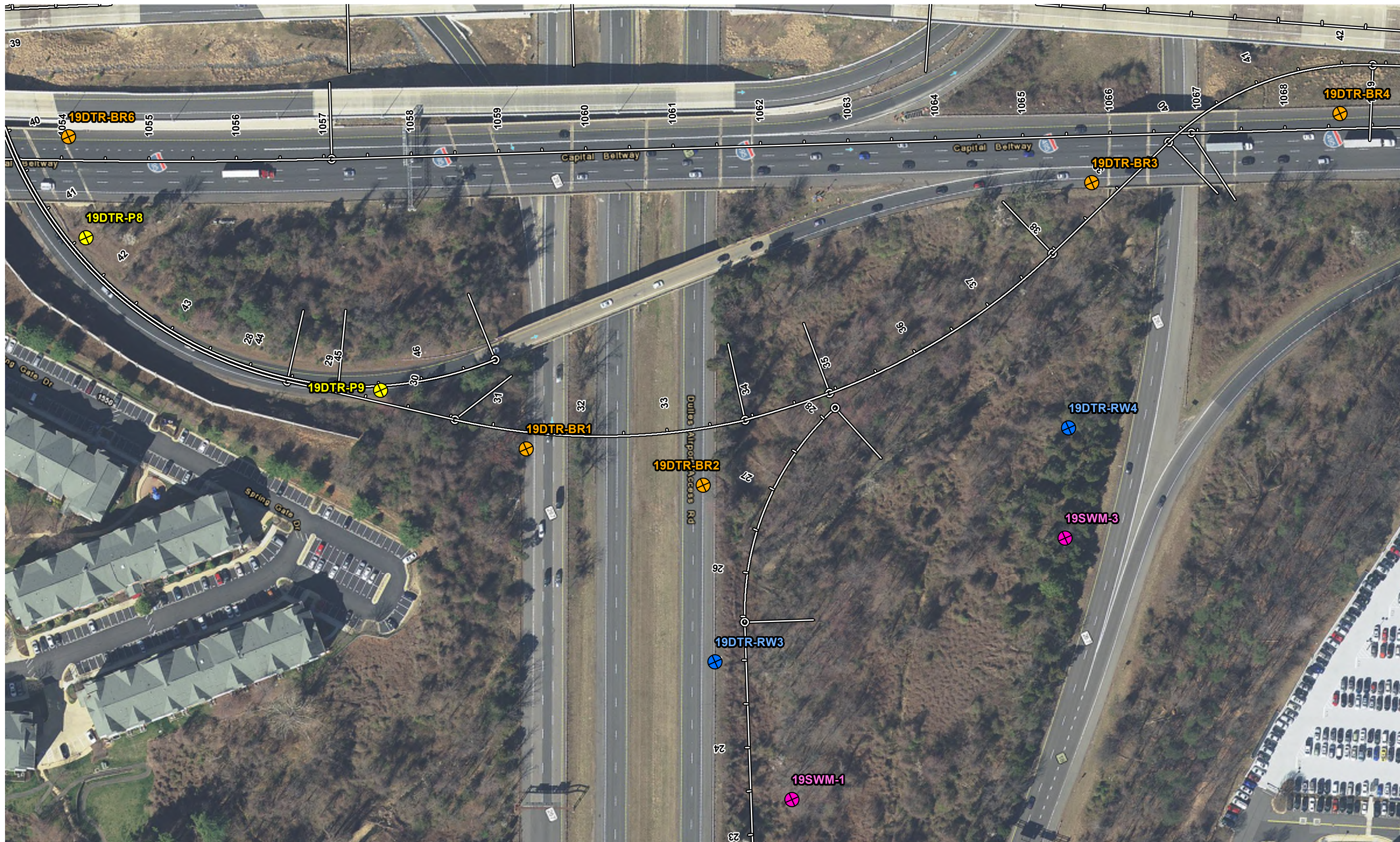
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BORING LOCATION PLAN






PROJECT NEXT

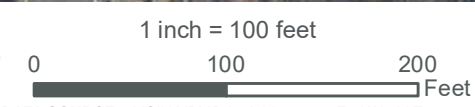
FIGURE 3

SHEET 3 OF 19



LEGEND

-  Bridge Boring
-  Retaining Wall Boring
-  Existing Soil Borings
-  Roadway Boring
-  SWM Boring



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

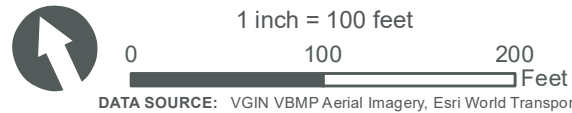
FIGURE 3

SHEET 4 OF 19



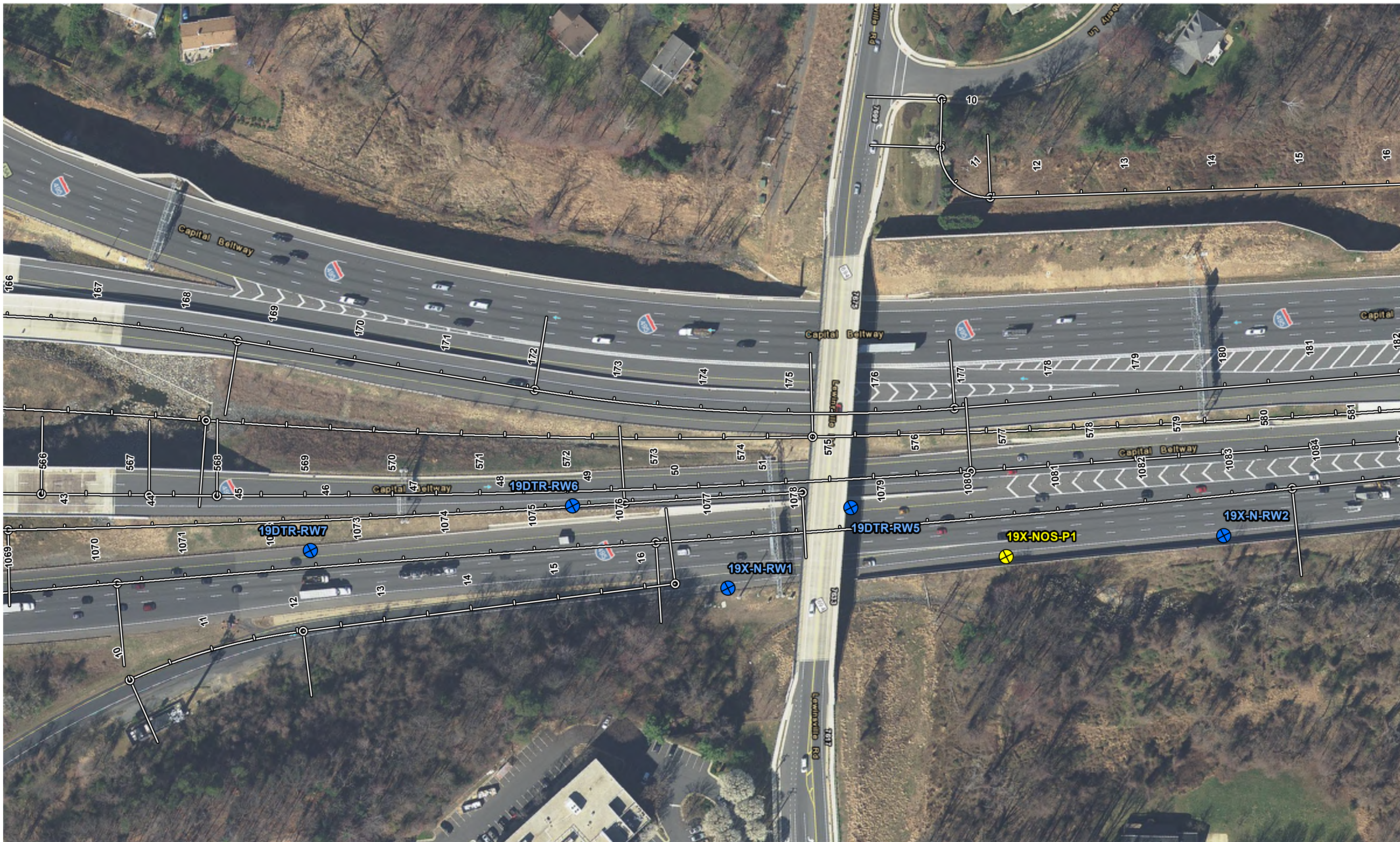
LEGEND

- ⊕ Bridge Boring
- ⊕ Retaining Wall Boring
- ⊕ Existing Soil Borings
- ⊕ Roadway Boring
- ⊕ SWM Boring








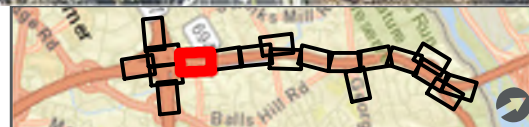
BORING LOCATION PLAN
PROJECT NEXT
 FIGURE 3
 SHEET 5 OF 19

DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation



LEGEND

-  Bridge Boring
-  Roadway Boring
-  Retaining Wall Boring
-  SWM Boring
-  Existing Soil Borings



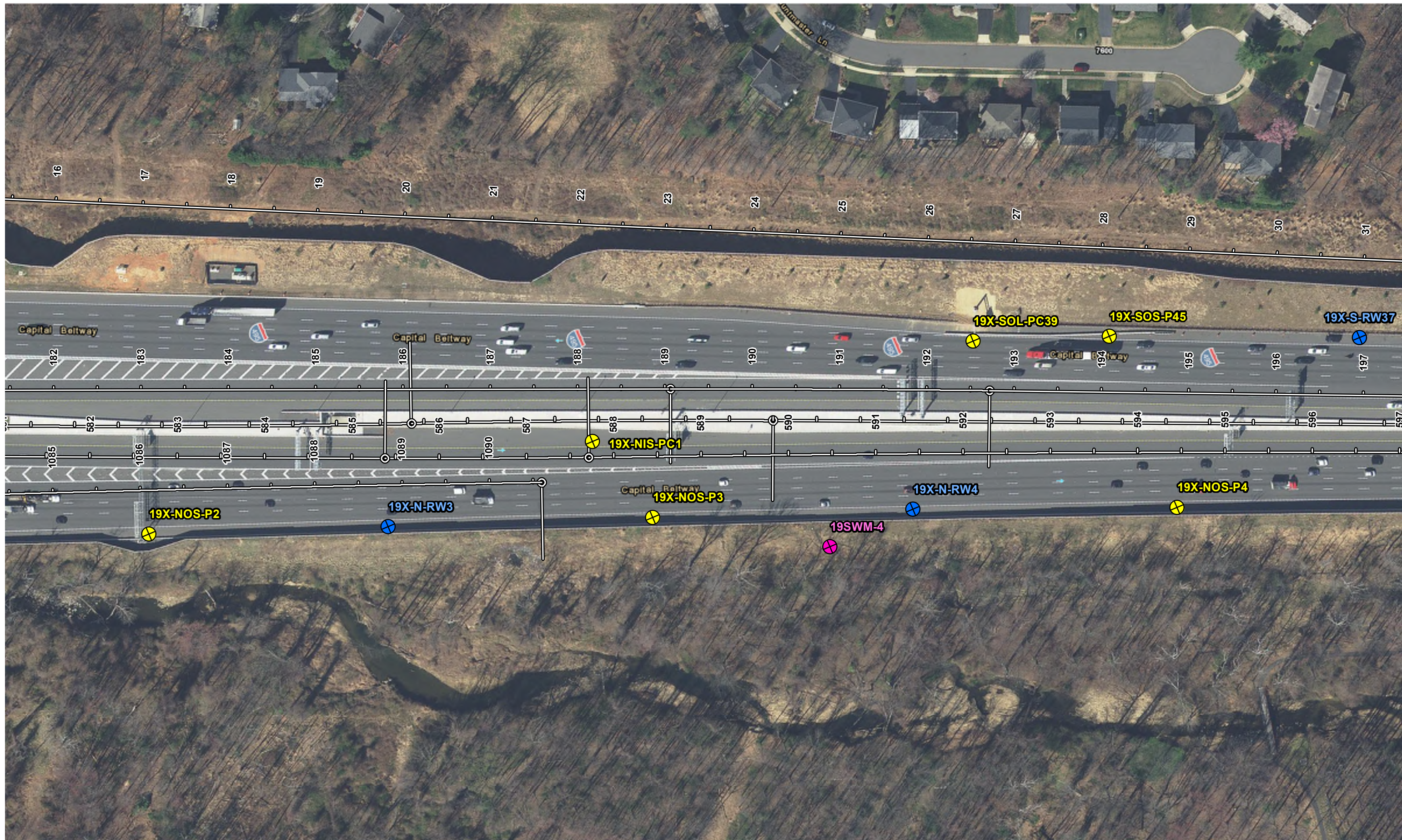
1 inch = 100 feet
 0 100 200 Feet

DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

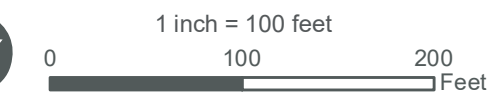
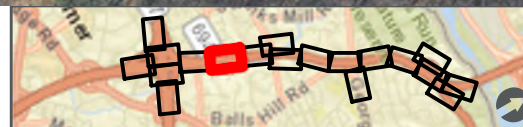
PROJECT NEXT
 FIGURE 3

SHEET 6 OF 19



LEGEND

- Bridge Boring
- Roadway Boring
- Retaining Wall Boring
- SWM Boring
- Existing Soil Borings



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

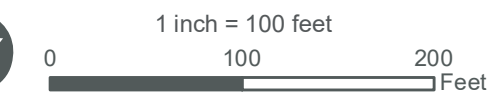
FIGURE 3

SHEET 7 OF 19



LEGEND

- Bridge Boring
- Retaining Wall Boring
- Existing Soil Borings
- Roadway Boring
- SWM Boring



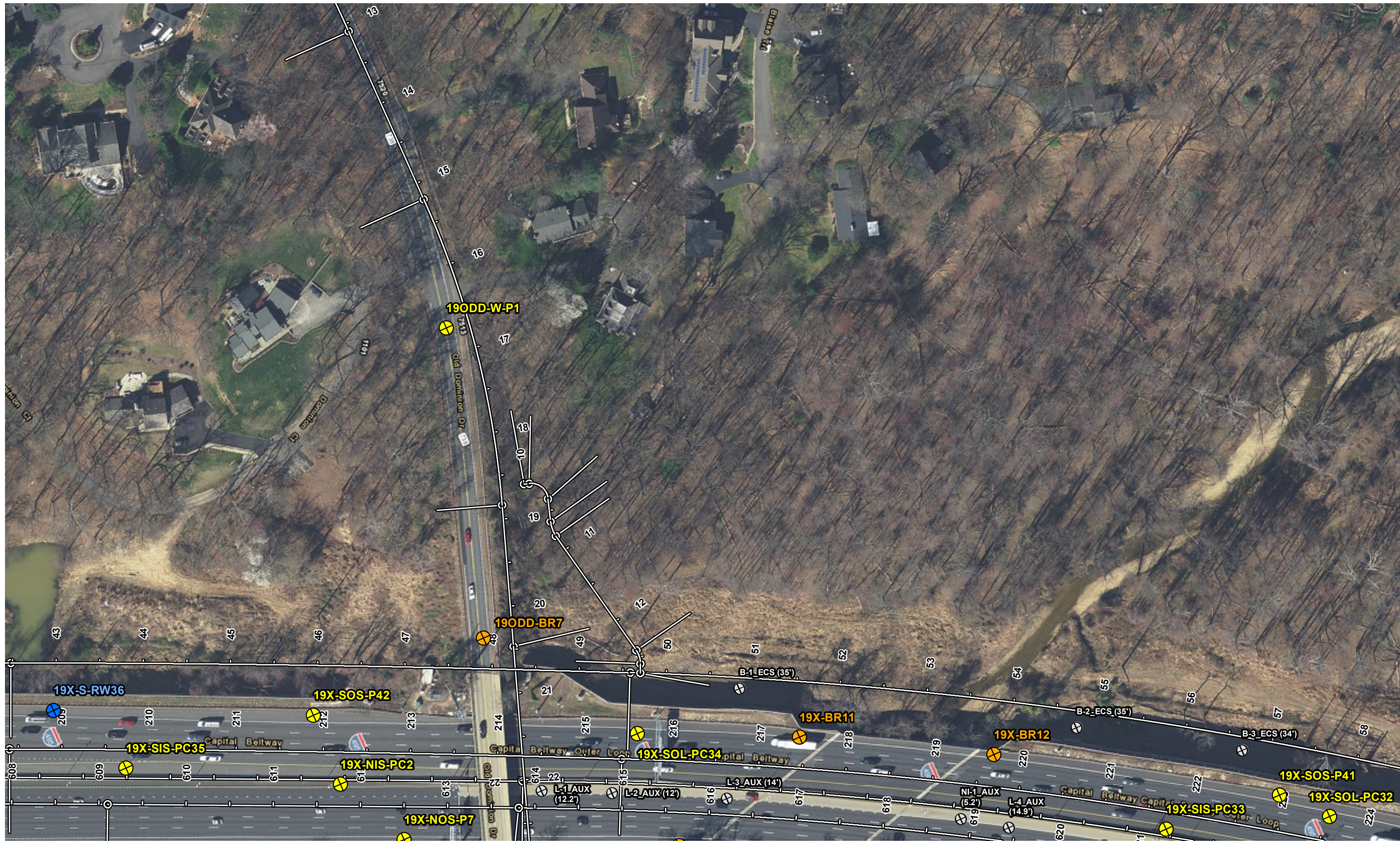
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

FIGURE 3

SHEET 8 OF 19



LEGEND

- Bridge Boring
- Retaining Wall Boring
- Existing Soil Borings
- Roadway Boring
- SWM Boring



1 inch = 100 feet
 0 100 200 Feet

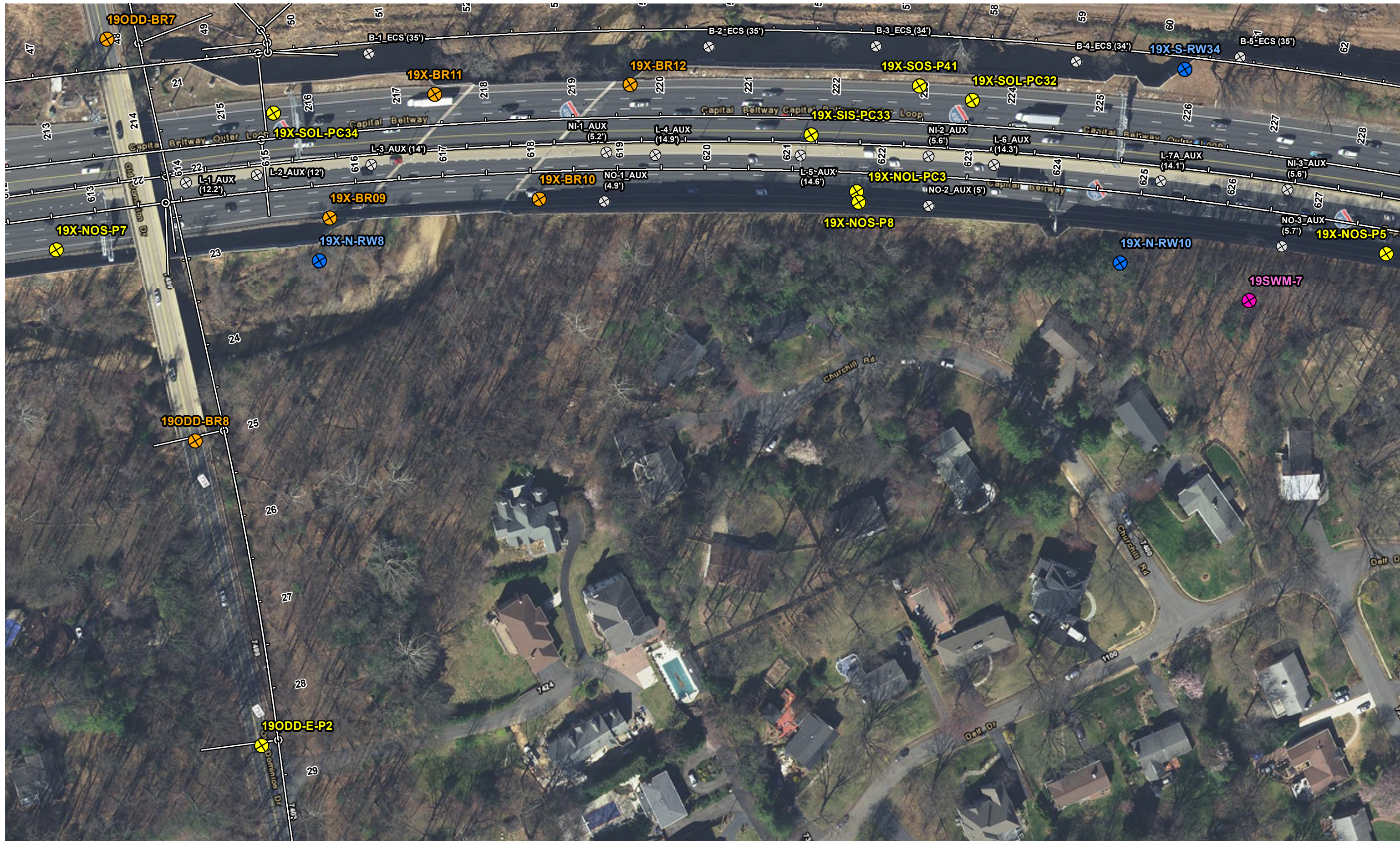
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

FIGURE 3

SHEET 9 OF 19



LEGEND

- ⊗ Bridge Boring
- ⊗ Retaining Wall Boring
- ⊗ Existing Soil Borings
- ⊗ Roadway Boring
- ⊗ SWM Boring



1 inch = 100 feet



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

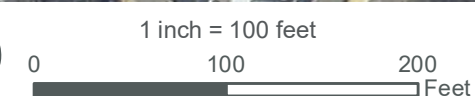
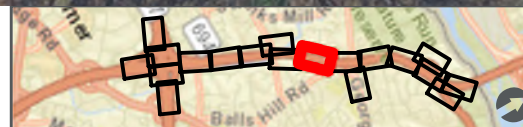
FIGURE 3

SHEET 10 OF 19



LEGEND

- ⊕ Bridge Boring
- ⊕ Roadway Boring
- ⊕ Retaining Wall Boring
- ⊕ SWM Boring
- ⊕ Existing Soil Borings



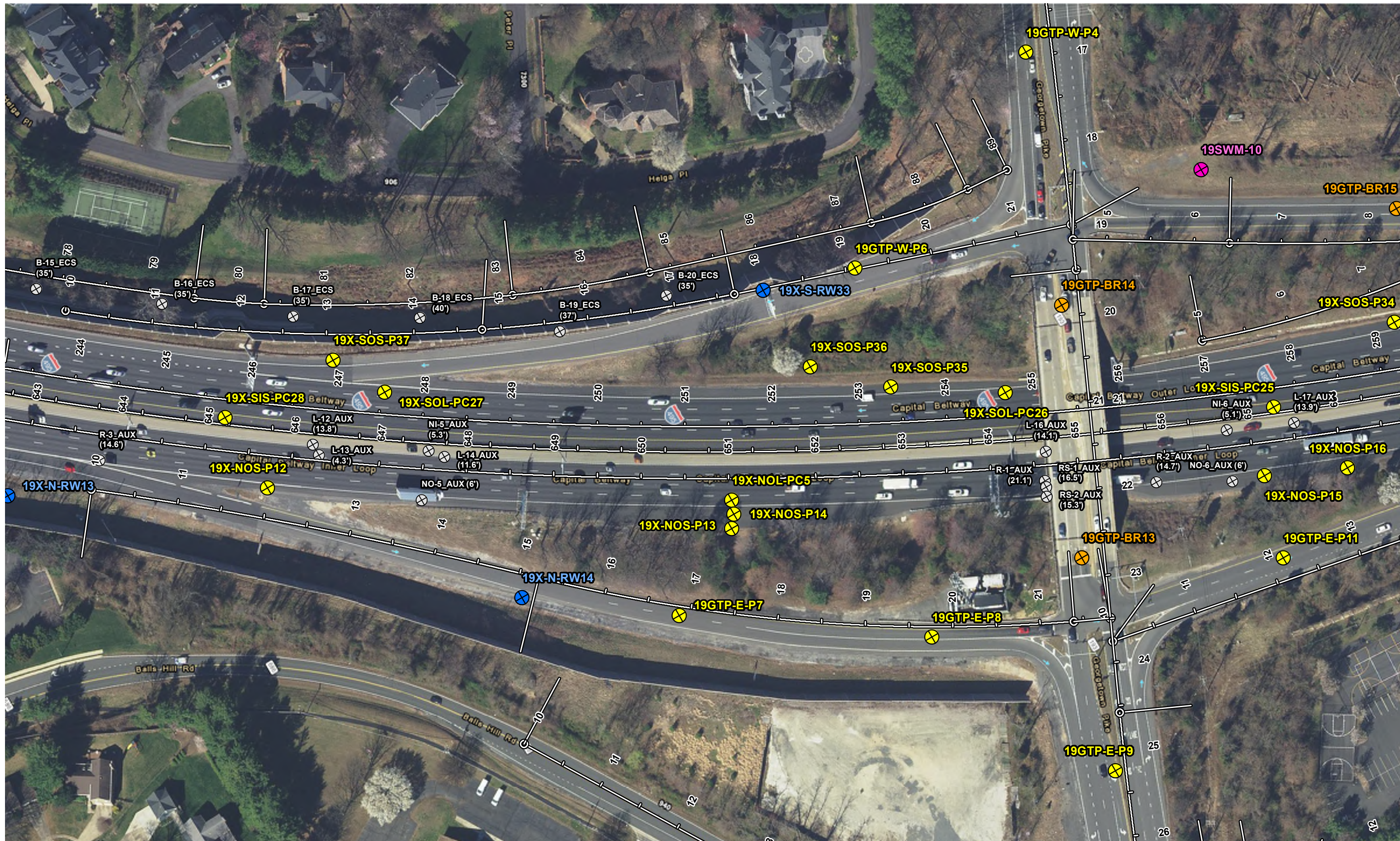
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

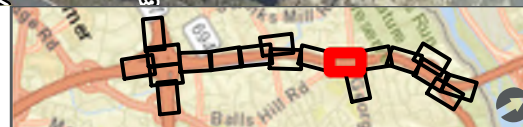
FIGURE 3

SHEET 11 OF 19



LEGEND

- ⊗ Bridge Boring
- ⊗ Roadway Boring
- ⊕ Retaining Wall Boring
- ⊗ SWM Boring
- ⊗ Existing Soil Borings



1 inch = 100 feet
 0 100 200 Feet

DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

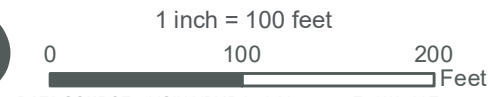
FIGURE 3

SHEET 12 OF 19



LEGEND

-  Bridge Boring
-  Retaining Wall Boring
-  Existing Soil Borings
-  Roadway Boring
-  SWM Boring



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

FIGURE 3

SHEET 13 OF 19



LEGEND

- ⊕ Bridge Boring
- ⊕ Roadway Boring
- ⊕ Retaining Wall Boring
- ⊕ SWM Boring
- ⊕ Existing Soil Borings



1 inch = 100 feet
 0 100 200 Feet

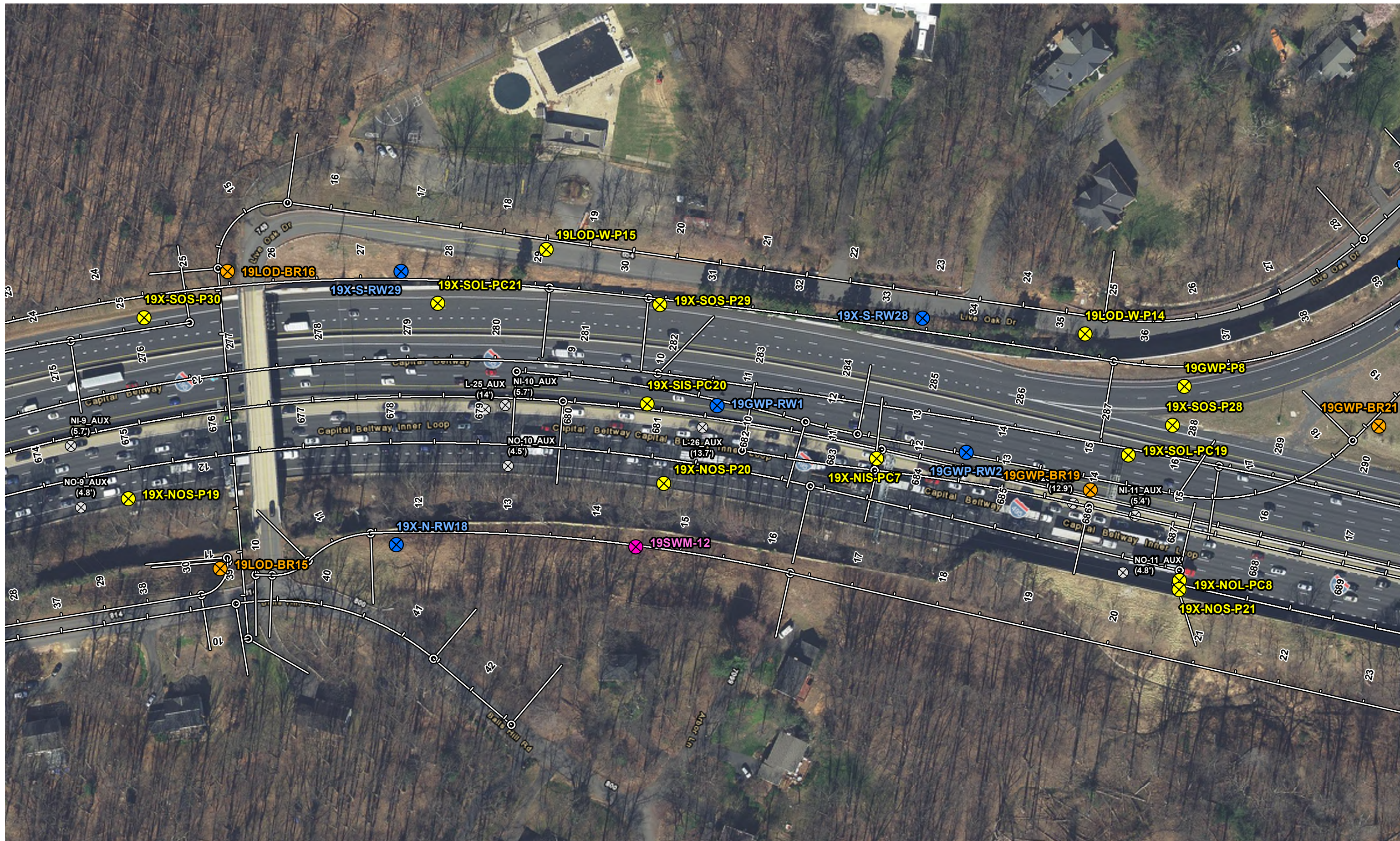
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

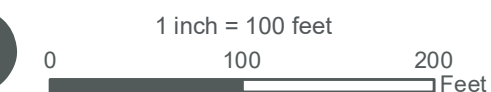
FIGURE 3

SHEET 14 OF 19



LEGEND

- | | | | | | |
|---|----------------|---|-----------------------|---|-----------------------|
|  | Bridge Boring |  | Retaining Wall Boring |  | Existing Soil Borings |
|  | Roadway Boring |  | SWM Boring | | |



DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

FIGURE 3

SHEET 15 OF 19



LEGEND

-  Bridge Boring
-  Roadway Boring
-  Retaining Wall Boring
-  SWM Boring
-  Existing Soil Borings



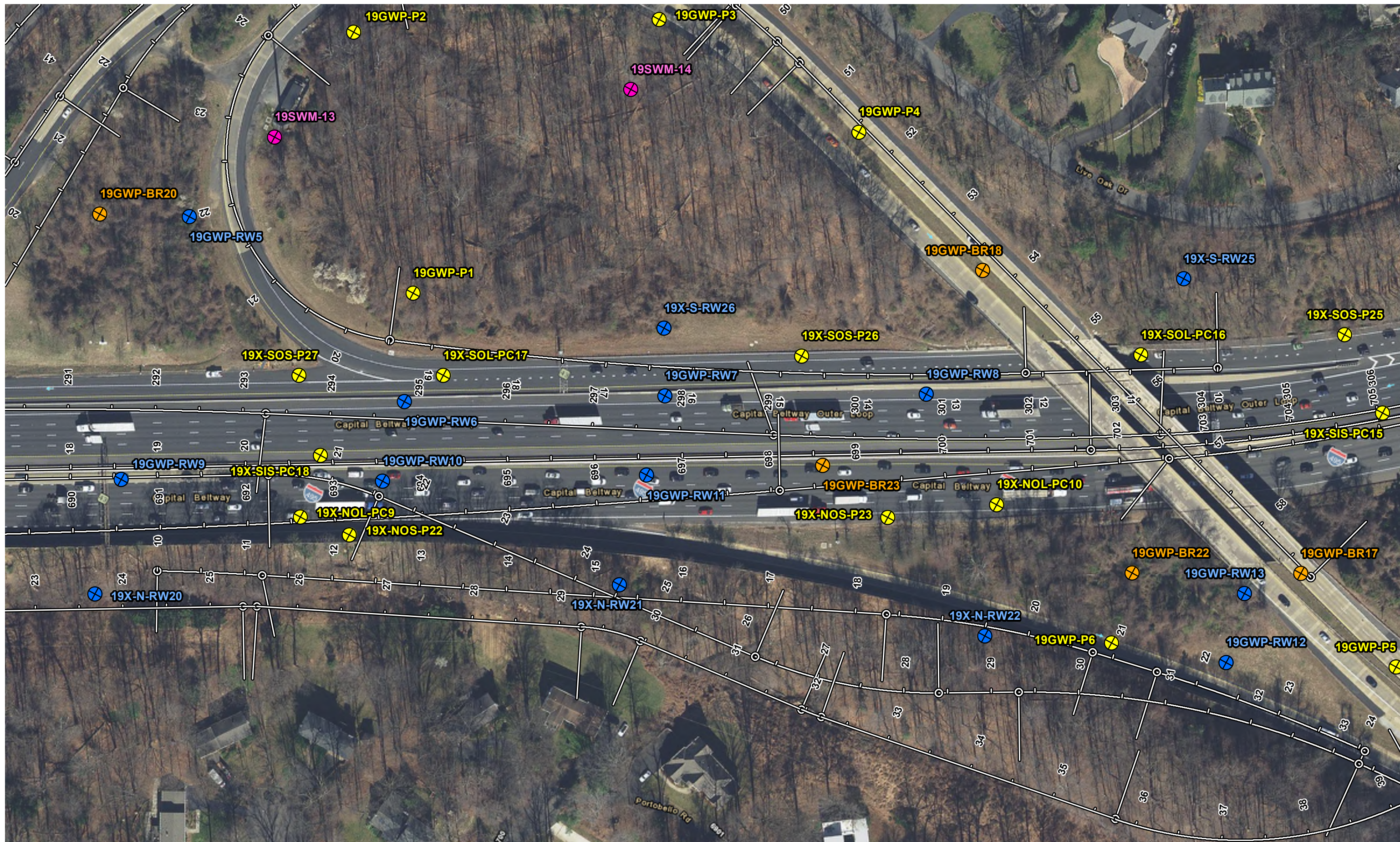
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

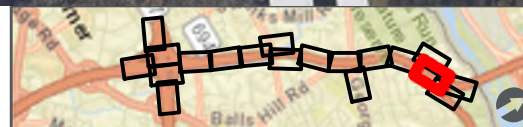
FIGURE 3

SHEET 16 OF 19



LEGEND

- ⊕ Bridge Boring
- ⊕ Roadway Boring
- ⊕ Retaining Wall Boring
- ⊕ SWM Boring
- ⊕ Existing Soil Borings



1 inch = 100 feet
 0 100 200 Feet

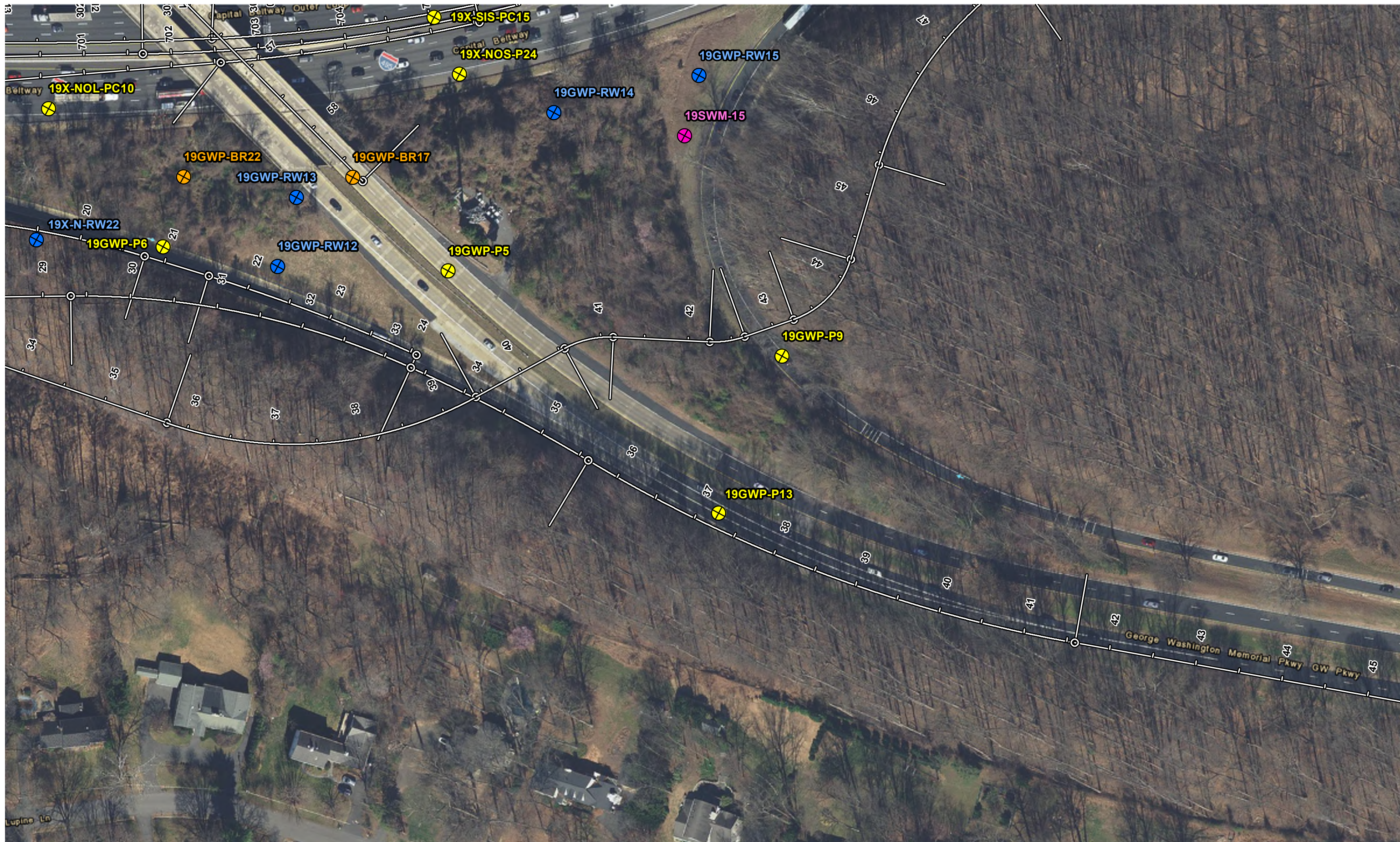
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN

PROJECT NEXT

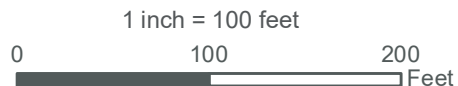
FIGURE 3

SHEET 17 OF 19



LEGEND

- Bridge Boring
- Roadway Boring
- Retaining Wall Boring
- SWM Boring
- Existing Soil Borings



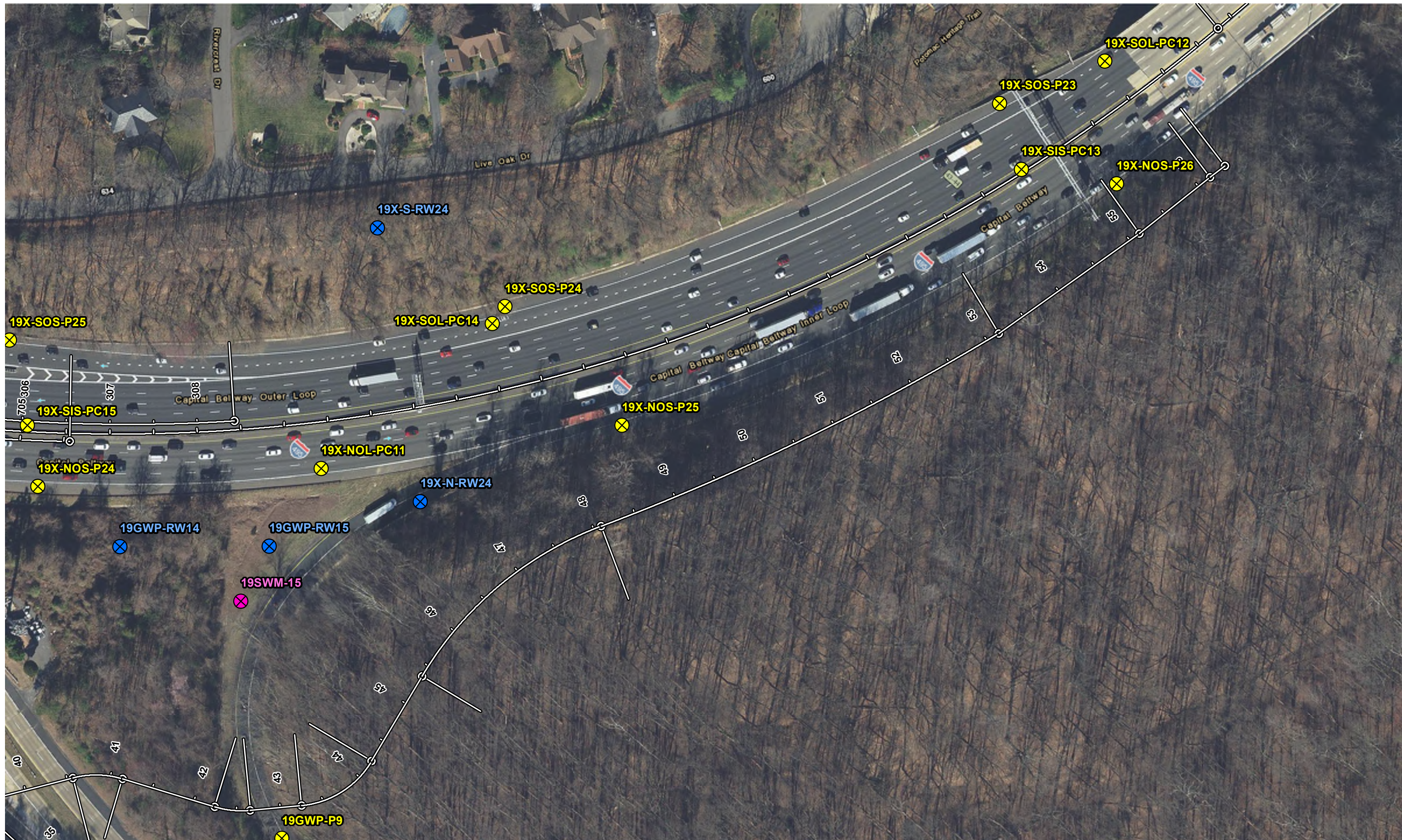
DATA SOURCE: VGIN VBMP Aerial Imagery, Esri World Transportation

BORING LOCATION PLAN






PROJECT NEXT

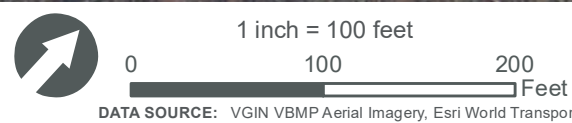
FIGURE 3

SHEET 18 OF 19



LEGEND

| | | | | | |
|---|----------------|---|-----------------------|---|-----------------------|
|  | Bridge Boring |  | Retaining Wall Boring |  | Existing Soil Borings |
|  | Roadway Boring |  | SWM Boring | | |



BORING LOCATION PLAN
PROJECT NEXT
FIGURE 3
SHEET 19 OF 19



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

| Exploration Designation | Primary Design Element Purpose | General Location of Exploration | Travel Lane | Reference Base Line | Station | Offset (ft) | Surface Elevation (ft) | Latitude | Longitude | Northing | Easting | Depth Drilled (ft) | Date Completed |
|-------------------------|--------------------------------|---|---------------------|---------------------|---------|-------------|------------------------|-----------|------------|-----------|------------|--------------------|----------------|
| 19DTR-BR01 | Bridge DTR-N1 | Dulles Toll Road EB | Outside Shoulder | DTR RMP E1 | 31+44 | 24 RT | 301.3 | 38.930608 | -77.209429 | 462902.42 | 3648173.58 | 50.0 | 6/27/19 |
| 19DTR-BR02 | Bridge DTR-N1 | Dulles Toll Road WB | Outside Shoulder | DTR RMP E1 | 33+35 | 71 RT | 298.3 | 38.931068 | -77.208992 | 463071.79 | 3648295.51 | 60.0 | 6/11/19 |
| 19DTR-BR03 | Bridge DTR-N2 | I-495 NB | Outside Shoulder | DTR RMP E1 | 38+76 | 36 LT | 303.7 | 38.932543 | -77.209490 | 463606.92 | 3648146.29 | 68.2 | 6/25/19 |
| 19DTR-BR04 | Bridge | I-495 NB | Inside Shoulder | DTR RMP E1 | 43+64 | 22 LT | 286.6 | 38.933867 | -77.209331 | 464089.92 | 3648196.52 | 24.0 | 5/28/19 |
| 19DTR-BR04A | Bridge DTR-N2 | I-495 NB | Inside Shoulder | 495GP NB | 1068+45 | 17 LT | 297.9 | 38.933322 | -77.20929 | 463891.20 | 3648187.62 | 65.0 | 6/23/19 |
| 19DTR-BR06 | Bridge DTR-W2 | I-495 NB | Inside Shoulder | 495GP NB | 1054+25 | 30 LT | 331.5 | 38.929755 | -77.211338 | 462584.05 | 3647635.10 | 70.0 | 6/19/19 |
| 19DTR-P02 | Pavement/Tie-in | Aux. Ramp from DTR to 495NB | Outside Shoulder | DTR EB | 21+16 | 60 RT | 299.9 | 38.933498 | -77.218667 | 463918.30 | 3645531.19 | 8.0 | 7/2/19 |
| 19DTR-P06 | Pavement/Tie-in | Aux. Ramp from DTR to 495NB | Inside Shoulder | DTR RMP G3 | 35+65 | 32 LT | 306.6 | 38.930191 | -77.212665 | 462737.65 | 3647255.21 | 8.5 | 7/2/19 |
| 19DTR-P07 | Pavement/Tie-in | Dulles Toll Road On-Ramp 495 NB | -- | DTR RMP E3 | 12+33 | 9 RT | 339.9 | 38.929495 | -77.204272 | 462517.74 | 3649646.26 | 7.0 | 6/27/19 |
| 19DTR-P08 | Pavement/Tie-in | Dulles Toll Road On-Ramp 495 NB | Outside Shoulder | DTR RMP G3 | 41+45 | 10 LT | 313.4 | 38.929601 | -77.210983 | 462529.44 | 3647736.84 | 6.0 | 7/2/19 |
| 19DTR-P09 | Pavement/Tie-in | I-495 NB | Outside Shoulder | DTR RMP G3 | 45+46 | 8 RT | 320.0 | 38.930248 | -77.209905 | 462769.54 | 3648040.02 | 7.5 | 7/15/19 |
| 19DTR-RW01 | Retaining Wall RW13 | Dulles Toll Road WB | -- | DTR RMP E3 | 18+97 | 52 LT | 317.6 | 38.930189 | -77.206422 | 462762.02 | 3649031.18 | 50.0 | 5/17/19 |
| 19DTR-RW02 | Retaining Wall RW13 | Dulles Toll Road WB | -- | DTR RMP E3 | 21+96 | 44 LT | 308.9 | 38.930525 | -77.207380 | 462880.49 | 3648756.99 | 50.0 | 5/17/19 |
| 19DTR-RW03 | Retaining Wall RW13 | Dulles Toll Road WB | -- | DTR RMP E3 | 24+95 | 27 LT | 300.8 | 38.930883 | -77.208328 | 463006.87 | 3648485.51 | 48.3 | 6/30/19 |
| 19DTR-RW04 | Retaining Wall RW13 | Dulles Toll Road WB Off-Ramp 495 NB | -- | DTR RMP E1 | 37+10 | 167 RT | 279.7 | 38.932241 | -77.208624 | 463500.27 | 3648394.19 | 30.3 | 6/25/19 |
| 19DTR-RW05 | Retaining Wall RW01 | I-495 NB | Inside Shoulder | 495GP NB | 1078+73 | 26 LT | 275.6 | 38.935919 | -77.207915 | 464842.76 | 3648577.05 | 41.6 | 5/6/19 |
| 19DTR-RW06 | Retaining Wall RW01 | I-495 NB Express Lane | Outside Shoulder | DTR RMP E1 | 48+80 | 1 RT | 287.5 | 38.935125 | -77.208457 | 464551.58 | 3648426.91 | 32.5 | 5/29/19 |
| 19DTR-RW07 | Retaining Wall RW01 | I-495 NB | Inside Shoulder | 495GP NB | 1072+32 | 16 LT | 289.1 | 38.934298 | -77.208792 | 464248.83 | 3648335.87 | 52.0 | 5/6/19 |
| 19GTP-BR13 | Bridge EXT-N2 | Georgetown Turnpike EB | Inside Inside Lane | GTP | 22+67 | 24 RT | 316.1 | 38.954438 | -77.193492 | 471645.42 | 3652583.58 | 68.8 | 6/4/19 |
| 19GTP-BR14 | Bridge EXT-N2 | Georgetown Turnpike WB | Inside Inside Lane | GTP | 20+00 | 19 RT | 319.6 | 38.954760 | -77.194334 | 471759.20 | 3652342.57 | 68.2 | 6/5/19 |
| 19GTP-BR15 | Bridge EXT-N4 | SB Off-Ramp Georgetown Turnpike | Outside Shoulder | GTP RMP NW | 08+28 | 41 LT | 305.6 | 38.955824 | -77.194040 | 472147.69 | 3652420.59 | 69.3 | 6/19/19 |
| 19GTP-BR16 | Bridge EXT-N4 | SB Off-Ramp Georgetown Turnpike | Outside Lane | GWMP RMP G21 | 09+80 | 12 LT | 292.9 | 38.956393 | -77.193680 | 472356.44 | 3652520.05 | 68.2 | 6/18/19 |
| 19GTP-E-P07 | Pavement/Tie-in | 495 NB Off-Ramp Georgetown Parkway | Inside Travel Lane | GTP RMP SE | 16+78 | 25 RT | 311.0 | 38.953195 | -77.194071 | 471190.33 | 3652425.38 | 7.5 | 4/23/19 |
| 19GTP-E-P08 | Pavement/Tie-in | 495 NB Off-Ramp Georgetown Parkway | Inside Travel Lane | GTP RMP SE | 19+69 | 29 RT | 314.3 | 38.953848 | -77.193454 | 471430.51 | 3652597.52 | 7.0 | 4/23/19 |
| 19GTP-E-P09 | Pavement/Tie-in | Georgetown Parkway EB | Median | GTP | 25+25 | 15 RT | 308.8 | 38.954161 | -77.192656 | 471547.88 | 3652822.91 | 8.0 | 5/31/19 |
| 19GTP-E-P10 | Pavement/Tie-in | Georgetown Parkway EB | Inside Travel Lane | GTP | 30+79 | 15 LT | 280.9 | 38.953715 | -77.190793 | 471392.99 | 3653354.93 | 8.0 | 6/6/19 |
| 19GTP-E-P11 | Pavement/Tie-in | Georgetown Parkway EB On-Ramp 495 NB | Inside Travel Lane | GTP RMP NE | 12+26 | 5 LT | 307.3 | 38.954983 | -77.192967 | 471845.84 | 3652730.07 | 9.0 | 4/29/19 |
| 19GTP-E-P12 | Pavement/Tie-in | Georgetown Parkway EB | Outside Travel Lane | BH RD | 16+64 | 19 RT | 300.8 | 38.953687 | -77.192087 | 471377.46 | 3652987.06 | 8.0 | 6/6/19 |
| 19GTP-E-P13 | Pavement/Tie-in | Georgetown Parkway EB | Outside Travel Lane | BH RD | 18+97 | 17 LT | 295.6 | 38.954326 | -77.191932 | 471610.68 | 3653027.83 | 8.3 | 6/6/19 |
| 19GTP-W-P04 | Pavement/Tie-in | Georgetown Parkway WB | Inside Travel Lane | GTP | 17+04 | 25 RT | 319.2 | 38.955086 | -77.195286 | 471873.92 | 3652070.05 | 7.6 | 5/31/19 |
| 19GTP-W-P06 | Pavement/Tie-in | Georgetown Parkway WB On-Ramp 495 SB | Outside Travel Lane | GTP RMP SW | 18+98 | 4 LT | 313.2 | 38.954243 | -77.194953 | 471568.28 | 3652169.18 | 6.6 | 6/11/19 |
| 19GWP-BR17 | Bridge | George Washington Parkway On-Ramp NB | Inside Travel Lane | GWMP RMP G23 | 22+93 | 145 LT | 229.8 | 38.963535 | -77.182214 | 475004.07 | 3655743.16 | 55.0 | 6/5/19 |
| 19GWP-BR18 | Bridge | George Washington Parkway On-Ramp NB | Median | GWMP RMP G21 | 53+60 | 20 RT | 223.1 | 38.963952 | -77.184045 | 475148.41 | 3655220.29 | 70.0 | 6/4/19 |
| 19GWP-BR19 | Bridge | I-495 SB | Inside Shoulder | GWMP RMP E21 | 14+87 | 8 RT | 239.2 | 38.961533 | -77.188227 | 474250.62 | 3654043.87 | 70.2 | 5/24/19 |
| 19GWP-BR20 | Bridge GWP-N3 | George Washington Parkway On-Ramp NB | -- | GWMP RMP E21 | 20+24 | 7 RT | 226.9 | 38.962752 | -77.187423 | 474697.89 | 3654266.04 | 73.5 | 7/2/19 |
| 19GWP-BR21 | Bridge GWP-N3 | George Washington Parkway On-Ramp NB | -- | GWMP RMP E21 | 18+75 | 19 RT | 233.5 | 38.962341 | -77.187409 | 474548.32 | 3654272.21 | 73.2 | 4/23/19 |
| 19GWP-BR22 | Bridge | NB Off-Ramp George Washington Parkway | -- | GWMP RMP G23 | 20+65 | 80 LT | 214.3 | 38.963254 | -77.182999 | 474898.65 | 3655521.50 | 61.2 | 5/2/19 |
| 19GWP-BR23 | Bridge GWP-N2 | I-495 NB | Inside Shoulder | 495XL NBC | 698+76 | 20 LT | 212.1 | 38.963180 | -77.184167 | 474866.99 | 3655189.86 | 50.0 | 5/7/19 |
| 19GWP-P01 | Pavement/Tie-in | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP G22 | 19+35 | 51 RT | 231.5 | 38.963033 | -77.186012 | 474805.77 | 3654665.93 | 6.0 | 7/9/19 |
| 19GWP-P02 | Pavement/Tie-in | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP G22 | 24+86 | 57 RT | 207.2 | 38.963687 | -77.186724 | 475041.22 | 3654460.16 | 6.0 | 7/9/19 |
| 19GWP-P03 | Pavement/Tie-in | 495 SB Off-Ramp George Washington Parkway | Outside Shoulder | GWMP RMP E21 | 29+11 | 59 RT | 214.5 | 38.964177 | -77.185639 | 475223.96 | 3654765.87 | 7.0 | 6/21/19 |
| 19GWP-P04 | Pavement/Tie-in | George Washington Parkway On-Ramp 495 SB | Inside Travel Lane | GWMP RMP E21 | 29+77 | 39 RT | 219.6 | 38.964149 | -77.184706 | 475217.63 | 3655031.31 | 6.7 | 6/5/19 |
| 19GWP-P05 | Pavement/Tie-in | George Washington Parkway On-Ramp 495 SB | Inside Travel Lane | GWMP RMP G23 | 24+07 | 98 LT | 231.6 | 38.963435 | -77.181776 | 474969.41 | 3655868.12 | 6.8 | 6/4/19 |
| 19GWP-P06 | Pavement/Tie-in | 495 NB Off-Ramp George Washington Parkway | Outside Shoulder | GWMP RMP G23 | 20+59 | 19 LT | 220.8 | 38.963087 | -77.182979 | 474837.89 | 3655527.88 | 6.8 | 6/27/19 |
| 19GWP-P07 | Pavement/Tie-in | George Washington Parkway On-Ramp 495 SB | Inside Shoulder | GWMP RMP E21 | 25+24 | 14 RT | 217.0 | 38.963974 | -77.186866 | 475145.28 | 3654418.05 | 8.5 | 6/5/19 |
| 19GWP-P08 | Pavement/Tie-in | George Washington Parkway On-Ramp 495 SB | Inside Shoulder | GWMP RMP G21 | 36+49 | 19 RT | 232.8 | 38.962000 | -77.188144 | 474420.94 | 3654065.00 | 6.5 | 6/6/19 |
| 19GWP-P09 | Pavement/Tie-in | George Washington Parkway On-Ramp 495 NB | Outside Shoulder | GWMP RMP G21 | 43+21 | 64 RT | 211.8 | 38.963688 | -77.180322 | 475067.53 | 3656280.29 | 7.5 | 6/23/19 |
| 19GWP-RW01 | Retaining Wall RW20 | I-495 SB | Outside Shoulder | GWMP RMP E21 | 10+88 | 5 RT | 249.1 | 38.960996 | -77.189450 | 474050.09 | 3653699.04 | 29.6 | 5/28/19 |
| 19GWP-RW02 | Retaining Wall RW20 | I-495 SB | Outside Shoulder | GWMP RMP E21 | 13+79 | 0 LT | 241.8 | 38.961399 | -77.188565 | 474200.33 | 3653948.36 | 50.2 | 5/24/19 |
| 19GWP-RW03 | Retaining Wall RW22 | George Washington Parkway On-Ramp 495 SB | Outside Shoulder | GWMP RMP G21 | 46+46 | 9 RT | 216.6 | 38.964248 | -77.186444 | 475246.52 | 3654536.88 | 50.0 | 6/6/19 |
| 19GWP-RW04 | Retaining Wall RW23/RW24 | George Washington Parkway On-Ramp 495 SB | Outside Shoulder | GWMP RMP G21 | 43+59 | 10 RT | 218.8 | 38.963786 | -77.187224 | 475075.28 | 3654317.49 | 48.9 | 6/6/19 |



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

| Exploration Designation | Primary Design Element Purpose | General Location of Exploration | Travel Lane | Reference Base Line | Station | Offset (ft) | Surface Elevation (ft) | Latitude | Longitude | Northing | Easting | Depth Drilled (ft) | Date Completed |
|-------------------------|--------------------------------|---|--------------------|---------------------|---------|-------------|------------------------|-----------|------------|-----------|------------|--------------------|----------------|
| 19GWP-RW05 | Retaining Wall RW23 | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP G22 | 22+08 | 64 LT | 227.4 | 38.962935 | -77.186995 | 474766.34 | 3654386.86 | 54.3 | 7/2/19 |
| 19GWP-RW06 | Retaining Wall | I-495 NB | Outside Shoulder | 495XL SB | 294+81 | 18 LT | 220.8 | 38.962728 | -77.185833 | 474695.52 | 3654718.29 | 44.1 | 6/26/19 |
| 19GWP-RW07 | Retaining Wall | I-495 NB | Outside Shoulder | 495XL SB | 297+77 | 38 LT | 214.3 | 38.963124 | -77.184923 | 474843.33 | 3654975.16 | 39.5 | 5/29/19 |
| 19GWP-RW08 | Retaining Wall | I-495 NB | Outside Shoulder | 495XL SB | 300+73 | 53 LT | 207.0 | 38.963512 | -77.184013 | 474988.57 | 3655231.77 | 39.3 | 5/31/19 |
| 19GWP-RW09 | Retaining Wall RW21 | I-495 NB | Inside Travel Lane | GWMP RMP E22 | 18+59 | 2 RT | 228.7 | 38.962109 | -77.186692 | 474466.60 | 3654477.36 | 50.0 | 5/2/19 |
| 19GWP-RW10 | Retaining Wall | I-495 NB | Inside Travel Lane | GWMP RMP E22 | 21+62 | 32 LT | 222.7 | 38.962526 | -77.185733 | 474622.36 | 3654747.90 | 43.1 | 5/2/19 |
| 19GWP-RW11 | Bridge GWP-N2 | I-495 NB | Inside Travel Lane | 495XL NBC | 696+77 | 36 LT | 216.3 | 38.962926 | -77.184787 | 474772.02 | 3655014.86 | 50.5 | 5/7/19 |
| 19GWP-RW12 | Retaining Wall RW27 | 495 NB Off-Ramp George Washington Parkway | -- | GWMP RMP G23 | 22+31 | 30 LT | 225.7 | 38.963200 | -77.182388 | 474881.60 | 3655695.57 | 28.5 | 4/29/19 |
| 19GWP-RW13 | Retaining Wall | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP G21 | 58+43 | 66 RT | 227.3 | 38.963432 | -77.182476 | 474965.61 | 3655669.36 | 67.0 | 7/15/19 |
| 19GWP-RW14 | Retaining Wall | I-495 NB | -- | 495XL SB | 307+06 | 137 RT | 207.8 | 38.964035 | -77.181742 | 475188.30 | 3655874.67 | 36.0 | 7/1/19 |
| 19GWP-RW15 | Retaining Wall | I-495 NB | -- | GWMP TRL | 45+64 | 223 LT | 189.6 | 38.964369 | -77.181256 | 475311.81 | 3656011.17 | 38.4 | 4/29/19 |
| 19GWP-RW16 | Retaining Wall RW25 | 495 SB Off-Ramp George Washington Parkway | Inside Shoulder | GWMP RMP G22 | 24+66 | 11 LT | 216.8 | 38.963728 | -77.186967 | 475055.02 | 3654390.80 | 45.1 | 6/20/19 |
| 19LOD-BR15 | Bridge EXT-N3 | Live Oak Drive | -- | LOD | 10+92 | 60 RT | 268.5 | 38.959558 | -77.190596 | 473521.57 | 3653380.44 | 68.1 | 5/10/19 |
| 19LOD-BR16 | Bridge EXT-N3 | Live Oak Drive | -- | LOD | 14+37 | 16 RT | 286.7 | 38.960308 | -77.191342 | 473791.98 | 3653164.68 | 68.3 | 7/10/19 |
| 19LOD-W-P14 | Pavement/Tie-in | Live Oak Drive | EB Travel Lane | LOD | 24+75 | 23 RT | 230.4 | 38.961906 | -77.188570 | 474385.15 | 3653944.37 | 7.5 | 7/12/19 |
| 19LOD-W-P15 | Pavement/Tie-in | Live Oak Drive | EB Travel Lane | LOD | 18+41 | 26 RT | 274.9 | 38.960937 | -77.190423 | 474024.57 | 3653422.53 | 7.5 | 7/12/19 |
| 19ODD-BR07 | Bridge EXT-N1 | Old Dominion Drive | WB Travel Lane | ODD | 20+61 | 45 RT | 263.2 | 38.945674 | -77.203100 | 468414.67 | 3649896.51 | 70.0 | 5/16/19 |
| 19ODD-BR08 | Bridge EXT-N1 | Old Dominion Drive | WB Travel Lane | ODD | 24+90 | 46 RT | 258.8 | 38.945268 | -77.201682 | 468272.57 | 3650301.98 | 45.0 | 5/15/19 |
| 19ODD-BR08A | Bridge EXT-N1 | Old Dominion Drive | WB Travel Lane | ODD | 25+10 | 30 RT | 258.8 | 38.945283 | -77.201683 | 468150.82 | 3650651.57 | 70.0 | 5/14/19 |
| 19ODD-E-P02 | Pavement/Tie-in | Old Dominion Drive | EB Travel Lane | ODD | 28+64 | 29 RT | 256.2 | 38.944920 | -77.200459 | 468150.82 | 3650651.57 | 8.0 | 5/13/19 |
| 19ODD-W-P01 | Pavement/Tie-in | Old Dominion Drive | WB Travel Lane | ODD | 16+35 | 31 RT | 267.8 | 38.946028 | -77.204492 | 468538.05 | 3649498.91 | 8.0 | 5/14/19 |
| 19SWM-01 | Storm Water Management | Dulles Toll Road WB | -- | DTR RMP E3 | 23+46 | 58 RT | 279.0 | 38.930942 | -77.207729 | 463030.87 | 3648655.44 | 8.0 | 8/9/19 |
| 19SWM-03 | Storm Water Management | Dulles Toll Road WB On-Ramp 495 NB | -- | DTR RMP E1 | 36+38 | 251 RT | 283.6 | 38.932029 | -77.208279 | 463424.47 | 3648493.62 | 25.0 | 6/25/19 |
| 19SWM-04 | Storm Water Management | I-495 NB | -- | 495XL NB | 590+66 | 139 RT | 243.8 | 38.939663 | -77.205395 | 466216.30 | 3649274.57 | 8.0 | 8/9/19 |
| 19SWM-05 | Storm Water Management | I-495 NB | -- | 495XL NB | 605+84 | 82 RT | 236.8 | 38.943528 | -77.203419 | 467632.01 | 3649816.99 | 25.0 | 7/11/19 |
| 19SWM-07 | Storm Water Management | I-495 NB | -- | 495XL NB | 625+98 | 108 RT | 273.3 | 38.948221 | -77.199906 | 469355.25 | 3650791.84 | 24.0 | 6/19/19 |
| 19SWM-08 | Storm Water Management | I-495 NB | -- | 495XL NB | 631+05 | 69 RT | 283.4 | 38.949295 | -77.198808 | 469750.87 | 3651098.52 | 25.0 | 6/20/19 |
| 19SWM-09 | Storm Water Management | Georgetown Parkway | -- | BH RD | 16+46 | 87 LT | 302.7 | 38.953754 | -77.192454 | 471400.54 | 3652882.27 | 25.0 | 5/19/19 |
| 19SWM-10 | Storm Water Management | Georgetown Parkway On-Ramp 495 NB | -- | GTP RMP NW | 06+02 | 71 LT | 313.2 | 38.955340 | -77.194529 | 471969.70 | 3652283.97 | 25.0 | 5/19/19 |
| 19SWM-11 | Storm Water Management | I-495 NB | -- | GTP RMP NE | 14+79 | 27 RT | 288.9 | 38.955646 | -77.192681 | 472088.35 | 3652808.01 | 25.0 | 7/16/19 |
| 19SWM-12 | Storm Water Management | I-495 NB | -- | GWMP TRL | 14+36 | 5 LT | 252.1 | 38.960469 | -77.189410 | 473858.37 | 3653712.98 | 25.0 | 5/15/19 |
| 19SWM-13 | Storm Water Management | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP G22 | 22+86 | 57 RT | 215.7 | 38.963289 | -77.186776 | 474896.12 | 3654447.43 | 25.0 | 7/19/19 |
| 19SWM-14 | Storm Water Management | 495 SB Off-Ramp George Washington Parkway | -- | GWMP RMP E21 | 29+29 | 133 RT | 193.1 | 38.963972 | -77.185593 | 475149.52 | 3654780.19 | 23.8 | 7/9/19 |
| 19SWM-15 | Storm Water Management | George Washington Parkway On-Ramp 495 NB | -- | GWMP TRL | 45+22 | 217 LT | 193.2 | 38.964218 | -77.181199 | 475256.98 | 3656028.21 | 23.2 | 6/28/19 |
| 19X-BR09 | Bridge EXT-W1 | I-495 NB | Outside Shoulder | 495XL NB | 615+85 | 34 RT | 240.8 | 38.946063 | -77.202069 | 468560.61 | 3650187.83 | 29.3 | 4/17/19 |
| 19X-BR10 | Bridge EXT-W1 | I-495 NB | Outside Shoulder | 495XL NB | 617+85 | 34 RT | 244.5 | 38.946539 | -77.201734 | 468735.46 | 3650280.52 | 69.5 | 4/18/19 |
| 19X-BR11 | Bridge EXT-W2 | I-495 SB | Outside Shoulder | 495XL SB | 217+64 | 38 LT | 245.0 | 38.946553 | -77.202253 | 468738.27 | 3650132.76 | 70.0 | 6/24/19 |
| 19X-BR12 | Bridge EXT-W2 | I-495 SB | Outside Shoulder | 495XL SB | 219+59 | 37 LT | 249.9 | 38.947019 | -77.201903 | 468909.51 | 3650229.94 | 70.4 | 5/21/19 |
| 19X-NOS-P01 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495GP NB | 1080+41 | 45 RT | 272.8 | 38.936267 | -77.207453 | 464971.19 | 3648706.86 | 8.3 | 4/16/19 |
| 19X-NOS-P02 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495GP NB | 1086+11 | 48 RT | 267.6 | 38.937712 | -77.206681 | 465500.64 | 3648918.99 | 8.0 | 4/16/19 |
| 19X-NOS-P03 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 588+42 | 68 RT | 262.4 | 38.939173 | -77.205932 | 466035.83 | 3649124.43 | 11.0 | 4/18/19 |
| 19X-NOS-P04 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 594+48 | 63 RT | 256.9 | 38.940707 | -77.205111 | 466597.78 | 3649349.98 | 8.0 | 4/23/19 |
| 19X-NOS-P05 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 627+80 | 29 RT | 272.3 | 38.948735 | -77.199699 | 469543.11 | 3650847.93 | 7.5 | 4/24/19 |
| 19X-NOS-P06 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 606+42 | 39 RT | 246.5 | 38.943721 | -77.203471 | 467701.86 | 3649800.96 | 10.0 | 4/23/19 |
| 19X-NOS-P07 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 612+62 | 39 RT | 240.9 | 38.945261 | -77.202547 | 468266.62 | 3650056.03 | 8.0 | 4/24/19 |
| 19X-NOS-P08 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 621+72 | 33 RT | 255.3 | 38.947431 | -77.201010 | 469063.05 | 3650481.91 | 7.5 | 4/24/19 |
| 19X-NOS-P09 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 600+43 | 54 RT | 251.4 | 38.942209 | -77.204294 | 467147.95 | 3649574.84 | 10.0 | 4/24/19 |
| 19X-NOS-P10 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 633+86 | 29 RT | 289.6 | 38.949917 | -77.198208 | 469979.80 | 3651265.99 | 9.0 | 4/25/19 |
| 19X-NOS-P11 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 639+94 | 46 RT | 305.6 | 38.951085 | -77.196673 | 470411.35 | 3651696.51 | 9.0 | 4/25/19 |
| 19X-NOS-P12 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 645+72 | 37 RT | 307.4 | 38.952327 | -77.195385 | 470868.92 | 3652056.35 | 7.5 | 4/25/19 |
| 19X-NOS-P13 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 651+14 | 56 RT | 301.7 | 38.953551 | -77.194266 | 471319.14 | 3652368.01 | 9.5 | 4/28/19 |



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

| Exploration Designation | Primary Design Element Purpose | General Location of Exploration | Travel Lane | Reference Base Line | Station | Offset (ft) | Surface Elevation (ft) | Latitude | Longitude | Northing | Easting | Depth Drilled (ft) | Date Completed |
|-------------------------|--------------------------------|--|------------------|---------------------|---------|-------------|------------------------|-----------|------------|-----------|------------|--------------------|----------------|
| 19X-NOS-P14 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 650+98 | 39 RT | 301.9 | 38.953536 | -77.194348 | 471313.47 | 3652344.87 | 10.0 | 4/30/19 |
| 19X-NOS-P15 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 656+97 | 43 RT | 295.4 | 38.955007 | -77.193373 | 471853.18 | 3652614.39 | 7.5 | 4/25/19 |
| 19X-NOS-P16 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 657+79 | 41 RT | 294.6 | 38.955220 | -77.193266 | 471931.03 | 3652643.89 | 9.0 | 4/25/19 |
| 19X-NOS-P17 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 662+51 | 35 RT | 288.0 | 38.956451 | -77.192720 | 472381.46 | 3652792.85 | 13.6 | 4/29/19 |
| 19X-NOS-P18 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 668+54 | 48 RT | 274.9 | 38.958014 | -77.192025 | 472953.42 | 3652982.34 | 9.0 | 4/29/19 |
| 19X-NOS-P19 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 674+83 | 32 RT | 260.9 | 38.959511 | -77.191039 | 473502.67 | 3653254.79 | 9.0 | 4/30/19 |
| 19X-NOS-P20 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NB | 681+07 | 22 RT | 247.6 | 38.960676 | -77.189485 | 473933.37 | 3653690.60 | 9.0 | 4/30/19 |
| 19X-NOS-P21 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NBC | 687+21 | 5 RT | 235.3 | 38.961506 | -77.187613 | 474243.16 | 3654218.61 | 8.5 | 5/1/19 |
| 19X-NOS-P22 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NBC | 693+13 | 12 RT | 222.7 | 38.962296 | -77.185792 | 474538.43 | 3654732.24 | 8.5 | 5/1/19 |
| 19X-NOS-P23 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NBC | 699+13 | 39 RT | 210.3 | 38.963098 | -77.183947 | 474838.15 | 3655252.80 | 8.5 | 5/1/19 |
| 19X-NOS-P24 | Pavement/Tie-in | I-495 NB | Outside Shoulder | 495XL NBC | 705+11 | 53 RT | 196.0 | 38.963991 | -77.182155 | 475170.41 | 3655757.45 | 9.0 | 5/1/19 |
| 19X-NOS-P25 | Pavement/Tie-in | I-495 NB | Outside Shoulder | GWMP TRL | 49+30 | 89 LT | 172.9 | 38.965499 | -77.180419 | 475726.65 | 3656243.30 | 7.3 | 5/1/19 |
| 19X-NOS-P26 | Pavement/Tie-in | I-495 NB | Outside Shoulder | GWMP TRL | 55+00 | 63 LT | 155.2 | 38.966914 | -77.179722 | 476244.97 | 3656434.12 | 7.9 | 5/1/19 |
| 19X-N-RW01 | Retaining Wall RW03 | I-495 NB | Outside Shoulder | 495GP NB | 1077+29 | 53 RT | 276.3 | 38.935469 | -77.207863 | 464679.26 | 3648594.27 | 33.0 | 5/20/19 |
| 19X-N-RW02 | Retaining Wall RW03 | I-495 NB | Outside Shoulder | 495GP NB | 1082+82 | 46 RT | 270.5 | 38.936875 | -77.207122 | 465194.12 | 3648797.84 | 48.2 | 4/16/19 |
| 19X-N-RW03 | Retaining Wall RW03 | I-495 NB | Outside Shoulder | 495GP NB | 1088+84 | 46 RT | 265.2 | 38.938406 | -77.206322 | 465754.77 | 3649017.59 | 43.1 | 4/16/19 |
| 19X-N-RW04 | Retaining Wall RW03 | I-495 NB | Outside Shoulder | 495XL NB | 591+54 | 66 RT | 259.3 | 38.939963 | -77.205512 | 466325.02 | 3649239.94 | 38.3 | 4/18/19 |
| 19X-N-RW05 | Retaining Wall RW03 | I-495 NB | Outside Shoulder | 495XL NB | 597+47 | 59 RT | 254.1 | 38.941461 | -77.204702 | 466873.97 | 3649462.64 | 42.4 | 6/30/19 |
| 19X-N-RW06 | Retaining Wall RW03 | I-495 NB | -- | 495XL NB | 603+55 | 91 RT | 238.3 | 38.942947 | -77.203724 | 467419.07 | 3649732.96 | 33.3 | 7/12/19 |
| 19X-N-RW07 | Retaining Wall RW03 | I-495 NB | -- | 495XL NB | 609+41 | 93 RT | 232.9 | 38.944400 | -77.202852 | 467951.69 | 3649973.53 | 39.0 | 7/10/19 |
| 19X-N-RW08 | Bridge EXT-W1/RW03 | I-495 NB | -- | 495XL NB | 615+18 | 76 RT | 234.9 | 38.945849 | -77.202043 | 468482.69 | 3650196.22 | 37.2 | 7/5/19 |
| 19X-N-RW10 | Retaining Wall RW04 | I-495 NB | -- | 495XL NB | 625+16 | 92 RT | 264.0 | 38.948078 | -77.200129 | 469302.37 | 3650729.07 | 48.8 | 6/20/19 |
| 19X-N-RW11 | Retaining Wall RW04 | I-495 NB | -- | 495XL NB | 630+97 | 80 RT | 283.3 | 38.949258 | -77.198800 | 469377.23 | 3651101.08 | 49.9 | 6/18/19 |
| 19X-N-RW12 | Retaining Wall | I-495 NB | -- | 495XL NB | 637+12 | 63 RT | 299.1 | 38.950486 | -77.197314 | 470190.40 | 3651517.20 | 44.3 | 6/18/19 |
| 19X-N-RW13 | Retaining Wall | I-495 NB | -- | 495XL NB | 642+94 | 104 RT | 310.5 | 38.951606 | -77.195817 | 470604.56 | 3651937.21 | 50.0 | 5/22/19 |
| 19X-N-RW14 | Retaining Wall | I-495 NB Off-Ramp Georgetown Parkway | Outside Shoulder | GTP RMP SE | 14+76 | 34 RT | 308.0 | 38.952768 | -77.194536 | 471032.76 | 3652295.35 | 50.0 | 4/23/19 |
| 19X-N-RW15 | Retaining Wall | I-495 NB | Outside Shoulder | GTP RMP NE | 14+60 | 1 RT | 297.3 | 38.955609 | -77.192784 | 472074.66 | 3652779.03 | 50.9 | 4/29/19 |
| 19X-N-RW16 | Retaining Wall RW16 | I-495 NB | Outside Shoulder | 495XL NB | 665+65 | 50 RT | 281.5 | 38.957259 | -77.192331 | 472677.55 | 3652899.24 | 51.3 | 4/30/19 |
| 19X-N-RW17 | Retaining Wall RW16 | I-495 NB | Outside Shoulder | 495XL NB | 671+71 | 38 RT | 267.4 | 38.958800 | -77.191612 | 473241.53 | 3653095.60 | 48.8 | 5/30/19 |
| 19X-N-RW18 | Retaining Wall RW16/RW18 | I-495 NB | -- | GWMP TRL | 11+65 | 17 RT | 274.0 | 38.959958 | -77.190102 | 473669.19 | 3653518.99 | 50.0 | 5/14/19 |
| 19X-N-RW18A | Pavement/Tie-in | I-495 NB | -- | 495XL NB | 677+71 | 28 RT | 255.5 | 38.960094 | -77.190381 | 473717.77 | 3653438.91 | 9.0 | 4/30/19 |
| 19X-N-RW20 | Retaining Wall RW19 | I-495 NB | -- | 495XL NBC | 690+31 | 72 RT | 219.6 | 38.961761 | -77.186545 | 474340.47 | 3654521.09 | 48.2 | 5/24/19 |
| 19X-N-RW21 | Retaining Wall RW26 | I-495 NB | -- | GWMP RMP G23 | 15+22 | 16 LT | 217.9 | 38.962538 | -77.184741 | 474630.71 | 3655029.79 | 48.1 | 5/24/19 |
| 19X-N-RW22 | Bridge GWP N-2/RW27 | I-495 NB | -- | GWMP RMP G23 | 19+54 | 12 RT | 215.8 | 38.962931 | -77.183311 | 474779.70 | 3655434.31 | 48.2 | 5/23/19 |
| 19X-N-RW24 | Retaining Wall | George Washington Parkway On-Ramp 495 NB | Outside Shoulder | GWMP TRL | 46+80 | 130 LT | 181.6 | 38.964820 | -77.180921 | 475477.38 | 3656103.96 | 41.8 | 6/23/19 |
| 19X-SOS-P23 | Pavement/Tie-in | I-495 SB | Outside Shoulder | GWMP TRL | 54+54 | 218 LT | 153.0 | 38.966885 | -77.180287 | 476231.97 | 3656273.47 | 8.7 | 4/17/19 |
| 19X-SOS-P24 | Pavement/Tie-in | I-495 SB | Outside Shoulder | GWMP TRL | 47+98 | 270 LT | 171.9 | 38.965393 | -77.181197 | 475685.13 | 3656022.51 | 8.8 | 4/17/19 |
| 19X-SOS-P25 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 305+83 | 90 LT | 188.7 | 38.964301 | -77.182586 | 475281.67 | 3655633.42 | 6.0 | 6/20/19 |
| 19X-SOS-P26 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 299+35 | 91 LT | 209.6 | 38.963440 | -77.184502 | 474960.24 | 3655093.04 | 6.0 | 6/20/19 |
| 19X-SOS-P27 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 293+56 | 48 LT | 222.7 | 38.962656 | -77.186276 | 474667.64 | 3654592.76 | 7.5 | 6/21/19 |
| 19X-SOS-P28 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 287+95 | 33 LT | 235.2 | 38.961897 | -77.188008 | 474384.09 | 3654104.20 | 8.0 | 6/21/19 |
| 19X-SOS-P29 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 281+82 | 79 LT | 256.0 | 38.961098 | -77.189928 | 474085.27 | 3653562.55 | 7.5 | 5/5/19 |
| 19X-SOS-P30 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 276+03 | 78 LT | 266.4 | 38.959971 | -77.191469 | 473668.53 | 3653130.25 | 7.3 | 5/5/19 |
| 19X-SOS-P31 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 270+42 | 88 LT | 280.0 | 38.958587 | -77.192508 | 473160.40 | 3652841.86 | 7.5 | 5/6/19 |
| 19X-SOS-P32 | Pavement/Tie-in | 495 SB Off-Ramp Georgetown Pike | Outside Shoulder | 495XL SB | 264+41 | 103 LT | 283.2 | 38.957020 | -77.193220 | 472586.58 | 3652647.52 | 9.0 | 6/20/19 |
| 19X-SOS-P33 | Pavement/Tie-in | 495 SB Off-Ramp Georgetown Pike | -- | 495XL SB | 260+72 | 130 LT | 299.1 | 38.956088 | -77.193709 | 472245.45 | 3652513.31 | 15.0 | 7/17/19 |
| 19X-SOS-P34 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 259+25 | 51 LT | 290.7 | 38.955643 | -77.193624 | 472083.54 | 3652539.93 | 7.5 | 6/14/19 |
| 19X-SOS-P35 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 253+41 | 41 LT | 297.0 | 38.954189 | -77.194439 | 471550.80 | 3652315.71 | 7.5 | 6/14/19 |
| 19X-SOS-P36 | Pavement/Tie-in | I-495 SB | -- | 495XL SB | 252+43 | 69 LT | 298.5 | 38.953991 | -77.194689 | 471477.69 | 3652245.44 | 6.0 | 6/16/19 |
| 19X-SOS-P37 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 246+97 | 57 LT | 304.0 | 38.952729 | -77.195673 | 471013.96 | 3651972.35 | 8.0 | 5/14/19 |
| 19X-SOS-P38 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 240+92 | 51 LT | 303.0 | 38.951449 | -77.196992 | 470542.49 | 3651603.86 | 8.0 | 5/15/19 |



TABLE A-1: SUMMARY OF SUBSURFACE EXPLORATIONS

| Exploration Designation | Primary Design Element Purpose | General Location of Exploration | Travel Lane | Reference Base Line | Station | Offset (ft) | Surface Elevation (ft) | Latitude | Longitude | Northing | Easting | Depth Drilled (ft) | Date Completed |
|-------------------------|--------------------------------|--|------------------|---------------------|---------|-------------|------------------------|-----------|------------|-----------|------------|--------------------|----------------|
| 19X-SOS-P39 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 234+67 | 43 LT | 289.7 | 38.950218 | -77.198510 | 470088.14 | 3651178.39 | 7.5 | 5/15/19 |
| 19X-SOS-P40 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 228+75 | 39 LT | 274.5 | 38.949046 | -77.199962 | 469655.38 | 3650771.57 | 6.3 | 5/15/19 |
| 19X-SOS-P41 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 222+96 | 39 LT | 258.7 | 38.947798 | -77.201252 | 469195.87 | 3650411.14 | 7.6 | 5/16/19 |
| 19X-SOS-P42 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 211+95 | 40 LT | 242.7 | 38.945155 | -77.203162 | 468225.43 | 3649881.52 | 8.8 | 5/8/19 |
| 19X-SOS-P43 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 205+89 | 50 LT | 250.4 | 38.943653 | -77.204091 | 467674.92 | 3649625.15 | 9.0 | 5/9/19 |
| 19X-SOS-P44 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 199+83 | 60 LT | 258.3 | 38.942151 | -77.205008 | 467124.10 | 3649372.01 | 8.4 | 5/9/19 |
| 19X-SOS-P45 | Pavement/Tie-in | I-495 SB | Outside Shoulder | 495XL SB | 194+03 | 67 LT | 266.0 | 38.940709 | -77.205872 | 466595.33 | 3649133.75 | 8.5 | 5/14/19 |
| 19X-S-RW24 | Retaining Wall | I-495 SB | -- | GWMP TRL | 47+50 | 409 LT | 229.8 | 38.965318 | -77.181768 | 475655.29 | 3655860.76 | 50.0 | 7/31/19 |
| 19X-S-RW25 | Retaining Wall | I-495 SB | -- | GWMP RMP G22 | 10+26 | 104 RT | 243.0 | 38.964232 | -77.183252 | 475253.80 | 3655444.46 | 41.0 | 5/2/19 |
| 19X-S-RW26 | Retaining Wall | I-495 SB | -- | GWMP RMP G22 | 16+26 | 33 RT | 211.0 | 38.963305 | -77.184990 | 474909.16 | 3654955.19 | 50.0 | 4/30/19 |
| 19X-S-RW27 | Retaining Wall RW10 | George Washington Parkway On-Ramp 495 SB | -- | GWMP RMP G21 | 39+51 | 59 LT | 214.7 | 38.962782 | -77.187884 | 474706.72 | 3654134.81 | 49.8 | 7/12/19 |
| 19X-S-RW28 | Retaining Wall RW17 | I-495 SB | -- | GWMP RMP G21 | 33+53 | 13 LT | 243.6 | 38.961616 | -77.189078 | 474277.47 | 3653801.64 | 50.0 | 4/23/19 |
| 19X-S-RW29 | Retaining Wall RW17 | I-495 SB | -- | GWMP RMP G21 | 27+56 | 13 LT | 279.1 | 38.960658 | -77.190785 | 473921.58 | 3653321.25 | 50.0 | 4/22/19 |
| 19X-S-RW30 | Retaining Wall RW17 | I-495 SB | -- | 495XL SB | 273+01 | 91 LT | 275.7 | 38.959268 | -77.192118 | 473410.00 | 3652949.43 | 41.1 | 5/6/19 |
| 19X-S-RW31 | Retaining Wall RW09 | I-495 SB | Outside Shoulder | 495XL SB | 267+42 | 92 LT | 280.4 | 38.957796 | -77.192858 | 472870.88 | 3652746.55 | 43.2 | 5/7/19 |
| 19X-S-RW33 | Retaining Wall RW08 | Georgetown Parkway I-495 SB | Outside Shoulder | 495XL SB | 252+05 | 159 LT | 309.6 | 38.954025 | -77.195029 | 471488.52 | 3652148.85 | 36.0 | 6/12/19 |
| 19X-S-RW34 | Retaining Wall RW05 | I-495 SB | -- | 495XL SB | 225+83 | 77 LT | 268.0 | 38.948497 | -77.200742 | 469452.50 | 3650552.68 | 48.9 | 5/22/19 |
| 19X-S-RW36 | Retaining Wall | I-495 SB | Outside Shoulder | 495XL SB | 208+82 | 45 LT | 246.5 | 38.944379 | -77.203646 | 467941.02 | 3649747.77 | 33.2 | 5/8/19 |
| 19X-S-RW37 | Retaining Wall | I-495 SB | Outside Shoulder | 495XL SB | 196+86 | 65 LT | 262.2 | 38.941414 | -77.205456 | 466854.03 | 3649248.24 | 25.0 | 5/14/19 |

TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

| Exploration Designation | Depth Drilled (ft) | Topsoil Thickness (in) | Depth to Subsurface Water (ft) | | | Suspected Fill Material | | Alluvial Material ¹ | | Highly Plastic Fine Grained Material (USCS Symbol CH or MH) | | Very Soft to Soft Fine Grained Soil (SPT Field N-Value 0 to 3 bpf) | | Very Loose Coarse Grained Soils (SPT Field N-Value 0 to 2 bpf) | | Intermediate Geomaterial (Residuum with SPT N-Value >50 blows over 6" Interval) | | Auger Refusal | | Rock Cored | |
|-------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|-------------------------|---------------------|--------------------------------|---------------------|---|---------------------|--|---------------------|--|---------------------|---|---------------------|---------------|------------|----------------|---------------------|
| | | | At Time of Drilling (ft) | End of Drilling (ft) | After Drilling (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth (ft) | Encountered | Depth Range(s) (ft) |
| 19DTR-BR01 | 50.0 | -- | 33.0 | 22.6 | N/A | | | | | | | | | | | X | 16.4-40.0 | X | 40.0 | X | 40.0-50.0 |
| 19DTR-BR02 | 60.0 | -- | 28.0 | N/A | N/A | X | 0.8-12.0 | X | 12.0-21.5 | | | | | | | X | 41.5-45.0 | X | 45.0 | X | 45.0-60.0 |
| 19DTR-BR03 | 68.2 | -- | 43.0 | N/A | N/A | X | 1.8-36.5 | X | 36.5-41.5 | | | X | 6.0-10.0 | | | X | 46.5-68.2 | | | | |
| 19DTR-BR04 | 24.0 | -- | NE | NE | N/A | | | | | | | | | | | | | X | 24.0 | | |
| 19DTR-BR04A | 65.0 | -- | 43.0 | 26.0 | N/A | X | 1.4-12.5 | | | | | | | | | X | 26.4-55.0 | X | 55.0 | X | 55.0-65.0 |
| 19DTR-BR06 | 70.0 | -- | 53.0 | 49.0 | N/A | X | 1.5-4.0 | | | | | | | | | X | 36.4-70.0 | | | | |
| 19DTR-P02 | 8.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19DTR-P06 | 8.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19DTR-P07 | 7.0 | -- | NE | NE | N/A | X | 1.0-7.0 | | | | | | | | | | | | | | |
| 19DTR-P08 | 6.0 | 3.0 | NE | NE | N/A | X | 1.0-4.0 | | | | | | | | | | | | | | |
| 19DTR-P09 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19DTR-RW01 | 50.0 | 2.0 | 44.0 | 47.9 | N/A | X | 0.2-11.5 | | | X | 8.0-11.5 | | | | | | | | | | |
| 19DTR-RW02 | 50.0 | 2.0 | 33.0 | 29.5 | N/A | X | 0.2-16.5 | | | | | X | 0.2-2.0 | | | | | | | | |
| 19DTR-RW03 | 48.3 | 2.0 | 32.0 | 42.3 | 17.5 | X | 0.2-26.5 | X | 26.5-31.5 | | | | | | | X | 36.5-48.3 | | | | |
| 19DTR-RW04 | 30.3 | 4.0 | 20.0 | 20.0 | N/A | X | 0.4-4.0 | X | 4.0-11.5 | | | | | X | 4.0-8.0 | X | 19.3-30.3 | | | | |
| 19DTR-RW05 | 41.6 | -- | 33.0 | 39.2 | N/A | X | 2.5-26.5 | X | 26.5-31.5 | | | X | 16.5-31.5 | | | X | 31.5-41.6 | X | 41.6 | | |
| 19DTR-RW06 | 32.5 | -- | NE | NE | N/A | X | 2.0-21.5 | | | | | | | | | X | 26.5-32.5 | X | 32.5 | | |
| 19DTR-RW07 | 52.0 | -- | NE | NE | N/A | | | | | | | | | | | X | 18.5-52.0 | | | | |
| 19GTP-BR13 | 68.8 | -- | 53.0 | N/A | N/A | X | 1.5-8.0 | | | X | 1.5-16.5 | | | | | X | 46.5-68.8 | | | X ² | 50.0-70.0 |
| 19GTP-BR14 | 68.2 | -- | NE | NE | N/A | X | 2.0-8.0 | | | | | | | | | X | 41.5-68.2 | | | | |
| 19GTP-BR15 | 69.3 | -- | 40.0 | NE | N/A | | | | | | | | | | | X | 51.5-69.3 | | | | |
| 19GTP-BR16 | 68.2 | -- | 53.0 | 30.0 | N/A | X | 0.0-6.0 | | | | | | | | | X | 41.5-68.2 | | | | |
| 19GTP-E-P07 | 7.5 | -- | NE | 7.5 | N/A | | | | | | | | | | | | | | | | |
| 19GTP-E-P08 | 7.0 | -- | NE | NE | N/A | X | 1.0-2.5 | | | | | | | | | | | | | | |
| 19GTP-E-P09 | 8.0 | -- | NE | NE | N/A | X | 2.0-8.0 | | | | | | | | | | | | | | |
| 19GTP-E-P10 | 8.0 | -- | NE | NE | N/A | X | 2.0-8.0 | | | | | | | | | | | | | | |
| 19GTP-E-P11 | 9.0 | -- | NE | NE | N/A | X | 1.0-9.0 | | | | | | | | | | | | | | |
| 19GTP-E-P12 | 8.0 | -- | NE | NE | N/A | X | 1.5-8.0 | | | X | 1.5-8.0 | | | | | | | | | | |
| 19GTP-E-P13 | 8.3 | -- | NE | NE | N/A | X | 2.3-8.3 | | | | | | | | | | | | | | |
| 19GTP-W-P04 | 7.6 | -- | NE | NE | N/A | | | | | X | 1.6-7.6 | | | | | | | | | | |
| 19GTP-W-P06 | 6.6 | -- | NE | NE | N/A | X | 0.6-2.6 | | | | | | | | | | | | | | |
| 19GWP-BR17 | 55.0 | -- | 38.8 | 38.8 | N/A | X | 0.8-4.8 | | | | | | | | | X | 27.3-47.9 | X | 47.9 | X | 47.9-55.0 |
| 19GWP-BR18 | 70.0 | 3.0 | 32.0 | 39.0 | N/A | X | 0.3-4.0 | | | | | | | | | X | 35.0-70.0 | | | | |
| 19GWP-BR19 | 70.2 | -- | 38.0 | 38.0 | N/A | X | 1.7-9.0 | | | | | | | | | X | 46.5-70.2 | | | | |
| 19GWP-BR20 | 73.5 | -- | 48.0 | 30.0 | N/A | | | | | | | | | X | 21.5-26.5 | X | 61.5-73.5 | | | | |
| 19GWP-BR21 | 73.2 | 5.0 | 60.0 | 59.8 | N/A | X | 0.4-6.0 | | | | | | | | | X | 61.5-73.2 | | | | |
| 19GWP-BR22 | 61.2 | 6.0 | 22.0 | N/A | N/A | | | | | | | | | | | X | 21.5-51.2 | X | 51.2 | X | 51.2-61.2 |
| 19GWP-BR23 | 50.0 | -- | NE | N/A | N/A | | | | | | | | | | | X | 31.5-40.0 | X | 40.0 | X | 40.0-50.0 |
| 19GWP-P01 | 6.0 | 3.0 | NE | NE | N/A | X | 0.3-2.0 | | | | | | | | | | | | | | |
| 19GWP-P02 | 6.0 | 5.0 | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19GWP-P03 | 7.0 | -- | NE | NE | N/A | X | 0.8-7.0 | | | | | | | | | | | | | | |
| 19GWP-P04 | 6.7 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |

TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

| Exploration Designation | Depth Drilled (ft) | Topsoil Thickness (in) | Depth to Subsurface Water (ft) | | | Suspected Fill Material | | Alluvial Material ¹ | | Highly Plastic Fine Grained Material (USCS Symbol CH or MH) | | Very Soft to Soft Fine Grained Soil (SPT Field N-Value 0 to 3 bpf) | | Very Loose Coarse Grained Soils (SPT Field N-Value 0 to 2 bpf) | | Intermediate Geomaterial (Residuum with SPT N-Value >50 blows over 6" Interval) | | Auger Refusal | | Rock Cored | | |
|-------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|-------------------------|---------------------|--------------------------------|---------------------|---|---------------------|--|---------------------|--|---------------------|---|---------------------|---------------|------------|-------------|---------------------|-----------|
| | | | At Time of Drilling (ft) | End of Drilling (ft) | After Drilling (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth (ft) | Encountered | Depth Range(s) (ft) | |
| 19GWP-P05 | 6.8 | -- | NE | NE | N/A | X | 0.8-4.8 | | | | | | | | | | | | | | | |
| 19GWP-P06 | 6.8 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | | |
| 19GWP-P07 | 8.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | | |
| 19GWP-P08 | 6.5 | -- | NE | NE | N/A | X | 1.0-4.5 | | | | | | | | | | | | | | | |
| 19GWP-P09 | 7.5 | -- | NE | NE | N/A | X | 1.5-7.5 | | | | | | | | | | | | | | | |
| 19GWP-RW01 | 29.6 | -- | 28.0 | 29.0 | N/A | X | 1.7-6.0 | | | | | | | | | X | 21.5-29.5 | X | 29.6 | | | |
| 19GWP-RW02 | 50.2 | -- | 43.0 | 25.0 | N/A | X | 1.7-21.5 | | | | | | | | | X | 31.5-50.2 | | | | | |
| 19GWP-RW03 | 50.0 | -- | NE | NE | N/A | X | 0.2-41.5 | | | | | | | | | | | | | | | |
| 19GWP-RW04 | 48.9 | -- | NE | NE | N/A | | | | | | | | | | | X | 46.5-48.9 | | | | | |
| 19GWP-RW05 | 54.3 | -- | 52.0 | 52.0 | N/A | X | 0.0-4.0 | | | | | | | | | X | 51.5-54.3 | | | | | |
| 19GWP-RW06 | 44.1 | -- | 38.0 | 38.0 | N/A | | | | | | | | | | | X | 41.5-43.3 | | | | | |
| 19GWP-RW07 | 39.5 | -- | 38.0 | 28.0 | N/A | X | 0.9-36.5 | | | | X | 31.5-36.5 | | | | X | 36.5-39.5 | X | 39.5 | | | |
| 19GWP-RW08 | 40.0 | -- | 24.0 | 17.0 | N/A | | | | | | | | | | | X | 22.5-40.0 | X | 40.0 | | | |
| 19GWP-RW09 | 50.0 | -- | 50.0 | NE | N/A | | | | | | | | | | | | | | | | | |
| 19GWP-RW10 | 43.1 | -- | NE | NE | N/A | X | 2.0-3.5 | | | | | | | | | X | 26.5-43.1 | | | | | |
| 19GWP-RW11 | 50.5 | -- | 48.0 | 37.7 | N/A | X | 2.0-23.5 | | | | | | | | | X | 36.5-50.5 | | | | | |
| 19GWP-RW12 | 28.5 | -- | 23.0 | 21.0 | N/A | | | | | | | | | | | X | 2.0-28.5 | | | | | |
| 19GWP-RW13 | 67.0 | 6.0 | 43.0 | N/A | N/A | X | 0.5-16.5 | | | | | | | | | X | 26.5-56.0 | X | 56.0 | X | 56.0-67.0 | |
| 19GWP-RW14 | 36.0 | -- | 35.0 | 28.0 | N/A | | | | | | | | | | | X | 31.5-36.0 | X | 36.0 | | | |
| 19GWP-RW15 | 38.4 | 6.0 | 15.0 | 15.0 | N/A | | | | | | | | | | | X | 11.5-38.4 | | | | | |
| 19GWP-RW16 | 45.1 | 3.0 | NE | NE | N/A | X | 0.3-11.5 | | | | | | | | | X | 41.5-45.1 | X | 45.1 | | | |
| 19LOD-BR15 | 68.1 | 3.0 | 23.0 | N/A | N/A | X | 0.3-6.0 | | | X | 8.0-21.5 | X | 0.2-4.0 | | | X | 31.5-48.1 | X | 48.1 | X | 48.1-68.1 | |
| 19LOD-BR16 | 68.3 | 4.0 | 48.0 | NE | N/A | X | 0.3-6.0 | | | | | X | 0.2-2.0 | | | X | 56.5-68.3 | | | | | |
| 19LOD-W-P14 | 7.5 | -- | 7.5 | NE | N/A | | | | | | | | | | | | | | | | | |
| 19LOD-W-P15 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | | |
| 19ODD-BR07 | 70.0 | -- | 38.0 | 38.0 | N/A | X | 1.4-29.0 | X | 29.0-41.5 | | | X | 21.5-26.5 | | | X | 21.5-26.5 | | | | | |
| 19ODD-BR08 | 45.0 | -- | 33.0 | 33.0 | N/A | X | 1.8-31.5 | | | | | X | 6.0-10.0 | | | X | 31.5-35.0 | | | | X ² | 35.0-45.0 |
| 19ODD-BR08A | 70.0 | -- | 40.0 | 29.0 | N/A | X | 1.3-19.5 | X | 19.5-26.5 | | | | | | | X | 56.5-68.9 | | | | | |
| 19ODD-E-P02 | 8.0 | -- | NE | NE | N/A | X | 1.5-8.0 | | | | | | | | | | | | | | | |
| 19ODD-W-P01 | 8.0 | -- | NE | NE | N/A | X | 1.7-8.0 | | | | | | | | | | | | | | | |
| 19SWM-01 ³ | 8.0 | -- | NE | NE | N/A | | | X | 0.0-8.0 | | | | | | | | | | | | | |
| 19SWM-03 | 25.0 | 3.0 | 18.0 | 18.0 | 12.7 | X | 0.3-4.0 | X | 4.0-25.0 | | | X | 4.0-6.0, 16.5-21.5 | | | | | | | | | |
| 19SWM-04 ³ | 8.0 | -- | 6.5 | 6.5 | N/A | | | X | 0.0-8.0 | | | | | | | | | | | | | |
| 19SWM-05 | 25.0 | 1.0 | 8.0 | NE | 9.1 | | | X | 0.1-3.5 | | | | | | | X | 16.5-25.0 | | | | | |
| 19SWM-07 | 24.0 | 4.0 | NE | NE | NE | | | | | X | 16.5-24.0 | | | | | X | 16.5-24.0 | | | | | |
| 19SWM-08 | 25.0 | -- | NE | NE | NE | | | | | X | 15.0-20.0 | | | | | | | | | | | |
| 19SWM-09 | 25.0 | -- | NE | NE | N/A | X | 0.0-9.0 | | | | | | | | | | | | | | | |
| 19SWM-10 | 25.0 | -- | NE | NE | N/A | | | | | X | 1.0-11.5 | | | | | | | | | | | |
| 19SWM-11 | 25.0 | 2.0 | NE | NE | 23.3 | | | | | | | | | | | | | | | | | |
| 19SWM-12 | 25.0 | 3.0 | NE | NE | 13.1 | | | | | | | X | 0.0-2.0, 4.0-6.0 | | | | | | | | | |
| 19SWM-13 | 25.0 | 1.0 | NE | NE | NE | X | 0.1-4.0 | | | | | | | | | | | | | | | |
| 19SWM-14 | 23.8 | 2.0 | NE | NE | 19.5 | | | | | | | | | | | X | 21.5-23.8 | | | | | |

TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

| Exploration Designation | Depth Drilled (ft) | Topsoil Thickness (in) | Depth to Subsurface Water (ft) | | | Suspected Fill Material | | Alluvial Material ¹ | | Highly Plastic Fine Grained Material (USCS Symbol CH or MH) | | Very Soft to Soft Fine Grained Soil (SPT Field N-Value 0 to 3 bpf) | | Very Loose Coarse Grained Soils (SPT Field N-Value 0 to 2 bpf) | | Intermediate Geomaterial (Residuum with SPT N-Value >50 blows over 6" Interval) | | Auger Refusal | | Rock Cored | |
|-------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|-------------------------|---------------------|--------------------------------|---------------------|---|---------------------|--|------------------------------|--|---------------------|---|---------------------|---------------|------------|-------------|---------------------|
| | | | At Time of Drilling (ft) | End of Drilling (ft) | After Drilling (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth (ft) | Encountered | Depth Range(s) (ft) |
| 19SWM-15 | 23.2 | 4.0 | 21.0 | 21.0 | 6.2 | X | 0.3-2.0 | | | | | | | | | X | 6.0-23.2 | | | | |
| 19X-BR09 | 29.3 | -- | NE | N/A | N/A | X | 1.7-12.5 | X | 12.5-16.5 | | | X | 6.0-12.0 | | | X | 16.5-19.3 | X | 19.3 | X | 19.3-29.3 |
| 19X-BR10 | 69.5 | -- | 33.0 | N/A | N/A | X | 2.0-16.5 | X | 16.5-26.5 | | | | | | | X | 31.5-59.5 | X | 59.5 | X | 59.5-69.5 |
| 19X-BR11 | 70.0 | -- | 22.0 | NE | N/A | X | 1.9-11.5 | X | 11.5-26.5 | | | | | | | X | 41.5-70.0 | | | | |
| 19X-BR12 | 70.4 | -- | 28.1 | 28.1 | N/A | X | 2.1-21.6 | X | 21.6-34.6 | | | X | 2.1-6.1, 8.1-11.6, 16.6-21.6 | | | X | 41.6-70.4 | | | X | 53.1-58.1 |
| 19X-NOS-P01 | 8.3 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P02 | 8.0 | -- | NE | NE | N/A | X | 1.7-8.0 | | | | | X | 4.0-6.0 | | | | | | | | |
| 19X-NOS-P03 | 11.0 | -- | NE | NE | N/A | X | 4.3-11.0 | | | | | | | | | | | | | | |
| 19X-NOS-P04 | 8.0 | -- | NE | NE | N/A | X | 2.2-8.0 | | | | | | | | | | | | | | |
| 19X-NOS-P05 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P06 | 10.0 | -- | NE | NE | N/A | X | 2.4-10.0 | | | | | | | | | | | | | | |
| 19X-NOS-P07 | 8.0 | -- | NE | NE | N/A | X | 4.0-8.0 | | | | | | | | | | | | | | |
| 19X-NOS-P08 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P09 | 10.0 | -- | NE | NE | N/A | X | 4.0-10.0 | | | | | | | | | | | | | | |
| 19X-NOS-P10 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P11 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P12 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P13 | 9.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P14 | 10.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P15 | 7.5 | -- | NE | NE | N/A | | | | | X | 2.5-7.5 | | | | | | | | | | |
| 19X-NOS-P16 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P17 | 13.6 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P18 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P19 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P20 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P21 | 8.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P22 | 8.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P23 | 8.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P24 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-NOS-P25 | 7.3 | -- | NE | NE | N/A | | | | | | | | | | | X | 6.0-7.3 | | | | |
| 19X-NOS-P26 | 7.9 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-N-RW01 | 33.0 | -- | NE | NE | N/A | X | 2.0-6.0 | | | | | | | | | | | X | 33.0 | | |
| 19X-N-RW02 | 48.2 | -- | 23.0 | 32.0 | N/A | X | 1.8-21.5 | X | 21.5-26.5 | | | | | | | X | 41.5-48.2 | | | | |
| 19X-N-RW03 | 43.1 | -- | 23.0 | 21.9 | N/A | X | 1.7-16.5 | X | 16.5-21.5 | X | 16.5-21.5 | | | | | X | 26.5-43.1 | | | | |
| 19X-N-RW04 | 38.3 | -- | 23.0 | NE | N/A | X | 2.7-12.0 | X | 12.0-21.5 | | | X | 13.0-17.5 | | | X | 26.5-38.3 | | | | |
| 19X-N-RW05 | 48.4 | -- | 13.0 | 13.8 | N/A | X | 2.2-11.5 | X | 11.5-21.5 | | | | | X | 11.5-16.5 | X | 36.5-48.3 | | | | |
| 19X-N-RW06 | 33.3 | 1.0 | 7.0 | 2.3 | N/A | | | X | 0.1-8.5 | | | X | 0.1-4.0 | | | X | 16.5-33.3 | | | | |
| 19X-N-RW07 | 39.0 | 1.0 | 8.0 | 15.8 | 4.9 | | | X | 0.1-6.0 | | | X | 0.1-4.0 | | | X | 11.5-39.0 | | | | |
| 19X-N-RW08 | 37.2 | -- | 33.0 | 3.0 | N/A | X | 0.0-4.0 | X | 4.0-16.5 | | | X | 4.0-6.0 | | | X | 21.5-37.2 | X | 37.2 | | |
| 19X-N-RW10 | 48.8 | 3.0 | 26.0 | 27.9 | 22.5 | | | | | | | | | | | X | 11.5-48.8 | | | | |
| 19X-N-RW11 | 49.9 | 2.0 | 38.0 | 27.8 | N/A | X | 0.2-8.0 | | | | | | | | | X | 36.5-49.9 | | | | |
| 19X-N-RW12 | 44.3 | 2.0 | 43.0 | NE | N/A | X | 0.2-2.0 | | | | | | | | | X | 26.5-44.3 | | | | |

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|-------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|-------------------------|---------------------|--------------------------------|---------------------|---|---------------------|--|---------------------|--|---------------------|---|---------------------|---------------|------------|-------------|---------------------|
| | | | At Time of Drilling (ft) | End of Drilling (ft) | After Drilling (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth (ft) | Encountered | Depth Range(s) (ft) |
| 19X-N-RW13 | 50.0 | -- | 43.0 | NE | N/A | | | | | | | | | | | X | 41.5-50.0 | | | | |
| 19X-N-RW14 | 50.0 | -- | 23.0 | 18.1 | N/A | | | | | | | | | | | X | 31.5-50.0 | | | | |
| 19X-N-RW15 | 50.9 | -- | 33.0 | 49.1 | N/A | X | 0.0-2.0 | | | | | | | | | X | 41.5-50.9 | | | | |
| 19X-N-RW16 | 51.3 | -- | 29.0 | 29.9 | N/A | X | 2.0-3.0 | | | X | 3.0-16.5 | | | | | X | 26.5-51.3 | | | | |
| 19X-N-RW17 | 48.8 | -- | 18.0 | 8.5 | N/A | X | 1.6-4.0 | | | | | | | | | X | 31.5-48.8 | | | | |
| 19X-N-RW18 | 50.0 | -- | 39.0 | NE | N/A | X | 0.0-16.5 | | | | | X | 0.0-2.0, 4.0-6.0 | | | | | | | | |
| 19X-N-RW18A | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-N-RW20 | 48.2 | -- | 43.0 | NE | N/A | | | | | | | X | 0.0-2.0 | | | X | 21.5-48.2 | | | | |
| 19X-N-RW21 | 48.1 | -- | 39.0 | NE | N/A | | | | | | | | | | | X | 11.5-48.1 | | | | |
| 19X-N-RW22 | 48.2 | -- | 28.0 | 15.3 | N/A | | | | | | | | | | | X | 21.5-48.2 | | | | |
| 19X-N-RW24 | 41.8 | -- | 33.0 | 8.0 | N/A | X | 0.5-6.5 | | | | | | | | | X | 31.5-41.8 | X | 41.8 | | |
| 19X-SOS-P23 | 8.7 | -- | NE | NE | N/A | X | 2.7-8.7 | | | | | | | | | | | | | | |
| 19X-SOS-P24 | 8.8 | -- | NE | NE | N/A | X | 1.8-2.6 | | | | | | | | | X | 2.6-8.8 | | | | |
| 19X-SOS-P25 | 6.0 | -- | NE | NE | N/A | X | 1.5-6.0 | | | | | | | | | | | | | | |
| 19X-SOS-P26 | 6.0 | -- | NE | NE | N/A | X | 1.9-6.0 | | | | | | | | | | | | | | |
| 19X-SOS-P27 | 7.5 | -- | NE | NE | N/A | X | 1.3-7.5 | | | | | | | | | | | | | | |
| 19X-SOS-P28 | 8.0 | -- | NE | NE | N/A | X | 1.8-8.0 | | | | | | | | | | | | | | |
| 19X-SOS-P29 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P30 | 7.3 | -- | NE | 2.5 | N/A | X | 1.3-7.3 | | | | | | | | | | | | | | |
| 19X-SOS-P31 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P32 | 9.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P33 | 15.0 | 2.0 | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P34 | 7.5 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P35 | 7.5 | -- | NE | NE | N/A | X | 1.4-3.5 | | | | | | | | | | | | | | |
| 19X-SOS-P36 | 6.0 | 6.0 | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P37 | 8.0 | -- | NE | NE | N/A | X | 1.6-8.0 | | | | | | | | | | | | | | |
| 19X-SOS-P38 | 8.0 | -- | NE | NE | N/A | | | | | | | | | | | | | | | | |
| 19X-SOS-P39 | 7.5 | -- | NE | NE | N/A | X | 1.5-7.5 | | | | | | | | | | | | | | |
| 19X-SOS-P40 | 6.3 | -- | NE | NE | N/A | | | | | | | | | | | X | 3.5-6.3 | | | | |
| 19X-SOS-P41 | 7.6 | -- | NE | NE | N/A | X | 1.6-7.6 | | | | | | | | | | | | | | |
| 19X-SOS-P42 | 8.8 | -- | NE | NE | N/A | X | 2.8-8.8 | | | | | | | | | | | | | | |
| 19X-SOS-P43 | 9.0 | -- | NE | NE | N/A | X | 2.9-9.0 | | | | | | | | | | | | | | |
| 19X-SOS-P44 | 8.4 | -- | NE | NE | N/A | | | | | | | | | | | X | 8.0-8.4 | | | | |
| 19X-SOS-P45 | 8.5 | -- | NE | NE | N/A | X | 2.5-8.5 | | | | | | | | | | | | | | |
| 19X-S-RW24 | 50.0 | -- | NE | NE | N/A | | | | | | | | | | | X | 21.5-50.0 | | | | |
| 19X-S-RW25 | 41.0 | 3.0 | NE | NE | N/A | | | | | | | | | | | X | 11.5-41.0 | | | | |
| 19X-S-RW26 | 50.0 | 6.0 | 48.0 | 46.5 | N/A | X | 0.5-31.5 | | | | | | | | | | | | | | |
| 19X-S-RW27 | 49.8 | 3.0 | 43.0 | 49.3 | N/A | X | 0.3-2.0 | | | | | X | 0.3-2.0 | | | | | | | | |
| 19X-S-RW28 | 50.0 | 5.0 | 35.0 | 35.0 | N/A | X | 0.3-6.0 | | | X | 6.0-8.0 | | | | | X | 36.5-50.0 | | | | |
| 19X-S-RW29 | 50.0 | 5.0 | 38.0 | 38.0 | N/A | | | | | | | | | | | | | | | | |
| 19X-S-RW30 | 41.1 | -- | 28.0 | 18.0 | N/A | X | 0.0-2.0 | | | | | | | | | X | 11.5-41.0 | X | 41.0 | | |
| 19X-S-RW31 | 43.2 | -- | 32.0 | 21.0 | N/A | | | | | | | | | | | X | 36.5-43.2 | X | 43.0 | | |

TABLE A-2: SUMMARY OF SUBSURFACE CONDITIONS

| Exploration Designation | Depth Drilled (ft) | Topsoil Thickness (in) | Depth to Subsurface Water (ft) | | | Suspected Fill Material | | Alluvial Material ¹ | | Highly Plastic Fine Grained Material (USCS Symbol CH or MH) | | Very Soft to Soft Fine Grained Soil (SPT Field N-Value 0 to 3 bpf) | | Very Loose Coarse Grained Soils (SPT Field N-Value 0 to 2 bpf) | | Intermediate Geomaterial (Residuum with SPT N-Value >50 blows over 6" Interval) | | Auger Refusal | | Rock Cored | |
|-------------------------|--------------------|------------------------|--------------------------------|----------------------|---------------------|-------------------------|---------------------|--------------------------------|---------------------|---|---------------------|--|---------------------|--|---------------------|---|---------------------|---------------|------------|-------------|---------------------|
| | | | At Time of Drilling (ft) | End of Drilling (ft) | After Drilling (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth Range(s) (ft) | Encountered | Depth (ft) | Encountered | Depth Range(s) (ft) |
| 19X-S-RW33 | 36.0 | -- | 33.0 | NE | N/A | X | 1.0-12.0 | | | | | | | | | | | X | 36.0 | | |
| 19X-S-RW34 | 48.9 | 1.0 | NE | NE | N/A | X | 0.1-4.0 | | | | | | | | X | 31.5-48.9 | | | | | |
| 19X-S-RW36 | 33.2 | -- | 14.0 | 14.0 | N/A | X | 2.4-12.0 | X | 12.0-19.0 | | | X | 12.0-16.5 | | | X | 26.5-33.2 | X | 33.2 | | |
| 19X-S-RW37 | 25.0 | -- | NE | NE | N/A | | | | | | | | | | | X | 21.5-25.0 | X | 25.0 | | |

¹ Alluvial material was typically identified in the field by the presence of organic material, low blow counts, and/or their vicinity to stream channels and floodplain environments.

² Rock coring attempted, but was unsuccessful. Borehole offset and SPT soil drilling resumed.

³ Boring advanced using hand auger.



TABLE A-3: PIEZOMETER WATER DEPTH OBSERVATIONS

| Exploration Designation | Baseline Alignment | Station ² | Offset (ft) | | Surface Elevation (ft) | Depth Drilled (ft) | Screened Depth of Piezometer (ft) | | | Piezometer Installation Date | At Time of Drilling Water Depth ¹ (ft) | Reading Date | Water Depth ¹ (ft) |
|-------------------------|--------------------|----------------------|-------------|----|------------------------|--------------------|-----------------------------------|----|------|------------------------------|---|--------------|-------------------------------|
| | | | | | | | | to | | | | | |
| 19SWM-03 | DTR RMP E1 | 36+38 | 251 | RT | 283.6 | 25 | 20.0 | to | 25.0 | 6/25/2019 | 18.0 | 7/25/2019 | 12.7 |
| 19SWM-05 | 495XL NB | 605+84 | 82 | RT | 236.8 | 25 | 20.0 | to | 25.0 | 7/11/2019 | Dry | 7/25/2019 | 9.1 |
| 19SWM-07 | 495XL NB | 625+98 | 108 | RT | 273.3 | 24 | 19.0 | to | 24.0 | 6/19/2019 | Dry | 7/25/2019 | Dry |
| 19SWM-08 | 495XL NB | 631+05 | 69 | RT | 283.4 | 25 | 20.0 | to | 25.0 | 6/20/2019 | Dry | 7/25/2019 | Dry |
| 19SWM-11 | GTP RMP NE | 14+79 | 27 | RT | 288.9 | 25 | 20.0 | to | 25.0 | 7/16/2019 | Dry | 7/25/2019 | 23.3 |
| 19SWM-12 | GWMP TRL | 14+36 | 5 | LT | 252.1 | 25 | 20.0 | to | 25.0 | 5/15/2019 | Dry | 7/25/2019 | 13.1 |
| 19SWM-13 | GWMP RMP G22 | 22+86 | 57 | RT | 215.7 | 25 | 20.0 | to | 25.0 | 7/9/2019 | Dry | 7/25/2019 | Dry |
| 19SWM-14 | GWMP RMP E21 | 29+29 | 133 | RT | 193.1 | 23.8 | 18.8 | to | 23.8 | 7/9/2019 | Dry | 7/25/2019 | 19.5 |
| 19SWM-15 | GWMP TRL | 45+22 | 217 | LT | 193.2 | 23.2 | 18.2 | to | 23.2 | 6/28/2019 | 21.0 | 7/25/2019 | 6.2 |

¹ Water depth measurements are referenced from the ground surface



TABLE A-4: SUMMARY OF EXISTING PAVEMENT THICKNESS

| Pavement Core Designation | Date Extracted | Core Collected ¹ | Roadway | Lane Location | Reference Baseline | Station | Offset (ft) | | Thickness (in.) | | | | |
|---------------------------|----------------|-----------------------------|--------------------------------------|-----------------------|--------------------|---------|-------------|----|------------------|--------------------------|--------------------------|-------------------|-------|
| | | | | | | | | | Asphalt Concrete | Portland Cement Concrete | Cement Treated Aggregate | Aggregate Subbase | Total |
| 19DTR-BR01 | 6/26/2019 | | DTR WB | Outside Shoulder | DTR RMP E1 | 31+44 | 24 | RT | 5.0 | -- | -- | 12.0 | 17.0 |
| 19DTR-BR02 | 6/11/2019 | | DTR EB | Outside Shoulder | DTR RMP E1 | 33+35 | 71 | LT | 5.3 | -- | -- | 4.0 | 9.3 |
| 19DTR-BR03 | 6/24/2019 | | 495 NB | Outside Shoulder | DTR RMP E1 | 38+76 | 36 | RT | 3.0 | 9.0 | 10.0 | -- | 22.0 |
| 19DTR-BR04 | 5/28/2019 | | 495 NB | Inside Shoulder | 495GP NB | 1068+45 | 17 | RT | 12.0 | 8.0 | -- | 46.0 | 66.0 |
| 19DTR-BR04a | 6/19/2019 | | 495 NB | Inside Shoulder | DTR RMP E1 | 43+64 | 22 | RT | 2.5 | 9.5 | -- | 5.0 | 17.0 |
| 19DTR-BR06 | 6/17/2019 | | 495 NB | Inside Shoulder | 495GP NB | 1054+25 | 30 | RT | 2.5 | 9.5 | -- | 6.0 | 18.0 |
| 19DTR-P02 | 7/2/2019 | X | Aux. Ramp from DTR to 495NB | Inside Shoulder | DTR EB | 21+16 | 60 | RT | 9.0 | -- | -- | 13.0 | 22.0 |
| 19DTR-P06 | 7/2/2019 | X | Aux. Ramp from DTR to 495NB | Inside Travel Lane | DTR RMP G3 | 35+65 | 32 | LT | 15.5 | -- | -- | 14.5 | 30.0 |
| 19DTR-P07 | 6/27/2019 | X | DTR EB | Inside Shoulder | DTR RMP E3 | 12+33 | 9 | RT | 5.5 | -- | -- | 6.5 | 12.0 |
| 19DTR-P09 | 7/15/2019 | X | Aux. Ramp from DTR to 495NB | Outside Shoulder | DTR RMP G3 | 45+46 | 8 | RT | 4.0 | -- | -- | 14.0 | 18.0 |
| 19DTR-RW05 | 5/5/2019 | | 495 NB | Inside Shoulder | 495GP NB | 1078+73 | 26 | RT | 18.0 | -- | -- | 6.0 | 24.0 |
| 19DTR-RW06 | 5/28/2019 | | HOV 495 NB | Outside Shoulder | DTR RMP E1 | 48+80 | 1 | RT | 11.0 | 6.0 | -- | 7.0 | 24.0 |
| 19DTR-RW07 | 5/5/2019 | | 495 NB | Inside Shoulder | 495GP NB | 1072+32 | 16 | RT | 7.0 | 10.0 | -- | 7.0 | 24.0 |
| 19GTP-BR13 | 6/2/2019 | | Georgetown Pike | Inside Travel Lane | GTP | 22+67 | 24 | RT | -- | 12.0 | -- | 6.0 | 18.0 |
| 19GTP-BR14 | 6/4/2019 | | Georgetown Pike | Inside Travel Lane | GTP | 20+00 | 19 | RT | -- | 13.5 | -- | 11.0 | 24.5 |
| 19GTP-BR15 | 6/16/2019 | X | On/Off Ramp - 495 SB & GTP | Outside Shoulder | GTP RMP NW | 08+28 | 41 | RT | 8.5 | -- | -- | 4.0 | 12.5 |
| 19GTP-E-P07 | 4/23/2019 | X | On/Off Ramp - 495 NB & GTP | Inside Travel Lane | GTP RMP SE | 16+78 | 25 | RT | 11.0 | -- | -- | 3.0 | 14.0 |
| 19GTP-E-P08 | 4/23/2019 | X | On/Off Ramp - 495 NB & GTP | Inside Travel Lane | GTP RMP SE | 19+69 | 29 | RT | 7.5 | -- | -- | 4.0 | 11.5 |
| 19GTP-E-P09 | 5/31/2019 | X | Georgetown Pike | Inside Travel Lane | GTP | 25+25 | 15 | RT | 10.0 | -- | -- | 9.0 | 19.0 |
| 19GTP-E-P10 | 6/5/2019 | X | Georgetown Pike | EB Travel Lane | GTP | 30+79 | 15 | LT | 9.0 | -- | -- | 15.0 | 24.0 |
| 19GTP-E-P11 | 4/29/2019 | X | On/Off Ramp - 495 NB & GTP | Inside Travel Lane | GTP RMP NE | 12+26 | 5 | LT | 3.0 | -- | -- | 9.0 | 12.0 |
| 19GTP-E-P12 | 6/7/2019 | X | Balls Hill Road | Outside Travel Lane | BH RD | 16+64 | 19 | RT | 10.0 | -- | -- | 8.0 | 18.0 |
| 19GTP-E-P13 | 6/7/2019 | X | Balls Hill Road | Outside Travel Lane | BH RD | 18+97 | 17 | LT | 9.5 | -- | -- | 18.0 | 27.5 |
| 19GTP-W-P04 | 5/31/2019 | X | Georgetown Pike | EB Travel Lane | GTP | 17+04 | 25 | RT | 10.0 | -- | -- | 9.0 | 19.0 |
| 19GTP-W-P06 | 6/11/2019 | X | On/Off Ramp - 495 SB & GTP | Ramp Merge Lane | GTP RMP SW | 18+98 | 4 | LT | 4.0 | -- | -- | 2.0 | 6.0 |
| 19GWP-BR17 | 06/03/19 | | On/Off Ramp - 495 SB Aux. Lane & GWP | WB Travel Lane | GWMP RMP G23 | 22+93 | 145 | RT | -- | 9.0 | -- | -- | 9.0 |
| 19GWP-BR19 | 5/22/2019 | | 495 SB | Inside Shoulder | GWMP RMP E21 | 14+87 | 8 | LT | 4.2 | 9.0 | -- | 7.0 | 20.2 |
| 19GWP-BR23 | 5/6/2019 | | 495 NB | Inside Travel Lane | 495XL NBC | 698+76 | 20 | LT | 13.0 | 10.0 | -- | 9.0 | 32.0 |
| 19GWP-P03 | 6/20/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | Outside Shoulder | GWMP RMP E21 | 29+11 | 59 | RT | 5.0 | -- | -- | 3.0 | 8.0 |
| 19GWP-P04 | 6/5/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | WB Inside Travel Lane | GWMP RMP E21 | 29+77 | 39 | RT | -- | 8.5 | -- | -- | 8.5 |
| 19GWP-P05 | 6/3/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | WB Inside Travel Lane | GWMP RMP G23 | 24+07 | 98 | LT | -- | 9.0 | -- | -- | 9.0 |
| 19GWP-P06 | 6/27/2019 | X | On/Off Ramp - 495 NB & GWP | Ramp Travel Lane | GWMP RMP G23 | 20+59 | 19 | LT | -- | 9.5 | -- | -- | 9.5 |
| 19GWP-P07 | 6/5/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | WB Inside Travel Lane | GWMP RMP E21 | 25+24 | 14 | RT | 16.5 | 7.0 | -- | 8.0 | 31.5 |
| 19GWP-P08 | 6/7/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | Outside Shoulder | GWMP RMP G21 | 36+49 | 19 | RT | 6.0 | -- | -- | 6.0 | 12.0 |
| 19GWP-P09 | 6/23/2019 | X | On/Off Ramp - 495 NB & GWP | Outside Shoulder | GWMP TRL | 43+21 | 64 | RT | 8.0 | -- | -- | 10.0 | 18.0 |
| 19GWP-RW01 | 5/28/2019 | | 495 SB | Inside Travel Lane | GWMP RMP E21 | 10+88 | 5 | LT | 6.0 | 9.0 | 5.0 | -- | 20.0 |
| 19GWP-RW02 | 5/23/2019 | | 495 SB | Inside Travel Lane | GWMP RMP E21 | 13+79 | 0 | LT | 3.0 | 9.0 | -- | 8.0 | 20.0 |
| 19GWP-RW03 | 6/6/2019 | | On/Off Ramp - 495 SB Aux. Lane & GWP | Outside Shoulder | GWMP RMP G21 | 46+46 | 9 | LT | 2.0 | -- | -- | -- | 2.0 |
| 19GWP-RW04 | 6/6/2019 | | On/Off Ramp - 495 SB Aux. Lane & GWP | Outside Shoulder | GWMP RMP G21 | 43+59 | 10 | RT | 5.0 | -- | -- | 3.0 | 8.0 |
| 19GWP-RW06 | 5/30/2019 | | 495 SB | Outside Shoulder | 495XL SB | 294+81 | 18 | LT | 5.0 | -- | -- | 10.0 | 15.0 |
| 19GWP-RW06a | 6/26/2019 | | 495 SB | Outside Shoulder | 495XL SB | 294+81 | 18 | LT | 5.0 | -- | -- | 11.0 | 16.0 |
| 19GWP-RW07 | 5/29/2019 | | 495 SB | Outside Shoulder | 495XL SB | 297+77 | 38 | LT | 6.0 | -- | -- | 5.0 | 11.0 |
| 19GWP-RW08 | 5/29/2019 | | 495 SB | Outside Shoulder | 495XL SB | 300+73 | 53 | LT | 9.0 | -- | -- | 3.0 | 12.0 |
| 19GWP-RW09 | 5/2/2019 | | 495 NB | Inside Shoulder | GWMP RMP E22 | 18+59 | 2 | LT | 8.5 | 9.5 | -- | 6.0 | 24.0 |
| 19GWP-RW10 | 5/1/2019 | | 495 NB | Inside Travel Lane | GWMP RMP E22 | 21+62 | 32 | LT | 12.0 | 8.0 | -- | 4.0 | 24.0 |
| 19GWP-RW11 | 5/6/2019 | | 495 NB | Inside Travel Lane | 495XL NBC | 696+77 | 36 | LT | 13.0 | 11.0 | -- | -- | 24.0 |
| 19LOD-W-P14 | 7/12/2019 | X | Live Oak Drive | EB Travel Lane | LOD | 24+75 | 23 | LT | 3.5 | -- | -- | 10.0 | 13.5 |



TABLE A-4: SUMMARY OF EXISTING PAVEMENT THICKNESS

| Pavement Core Designation | Date Extracted | Core Collected ¹ | Roadway | Lane Location | Reference Baseline | Station | Offset (ft) | | Thickness (in.) | | | | |
|---------------------------|----------------|-----------------------------|----------------------------|---------------------|--------------------|---------|-------------|----|------------------|--------------------------|--------------------------|-------------------|-------|
| | | | | | | | | | Asphalt Concrete | Portland Cement Concrete | Cement Treated Aggregate | Aggregate Subbase | Total |
| 19LOD-W-P15 | 7/12/2019 | X | Live Oak Drive | EB Travel Lane | LOD | 18+41 | 26 | RT | 6.0 | -- | -- | 12.0 | 18.0 |
| 19ODD-BR07 | 5/15/2019 | | Old Dominion Drive | WB Travel Lane | ODD | 20+61 | 45 | RT | 9.0 | -- | -- | 8.0 | 17.0 |
| 19ODD-BR08 | 5/13/2019 | | Old Dominion Drive | WB Travel Lane | ODD | 24+90 | 46 | RT | 7.0 | -- | -- | 14.0 | 21.0 |
| 19ODD-BR08A | 5/14/2019 | | Old Dominion Drive | WB Travel Lane | ODD | 25+16 | 30 | RT | 8.0 | -- | -- | 8.0 | 16.0 |
| 19ODD-E-P02 | 5/16/2019 | X | Old Dominion | EB Travel Lane | ODD | 28+64 | 29 | RT | 11.0 | -- | -- | 7.0 | 18.0 |
| 19ODD-W-P01 | 5/15/2019 | X | Old Dominion | WB Travel Lane | ODD | 16+35 | 31 | RT | 12.0 | -- | -- | 14.5 | 26.5 |
| 19X-BR09 | 4/17/2019 | | 495 NB | Outside Shoulder | 495XL NB | 615+85 | 34 | RT | 4.3 | 13.8 | -- | 2.0 | 20.0 |
| 19X-BR10 | 4/17/2019 | | 495 NB | Outside Shoulder | 495XL NB | 617+85 | 34 | RT | 6.0 | 18.0 | -- | -- | 24.0 |
| 19X-BR11 | 6/24/2019 | | 495 SB | Outside Shoulder | 495XL SB | 217+64 | 38 | LT | 4.8 | 11.5 | -- | 6.5 | 22.8 |
| 19X-BR12 | 5/19/2019 | | 495 SB | Outside Shoulder | 495XL SB | 219+59 | 37 | LT | 4.0 | 14.5 | 7.0 | -- | 25.5 |
| 19X-NIS-PC01 | 5/9/2019 | X | HOV NB | Inside Shoulder | 495XL NB | 587+77 | 22 | LT | 10.0 | -- | -- | 19.0 | 29.0 |
| 19X-NIS-PC02 | 5/8/2019 | X | 495 NB | Inside Shoulder | 495XL NB | 611+67 | 26 | LT | 5.5 | 9.0 | 6.5 | 4.0 | 25.0 |
| 19X-NIS-PC04 | 5/9/2019 | X | 495 NB | Inside Shoulder | 495XL NB | 635+71 | 29 | LT | 4.5 | 10.5 | 6.5 | 2.5 | 24.0 |
| 19X-NIS-PC06 | 5/1/2019 | X | 495 NB | Inside Shoulder | 495XL NB | 659+80 | 24 | LT | 4.5 | 7.5 | -- | 10.0 | 22.0 |
| 19X-NIS-PC07 | 5/1/2019 | X | 495 NB | Inside Shoulder | 495XL NB | 683+80 | 46 | LT | 15.5 | 9.0 | 5.0 | -- | 29.5 |
| 19X-NOL-PC03 | 5/10/2019 | X | 495 NB | Outside Travel Lane | 495XL NB | 621+69 | 27 | RT | 16.0 | -- | -- | -- | 16.0 |
| 19X-NOL-PC05 | 5/10/2019 | X | 495 NB | Outside Travel Lane | 495XL NB | 650+96 | 27 | RT | 9.3 | 9.3 | -- | -- | 18.6 |
| 19X-NOL-PC08 | 4/30/2019 | X | 495 NB | Outside Travel Lane | 495XL NBC | 687+20 | 0 | RT | 17.5 | -- | -- | -- | 17.5 |
| 19X-NOL-PC09 | 5/1/2019 | X | 495 NB | Outside Travel Lane | 495XL NBC | 692+55 | 10 | RT | 16.0 | -- | -- | -- | 16.0 |
| 19X-NOL-PC10 | 4/30/2019 | X | 495 NB | Outside Travel Lane | 495XL NBC | 700+52 | 39 | RT | 14.0 | 8.0 | 6.5 | -- | 28.5 |
| 19X-NOL-PC11 | 5/1/2019 | X | 495 NB | Outside Travel Lane | GWMP TRL | 46+18 | 248 | RT | 6.5 | 8.8 | -- | -- | 15.3 |
| 19X-NOS-P01 | 4/16/2019 | X | 495 NB | Outside Shoulder | 495GP NB | 1080+41 | 45 | RT | 7.8 | 10.0 | 5.0 | 3.0 | 25.8 |
| 19X-NOS-P02 | 4/17/2019 | X | 495 NB | Outside Shoulder | 495GP NB | 1086+11 | 48 | RT | 13.0 | -- | -- | 7.0 | 20.0 |
| 19X-NOS-P03 | 4/18/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 588+42 | 68 | RT | 19.8 | -- | -- | 4.5 | 24.3 |
| 19X-NOS-P04 | 4/24/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 594+48 | 63 | RT | 19.5 | -- | -- | 6.0 | 25.5 |
| 19X-NOS-P05 | 4/25/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 627+80 | 29 | RT | 17.0 | -- | -- | 7.0 | 24.0 |
| 19X-NOS-P06 | 4/23/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 606+42 | 39 | RT | 19.5 | -- | -- | 28.5 | 48.0 |
| 19X-NOS-P07 | 4/24/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 612+62 | 39 | RT | 14.0 | -- | -- | 34.0 | 48.0 |
| 19X-NOS-P08 | 4/24/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 621+72 | 33 | RT | 17.0 | -- | -- | 7.0 | 24.0 |
| 19X-NOS-P09 | 4/24/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 600+43 | 54 | RT | 18.0 | -- | -- | 30.0 | 48.0 |
| 19X-NOS-P10 | 4/25/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 633+86 | 29 | RT | 17.5 | -- | -- | 18.5 | 36.0 |
| 19X-NOS-P11 | 4/25/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 639+94 | 46 | RT | 12.5 | -- | -- | 23.5 | 36.0 |
| 19X-NOS-P12 | 4/25/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 645+72 | 37 | RT | 17.0 | -- | -- | 9.4 | 26.4 |
| 19X-NOS-P13 | 4/28/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 651+14 | 56 | RT | 33.0 | -- | -- | 9.0 | 42.0 |
| 19X-NOS-P14 | 4/29/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 650+98 | 39 | RT | 22.0 | -- | -- | 26.0 | 48.0 |
| 19X-NOS-P15 | 4/25/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 656+97 | 43 | RT | 16.5 | -- | -- | 13.5 | 30.0 |
| 19X-NOS-P16 | 4/24/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 657+79 | 41 | RT | 27.0 | -- | -- | 9.0 | 36.0 |
| 19X-NOS-P17 | 4/29/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 662+51 | 35 | RT | 16.0 | 11.5 | -- | 15.7 | 43.2 |
| 19X-NOS-P18 | 4/30/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 668+54 | 48 | RT | 17.5 | -- | -- | 18.5 | 36.0 |
| 19X-NOS-P19 | 4/30/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 674+83 | 32 | RT | 16.0 | -- | -- | 20.0 | 36.0 |
| 19X-NOS-P20 | 4/30/2019 | X | 495 NB | Outside Shoulder | 495XL NB | 681+07 | 22 | RT | 17.8 | -- | -- | 18.3 | 36.0 |
| 19X-NOS-P21 | 4/30/2019 | X | 495 NB | Outside Shoulder | 495XL NBC | 687+21 | 5 | RT | 17.5 | -- | -- | 10.0 | 27.5 |
| 19X-NOS-P22 | 5/1/2019 | X | On/Off Ramp - 495 NB & GWP | Outside Shoulder | 495XL NBC | 693+13 | 12 | LT | 17.0 | -- | -- | 10.0 | 27.0 |
| 19X-NOS-P23 | 5/1/2019 | X | 495 NB | Outside Shoulder | 495XL NBC | 699+13 | 39 | RT | 17.0 | -- | -- | 10.0 | 27.0 |
| 19X-NOS-P24 | 4/30/2019 | X | 495 NB | Outside Shoulder | 495XL NBC | 705+11 | 53 | RT | 7.0 | 10.0 | 5.5 | 13.5 | 36.0 |
| 19X-NOS-P25 | 5/1/2019 | X | On/Off Ramp - 495 NB & GWP | Outside Shoulder | GWMP TRL | 49+30 | 89 | LT | 11.0 | -- | -- | 12.5 | 23.5 |
| 19X-NOS-P26 | 5/1/2019 | X | 495 NB | Outside Shoulder | GWMP TRL | 55+00 | 63 | RT | 4.5 | -- | -- | 19.5 | 24.0 |



TABLE A-4: SUMMARY OF EXISTING PAVEMENT THICKNESS

| Pavement Core Designation | Date Extracted | Core Collected ¹ | Roadway | Lane Location | Reference Baseline | Station | Offset (ft) | | Thickness (in.) | | | | |
|---------------------------|----------------|-----------------------------|--------------------------------------|---------------------|--------------------|---------|-------------|----|------------------|--------------------------|--------------------------|-------------------|-------|
| | | | | | | | | | Asphalt Concrete | Portland Cement Concrete | Cement Treated Aggregate | Aggregate Subbase | Total |
| 19X-N-RW01 | 5/20/2019 | | 495 NB | Outside Shoulder | 495GP NB | 1077+29 | 53 | RT | 3.5 | 14.5 | -- | 6.0 | 24.0 |
| 19X-N-RW02 | 4/16/2019 | | 495 NB | Outside Shoulder | 495GP NB | 1082+82 | 46 | RT | 7.8 | 6.8 | -- | 6.5 | 21.0 |
| 19X-N-RW03 | 4/16/2019 | | 495 NB | Outside Shoulder | 495GP NB | 1088+84 | 46 | RT | 12.0 | -- | -- | 8.0 | 20.0 |
| 19X-N-RW04 | 4/18/2019 | | 495 NB | Outside Shoulder | 495XL NB | 591+54 | 66 | RT | 26.0 | -- | -- | 6.0 | 32.0 |
| 19X-N-RW05 | 6/30/2019 | | 495 NB | Outside Shoulder | 495XL NB | 597+47 | 59 | RT | 12.0 | -- | -- | 10.0 | 22.0 |
| 19X-N-RW14 | 4/23/2019 | | On/Off Ramp - 495 NB & GTP | Outside Shoulder | GTP RMP SE | 14+76 | 34 | RT | 6.0 | -- | -- | 6.0 | 12.0 |
| 19X-N-RW16 | 04/29/19 | | 495 NB | Outside Shoulder | 495XL NB | 665+65 | 50 | RT | 16.0 | -- | -- | 8.0 | 24.0 |
| 19X-N-RW17 | 5/29/2019 | | 495 NB | Outside Shoulder | 495XL NB | 671+71 | 38 | RT | 19.0 | -- | -- | -- | 19.0 |
| 19X-N-RW18A | 4/29/2019 | | 495 NB | Outside Shoulder | 495XL NB | 677+71 | 28 | RT | 16.0 | -- | -- | -- | 16.0 |
| 19X-N-RW24 | 6/23/2019 | | On/Off Ramp - 495 NB & GWP | Outside Shoulder | GWMP TRL | 46+80 | 130 | LT | 2.0 | -- | -- | 4.0 | 6.0 |
| 19X-SIS-PC13 | 5/22/2019 | X | 495 SB | Inside Shoulder | GWMP TRL | 54+30 | 141 | RT | 13.0 | -- | -- | 14.8 | 27.8 |
| 19X-SIS-PC15 | 5/23/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 305+99 | 5 | RT | 12.3 | -- | -- | 16.0 | 28.3 |
| 19X-SIS-PC18 | 5/23/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 293+84 | 47 | LT | 3.5 | 8.5 | 4.0 | -- | 16.0 |
| 19X-SIS-PC20 | 5/23/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 281+91 | 34 | LT | 6.5 | 10.5 | 5.0 | -- | 22.0 |
| 19X-SIS-PC23 | 5/28/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 269+80 | 20 | LT | 6.0 | 8.5 | 6.0 | -- | 20.5 |
| 19X-SIS-PC25 | 5/29/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 257+72 | 17 | LT | 9.0 | 9.0 | 4.0 | -- | 22.0 |
| 19X-SIS-PC28 | 5/29/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 245+74 | 19 | LT | 10.0 | 8.5 | 6.5 | -- | 25.0 |
| 19X-SIS-PC30 | 6/11/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 233+89 | 19 | LT | 6.3 | 7.7 | -- | 3.0 | 17.0 |
| 19X-SIS-PC33 | 6/11/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 221+78 | 20 | LT | 6.3 | 8.3 | 5.0 | -- | 19.6 |
| 19X-SIS-PC35 | 6/11/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 209+72 | 20 | LT | 6.5 | 9.8 | 4.7 | -- | 21.0 |
| 19X-SIS-PC38 | 6/11/2019 | X | 495 SB | Inside Shoulder | 495XL SB | 197+86 | 19 | LT | 10.8 | 12.3 | -- | -- | 23.1 |
| 19X-SOL-PC12 | 4/17/2019 | X | 495 SB | Outside Lane | GWMP TRL | 56+17 | 189 | LT | 17.5 | -- | -- | 2.0 | 19.5 |
| 19X-SOL-PC14 | 4/18/2019 | X | 495 SB Aux. | Outside Travel Lane | GWMP TRL | 47+90 | 266 | LT | 14.5 | -- | -- | 8.0 | 22.5 |
| 19X-SOL-PC16 | 5/31/2019 | X | 495 SB Aux. | Outside Travel Lane | GWMP RMP G22 | 10+80 | 19 | LT | 13.5 | -- | 18.0 | -- | 31.5 |
| 19X-SOL-PC17 | 6/21/2019 | X | On/Off Ramp - 495 SB Aux. Lane & GWP | Outside Travel Lane | 495XL SB | 295+22 | 64 | LT | 6.0 | -- | 12.0 | -- | 18.0 |
| 19X-SOL-PC19 | 5/31/2019 | X | 495 SB | Outside Lane | 495XL SB | 287+32 | 5 | LT | 15.3 | -- | 6.0 | -- | 21.3 |
| 19X-SOL-PC21 | 5/6/2019 | X | 495 SB Aux. | Outside Travel Lane | 495XL SB | 279+36 | 65 | LT | 8.5 | -- | 6.0 | 3.0 | 17.5 |
| 19X-SOL-PC22 | 5/7/2019 | X | 495 SB Aux. | Outside Travel Lane | 495XL SB | 271+49 | 74 | LT | 13.0 | -- | 6.5 | 6.0 | 25.5 |
| 19X-SOL-PC24 | 6/13/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 263+54 | 39 | LT | 6.0 | -- | -- | 10.0 | 16.0 |
| 19X-SOL-PC26 | 6/14/2019 | X | 495 SB | Outside Lane | 495XL SB | 254+55 | 30 | LT | 6.0 | 10.0 | 5.0 | -- | 21.0 |
| 19X-SOL-PC27 | 6/16/2019 | X | 495 SB | Outside Lane | 495XL SB | 247+54 | 26 | LT | 6.0 | 10.0 | 2.0 | -- | 18.0 |
| 19X-SOL-PC29 | 5/15/2019 | X | 495 SB | Outside Lane | 495XL SB | 239+50 | 39 | LT | 4.5 | 9.5 | 3.5 | 11.0 | 28.5 |
| 19X-SOL-PC31 | 5/15/2019 | X | 495 SB | Outside Lane | 495XL SB | 231+40 | 30 | LT | 2.8 | 10.0 | -- | 5.7 | 18.5 |
| 19X-SOL-PC32 | 5/16/2019 | X | 495 SB | Outside Lane | 495XL SB | 223+47 | 30 | LT | 3.0 | 9.0 | 6.0 | -- | 18.0 |
| 19X-SOL-PC34 | 5/22/2019 | X | 495 SB | Outside Lane | 495XL SB | 215+41 | 29 | LT | 4.0 | 8.8 | 3.8 | -- | 16.6 |
| 19X-SOL-PC36 | 5/9/2019 | X | 495 SB | Outside Lane | 495XL SB | 207+54 | 37 | LT | 7.8 | 7.5 | 2.8 | 2.9 | 21.0 |
| 19X-SOL-PC37 | 5/10/2019 | X | 495 SB | Outside Lane | 495XL SB | 199+56 | 50 | LT | 7.3 | 6.8 | 5.5 | 9.4 | 29.0 |
| 19X-SOL-PC39 | 5/14/2019 | X | 495 SB | Outside Lane | 495XL SB | 192+43 | 61 | LT | 8.3 | 7.8 | 4.0 | 1.9 | 22.0 |
| 19X-SOS-P23 | 4/17/2019 | X | 495 SB | Outside Shoulder | GWMP TRL | 54+54 | 218 | LT | 9.0 | -- | -- | 23.4 | 32.4 |
| 19X-SOS-P24 | 4/18/2019 | X | 495 SB Aux. | Outside Shoulder | GWMP TRL | 47+98 | 270 | LT | 7.0 | -- | -- | 13.0 | 20.0 |
| 19X-SOS-P25 | 6/21/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 305+83 | 90 | LT | 6.5 | -- | -- | 12.0 | 18.5 |
| 19X-SOS-P26 | 6/21/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 299+35 | 91 | LT | 6.0 | -- | -- | 16.0 | 22.0 |
| 19X-SOS-P27 | 6/21/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 293+56 | 48 | LT | 9.0 | -- | -- | 6.0 | 15.0 |
| 19X-SOS-P28 | 6/20/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 287+95 | 33 | LT | 10.0 | -- | -- | 12.0 | 22.0 |
| 19X-SOS-P29 | 5/5/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 281+82 | 79 | LT | 6.0 | -- | -- | 12.0 | 18.0 |
| 19X-SOS-P30 | 5/6/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 276+03 | 78 | LT | 3.5 | -- | -- | 12.0 | 15.5 |
| 19X-SOS-P31 | 5/7/2019 | X | 495 SB Aux. | Outside Shoulder | 495XL SB | 270+42 | 88 | LT | 5.5 | -- | -- | 12.0 | 17.5 |



TABLE A-4: SUMMARY OF EXISTING PAVEMENT THICKNESS

| Pavement Core Designation | Date Extracted | Core Collected ¹ | Roadway | Lane Location | Reference Baseline | Station | Offset (ft) | | Thickness (in.) | | | | |
|---------------------------|----------------|-----------------------------|----------------------------|------------------|--------------------|---------|-------------|----|------------------|--------------------------|--------------------------|-------------------|-------|
| | | | | | | | | | Asphalt Concrete | Portland Cement Concrete | Cement Treated Aggregate | Aggregate Subbase | Total |
| 19X-SOS-P32 | 6/20/2019 | X | On/Off Ramp - 495 SB & GTP | Outside Shoulder | 495XL SB | 264+41 | 103 | LT | 8.5 | -- | -- | 12.0 | 20.5 |
| 19X-SOS-P34 | 6/13/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 259+25 | 51 | LT | 7.5 | -- | -- | 10.5 | 18.0 |
| 19X-SOS-P35 | 6/14/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 253+41 | 41 | LT | 3.0 | 4.0 | -- | 10.0 | 17.0 |
| 19X-SOS-P37 | 5/14/2019 | X | On/Off Ramp - 495 SB & GTP | Outside Shoulder | 495XL SB | 246+97 | 57 | LT | 11.3 | -- | -- | 8.0 | 19.3 |
| 19X-SOS-P38 | 5/15/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 240+92 | 51 | LT | 3.5 | 8.5 | -- | 11.0 | 23.0 |
| 19X-SOS-P39 | 5/15/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 234+67 | 43 | LT | 3.0 | 8.8 | 5.7 | -- | 17.5 |
| 19X-SOS-P40 | 5/15/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 228+75 | 39 | LT | 4.8 | 7.0 | 5.0 | -- | 16.8 |
| 19X-SOS-P41 | 5/16/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 222+96 | 39 | LT | 6.0 | 6.5 | 6.5 | -- | 19.0 |
| 19X-SOS-P42 | 5/8/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 211+95 | 40 | LT | 22.0 | -- | -- | 12.0 | 34.0 |
| 19X-SOS-P43 | 5/9/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 205+89 | 50 | LT | 18.5 | -- | -- | 16.0 | 34.5 |
| 19X-SOS-P44 | 5/10/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 199+83 | 60 | LT | 19.0 | -- | -- | 24.0 | 43.0 |
| 19X-SOS-P45 | 5/14/2019 | X | 495 SB | Outside Shoulder | 495XL SB | 194+03 | 67 | LT | 19.5 | -- | -- | 11.0 | 30.5 |
| 19X-S-RW31 | 5/7/2019 | | On/Off Ramp - 495 SB & GTP | Outside Shoulder | 495XL SB | 252+05 | 159 | LT | 5.0 | -- | -- | 7.0 | 12.0 |
| 19X-S-RW33 | 6/11/2019 | | On/Off Ramp - 495 SB & GTP | Outside Shoulder | 495XL SB | 225+83 | 77 | LT | 4.0 | -- | -- | 8.0 | 12.0 |
| 19X-S-RW36 | 5/8/2019 | | 495 SB | Outside Shoulder | 495XL SB | 208+82 | 45 | LT | 17.0 | -- | -- | 12.0 | 29.0 |
| 19X-S-RW37 | 5/13/2019 | | 495 SB | Outside Shoulder | 495XL SB | 196+86 | 65 | LT | 18.0 | -- | -- | 12.0 | 30.0 |

¹Blanks in "Core Collected" column indicate pavement was augered through.

Note: Refer to pavement core photo logs for additional information.



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

| Exploration Designation | Depth Drilled (ft) | Number of Tests Assigned | | | | | | | | | | | | | | |
|-------------------------|--------------------|--------------------------|------------------|---------------------|-----------|-------------------------------------|------------------|-----|-------------------|--------------|---------------|----|-------------|----------|---------|-----------------------------|
| | | Natural Moisture Content | Atterberg Limits | Grain Size Analysis | #200 Wash | Grain Size Analysis with Hydrometer | Standard Proctor | CBR | Resilient Modulus | Direct Shear | Consolidation | pH | Resistivity | Chloride | Sulfate | Unconfined Compression Rock |
| 19DTR-BR01 | 50.0 | 12 | 2 | 2 | | | | | | | | 1 | 1 | 1 | 1 | 1 |
| 19DTR-BR02 | 60.0 | 12 | 3 | 3 | | | | | | | | | | | | 1 |
| 19DTR-BR03 | 68.2 | 17 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19DTR-BR04a | 65.0 | 13 | 4 | 4 | | | | | | | | | | | | 1 |
| 19DTR-BR06 | 70.0 | 16 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19DTR-P02 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19DTR-P06 | 8.5 | 3 | | | | | | | | | | | | | | |
| 19DTR-P07 | 7.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19DTR-P08 | 6.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19DTR-P09 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19DTR-RW01 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19DTR-RW02 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19DTR-RW03 | 48.3 | 13 | 3 | 2 | 1 | | | | | | | | | | | |
| 19DTR-RW04 | 30.3 | 10 | 3 | 2 | 1 | | | | | | | | | | | |
| 19DTR-RW05 | 41.5 | 11 | 3 | 3 | | | | | | | | | | | | |
| 19DTR-RW06 | 32.5 | 9 | 2 | 2 | | | | | | | | | | | | |
| 19DTR-RW07 | 52.0 | 13 | 1 | 2 | | | | | | | | | | | | |
| 19GTP-BR13 | 68.8 | 17 | 3 | 3 | | | | | | | | | | | | |
| 19GTP-BR14 | 68.2 | 17 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GTP-BR15 | 69.3 | 17 | 4 | 4 | | | | | | | | | | | | |
| 19GTP-BR16 | 68.2 | 17 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GTP-E-P07 | 7.5 | 3 | 1 | | 1 | | | | | | | | | | | |
| 19GTP-E-P08 | 7.0 | 2 | | | | | | | | | | | | | | |
| 19GTP-E-P09 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19GTP-E-P10 | 8.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GTP-E-P11 | 9.0 | 4 | 1 | 1 | | | | | | | | | | | | |
| 19GTP-E-P12 | 8.0 | 3 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19GTP-E-P13 | 8.3 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GTP-W-P04 | 7.6 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GTP-W-P06 | 6.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-BR17 | 55.0 | 11 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GWP-BR18 | 70.0 | 17 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-BR19 | 70.0 | 18 | 3 | 3 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GWP-BR20 | 73.5 | 18 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-BR21 | 73.2 | 18 | 2 | 2 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GWP-BR22 | 61.2 | 14 | 3 | 3 | | | | | | | | | | | | 1 |
| 19GWP-BR23 | 50.0 | 11 | 2 | 2 | | | | | | | | 1 | 1 | 1 | 1 | |
| 19GWP-P01 | 6.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-P02 | 6.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-P03 | 7.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19GWP-P04 | 6.7 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-P05 | 6.8 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-P06 | 6.8 | 3 | | | | | | | | | | | | | | |
| 19GWP-P07 | 8.5 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19GWP-P08 | 6.5 | 3 | 1 | | 1 | | | | | | | | | | | |
| 19GWP-P09 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19GWP-RW01 | 29.5 | 9 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-RW02 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW03 | 50.0 | 13 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-RW04 | 48.9 | 13 | 2 | 1 | 1 | | | | | | | | | | | |
| 19GWP-RW05 | 54.3 | 14 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW06 | 44.1 | 12 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-RW07 | 39.5 | 10 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW08 | 39.3 | 11 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW09 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW10 | 43.1 | 11 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW11 | 50.5 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW12 | 28.5 | 9 | 3 | 3 | | | | | | | | | | | | |
| 19GWP-RW13 | 67.0 | 14 | 3 | 3 | | | | | | | | | | | | 1 |
| 19GWP-RW14 | 36.0 | 10 | 1 | | 1 | | | | | | | | | | | |
| 19GWP-RW15 | 38.4 | 11 | 2 | 2 | | | | | | | | | | | | |
| 19GWP-RW16 | 45.1 | 13 | 3 | 3 | | | | | | | | | | | | |
| 19LOD-BR15 | 68.1 | 13 | 3 | 1 | 2 | | | | | | | | | | | 1 |
| 19LOD-BR16 | 68.3 | 17 | 3 | 1 | 2 | | | | | | | 1 | 1 | 1 | 1 | |
| 19LOD-W-P14 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19LOD-W-P15 | 7.5 | 3 | 1 | | 1 | | | | | | | | | | | |
| 19ODD-BR07 | 70.0 | 17 | 3 | 2 | 2 | | | | | | | 1 | 1 | 1 | 1 | |
| 19ODD-BR08A | 70.0 | 17 | 3 | 1 | 2 | | | | | | | | | | | |
| 19ODD-E-P02 | 8.0 | 3 | 2 | | 2 | | | | | | | | | | | |
| 19ODD-W-P01 | 8.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19SWM-01 | 8.0 | 1 | 1 | 1 | | | 1 | | | | | | | | | |
| 19SWM-03 | 25.0 | 9 | 2 | | | 2 | 1 | | | | | | | | | |
| 19SWM-04 | 8.0 | 1 | 1 | 1 | | | 1 | | | | | | | | | |
| 19SWM-05 | 25.0 | 10 | 3 | 1 | | 2 | 1 | | | | 1 | 1 | 1 | 1 | 1 | |
| 19SWM-07 | 24.0 | 9 | 2 | 1 | | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | |
| 19SWM-08 | 25.0 | | 1 | | | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | |
| 19SWM-09 | 25.0 | 10 | 3 | 2 | | 1 | 1 | | | | | | | | | |



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

| Exploration Designation | Depth Drilled (ft) | Number of Tests Assigned | | | | | | | | | | | | | | |
|-------------------------|--------------------|--------------------------|------------------|---------------------|-----------|-------------------------------------|------------------|-----|-------------------|--------------|---------------|----|-------------|----------|---------|-----------------------------|
| | | Natural Moisture Content | Atterberg Limits | Grain Size Analysis | #200 Wash | Grain Size Analysis with Hydrometer | Standard Proctor | CBR | Resilient Modulus | Direct Shear | Consolidation | pH | Resistivity | Chloride | Sulfate | Unconfined Compression Rock |
| 19SWM-10 | 25.0 | 9 | 2 | 2 | | | | | | | | | | | | |
| 19SWM-11 | 25.0 | 10 | 2 | | | 2 | 1 | | | | | 1 | 1 | 1 | 1 | |
| 19SWM-12 | 25.0 | 10 | 3 | 4 | | | 1 | | | | | 1 | 1 | 1 | 1 | |
| 19SWM-13 | 25.0 | 10 | 3 | 1 | | 2 | 1 | | | | | | | | | |
| 19SWM-14 | 23.8 | 10 | 2 | 1 | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | |
| 19SWM-15 | 23.2 | 9 | 3 | 2 | | | 1 | 1 | | | | 1 | 1 | 1 | 1 | |
| 19X-BR09 | 29.3 | 7 | 2 | 2 | | | | | | | | | | | | 1 |
| 19X-BR10 | 69.5 | 14 | 3 | 2 | 1 | | | | | | | | | | | 1 |
| 19X-BR11 | 70.0 | 16 | 4 | 2 | 2 | | | | | | | 1 | 1 | 1 | 1 | |
| 19X-BR12 | 70.4 | 16 | 3 | 4 | | | | | | | | | | | | |
| 19X-NOS-P01 | 8.3 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P02 | 8.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P03 | 11.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P04 | 8.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P05 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P06 | 10.0 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P07 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P08 | 7.5 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P09 | 10.0 | 3 | | 1 | | | | | | | | | | | | |
| 19X-NOS-P10 | 9.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P11 | 9.0 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P12 | 7.5 | 2 | | | | | | | | | | | | | | |
| 19X-NOS-P13 | 9.5 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P14 | 10.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P15 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P16 | 9.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P17 | 13.6 | 5 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P18 | 9.0 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P19 | 9.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P20 | 9.0 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P21 | 8.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P22 | 8.5 | 3 | | | | | | | | | | | | | | |
| 19X-NOS-P23 | 8.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P24 | 9.0 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-NOS-P25 | 8.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-NOS-P26 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19X-N-RW01 | 33.0 | 9 | 2 | 3 | | | | | | | | | | | | |
| 19X-N-RW02 | 48.2 | 12 | 3 | 3 | | | | | | | | | | | | |
| 19X-N-RW03 | 43.1 | 11 | 3 | 2 | 1 | | | | | | | | | | | |
| 19X-N-RW04 | 38.3 | 11 | 3 | 2 | 1 | | | | | 1 | | | | | | |
| 19X-N-RW05 | 42.8 | 12 | 2 | 1 | 1 | | | | | | | | | | | |
| 19X-N-RW06 | 33.3 | 10 | 1 | 1 | 1 | | | | | | | | | | | |
| 19X-N-RW07 | 39.0 | 11 | 2 | 1 | 1 | | | | | | | | | | | |
| 19X-N-RW08 | 37.2 | 11 | 4 | 2 | 2 | | | | | | | | | | | |
| 19X-N-RW10 | 48.8 | 13 | 2 | 1 | 1 | | | | | | | | | | | |
| 19X-N-RW11 | 49.9 | 13 | 3 | 1 | 2 | | | | | | | | | | | |
| 19X-N-RW12 | 44.2 | 12 | 2 | 1 | 2 | | | | | | | | | | | |
| 19X-N-RW13 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW14 | 50.0 | 14 | 2 | 2 | | | 1 | 1 | 1 | | | | | | | |
| 19X-N-RW15 | 50.9 | 14 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW16 | 51.3 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW17 | 48.8 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW18 | 50.0 | 11 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW20 | 48.2 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW21 | 48.1 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW22 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-N-RW24 | 43.8 | 12 | 3 | 2 | 1 | | | | | | | | | | | |
| 19X-SOS-P23 | 8.7 | 4 | | | | | | | | | | | | | | |
| 19X-SOS-P24 | 8.8 | 5 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-SOS-P25 | 6.0 | 2 | | 1 | | | | | | | | | | | | |
| 19X-SOS-P26 | 6.0 | 2 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P27 | 7.5 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-SOS-P28 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19X-SOS-P29 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P30 | 7.3 | 3 | | 1 | | | | | | | | | | | | |
| 19X-SOS-P31 | 7.5 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-SOS-P32 | 9.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P33 | 15.0 | 7 | 2 | 2 | | | 1 | | | | | | | | 1 | |
| 19X-SOS-P34 | 7.5 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-SOS-P35 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P36 | 6.0 | 4 | 1 | 1 | | | 1 | | | | | | | | 1 | |
| 19X-SOS-P37 | 8.0 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P38 | 8.0 | 3 | | | | | | | | | | | | | | |
| 19X-SOS-P39 | 7.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-SOS-P40 | 6.3 | 4 | 1 | 1 | | | 1 | 1 | 1 | | | | | | | |
| 19X-SOS-P41 | 7.6 | 3 | | | | | | | | | | | | | | |
| 19X-SOS-P42 | 8.8 | 3 | 1 | 1 | | | | | | | | | | | | |



TABLE A-5: INDEX OF LABORATORY TESTING TO SUBSURFACE EXPLORATIONS

| Exploration Designation | Depth Drilled (ft) | Number of Tests Assigned | | | | | | | | | | | | | | |
|-------------------------|--------------------|--------------------------|------------------|---------------------|-----------|-------------------------------------|------------------|-----------|-------------------|--------------|---------------|-----------|-------------|-----------|-----------|-----------------------------|
| | | Natural Moisture Content | Atterberg Limits | Grain Size Analysis | #200 Wash | Grain Size Analysis with Hydrometer | Standard Proctor | CBR | Resilient Modulus | Direct Shear | Consolidation | pH | Resistivity | Choride | Sulfate | Unconfined Compression Rock |
| 19X-SOS-P43 | 9.0 | 3 | | | | | | | | | | | | | | |
| 19X-SOS-P44 | 8.4 | 3 | | | | | | | | | | | | | | |
| 19X-SOS-P45 | 8.5 | 3 | 1 | 1 | | | | | | | | | | | | |
| 19X-S-RW24 | 50.0 | | | | | | | | | | | | | | | |
| 19X-S-RW25 | 41.0 | 12 | 3 | 2 | 1 | | | | | | | | | | | |
| 19X-S-RW26 | 50.0 | 13 | 2 | 3 | | | | | | | | | | | | |
| 19X-S-RW27 | 49.3 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-S-RW28 | 50.0 | 14 | 3 | 2 | 1 | | 1 | | | 1 | | | | | | |
| 19X-S-RW29 | 50.0 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-S-RW30 | 41.1 | 11 | 2 | 2 | | | | | | | | | | | | |
| 19X-S-RW31 | 43.3 | 12 | 3 | 2 | 1 | | | | | | | | | | | |
| 19X-S-RW33 | 36.0 | 10 | 3 | 3 | | | | | | | | | | | | |
| 19X-S-RW34 | 48.9 | 13 | 2 | 2 | | | | | | | | | | | | |
| 19X-S-RW36 | 33.2 | 9 | 2 | 2 | | | | | | | | | | | | |
| 19X-S-RW37 | 25.0 | 8 | 2 | 2 | | | 1 | 1 | 1 | | | | | | | |
| TOTALS: | | 1363 | 281 | 242 | 36 | 13 | 34 | 19 | 19 | 3 | 1 | 19 | 19 | 19 | 19 | 8 |



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

| Boring ID | Sample Type | Depth, feet | | w (%) | Atterberg Limits | | | Grain Size Analysis | | | USCS Symbol | Standard Proctor | | California Bearing Ratio | | | Resilient Modulus ⁴ (Mr) (psi) | Corrosivity | | | Rock | | | |
|------------|-------------|-------------|---------|-------|------------------|--------|--------|-----------------------|---------------------|--------------------------|-------------|--------------------------|----------------------|--------------------------|-------|-------|---|-------------|---------|----|-----------------------|----------------|---------------|----------|
| | | | | | LL (%) | PL (%) | PI (%) | % Gravel ¹ | % Sand ² | % Silt/Clay ³ | | Y _{d max} (pcf) | W _{opt} (%) | Y _d (pcf) | w (%) | % MDD | | CBR | % Swell | pH | Resistivity (ohms/cm) | Chloride (ppm) | Sulfate (ppm) | UC (psi) |
| 19GWP-RW11 | Jar | 23.5 | to 25.0 | 14.2 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 28.0 | to 30.0 | 22.9 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 33.0 | to 35.0 | 8.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 38.0 | to 38.8 | 6.7 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 43.0 | to 43.8 | 8.6 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 48.0 | to 48.5 | 12.4 | 28 | 23 | 5 | 0.2 | 56.4 | 43.4 | SM | | | | | | | | | | | | | |
| 19GWP-RW11 | Jar | 50.0 | to 50.5 | 11.9 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 0.0 | to 2.0 | 9.6 | 32 | 28 | 4 | 5.8 | 60.3 | 33.9 | SM | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 2.0 | to 2.8 | 4.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 4.0 | to 5.3 | 5.4 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 6.0 | to 6.3 | 5.4 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 8.0 | to 8.4 | 6 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 13.0 | to 15.0 | 10.3 | 29 | 24 | 5 | 0.0 | 41.7 | 58.3 | ML | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 18.0 | to 18.9 | 8.7 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 23.0 | to 24.0 | 11.9 | 29 | 22 | 7 | 6.0 | 59.9 | 34.1 | SC-SM | | | | | | | | | | | | | |
| 19GWP-RW12 | Jar | 28.0 | to 28.5 | 6.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 0.0 | to 2.0 | 16.6 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 2.0 | to 4.0 | 18.9 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 4.0 | to 6.0 | 16.3 | 28 | 23 | 5 | 1.3 | 38.9 | 59.8 | ML | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 6.0 | to 8.0 | 14.7 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 8.0 | to 10.0 | 14.1 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 13.0 | to 15.0 | 18.5 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 18.0 | to 20.0 | 11.2 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 23.0 | to 24.4 | 12.5 | 32 | 28 | 4 | 0.0 | 41.9 | 58.1 | ML | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 28.0 | to 28.8 | 10.5 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 33.0 | to 33.7 | 10.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 38.0 | to 38.3 | 6.5 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 43.0 | to 43.3 | 11.8 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 48.0 | to 48.3 | 10.1 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW13 | Jar | 53.0 | to 53.8 | 15.5 | 31 | 25 | 6 | 0.2 | 42.8 | 57.0 | ML | | | | | | | | | | | | | |
| 19GWP-RW13 | Rock Core | 65.5 | to 65.8 | | | | | | | | | | | | | | | | | | | | | 8,720 |
| 19GWP-RW14 | Jar | 0.0 | to 2.0 | 11.7 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 2.0 | to 4.0 | 10.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 4.0 | to 6.0 | 8.9 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 6.0 | to 8.0 | 9.4 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 8.0 | to 9.9 | 7.2 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 13.0 | to 15.0 | 10.3 | 34 | 25 | 9 | | | 58.6 | ML | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 18.0 | to 19.8 | 16.3 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 23.0 | to 24.8 | 17.4 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 28.0 | to 29.2 | 10.6 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW14 | Jar | 33.0 | to 33.9 | 11.4 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW15 | Jar | 0.0 | to 2.0 | 12.5 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW15 | Jar | 2.0 | to 4.0 | 14 | | | | | | | | | | | | | | | | | | | | |
| 19GWP-RW15 | Jar | 4.0 | to 6.0 | 15.1 | 34 | 28 | 6 | 2.3 | 67.4 | 30.3 | SM | | | | | | | | | | | | | |



TABLE A-6: SUMMARY OF LABORATORY TESTING RESULTS

| Boring ID | Sample Type | Depth, feet | | w (%) | Atterberg Limits | | | Grain Size Analysis | | | USCS Symbol | Standard Proctor | | California Bearing Ratio | | | Resilient Modulus ⁴ (Mr) (psi) | Corrosivity | | | Rock | | | |
|------------|-------------|-------------|----|-------|------------------|--------|--------|-----------------------|---------------------|--------------------------|-------------|--------------------------|----------------------|--------------------------|-------|-------|---|-------------|---------|----|-----------------------|----------------|---------------|----------|
| | | | | | LL (%) | PL (%) | PI (%) | % Gravel ¹ | % Sand ² | % Silt/Clay ³ | | Y _{d max} (pcf) | W _{opt} (%) | Y _d (pcf) | w (%) | % MDD | | CBR | % Swell | pH | Resistivity (ohms/cm) | Chloride (ppm) | Sulfate (ppm) | UC (psi) |
| 19X-N-RW02 | Jar | 6.3 | to | 8.3 | 17.6 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 8.3 | to | 10.3 | 20.7 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 13.0 | to | 15.0 | 17.4 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 18.0 | to | 20.0 | 26.4 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 23.0 | to | 25.0 | 10.8 | 30 | 23 | 7 | 26.4 | 54.0 | 19.6 | SM | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 28.0 | to | 30.0 | 29.5 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 33.0 | to | 35.0 | 28.5 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 38.0 | to | 40.0 | 22.4 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 43.0 | to | 43.5 | 17.8 | 32 | 26 | 6 | 1.1 | 58.2 | 40.7 | SM | | | | | | | | | | | | |
| 19X-N-RW02 | Jar | 48.0 | to | 48.2 | 18.7 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 3.0 | to | 4.0 | 12.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 4.0 | to | 6.0 | 19.5 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 6.0 | to | 8.0 | 21.7 | 36 | 26 | 10 | 4.0 | 36.9 | 59.1 | ML | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 8.0 | to | 10.0 | 21.8 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 13.0 | to | 15.0 | 19.4 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 18.0 | to | 20.0 | 26.2 | 52 | 22 | 30 | | | 83.8 | CH | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 23.0 | to | 25.0 | 20.2 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 28.0 | to | 29.4 | 8.2 | 32 | 25 | 7 | 0.2 | 41.2 | 58.5 | ML | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 33.0 | to | 33.4 | 7.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 38.0 | to | 38.4 | 7 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW03 | Jar | 43.0 | to | 43.1 | 12.8 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 3.0 | to | 5.0 | 15.2 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 5.0 | to | 7.0 | 13.1 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 7.0 | to | 9.0 | 21.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 9.0 | to | 11.0 | 26.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 13.0 | to | 15.0 | 25.9 | 43 | 22 | 21 | | | 69.9 | CL | | | | | | | | | | | | |
| 19X-N-RW04 | Tube | 15.0 | | 17.0 | 34.9 | 44 | 30 | 14 | 0.0 | 18.6 | 81.4 | ML | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 18.0 | to | 20.0 | 19.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 23.0 | to | 25.0 | 13.6 | 38 | 28 | 10 | 27.8 | 42.8 | 29.5 | SM | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 28.0 | to | 28.4 | 16.8 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 33.0 | to | 33.5 | 19.4 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW04 | Jar | 38.0 | to | 38.3 | 15.9 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 2.0 | to | 4.0 | 15.7 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 4.0 | to | 6.0 | 20.1 | 33 | 26 | 7 | 14.9 | 40.1 | 45.0 | SM | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 6.0 | to | 8.0 | 19.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 8.0 | to | 10.0 | 16.2 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 13.0 | to | 15.0 | 31.1 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 18.0 | to | 20.0 | 9.7 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 23.0 | to | 25.0 | 27.8 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 28.0 | to | 30.0 | 19.3 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 33.0 | to | 34.8 | 8.6 | 31 | 26 | 5 | | | 34.0 | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 38.0 | to | 38.6 | 17.6 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 43.0 | to | 43.8 | 17.8 | | | | | | | | | | | | | | | | | | | |
| 19X-N-RW05 | Jar | 48.0 | to | 48.4 | 13.4 | | | | | | | | | | | | | | | | | | | |



TABLE A-7: SUMMARY OF BULK SAMPLE TEST RESULTS

| Exploration Designation | Depth (ft) | | | USCS Symbol | % > #4 Sieve (Gravel) | % < #200 Sieve (Fines) | Natural Moisture Content (%) | Liquid Limit | Plastic Limit | Plasticity Index | Standard Proctor | | California Bearing Ratio | | | | | Resilient Modulus ¹ (psi) | Corrosivity | | | |
|--------------------------|------------|----|------|-------------|-----------------------|------------------------|------------------------------|--------------|---------------|------------------|--------------------------|----------------------|-----------------------------|-------------------------|-------|------|---------|--------------------------------------|-------------|-----------------------|----------------|---------------|
| | | | | | | | | | | | Y _d max (pcf) | W _{opt} (%) | Y _d molded (pcf) | W _{molded} (%) | % MDD | CBR | % Swell | | pH | Resistivity (ohms/cm) | Chloride (ppm) | Sulfate (ppm) |
| 19DTR-P07 | 1.0 | to | 3.0 | SM | 19.2 | 30.1 | 22.1 | 39 | 30 | 9 | 126.8 | 10.4 | 123.7 | 10.7 | 97.6 | 0.9 | 6.8 | 7,526 | | | | |
| 19DTR-P08 | 3.0 | to | 6.0 | SM | 14.0 | 31.2 | 10.6 | 31 | 24 | 7 | 128.8 | 9.3 | 126.8 | 9.8 | 98.4 | 2.9 | 2.9 | 4,905 | | | | |
| 19GTP-E-P12 | 2.0 | to | 8.0 | CH | 0.2 | 68.4 | | 51 | 24 | 27 | 111.8 | 17.3 | 110.4 | 17.7 | 98.8 | 2.0 | 3.2 | 10,619 | | | | |
| 19GWP-P03 | 1.0 | to | 7.0 | SC | 15.7 | 41.5 | 9.1 | 34 | 23 | 11 | 129.7 | 9.2 | 124.5 | 9.5 | 96.0 | 2.0 | 4.5 | 10,172 | | | | |
| 19GWP-P07 | 2.5 | to | 6.5 | CL | 0.4 | 60.9 | 19.2 | 35 | 21 | 14 | 120.1 | 12.4 | 118.5 | 12.2 | 98.7 | 0.8 | 8.1 | 7,795 | | | | |
| 19ODD-W-P01 | 2.0 | to | 8.0 | CL | 9.6 | 53.3 | 18.3 | 42 | 24 | 18 | 118.9 | 13.4 | 121.5 | 13.6 | 102.2 | 2.3 | 2.6 | 9,226 | | | | |
| 19SWM-01 | 0.0 | to | 8.0 | CL | 1.2 | 77.3 | 18.6 | 43 | 26 | 17 | 104.0 | 19.0 | | | | | | | | | | |
| 19SWM-03 | 6.0 | to | 10.0 | CL | 1.3 | 83.0 | 28.2 | 39 | 25 | 14 | 108.2 | 17.7 | | | | | | | | | | |
| 19SWM-04 | 0.0 | to | 8.0 | CL | 0.8 | 76.6 | 27.7 | 35 | 21 | 14 | 111.0 | 16.0 | | | | | | | | | | |
| 19SWM-05 | 15.0 | to | 20.0 | SC | 0.2 | 47.9 | 29 | 30 | 20 | 10 | 118.9 | 11.0 | | | | | | | | | | |
| 19SWM-05 | 20.0 | to | 25.0 | | | | 25.3 | | | | | | | | | | | | | | | |
| 19SWM-07 | 15.0 | to | 20.0 | CH | 5.7 | 66.8 | 17.5 | 52 | 27 | 25 | 111.9 | 13.1 | | | | | | | 6.4 | 1,270 | 235 | 12 |
| 19SWM-08 | 15.0 | to | 20.0 | CH | 0.4 | 77.4 | | 55 | 29 | 26 | 109.7 | 14.5 | | | | | | | 5.7 | 3,500 | 30.7 | 9.8 |
| 19SWM-08 | 20.0 | to | 25.0 | | | | | | | | | | | | | | | | | | | |
| 19SWM-09 | 15.0 | to | 20.0 | CL | 0.3 | 67.4 | 21.6 | 44 | 25 | 19 | 109.8 | 15.0 | | | | | | | 4.6 | 6,300 | 28.0 | 1.3 |
| 19SWM-09 | 20.0 | to | 25.0 | CL | 0.9 | 71.8 | 24.3 | 45 | 26 | 19 | | | | | | | | | | | | |
| 19SWM-10 | 20.0 | to | 25.0 | ML | 0.0 | 82.0 | 35.8 | 46 | 31 | 15 | | | | | | | | | | | | |
| 19SWM-11 | 15.0 | to | 20.0 | SC | 0.2 | 47.9 | 29 | 30.0 | 20.0 | 10.0 | | | | | | | | | 6.6 | 1,230 | 190 | 12 |
| 19SWM-11 | 20.0 | to | 25.0 | ML | 0.0 | 69.0 | 18.8 | 46 | 28 | 18 | 109.0 | 14.9 | | | | | | | | | | |
| 19SWM-12 | 0.0 | to | 5.0 | CL | 7.9 | 72.0 | 16.4 | 46 | 25 | 21 | 104.7 | 18.9 | | | | | | | | | | |
| 19SWM-12 | 5.0 | to | 10.0 | ML | 4.9 | 57.6 | 1.3 | | | | | | | | | | | | 6.0 | 6,940 | <10 | 53 |
| 19SWM-13 | 11.0 | to | 15.0 | CL | 0.0 | 61.9 | 17 | 34 | 22 | 12 | 112.5 | 14.5 | | | | | | | | | | |
| 19SWM-14 | 6.0 | to | 10.0 | ML | 0.2 | 70.6 | 17.4 | 37 | 26 | 11 | 108.8 | 14.6 | | | | | | | | | | |
| 19SWM-14 | 10.0 | to | 15.0 | | | | 22.5 | | | | | | | | | | | | | | | |
| 19SWM-15 | 15.0 | to | 20.0 | | | | | | | | | | | | | | | | | | | |
| 19SWM-15 | 20.0 | to | 23.2 | CL | 2.1 | 56.0 | 28.2 | 30 | 21 | 9 | 124.7 | 11.4 | | | | | | | | | | |
| 19X-NOS-P01 | 2.3 | to | 6.3 | SM | 14.7 | 44.2 | 16.2 | 32 | 26 | 6 | 125.4 | 10.4 | 126.6 | 10.3 | 101.0 | 14.2 | 1.7 | 6,829 | | | | |
| 19X-NOS-P08 | 3.5 | to | 5.5 | CL | 3.9 | 74.6 | 22.1 | 47 | 26 | 21 | 115.1 | 15.0 | 117.8 | 15.4 | 102.3 | 1.7 | 3.8 | 8,335 | | | | |
| 19X-NOS-P10 | 3.0 | to | 6.0 | SC | 15.7 | 43.6 | 1.2 | 34 | 21 | 13 | 128.8 | 10.2 | 129.1 | 10.4 | 100.2 | 3.3 | 1.4 | 12,183 | | | | |
| 19X-NOS-P16 | 3.0 | to | 6.0 | CL | 11.5 | 59.7 | 2.6 | 38 | 22 | 16 | 122.8 | 12.0 | 124.6 | 12.3 | 101.5 | 4.1 | 1.9 | 12,232 | | | | |
| 19X-NOS-P19 | 3.0 | to | 6.0 | CL | 8.8 | 50.1 | 0.8 | 34 | 22 | 12 | 125.2 | 11.4 | 128.9 | 11.5 | 103.0 | 1.6 | 4.1 | 7,587 | | | | |
| 19X-NOS-P24 | 3.0 | to | 6.0 | SM | 7.6 | 45.3 | 0.8 | 31 | 23 | 8 | 124.0 | 10.5 | 125.2 | 10.6 | 100.9 | 3.3 | 3.3 | 6,301 | | | | |
| 19X-N-RW14 | 1.0 | to | 4.0 | CL | 6.8 | 59.1 | 2.6 | 38 | 23 | 15 | 113.8 | 12.5 | 116.8 | 12.4 | 102.6 | 1.1 | 6.5 | 5,789 | | | | |
| 19X-SOS-P24 | 2.6 | to | 5.6 | SC-SM | 9.2 | 36.5 | 4.8 | 25 | 19 | 6 | 127.2 | 10.2 | 130.5 | 10.1 | 102.6 | 12.8 | 0.7 | 7,908 | | | | |
| 19X-SOS-P27 | 1.5 | to | 7.5 | SC | 11.3 | 49.5 | 1.4 | 34 | 22 | 12 | 120.0 | 13.7 | 118.4 | 14.1 | 98.7 | 14.7 | 1.2 | 11,328 | | | | |
| 19X-SOS-P31 | 3.5 | to | 5.5 | SC | 9.6 | 41.9 | 11.6 | 34 | 22 | 12 | 117.0 | 13.0 | 120.5 | 13.6 | 103.0 | 1.8 | 2.9 | 7,073 | | | | |
| 19X-SOS-P33 ² | 5.0 | to | 10.0 | CL | 1.5 | 67.2 | 25.1 | 48 | 27 | 21 | 108.3 | 14.2 | | | | | | | | | | |
| 19X-SOS-P34 | 1.5 | to | 5.5 | SC | 24.9 | 34.8 | 8.9 | 34 | 23 | 11 | 137.1 | 7.2 | 133.9 | 8.9 | 97.7 | 3.6 | 2.9 | 11,283 | | | | |
| 19X-SOS-P36 ² | 0.0 | to | 3.0 | ML | 6.2 | 52.6 | 7.1 | 35 | 27 | 8 | 114.2 | 13.4 | | | | | | | | | | |
| 19X-SOS-P40 | 2.0 | to | 5.5 | CL | 0.7 | 73.5 | 9 | 42 | 20 | 22 | 124.6 | 11.6 | 126.5 | 11.8 | 101.5 | 2.7 | 1.9 | 11,071 | | | | |
| 19X-S-RW28 ² | 3.0 | to | 6.0 | CL | 4.3 | 59.3 | 20.2 | 39 | 24 | 15 | 111.8 | 15.3 | | | | | | | | | | |
| 19X-S-RW37 | 3.0 | to | 7.0 | ML | 8.2 | 52.7 | 10.4 | 33 | 25 | 8 | 113.9 | 12.5 | 115.8 | 12.5 | 101.7 | 3.3 | 2.7 | 4,755 | | | | |

¹ The reported resilient modulus values are based on Sequence 13 with a chamber confining pressure of 2.0 psi and a nominal maximum axial stress of 6.0 psi.

² Results of Direct Shear test are shown in Appendix D.



PROJECT NEXT

APPENDIX B

SUBSURFACE EXPLORATION DATA

Subsurface Exploration Logs – HDR 2019
Rock Core Photographs
Subsurface Exploration Logs – VDOT Provided
Field Soil Descriptions – VDOT Soil Logging
Field Rock Soil Descriptions – VDOT Soil Logging
VDOT Material and Sample Symbols List



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N1

19DTR-BR01

PAGE 1 OF 3

STATION: 31+44
 LATITUDE: 38.930608° N
 SURFACE ELEVATION: 301.3 ft
 OFFSET: 24 ft RT
 LONGITUDE: 77.209429° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/26/2019 - 06/27/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

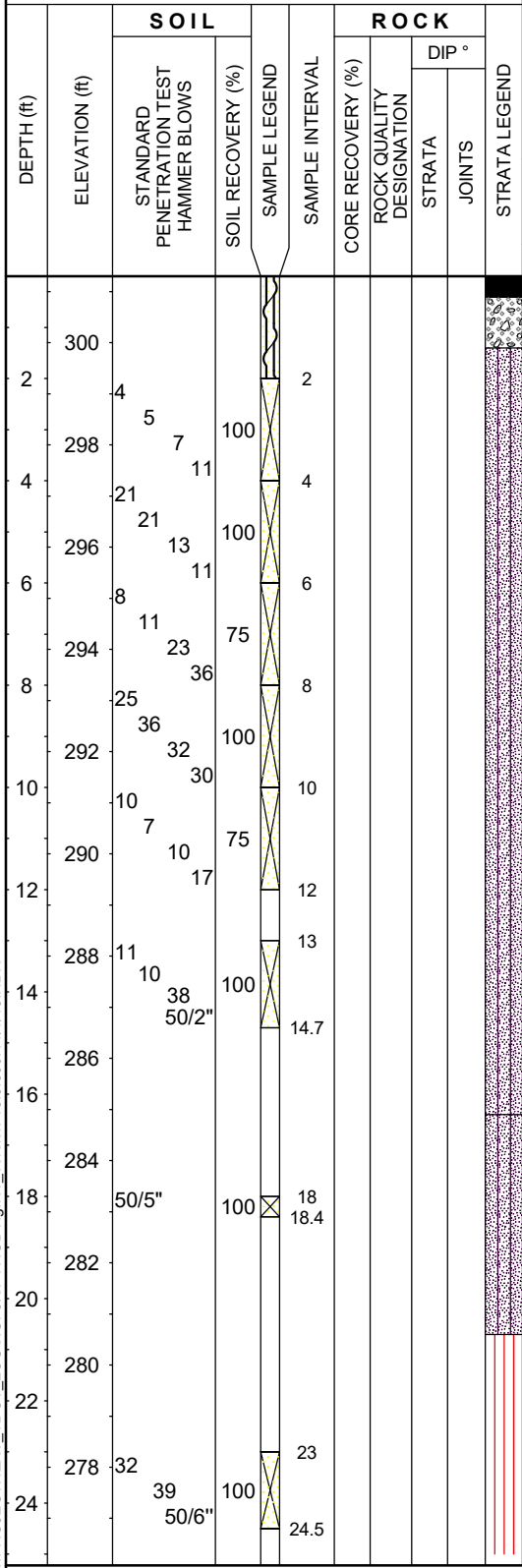
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 37 | 7 | 14.1 | 38.1 |
| 34 | 5 | 15.8 | 55.0 |

GROUND WATER
 FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 10.8 | |
| | | 5.5 | |
| | | 8.1 | |
| | | 7.9 | |
| | | 7.3 | |
| | | 7.5 | |



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 32.2 feet

PAGE 1 OF 3

19DTR-BR01

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N1

19DTR-BR01

PAGE 2 OF 3

STATION: 31+44 OFFSET: 24 ft RT
 LATITUDE: 38.930608° N LONGITUDE: 77.209429° W
 SURFACE ELEVATION: 301.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/26/2019 - 06/27/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▼ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 276 | | | | | | | | |
| 26 | | | | | | | | |
| 274 | | | | | | | | |
| 28 | 50/4" | 100 | 28 | 28.3 | | | | |
| 272 | | | | | | | | |
| 30 | | | | | | | | |
| 270 | | | | | | | | |
| 32 | | | | | | | | |
| 268 | 25 18 20 50/4" | 100 | 33 | 34.8 | | | | |
| 34 | | | | | | | | |
| 266 | | | | | | | | |
| 36 | | | | | | | | |
| 264 | | | | | | | | |
| 38 | 50/1" | 100 | 38 | 38.1 | | | | |
| 262 | | | | | | | | |
| 40 | | | | | | | | |
| 260 | | | | | | | | |
| 42 | | | | | 76 | 36 | | |
| 258 | | | | | | | | |
| 44 | | | | | | | | |
| 256 | | | | | | | | |
| 46 | | | | | | | | |
| 254 | | | | | 80 | 14 | | |
| 48 | | | | | | | | |
| 252 | | | | | | | | |
| 50 | | | | | | | | |

26.5 / 274.8

lgm, Brown, fine SILTY SAND, contains mica, very dense, moist, (SM)

7.7

lgm, Brown, fine to medium SILTY SAND, contains mica, very dense, wet, (SM)

9.9

lgm, Brown, fine to medium SILTY SAND, very dense, wet, (SM)

8.8

40.0 / 261.3

Highly weathered to decomposed, moderately hard, gray SCHIST, highly to intensely fractured

45.0 / 256.3

Highly weathered to decomposed, moderately hard, gray and brown SCHIST, highly to intensely fractured

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 32.2 feet

PAGE 2 OF 3

19DTR-BR01

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N1

19DTR-BR01

PAGE 3 OF 3

STATION: 31+44 OFFSET: 24 ft RT
 LATITUDE: 38.930608° N LONGITUDE: 77.209429° W
 SURFACE ELEVATION: 301.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|---|--|------------------------------|-------------------------------|--------------------------------|-----------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/26/2019 - 06/27/2019 | Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Mark Tilashalski, PE/S&ME | 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 ° | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | | | |
| | | | | | | | | | | <input checked="" type="checkbox"/> FIRST ENCOUNTERED AT 33.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | | |
| | | | | | | | | | | LL PI MOISTURE CONTENT (%) FINES CONTENT #200 (%) | | | | | | | | | |
| | | | | | | | | | | Auger refusal at 40.0 feet. Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings and hole plug upon completion. Auger refusal at 40.0 feet. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 32.2 feet

PAGE 3 OF 3

19DTR-BR01

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: BRIDGE DTR-N1

19DTR-BR02

PAGE 1 OF 3

STATION: 33+35 **OFFSET:** 71 ft RT
LATITUDE: 38.931068° N **LONGITUDE:** 77.208992° W
SURFACE ELEVATION: 298.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/11/2019 - 06/11/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER

☑ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 ° | |
| 298 | 8 | | | 1 | | | | |
| 296 | 7 | 4 | 25 | 3 | | | | |
| 294 | 5 | 4 | 50 | 5 | | | | |
| 292 | 5 | 7 | 75 | 7 | | | | |
| 290 | 6 | 6 | 5 | 9 | | | | |
| 288 | 6 | 5 | 50 | 11 | | | | |
| 286 | 16 | 21 | 15 | 13 | | | | |
| 284 | 15 | 7 | | 15 | | | | |
| 282 | | | | | | | | |
| 280 | 7 | 10 | 5 | 18 | | | | |
| 278 | 9 | 12 | | 20 | | | | |
| 276 | | | | | | | | |
| 274 | 8 | 5 | 15 | 23 | | | | |

| | | | |
|--|----|----|-----------|
| 0.0 / 298.3 | | | |
| 5.25" Asphalt | | | |
| 0.4 / 297.9 | | | |
| 4.0" Aggregate Subbase | | | 19.4 |
| 0.8 / 297.5 | | | |
| Fill, Brown, SANDY SILT, stiff, moist, (ML) | | | |
| Fill, Red-brown, SANDY SILT, stiff, moist, (ML) | | | 20.1 |
| | | | |
| Fill, Red-brown, SANDY SILT, very stiff, moist, (ML) | 42 | 12 | 23.1 64.2 |
| | | | |
| 7.0 / 291.3 | | | |
| Fill, Brown, fine to medium SILTY SAND, medium dense, moist, (SM) | | | 13.5 |
| | | | |
| Fill, Brown and red-brown, fine SILTY SAND, medium dense, moist, (SM) | | | 16.9 |
| | | | |
| 12.0 / 286.3 | | | |
| Alluvial, Gray, fine to coarse POORLY GRADED SAND, dense, moist, (SP) | | | 3.3 |
| | | | |
| 16.5 / 281.8 | | | |
| Alluvial, Gray, coarse POORLY GRADED GRAVEL, medium dense, moist, (GP) | | | |
| | | | |
| 21.5 / 276.8 | | | |
| Residual, Brown, fine to medium SILTY SAND, medium dense, moist, (SM) | | | 17.5 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19DTR-BR02

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N1

19DTR-BR02

PAGE 2 OF 3

STATION: 33+35
 LATITUDE: 38.931068° N
 SURFACE ELEVATION: 298.3 ft
 OFFSET: 71 ft RT
 LONGITUDE: 77.208992° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/11/2019 - 06/11/2019

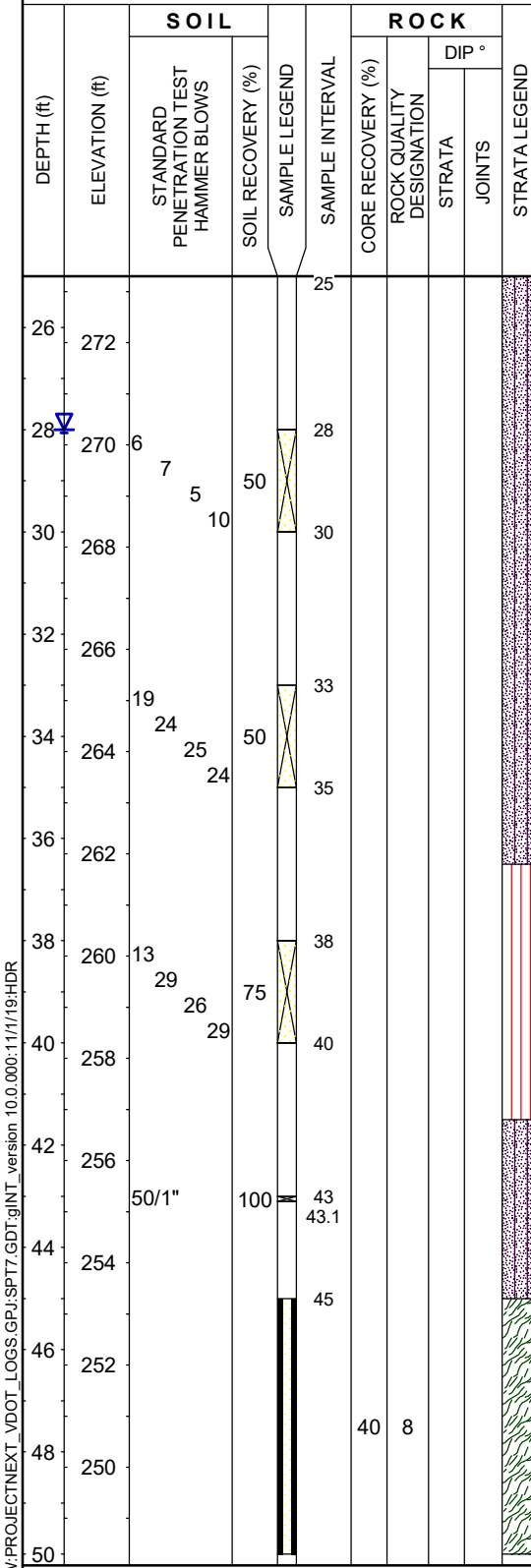
LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

FIELD DESCRIPTION OF STRATA



| | | | |
|----|----|------|------|
| | | | |
| 37 | 7 | 20.4 | 48.0 |
| | | 18.3 | |
| 36 | 11 | 13.7 | 64.3 |
| | | 23.0 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19DTR-BR02

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ\SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N2

19DTR-BR03

PAGE 1 OF 3

STATION: 38+76
 LATITUDE: 38.932543° N
 SURFACE ELEVATION: 303.7 ft
 OFFSET: 36 ft LT
 LONGITUDE: 77.209490° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/24/2019 - 06/25/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

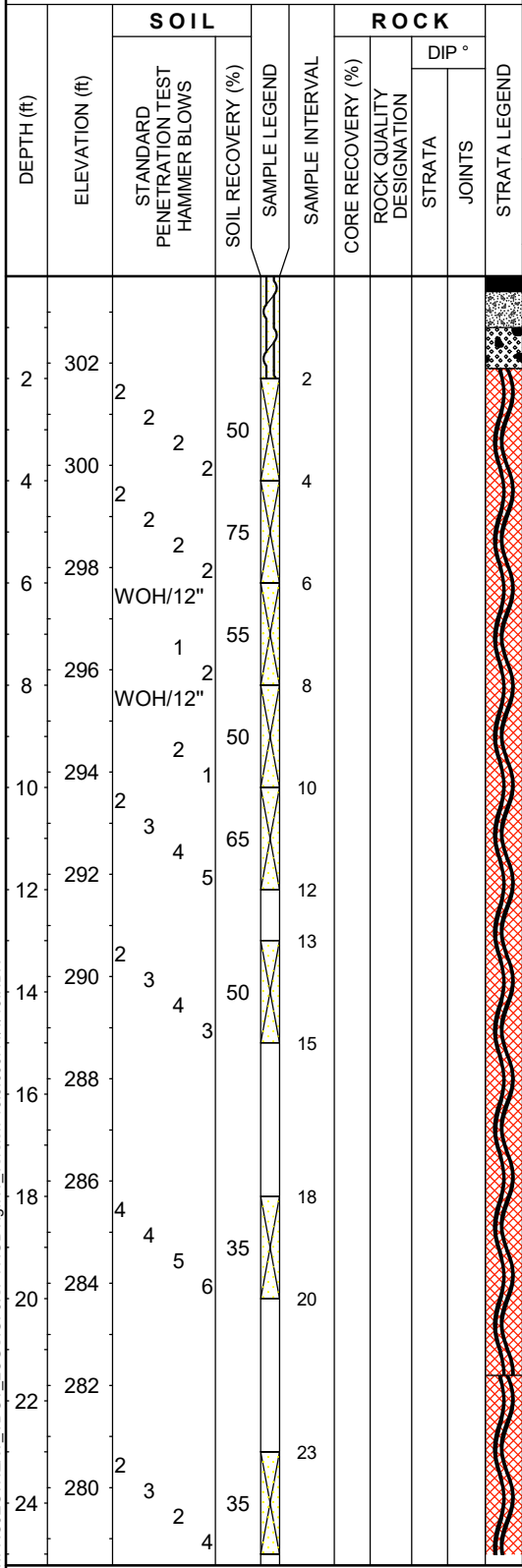
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 34 | 9 | 26.0 | 52.6 |
| 38 | 18 | 25.4 | 56.2 |

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI |
|----|----|
| | |



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 1 OF 3

19DTR-BR03

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7\GDT\GINT_version 10.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N2

19DTR-BR03

PAGE 2 OF 3

STATION: 38+76
 LATITUDE: 38.932543° N
 SURFACE ELEVATION: 303.7 ft
 OFFSET: 36 ft LT
 LONGITUDE: 77.209490° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/24/2019 - 06/25/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| 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 | | | | | | |
| 26 | 278 | | | | | | | | 26.5 / 277.2 | | | | |
| 28 | 276 | 3 | | | | | | | Fill, Orange-brown, SILT WITH SAND, firm, moist, (ML) | | | 30.4 | |
| 30 | 274 | 4 | 75 | | | | | | | | | | |
| 32 | 272 | | | | | | | | | | | | |
| 34 | 270 | 5 | | | | | | | Fill, Orange-brown, SANDY SILT, very stiff, moist, (ML) | | | 19.9 | |
| 36 | 268 | 6 | 75 | | | | | | | | | | |
| 38 | 266 | 7 | | | | | | | | | | | |
| 40 | 264 | 9 | | | | | | | 36.5 / 267.2 | | | | |
| 42 | 262 | 17 | 25 | | | | | | Alluvial, Gray, medium to coarse POORLY GRADED SAND WITH GRAVEL, dense, moist, (SP) | | | 9.8 | |
| 44 | 260 | 24 | | | | | | | | | | | |
| 46 | 258 | 7 | | | | | | | 41.5 / 262.2 | | | | |
| 48 | 256 | 8 | | | | | | | Residual, Brown and black, mottled, fine to medium SILTY SAND, medium dense, wet, (SM) | | | 14.1 | |
| 50 | 254 | 6 | 50 | | | | | | | | | | |
| | | 8 | | | | | | | 46.5 / 257.2 | | | | |
| | | 21 | 100 | | | | | | | | | | |
| | | 50/5" | | | | | | | lgm, Brown and black, mottled, fine to coarse SILTY SAND WITH GRAVEL, very dense, wet, (SM) | | | 12.8 | |
| | | | | | | | | | | | | | |

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 2 OF 3

19DTR-BR03



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N2

19DTR-BR03

PAGE 3 OF 3

STATION: 38+76 OFFSET: 36 ft LT
 LATITUDE: 38.932543° N LONGITUDE: 77.209490° W
 SURFACE ELEVATION: 303.7 ft COORD. DATUM: NAD 83

| 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: 06/24/2019 - 06/25/2019 | | | | | | | | | | LAB DATA | | | |
| Drilling Method(s): 3.25" HSA w/ SPTs | | | | | | | | | | FIRST ENCOUNTERED AT 43.0 ft DEPTH | | | |
| SPT Method: Automatic Hammer | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | |
| Other Test(s): Not Applicable | | | | | | | | | | | | | |
| Driller: M.Fletcher/SaLUT inc. | | | | | | | | | | | | | |
| Logger: Mark Tilashalski, PE/S&ME | | | | | | | | | | | | | |
| GROUND WATER | | | | | | | | | | | | | |
| FIRST ENCOUNTERED AT 43.0 ft DEPTH | | | | | | | | | | | | | |
| NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | | | |
| 52 | 252 | 28 | 100 | 53 | | | | | | NP | NP | 10.4 | 12.5 |
| 54 | 250 | 50/4" | | 53.8 | | | | | | | | | |
| 56 | 248 | | | | | | | | | | | | |
| 58 | 246 | 50/5" | 75 | 58 | | | | | | | | 12.3 | |
| 60 | 244 | | | 58.4 | | | | | | | | | |
| 62 | 242 | | | | | | | | | | | | |
| 64 | 240 | 11 | 50 | 63 | | | | | | | | 9.4 | |
| | | 13 | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | |
| | | 39 | | | | | | | | | | | |
| 66 | 238 | | | | | | | | | | | | |
| 68 | 236 | 50/2" | 100 | 68 | | | | | | | | 10.0 | |
| | | | | 68.2 | | | | | | | | | |
| Bottom of borehole at 68.2 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 3 OF 3

19DTR-BR03



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19DTR-BR04

PAGE 1 OF 2

STATION: 1068+45 OFFSET: 17 ft LT
 LATITUDE: 38.933322° N LONGITUDE: 77.209331° W
 SURFACE ELEVATION: 297.9 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/28/2019 - 05/28/2019

LAB DATA

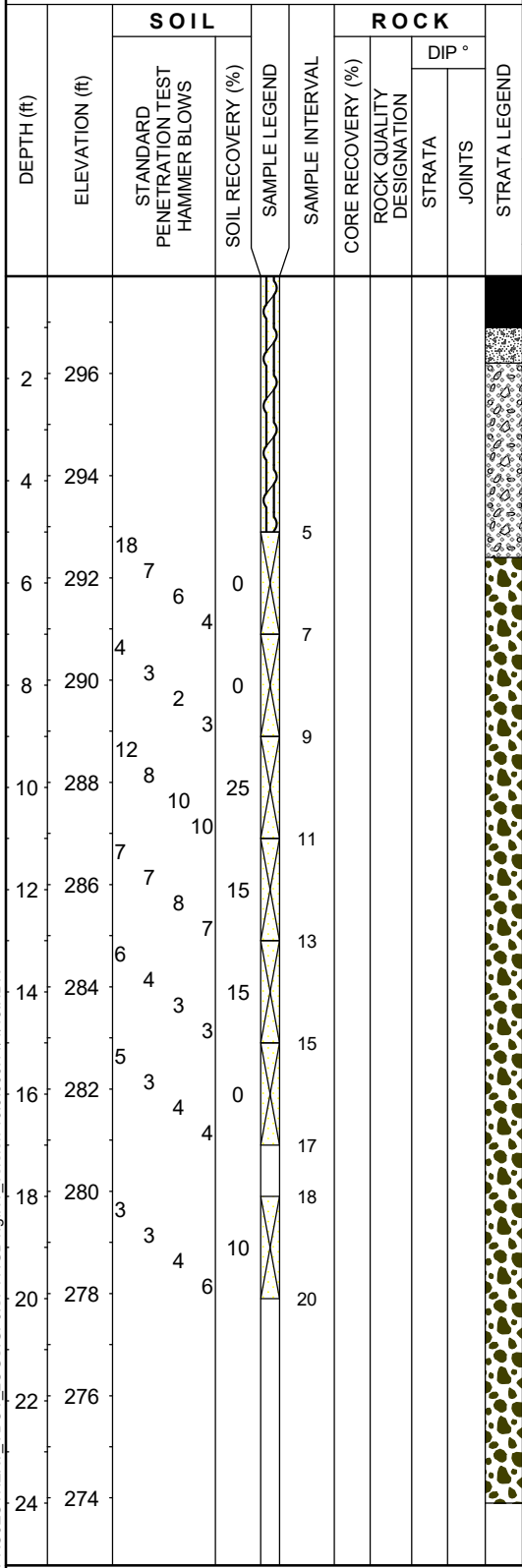
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



0.0 / 297.9
 12.0" Asphalt
 1.0 / 296.9
 8.0" Concrete
 1.7 / 296.2
 46.0" Aggregate Subbase

5.5 / 292.4
 Encountered MSE backfill. Boring was relocated off of MSE wall.

Auger refusal at 24.0 feet.
 Bottom of borehole at 24.0 feet.

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19DTR-BR04

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\SPT7.GDT.gINT_version 10.0.000:11/19/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19DTR-BR04

PAGE 2 OF 2

STATION: 1068+45 OFFSET: 17 ft LT
 LATITUDE: 38.933322° N LONGITUDE: 77.209331° W
 SURFACE ELEVATION: 297.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/28/2019 - 05/28/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Andy Lewis, S&ME | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | | | | | | |
| | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | LL | PI | | | | |
| | | | | | | | | | | Boring backfilled with auger cuttings, hole plug, and asphalt upon completion. | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19DTR-BR04

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N2

19DTR-BR04a

PAGE 1 OF 3

STATION: 43+64
 LATITUDE: 38.933867° N
 SURFACE ELEVATION: 286.6 ft
 OFFSET: 22 ft LT
 LONGITUDE: 77.209290° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2019 - 06/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

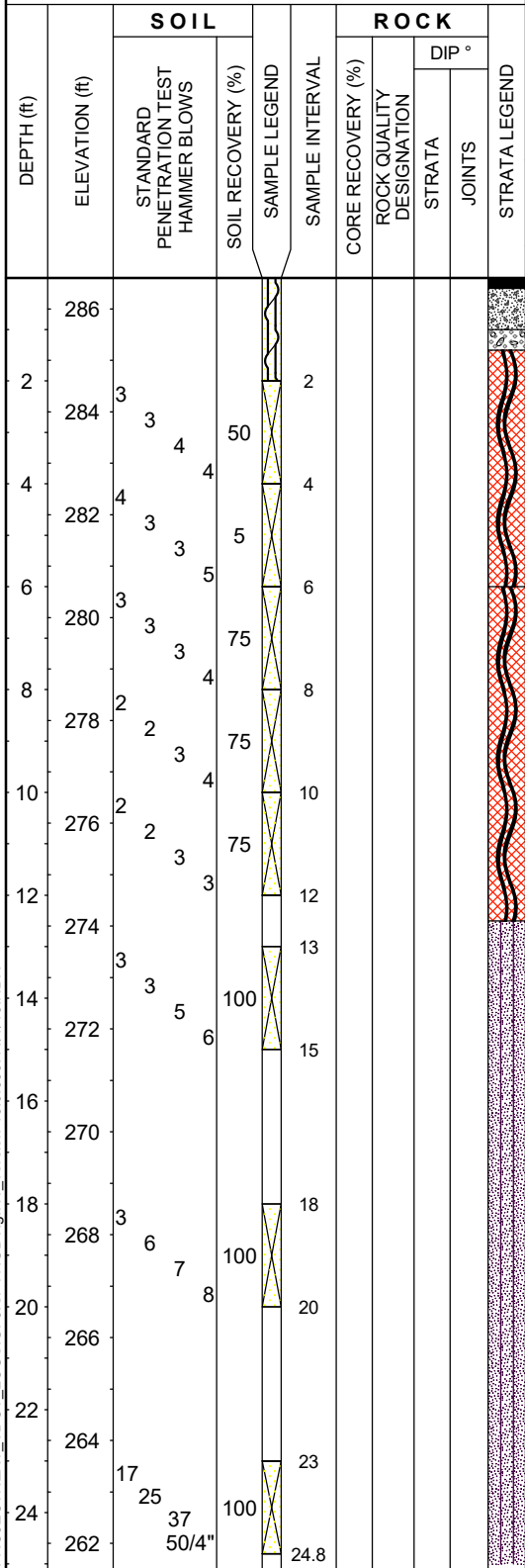
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 41 | 9 | 23.0 | 58.1 |
| | | 18.9 | |
| | | 20.7 | |
| | | 22.9 | |
| 32 | 3 | 22.7 | 49.3 |
| | | 19.0 | |
| | | 32.7 | |
| NP | NP | 8.3 | 28.9 |

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 46 feet

PAGE 1 OF 3

19DTR-BR04a

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-N2

19DTR-BR04a

PAGE 2 OF 3

STATION: 43+64
 LATITUDE: 38.933867° N
 SURFACE ELEVATION: 286.6 ft
 OFFSET: 22 ft LT
 LONGITUDE: 77.209290° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2019 - 06/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 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 LEGEND | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 26 | 260 | | | | | | | 26.4 / 260.2 |
| 28 | 258 | 50/2" | 100 | 28 | 28.2 | | | <i>lgm</i> , Light brown and gray, fine to coarse SILTY SAND, very dense, moist, (SM) |
| 30 | 256 | | | | | | | |
| 32 | 254 | 50/2" | 100 | 33 | 33.2 | | | |
| 34 | 252 | | | | | | | |
| 36 | 250 | | | | | | | |
| 38 | 248 | 50/1" | 100 | 38 | 38.1 | | | <i>lgm</i> , Light brown, fine to coarse SILTY SAND, very dense, moist, (SM) |
| 40 | 246 | | | | | | | |
| 42 | 244 | 37 50/5" | 100 | 43 | 43.9 | | | <i>lgm</i> , Brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM) |
| 44 | 242 | | | | | | | |
| 46 | 240 | | | | | | | |
| 48 | 238 | 50/1" | 0 | 48 | 48.1 | | | No Recovery |
| 50 | | | | | | | | |

| | | | |
|----|----|-----|------|
| | | | |
| | | 4.5 | |
| | | 7.2 | |
| | | 6.2 | |
| NP | NP | 7.0 | 43.9 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 46 feet

PAGE 2 OF 3

19DTR-BR04a

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-W2

19DTR-BR06

PAGE 2 OF 3

STATION: 1054+25 OFFSET: 30 ft LT
 LATITUDE: 38.929755° N LONGITUDE: 77.211338° W
 SURFACE ELEVATION: 331.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/19/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

LAB DATA

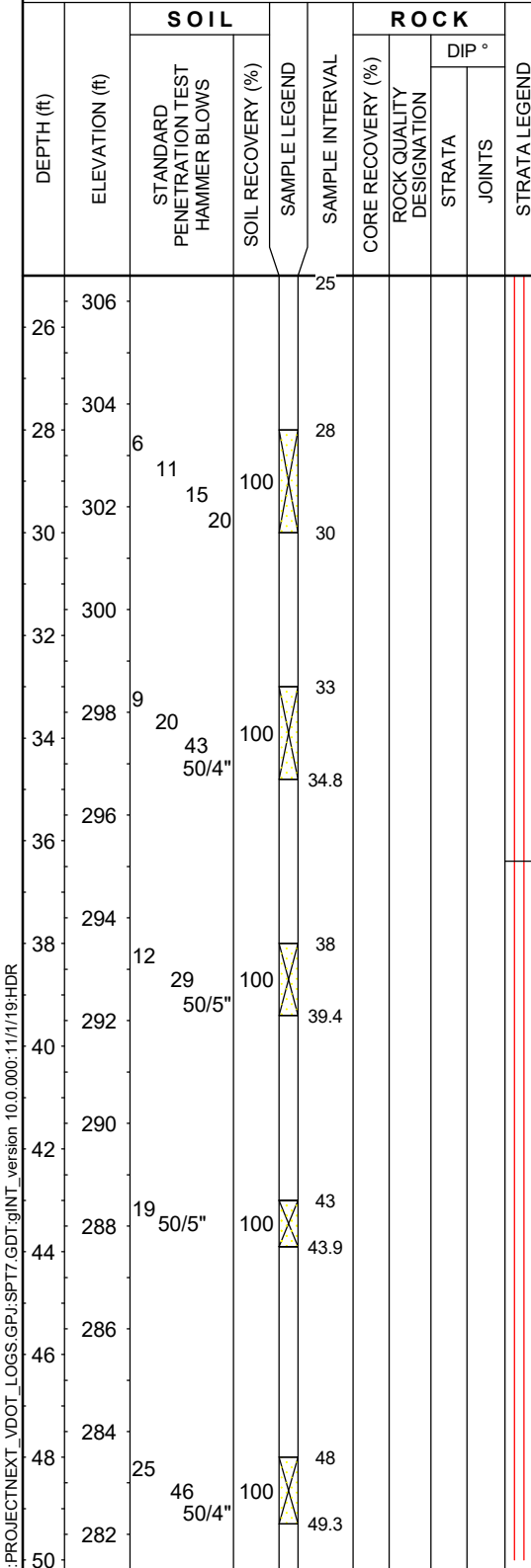
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Brown and black, mottled, SANDY SILT, hard, moist, (ML)

22.4

Residual, Brown, SANDY SILT, contains mica, very hard, moist, (ML)

19.9

36.4 / 295.1

Igm, Brown, SANDY SILT, very hard, moist, (ML)

18.0

Igm, Brown, SANDY SILT, very hard, moist, (ML)

33 5 14.0 59.5

Igm, Brown, SANDY SILT, very hard, moist, (ML)

13.7

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 60 feet

PAGE 2 OF 3

19DTR-BR06

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE DTR-W2

19DTR-BR06

PAGE 3 OF 3

STATION: 1054+25 OFFSET: 30 ft LT
 LATITUDE: 38.929755° N LONGITUDE: 77.211338° W
 SURFACE ELEVATION: 331.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/19/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Mark Tilashalski, PE/S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA | JOINTS |
| 52 | 280 | | | | | | | | | | |
| 54 | 278 | 37 50/4" | 100 | X | 53 53.8 | | | | | | |
| 58 | 274 | 18 50/5" | 100 | X | 58 58.9 | | | | | | |
| 64 | 268 | 50/5" | 100 | X | 63 63.4 | | | | | | |
| 68 | 264 | 50/5" | 100 | X | 68 68.4 | | | | | | |
| 70 | 262 | | | | | | | | | | |

lgm, Brown, SANDY SILT, very hard, wet, (ML)

Bottom of borehole at 70.0 feet.
 Boring backfilled with auger cuttings, hole plug, and concrete upon completion.

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 60 feet

PAGE 3 OF 3

19DTR-BR06

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 21+16 OFFSET: 60 ft RT
 LATITUDE: 38.933498° N LONGITUDE: 77.218667° W
 SURFACE ELEVATION: 299.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|--------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | | | | JOINTS |
| <p>Date(s) Drilled: 07/02/2019 - 07/02/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Amanda Thomason/HDR</p> <p style="text-align: center;">GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | | | | |
| 0.2 | 2 | 298 | 4 | | | 2 | | | | | | | | |
| | | | 5 | | | 3 | | | | | | | | |
| 1.3 | 4 | 296 | 8 | | | 4 | | | | | | | | |
| | | | 2 | | | | | | | | | | | |
| | | | 4 | | | | | | | | | | | |
| 1.3 | 6 | 294 | 4 | | | 6 | | | | | | | | |
| | | | 6 | | | | | | | | | | | |
| | | | 5 | | | | | | | | | | | |
| 8 | 8 | 292 | 8 | | | 8 | | | | | | | | |
| <p>0.0 / 299.9 9.0" Asphalt</p> <p>0.8 / 299.1 13.0" Aggregate Subbase</p> <p>2.0 / 297.9 <i>Residual, Brown, SILT, contains mica and relict rock texture, very stiff, moist, (ML)</i></p> <p><i>Residual, Brown, SILT, contains mica and relict rock texture, stiff, moist, (ML)</i></p> <p style="text-align: center;">Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. Bulk sample collected from 3.0 to 6.0 feet bgs.</p> | | | | | | | | | | | | | 17.0 | |
| | | | | | | | | | | | | | 26.6 | |
| | | | | | | | | | | | | | 22.8 | |

SPT_LOGAW;PROJECTNEXT_VDOT_LOGS.GPJ;SPT7.GDT;gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19DTR-P07

PAGE 1 OF 1

STATION: 12+33
 LATITUDE: 38.929495° N
 SURFACE ELEVATION: 339.9 ft
 OFFSET: 9 ft RT
 LONGITUDE: 77.204272° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 2 | 338 | 11 | 75 | 1 | | | | 0.0 / 339.9 5.5" Asphalt | | | | | |
| 4 | 336 | 6 | 75 | 3 | | | | 0.4 / 339.5 6.5" Aggregate Subbase | 39 | 9 | 6.4 | 30.1 | |
| 6 | 334 | 3 | 75 | 5 | | | | 1.0 / 338.9 Fill, Brown, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | 22.1 | | |
| | | 8 | 75 | 7 | | | | Fill, Brown and red, fine to coarse SILTY SAND WITH GRAVEL, contains wood fragment, medium dense, moist, (SM) | | | 25.3 | | |
| | | 9 | 100 | 5 | | | | Fill, Brown and red, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | 24.8 | | |
| | | 10 | | 7 | | | | Bottom of borehole at 7.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. Bulk sample collected from 1.0 to 3.0 feet bgs. | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 2 feet

PAGE 1 OF 1

19DTR-P07

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19DTR-P08

PAGE 1 OF 1

STATION: 41+45
 LATITUDE: 38.929601° N
 SURFACE ELEVATION: 313.4 ft
 OFFSET: 10 ft LT
 LONGITUDE: 77.210983° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/02/2019 - 07/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA |
| 3 | 312 | 11 | 50 | | | | | | |
| 2 | 310 | 17 | 10 | | | | | | |
| 4 | 308 | 15 | 19 | | | | | | |
| 6 | | 22 | 90 | | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 313.4
 3.0" Topsoil
 0.3 / 313.1
 9.0" Aggregate Subbase
 1.0 / 312.4
 Fill, Brown, fine to coarse SILTY SAND, moist, (SM)
 Fill, Brown and gray, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, dense, moist, (SM)
 4.0 / 309.4
 Residual, Brown and gray, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)
 Bottom of borehole at 6.0 feet.
 Boring backfilled with auger cuttings upon completion.
 Bulk sample collected from 3.0 to 6.0 feet bgs.

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 5.7 | |
| | | 7.7 | |
| 31 | 7 | 10.6 | 31.2 |
| | | 10.4 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 2.4 feet

PAGE 1 OF 1

19DTR-P08

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19DTR-P09

PAGE 1 OF 1

STATION: 45+46
 LATITUDE: 38.930248° N
 SURFACE ELEVATION: 320.0 ft
 OFFSET: 8 ft RT
 LONGITUDE: 77.209905° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|-------------------------------|-----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 07/15/2019 - 07/15/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Amanda Thomason/HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 2 | 318 | 4 | 16 | 75 | 1.5 | | | | 0.0 / 320.0 | | | | | | | | | |
| | | 25 | 26 | | | | | | 4.0" Asphalt | | | | | | | | | |
| 4 | 316 | 12 | 20 | 75 | 3.5 | | | | 0.4 / 319.6 | | | | | | | | | |
| | | 27 | 28 | | | | | | 13.0" Aggregate Subbase | | | | | | | | | |
| 6 | 314 | 4 | 24 | 75 | 5.5 | | | | 1.5 / 318.5 | | | | | | | 5.3 | | |
| | | 29 | 30 | | | | | | <i>Residual</i> , Light-brown, fine to coarse SILTY SAND, contains mica, rock fragments, and relict rock texture, very dense, moist, (SM) | | | | | NP | NP | 4.4 | 37.4 | |
| | | | | | 7.5 | | | | <i>Residual</i> , Light-brown and white, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very hard, moist, (SM) | | | | | | | 4.8 | | |
| | | | | | | | | | <i>Residual</i> , Light-brown, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very hard, moist, (SM) | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3.5 feet

PAGE 1 OF 1

19DTR-P09

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW01

PAGE 1 OF 3

STATION: 18+97
 LATITUDE: 38.930189° N
 SURFACE ELEVATION: 317.6 ft
 OFFSET: 52 ft LT
 LONGITUDE: 77.206422° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/16/2019 - 05/17/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

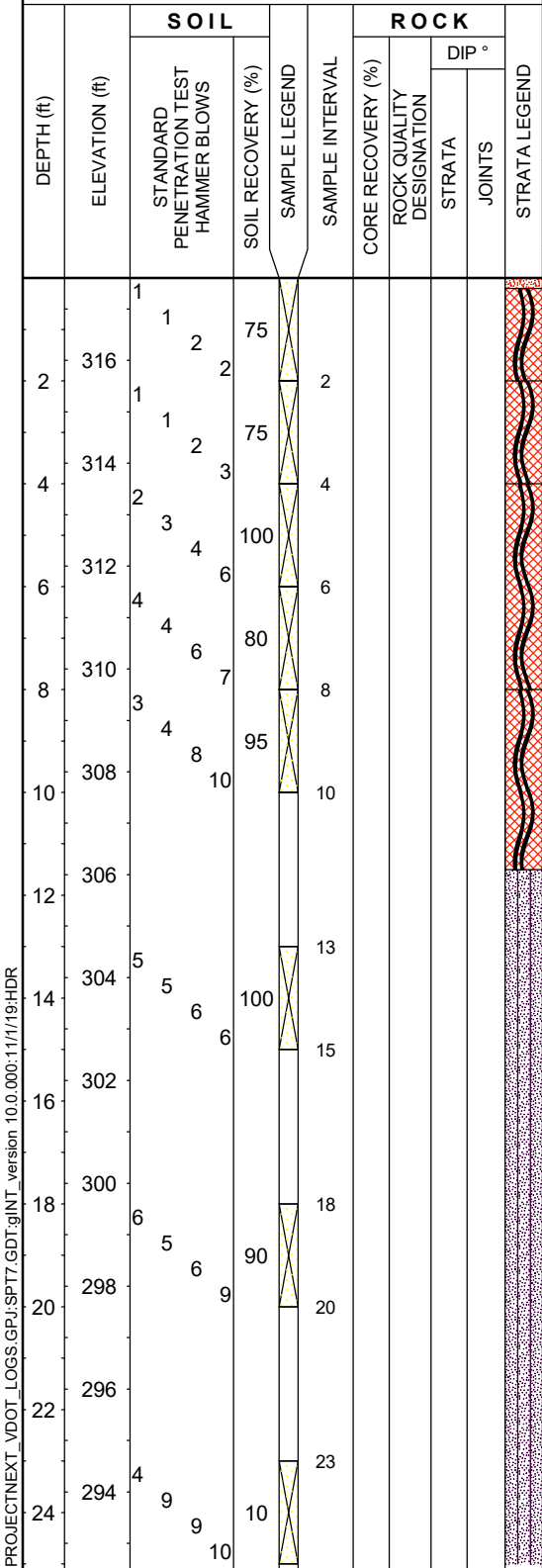
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 44.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/1/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 7.7 feet

PAGE 1 OF 3

19DTR-RW01



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW01

PAGE 2 OF 3

STATION: 18+97 OFFSET: 52 ft LT
 LATITUDE: 38.930189° N LONGITUDE: 77.206422° W
 SURFACE ELEVATION: 317.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/16/2019 - 05/17/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 44.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| 26 | 292 | | | | 25 | | | | | |
| 28 | 290 | 3 | | | 28 | | | | | |
| 30 | 288 | 4 5 8 | 100 | | 30 | | | | | |
| 32 | 286 | | | | | | | | | |
| 34 | 284 | 3 6 6 8 | 100 | | 33 35 | | | | | |
| 36 | 282 | | | | | | | | | |
| 38 | 280 | 4 7 11 15 | 100 | | 38 40 | | | | | |
| 40 | 278 | | | | | | | | | |
| 42 | 276 | | | | | | | | | |
| 44 | 274 | 4 10 18 22 | 100 | | 43 45 | | | | | |
| 46 | 272 | | | | | | | | | |
| 48 | 270 | 10 15 25 30 | 100 | | 48 | | | | | |
| 50 | 268 | | | | | | | | | |

26.5 / 291.1

Residual, Light-brown to yellow-orange, SILT, stiff, moist, (ML)

22.4

Residual, Orange and black, mottled, SILT, very stiff, moist, (ML)

36.3

Residual, Orange and black, mottled, SILT, contains mica, very stiff, moist, (ML)

45 9 34.8 86.4

Residual, Light-brown to black, SILT, contains wood fragments, hard, moist to wet, (ML)

25.6

Residual, Black, SILT, hard, wet, (ML)

22.5

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 7.7 feet

PAGE 2 OF 3

19DTR-RW01

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW01

PAGE 3 OF 3

STATION: 18+97 OFFSET: 52 ft LT
 LATITUDE: 38.930189° N LONGITUDE: 77.206422° W
 SURFACE ELEVATION: 317.6 ft COORD. DATUM: NAD 83

| 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 |
| | | | | | 50 | | | | | | | | | |
| <p>Date(s) Drilled: 05/16/2019 - 05/17/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Jacob Moorman, HDR</p> <p>GROUND WATER ▽ FIRST ENCOUNTERED AT 44.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 7.7 feet

PAGE 3 OF 3

19DTR-RW01

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW02

PAGE 1 OF 3

STATION: 21+96
 LATITUDE: 38.930525° N
 SURFACE ELEVATION: 308.9 ft
 OFFSET: 44 ft LT
 LONGITUDE: 77.207380° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/16/2019 - 05/17/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 | 308 | 1 | 40 | | | | | 0.0 / 308.9 2.0" Topsoil | | | 23.5 | | |
| 2 | 306 | 1 2 | 2 50 | 2 | | | | 0.2 / 308.7 Fill, Red-brown, SANDY SILT, soft, moist, (ML) Fill, Light brown to red-brown, SANDY SILT, firm, moist, (ML) | | | 12.7 | | |
| 4 | 304 | 3 4 | 3 90 | 4 | | | | Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | 18.9 | | |
| 6 | 302 | 2 3 4 | 6 90 | 6 | | | | Fill, Red-brown, SANDY SILT, stiff, moist, (ML) | | | 22.5 | | |
| 8 | 300 | 2 3 | 6 100 | 8 | | | | Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | 27.3 | | |
| 10 | 298 | | | 10 | | | | | | | | | |
| 12 | 296 | | | 12 | | | | | | | | | |
| 14 | 294 | 3 6 9 | 85 | 13 15 | | | | Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | 23.2 | | |
| 16 | 292 | | | 16 | | | | 16.5 / 292.4 | | | | | |
| 18 | 290 | 10 15 | 18 50 | 18 | | | | Residual, Red-brown, SANDY SILT, hard, moist, (ML) | 36 | 9 | 19.2 | 58.3 | |
| 20 | 288 | 14 10 | 20 | 20 | | | | | | | | | |
| 22 | 286 | | | 22 | | | | | | | | | |
| 24 | 284 | 6 8 10 13 | 23 80 | 23 | | | | Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML) | | | 19.4 | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.4 feet

PAGE 1 OF 3

19DTR-RW02



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW02

PAGE 2 OF 3

STATION: 21+96
 LATITUDE: 38.930525° N
 SURFACE ELEVATION: 308.9 ft
 OFFSET: 44 ft LT
 LONGITUDE: 77.207380° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| 25 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | 282 | 2 | | | | | | | | | | | |
| 280 | | 4 | 4 | 80 | | | | | | | 24.1 | | |
| 30 | | 8 | | | | | | | | | | | |
| 278 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 276 | | 2 | | | | | | | | | | | |
| 34 | | 8 | | | | | | | | | | | |
| 274 | | 10 | 17 | 100 | | | | | | | 24.2 | | |
| 36 | | | | | | | | | | | | | |
| 272 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 270 | | 20 | 21 | 100 | | | | | | | 9.7 | | |
| 40 | | 11 | 10 | | | | | | | | | | |
| 268 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 266 | | 6 | | | | | | | | | | | |
| 44 | | 12 | 18 | 100 | | | | | 39 | 7 | 18.2 | 72.2 | |
| 264 | | 22 | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 262 | | | | | | | | | | | | | |
| 48 | | 10 | | | | | | | | | | | |
| 260 | | 20 | 38 | 75 | | | | | | | 10.8 | | |
| 50 | | 48 | | | | | | | | | | | |

Date(s) Drilled: 05/16/2019 - 05/17/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

Residual, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Red-brown, SANDY SILT, very stiff, wet, (ML)

Residual, Light brown to yellow-orange, SILT WITH SAND, contains mica and quartz fragments, hard, wet, (ML)

Residual, Yellow-orange, white and black, mottled, SILT WITH SAND, contains mica and quartz fragments, hard, wet, (ML)

Residual, Yellow-orange, white and black, mottled, SILT WITH SAND, contains mica and quartz fragments, very hard, wet, (ML)

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.4 feet

PAGE 2 OF 3

19DTR-RW02



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 13

19DTR-RW02

PAGE 3 OF 3

STATION: 21+96 OFFSET: 44 ft LT
 LATITUDE: 38.930525° N LONGITUDE: 77.207380° W
 SURFACE ELEVATION: 308.9 ft COORD. DATUM: NAD 83

| 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 |
| | | | | | 50 | | | | | | | | | |
| <p>Date(s) Drilled: 05/16/2019 - 05/17/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Jacob Moorman, HDR</p> <p>GROUND WATER ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.4 feet

PAGE 3 OF 3

19DTR-RW02

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 24+95 OFFSET: 27 ft LT
 LATITUDE: 38.930883° N LONGITUDE: 77.208328° W
 SURFACE ELEVATION: 300.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/28/2019 - 06/30/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: B.Strawderman/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 32.0 ft DEPTH
 ▽ STABILIZED AT 17.5 ft

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|--------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| 2 | | 300 | 1 | | | | | | | |
| | 1.25 | 298 | 2 | 70 | 2 | | | | | |
| | 2 | 296 | 4 | 65 | 4 | | | | | |
| | 6 | 294 | 6 | 90 | 6 | | | | | |
| | 10 | 292 | 8 | 15 | 8 | | | | | |
| | 14 | 288 | 10 | 10 | 10 | | | | | |
| | 16 | 286 | 15 | 80 | 15 | | | | | |
| | 18 | 284 | 18 | 3 | 18 | | | | | |
| | 20 | 282 | 20 | 100 | 20 | | | | | |
| | 22 | 280 | 23 | 100 | 23 | | | | | |
| | 24 | 278 | 24 | 100 | 24 | | | | | |
| | 24 | 276 | 24 | 100 | 24 | | | | | |

0.0 / 300.8
 2.0" Topsoil
 0.2 / 300.6
 Fill, Brown, SANDY SILT, firm, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, firm, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML)
 Fill, Brown, SANDY SILT WITH GRAVEL, very stiff, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, firm, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, very stiff, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | 26.2 | |
| 41 | 14 | 23.5 | 63.5 |
| | | 18.1 | |
| | | 16.5 | |
| | | 25.4 | |
| 40 | 11 | 20.8 | 67.3 |
| | | 26.8 | |
| | | 33.9 | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42.3 feet



STATION: 37+10 OFFSET: 167 ft RT
 LATITUDE: 38.932241° N LONGITUDE: 77.208624° W
 SURFACE ELEVATION: 279.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | |
|--|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|--------|---------------|--|------------------|----------------------|------------------------|-------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | | STRATA LEGEND | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) | |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | | | | | DIP ° |
| GROUND WATER ▽ FIRST ENCOUNTERED AT 20.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | LL | PI | | | |
| 2.75 | | | 1 | | | | | | | | 0.0 / 279.7 | | | | |
| | | | 2 | 85 | | | | | | | 4.0" Topsoil | 44 | 14 | 23.7 | 67.0 |
| 1.75 | 2 | 278 | 3 | 3 | 2 | | | | | | 0.4 / 279.3 | | | 22.3 | |
| | | | 3 | 100 | | | | | | | Fill, Brown and gray, mottled, SANDY SILT, contains mica, firm, moist, (ML) | | | | |
| | 4 | 276 | 3 | 3 | 4 | | | | | | 4.0 / 275.7 | | | 35.9 | |
| | | | 1 | 90 | | | | | | | Alluvial, Green-gray, fine to coarse SILTY SAND, contains mica and root fragments, very loose, moist, (SM) | | | | |
| | 6 | 274 | 1 | 1 | 6 | | | | | | Alluvial, Green-gray, fine to coarse SILTY SAND, contains mica, very loose, moist, (SM) | 37 | 6 | 29.0 | 49.1 |
| | | | 1 | 95 | | | | | | | 8.0 / 271.7 | | | 30.8 | |
| 1.5 | 8 | 272 | 2 | 1 | 8 | | | | | | Alluvial, Brown-gray, SILT, contains mica and organic matter, soft, moist, (ML) | | | | |
| | | | 2 | 100 | | | | | | | 11.5 / 268.2 | | | 6.1 | |
| | 10 | 270 | 2 | 3 | 10 | | | | | | Residual, Orange-brown, fine to medium SILTY SAND, contains quartz fragments, dense, moist, (SM) | | | | |
| | | | 2 | 2 | | | | | | | No Recovery | | | | |
| | 12 | 268 | 3 | | | | | | | | 19.3 / 260.4 | | | 10.6 | 46.3 |
| | | | 13 | | 13 | | | | | | Igm, Brown, fine to coarse SILTY SAND, contains mica, relict rock texture, and friable schist fragments, very dense, wet, (SM) | 29 | 3 | 10.6 | 46.3 |
| | 14 | 266 | 15 | 60 | 15 | | | | | | | | | 12.8 | |
| | | | 15 | 12 | 15 | | | | | | | | | | |
| | 16 | 264 | | | | | | | | | | | | | |
| | 18 | 262 | 50/6" | 0 | 18 | | | | | | | | | | |
| | | | | | 18.5 | | | | | | | | | | |
| | 20 | 260 | 37 | 75 | 20 | | | | | | | | | | |
| | | | 50/4" | | 20.8 | | | | | | | | | | |
| | 22 | 258 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | 24 | 256 | 50/6" | 80 | 23 | | | | | | | | | | |
| | | | | | 23.5 | | | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gnT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 30.1 feet



STATION: 37+10 OFFSET: 167 ft RT
 LATITUDE: 38.932241° N LONGITUDE: 77.208624° W
 SURFACE ELEVATION: 279.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|---------------|--|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS | STRATA LEGEND | |
| | 26 | 254 | | | | | | | | | | | | | | | |
| | 28 | 252 | 50/1" | 100 | | 28 28.1 | | | | | | | | 13.1 | | | |
| | 30 | 250 | 50/4" | 100 | | 30 30.3 | | | | | | | | 12.6 | | | |
| GROUND WATER | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> FIRST ENCOUNTERED AT 20.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | LL | PI | | | | | |
| <p><i>Igm</i>, Brown, fine to coarse SILTY SAND, contains mica, relict rock texture, and friable schist fragments, very dense, wet, (SM)</p> | | | | | | | | | | | | | | | | | |
| <p>Bottom of borehole at 30.3 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 30.1 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW05

PAGE 1 OF 2

STATION: 1078+73 OFFSET: 26 ft LT
 LATITUDE: 38.935919° N LONGITUDE: 77.207915° W
 SURFACE ELEVATION: 275.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/05/2019 - 05/06/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

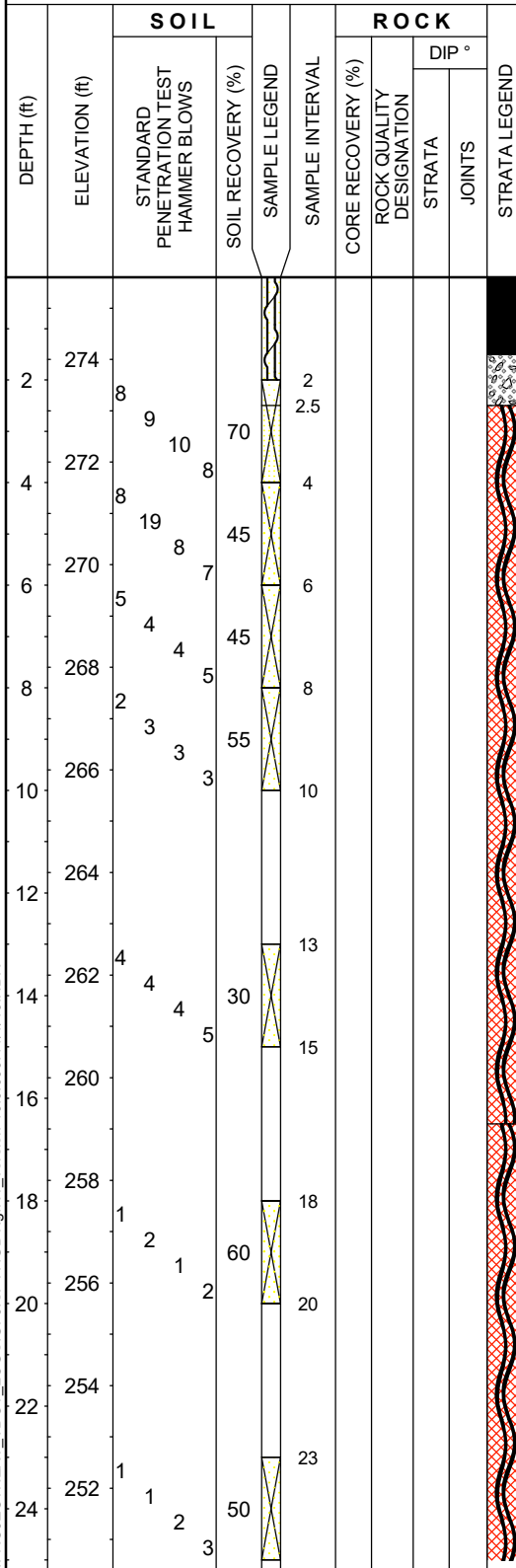
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |
| | | 10.3 | |
| 32 | 4 | 8.0 | 35.6 |
| | | 17.0 | |
| | | 19.3 | |
| | | 13.1 | |
| 38 | 8 | 32.8 | 72.7 |
| | | 27.7 | |



SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 1 OF 2

19DTR-RW05



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW05

PAGE 2 OF 2

STATION: 1078+73
 LATITUDE: 38.935919° N
 SURFACE ELEVATION: 275.6 ft
 OFFSET: 26 ft LT
 LONGITUDE: 77.207915° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | LAB DATA | | | | | | | | | | | | | |
|------------------------------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|-------------------------------|------------------------------|--------------|------------------|----------------------|------------------------|-------|------|------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/05/2019 - 05/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Lance Martin, PE/HDR | 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 ° | | |
| 25 | 250 | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | LL | PI | | | | | | | | | | | |
| 26 | 248 | 1 | | | | | | | 26.5 / 249.1 | <i>Alluvial</i> , Light brown to gray, SANDY LEAN CLAY, contains root fragments, soft, moist, (CL) | | | | | | | | | | 26.7 | |
| 28 | 246 | 2 | 50 | | | | | | 31.5 / 244.1 | <i>lgm</i> , Light brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM) | | | | | | | | 33 | 6 | 5.2 | 45.5 |
| 30 | 244 | 4 | | | | | | | 39.9 / 235.7 | <i>lgm</i> , Gray, fine to coarse SILTY SAND WITH GRAVEL, very dense, wet, (SM) | | | | | | | | | | 1.4 | |
| 32 | 242 | 50/5" | 100 | | | | | | 41.5 / 41.6 | <i>lgm</i> , Gray, fine SILTY GRAVEL, very dense, wet, (GM) Auger refusal at 41.6 feet. Bottom of borehole at 41.6 feet. Boring backfilled with auger cuttings, hole plug, and grout upon completion. | | | | | | | | | | 0.4 | |
| 34 | 240 | | | | | | | | | | | | | | | | | | | | |
| 36 | 238 | 50/4" | 100 | | | | | | | | | | | | | | | | | | |
| 38 | 236 | | | | | | | | | | | | | | | | | | | | |
| 40 | 234 | 50/1" | 100 | | | | | | | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 2 OF 2

19DTR-RW05



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW06

PAGE 1 OF 2

STATION: 48+80
 LATITUDE: 38.935125° N
 SURFACE ELEVATION: 287.5 ft

OFFSET: 1 ft RT
 LONGITUDE: 77.208457° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/28/2019 - 05/29/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

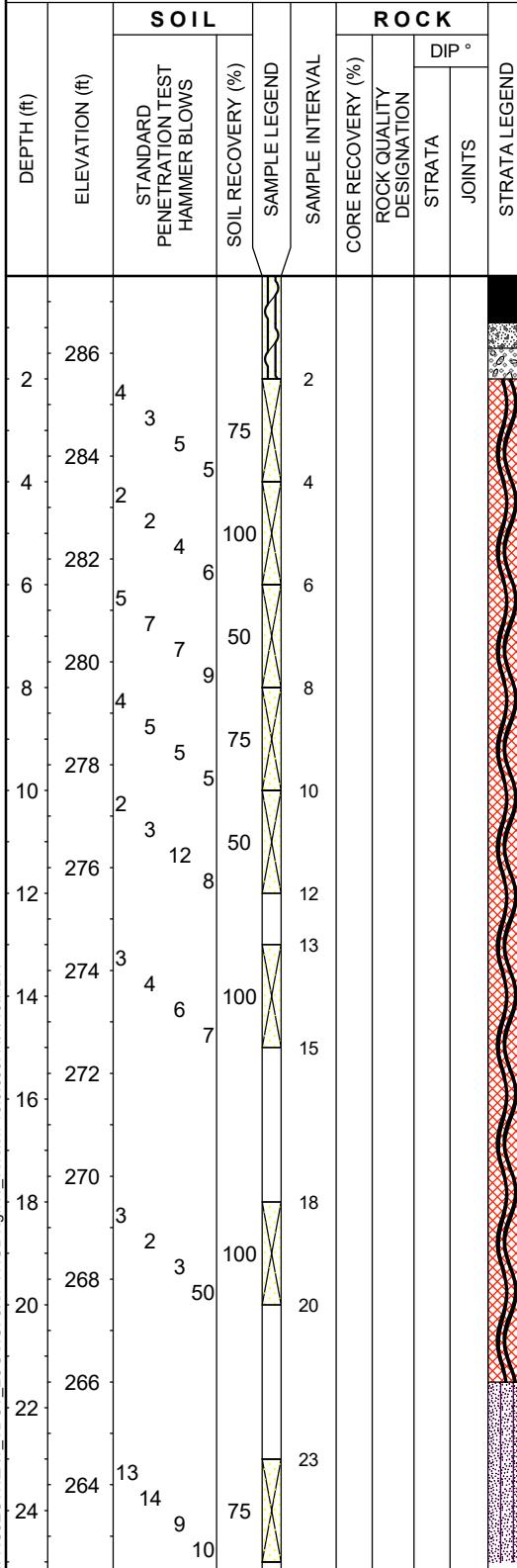
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |
| | | 17.1 | |
| | | 21.2 | |
| | | 17.3 | |
| 39 | 7 | 23.4 | 75.0 |
| | | 19.8 | |
| | | 21.8 | |
| | | 19.7 | |
| | | | |
| NP | NP | 11.2 | 31.0 |



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19DTR-RW06



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW06

PAGE 2 OF 2

STATION: 48+80 OFFSET: 1 ft RT
 LATITUDE: 38.935125° N LONGITUDE: 77.208457° W
 SURFACE ELEVATION: 287.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/28/2019 - 05/29/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Andy Lewis, S&ME | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | |
| 26 | 262 | | | | 25 | | | | 26.5 / 261.0 | | | | | | | | | |
| 28 | 260 | 50/2" | 100 | | 28 28.2 | | | | 1gm, Orange-brown, fine to coarse SILTY SAND, very dense, moist, (SM) | | | | | | | | 11.4 | |
| 30 | 258 | | | | | | | | | | | | | | | | | |
| 32 | 256 | 50/0" | | | 32.5 | | | | Auger refusal at 32.5 feet. Bottom of borehole at 32.5 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19DTR-RW06

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW07

PAGE 1 OF 3

STATION: 1072+32 OFFSET: 16 ft LT
 LATITUDE: 38.934298° N LONGITUDE: 77.208792° W
 SURFACE ELEVATION: 289.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/05/2019 - 05/06/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 288 | 2 | 2 | 100 | | | | | |
| 286 | 5 | 6 | 100 | | | | | |
| 284 | 7 | 13 | 90 | | | | | |
| 282 | 11 | 32 | 93 | | | | | |
| 280 | 17 | 26 | 90 | | | | | |
| 278 | 4 | 5 | 95 | | | | | |
| 276 | 12 | 15 | 100 | | | | | |
| 274 | 15 | 20 | 100 | | | | | |
| 272 | 16 | 45 | 100 | | | | | |
| 270 | 18 | | | | | | | |
| 268 | 20 | 43 | 100 | | | | | |
| 266 | 22 | | | | | | | |
| 264 | 24 | | | | | | | |

0.0 / 289.1
 7.0" Asphalt
 0.6 / 288.5
 10.0" Concrete
 1.4 / 287.7
 7.0" Aggregate Subbase
 2.0 / 287.1
Residual, Yellow-orange to red, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM)
Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, dense, moist, (SM)
Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, very dense, moist, (SM)
Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, very dense, moist, (SM)
Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM)
Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, very dense, moist, (SM)
 18.5 / 270.6
lgm, Light brown, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

| | | | |
|----|---|------|------|
| | | | |
| | | 21.6 | |
| 37 | 4 | 10.9 | 36.2 |
| | | 6.5 | |
| | | 6.7 | |
| | | 21.6 | |
| | | 11.8 | |
| | | | |
| | | 6.5 | 36.5 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 1 OF 3

19DTR-RW07

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW07

PAGE 2 OF 3

STATION: 1072+32
 LATITUDE: 38.934298° N
 SURFACE ELEVATION: 289.1 ft
 OFFSET: 16 ft LT
 LONGITUDE: 77.208792° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/05/2019 - 05/06/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

lgm, Light brown, fine to medium SILTY SAND, contains mica, very dense, moist, (SM)

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA |
| 26 | 262 | 50/5" | 100 | X | 25 25.4 | | | | |
| 30 | 258 | 28 50/4" | 100 | X | 30 30.8 | | | | |
| 36 | 254 | 50/2" | 100 | X | 35 35.2 | | | | |
| 40 | 248 | 50/1" | 100 | | 40 40.1 | | | | |
| 46 | 244 | 50/1" | 100 | | 45 45.1 | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 2 OF 3

19DTR-RW07



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 01

19DTR-RW07

PAGE 3 OF 3

STATION: 1072+32 OFFSET: 16 ft LT
 LATITUDE: 38.934298° N LONGITUDE: 77.208792° W
 SURFACE ELEVATION: 289.1 ft COORD. DATUM: NAD 83

| 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 | | | | | JOINTS | STRATA LEGEND | | | |
| 52 | 238 | 50/2" | 100 | X | 50 50.2 | | | | | | | | | | | | | |
| <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p><i>lgm</i>, Light brown, fine to medium SILTY SAND, contains mica, very dense, moist, (SM)</p> <p>Bottom of borehole at 52.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion.</p> | | | | | | | | | | LL | PI | 4.8 | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 3 OF 3

19DTR-RW07

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR13

PAGE 1 OF 3

STATION: 22+67 OFFSET: 24 ft RT
 LATITUDE: 38.954438° N LONGITUDE: 77.193492° W
 SURFACE ELEVATION: 316.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | ELEVATION (ft) | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | JOINTS | STRATA LEGEND | LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|--------|--------|--|----|----|----------------------|------------------------|
| 0.0 | 316.1 | | | | | | | | | 12.0" Concrete | | | | |
| 1.0 | 315.1 | | | | | | | | | 6.0" Aggregate Subbase | | | | |
| 1.5 | 314.6 | 2 | 80 | 2 | | | | | | Fill, Orange-brown, ELASTIC SILT WITH SAND, firm, moist, (MH) | | | 24.4 | |
| 4.0 | 312.8 | 8 | 7 | 4 | | | | | | Fill, Orange-brown, ELASTIC SILT WITH SAND, stiff, moist, (MH) | | | 24.4 | |
| 6.0 | 310.2 | 2 | 5 | 6 | | | | | | Fill, Orange-brown, ELASTIC SILT WITH SAND, firm, moist, (MH) | | | 33.8 | |
| 8.0 | 308.2 | 2 | 4 | 8 | | | | | | Residual, Orange-brown, ELASTIC SILT WITH SAND, firm, moist, (MH) | | | 30.3 | |
| 10.0 | 306.2 | 3 | 4 | 10 | | | | | | Residual, Orange-brown and white, stratified, ELASTIC SILT WITH SAND, stiff, moist, (MH) | | | 31.6 | |
| 12.0 | 304.3 | 6 | 6 | 12 | | | | | | Residual, Orange-brown, ELASTIC SILT WITH SAND, firm, moist, (MH) | | | 29.3 | 71.5 |
| 14.0 | 302.3 | 3 | 3 | 14 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | 58 | 20 | 29.3 | 71.5 |
| 16.0 | 300.3 | 7 | 7 | 16 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | | | 13.8 | |
| 18.0 | 298.4 | 4 | 4 | 18 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | | | 13.8 | |
| 20.0 | 296.4 | 5 | 5 | 20 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | | | 13.8 | |
| 22.0 | 294.4 | 8 | 8 | 22 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | | | 13.8 | |
| 24.0 | 292.4 | 9 | 9 | 24 | | | | | | Residual, Orange-brown, SANDY LEAN CLAY, contains quartz fragments, stiff, moist, (CL) | | | 13.8 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GTP-BR13

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR13

PAGE 2 OF 3

STATION: 22+67 OFFSET: 24 ft RT
 LATITUDE: 38.954438° N LONGITUDE: 77.193492° W
 SURFACE ELEVATION: 316.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| 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 ° | | STRATA | JOINTS |
| 25 | | | | | | | | | | |
| 26 | 290 | | | | | | | | | |
| 28 | 288 | 42 38 22 | 75 | 28 | | | | | | |
| 30 | 286 | 24 | | 30 | | | | | | |
| 32 | 284 | | | | | | | | | |
| 34 | 282 | 28 32 35 40 | 90 | 33 35 | | | | | | |
| 36 | 280 | | | | | | | | | |
| 38 | 278 | 50/6" | 0 | 38 38.5 | | | | | | |
| 40 | 276 | | | | | | | | | |
| 42 | 274 | | | | | | | | | |
| 44 | 272 | 50/4" | 0 | 43 43.3 | | | | | | |
| 46 | 270 | | | | | | | | | |
| 48 | 268 | 24 30 50/4" | 100 | 48 48.3 49 49.3 | | | | | | |
| 50 | | | | | | | | | | |

Residual, Orange-brown, black and white, stratified, SANDY LEAN CLAY, contains mica, very hard, moist, (CL)

Residual, Orange-brown, black and white, stratified, SANDY LEAN CLAY, contains mica, very hard, moist, (CL)

No Recovery

No Recovery

46.5 / 269.6

lgm, Orange-brown, fine to coarse CLAYEY SAND, contains mica, quartz fragments, and relict rock texture, very dense, wet, (SC)

| | | | |
|----|----|------|------|
| | | | |
| | | 12.8 | |
| 37 | 14 | 11.8 | 57.1 |
| | | | |
| | | 14.6 | |
| | | | |
| | | 12.8 | |
| | | | |
| | | 20.2 | |
| | | 16.8 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19GTP-BR13

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR13

PAGE 3 OF 3

STATION: 22+67
 LATITUDE: 38.954438° N
 SURFACE ELEVATION: 316.1 ft
 OFFSET: 24 ft RT
 LONGITUDE: 77.193492° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 52 | 264 | 50/5" | 50 | 53 53.4 | | | | |
| 54 | 262 | | | | | | | |
| 56 | 260 | | | | | | | |
| 58 | 258 | 46 50/4" | 100 | 58 58.8 | | | | |
| 60 | 256 | | | | | | | |
| 62 | 254 | | | | | | | |
| 64 | 252 | 40 50/4" | 100 | 63 63.8 | | | | |
| 66 | 250 | | | | | | | |
| 68 | 248 | 38 50/4" | 100 | 68 68.8 | | | | |

Igm, Orange-brown, fine to coarse CLAYEY SAND, contains mica, quartz fragments, and relict rock texture, very dense, wet, (SC)

Igm, Orange-brown, mottled, fine to coarse CLAYEY SAND, contains mica and quartz fragments, very dense, wet, (SC)

Bottom of borehole at 68.8 feet.
 Rock Coring was attempted between 50.0 and 70.0 feet with very little to no recovery. Boring was offset and continued soil sampling from 53 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion.

| | | | |
|----|----|------|------|
| | | 14.5 | |
| | | 14.5 | |
| 33 | 11 | 11.4 | 42.9 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19GTP-BR13

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GTP-BR13a

PAGE 1 OF 3

STATION: OFFSET:
 LATITUDE: 38.954452° N LONGITUDE: 77.193497° W
 SURFACE ELEVATION: 315.77 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Mark Fletcher/SaLUT
 Logger: Andy Lewis, S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

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 | DIP ° | | STRATA | JOINTS |
| 2 | 314 | | | | | | | | | | |
| 4 | 312 | | | | | | | | | | |
| 6 | 310 | | | | | | | | | | |
| 8 | 308 | | | | | | | | | | |
| 10 | 306 | | | | | | | | | | |
| 12 | 304 | | | | | | | | | | |
| 14 | 302 | | | | | | | | | | |
| 16 | 300 | | | | | | | | | | |
| 18 | 298 | | | | | | | | | | |
| 20 | 296 | | | | | | | | | | |
| 22 | 294 | | | | | | | | | | |
| 24 | 292 | | | | | | | | | | |

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GTP-BR13a



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GTP-BR13a

PAGE 2 OF 3

STATION: OFFSET:
 LATITUDE: 38.954452° N LONGITUDE: 77.193497° W
 SURFACE ELEVATION: 315.77 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Mark Fletcher/SaLUT
 Logger: Andy Lewis, S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

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 | DIP ° | | STRATA | JOINTS |
| 26 | 290 | | | | | | | | | | |
| 28 | 288 | | | | | | | | | | |
| 30 | 286 | | | | | | | | | | |
| 32 | 284 | | | | | | | | | | |
| 34 | 282 | | | | | | | | | | |
| 36 | 280 | | | | | | | | | | |
| 38 | 278 | | | | | | | | | | |
| 40 | 276 | | | | | | | | | | |
| 42 | 274 | | | | | | | | | | |
| 44 | 272 | | | | | | | | | | |
| 46 | 270 | | | | | | | | | | |
| 48 | 268 | | | | | | | | | | |
| 50 | 266 | | | | | | | | | | |

SPT_LOG\PROJECT\NEXT_VDOT_LOGS.GP\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19GTP-BR13a



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GTP-BR13a

PAGE 3 OF 3

STATION: OFFSET:
 LATITUDE: 38.954452° N LONGITUDE: 77.193497° W
 SURFACE ELEVATION: 315.77 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/02/2019 - 06/04/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Mark Fletcher/SaLUT
 Logger: Andy Lewis, S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

| DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|--------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| | | | | 50 | | | | | |
| 52 | 264 | | | 10 | 0 | | | | |
| 54 | 262 | | | 55 | | | | | |
| 56 | 260 | | | 0 | 0 | | | | |
| 58 | 258 | | | 60 | | | | | |
| 60 | 256 | | | 0 | 0 | | | | |
| 62 | 254 | | | 65 | | | | | |
| 64 | 252 | | | 10 | 7 | | | | |
| 66 | 250 | | | | | | | | |
| 68 | 248 | | | | | | | | |
| | | | | 70 | | | | | |

GROUND WATER

FIELD DESCRIPTION OF STRATA

50.0 / 265.77
 Slightly weathered, very hard, NA bedded, gray, QUARTZ, intensely fractured

55.0 / 260.77

65.0 / 250.77
 Highly weathered, soft, thinnly bedded, light to dark brown, SCHIST, intensely fractured, 70 degrees bedded

Bottom of borehole at 68.8 feet.
 Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion.

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19GTP-BR13a

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR14

PAGE 1 OF 3

STATION: 20+00 OFFSET: 19 ft RT
 LATITUDE: 38.954760° N LONGITUDE: 77.194334° W
 SURFACE ELEVATION: 319.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/04/2019 - 06/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

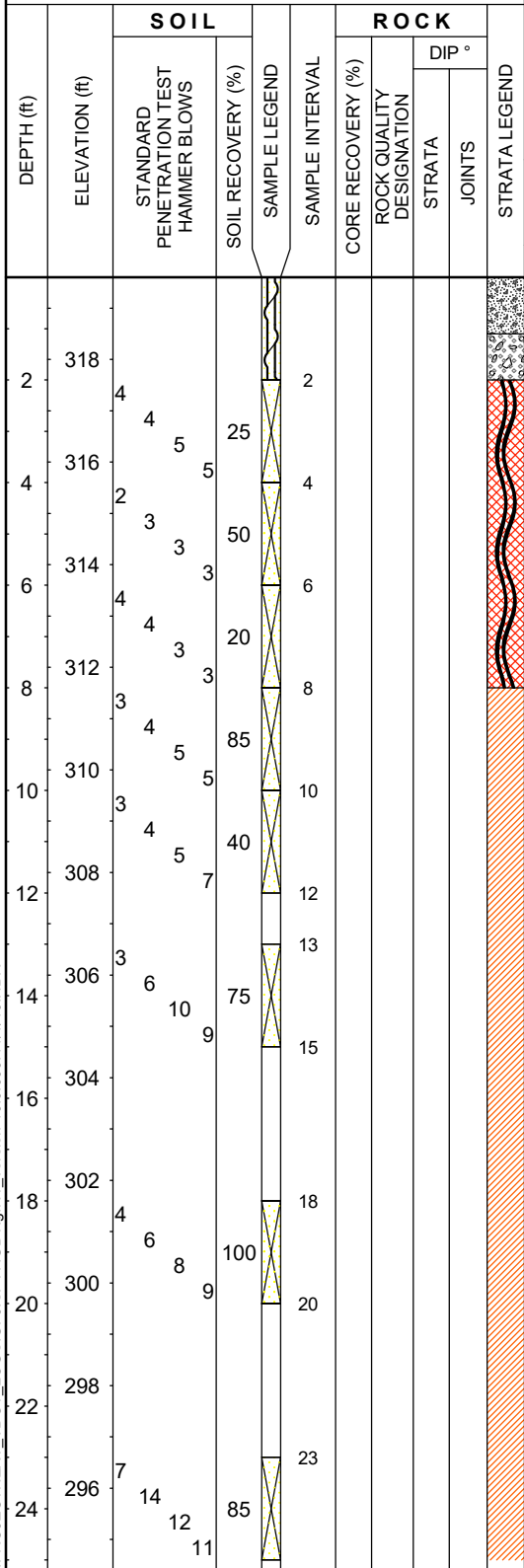
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |
| | | 10.1 | |
| 46 | 17 | 22.4 | 53.5 |
| | | 19.3 | |
| | | 15.1 | |
| | | 17.8 | |
| | | 11.8 | |
| 40 | 15 | 15.3 | 61.1 |
| | | 15.0 | |



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GTP-BR14



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR14

PAGE 2 OF 3

STATION: 20+00
 LATITUDE: 38.954760° N
 SURFACE ELEVATION: 319.6 ft
 OFFSET: 19 ft RT
 LONGITUDE: 77.194334° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/04/2019 - 06/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

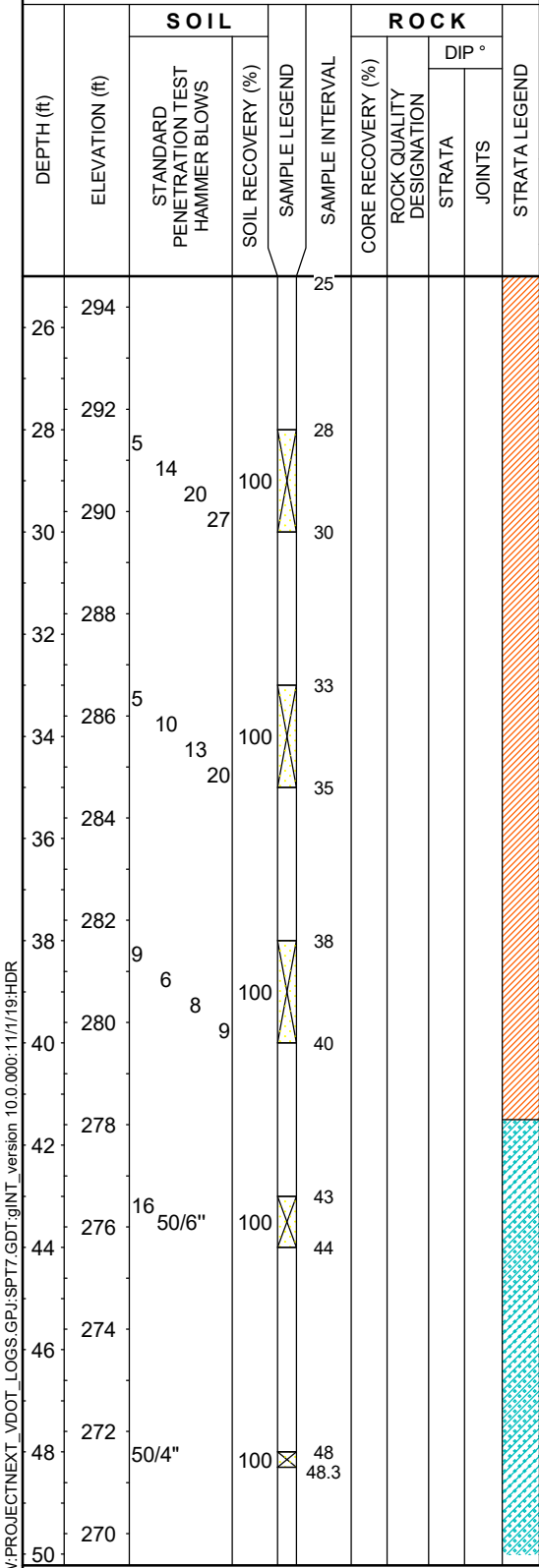
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Red-brown, orange and white, stratified, SANDY LEAN CLAY, contains mica, hard, moist, (CL)

Residual, Red-brown, orange and white, stratified, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)

41.5 / 278.1

Igm, Orange-brown, white and gray, stratified, fine to coarse CLAYEY SAND, contains mica, very dense, moist, (SC)

12.2

23.8

35.7

15.2

12.6

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19GTP-BR14



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N2

19GTP-BR14

PAGE 3 OF 3

STATION: 20+00
 LATITUDE: 38.954760° N
 SURFACE ELEVATION: 319.6 ft
 OFFSET: 19 ft RT
 LONGITUDE: 77.194334° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/04/2019 - 06/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

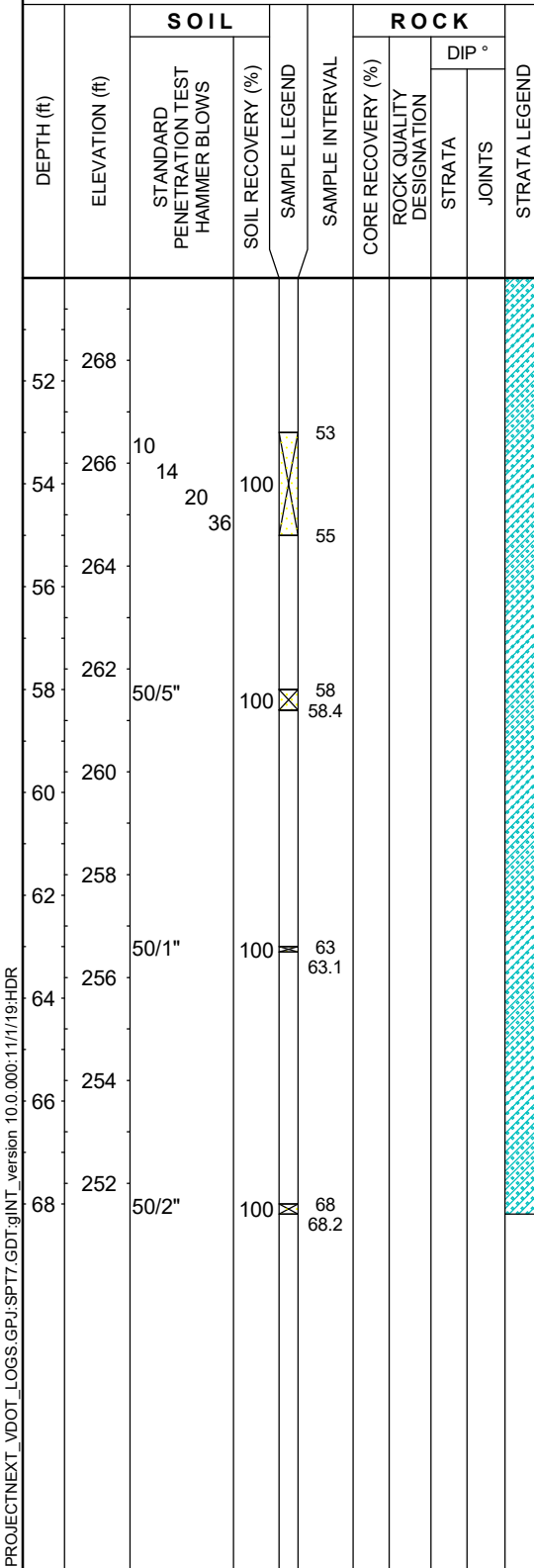
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Igm, Orange-brown, white and gray, stratified, fine to coarse CLAYEY SAND, contains mica, dense, moist, (SC)

15.8

Igm, Orange-brown, white and gray, stratified, fine to coarse CLAYEY SAND, contains mica, very dense, moist, (SC)

34 12 19.6 46.7

Igm, Brown, black and orange, stratified, fine to coarse CLAYEY SAND, contains mica, very dense, moist, (SC)

8.6

Bottom of borehole at 68.2 feet.
 Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion.

6.7

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19GTP-BR14

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N4

19GTP-BR15

PAGE 2 OF 3

STATION: 8+28
 LATITUDE: 38.955824° N
 SURFACE ELEVATION: 305.6 ft
 OFFSET: 41 ft LT
 LONGITUDE: 77.194040° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/19/2019

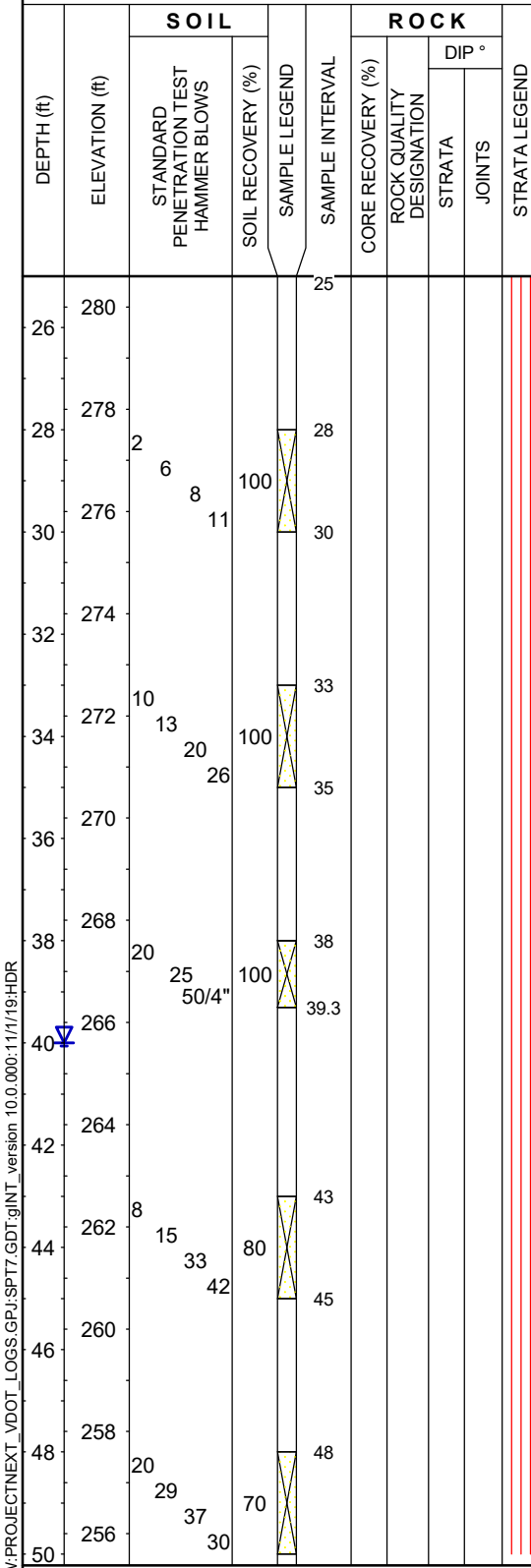
LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

FIELD DESCRIPTION OF STRATA



Residual, Yellow-orange and dark brown, mottled, SILT WITH SAND, contains mica, very stiff, moist, (ML)

Residual, Light brown and dark brown, mottled, SILT WITH SAND, contains mica, hard, moist, (ML)

Residual, Light brown and dark brown, mottled, SILT WITH SAND, contains mica, very hard, moist, (ML)

Residual, Light brown and dark brown, mottled, SILT WITH SAND, contains mica, very hard, wet, (ML)

Residual, Light brown and white, mottled, SILT WITH SAND, contains mica, very hard, wet, (ML)

| | | | |
|----|---|------|------|
| | | | |
| | | 25.2 | |
| | | 14.3 | |
| 38 | 8 | 26.2 | 70.8 |
| | | 23.1 | |
| | | 22.2 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 10 feet

PAGE 2 OF 3

19GTP-BR15

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N4

19GTP-BR15

PAGE 3 OF 3

STATION: 8+28 OFFSET: 41 ft LT
 LATITUDE: 38.955824° N LONGITUDE: 77.194040° W
 SURFACE ELEVATION: 305.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/19/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| | | | | | | | | |
| 52 | 254 | 11 | | | 50 | | | |
| 54 | 252 | 28 | 50/5" | 100 | 53 | | | |
| | | | | | 54.4 | | | |
| 56 | 250 | | | | | | | |
| 58 | 248 | 41 | 50/4" | 100 | 58 | | | |
| | | | | | 58.8 | | | |
| 60 | 246 | | | | | | | |
| 62 | 244 | | | | | | | |
| 64 | 242 | 50/5" | | 100 | 63 | | | |
| | | | | | 63.4 | | | |
| 66 | 240 | | | | | | | |
| 68 | 238 | 37 | 43 | 50/4" | 68 | | | |
| | | | | | 69.3 | | | |

51.5 / 254.1

lgm, Light brown and dark brown, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, very dense, wet, (SC)

lgm, Light brown, white and dark brown, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, and quartz fragments, very dense, wet, (SC)

Bottom of borehole at 69.3 feet.
 Boring backfilled with auger cuttings, bentonite chips, and hole plug upon completion.

| | | | |
|----|---|------|------|
| 31 | 8 | 14.8 | 32.5 |
|----|---|------|------|

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 10 feet

PAGE 3 OF 3

19GTP-BR15

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N4

19GTP-BR16

PAGE 1 OF 3

STATION: 9+80
 LATITUDE: 38.956393° N
 SURFACE ELEVATION: 292.9 ft
 OFFSET: 12 ft LT
 LONGITUDE: 77.193680° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/18/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 29 | 8 | 16.9 | 30.8 |
| | | 19.0 | |
| | | 19.1 | |
| | | 17.2 | |
| | | 23.4 | |
| | | 19.0 | |
| 37 | 8 | 20.7 | 55.8 |
| | | 13.1 | |

GROUND WATER
 FIRST ENCOUNTERED AT 53.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | JOINTS | STRATA LEGEND |
| 1 | 292 | 2 | 40 | | | | | | | | |
| 2 | 290 | 8 | 15 | | | | | | | | |
| 4 | 288 | 6 | 75 | | | | | | | | |
| 6 | 286 | 4 | 90 | | | | | | | | |
| 8 | 284 | 10 | 65 | | | | | | | | |
| 10 | 282 | 10 | | | | | | | | | |
| 12 | 280 | 6 | 100 | | | | | | | | |
| 14 | 278 | 8 | 13 | | | | | | | | |
| 16 | 276 | | | | | | | | | | |
| 18 | 274 | 5 | 85 | | | | | | | | |
| 20 | 272 | 7 | 100 | | | | | | | | |
| 22 | 270 | 10 | | | | | | | | | |
| 24 | 268 | 16 | 100 | | | | | | | | |

0.0 / 292.9
 Fill, Brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, dense, moist, (SC)

Fill, Brown, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC)

Fill, Red-orange and white, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC)

6.0 / 286.9
 Residual, Red-brown, white and black, mottled, SANDY SILT, contains quartz fragments, very stiff, moist, (ML)

Residual, Red-brown, white and black, mottled, SANDY SILT, contains quartz fragments, very stiff, moist, (ML)

Residual, Red-brown, white and black, mottled, SANDY SILT, hard, moist, (ML)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 55 feet

PAGE 1 OF 3

19GTP-BR16

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N4

19GTP-BR16

PAGE 2 OF 3

STATION: 9+80
 LATITUDE: 38.956393° N
 SURFACE ELEVATION: 292.9 ft
 OFFSET: 12 ft LT
 LONGITUDE: 77.193680° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/17/2019 - 06/18/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 53.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | 266 | | | | | | | | | | | | |
| 28 | 264 | 4 | 100 | | | | | | <i>Residual, Red-brown and black, mottled, SANDY SILT, contains mica, very stiff, moist, (ML)</i> | | | 21.1 | |
| 30 | 262 | 7 | 100 | | | | | | | | | | |
| 32 | 260 | 9 | 100 | | | | | | <i>Residual, Red-brown and black, mottled, SANDY SILT, very hard, moist, (ML)</i> | | | 18.8 | |
| 34 | 258 | 20 | 100 | | | | | | | | | | |
| 36 | 256 | 29 | 100 | | | | | | | | | | |
| 38 | 254 | 7 | 90 | | | | | | <i>Residual, Red-brown and black, mottled, SANDY SILT, hard, moist, (ML)</i> | | | 21.3 | |
| 40 | 252 | 23 | 100 | | | | | | | | | | |
| 42 | 250 | 17 | 100 | | | | | | 41.5 / 251.4 | | | | |
| 44 | 248 | 24 | 100 | | | | | | <i>lgm, Brown and black, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, very dense, moist, (SM)</i> | | | 13.2 | |
| 46 | 246 | | | | | | | | | | | | |
| 48 | 244 | 50/4" | 100 | | | | | | <i>lgm, Brown and black, mottled, fine to coarse SILTY SAND, very dense, moist, (SM)</i> | | | 9.5 | |
| 50 | | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 55 feet

PAGE 2 OF 3

19GTP-BR16



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-N4

19GTP-BR16

PAGE 3 OF 3

STATION: 9+80
 LATITUDE: 38.956393° N
 SURFACE ELEVATION: 292.9 ft
 OFFSET: 12 ft LT
 LONGITUDE: 77.193680° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 ° | | | |
| 242 | | | | | | | | | | | | | | | | | |
| 52 | 240 | 41 | | | | | | | ▽ FIRST ENCOUNTERED AT 53.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| 54 | | 46 | 100 | 53 | | | | | FIELD DESCRIPTION OF STRATA | LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) | | | | |
| 54 | | 50/5" | | 54.4 | | | | <i>Igm</i> , Brown and black, mottled, fine to coarse SILTY SAND, very dense, wet, (SM) | | | | | | 39 | 12 | 14.8 | 47.1 |
| 56 | | | | | | | | | | | | | | | | | |
| 58 | | 45 | 100 | 58 | | | | | | | | | | | | | |
| 58 | 234 | 50/4" | | 58.8 | | | | | <i>Igm</i> , Brown and black, mottled, fine to coarse SILTY SAND, very dense, wet, (SM) | | | 16.7 | | | | | |
| 60 | | | | | | | | | | | | | | | | | |
| 62 | | | | | | | | | | | | | | | | | |
| 62 | 230 | 50/2" | 100 | 63 | | | | | <i>Igm</i> , Brown and black, mottled, fine to coarse SILTY SAND, contains quartz fragments, very dense, wet, (SM) | | | 11.6 | | | | | |
| 64 | | | | 63.2 | | | | | | | | | | | | | |
| 66 | | | | | | | | | | | | | | | | | |
| 66 | 226 | | | | | | | | | | | | | | | | |
| 68 | | 50/2" | | 68 | | | | | | | | | | | | | |
| 68 | | | | 68.2 | | | | | Bottom of borehole at 68.2 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | 9.0 | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 55 feet

PAGE 3 OF 3

19GTP-BR16

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 16+78 OFFSET: 25 ft RT
 LATITUDE: 38.953195° N LONGITUDE: 77.194071° W
 SURFACE ELEVATION: 311.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|--|------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 04/23/2019 - 04/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Russell Kanith, PG/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| 2.5 | | 310 | 4 | | | 1.5 | | | | | 0.0 / 311.0 | 11.0" Asphalt | | | | | | | | |
| 2 | | | 7 | | | | | | | | 0.9 / 310.1 | 3.0" Aggregate Subbase | | | | | | | | |
| 1.5 | | 308 | 7 | 85 | | | | | | | 1.2 / 309.8 | <i>Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML)</i> | | | | | | 21.8 | | |
| 4 | | | 2 | 8 | | 3.5 | | | | | | <i>Residual, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)</i> | | | | | | | | |
| | | 306 | 3 | 75 | | | | | | | | | | | | | | | | |
| 2 | | | 5 | 7 | | 5.5 | | | | | | | | | | | | | | |
| 6 | | 304 | 6 | 55 | | | | | | | | <i>Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML)</i> | | | | | | | | |
| | | | 8 | | | | | | | | | | | | | | | | | |
| | | | 8 | | | | | | | | | | | | | | | | | |
| | | | 9 | | | 7.5 | | | | | | | | | | | | | | |
| | | | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with cuttings, hole plug, and concrete upon completion. | | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)



STATION: 19+69 OFFSET: 29 ft RT
 LATITUDE: 38.953848° N LONGITUDE: 77.193454° W
 SURFACE ELEVATION: 314.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|---------------------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|--|--------------|------------------|----------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/23/2019 - 04/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Russell Kanith, PG/HDR | GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | | | | | | | |
| | | 314 | | | | | | | | | | | | | | | | | |
| 2.5 | 2 | 312 | 5 | 25 | 1 | | | | | | | | | | | | | | |
| 2.5 | 4 | 310 | 5 | 6 | 2.5 | | | | | | | | | | | | | | |
| | 4 | 310 | 5 | 7 | 3 | | | | | | | | | | | | | | |
| 3 | 6 | 308 | 4 | 10 | 5 | | | | | | | | | | | | | | 17.7 |
| | 6 | 308 | 6 | 8 | 100 | | | | | | | | | | | | | | 23.0 |
| | | | 8 | 8 | 7 | | | | | | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA 0.0 / 314.3 7.5" Asphalt 0.6 / 313.7 4.0" Aggregate Subbase 1.0 / 313.3 Fill, Brown, fine to coarse, contains rock fragments, very stiff, moist, (SM) 2.5 / 311.8 Residual, Red-brown, SILT, contains mica and rock fragments, moist, (ML) Residual, Red-brown, SILT, contains mica and rock fragments, very stiff, moist, (ML) | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 7.0 feet. Backfilled with cuttings, hole plug, and concrete upon completion. | | | | | | | | | |

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.1 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-E-P09

PAGE 1 OF 1

STATION: 25+25
 LATITUDE: 38.954161° N
 SURFACE ELEVATION: 308.8 ft
 OFFSET: 15 ft RT
 LONGITUDE: 77.192656° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|----------|--------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | GROUND WATER | | | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | DIP ° | STRATA | JOINTS | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | LL | PI | |
| 0.0 | 308.8 | | | | | | | | 10.0" Asphalt | | | | | |
| 0.8 | 308.0 | | | | | | | | 9.0" Aggregate Subbase | | | | | |
| 2.0 | 306.8 | 2 | 75 | | 2 | | | | Fill, Orange-brown, SILT WITH SAND, firm, moist, (ML) | | | | | 21.1 |
| 4.0 | 304.0 | 3 | 100 | | 4 | | | | Fill, Red-brown, SANDY SILT, firm, moist, (ML) | | | | | 23.9 |
| 6.0 | 302.0 | 4 | 100 | | 6 | | | | | | | | | 25.6 |
| 8.0 | | 5 | | | 8 | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GTP-E-P09

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDL



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-E-P10

PAGE 1 OF 1

STATION: 30+79
 LATITUDE: 38.953715° N
 SURFACE ELEVATION: 280.9 ft
 OFFSET: 15 ft LT
 LONGITUDE: 77.190793° W
 COORD. DATUM: NAD 83

| 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: 06/06/2019 - 06/06/2019 | | | | | | | | | | LAB DATA | | | |
| Drilling Method(s): 3.25" HSA w/ SPTs | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | |
| SPT Method: Automatic Hammer | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | |
| Other Test(s): Not Applicable | | | | | | | | | | | | | |
| Driller: M.Fletcher/SaLUT inc. | | | | | | | | | | | | | |
| Logger: Andy Lewis, S&ME | | | | | | | | | | | | | |
| GROUND WATER | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | | | |
| 280 | | | | | | | | | | 0.0 / 280.9 | | | |
| | | | | | | | | | | 9.0" Asphalt | | | |
| 2 | 2 | 3 | 25 | | | | | | | 0.7 / 280.2 | | | |
| | | | | | | | | | | 15.0" Aggregate Subbase | | | |
| 278 | 3 | 3 | | | | | | | | 2.0 / 278.9 | 36 | 13 | 21.1 |
| | | | | | | | | | | Fill, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, loose, moist, (SC) | | | 39.0 |
| 4 | 2 | 4 | 60 | | | | | | | | | | 22.8 |
| 276 | 3 | 2 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 6 | 2 | 3 | 75 | | | | | | | | | | 26.7 |
| 274 | 2 | 2 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 8 | 5 | | | | | | | | | | | | |
| Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GTP-E-P10



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-E-P11

PAGE 1 OF 1

STATION: 12+26
 LATITUDE: 38.954983° N
 SURFACE ELEVATION: 307.3 ft
 OFFSET: 5 ft LT
 LONGITUDE: 77.192967° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 307.3 | | | | | | | | 0.0 / 307.3 3.0" Asphalt | | | | |
| 0.3 | 307.0 | | | | | | | | 0.3 / 307.0 9.0" Aggregate Subbase | | | 5.1 | |
| 1.0 | 306.3 | | | | | | | | 1.0 / 306.3 Fill, Brown, SANDY LEAN CLAY, stiff, moist, (CL) Fill, Brown, SANDY LEAN CLAY, stiff, moist, (CL) | 35 | 11 | 14.6 | 50.2 |
| 3.0 | 304.3 | | | | | | | | | | | 19.1 | |
| 4.0 | 302.2 | | | | | | | | | | | 21.2 | |
| 6.0 | 300.5 | | | | | | | | | | | | |
| 8.0 | 300.5 | | | | | | | | | | | | |
| Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 7.9 feet

PAGE 1 OF 1

19GTP-E-P11

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-E-P12

PAGE 1 OF 1

STATION: 16+64
 LATITUDE: 38.953687° N
 SURFACE ELEVATION: 300.8 ft
 OFFSET: 19 ft RT
 LONGITUDE: 77.192087° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/06/2019 - 06/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Andy Lewis, S&ME | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 300 | | | | | | | | | 0.0 / 300.8 | 10.0" Asphalt | | | | | | | | |
| 2 | 298 | 3 | 2 | 45 | 2 | | | | 0.8 / 300.0 | 8.0" Aggregate Subbase | | | | | | 25.6 | | |
| 4 | 296 | 2 | 3 | 5 | 4 | | | | 1.5 / 299.3 | Fill, Red-brown, SANDY FAT CLAY, firm, moist, (CH) | | | | | | | | |
| 6 | 294 | 3 | 4 | 65 | 6 | | | | | Fill, Red-brown, SANDY FAT CLAY, contains mica, stiff, moist, (CH) | 51 | 27 | 22.8 | 68.4 | | | | |
| 8 | | 4 | 4 | 25 | 8 | | | | | | | | | | | 22.9 | | |
| | | | | | | | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. Bulk sample collected from 2.0 to 8.0 feet bgs. | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GTP-E-P12

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-E-P13

PAGE 1 OF 1

STATION: 18+97
 LATITUDE: 38.954326° N
 SURFACE ELEVATION: 295.6 ft
 OFFSET: 17 ft LT
 LONGITUDE: 77.191932° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/06/2019 - 06/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Andy Lewis, S&ME | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | |
| | | | | | | | | | 0.0 / 295.6 | | | | | | | | | |
| | | | | | | | | | 9.5" Asphalt | | | | | | | | | |
| 2 | 294 | | | | | | | | 0.7 / 294.9 | | | | | | | | | |
| | | | | | | | | | 18.0" Aggregate Subbase | | | | | | | | | |
| | | | | | | | | | 2.3 / 293.3 | | | | | | | | | |
| 3 | 292 | 3 | 85 | | 2.3 | | | | Fill, Orange-brown, fine to coarse SILTY SAND WITH GRAVEL, loose, moist, (SM) | | | | | | | 26.0 | | |
| 4 | | 3 | 5 | | 4.3 | | | | Fill, Orange-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, loose, moist, (SM) | | | | | 44 | 15 | 22.1 | 39.0 | |
| 6 | 290 | 3 | 50 | | 6.3 | | | | Fill, Orange-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM) | | | | | | | 24.8 | | |
| 8 | 288 | 4 | 75 | | 8.3 | | | | Bottom of borehole at 8.3 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. Bulk sample collected from 2.3 to 8.3 feet bgs. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 1

19GTP-E-P13

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-W-P04

PAGE 1 OF 1

STATION: 17+04
 LATITUDE: 38.955086° N
 SURFACE ELEVATION: 319.2 ft
 OFFSET: 25 ft RT
 LONGITUDE: 77.195286° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/31/2019 - 05/31/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 2 | 318 | 3 | | | 1.6 | | | |
| 4 | 316 | 4 | 50 | | 3.6 | | | |
| 6 | 314 | 3 | 75 | | 5.6 | | | |
| | 312 | 4 | 100 | | 7.6 | | | |

0.0 / 319.2
 10.0" Asphalt
 0.8 / 318.4
 9.0" Aggregate Subbase
 1.6 / 317.6
Residual, Red-brown, white and black, stratified, SANDY ELASTIC SILT, contains mica, stiff, moist, (MH)
Residual, Red-brown, white and black, stratified, SANDY ELASTIC SILT, contains mica, stiff, moist, (MH)

Bottom of borehole at 7.6 feet.
 Boring backfilled with auger cuttings, hole plug, aggregate, and concrete upon completion.

| | | | |
|----|---|------|------|
| | | 18.6 | |
| 51 | 5 | 20.2 | 54.6 |
| | | 17.6 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 1

19GTP-W-P04

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GTP-W-P06

PAGE 1 OF 1

STATION: 18+98
 LATITUDE: 38.954243° N
 SURFACE ELEVATION: 313.2 ft
 OFFSET: 4 ft LT
 LONGITUDE: 77.194953° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 313.2 | 34 | | 0.6 | | | | 0.0 / 313.2 | | | | | |
| 0.4 | 312.8 | 22 | | | | | | 4.0" Asphalt | | | | | |
| 0.7 | 312.5 | 13 | | | | | | 0.3 / 312.9 | | | | | |
| 1.0 | 312.2 | 7 | | | | | | 3.0" Aggregate Subbase | | | 6.6 | | |
| 1.6 | 311.6 | 4 | | 2.6 | | | | 0.6 / 312.6 | | | | | |
| 2.2 | 311.0 | 5 | | | | | | Fill, Brown to yellow-orange, fine to coarse SILTY SAND WITH GRAVEL, dense, moist, (SM) | 42 | 13 | 23.3 | 68.3 | |
| 2.8 | 310.4 | 6 | | | | | | 2.6 / 310.6 | | | | | |
| 3.4 | 309.8 | 7 | | | | | | Residual, Red-brown, SANDY SILT, stiff, moist, (ML) | | | | | |
| 4.0 | 309.2 | 6 | | | | | | Residual, Red-brown, SANDY SILT, very stiff, moist, (ML) | | | | | |
| 4.6 | 308.6 | 6 | | | | | | | | | 26.9 | | |
| 5.2 | 308.0 | 6 | | | | | | | | | | | |
| 5.8 | 307.4 | 6 | | | | | | | | | | | |
| 6.4 | 306.8 | 6 | | | | | | | | | | | |
| 6.6 | 306.6 | 6 | | | | | | | | | | | |
| Bottom of borehole at 6.6 feet. Boring backfilled with auger cuttings, spider plug, aggregate and grout upon completion. | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5 feet

PAGE 1 OF 1

19GTP-W-P06

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR17

PAGE 1 OF 3

STATION: 22+93
 LATITUDE: 38.963535° N
 SURFACE ELEVATION: 229.8 ft
 OFFSET: 145 ft LT
 LONGITUDE: 77.182214° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/04/2019 - 06/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

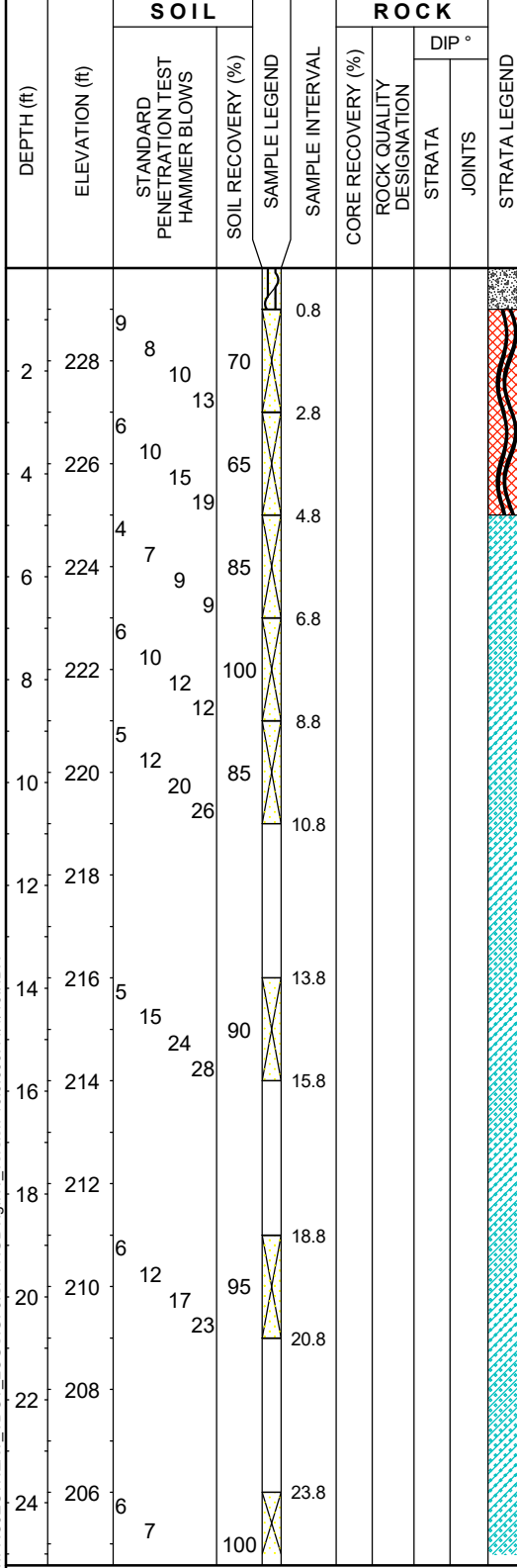
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 35 | 12 | 5.5 | 36.0 |
| | | 17.3 | |
| | | 18.0 | |
| | | 16.2 | |
| | | 12.3 | |
| | | 11.1 | |
| 34 | 11 | 14.5 | 36.0 |
| | | 27.0 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.8 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



0.0 / 229.8
 9.0" Concrete

0.8 / 229.0
Fill, Light brown to yellow-orange, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC)

Fill, Yellow-orange, fine to coarse CLAYEY SAND WITH GRAVEL, dense, moist, (SC)

4.8 / 225.0
Residual, Yellow-orange, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC)

Residual, Yellow-orange and white, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, medium dense, moist, (SC)

Residual, Yellow-orange and white, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, dense, moist, (SC)

Residual, Yellow-orange, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica and quartz fragments, very dense, moist, (SC)

Residual, Light brown, dark brown and white, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, dense, moist, (SC)

Residual, Light brown, white and dark brown, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica,

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40 feet

PAGE 1 OF 3

19GWP-BR17

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR17

PAGE 2 OF 3

STATION: 22+93
 LATITUDE: 38.963535° N
 SURFACE ELEVATION: 229.8 ft
 OFFSET: 145 ft LT
 LONGITUDE: 77.182214° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/04/2019 - 06/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

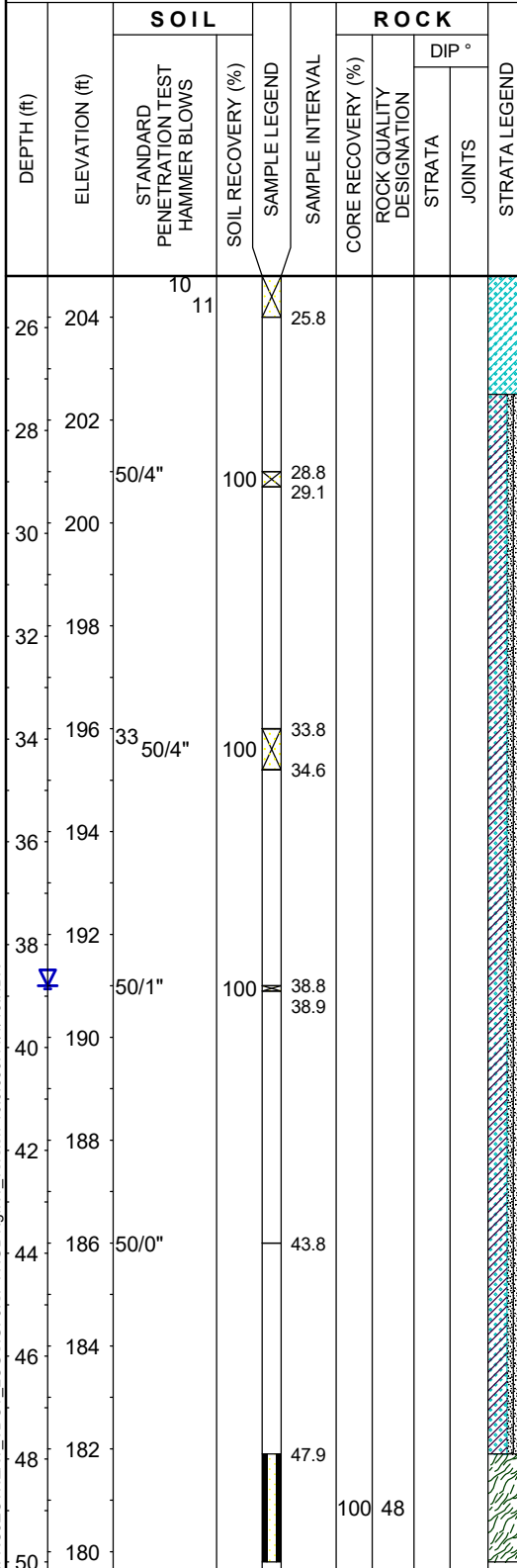
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.8 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



medium dense, moist, (SC)

27.3 / 202.5

lgm, Light brown, fine to coarse SILTY, CLAYEY SAND, very dense, moist, (SC-SM)

14.5

lgm, Light brown, dark brown and white, mottled, fine to coarse SILTY, CLAYEY SAND, very dense, moist, (SC-SM)

28 6 6.4 49.5

lgm, Light brown, fine to coarse SILTY, CLAYEY SAND, very hard, wet, (SC-SM)

16.8

No Recovery

47.9 / 181.9
 Moderately weathered, moderately hard, thin foliated, gray and white banded, SCHIST, highly fractured, contains quartz inclusions

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40 feet

PAGE 2 OF 3

19GWP-BR17

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR17

PAGE 3 OF 3

STATION: 22+93 OFFSET: 145 ft LT
 LATITUDE: 38.963535° N LONGITUDE: 77.182214° W
 SURFACE ELEVATION: 229.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|--|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/04/2019 - 06/05/2019 | Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: E.Pozas/Connelly & Associates, inc. | Logger: Jacob Moorman, HDR | 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 ▽ FIRST ENCOUNTERED AT 38.8 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | |
| 52 | 178 | | | | 50 | | | | 50.0 / 179.8 Moderately weathered, moderately hard, thin foliated, gray and white banded, SCHIST, highly to intensely fractured, contains quartz inclusions | | | | | | | | | |
| 54 | 176 | | | | 55 | 90 | 35 | | Auger refusal at 47.9 feet. Bottom of borehole at 55.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40 feet

PAGE 3 OF 3

19GWP-BR17

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR18

PAGE 1 OF 3

STATION: 53+60
 LATITUDE: 38.963952° N
 SURFACE ELEVATION: 223.1 ft
 OFFSET: 20 ft RT
 LONGITUDE: 77.184045° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/03/2019 - 06/04/2019

LAB DATA

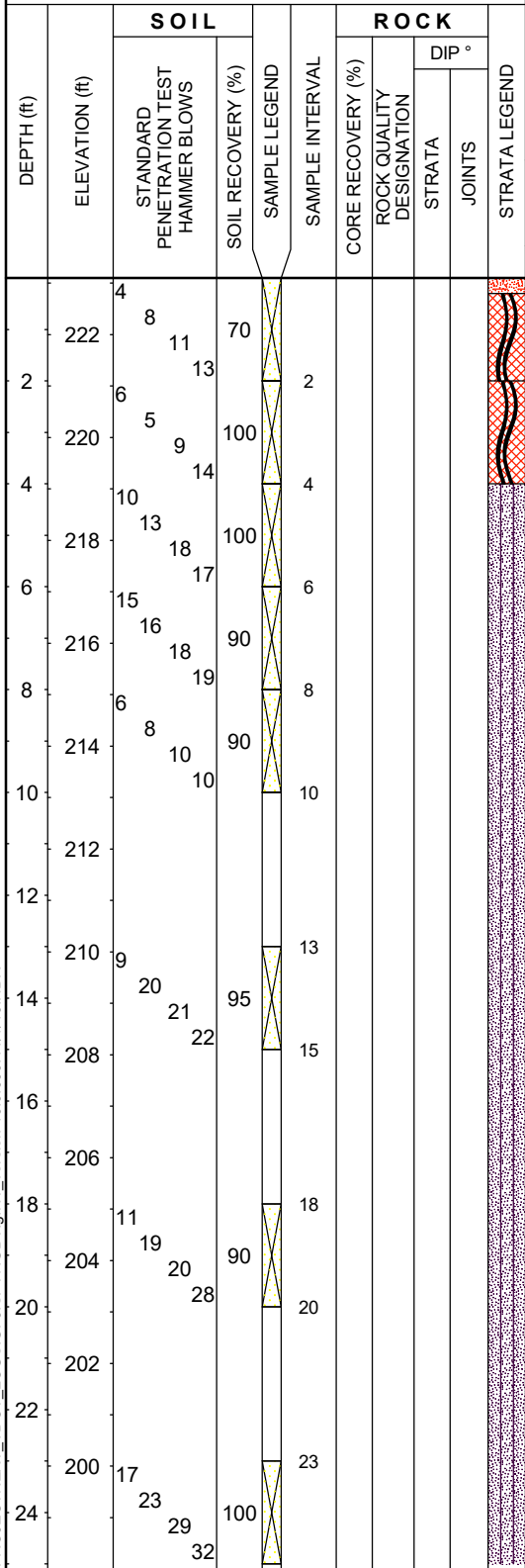
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 FIRST ENCOUNTERED AT 32.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 18 | 6 | 2.9 | 10.1 |
| | | 15.6 | |
| | | 11.9 | |
| | | 11.0 | |
| 43 | 13 | 16.3 | 36.8 |
| | | 15.4 | |
| | | 12.4 | |
| | | 17.6 | |

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| 18 | 6 | 2.9 | 10.1 |
| | | 15.6 | |
| | | 11.9 | |
| | | 11.0 | |
| 43 | 13 | 16.3 | 36.8 |
| | | 15.4 | |
| | | 12.4 | |
| | | 17.6 | |



0.0 / 223.1
 3.0" Topsoil

0.3 / 222.8
 Fill, Orange-brown, fine to coarse POORLY GRADED SAND WITH SILT AND GRAVEL, medium dense, moist, (SP-SC)

2.0 / 221.1
 Fill, Orange-brown, fine to medium SILTY SAND, medium dense, moist, (SM)

4.0 / 219.1
 Residual, Orange, tan and brown, fine to coarse SILTY SAND, dense, moist, (SM)

Residual, Orange, brown and black, fine to coarse SILTY SAND, medium dense, moist, (SM)

Residual, Brown and black, fine to coarse SILTY SAND, very dense, moist, (SM)

Residual, Brown and white, fine to coarse SILTY SAND, very dense, moist, (SM)

Residual, Brown and white, fine to coarse SILTY SAND, very dense, moist, (SM)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64 feet

PAGE 1 OF 3

19GWP-BR18

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR18

PAGE 3 OF 3

STATION: 53+60 OFFSET: 20 ft RT
 LATITUDE: 38.963952° N LONGITUDE: 77.184045° W
 SURFACE ELEVATION: 223.1 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---|---|---|------------------------------|-------------------------------|---|-----------------------------------|--------------|------------------|----------------------|------------------------|-------|--|--|--|--|--|--|--|--|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/03/2019 - 06/04/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: N.Chew/Connelly & Associates, inc. | Logger: Mark Tilashalski, PE/S&ME | 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 ° | | | | | | | | | | |
| 172 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 52 | 170 | 25 | | 53 | | | | 1gm, Brown and white, fine to medium CLAYEY SAND, very dense, wet, (SC) | FIRST ENCOUNTERED AT 32.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | GROUND WATER | | | | | | | | | | | | | | | | | | | |
| 54 | 54 | 42 | 79 | 54.4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 168 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 58 | 166 | 50/2" | 100 | 58 | 58.2 | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 62 | 162 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 64 | 160 | 50/5" | 100 | 63 | 63.4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 66 | 158 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 156 | 50/4" | 100 | 68 | 68.3 | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | 154 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 70.0 feet. Boring backfilled using auger cuttings and hole plug upon completion. | | | | | | | | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64 feet

PAGE 3 OF 3

19GWP-BR18



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR19

PAGE 1 OF 3

STATION: 14+87
 LATITUDE: 38.961533° N
 SURFACE ELEVATION: 239.2 ft
 OFFSET: 8 ft RT
 LONGITUDE: 77.188227° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/22/2019 - 05/24/2019

LAB DATA

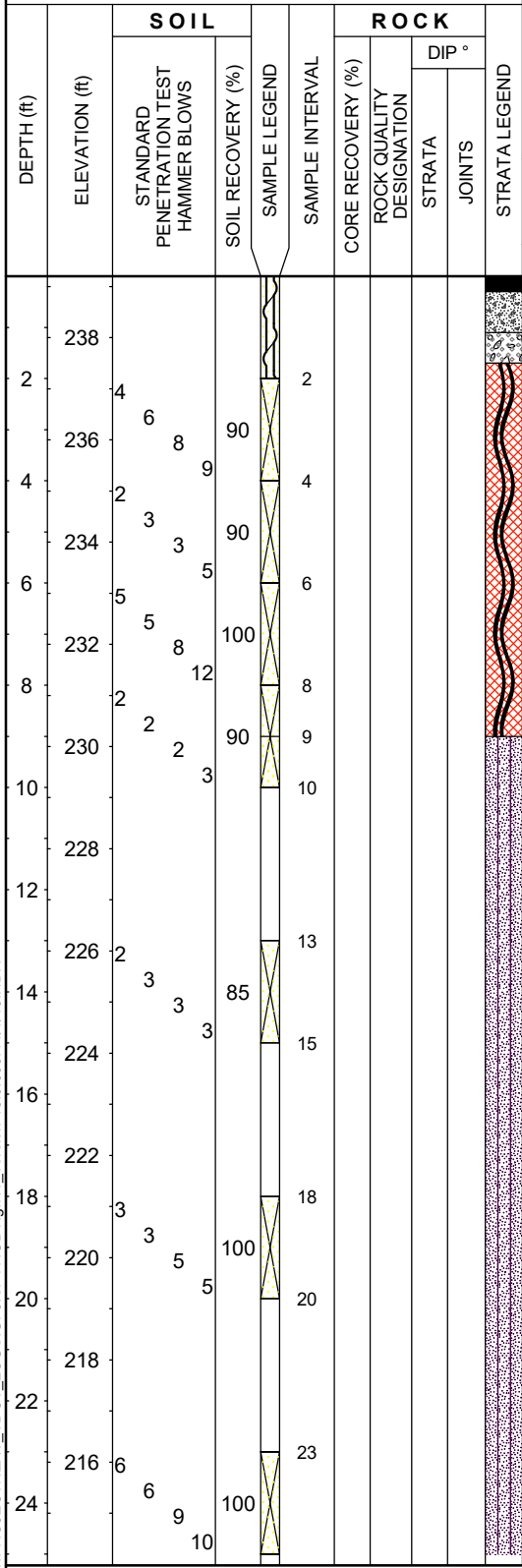
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Mitch Jennings, S&ME

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 33 | 6 | 22.1 | 42.4 |
| | | 27.0 | |
| | | 19.1 | |
| | | 16.2 | 16.2 |
| | | 14.1 | |
| | | 17.1 | |
| 35 | 5 | 14.4 | 38.9 |

GROUND WATER
 FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 66 feet

PAGE 1 OF 3

19GWP-BR19

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR19

PAGE 2 OF 3

STATION: 14+87
 LATITUDE: 38.961533° N
 SURFACE ELEVATION: 239.2 ft
 OFFSET: 8 ft RT
 LONGITUDE: 77.188227° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/22/2019 - 05/24/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Mitch Jennings, S&ME

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | 9.7 | |
| | | 11.5 | |
| | | 16.8 | |
| | | 8.1 | |
| | | 20.0 | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | |
|----|----|
| LL | PI |
|----|----|

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA LEGEND |
| 214 | | | | | | | | | |
| 26 | | | | | | | | | |
| 212 | | | | | | | | | |
| 28 | 14 | 25 | 100 | X | 28 | | | | |
| 210 | 32 | 33 | | | 30 | | | | |
| 30 | | | | | | | | | |
| 208 | | | | | | | | | |
| 32 | | | | | | | | | |
| 206 | 13 | 23 | 100 | X | 33 | | | | |
| 34 | 30 | 50/5" | | | 34.9 | | | | |
| 204 | | | | | | | | | |
| 36 | | | | | | | | | |
| 202 | | | | | | | | | |
| 38 | 12 | 20 | 83 | X | 38 | | | | |
| 200 | 39 | 50/4" | | | 39.8 | | | | |
| 40 | | | | | | | | | |
| 198 | | | | | | | | | |
| 42 | | | | | | | | | |
| 196 | 13 | 27 | 94 | X | 43 | | | | |
| 44 | 50 | 50/4" | | | 44.8 | | | | |
| 194 | | | | | | | | | |
| 46 | | | | | | | | | |
| 192 | | | | | | | | | |
| 48 | 39 | 50/4" | 100 | X | 48 | | | | |
| 190 | | | | | 48.8 | | | | |
| 50 | | | | | | | | | |

Residual, Brown, fine to coarse SILTY SAND, contains mica and weathered rock fragments, very dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica and weathered rock fragments, very dense, wet, (SM)

46.5 / 192.7

lgm, Brown, fine to coarse SILTY SAND, contains mica and weathered rock fragments, very dense, wet, (SM)

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 66 feet

PAGE 2 OF 3

19GWP-BR19



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR19

PAGE 3 OF 3

STATION: 14+87
 LATITUDE: 38.961533° N
 SURFACE ELEVATION: 239.2 ft
 OFFSET: 8 ft RT
 LONGITUDE: 77.188227° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/22/2019 - 05/24/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Mitch Jennings, S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 | | | | | | | DIP ° |
| 188 | | | | | | | | | | | | | | |
| 52 | 186 | 50/5" | 100 | 53 53.4 | | | | | <i>lgm</i> , Brown, fine to coarse SILTY SAND, contains mica and weathered rock fragments, very dense, wet, (SM) | | | 11.1 | | |
| 54 | | | | | | | | | | | | | | |
| 184 | | | | | | | | | | | | | | |
| 56 | 182 | 50/4" | 100 | 58 58.3 | | | | | | | | | | 16.6 |
| 180 | | | | | | | | | | | | | | |
| 60 | 178 | | | | | | | | | | | | | |
| 62 | 176 | 50/4" | 100 | 63 63.3 | | | | | | | | | 8.9 | |
| 64 | | | | | | | | | | | | | | |
| 174 | | | | | | | | | | | | | | |
| 66 | 172 | | | | | | | | | | | | | |
| 68 | 170 | 50/4" | 100 | 68 68.8 | | | | | <i>lgm</i> , Brown, fine to coarse SILTY SAND, contains mica and weathered rock fragments, very dense, wet, (SM) | 31 | 4 | 9.6 | 41.3 | |
| 170 | | | | | | | | | | | | | | |
| 70 | | 50/2" | 100 | 70 70.2 | | | | | | | | | 7.6 | |
| | | | | | | | | | Bottom of borehole at 70.2 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips, and concrete upon completion. | | | | | |

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 66 feet

PAGE 3 OF 3

19GWP-BR19



STATION: 20+24 OFFSET: 7 ft RT
 LATITUDE: 38.962752° N LONGITUDE: 77.187423° W
 SURFACE ELEVATION: 226.9 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/02/2019 - 07/02/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | SAMPLE INTERVAL | ROCK | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| | | 226 | 5 | 67 | 1.5 | | | | |
| 2 | | 224 | 4 | 5 | 2 | | | | |
| 4 | | 222 | 3 | 5 | 4 | | | | |
| 6 | | 220 | 2 | 10 | 6 | | | | |
| 8 | | 218 | 4 | 8 | 8 | | | | |
| 10 | | 216 | | 9 | 10 | | | | |
| 12 | | 214 | 3 | | 13 | | | | |
| 14 | | 212 | 4 | 80 | 15 | | | | |
| 16 | | 210 | | | | | | | |
| 18 | | 208 | 1 | | 18 | | | | |
| 20 | | 206 | 2 | 70 | 20 | | | | |
| 22 | | 204 | | | 23 | | | | |
| 24 | | 202 | 1 | 80 | | | | | |

0.0 / 226.9
Residual, Brown, fine to coarse SILTY SAND, contains root fragments, medium dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, loose, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, loose, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, very loose, moist, (SM)

| | | | |
|----|---|------|------|
| | | 12.5 | |
| | | 19.5 | |
| | | 12.7 | |
| 32 | 6 | 14.9 | 44.7 |
| | | 16.6 | |
| | | 16.7 | |
| | | 17.5 | |
| | | 20.7 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 27.5 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.000:11/1/19:HDR



STATION: 20+24 OFFSET: 7 ft RT
 LATITUDE: 38.962752° N LONGITUDE: 77.187423° W
 SURFACE ELEVATION: 226.9 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/02/2019 - 07/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | |
| | 25 | | | | | | | |
| | 26 | 200 | | | | | | |
| | 28 | | WOH 2 | 100 | | | | |
| | 198 | | 2 | 4 | | | | |
| | 30 | 196 | | | | | | |
| | 32 | | | | | | | |
| | 194 | | WOH 2 | 100 | | | | |
| | 34 | | 4 | 6 | | | | |
| | 192 | | | | | | | |
| | 36 | 190 | | | | | | |
| | 38 | | 4 | 6 | | | | |
| | 188 | | 8 | 11 | | | | |
| | 40 | 186 | | | | | | |
| | 42 | | | | | | | |
| | 184 | | 2 | 6 | | | | |
| | 44 | | 7 | 9 | | | | |
| | 182 | | | | | | | |
| | 46 | 180 | | | | | | |
| | 48 | | 5 | 7 | | | | |
| | 178 | | 9 | 9 | | | | |
| | 50 | | | | | | | |

Residual, Brown, fine to coarse SILTY SAND, contains mica, loose, moist, (SM)

23.4

Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

21.1

Residual, Brown, fine to coarse SILTY SAND, contains mica and relict rock texture, medium dense, wet, (SM)

22.6

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 27.5 feet



STATION: 20+24 OFFSET: 7 ft RT
 LATITUDE: 38.962752° N LONGITUDE: 77.187423° W
 SURFACE ELEVATION: 226.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 48.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | |
| FIELD DESCRIPTION OF STRATA Boring backfilled with auger cuttings upon completion. | | | | | | | | | | | LL | PI | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 27.5 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N3

19GWP-BR21

PAGE 2 OF 4

STATION: 18+75
 LATITUDE: 38.962341° N
 SURFACE ELEVATION: 233.5 ft
 OFFSET: 19 ft RT
 LONGITUDE: 77.187409° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/22/2019 - 04/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: A.Fowler/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

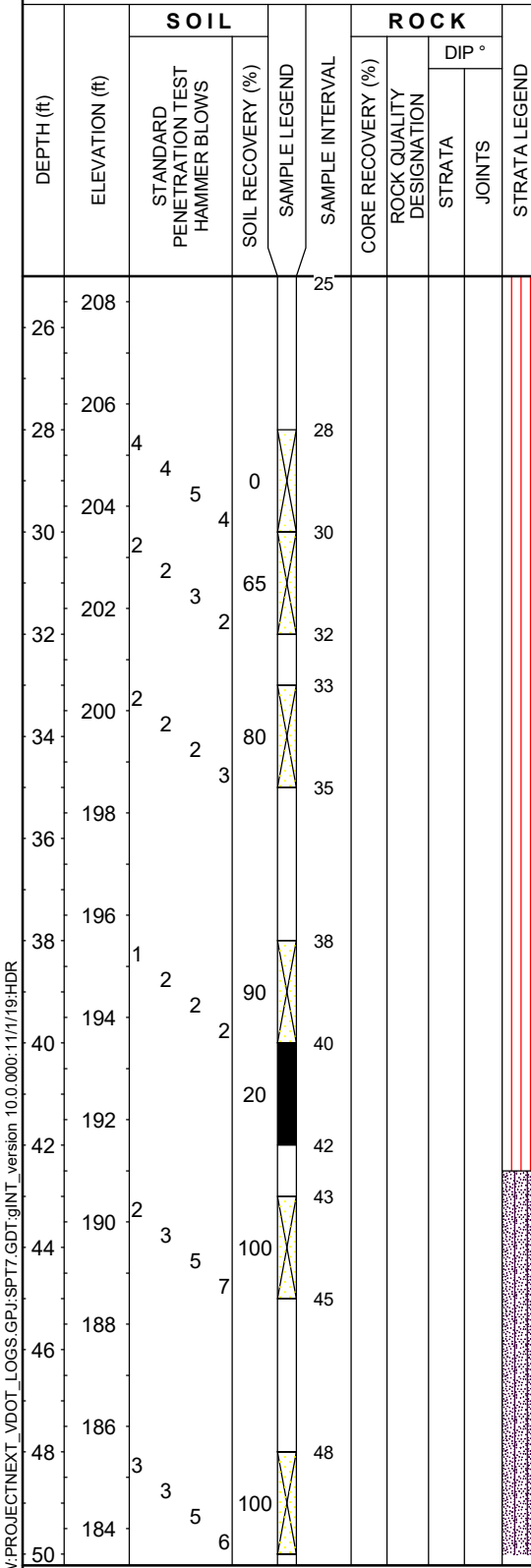
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |
| | | | |
| | | | |

GROUND WATER

☑ FIRST ENCOUNTERED AT 60.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
| | | | |
| | | | |
| | | | |



No Recovery

Residual, Brown and gray, mottled, SILT, contains mica, firm, moist, (ML) 15.3

19.6

Shelby Tube collected from 40.0 to 42.0 feet bgs

42.5 / 191.0
Residual, Red and brown-white, mottled, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) 20.8

Residual, Red and brown-white, mottled, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) 20.4 46.1

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 10.4 feet

PAGE 2 OF 4

19GWP-BR21

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N3

19GWP-BR21

PAGE 3 OF 4

STATION: 18+75
 LATITUDE: 38.962341° N
 SURFACE ELEVATION: 233.5 ft
 OFFSET: 19 ft RT
 LONGITUDE: 77.187409° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/22/2019 - 04/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: A.Fowler/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 20.7 | |
| | | 14.6 | |
| | | 14.4 | |
| | | 13.2 | |
| | | 20.7 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 60.0 ft DEPTH
 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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | | | | | | | |
| 52 | 182 | | | | | | | |
| 54 | 180 | 3 | | | | | | |
| | | 4 | | | | | | |
| | | 6 | 100 | | | | | |
| | | 7 | | | | | | |
| 56 | 178 | | | | | | | |
| 58 | 176 | 6 | | | | | | |
| | | 7 | | | | | | |
| | | 5 | 90 | | | | | |
| | | 9 | | | | | | |
| 60 | 174 | | | | | | | |
| 62 | 172 | | | | | | | |
| | | 50/4" | 100 | | | | | |
| | | | | | 63 | | | |
| | | | | | 63.3 | | | |
| 64 | 170 | | | | | | | |
| 66 | 168 | | | | | | | |
| 68 | 166 | 50/5" | 100 | | | | | |
| | | | | | 68 | | | |
| | | | | | 68.4 | | | |
| 70 | 164 | 50/4" | 100 | | | | | |
| | | | | | 70 | | | |
| | | | | | 70.3 | | | |
| 72 | 162 | 50/2" | 100 | | | | | |
| | | | | | 73 | | | |
| | | | | | 73.2 | | | |

Residual, Red and brown-white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, medium dense, moist, (SM)

Residual, Red and brown-white, mottled, fine to coarse SILTY SAND, contains mica, medium dense, moist to wet, (SM)

61.5 / 172.0

Igm, Brown to gray, fine to medium SILTY SAND WITH GRAVEL, contains mica and weathered rock fragments, very dense, wet, (SM)

69.2 / 164.3

Igm, Gray, fine to medium CLAYEY SAND WITH GRAVEL, very dense, wet, (SC)

Bottom of borehole at 73.2 feet.
 Shelby Tube collected from 40.0 to 42.2 feet bgs. Boring backfilled with auger cuttings and hole plug upon

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 10.4 feet

PAGE 3 OF 4

19GWP-BR21



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N3

19GWP-BR21

PAGE 4 OF 4

STATION: 18+75 OFFSET: 19 ft RT
 LATITUDE: 38.962341° N LONGITUDE: 77.187409° W
 SURFACE ELEVATION: 233.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|---|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| Date(s) Drilled: 04/22/2019 - 04/23/2019 | | | | | | | | | | | | | |
| Drilling Method(s): 3.25" HSA w/ SPTs | | | | | | | | | | | | | |
| SPT Method: Automatic Hammer | | | | | | | | | | | | | |
| Other Test(s): Not Applicable | | | | | | | | | | | | | |
| Driller: A.Fowler/Connelly & Associates, inc. | | | | | | | | | | | | | |
| Logger: Harsh Patel, HDR | | | | | | | | | | | | | |
| GROUND WATER | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> FIRST ENCOUNTERED AT 60.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | LL | PI | | | | |
| completion. | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 10.4 feet

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19GWP-BR21

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR22

PAGE 1 OF 3

STATION: 20+65 OFFSET: 80 ft LT
 LATITUDE: 38.963254° N LONGITUDE: 77.182999° W
 SURFACE ELEVATION: 214.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 05/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

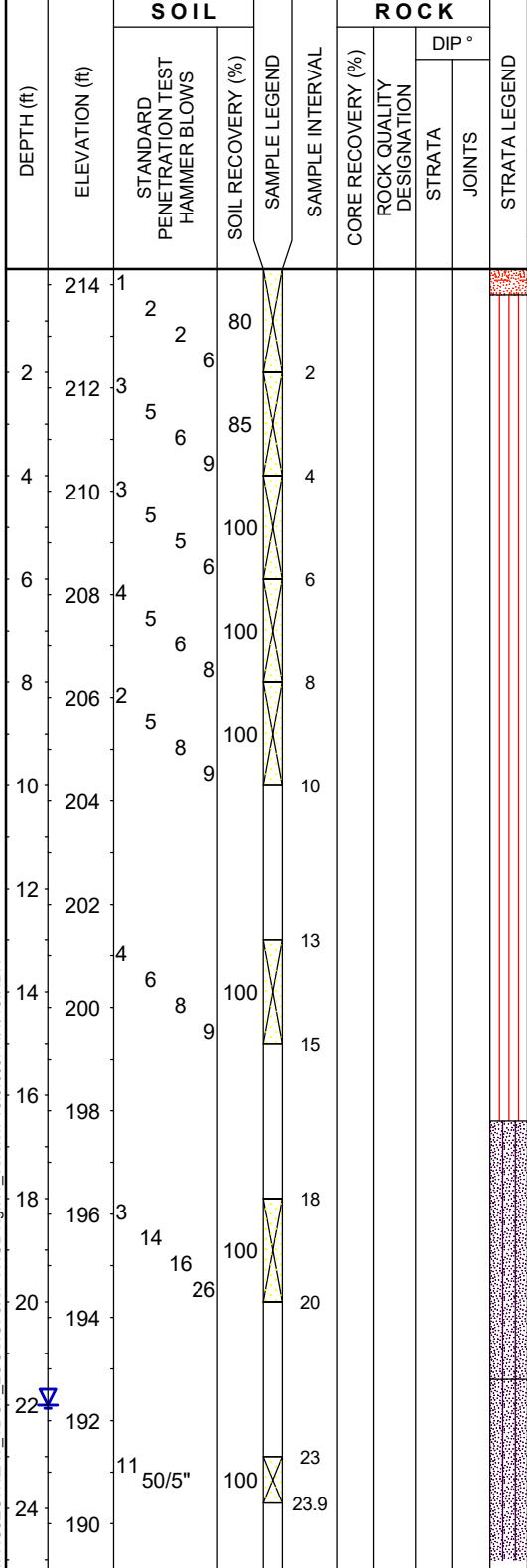
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 22.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 21.7 | |
| 46 | 9 | 23.5 | 72.2 |
| | | 33.4 | |
| | | 18.0 | |
| | | 20.2 | |
| | | 17.8 | |
| 32 | 5 | 15.4 | 46.5 |
| | | 18.7 | |



REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GWP-BR22

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE

19GWP-BR22

PAGE 2 OF 3

STATION: 20+65
 LATITUDE: 38.963254° N
 SURFACE ELEVATION: 214.3 ft
 OFFSET: 80 ft LT
 LONGITUDE: 77.182999° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 05/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | | |

GROUND WATER
 FIRST ENCOUNTERED AT 22.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |

| DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 188 | 50/2" | 50 | 26.5 26.7 | | | | |
| 28 | 186 | 36 50/4" | 100 | 28 28.8 | | | | |
| 30 | 184 | | | | | | | |
| 32 | 182 | | | | | | | |
| 34 | 180 | 30 50/5" | 100 | 33 33.9 | | | | |
| 36 | 178 | | | | | | | |
| 38 | 176 | 49 50/4" | 100 | 38 38.8 | | | | |
| 40 | 174 | | | | | | | |
| 42 | 172 | 50/6" | 100 | 43 43.5 | | | | |
| 44 | 170 | | | | | | | |
| 46 | 168 | | | | | | | |
| 48 | 166 | 50/4" | 100 | 48 48.3 | | | | |
| 50 | | | | | | | | |

lgm, Brown, gray and black, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

lgm, Brown, gray and black, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GWP-BR22

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N2

19GWP-BR23

PAGE 1 OF 3

STATION: 698+76 OFFSET: 20 ft LT
 LATITUDE: 38.963180° N LONGITUDE: 77.184167° W
 SURFACE ELEVATION: 212.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/06/2019 - 05/07/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |
| | | 15.4 | |
| | | 16.1 | |
| | | 14.2 | |
| | | 18.3 | |
| | | 18.0 | |
| 40 | 11 | 25.4 | 55.1 |
| | | 13.2 | |
| 43 | 4 | 23.4 | 49.6 |

| DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-------------------|--------------------------|--------|-------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | DIP ° | |
| | | | | | | | | |
| 2 | 210 | | | | | | | |
| 4 | 208 | 5 | 100 | | | | | |
| 6 | 206 | 7 | 100 | | | | | |
| 8 | 204 | 8 | 100 | | | | | |
| 10 | 202 | 6 | 100 | | | | | |
| 12 | 200 | 4 | 100 | | | | | |
| 14 | 198 | 4 | 100 | | | | | |
| 16 | 196 | | | | | | | |
| 18 | 194 | 2 | 100 | | | | | |
| 20 | 192 | 6 | 100 | | | | | |
| 22 | 190 | | | | | | | |
| 24 | 188 | 9 | 100 | | | | | |

0.0 / 212.1
 13.0" Asphalt

1.1 / 211.0
 10.0" Concrete

1.9 / 210.2
 9.0" Aggregate Subbase

2.7 / 209.4
Residual, Light brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Light brown to yellow-orange, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Yellow-orange, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

9.0 / 203.1
Residual, Light brown to red-brown, SANDY SILT, very stiff, moist, (ML)

Residual, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Red-brown, SANDY SILT, stiff, moist, (ML)

16.5 / 195.6

Residual, Dark brown to dark gray, fine to coarse SILTY SAND, medium dense, moist, (SM)

Residual, Red-brown, fine to medium SILTY SAND, contains mica, medium dense, moist, (SM)

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GWP-BR23

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N2

19GWP-BR23

PAGE 2 OF 3

STATION: 698+76 OFFSET: 20 ft LT
 LATITUDE: 38.963180° N LONGITUDE: 77.184167° W
 SURFACE ELEVATION: 212.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/06/2019 - 05/07/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

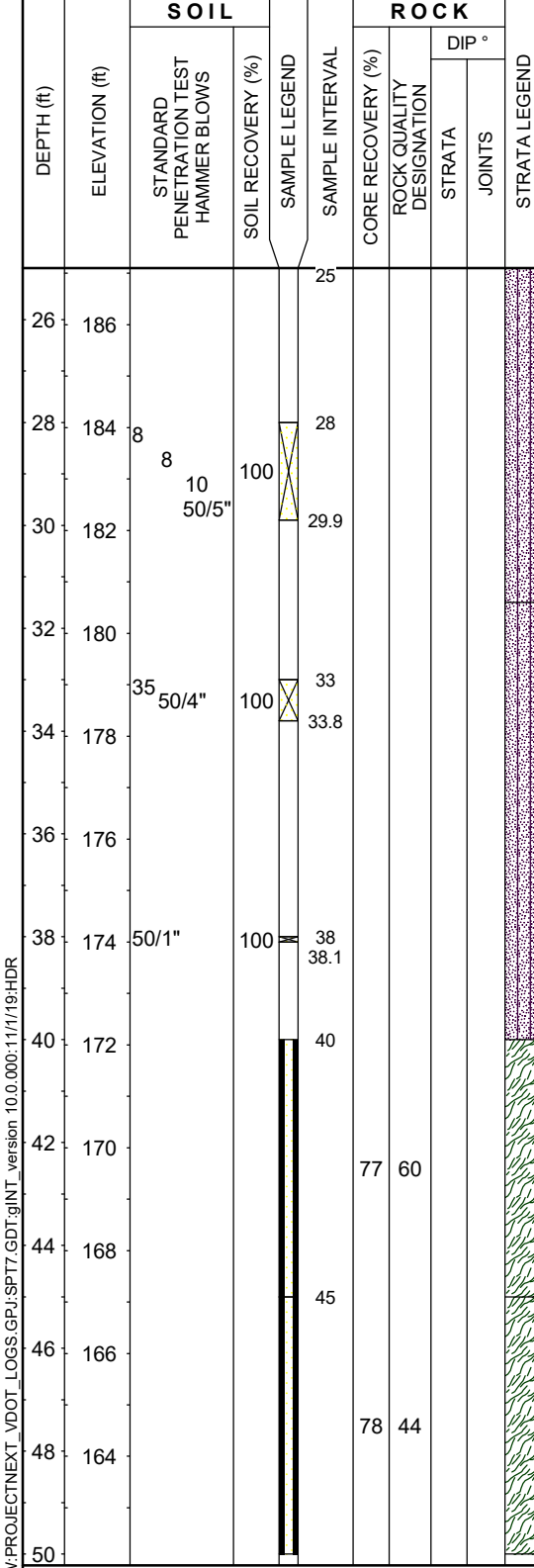
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Dark brown, light gray and black, mottled, fine to coarse SILTY SAND WITH GRAVEL, contains mica and quartz fragments, medium dense, moist, (SM)

31.5 / 180.6

lgn, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains quartz fragments, very dense, moist, (SM)

40.0 / 172.1
 Moderately to highly weathered, moderately hard to hard, light brown to light gray-red, SCHIST, highly to moderately fractured, joint angle at 5-45 degrees, foliation orientated at 45-60 degrees

45.0 / 167.1
 Moderately to highly weathered, moderately hard to hard, light brown to light gray-red, SCHIST, highly to moderately fractured, joint angle at 5-45 degrees, foliation orientated at 45-60 degrees

15.7

5.4

11.6

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19GWP-BR23

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE GWP-N2

19GWP-BR23

PAGE 3 OF 3

STATION: 698+76 OFFSET: 20 ft LT
 LATITUDE: 38.963180° N LONGITUDE: 77.184167° W
 SURFACE ELEVATION: 212.1 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/06/2019 - 05/07/2019 | Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| | | | | | | | | | | Auger refusal at 40.0 feet. Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings, hole plug and grout upon completion. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19GWP-BR23

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 19+35 OFFSET: 51 ft RT
 LATITUDE: 38.963033° N LONGITUDE: 77.186012° W
 SURFACE ELEVATION: 231.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--|------------------|----------------------|------------------------|--------|--------|
| PKT. PENETROMETER (tsf) | 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 | JOINTS |
| <p>Date(s) Drilled: 07/09/2019 - 07/09/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: N.Chew/Connelly & Associates, inc. Logger: Harsh Patel, HDR</p> | | | | | | | | | | <p style="text-align: center;">GROUND WATER</p> <p>NOT ENCOUNTERED DURING DRILLING NOT ENCOUNTERED DURING DRILLING</p> | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | LL | PI | | | | |
| 2.5 | 2 | 230 | 3 2 2 4 4 7 7 7 | 60 85 50 | | | | | | | | | | | |
| | 4 | 228 | | | | | | | | | | | | | |
| | 6 | 226 | | | | | | | | | | | | | |
| <p>0.0 / 231.5 3.0" Topsoil</p> <p>0.3 / 231.2 <i>Fill</i>, Brown, SILT WITH SAND, contains mica and wood fragments, firm, moist, (ML)</p> <p>2.0 / 229.5 <i>Residual</i>, Red-brown, SILT WITH SAND, contains mica and friable weathered rock fragments, stiff, moist, (ML)</p> <p>4.0 / 227.5 <i>Residual</i>, Light brown, fine to coarse SILTY SAND, contains mica and friable weathered rock fragments, medium dense, moist, (SM)</p> <p style="text-align: center;">Bottom of borehole at 6.0 feet. Boring backfilled with auger cuttings, spider plug, aggregate and grout upon completion.</p> | | | | | | | | | | 33 | 5 | 18.3 | 18.8 | 9.3 | 37.5 |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GWP-P02

PAGE 1 OF 1

STATION: 24+86
 LATITUDE: 38.963687° N
 SURFACE ELEVATION: 207.2 ft
 OFFSET: 57 ft RT
 LONGITUDE: 77.186724° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| | | WOH | | | | | | | 0.0 / 207.2 | | | | |
| | 206 | 3 | 100 | | | | | 5.0" Topsoil | | | 21.0 | | |
| 2 | | 4 | | | 2 | | | 0.4 / 206.8 | | | | | |
| | 204 | 3 | 85 | | | | | <i>Residual</i> , Red-brown, fine to coarse CLAYEY SAND, contains mica, loose, moist, (SC) | 35 | 11 | 10.6 | 40.4 | |
| 4 | | 4 | | | 4 | | | <i>Residual</i> , Red-brown, fine to coarse CLAYEY SAND, loose, moist, (SC) | | | | | |
| | 202 | 5 | 100 | | | | | <i>Residual</i> , Red-brown, fine to coarse CLAYEY SAND, medium dense, moist, (SC) | | | 10.7 | | |
| 6 | | 11 | | | | | | | | | | | |
| | | 15 | | | 6 | | | | | | | | |
| Bottom of borehole at 6.0 feet. Boring backfilled with auger cuttings, spider plug, aggregate and grout upon completion. Bulk sample collected from 2.0 to 6.0 feet bgs. | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GWP-P02

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GWP-P03

PAGE 1 OF 1

STATION: 29+11 OFFSET: 59 ft RT
 LATITUDE: 38.964177° N LONGITUDE: 77.185639° W
 SURFACE ELEVATION: 214.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---|------------------------------|-------------------------------|---|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/20/2019 - 06/21/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: N.Chew/Connelly & Associates, inc. | Logger: Austin Morgan, HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 214 | 6 | | | | 1 | | | | 0.0 / 214.5 | | | | | | | | | |
| | 7 | | | | | | | | 5.0" Asphalt | | | | | | | | | |
| 212 | 7 | | | | | | | | 0.4 / 214.1 | | | | | | | | | |
| | 9 | | | | | | | | 3.0" Cement Treated Aggregate | | | | | | | 11.0 | | |
| 210 | 3 | | | | 3 | | | | 0.8 / 213.7 | | | | | | | | | |
| | 4 | | | | | | | | Fill, Brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains fragments of cement treated aggregate, medium dense, moist, (SC) | | | | | 34 | 11 | 19.2 | 41.5 | |
| | 6 | | | | 5 | | | | Fill, Brown, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC) | | | | | | | 18.2 | | |
| 208 | 6 | | | | 5 | | | | | | | | | | | | | |
| | 7 | | | | 7 | | | | | | | | | | | 18.3 | | |
| | 8 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 7.0 feet. Boring backfilled with auger cuttings, spider plug, aggregate and grout upon completion. Bulk sample collected from 1.0 to 7.0 feet bgs. | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GWP-P03

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 29+77 OFFSET: 39 ft RT
 LATITUDE: 38.964149° N LONGITUDE: 77.184706° W
 SURFACE ELEVATION: 219.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | 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 | | | | | |
| <p>Date(s) Drilled: 06/05/2019 - 06/05/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: N.Chew/Connelly & Associates, inc. Logger: Harsh Patel, HDR</p> | | | | | | | | | | | <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | |
| 3.5 | | 218 | 7 | | 0.7 | | | | | | | | | |
| 2 | | 218 | 8 | | 0.7 | | | | | | | | | |
| | | | 12 | | 2.7 | | | | | | | | | |
| | | 216 | 11 | | 2.7 | | | | | | | | | |
| 4 | | 216 | 17 | | 2.7 | | | | | | | | | |
| | | | 13 | | 4.7 | | | | | | | | | |
| 1.5 | | | 17 | | 4.7 | | | | | | | | | |
| | | 214 | 23 | | 4.7 | | | | | | | | | |
| 6 | | | 21 | | 6.7 | | | | | | | | | |
| | | | 23 | | 6.7 | | | | | | | | | |
| <p>0.0 / 219.6 8.5" Concrete</p> <p>0.7 / 218.9 <i>Residual</i>, Brown and red, mottled, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)</p> <p><i>Residual</i>, Brown and white, mottled, SANDY LEAN CLAY, contains mica, hard, moist, (CL)</p> <p><i>Residual</i>, Brown and white, mottled, SANDY LEAN CLAY, contains mica, very hard, moist, (CL)</p> <p>Bottom of borehole at 6.7 feet. Boring backfilled with auger cuttings, hole plug, aggregate, and concrete upon completion.</p> | | | | | | | | | | | 35 | 13 | 16.0 | 52.0 |
| | | | | | | | | | | | | | 7.6 | |
| | | | | | | | | | | | | | 8.0 | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 2.4 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GWP-P05

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STATION: 24+07
 LATITUDE: 38.963435° N
 SURFACE ELEVATION: 231.6 ft
 OFFSET: 98 ft LT
 LONGITUDE: 77.181776° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|--|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/04/2019 - 06/04/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: E.Pozas/Connelly & Associates, inc. | Logger: Jacob Moorman, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| 0.0 | 231.6 | | | | 0.8 | | | | | 0.0 / 231.6 | | | | | | | | | |
| 0.8 | 230.8 | | | | 2.8 | | | | | 9.0" Concrete | | | | | | | | | |
| 0.8 | 230.8 | | | | 4.8 | | | | | 0.8 / 230.8 | | | | | | | 23.2 | | |
| 0.8 | 230.8 | | | | 6.8 | | | | | Fill, Light-brown to yellow-orange, fine to coarse CLAYEY SAND, medium dense, moist, (SC) | | | | | | | 12.8 | 42.0 | |
| 4.8 | 226.8 | | | | | | | | | 4.8 / 226.8 | | | | | | | 14.4 | | |
| 4.8 | 226.8 | | | | | | | | | Residual, Light-brown, fine to coarse CLAYEY SAND, dense, moist, (SC) | | | | | | | | | |
| 6.8 | | | | | | | | | | Bottom of borehole at 6.8 feet. Boring backfilled with auger cuttings, hole plug, and grout upon completion. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4 feet

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19GWP-P05

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 20+59 OFFSET: 19 ft LT
 LATITUDE: 38.963087° N LONGITUDE: 77.182979° W
 SURFACE ELEVATION: 220.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|--------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | | | | JOINTS |
| <p>Date(s) Drilled: 06/27/2019 - 06/27/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: N.Chew/Connelly & Associates, inc. Logger: Amanda Thomason/HDR</p> | | | | | | | | | | | | | | |
| <p align="center">GROUND WATER</p> <p>NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | | | | | | |
| <p align="center">FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | |
| 1.8 | 220 | 3 | 5 | 90 | 0.8 | | | | | | | | | |
| 2 | | | 8 | | | | | | | | | | | |
| 1 | 218 | 3 | 4 | 6 | 2.8 | | | | | | | | | |
| 4 | | | 3 | 100 | | | | | | | | | | |
| 1.3 | 216 | 5 | 7 | 65 | 4.8 | | | | | | | | | |
| 6 | | | 8 | | | | | | | | | | | |
| | 214 | | 8 | | 6.8 | | | | | | | | | |
| <p>0.0 / 220.8 9.5" Concrete 0.8 / 220.0 <i>Residual</i>, Gray-brown, SILT, Contains mica., very stiff, moist, (ML) <i>Residual</i>, Orange-brown, SILT, contains mica and relict rock texture, stiff, moist, (ML) <i>Residual</i>, Orange-brown, SILT, contains mica, rock fragments, and relict rock texture, very stiff, moist, (ML) Bottom of borehole at 6.8 feet. Boring backfilled with auger cuttings, hole plug, aggregate, and concrete upon completion.</p> | | | | | | | | | | | | | 21.4 | |
| | | | | | | | | | | | | | | 38.1 |
| | | | | | | | | | | | | | | 10.5 |

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GWP-P07

PAGE 1 OF 1

STATION: 25+24
 LATITUDE: 38.963974° N
 SURFACE ELEVATION: 217.0 ft
 OFFSET: 14 ft RT
 LONGITUDE: 77.186866° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| | 216 | | | | | | | 0.0 / 217.0 15.5" Asphalt | | | | | |
| 2 | | | | | | | | 1.3 / 215.7 7.0" Concrete | | | | | |
| 4 | 214 | 9 | 45 | | 2.5 | | | 1.8 / 215.2 8.0" Aggregate Subbase | | | 14.5 | | |
| 6 | 212 | 5 | 85 | | 4.5 | | | 2.5 / 214.5 <i>Residual</i> , Brown and white, mottled, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL) | 35 | 14 | 19.2 | 60.9 | |
| 8 | 210 | 10 | 80 | | 6.5 | | | | | | 18.0 | | |
| | | 11 | | | 8.5 | | | | | | 13.6 | | |
| | | 10 | | | | | | | Bottom of borehole at 8.5 feet. Boring backfilled with benotinite and hole plug upon completion. Bulk sample collected from 2.5 to 6.5 feet bgs. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 1

19GWP-P07

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 36+49 OFFSET: 19 ft RT
 LATITUDE: 38.962000° N LONGITUDE: 77.188144° W
 SURFACE ELEVATION: 232.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--|---------------------------------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/06/2019 - 06/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: E.Pozas/Connelly & Associates, inc. | Logger: Kohltan Heiter, EIT/HDR | 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 |
| 1.5 | 2 | 232 | 13 | 13 | 8 | 50 | 0.5 | | | | | | | | | | | | | | |
| | 4 | 230 | 3 | 2 | 3 | 90 | 2.5 | | | | | | | | | | 43 | 11 | 25.7 | 57.6 | |
| | 6 | 228 | 9 | 3 | 3 | 100 | 4.5 | | | | | | | | | | | | 22.6 | | |
| | | | | | | | 6.5 | | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA 0.0 / 232.8 6.0" Asphalt 0.5 / 232.3 6.0" Aggregate Subbase 1.0 / 231.8 Fill, Brown, SANDY SILT, very stiff, moist, (ML) Fill, Red-brown, SANDY SILT, firm, moist, (ML) 4.5 / 228.3 Residual, Red-brown, SANDY SILT, firm, moist, (ML) | | | | | | | | | | | LL | PI | | | | | | | | | |
| Bottom of borehole at 6.5 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | | | | | | | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19GWP-P09

PAGE 1 OF 1

STATION: 43+21
 LATITUDE: 38.963688° N
 SURFACE ELEVATION: 211.8 ft
 OFFSET: 64 ft RT
 LONGITUDE: 77.180322° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|--|--|------------------------------|-------------------------------|---|-----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/23/2019 - 06/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: N.Chew/Connelly & Associates, inc. | Logger: Amanda Thomason/HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 2 | 210.6 | 9 | 95 | | | | | 0.0 / 211.8 | | | | | | | | | | |
| | | 12 | | | | | | 8.0" Asphalt | | | | | | | | | | |
| 4 | 208.10 | 15 | 65 | | | | | 0.7 / 211.1 | | | | | | | | | | |
| | | 30 | | | | | | 10.0" Aggregate Subbase | | | | | | | | | | |
| | | 34 | | | | | | 1.5 / 210.3 | | | | | | | | 11.1 | | |
| 6 | 206.13 | 34 | 100 | | | | | Fill, Brown, SANDY SILT, very stiff, moist, (ML) | | | | | | | | | | |
| | | 32 | | | | | | Fill, Brown, SANDY SILT, hard, moist, (ML) | | | | | | NP | NP | 10.8 | 54.1 | |
| | | 36 | | | | | | Fill, Brown, SANDY SILT, very hard, moist, (ML) | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 12.4 | | |
| | | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3.6 feet

PAGE 1 OF 1

19GWP-P09



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 20

19GWP-RW01

PAGE 1 OF 2

STATION: 10+88
 LATITUDE: 38.960996° N
 SURFACE ELEVATION: 249.1 ft
 OFFSET: 5 ft RT
 LONGITUDE: 77.189450° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/28/2019 - 05/28/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 248 | 5 | 9 | 75 | | | | | |
| 246 | 13 | 15 | 100 | | | | | |
| 244 | 8 | 10 | 111 | | | | | |
| 242 | 11 | 12 | 100 | | | | | |
| 240 | 3 | 6 | 60 | | | | | |
| 238 | | | | | | | | |
| 236 | 6 | 15 | 65 | | | | | |
| 234 | 22 | 26 | | | | | | |
| 232 | | | | | | | | |
| 230 | 6 | 18 | 60 | | | | | |
| 228 | 17 | 16 | | | | | | |
| 226 | 35 | 50/4" | 100 | | | | | |
| 224 | | | 23.8 | | | | | |

| | | | |
|--|----|----|------|
| 0.0 / 249.1 | | | |
| 6.0" Asphalt | | | |
| 0.5 / 248.6 | | | |
| 9.0" Concrete | | | |
| 1.3 / 247.8 | | | |
| 5.0" Aggregate Subbase | 36 | 6 | 17.3 |
| 1.7 / 247.4 | | | |
| Fill, Tan and brown, SANDY SILT, very stiff, moist, (ML) | | | 18.9 |
| Fill, Brown and gray, SANDY SILT, very stiff, moist, (ML) | | | 24.8 |
| 6.0 / 243.1 | | | |
| Residual, Orange-tan, SANDY LEAN CLAY, very stiff, moist, (CL) | | | |
| Residual, Orange-tan, SANDY LEAN CLAY, stiff, moist, (CL) | 35 | 14 | 17.9 |
| 11.5 / 237.6 | | | |
| Residual, Brown, fine to coarse SILTY SAND, dense, moist, (SM) | | | 12.7 |
| 21.5 / 227.6 | | | |
| lgm, Brown, fine to coarse SILTY SAND, very dense, moist, (SM) | | | 7.3 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29 feet

PAGE 1 OF 2

19GWP-RW01

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 20

19GWP-RW02

PAGE 1 OF 3

STATION: 13+79
 LATITUDE: 38.961399° N
 SURFACE ELEVATION: 241.8 ft
 OFFSET: 0 ft
 LONGITUDE: 77.188565° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/23/2019 - 05/24/2019

LAB DATA

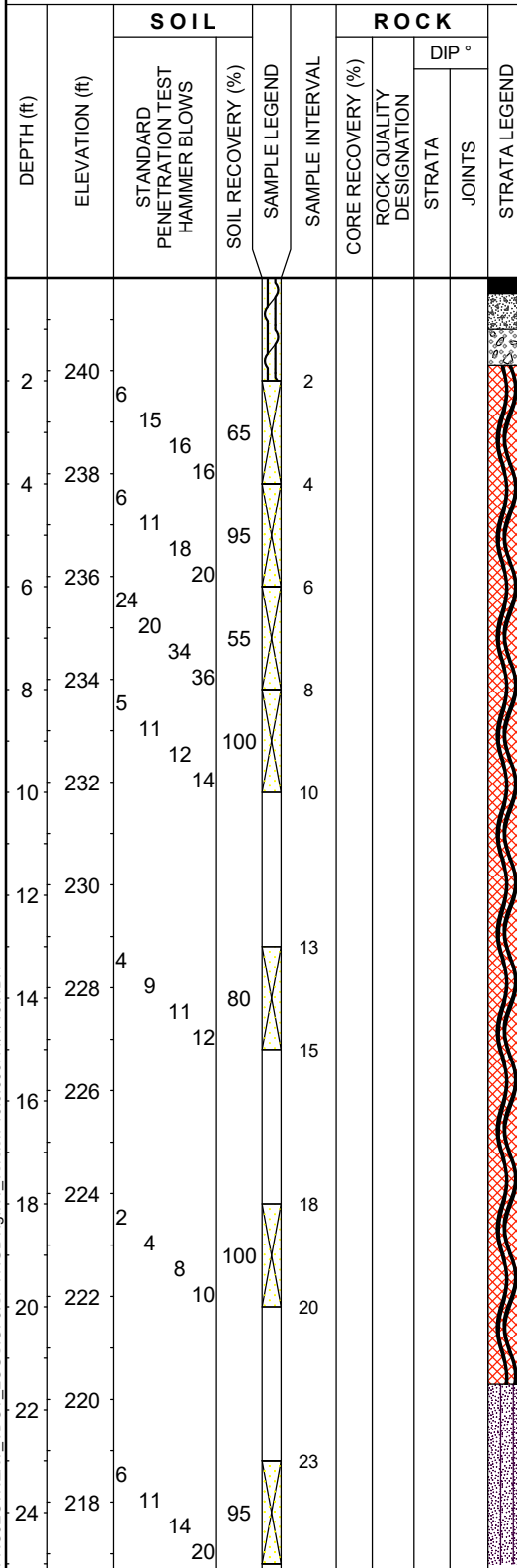
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 12.0 | |
| NP | NP | 10.7 | 26.0 |
| | | 12.3 | |
| | | 12.6 | |
| | | 15.6 | |
| | | 25.3 | |
| 33 | 4 | 16.7 | 44.5 |

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 241.8
 3.0" Asphalt
 0.3 / 241.5
 9.0" Concrete
 1.0 / 240.8
 8.0" Aggregate Subbase
 1.7 / 240.1
Fill, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, dense, moist, (SM)
Fill, Brown with black, fine to coarse SILTY SAND WITH GRAVEL, contains mica, dense, moist, (SM)
Fill, Brown with black, fine to coarse SILTY SAND WITH GRAVEL, contains mica, very dense, moist, (SM)
Fill, Brown with black, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM)
 21.5 / 220.3
Residual, Brown and white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, dense, moist, (SM)



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

PAGE 1 OF 3

19GWP-RW02



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 20

19GWP-RW02

PAGE 2 OF 3

STATION: 13+79 OFFSET: 0 ft
 LATITUDE: 38.961399° N LONGITUDE: 77.188565° W
 SURFACE ELEVATION: 241.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 ° |
| 26 | 216 | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | |
| 28 | 214 | 9 | | | | | | FIELD DESCRIPTION OF STRATA <i>Residual</i> , Brown and white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, dense, moist, (SM) | | | | | | |
| 30 | 212 | 13 | 19 | 100 | | | | | | | | | | |
| 32 | 210 | | | | | | | | | | | | | |
| 34 | 208 | 50/5" | | 100 | | | | | | | | | | |
| 36 | 206 | | | | | | | | | | | | | |
| 38 | 204 | 50/5" | | 100 | | | | | | | | | | |
| 40 | 202 | | | | | | | | | | | | | |
| 42 | 200 | | | | | | | | | | | | | |
| 44 | 198 | 50/4" | | 100 | | | | | | | | | | |
| 46 | 196 | | | | | | | | | | | | | |
| 48 | 194 | 50/4" | | 100 | | | | | | | | | | |
| 50 | 192 | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

PAGE 2 OF 3

19GWP-RW02

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 20

19GWP-RW02

PAGE 3 OF 3

STATION: 13+79 OFFSET: 0 ft
 LATITUDE: 38.961399° N LONGITUDE: 77.188565° W
 SURFACE ELEVATION: 241.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| | | 50/2" | 100 | | 50 | | | | | | | | |
| | | | | | 50.2 | | | | | | | | |
| | | | | | | | | <p>GROUND WATER</p> <p>☒ FIRST ENCOUNTERED AT 43.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | |
| | | | | | | | | <p>FIELD DESCRIPTION OF STRATA</p> <p>LL PI</p> | | | | | |
| | | | | | | | | <p>1gm, Dark-brown and white, mottled, medium to coarse SILTY SAND, contains mica, very dense, wet, (SM)</p> <p>Bottom of borehole at 50.2 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion.</p> | | | | | |
| | | | | | | | | 18.2 | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

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19GWP-RW02

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 22

19GWP-RW03

PAGE 1 OF 3

STATION: 46+46
 LATITUDE: 38.964248° N
 SURFACE ELEVATION: 216.6 ft
 OFFSET: 9 ft RT
 LONGITUDE: 77.186444° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/06/2019 - 06/06/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 216 | 7 | | | | | | 1 |
| 214 | 7 | 75 | | | | | 3 |
| 212 | 3 | 100 | | | | | 5 |
| 210 | 6 | 100 | | | | | 7 |
| 208 | 5 | 100 | | | | | 9 |
| 206 | 7 | 85 | | | | | 11 |
| 204 | 3 | 95 | | | | | 13 |
| 202 | 6 | 7 | | | | | 15 |
| 200 | | | | | | | |
| 198 | 4 | 100 | | | | | 18 |
| 196 | 6 | 7 | | | | | 20 |
| 194 | 6 | 75 | | | | | 23 |
| 192 | 8 | | | | | | |

0.0 / 216.6
 2.0" Asphalt

0.2 / 216.4
 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM)

Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM)

9.0 / 207.6
 Fill, Brown, SANDY SILT, stiff, moist, (ML)

Fill, Brown, SANDY SILT, very stiff, moist, (ML)

Fill, Brown, SANDY SILT, very stiff, moist, (ML)

| | | | |
|----|---|------|------|
| | | 19.1 | |
| | | 17.5 | |
| 32 | 5 | 13.5 | 39.1 |
| | | 17.1 | |
| | | 14.7 | |
| | | 20.8 | |
| | | 18.0 | |
| 35 | 5 | 20.5 | 50.2 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 46 feet

PAGE 1 OF 3

19GWP-RW03

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 22

19GWP-RW03

PAGE 2 OF 3

STATION: 46+46
 LATITUDE: 38.964248° N
 SURFACE ELEVATION: 216.6 ft
 OFFSET: 9 ft RT
 LONGITUDE: 77.186444° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/06/2019 - 06/06/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | 190 | | | | | | | | Fill, Brown, SANDY SILT, very stiff, moist, (ML) | | | | |
| 28 | 188 | 3 | | | | | | | | | | 22.7 | |
| 30 | 186 | 6 | 7 | 100 | | | | | | | | | |
| 32 | 184 | 4 | | | | | | | Fill, Brown and dark-gray, SANDY SILT, very stiff, moist, (ML) | | | | |
| 34 | 182 | 6 | 7 | 90 | | | | | | | | 21.2 | |
| 36 | 180 | | | | | | | | | | | | |
| 38 | 178 | 6 | 8 | | | | | | Residual, Dark-gray, SANDY SILT, stiff, moist, (ML) | | | | |
| 40 | 176 | 8 | 8 | 50 | | | | | | | | 18.1 | |
| 42 | 174 | 2 | | | | | | | 41.5 / 175.1 | | | | |
| 44 | 172 | 2 | 7 | 100 | | | | | Residual, Orange-brown, SANDY SILT, stiff, moist, (ML) | | | | |
| 46 | 170 | | | | | | | | | | | 5.7 | |
| 48 | 168 | 4 | 5 | | | | | | | | | | |
| 50 | 166 | 6 | 6 | 100 | | | | | | 38 | 11 | 25.6 | 50.7 |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 46 feet

PAGE 2 OF 3

19GWP-RW03



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 22

19GWP-RW03

PAGE 3 OF 3

STATION: 46+46 OFFSET: 9 ft RT
 LATITUDE: 38.964248° N LONGITUDE: 77.186444° W
 SURFACE ELEVATION: 216.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|---|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | |
| GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings, hole plug, and concrete upon completion. | | | | | | | | LL | PI | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 46 feet

PAGE 3 OF 3

19GWP-RW03

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 23/24

19GWP-RW04

PAGE 1 OF 3

STATION: 43+59 OFFSET: 10 ft RT
 LATITUDE: 38.963786° N LONGITUDE: 77.187224° W
 SURFACE ELEVATION: 218.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/06/2019 - 06/06/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 0.0 | 218.8 | 14 | 60 | | | | 0.5 |
| 2 | 216 | 8 | 8 | | | | 2.5 |
| 4 | 214 | 6 | 8 | | | | 4.5 |
| 6 | 212 | 5 | 8 | | | | 6.5 |
| 8 | 210 | 5 | 8 | | | | 8.5 |
| 10 | 208 | 7 | 8 | | | | 10.5 |
| 12 | 206 | 2 | 90 | | | | 13 |
| 14 | 204 | 6 | 7 | | | | 15 |
| 16 | 202 | | | | | | |
| 18 | 200 | 4 | 4 | | | | 18 |
| 20 | 198 | 4 | 5 | | | | 20 |
| 22 | 196 | 4 | 4 | | | | 23 |
| 24 | 194 | 6 | 7 | | | | 23 |

0.0 / 218.8
 5.0" Asphalt
 0.4 / 218.4
 3.0" Aggregate Subbase
 0.7 / 218.1
Residual, Brown, fine to coarse SILTY SAND, contains quartz pocket from 1.0 to 1.2 ft bgs, medium dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica and quartz fragments, medium dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)
 19.5 / 199.3
Residual, Gray-brown, LEAN CLAY, contains mica, stiff, moist, (CL)
 21.5 / 197.3
Residual, Orange-brown, SANDY SILT, contains mica, stiff, moist, (ML)

| | | | |
|----|---|------|------|
| | | 10.1 | |
| | | 18.1 | |
| | | 14.3 | |
| | | 18.5 | |
| 33 | 3 | 15.7 | 48.1 |
| | | 16.3 | |
| | | 22.3 | |
| | | 15.2 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 1 OF 3

19GWP-RW04

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 23/24

19GWP-RW04

PAGE 2 OF 3

STATION: 43+59
 LATITUDE: 38.963786° N
 SURFACE ELEVATION: 218.8 ft
 OFFSET: 10 ft RT
 LONGITUDE: 77.187224° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/06/2019 - 06/06/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Kohltan Heiter, EIT/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | | | | | |
| 26 | 192 | | | | | | | | | | | | |
| 28 | 190 | 4 | 90 | 28 | | | | | <i>Residual, Brown, SANDY SILT, contains mica, stiff, moist, (ML)</i> | | | 16.6 | |
| 30 | 188 | 5 | 90 | 30 | | | | | | | | | |
| 32 | 186 | 6 | 90 | 33 | | | | | <i>Residual, Brown, SANDY SILT, contains mica, hard, moist, (ML)</i> | | | 13.8 | |
| 34 | 184 | 8 | 90 | 35 | | | | | | | | | |
| 36 | 182 | | | | | | | | | | | | |
| 38 | 180 | 7 | 90 | 38 | | | | | <i>Residual, Brown and white, SANDY SILT, contains mica, very stiff, moist, (ML)</i> | | | 15.7 | |
| 40 | 178 | 9 | 90 | 40 | | | | | | | | | |
| 42 | 176 | 13 | 90 | 43 | | | | | | | | | |
| 44 | 174 | 19 | 100 | 45 | | | | | <i>Residual, Brown and white, SANDY SILT, contains mica, hard, moist, (ML)</i> | 33 | 2 | 14.3 | 65.5 |
| 46 | 172 | | | | | | | | 46.5 / 172.3 | | | | |
| 48 | 170 | 26 | 100 | 48 | | | | | <i>lgm, Brown and white, SANDY SILT, contains mica, very hard, moist, (ML)</i> | | | 13.1 | |
| | | 50/5" | | 48.9 | | | | | Bottom of borehole at 48.9 feet. Boring backfilled with auger cuttings, hole plug, and | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:igINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 2 OF 3

19GWP-RW04



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 23/24

19GWP-RW04

PAGE 3 OF 3

STATION: 43+59 OFFSET: 10 ft RT
 LATITUDE: 38.963786° N LONGITUDE: 77.187224° W
 SURFACE ELEVATION: 218.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--|---------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/06/2019 - 06/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: E.Pozas/Connelly & Associates, inc. | Logger: Kohltan Heiter, EIT/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| | | | | | | | | | | concrete upon completion. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 28 feet

PAGE 3 OF 3

19GWP-RW04

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 22+08 OFFSET: 64 ft LT
 LATITUDE: 38.962935° N LONGITUDE: 77.186995° W
 SURFACE ELEVATION: 227.4 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/02/2019 - 07/02/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 52.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 226 | 4 | 50 | | | | | |
| 1.25 | 2 | 224 | 3 | 75 | | | | | |
| 1.5 | 4 | 222 | 3 | 60 | | | | | |
| 1.5 | 6 | 220 | 2 | 85 | | | | | |
| 2.25 | 8 | 218 | 3 | 100 | | | | | |
| | 10 | 216 | | | | | | | |
| 1.5 | 14 | 212 | 4 | 100 | | | | | |
| | 16 | 210 | | | | | | | |
| 1.5 | 18 | 208 | 2 | 100 | | | | | |
| | 20 | 206 | | | | | | | |
| | 22 | 204 | 3 | 100 | | | | | |
| 1.75 | 24 | | 3 | 100 | | | | | |

0.0 / 227.4
Fill, Brown, fine to coarse SILTY SAND WITH GRAVEL, contains root fragments, medium dense, moist, (SM)
 4.0 / 223.4
Fill, Brown, fine to coarse SILTY SAND WITH GRAVEL, contains root fragments, loose, moist, (SM)
 4.0 / 223.4
Fill, Brown, SILT WITH SAND, firm, moist, (ML)
 Residual, Brown, SILT, firm, moist, (ML)
 Residual, Brown, SILT, stiff, moist, (ML)

| | | | |
|----|---|------|------|
| | | | |
| 32 | 7 | 11.5 | 38.6 |
| | | 18.0 | |
| | | 20.5 | |
| | | 24.0 | |
| | | 17.8 | |
| | | 20.3 | |
| | | 19.8 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



STATION: 22+08 OFFSET: 64 ft LT
 LATITUDE: 38.962935° N LONGITUDE: 77.186995° W
 SURFACE ELEVATION: 227.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|---------------|--|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS | STRATA LEGEND | |
| | | 176 | | | | 50 | | | | | | | | | | | |
| | 52 | | | | | | | | | | | | | | | | |
| | | 174 | 20 | | | 53 | | | | | | | | | | | |
| | 54 | | 33 50/4" | 69 | X | 54.3 | | | | | | | | | | 23.3 | |
| GROUND WATER FIRST ENCOUNTERED AT 52.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | LL | PI | | | | | |
| 51.5 / 175.9 | | | | | | | | | | | | | | | | | |
| <i>lgm</i> , Tan, SILT WITH SAND, contains mica, very hard, moist, (ML) | | | | | | | | | | | | | | | | | |
| Bottom of borehole at 54.3 feet. Boring backfilled with auger cuttings upon completion. | | | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW06

PAGE 1 OF 2

STATION: 294+81
 LATITUDE: 38.962728° N
 SURFACE ELEVATION: 220.8 ft
 OFFSET: 18 ft LT
 LONGITUDE: 77.185833° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/30/2019 - 06/26/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 220 | | | | | | | 0.0 / 220.8 |
| 2 | 218 | 4 | 65 | | | | 5.0" Asphalt |
| | | 11 | | | | | 0.4 / 220.4 |
| 4 | 216 | 5 | 65 | | | | 10.0" Aggregate Subbase |
| | | 19 | | | | | 1.7 / 219.1 |
| 6 | 214 | 16 | 65 | | | | <i>Residual</i> , Brown, fine to medium SILTY SAND, dense, moist, (SM) |
| | | 24 | | | | | <i>Residual</i> , Brown, fine to medium SILTY SAND, dense, moist, (SM) |
| 8 | 212 | 19 | 90 | | | | <i>Residual</i> , Brown and white, fine to medium SILTY SAND, very dense, moist, (SM) |
| | | 27 | | | | | |
| 10 | 210 | 17 | 95 | | | | |
| | | 27 | | | | | |
| 12 | 208 | 50/5" | | | | | |
| | | | | | | | |
| 14 | 206 | 7 | 85 | | | | <i>Residual</i> , Light brown and white, mottled, fine to medium SILTY SAND, contains rock fragments, relict rock texture, and mica, very dense, moist, (SM) |
| | | 16 | | | | | |
| 16 | 204 | 26 | | | | | |
| | | 27 | | | | | |
| 18 | 202 | 14 | 89 | | | | <i>Residual</i> , Red-brown, light brown to white, mottled, fine to medium SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM) |
| | | 24 | | | | | |
| 20 | 200 | 44 | | | | | |
| | | 50/5" | | | | | |
| 22 | 198 | 19 | 71 | | | | |
| | | | | | | | |
| 24 | 196 | 35 | | | | | |
| | | 50/5" | | | | | |
| | | | | | | | |

| | | | |
|----|----|------|------|
| | | | |
| | | | |
| 35 | 10 | 11.1 | 42.0 |
| | | 9.6 | |
| | | 8.3 | |
| | | 10.2 | |
| | | 9.6 | |
| | | 8.1 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 44 feet

PAGE 1 OF 2

19GWP-RW06

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW06

PAGE 2 OF 2

STATION: 294+81
 LATITUDE: 38.962728° N
 SURFACE ELEVATION: 220.8 ft
 OFFSET: 18 ft LT
 LONGITUDE: 77.185833° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/30/2019 - 06/26/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 36 | 4 | 16.7 | 57.7 |
| | | 18.4 | |
| | | 11.6 | |
| 25 | 3 | 11.5 | 33.4 |
| | | 14.3 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 194 | | | | | | | |
| 28 | 192 | 12 | 95 | | 28 | | | |
| 30 | 190 | 17 | 30 | | 30 | | | |
| 32 | 188 | 7 | 90 | | 33 | | | |
| 34 | 186 | 16 | 25 | | 35 | | | |
| 36 | 184 | | | | | | | |
| 38 | 182 | 25 | 90 | | 38 | | | |
| 40 | 180 | 48 | 32 | | 40 | | | |
| 42 | 178 | 50/4" | 100 | | 43 | | | |
| 44 | 178 | 50/1" | 100 | | 43.3 | | | |
| | | | | | 44 | | | |
| | | | | | 44.1 | | | |

26.5 / 194.3

Residual, Brown, SANDY SILT, contains mica and relict rock texture, very hard, moist, (ML)

Residual, Brown and white, mottled, SANDY SILT, contains mica and relict rock texture, hard, wet, (ML)

36.5 / 184.3

Residual, Brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica and relict rock texture, very dense, wet, (SM)

41.5 / 179.3

lgm, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, very dense, wet, (SM)

Spoon refusal at 44.1 feet.
 Bottom of borehole at 44.1 feet.
 Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. Rig break down on 5/30/2019, boring offset 5 ft south and completed on 6/26/2019.

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 44 feet

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19GWP-RW06

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



STATION: OFFSET:
 LATITUDE: 38.962747° N LONGITUDE: 77.185840° W
 SURFACE ELEVATION: 220.66 ft COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

Date(s) Drilled: 06/26/2019 - 06/26/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Nathen Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | 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 |
| | | 220 | | | | | | | | | |
| | 2 | 218 | | | | | | | | | |
| | 4 | 216 | | | | | | | | | |
| | 6 | 214 | | | | | | | | | |
| | 8 | 212 | | | | | | | | | |
| | 10 | 210 | | | | | | | | | |
| | 12 | 208 | | | | | | | | | |
| 1.5 | 7 | 208 | | | | | | | | | |
| | 14 | 206 | 16 26 27 | 85 | | | | | | | |
| | 15 | 206 | | | | | | | | | |
| | 16 | 204 | | | | | | | | | |
| 1.5 | 18 | 202 | 14 24 | 89 | | | | | | | |
| | 20 | 200 | 44 50/5" | | | | | | | | |
| | 22 | 198 | | | | | | | | | |
| 1 | 19 | 198 | | | | | | | | | |
| | 24 | 196 | 35 50/5" | 71 | | | | | | | |
| | | 196 | | | | | | | | | |

0.0 / 220.66
 0.4 / 220.26

13.0 / 207.66
 (SM)
Residual, Light-brown and white, mottled, fine SILTY SAND, Contains rock fragments, relict rock structure, and mica., hard, moist, (SM)

Residual, Red-brown, light-brown to white, mottled, fine SILTY SAND, Contains mica and relict rock structure., very hard, moist, (SM)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGAW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/1/19:HDR



STATION: OFFSET:
 LATITUDE: 38.962747° N LONGITUDE: 77.185840° W
 SURFACE ELEVATION: 220.66 ft COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

Date(s) Drilled: 06/26/2019 - 06/26/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Nathen Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|--------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | JOINTS |
| 1 | 26 | 194 | | | | | | | | |
| | 28 | 192 | 12 | 95 | 28 | | | | | |
| | 30 | 190 | 17 | 36 | 30 | | | | | |
| | 32 | 188 | 30 | | 30 | | | | | |
| 0.8 | 34 | 186 | 7 | 90 | 33 | | | | | |
| | 36 | 184 | 16 | 25 | 35 | | | | | |
| | 38 | 182 | 18 | 90 | 38 | | | | | |
| 0.8 | 40 | 180 | 25 | 32 | 40 | | | | | |
| | 42 | 178 | 48 | | 43 | | | | | |
| 3.3 | 44 | 178 | 50/4" | 133 | 43.3 | | | | | |
| 3 | | | 50/1" | 100 | 44 | | | | | |
| | | | | | 44.1 | | | | | |

26.0 / 194.66 (ML)
 Residual, Brown, SILT, Contains mica and relict rock structure., very hard, moist, (ML)
 31.5 / 189.16 (SM)
 Residual, Brown and white, mottled, fine SILTY SAND, Contains mica and relict rock structure., hard, moist, (SM)
 41.5 / 179.16 (SC)
 Residual, Red-brown, fine CLAYEY SAND, Contains mica and relict rock structure., very hard, wet, (SC)
 Residual, Red-brown, fine CLAYEY SAND, Contains mica and relict rock structure., very hard, wet, (SC)
 Auger refusal

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW07

PAGE 1 OF 2

STATION: 297+77
 LATITUDE: 38.963124° N
 SURFACE ELEVATION: 214.3 ft
 OFFSET: 38 ft LT
 LONGITUDE: 77.184923° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/29/2019 - 05/29/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Mark Tilashalski, PE/S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 ° | |
| 214 | | | | | | | | |
| 2 | 212.4 | 4 | 75 | 2 | | | | |
| 4 | 210.2 | 4 | 75 | 4 | | | | |
| 6 | 208.7 | 7 | 100 | 6 | | | | |
| 8 | 206.4 | 4 | 75 | 8 | | | | |
| 10 | 204 | 6 | 75 | 10 | | | | |
| 12 | 202 | | | | | | | |
| 14 | 200 | 5 | 75 | 13 | | | | |
| 16 | 198 | | | | | | | |
| 18 | 196 | 4 | 80 | 18 | | | | |
| 20 | 194 | 6 | 75 | 20 | | | | |
| 22 | 192 | | | | | | | |
| 24 | 190 | 4 | 75 | 23 | | | | |

0.0 / 214.3
 6.0" Asphalt
 0.5 / 213.8
 5.0" Aggregate Subbase
 0.9 / 213.4
 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) 17.4
 Fill, Brown and tan, fine to coarse SILTY SAND, medium dense, moist, (SM) 13.9
 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) 17.7
 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) 13.9
 Fill, Brown and red, fine to coarse SILTY SAND, medium dense, moist, (SM) 16.5
 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) 35 7 15.9 46.9
 Fill, Brown, fine to coarse SILTY SAND, contains root fragments, medium dense, moist, (SM) 17.6

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29 feet

PAGE 1 OF 2

19GWP-RW07

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW07

PAGE 2 OF 2

STATION: 297+77
 LATITUDE: 38.963124° N
 SURFACE ELEVATION: 214.3 ft
 OFFSET: 38 ft LT
 LONGITUDE: 77.184923° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | 188 | | | | | | | | | | | | |
| 28 | 186 | 3 | | | | | | | Fill, Brown, fine to coarse SILTY SAND, loose, moist, (SM) | | | 19.2 | |
| 30 | 184 | 4 | 70 | | | | | | | | | | |
| 32 | 182 | | | | | | | | 31.5 / 182.8 | | | | |
| 34 | 180 | 40 | 100 | | | | | | Fill, Brown, SANDY SILT, very soft, moist, (ML) | 32 | 4 | 25.7 | 54.3 |
| 36 | 178 | | | | | | | | | | | | |
| 38 | 176 | 50/4" | 100 | | | | | | 36.5 / 177.8 | | | | |
| 38.8 | | | | | | | | | Igm, Brown, gray and white, fine to medium SILTY SAND, very dense, wet, (SM) | | | 14.1 | |
| 39.5 | | | | | | | | | Auger refusal at 39.5 feet. Bottom of borehole at 39.5 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29 feet

PAGE 2 OF 2

19GWP-RW07

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW08

PAGE 1 OF 2

STATION: 300+73
 LATITUDE: 38.963512° N
 SURFACE ELEVATION: 207.0 ft
 OFFSET: 53 ft LT
 LONGITUDE: 77.184013° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/30/2019 - 05/31/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 24.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 ° | |
| 206 | 6 | 6 | 100 | 1 | | | | |
| 204 | 6 | 6 | 100 | 3 | | | | |
| 202 | 4 | 5 | 80 | 5 | | | | |
| 200 | 4 | 7 | 100 | 7 | | | | |
| 198 | 6 | 10 | 100 | 9 | | | | |
| 196 | 10 | 17 | 100 | 11 | | | | |
| 194 | 20 | 24 | 100 | 14 | | | | |
| 192 | 30 | 30 | 100 | 16 | | | | |
| 190 | 35 | | | | | | | |
| 188 | 17 | 27 | 100 | 19 | | | | |
| 186 | 30 | 48 | 100 | 21 | | | | |
| 184 | 24 | 50/5" | 100 | 24 | | | | |
| 182 | | | | 24.4 | | | | |

0.0 / 207.0
 9.0" Asphalt
 0.8 / 206.2
 3.0" Aggregate Subbase
 1.0 / 206.0
Residual, Yellow-orange, LEAN CLAY WITH SAND, very stiff, moist, (CL)
 3.0 / 204.0
Residual, Yellow-orange, fine to coarse SILTY SAND, medium dense, moist, (SM)

Residual, Light brown, fine to coarse SILTY SAND, dense, moist, (SM)

Residual, Light brown, fine to coarse SILTY SAND, contains quartz fragments, dense, moist, (SM)

Residual, Light brown, white and dark brown, mottled, fine to medium SILTY SAND, very dense, moist, (SM)

 22.5 / 184.5
lgm, Light brown, white and dark brown, mottled, SANDY SILT, contains mica, very hard, wet, (ML)

| | | | |
|----|----|------|------|
| | | | |
| 40 | 15 | 19.7 | 73.8 |
| | | 13.2 | |
| | | 12.6 | |
| | | 12.9 | |
| | | 13.6 | |
| | | | |
| | | 14.9 | |
| | | | |
| | | 12.3 | |
| | | | |
| | | 9.9 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 33 feet

PAGE 1 OF 2

19GWP-RW08

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW08

PAGE 2 OF 2

STATION: 300+73
 LATITUDE: 38.963512° N
 SURFACE ELEVATION: 207.0 ft
 OFFSET: 53 ft LT
 LONGITUDE: 77.184013° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 26 | | | | | | | | | | | | | |
| 180 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 178 | 27 | 36 | 86 | 29 | | | | <i>lgm</i> , Light brown to yellow-orange, SANDY SILT, contains mica, very hard, wet, (ML) | 34 | 6 | 22.5 | 60.9 | |
| 30 | 50/5" | | | 30.4 | | | | | | | | | |
| 176 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 174 | | | | | | | | | | | | | |
| 34 | 34 | 50/5" | 100 | 34 | | | | <i>lgm</i> , Yellow-orange, white and dark brown, mottled, SANDY SILT, contains mica, very hard, wet, (ML) | | | 15.9 | | |
| 172 | | | | 34.9 | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 168 | 50/4" | | 100 | 39 | | | | | | | 20.2 | | |
| 40 | | | | 39.3 | | | | | | | | | |
| | | | | | | | | | Auger refusal at 40.0 feet. Bottom of borehole at 40.0 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. | | | | |

Date(s) Drilled: 05/30/2019 - 05/31/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 24.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

SPT_LOGBW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 33 feet

PAGE 2 OF 2

19GWP-RW08



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 21

19GWP-RW09

PAGE 2 OF 3

STATION: 18+59
 LATITUDE: 38.962109° N
 SURFACE ELEVATION: 228.7 ft
 OFFSET: 2 ft RT
 LONGITUDE: 77.186692° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/01/2019 - 05/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

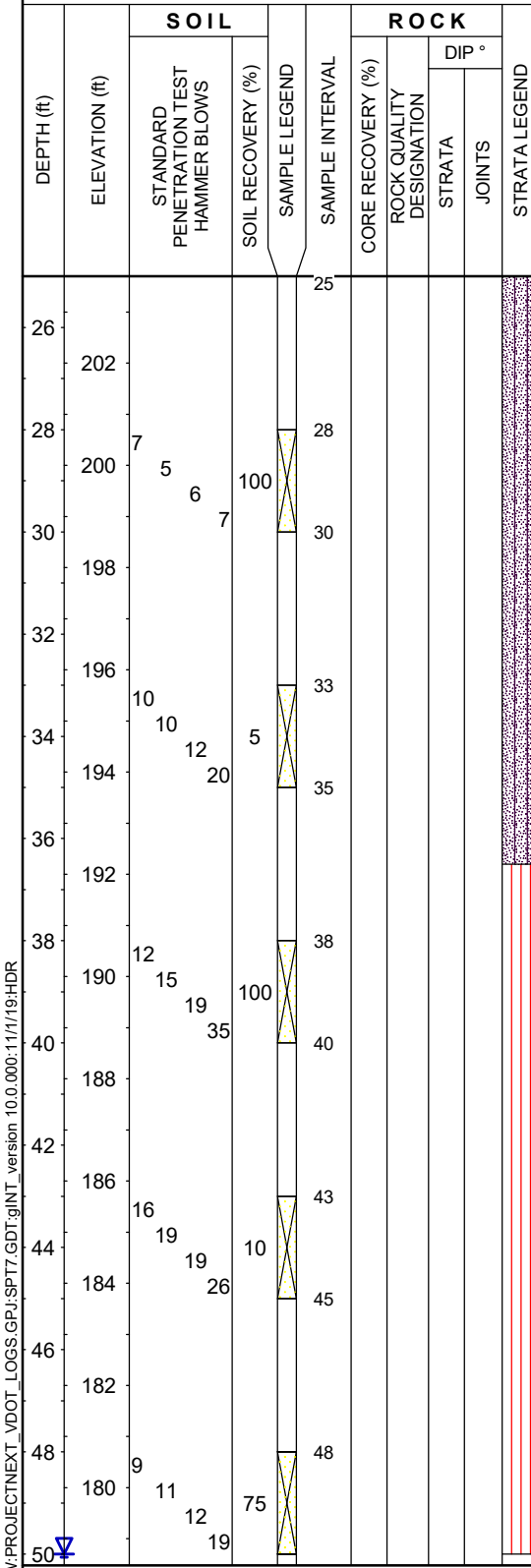
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |
| | | | |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 50.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Red-brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

17.7

36.5 / 192.2

Residual, Light brown to dark brown, SANDY SILT, hard, moist, (ML)

15.8

Residual, Dark brown, SANDY SILT, hard, moist, (ML)

14.8

Residual, Dark brown, SANDY SILT, contains mica, hard, moist, (ML)

32 4 17.7 53.2

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 38 feet

PAGE 2 OF 3

19GWP-RW09



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 21

19GWP-RW09

PAGE 3 OF 3

STATION: 18+59 OFFSET: 2 ft RT
 LATITUDE: 38.962109° N LONGITUDE: 77.186692° W
 SURFACE ELEVATION: 228.7 ft COORD. DATUM: NAD 83

| 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 | | | | |
| | | | | | 50 | | | | | | | | |
| <p>Date(s) Drilled: 05/01/2019 - 05/02/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: M.Fletcher/SaLUT inc. Logger: Jacob Moorman, HDR</p> <p>GROUND WATER ▽ FIRST ENCOUNTERED AT 50.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion.</p> | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 38 feet

PAGE 3 OF 3

19GWP-RW09

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW10

PAGE 1 OF 2

STATION: 21+62
 LATITUDE: 38.962526° N
 SURFACE ELEVATION: 222.7 ft

OFFSET: 32 ft LT
 LONGITUDE: 77.185733° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/01/2019 - 05/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

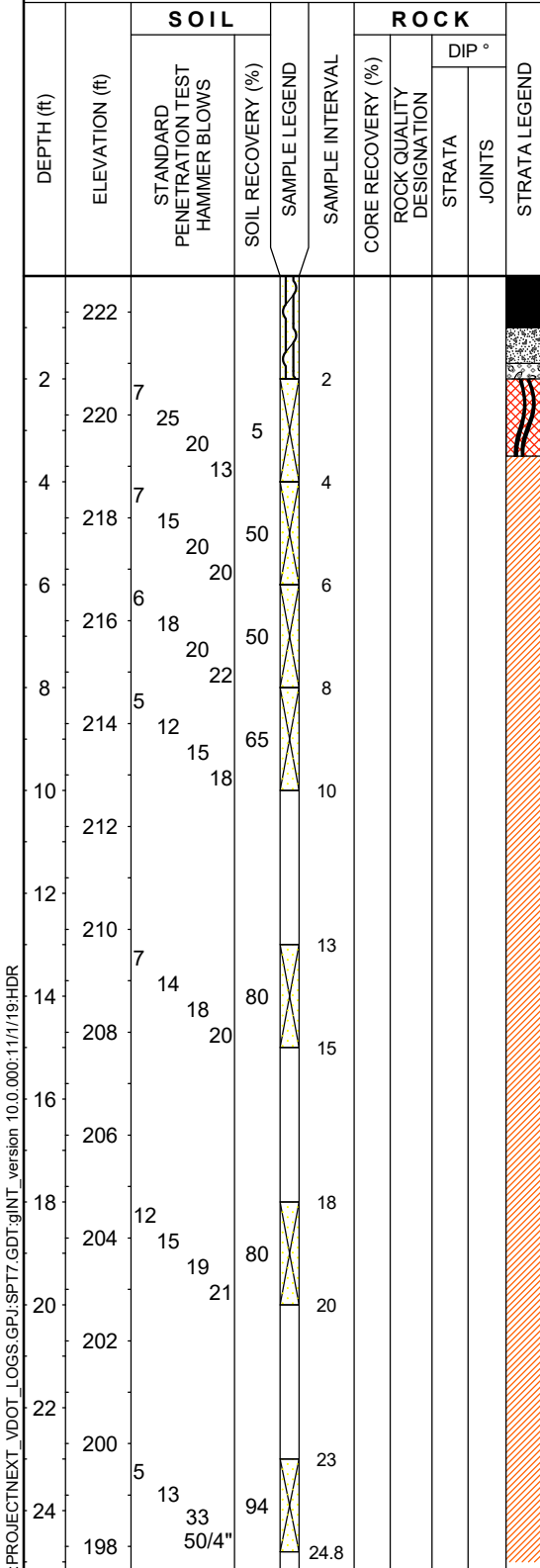
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 29 | 8 | 6.9 | 55.1 |
| | | 7.3 | |
| | | 10.2 | |
| | | 10.8 | |
| | | 12.2 | |
| | | 8.3 | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | ROCK | STRATA LEGEND |
|------------|----------------|------|------|--|
| 0.0 | 222.7 | | | 12.0" Asphalt |
| 1.0 | 221.7 | | | 8.0" Concrete |
| 1.7 | 221.0 | | | 4.0" Aggregate Subbase |
| 2.0 | 220.7 | | | Fill, Gray, fine to coarse SILTY GRAVEL WITH SAND, very dense, moist, (GM) |
| 3.5 | 219.2 | | | Residual, Light brown to tan, SANDY LEAN CLAY, hard, moist, (CL) |
| | | | | Residual, Tan, SANDY LEAN CLAY, hard, moist, (CL) |
| | | | | Residual, Brown, SANDY LEAN CLAY, contains mica, very hard, moist, (CL) |



SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37.4 feet

PAGE 1 OF 2

19GWP-RW10



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW10

PAGE 2 OF 2

STATION: 21+62
 LATITUDE: 38.962526° N
 SURFACE ELEVATION: 222.7 ft
 OFFSET: 32 ft LT
 LONGITUDE: 77.185733° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/01/2019 - 05/02/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 196 | | | | | | | |
| 28 | 194 | 28 50/4" | 100 | X | 28 28.8 | | | |
| 30 | 192 | | | | | | | |
| 32 | 190 | 30 50/5" | 100 | X | 33 33.9 | | | |
| 34 | 188 | | | | | | | |
| 36 | 186 | | | | | | | |
| 38 | 184 | 50/2" | 100 | X | 38 38.2 | | | |
| 40 | 182 | | | | | | | |
| 42 | 180 | 50/1" | 100 | X | 43 43.1 | | | |

26.5 / 196.2

Igm, Light brown, fine to coarse SILTY SAND, very dense, moist, (SM)

Igm, Light brown, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

Igm, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, very dense, moist, (SM)

| | | | |
|----|---|-----|------|
| | | | |
| | | 9.4 | |
| 31 | 6 | 9.8 | 48.6 |
| | | | |
| | | 6.1 | |
| | | | |
| | | | |
| | | 5.0 | |

Bottom of borehole at 43.1 feet.
 Boring backfilled with auger cuttings, hole plug and concrete upon completion.

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37.4 feet

PAGE 2 OF 2

19GWP-RW10



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW11

PAGE 1 OF 3

STATION: 696+77
 LATITUDE: 38.962926° N
 SURFACE ELEVATION: 216.3 ft
 OFFSET: 36 ft LT
 LONGITUDE: 77.184787° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/06/2019 - 05/07/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| 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 | | | | | | |
| 216 | | | | | | | | 0.0 / 216.3 13.0" Asphalt | | | | | |
| 214.7 | | 6 | 20 | | | | | 1.1 / 215.2 11.0" Concrete | | | | | |
| 212.4 | | 6 | 100 | | | | | 2.0 / 214.3 Fill, Gray, fine to coarse SILTY GRAVEL WITH SAND, medium dense, moist, (GM) | | | 8.8 | | |
| 210.3 | | 6 | 100 | | | | | 4.0 / 212.3 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 15.0 | | |
| 208.4 | | 8 | 85 | | | | | | | | 14.7 | | |
| 206 | | 9 | | | | | | | | | 12.3 | | |
| 204 | | 4 | | | | | | | | | | | |
| 202 | | 6 | 85 | | | | | Fill, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | 35 | 7 | 17.3 | 42.6 | |
| 200 | | 7 | | | | | | | | | | | |
| 198.4 | | 5 | 100 | | | | | Fill, Gray, fine to coarse SILTY SAND, contains root fragments, medium dense, moist, (SM) | | | 18.2 | | |
| 196 | | 7 | | | | | | | | | | | |
| 194 | | 5 | | | | | | | | | | | |
| 192 | | 6 | 90 | | | | | 23.5 / 192.8 Residual, Light brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 14.2 | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 47.1 feet

PAGE 1 OF 3

19GWP-RW11



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW11

PAGE 2 OF 3

STATION: 696+77
 LATITUDE: 38.962926° N
 SURFACE ELEVATION: 216.3 ft
 OFFSET: 36 ft LT
 LONGITUDE: 77.184787° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/06/2019 - 05/07/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

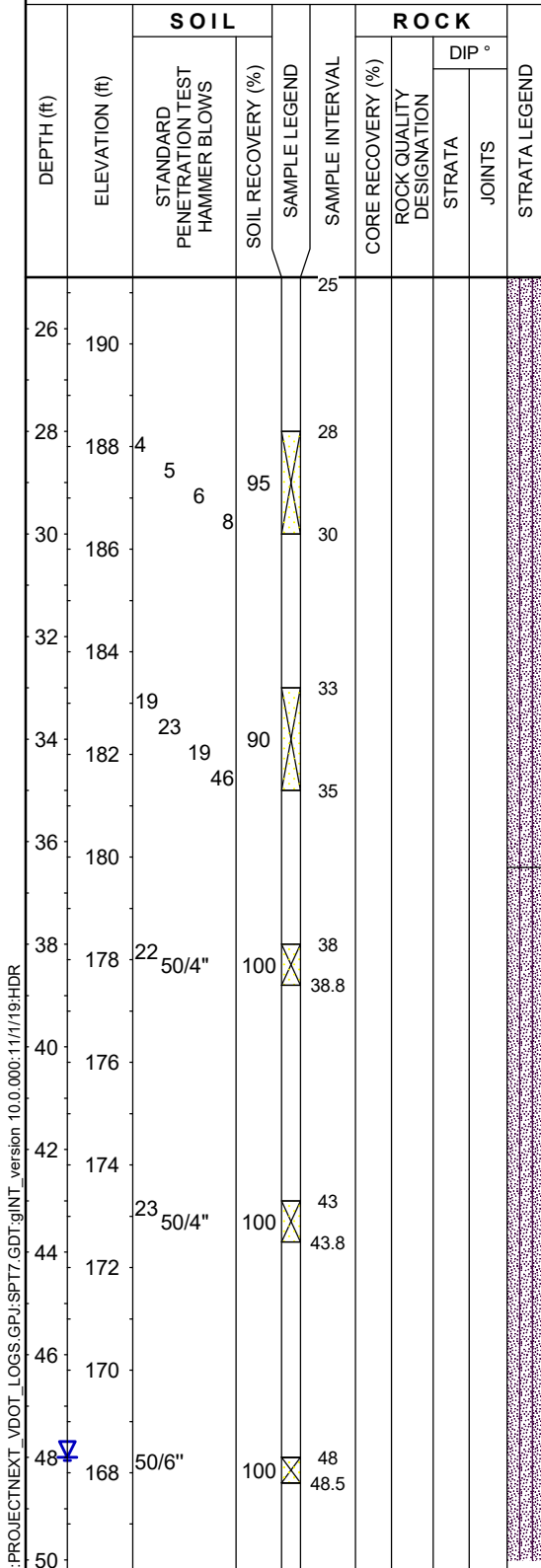
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Light brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

22.9

Residual, Light brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, very dense, moist, (SM)

8.3

36.5 / 179.8

lgm, Light brown, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

6.7

43

8.6

43.8

lgm, Light brown, fine to coarse SILTY SAND, very dense, wet, (SM)

28 5 12.4 43.4

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 47.1 feet

PAGE 2 OF 3

19GWP-RW11

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW11

PAGE 3 OF 3

STATION: 696+77 OFFSET: 36 ft LT
 LATITUDE: 38.962926° N LONGITUDE: 77.184787° W
 SURFACE ELEVATION: 216.3 ft COORD. DATUM: NAD 83

| 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 | | | | | JOINTS |
| 166 | 50/6" | 100 | 50 | 50.5 | | | | | | | | | | |
| <p>GROUND WATER</p> <p>☒ FIRST ENCOUNTERED AT 48.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p><i>lgm</i>, Light brown, fine to coarse SILTY SAND, very dense, wet, (SM)</p> <p>Bottom of borehole at 50.5 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion.</p> | | | | | | | | | | LL | PI | 11.9 | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 47.1 feet

PAGE 3 OF 3

19GWP-RW11

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 27

19GWP-RW12

PAGE 1 OF 2

STATION: 22+31
 LATITUDE: 38.963200° N
 SURFACE ELEVATION: 225.7 ft
 OFFSET: 30 ft LT
 LONGITUDE: 77.182388° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/29/2019 - 04/29/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 6 | 224 | 5 | 100 | | | | | |
| 2 | 224 | 28 | 88 | | 2 | | | |
| 4 | 222 | 8 | 92 | | 4 | | | |
| 6 | 220 | 50/4" | 100 | | 6 | | | |
| 8 | 218 | 50/5" | 100 | | 8 | | | |
| 10 | 216 | | | | | | | |
| 12 | 214 | | | | | | | |
| 14 | 212 | 10 | 100 | | 13 | | | |
| 16 | 210 | | | | | | | |
| 18 | 208 | 39 | 100 | | 18 | | | |
| 20 | 206 | | | | | | | |
| 22 | 204 | | | | | | | |
| 24 | 202 | 50/6" | 100 | | 23 | | | |

0.0 / 225.7
Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

2.0 / 223.7
Igm, Brown, GRAVELLY SILT WITH SAND, contains mica, very hard, moist, (ML)

Igm, Brown, SILT WITH SAND, contains mica and relict rock texture, very hard, moist, (ML)

5.3 / 220.0
 6.3 / 219.0

8.4 / 217.5

13 / 212.5
 15 / 211.5
Igm, Brown and black, SANDY SILT, contains mica and relict rock texture, hard, moist, (ML)

18.9 / 207.0
Igm, Brown and black, SILT WITH SAND, contains mica and relict rock texture, very hard, moist, (ML)

21.5 / 204.2

23 / 202.5
 24 / 201.5
Igm, Gray and brown, fine to coarse SILTY, CLAYEY SAND, very dense, wet, (SC-SM)

| | | | |
|----|---|------|------|
| | | 9.6 | 33.9 |
| | | 4.3 | |
| | | 5.4 | |
| | | 5.4 | |
| | | 6.0 | |
| 29 | 5 | 10.3 | 58.3 |
| | | 8.7 | |
| 29 | 7 | 11.9 | 34.1 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 27 feet

PAGE 1 OF 2

19GWP-RW12

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 27

19GWP-RW12

PAGE 2 OF 2

STATION: 22+31
 LATITUDE: 38.963200° N
 SURFACE ELEVATION: 225.7 ft
 OFFSET: 30 ft LT
 LONGITUDE: 77.182388° W
 COORD. DATUM: NAD 83

| 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 | | | | | JOINTS |
| 26 | 200 | | | | | | | | | | | | | |
| 28 | 198 | 50/6" | 100 | X | 28 28.5 | | | | | | | | 6.3 | |
| <p>Date(s) Drilled: 04/29/2019 - 04/29/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: N.Chew/Connelly & Associates, inc. Logger: Joe Wallen, PE/HDR</p> <p>GROUND WATER FIRST ENCOUNTERED AT 23.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>26.0 / 199.7</p> <p>1gm, Gray and brown, fine to coarse SILTY SAND, very dense, wet, (SM)</p> <p>Bottom of borehole at 28.5 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 27 feet

PAGE 2 OF 2

19GWP-RW12



STATION: 58+43 OFFSET: 66 ft RT
 LATITUDE: 38.963432° N LONGITUDE: 77.182476° W
 SURFACE ELEVATION: 227.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/15/2019 - 07/15/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|--------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| | | 1 | | | | | | | | |
| | | 226 | 3 | 60 | | | | | | |
| 3 | 2 | 224 | 3 | 5 | 2 | | | | | |
| | | 224 | 3 | 100 | | | | | | |
| 1.5 | 4 | 222 | 3 | 6 | 4 | | | | | |
| | | 222 | 4 | 90 | | | | | | |
| 1 | 6 | 220 | 3 | 5 | 6 | | | | | |
| | | 220 | 4 | 70 | | | | | | |
| 0.8 | 8 | 218 | 4 | 6 | 8 | | | | | |
| | | 218 | 5 | 100 | | | | | | |
| | | 216 | | 7 | 10 | | | | | |
| | | 216 | | | | | | | | |
| 1.3 | 12 | 214 | 4 | | 13 | | | | | |
| | | 214 | 6 | 100 | | | | | | |
| | | 212 | 11 | 15 | 15 | | | | | |
| | | 212 | | | | | | | | |
| | | 210 | | | | | | | | |
| 1.5 | 18 | 208 | 10 | 100 | 18 | | | | | |
| | | 208 | 24 | | | | | | | |
| | | 206 | 35 | 100 | 20 | | | | | |
| | | 206 | 45 | | | | | | | |
| | | 204 | | | | | | | | |
| 2.8 | 22 | 204 | 24 | 100 | 23 | | | | | |
| | | 204 | 35 | | | | | | | |
| | | 204 | 50/5" | 100 | 24.4 | | | | | |

0.0 / 227.3
 6.0" Topsoil
 0.5 / 226.8
 Fill, Red-brown, SILT WITH SAND, contains mica, firm, moist, (ML) 16.6
 18.9
 Fill, Gray and black, SANDY SILT, contains mica, stiff, moist, (ML) 28 5 16.3 59.8
 Fill, Brown, mottled, SANDY SILT, contains mica and quartz fragments, stiff, moist, (ML) 14.7
 Fill, Brown, gray and black, mottled, SANDY SILT, contains mica, stiff, moist, (ML) 14.1
 16.5 / 210.8
 Residual, Brown, white and gray, mottled, SANDY SILT, contains mica, very hard, moist, (ML) 11.2
 Residual, Brown, white and gray, mottled, SANDY SILT, contains mica, very hard, moist, (ML) 32 4 12.5 58.1

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)



STATION: 58+43 OFFSET: 66 ft RT
 LATITUDE: 38.963432° N LONGITUDE: 77.182476° W
 SURFACE ELEVATION: 227.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/15/2019 - 07/15/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 1 | 26 | 202 | | | | | | | |
| | 28 | 200 | 26 50/4" | 100 | 28 28.8 | | | | |
| 1.8 | 30 | 198 | | | | | | | |
| | 32 | 196 | | | | | | | |
| | 34 | 194 | 49 50/2" | 100 | 33 33.7 | | | | |
| | 36 | 192 | | | | | | | |
| | 38 | 190 | 50/4" | 100 | 38 38.3 | | | | |
| | 40 | 188 | | | | | | | |
| | 42 | 186 | | | | | | | |
| | 44 | 184 | 50/4" | 100 | 43 43.3 | | | | |
| | 46 | 182 | | | | | | | |
| | 48 | 180 | 50/4" | 100 | 48 48.3 | | | | |
| | 50 | 178 | | | | | | | |

26.5 / 200.8

Igm, Brown, white and gray, mottled, SANDY SILT, contains mica and quartz fragments, very hard, moist, (ML)

Igm, Brown and white, mottled, SANDY SILT, contains mica and quartz fragments, very hard, moist, (ML)

Igm, Brown and white, mottled, SANDY SILT, contains mica and quartz fragments, very hard, wet, (ML)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GWP-RW13a

PAGE 1 OF 3

STATION: OFFSET:
 LATITUDE: 38.963680° N LONGITUDE: 77.182282° W
 SURFACE ELEVATION: 227.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/15/2019 - 07/15/2019

LAB DATA

Drilling Method(s): NQ2
 SPT Method:
 Other Test(s): Not Applicable
 Driller: Edgar Pozos/Connelly & Associates, inc.
 Logger: Haleigh Schilling, GETS

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

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 | DIP ° | | STRATA |
| 2 | 226 | | | | | | | | | |
| 4 | 224 | | | | | | | | | |
| 6 | 222 | | | | | | | | | |
| 8 | 220 | | | | | | | | | |
| 10 | 218 | | | | | | | | | |
| 12 | 216 | | | | | | | | | |
| 14 | 214 | | | | | | | | | |
| 16 | 212 | | | | | | | | | |
| 18 | 210 | | | | | | | | | |
| 20 | 208 | | | | | | | | | |
| 22 | 206 | | | | | | | | | |
| 24 | 204 | | | | | | | | | |

REMARKS: Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19GWP-RW13a

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GWP-RW13a

PAGE 2 OF 3

STATION: OFFSET:
 LATITUDE: 38.963680° N LONGITUDE: 77.182282° W
 SURFACE ELEVATION: 227.68 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/15/2019 - 07/15/2019

LAB DATA

Drilling Method(s): NQ2
 SPT Method:
 Other Test(s): Not Applicable
 Driller: Edgar Pozos/Connelly & Associates, inc.
 Logger: Haleigh Schilling, GETS

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER

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 | DIP ° | | STRATA |
| 26 | 202 | | | | | | | | | |
| 28 | 200 | | | | | | | | | |
| 30 | 198 | | | | | | | | | |
| 32 | 196 | | | | | | | | | |
| 34 | 194 | | | | | | | | | |
| 36 | 192 | | | | | | | | | |
| 38 | 190 | | | | | | | | | |
| 40 | 188 | | | | | | | | | |
| 42 | 186 | | | | | | | | | |
| 44 | 184 | | | | | | | | | |
| 46 | 182 | | | | | | | | | |
| 48 | 180 | | | | | | | | | |
| 50 | 178 | | | | | | | | | |

REMARKS: Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19GWP-RW13a

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE:

19GWP-RW13a

PAGE 3 OF 3

STATION: OFFSET:
 LATITUDE: 38.963680° N LONGITUDE: 77.182282° W
 SURFACE ELEVATION: 227.68 ft COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 07/15/2019 - 07/15/2019 | Drilling Method(s): NQ2 | SPT Method: | Other Test(s): Not Applicable | Driller: Edgar Pozos/Connelly & Associates, inc. | Logger: Haleigh Schilling, GETS | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|--|-------------------------------|--|---------------------------------|--------------|------------------|----------------------|---|--------|--------|--|--|--|--|--|--|--|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | | | | | | | DIP ° | STRATA | JOINTS | | | | | | | |
| 52 | 176 | | | | | | | | <p align="center">GROUND WATER</p> <p align="center">FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | | | | | | | | |
| 54 | 174 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 172 | | | 56 | | | | | | | | | | | | | 56.0 / 171.68 | Decomposed to moderately weathered, soft to moderately hard, thinly bedded, brown and gray and white, SCHIST, moderately to intensely fractured, quartz, fracture angle 0 to 70 degrees | | | | | | | | | |
| 58 | 170 | | | | | 85 | 63 | | | | | | | | | | | | | | | | | | | | |
| 60 | 168 | | | | | 60 | | | | 60.0 / 167.68 | Moderately weathered to unweathered, moderately hard to very hard, thinly bedded, brown and gray and white, SCHIST, moderately fractured, quartz veins, fracture angle 0 to 60 degrees | | | | | | | | | | | | | | | | |
| 62 | 166 | | | | | 80 | 62 | | | | | | | | | | | | | | | | | | | | |
| 64 | 164 | | | | | | | | | 65.0 / 162.68 | Unweathered, very hard, thinnly bedded, gray and white, SCHIST, moderately fractured, quartz veins, fracture angle 45 to 50 degrees. | | | | | | | | | | | | | | | | |
| 66 | 162 | | | | | 100 | 90 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 67 | | | | Bottom of borehole at 67.0 feet. Boring backfilled with ----- | | | | | | | | | | | | | | | | | |

SPT_LOG:W:\PROJECT\NEXT_VDOT_LOGS.GP\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19GWP-RW13a



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW14

PAGE 1 OF 2

STATION: 307+06
 LATITUDE: 38.964035° N
 SURFACE ELEVATION: 207.8 ft
 OFFSET: 137 ft RT
 LONGITUDE: 77.181742° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/01/2019 - 07/01/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: Earl/Connelly & Associates, inc.
 Logger: Kohltan Heiter, EIT/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 FIRST ENCOUNTERED AT 35.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 2 | 206 | 4 | 60 | | | | | |
| 6 | 204 | 7 | 70 | | | | | |
| 10 | 202 | 8 | 90 | | | | | |
| 14 | 200 | 14 | 40 | | | | | |
| 18 | 198 | 28 | 100 | | | | | |
| 22 | 196 | | | | | | | |
| 26 | 194 | 31 | 90 | | | | | |
| 30 | 192 | 27 | 100 | | | | | |
| 34 | 190 | 11 | 100 | | | | | |
| 38 | 188 | 15 | 100 | | | | | |
| 42 | 186 | 40 | 100 | | | | | |
| 46 | 184 | 31 | 100 | | | | | |
| 50 | 184 | 50/4" | 100 | | | | | |

0.0 / 207.8
Residual, Brown and white, SANDY SILT, contains mica and relict rock texture, stiff, moist, (ML)
Residual, Brown and white, SANDY SILT, contains quartz fragments, very stiff, moist, (ML)
Residual, Light-brown and white, SANDY SILT, hard, moist, (ML)
Residual, Light-brown, white and black, SANDY SILT, very hard, moist, (ML)
Residual, Light-brown, white and black, SANDY SILT, very hard, moist, (ML)
Residual, Light-brown, white and black, SANDY SILT, contains relict rock texture, very hard, moist, (ML)
Residual, White, black and brown, SANDY SILT, contains relict rock texture, very hard, moist, (ML)

| | | | |
|----|---|------|------|
| | | | |
| | | 11.7 | |
| | | 10.3 | |
| | | 8.9 | |
| | | 9.4 | |
| | | 7.2 | |
| 34 | 9 | 10.3 | 58.6 |
| | | 16.3 | |
| | | 17.4 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 36 feet

PAGE 1 OF 2

19GWP-RW14

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW14

PAGE 2 OF 2

STATION: 307+06 OFFSET: 137 ft RT
 LATITUDE: 38.964035° N LONGITUDE: 77.181742° W
 SURFACE ELEVATION: 207.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|---------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 07/01/2019 - 07/01/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: Earl/Connelly & Associates, inc. | Logger: Kohltan Heiter, EIT/HDR | 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 | | | | | | | | | | | |
| 26 | 182 | | | | | | | | | | | | | | | | | | |
| 28 | 180 | 22 44 50/2" | 100 | 28 29.2 | | | | | | | | | | | | | | 10.6 | |
| 30 | 178 | | | | | | | | | | | | | | | | | | |
| 32 | 176 | | | | | | | | | | | | | | | | | | |
| 34 | 174 | 31 50/5" | 100 | 33 33.9 | | | | | | | | | | | | | | 11.4 | |
| 36 | 172 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | <p>31.5 / 176.3</p> <p><i>Residual</i>, White, black and brown, SANDY SILT, contains relict rock texture, very hard, moist, (ML)</p> <p><i>lgm</i>, White, black and brown, SANDY SILT, contains relict rock texture, very hard, moist, (ML)</p> <p>Auger refusal at 36.0 feet. Bottom of borehole at 36.0 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | LL | PI | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 36 feet

PAGE 2 OF 2

19GWP-RW14

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW15

PAGE 1 OF 2

STATION: 45+64
 LATITUDE: 38.964369° N
 SURFACE ELEVATION: 189.6 ft
 OFFSET: 223 ft LT
 LONGITUDE: 77.181256° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/29/2019 - 04/29/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 2 | 189.6 | 5 | 85 | | | | | |
| 5 | 188.8 | 5 | 7 | | | | | |
| 7 | 188.1 | 7 | 100 | | | | | |
| 11 | 186.7 | 11 | 14 | | | | | |
| 14 | 186.2 | 2 | 6 | | | | | |
| 6 | 184.6 | 8 | 85 | | | | | |
| 10 | 184.0 | 10 | 10 | | | | | |
| 8 | 182.8 | 11 | 100 | | | | | |
| 10 | 182.0 | 10 | 8 | | | | | |
| 2 | 180.6 | 2 | 6 | | | | | |
| 11 | 180.5 | 11 | 32 | | | | | |
| 10 | 180.0 | 11 | 80 | | | | | |
| 12 | 178.0 | | | | | | | |
| 14 | 176.0 | 31 | 50/5" | 100 | 13 | | | |
| 13.9 | 175.9 | | | | 13.9 | | | |
| 18 | 172.0 | 48 | 50/5" | 100 | 18 | | | |
| 18.9 | 171.9 | | | | 18.9 | | | |
| 23 | 168.0 | 16 | 50/6" | 100 | 23 | | | |
| 24 | 166.0 | 16 | 50/6" | 100 | 24 | | | |

0.0 / 189.6
 6.0" Topsoil
 0.5 / 189.1
Residual, Brown, SILT, contains mica, stiff, moist, (ML)
Residual, Brown, black and gray, SILT WITH GRAVEL, contains mica, very stiff, moist, (ML)

4.0 / 185.6
Residual, Brown and black, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

11.5 / 178.1
Igm, Brown, gray and black, fine to coarse SILTY SAND, contains mica and contains relict rock texture, very dense, moist, (SM)

Igm, Brown, gray and black, fine to coarse SILTY SAND, very dense, wet, (SM)

Igm, Brown, gray and black, fine to coarse SILTY SAND WITH GRAVEL, contains mica and contains relict rock texture, very dense, wet, (SM)

| | | | |
|----|---|------|------|
| | | 12.5 | |
| | | 14.0 | |
| 34 | 6 | 15.1 | 30.3 |
| | | 13.7 | |
| | | 16.1 | |
| | | 9.3 | |
| | | 8.7 | |
| | | 8.3 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37 feet

PAGE 1 OF 2

19GWP-RW15

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19GWP-RW15

PAGE 2 OF 2

STATION: 45+64
 LATITUDE: 38.964369° N
 SURFACE ELEVATION: 189.6 ft
 OFFSET: 223 ft LT
 LONGITUDE: 77.181256° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 26 | 164 | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 15.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | |
| 28 | 162 | 9 44 50/4" | 100 | 28 29.3 | | | | 1gm, Brown, gray and black, fine to medium SILTY SAND, contains mica and contains relict rock texture, dense, wet, (SM) | | 37 | 9 | 12.2 | 38.2 |
| 30 | 160 | | | | | | | | | | | | |
| 32 | 158 | | | | | | | | | | | | |
| 34 | 156 | 50/5" | 100 | 33 33.4 | | | | | | | 12.8 | | |
| 36 | 154 | | | | | | | | | | | | |
| 38 | 152 | 50/5" | 100 | 38 38.4 | | | | | | | | 13.0 | |
| Bottom of borehole at 38.4 feet. Boring backfilled with auger cuttings upon completion. | | | | | | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37 feet

PAGE 2 OF 2

19GWP-RW15



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 25

19GWP-RW16

PAGE 1 OF 2

STATION: 24+66
 LATITUDE: 38.963728° N
 SURFACE ELEVATION: 216.8 ft
 OFFSET: 11 ft LT
 LONGITUDE: 77.186967° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/20/2019 - 06/20/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | DIP ° | |
| 4 | 216 | 6 | 65 | | | | | |
| 6 | 214 | 6 | 75 | | | | | |
| 8 | 212 | 4 | 90 | | | | | |
| 10 | 210 | 6 | 75 | | | | | |
| 12 | 208 | 3 | 90 | | | | | |
| 14 | 206 | 5 | 90 | | | | | |
| 16 | 204 | 8 | 90 | | | | | |
| 18 | 202 | 10 | 90 | | | | | |
| 20 | 200 | 10 | 90 | | | | | |
| 22 | 198 | 10 | 65 | | | | | |
| 24 | 196 | 8 | 90 | | | | | |
| 26 | 194 | 9 | 90 | | | | | |
| 28 | 192 | 10 | 90 | | | | | |

0.0 / 216.8
 3.0" Topsoil

0.3 / 216.5
Fill, Light brown and white, mottled, fine to coarse SILTY SAND, contains organic matter, mica and quartz fragments, medium dense, moist, (SM)

Fill, Light brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Fill, Light brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

32 5 17.5 45.8

20.4

23.1

11.5 / 205.3

Residual, Red-brown, fine to medium SILTY SAND, contains mica, medium dense, moist, (SM)

12.5

12.5

Residual, Red-brown and white, mottled, fine to medium SILTY SAND, contains mica and trace gravel, medium dense, moist, (SM)

13.5

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37 feet

PAGE 1 OF 2

19GWP-RW16



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 25

19GWP-RW16

PAGE 2 OF 2

STATION: 24+66 OFFSET: 11 ft LT
 LATITUDE: 38.963728° N LONGITUDE: 77.186967° W
 SURFACE ELEVATION: 216.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/20/2019 - 06/20/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

| 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 190 | | | | | | | |
| 28 | 188 | 6 | 80 | X | 28 | | | |
| 30 | 186 | 9 | 22 | X | 30 | | | |
| 32 | 184 | 10 | | X | 33 | | | |
| 34 | 182 | 12 | 90 | X | 35 | | | |
| 36 | 180 | 13 | | X | | | | |
| 38 | 178 | 15 | 100 | X | 38 | | | |
| 40 | 176 | 24 | 50/5" | X | 39.4 | | | |
| 42 | 174 | 50/5" | 100 | X | 43 | | | |
| 44 | 172 | 50/1" | 100 | X | 43.4 | | | |
| | | | | | 45 | | | |
| | | | | | 45.1 | | | |

Residual, Brown and white, mottled, fine to medium SILTY SAND, contains mica, dense, moist, (SM)

NP NP 9.8 44.6

Residual, Brown, white and black, mottled, fine to medium SILTY SAND, contains mica, dense, moist, (SM)

12.7

Residual, Dark brown, fine to medium SILTY SAND, trace gravel, very dense, moist, (SM)

12.8

41.5 / 175.3

Igm, Brown, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

NP NP 8.3 45.9

Auger refusal at 45.1 feet.
 Bottom of borehole at 45.1 feet.
 Boring backfilled with auger cuttings upon completion.

9.6

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37 feet

PAGE 2 OF 2

19GWP-RW16

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_ version 10.0.000:11/11/19:HDR



STATION: 10+92 OFFSET: 60 ft RT
 LATITUDE: 38.959558° N LONGITUDE: 77.190596° W
 SURFACE ELEVATION: 268.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2019 - 05/10/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Harsh Patel, HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

FIELD DESCRIPTION OF STRATA

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 1.5 | | 268 | WOH/12" | | | | | | |
| | | | 1 | 55 | | | | | |
| | 2 | 266 | 1 | 35 | | | | | |
| | 4 | 264 | 1 | 50 | | | | | |
| | 6 | 262 | 3 | 100 | | | | | |
| | 8 | 260 | 3 | 100 | | | | | |
| 1 | 14 | 254 | 6 | 100 | | | | | |
| 2 | 18 | 250 | 1 | 100 | | | | | |
| | 20 | 248 | 3 | 100 | | | | | |
| | 22 | 246 | 2 | 100 | | | | | |
| | 24 | 244 | 3 | 100 | | | | | |

0.0 / 268.5
 3.0" Topsoil

0.25 / 268.25
 Fill, Brown, SANDY SILT, very soft, moist, (ML)
 Fill, Dark brown, SILT, contains root fragments, soft, moist, (ML)

Fill, Brown-red, SILT WITH SAND, stiff, moist, (ML)

6.0 / 262.5
 Residual, Brown-red, SILT, contains mica, firm, moist, (ML)

8.0 / 260.5
 Residual, Brown-red, ELASTIC SILT WITH SAND, contains mica, stiff, moist, (MH)

Residual, Brown-red, ELASTIC SILT WITH SAND, contains mica, stiff, moist, (MH)

Residual, Brown-red, ELASTIC SILT WITH SAND, contains mica, firm, moist, (MH)

21.5 / 247.0

Residual, Brown, black and green, mottled, SILT WITH SAND, contains mica, stiff, wet, (ML)

| | | | |
|----|----|------|------|
| | | | |
| | | 17.8 | |
| | | 27.5 | |
| 45 | 18 | 24.3 | 74.4 |
| | | 23.5 | |
| | | 36.6 | |
| 58 | 11 | 44.7 | 84.0 |
| | | 52.3 | |
| | | 42.4 | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 10+92 OFFSET: 60 ft RT
 LATITUDE: 38.959558° N LONGITUDE: 77.190596° W
 SURFACE ELEVATION: 268.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2019 - 05/10/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Harsh Patel, HDR

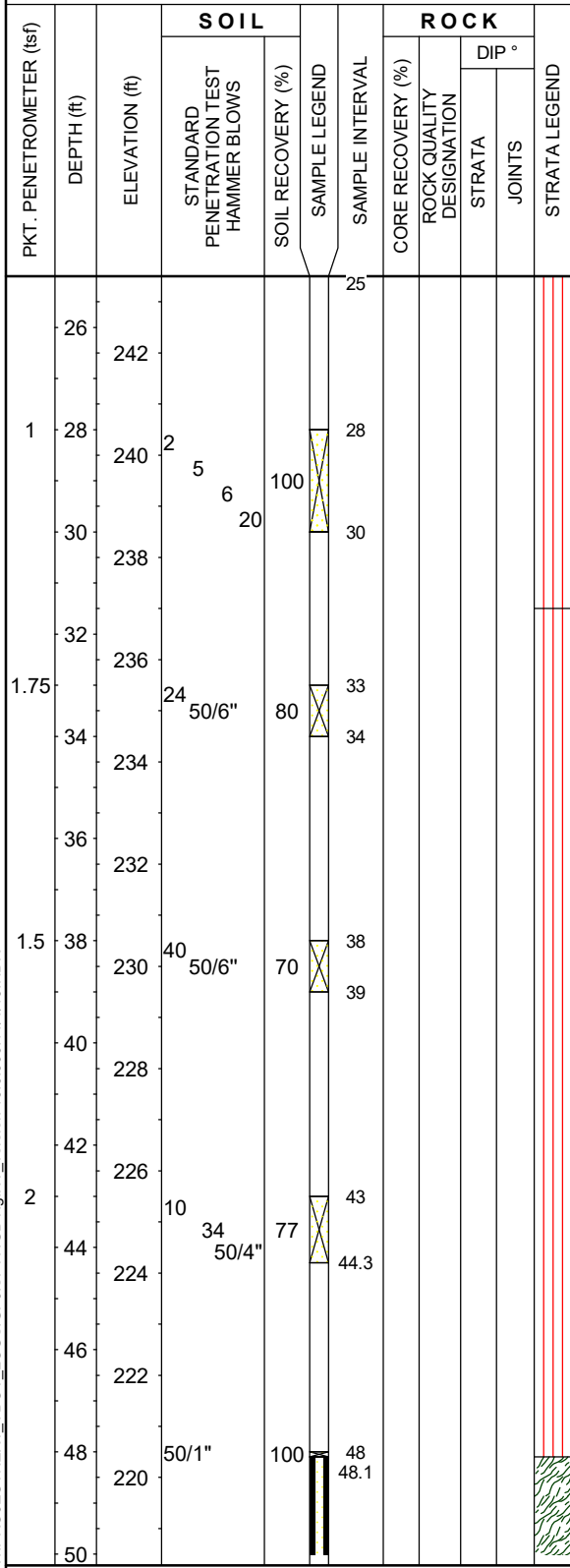
LAB DATA

GROUND WATER
 FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 45 | 8 | 44.2 | 76.3 |
| | | 16.2 | |
| | | 12.9 | |
| | | 22.2 | |
| | | 7.2 | |

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT (%) |
|----|----|----------------------|-------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |



25
26 242
28 240
30 238
32 236
34 234
36 232
38 230
40 228
42 226
44 224
46 222
48 220
50

1
2
1.75
1.5
2

5
6
20
24
40
10
34
50/4"

100
80
70
77
100

25
28
30
33
34
38
39
43
44.3
48
48.1

Residual, Brown, gray and white, mottled, SILT WITH SAND, contains mica, stiff, wet, (ML)

31.5 / 237.0

Igm, Brown and green, mottled, SILT, contains mica, very hard, wet, (ML)

Igm, Brown, SILT, contains mica and rock fragments, very hard, wet, (ML)

Igm, Brown and white, stratified, SANDY SILT, contains mica, very hard, moist, (ML)

Igm, Brown, SILT, contains mica and rock fragments, very hard, moist, (ML)
48.1 / 220.4
Moderately to highly weathered, moderately hard, thin

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 10+92 OFFSET: 60 ft RT
 LATITUDE: 38.959558° N LONGITUDE: 77.190596° W
 SURFACE ELEVATION: 268.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|---|--|------------------------------|-------------------------------|-------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | | STRATA LEGEND | Date(s) Drilled: 05/08/2019 - 05/10/2019 | Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Harsh Patel, HDR | 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 ° | | | | | | | | | | | |
| | | | | | | | | | | | GROUND WATER | | | | | | | | | |
| | | | | | | | | | | | FIRST ENCOUNTERED AT 23.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | | |
| | | | | | | | | | | | LL | PI | | | | | | | | |
| | 52 | 218 | | | | | 92 | 48 | | | | foliation, highly fractured, gray, green, and black SCHIST; fractures present at 60 to 80 degrees | | | | | | | | |
| | 54 | 216 | | | 53.1 | | | | | | | 53.1 / 215.4 Moderately weathered to decomposed, very soft to moderately hard, thin foliation, highly fractured, gray, green, and black SCHIST; fractures present at 10 to 60 degrees | | | | | | | | |
| | 56 | 214 | | | | 42 | 18 | | | | | 58.1 / 210.4 No recovery | | | | | | | | |
| | 62 | 206 | | | | | | | | | | 63.1 / 205.4 [63.1' - 64.6'] Highly weathered to decomposed, moderately hard, thin foliation, highly fractured, gray, green, and black SCHIST | | | | | | | | |
| | 66 | 202 | | | | | | 100 | 62 | | | [64.6' - 68.1'] Unweathered to slightly weathered, moderately hard to hard, thin foliation, slightly fractured, gray, green, and black SCHIST | | | | | | | | |
| | 68 | | | | 68.1 | | | | | | | Auger refusal at 48.1 feet. Bottom of borehole at 68.1 feet. Boring backfilled with auger cuttings upon completion. | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.2 feet



STATION: 14+37 OFFSET: 16 ft RT
 LATITUDE: 38.960308° N LONGITUDE: 77.191342° W
 SURFACE ELEVATION: 286.7 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/10/2019 - 07/10/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | SAMPLE INTERVAL | ROCK | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 1 | | 286 | 3 | 85 | | | | | |
| | | | 1 | | | | | | |
| | | | 1 | | | | | | |
| 2 | | 284 | 5 | 30 | 2 | | | | |
| | | | 8 | | | | | | |
| | | | 24 | | | | | | |
| 1.5 | | 282 | 3 | 90 | 4 | | | | |
| | | | 5 | | | | | | |
| | | | 5 | | | | | | |
| 1.75 | | 280 | 8 | 75 | 6 | | | | |
| | | | 8 | | | | | | |
| | | | 7 | | | | | | |
| 2.25 | | 278 | 4 | 85 | 8 | | | | |
| | | | 9 | | | | | | |
| | | | 11 | | | | | | |
| 10 | | 276 | 9 | | 10 | | | | |
| | | | | | | | | | |
| 12 | | 274 | 4 | | 13 | | | | |
| | | | 7 | | | | | | |
| 14 | | 272 | 7 | 20 | 15 | | | | |
| | | | 7 | | | | | | |
| | | | 8 | | | | | | |
| 16 | | 270 | | | | | | | |
| 18 | | 268 | 10 | 70 | 18 | | | | |
| | | | 11 | | | | | | |
| | | | 13 | | | | | | |
| 20 | | 266 | 15 | | 20 | | | | |
| | | | | | | | | | |
| 22 | | 264 | 19 | | 23 | | | | |
| | | | 29 | | | | | | |
| 24 | | 262 | 36 | 95 | | | | | |
| | | | 38 | | | | | | |

| | | | | |
|---|----|----|------|------|
| 0.0 / 286.7 | | | | |
| 4.0" Topsoil | | | | |
| 0.3 / 286.4 | | | | |
| Fill, Brown, SILT WITH SAND, contains mica, soft, moist, (ML) | | | 20.4 | |
| 2.0 / 284.7 | | | | |
| Fill, fine POORLY GRADED GRAVEL, dense, moist, (GP) | | | 4.8 | |
| 4.0 / 282.7 | | | | |
| Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | 15.6 | |
| 6.0 / 280.7 | | | | |
| Residual, Brown, SANDY SILT, contains mica and weathered rock fragments, very stiff, moist, (ML) | | | 12.3 | |
| Residual, Brown, gray and white, mottled, SANDY SILT, contains mica, very stiff, moist, (ML) | | | 12.7 | |
| Residual, Gray and brown, SANDY SILT, very stiff, moist, (ML) | 39 | 13 | 20.5 | 53.4 |
| Residual, Red, brown and gray, stratified, SANDY SILT, contains relict rock texture, rock fragments, and organic fragments, hard, moist, (ML) | | | 11.8 | |
| Residual, Red-brown, gray and white, stratified, SILT WITH SAND, contains rock fragments and relict rock texture, very hard, moist, (ML) | | | 11.2 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 21 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 24+75 OFFSET: 23 ft RT
 LATITUDE: 38.961906° N LONGITUDE: 77.188570° W
 SURFACE ELEVATION: 230.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--|--------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 07/12/2019 - 07/12/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: R.Carreno/Connelly & Associates, inc. | Logger: Harsh Patel, HDR | 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 | | | | | | | | | | | |
| | | 230 | | | | | | | | | GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| 1.25 | 2 | 228 | 3 | 4 | 70 | 1.5 | | | | | 0.0 / 230.4 3.5" Asphalt | | | | | | | | | |
| 1.75 | 4 | 226 | 3 | 2 | 90 | 3.5 | | | | | 0.3 / 230.1 12.0" Aggregate Subbase | | | | | | | | | |
| 1.25 | 6 | 224 | 3 | 2 | 70 | 5.5 | | | | | 1.5 / 228.9 <i>Residual</i> , Brown and white, mottled, SANDY SILT, contains mica, stiff, moist, (ML) <i>Residual</i> , Brown and white, mottled, SANDY SILT, contains mica, firm, moist, (ML) | | | | | 37 | 10 | 15.2 | 51.2 | |
| | | | 1 | 1 | | 7.5 | | | | | <i>Residual</i> , Brown and white, mottled, SANDY SILT, contains mica, soft, moist, (ML) | | | | | | | | | 14.5 |
| | | | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips, and grout upon completion. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.000:11/11/19:HDR



STATION: 18+41 OFFSET: 26 ft RT
 LATITUDE: 38.960937° N LONGITUDE: 77.190423° W
 SURFACE ELEVATION: 274.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| <p>Date(s) Drilled: 07/12/2019 - 07/12/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: R.Carreno/Connelly & Associates, inc. Logger: Harsh Patel, HDR</p> | | | | | | | | | | | <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | | |
| 3 | 2 | 274 | 6 | | | 1.5 | | | | | | | | | |
| | | | 7 | | | | | | | | | | | | |
| 3 | 4 | 272 | 11 | 95 | | 3.5 | | | | | | | 19.3 | | |
| | | | 10 | | | | | | | | | | | | |
| | | | 6 | 90 | | 5.5 | | | | | | | 37 | 9 | 12.0 |
| | | | 9 | | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | | |
| | | | 6 | 85 | | 7.5 | | | | | | | | | 13.1 |
| | | | 10 | | | | | | | | | | | | |
| | | 268 | 11 | | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | | |

0.0 / 274.9
 6.0" Asphalt
 0.5 / 274.4
 12.0" Aggregate Subbase
 1.5 / 273.4
Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML)
Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML)

Bottom of borehole at 7.5 feet.
 Boring backfilled with auger cuttings, hole plug, bentonite chips, and grout upon completion. Bulk sample collected from 1.5 to 5.5 feet bgs.

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.000:11/11/19:HDR



STATION: 20+61 OFFSET: 45 ft RT
 LATITUDE: 38.945674° N LONGITUDE: 77.203100° W
 SURFACE ELEVATION: 263.2 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/15/2019 - 05/16/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Nate Peterson, S&ME

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 262 | | | | | | | |
| 1 | 2 | | 2 | | | | | | |
| | | 260 | 2 | 100 | | | | | |
| 0.75 | 4 | | 3 | | | | | | |
| | | 258 | 1 | 100 | | | | | |
| 1.5 | 6 | | 2 | | | | | | |
| | | 256 | 3 | 100 | | | | | |
| 2 | 8 | | 4 | | | | | | |
| | | 254 | 1 | 100 | | | | | |
| 1.75 | 10 | | 2 | | | | | | |
| | | 252 | 3 | 100 | | | | | |
| 2 | 12 | | 4 | | | | | | |
| | | 250 | 2 | | | | | | |
| 14 | 14 | | 2 | 75 | | | | | |
| | | 248 | 3 | | | | | | |
| 16 | 16 | | 5 | | | | | | |
| | | 246 | | | | | | | |
| 1.5 | 18 | | 2 | | | | | | |
| | | 244 | 12 | 60 | | | | | |
| 20 | 20 | | 20 | | | | | | |
| | | 242 | 8 | | | | | | |
| 22 | 22 | | | | | | | | |
| 1.25 | 24 | | 2 | | | | | | |
| | | 240 | 1 | 90 | | | | | |
| 24 | 24 | | 2 | | | | | | |

0.0 / 263.2
 9.0" Asphalt
 0.8 / 262.4
 8.0" Aggregate Subbase
 1.4 / 261.8
 Fill, Brown, SANDY SILT, contains mica, firm, moist, (ML)
 Fill, Brown, SILT WITH SAND, firm, moist, (ML)
 Fill, Brown to yellow-brown, SILT WITH SAND, stiff, moist, (ML)
 Fill, Yellow-brown, SILT WITH SAND, firm, moist, (ML)
 Fill, Yellow-brown, SILT WITH SAND, stiff, moist, (ML)
 Fill, Yellow-brown, SILT WITH SAND, firm, moist, (ML)
 16.5 / 246.7
 Fill, Red, LEAN CLAY, contains quartz and asphalt fragments, hard, moist, (CL)
 Fill, Brown, LEAN CLAY, soft, moist, (CL)

| | | | |
|----|----|------|------|
| | | | |
| 40 | 13 | 21.8 | 66.8 |
| | | 22.7 | |
| | | 23.8 | |
| | | 21.6 | |
| | | 22.3 | |
| | | 20.9 | |
| | | 16.2 | |
| | | 31.4 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 36.4 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 20+61 OFFSET: 45 ft RT
 LATITUDE: 38.945674° N LONGITUDE: 77.203100° W
 SURFACE ELEVATION: 263.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | 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 | STRATA | | | | | |
| | 238 | | | | | | | | | | | | | |
| 1 | 26 | | | | | | | | | | | | | |
| | 236 | | | | | | | | | | | | | |
| | 28 | 1 | | | | | | | | | | | | |
| | 234 | 2 | 2 | 100 | | | | | | 29.0 / 234.2 | | | 27.7 | |
| | 30 | 3 | | | | | | | | <i>Alluvial</i> , Dark yellow-brown, LEAN CLAY WITH SAND, moist, (CL) | | | | |
| | 232 | | | | | | | | | | | | | |
| 1.5 | 32 | | | | | | | | | | | | | |
| | 230 | 1 | | | | | | | | | | | | |
| | 34 | 2 | 2 | 100 | | | | | | | | | | |
| | 228 | 4 | | | | | | | | | | | | |
| | 36 | | | | | | | | | | | | | |
| | 226 | | | | | | | | | 36.5 / 226.7 | | | | |
| | 38 | 8 | 12 | 30 | | | | | | | | | | |
| | 224 | 15 | 22 | | | | | | | | | | | |
| | 40 | | | | | | | | | | | | | |
| | 222 | | | | | | | | | | | | | |
| | 42 | | | | | | | | | 41.5 / 221.7 | | | | |
| 2 | 44 | 5 | 7 | 60 | | | | | | | | | | |
| | 220 | 11 | 16 | | | | | | | | | | | |
| | 46 | | | | | | | | | | | | | |
| | 218 | | | | | | | | | | | | | |
| | 48 | 13 | | | | | | | | | | | | |
| | 216 | 14 | | | | | | | | | | | | |
| 2 | 50 | 18 | 26 | 50 | | | | | | | | | | |
| | 214 | | | | | | | | | | | | 19.3 | |

Date(s) Drilled: 05/15/2019 - 05/16/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Nate Peterson, S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 36.4 feet



STATION: 24+90 OFFSET: 46 ft RT
 LATITUDE: 38.945268° N LONGITUDE: 77.201682° W
 SURFACE ELEVATION: 258.8 ft COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

Date(s) Drilled: 05/13/2019 - 05/15/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Nate Peterson, S&ME

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NOT ENCOUNTERED DURING DRILLING

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|--------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| | | 258 | | | | | | | | |
| 2 | | 256 | 2 | 70 | 2 | | | | | |
| 0.5 | | 254 | 2 | 60 | 3 | | | | | |
| 4 | | 252 | 2 | 65 | 4 | | | | | |
| 0.5 | | 250 | 1 | 85 | 5 | | | | | |
| 6 | | 248 | 2 | 100 | 6 | | | | | |
| 0.5 | | 246 | 2 | 100 | 7 | | | | | |
| 8 | | 244 | 3 | 100 | 8 | | | | | |
| 1 | | 242 | 3 | 100 | 9 | | | | | |
| 10 | | 240 | 4 | 100 | 10 | | | | | |
| 1.5 | | 238 | 5 | 100 | 11 | | | | | |
| 12 | | 236 | 8 | 100 | 12 | | | | | |
| 1.75 | | 234 | 3 | 80 | 13 | | | | | |
| 20 | | | 6 | | 14 | | | | | |
| 22 | | | 7 | | 15 | | | | | |

0.0 / 258.8
 7.0" Asphalt
 0.6 / 258.2
 14.0" Aggregate Subbase
 1.8 / 257.0
 Fill, Yellow-brown, LEAN CLAY, contains mica, firm, moist, (CL)
 Fill, Yellow-brown, LEAN CLAY, contains mica, soft, moist, (CL)
 8.0 / 250.8
 Fill, Yellow-brown to red-brown, SILT, contains mica, soft, moist, (ML)
 Fill, Brown, SILT, contains mica, firm, moist, (ML)
 Fill, Brown, SILT, contains mica, stiff, moist, (ML)
 Fill, Dark gray-brown, red and brown, SILT, contains mica, stiff, moist, (ML)

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 24+90 OFFSET: 46 ft RT
 LATITUDE: 38.945268° N LONGITUDE: 77.201682° W
 SURFACE ELEVATION: 258.8 ft COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/13/2019 - 05/15/2019 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: M.Fletcher/SaLUT inc. Logger: Nate Peterson, S&ME | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|---|--------------|------------------|----------------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | |
| | | | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH NOT ENCOUNTERED DURING DRILLING | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | LL | PI | |
| | 26 | 232 | | | | | | | | 26.5 / 232.3 | | | |
| | 28 | 230 | 3 4 6 7 | 100 | | | | | | Fill, Dark gray-brown, LEAN CLAY, contains mica and quartz fragments, stiff, moist, (CL) | | | |
| 1.75 | 30 | 228 | | | | | | | | 31.5 / 227.3 | | | |
| | 32 | 226 | | 50/4" | 100 | | | | | Igm, SILTY SAND, contains mica and quartz fragments, very dense, wet, (SM) | | | |
| | 34 | 224 | | | | | | | | 35.0 / 223.8 2.8' Concrete | | | |
| | 36 | 222 | | | | | | | | 56 56 | | | |
| | 38 | 220 | | | | | | | | | | | |
| | 40 | 218 | | | | | | | | 40.0 / 218.8 No Recovery | | | |
| | 42 | 216 | | | | | | | | 0 0 | | | |
| | 44 | 214 | | | | | | | | | | | |
| | | | | | | | | | | 45 | | | |
| Bottom of borehole at 45.0 feet. After no rock recovery from 40.0 to 45.0 feet boring was offset to 19ODD-BR08a so SPT sampling could be continued. Boring backfilled with bentonite chips and grout upon completion. | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 25+00 OFFSET: 46 ft RT
 LATITUDE: 38.945258° N LONGITUDE: 77.201651° W
 SURFACE ELEVATION: 258.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/14/2019 - 05/14/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Nate Peterson, S&ME

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 0.75 | 2 | 258 | 2 | | | | | | |
| | | 256 | 3 | 100 | | | | | |
| 1.5 | 4 | 254 | 2 | 100 | | | | | |
| 1.25 | 6 | 252 | 2 | 90 | | | | | |
| 1.25 | 8 | 250 | 2 | 90 | | | | | |
| 1 | 10 | 248 | 2 | 100 | | | | | |
| | 12 | 246 | 2 | 100 | | | | | |
| 1.5 | 14 | 244 | 4 | 100 | | | | | |
| | 16 | 242 | | | | | | | |
| 1.5 | 18 | 240 | 2 | 100 | | | | | |
| | 20 | 238 | 3 | 100 | | | | | |
| | 22 | 236 | 3 | | | | | | |
| | 24 | 234 | 4 | 25 | | | | | |

0.0 / 258.8
 8.0" Asphalt
 0.7 / 258.1
 8.0" Aggregate Subbase
 1.3 / 257.5
Fill, Yellow-brown to red-brown, SANDY SILT, contains mica, firm, moist, (ML)
Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)
Fill, Brown to yellow-brown, SANDY SILT, contains mica, firm, moist, (ML)
Fill, Yellow-brown, SANDY SILT, contains mica, stiff, moist, (ML)
Fill, Yellow-brown, SANDY SILT, contains mica, stiff, moist, (ML)
 19.5 / 239.3
Alluvial, Gray-brown, SANDY SILT, contains root fragments, stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | | |
| | | 18.1 | |
| 39 | 12 | 22.8 | 64.4 |
| | | 23.4 | |
| | | 24.5 | |
| | | 22.4 | |
| | | 22.8 | |
| | | 24.8 | |
| 40 | 14 | 21.8 | 66.5 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 31 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gnT_version:10.0.0.000:11/1/19:HDR



STATION: 25+00 OFFSET: 46 ft RT
 LATITUDE: 38.945258° N LONGITUDE: 77.201651° W
 SURFACE ELEVATION: 258.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/14/2019 - 05/14/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Nate Peterson, S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 40.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | 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 | | | | | | |
| | | | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | | |
| | 26 | | | | | | | | | | | | | |
| | 26.5 / 232.3 | 232 | | | | | | | | | | | | |
| 1 | 28 | 12 | | | | | | | | | | | | |
| | 230 | 9 | | | | | | | | | | | | |
| | 30 | 8 | | | | | | | | | | | | |
| | 228 | 8 | | | | | | | | | | | | |
| 0.5 | 32 | | | | | | | | | | | | | |
| | 226 | 3 | | | | | | | | | | | | |
| | 34 | 3 | | | | | | | | | | | | |
| | 224 | 4 | | | | | | | | | | | | |
| | 36 | 5 | | | | | | | | | | | | |
| | 222 | | | | | | | | | | | | | |
| 3 | 38 | 9 | | | | | | | | | | | | |
| | 220 | 20 | | | | | | | | | | | | |
| | 40 | 25 | | | | | | | | | | | | |
| | 218 | 40 | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | |
| 2 | 44 | 20 | | | | | | | | | | | | |
| | 216 | 25 | | | | | | | | | | | | |
| | 44 | 24 | | | | | | | | | | | | |
| | 214 | 50 | | | | | | | | | | | | |
| | 46 | | | | | | | | | | | | | |
| | 212 | | | | | | | | | | | | | |
| | 48 | 17 | | | | | | | | | | | | |
| | 210 | 33 | | | | | | | | | | | | |
| | 50 | 50/6" | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 31 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 28+64 OFFSET: 29 ft RT
 LATITUDE: 38.944920° N LONGITUDE: 77.200459° W
 SURFACE ELEVATION: 256.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|-----------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/13/2019 - 05/13/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Nate Peterson, S&ME | 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 ° | | | | | | | | | | | |
| | | 256 | | | | | | | | | | | | | | | | | | |
| 2 | 2 | 254.4 | 5 | 100 | | 2 | | | | | | | | | | | | | | |
| 1.5 | 4 | 252.3 | 5 | 100 | | 4 | | | | | | | | | | | | | | |
| 1.5 | 6 | 250.5 | 6 | 100 | | 6 | | | | | | | | | | | | | | |
| | 8 | | 8 | 100 | | 8 | | | | | | | | | | | | | | |
| GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | LL | PI | | | | | | | | |
| 0.0 / 256.2 11.0" Asphalt 0.9 / 255.3 7.0" Concrete 1.5 / 254.7 <i>Fill, Yellow-brown to red-brown, SANDY SILT, contains mica, stiff, moist, (ML)</i> <i>Fill, Yellow-brown, SILT WITH SAND, contains mica, stiff, moist, (ML)</i> <i>Fill, Yellow-brown, SILT WITH SAND, contains mica, very stiff, moist, (ML)</i> | | | | | | | | | | | 41 | 14 | 18.0 | 61.5 | | | | | | |
| Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, and asphalt upon completion. Bulk sample collected from 2.0 to 8.0 feet bgs. | | | | | | | | | | | 39 | 8 | 16.8 | 84.1 | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 16+35 OFFSET: 31 ft RT
 LATITUDE: 38.946028° N LONGITUDE: 77.204492° W
 SURFACE ELEVATION: 267.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | 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 ° | | | | | |
| | | | | | | | | | | Date(s) Drilled: 05/14/2019 - 05/14/2019 | | | | |
| | | | | | | | | | | Drilling Method(s): 3.25" HSA w/ SPTs | | | | |
| | | | | | | | | | | SPT Method: Automatic Hammer | | | | |
| | | | | | | | | | | Other Test(s): Not Applicable | | | | |
| | | | | | | | | | | Driller: M.Fletcher/SaLUT inc. | | | | |
| | | | | | | | | | | Logger: Nate Peterson, S&ME | | | | |
| | | | | | | | | | | GROUND WATER | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | | |
| | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | |
| | | | | | | | | | | 0.0 / 267.8 | | | | |
| | | | | | | | | | | 12.0" Asphalt | | | | |
| | | | | | | | | | | 1.0 / 266.8 | | | | |
| | | | | | | | | | | 8.5" Aggregate Subbase | | | | |
| | | | | | | | | | | 1.7 / 266.1 | | | | |
| | | | | | | | | | | Fill, Yellow-brown to red-brown, SANDY LEAN CLAY, contains mica and rock fragments, stiff, moist, (CL) | | | | |
| | | | | | | | | | | 42 | | | | |
| | | | | | | | | | | 18 | | | | |
| | | | | | | | | | | 18.3 | | | | |
| | | | | | | | | | | 21.0 | | | | |
| | | | | | | | | | | 15.9 | | | | |
| | | | | | | | | | | 53.3 | | | | |
| | | | | | | | | | | Bottom of borehole at 8.0 feet. | | | | |
| | | | | | | | | | | Boring backfilled with auger cuttings, hole plug and asphalt upon completion. Bulk sample collected from 2.0 to 8.0 feet bgs. | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-03

PAGE 2 OF 2

STATION: 36+38 **OFFSET:** 251 ft RT
LATITUDE: 38.932029° N **LONGITUDE:** 77.208279° W
SURFACE ELEVATION: 283.6 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | 25 | | | | | | | | | |
| <p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 18.0 ft DEPTH</p> <p>▼ STABILIZED AT 12.7 ft</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Piezometer installed to the depth of 25.0 feet bgs (screened from 20.0 to 25.0 feet bgs). Bulk sample collected from 6.0 to 10.0 feet and 10.0 to 15.0 feet bgs.</p> | | | | | | | | | | | LL | PI | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19SWM-03

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-04

PAGE 1 OF 1

STATION: 590+66 OFFSET: 139 ft RT
 LATITUDE: 38.939663° N LONGITUDE: 77.205395° W
 SURFACE ELEVATION: 243.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 2 | 242 | | | | 2 | | | | 0.0 / 243.8 <i>Alluvial</i> , Brown, LEAN CLAY WITH SAND, contains root fragments, moist, (CL) | | | | |
| 4 | 240 | | | | 4 | | | | <i>Alluvial</i> , Brown and gray, LEAN CLAY WITH SAND, moist, (CL) | 35 | 14 | 27.7 | 76.6 |
| 6 | 238 | | | | 6 | | | | <i>Alluvial</i> , Brown and gray, LEAN CLAY WITH SAND, contains root fragments, moist, (CL) | | | | |
| 8 | 236 | | | | 8 | | | | <i>Alluvial</i> , Gray, LEAN CLAY WITH SAND, moist to wet, (CL) | | | | |
| Bottom of borehole at 8.0 feet. Bag samples combined into one bulk sample from 0.0 to 8.0 feet bgs. Boring backfilled with gravel upon completion. | | | | | | | | | | | | | |

Date(s) Drilled: 08/09/2019 - 08/09/2019
 Drilling Method(s): Hand Auger
 SPT Method:
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Olivia Erony, SaLUT

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 6.5 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: --

PAGE 1 OF 1

19SWM-04



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-05
PAGE 1 OF 2

STATION: 605+84 **OFFSET:** 82 ft RT
LATITUDE: 38.943528° N **LONGITUDE:** 77.203419° W
SURFACE ELEVATION: 236.8 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|--------|--|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | | STRATA LEGEND | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | | | | |
| <p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 8.0 ft DEPTH</p> <p>▼ STABILIZED AT 9.1 ft</p> | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | LL | PI | | | |
| | | 236 | 2 | 60 | | | | | | 0.0 / 236.8 | | | | |
| | | | 1 | | | | | | | 1.0" Topsoil | | | 13.6 | |
| | | 234 | 3 | 75 | | | | | | 0.1 / 236.7 | | | | |
| | | | 2 | | | | | | | 2.0 / 234.8 | | | 23.2 | |
| | | | 1 | | | | | | | Alluvial, Brown, fine to coarse CLAYEY GRAVEL, contains root fragments, loose, moist, (GC) | | | | |
| | | 232 | 3 | 90 | | | | | | 2.0 / 234.8 | | | | |
| | | | 2 | | | | | | | Alluvial, Gray, LEAN CLAY, firm, moist, (CL) | | | | |
| | | | 1 | | | | | | | 3.5 / 233.3 | | | | |
| | | 232 | 3 | | | | | | | Residual, Orange-brown, SILT, moist, (ML) | | | | |
| | | | 2 | | | | | | | 4.0 / 232.8 | 47 | 21 | 30.2 | 78.1 |
| | | | 3 | | | | | | | Residual, Orange-gray, LEAN CLAY WITH SAND, contains mica, firm, moist, (CL) | | | | |
| | | 230 | 4 | 85 | | | | | | 6.0 / 230.8 | | | | |
| | | | 7 | | | | | | | Residual, Orange-brown to gray, fine to coarse SILTY, CLAYEY SAND, contains mica, medium dense, moist, (SC-SM) | 25 | 4 | 18.7 | 32.6 |
| | | | 13 | | | | | | | 8.0 / 228.8 | | | | |
| | | | 8 | | | | | | | Residual, Brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica and rock fragments, dense, wet, (SM) | | | | |
| | | 228 | 15 | 75 | | | | | | 11.5 / 225.3 | | | | |
| | | | 20 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 26 | | | | | | | 16.5 / 220.3 | | | | |
| | | 226 | | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 5 | | | | | | | 11.5 / 225.3 | | | | |
| | | | 9 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | 224 | 12 | 85 | | | | | | 16.5 / 220.3 | | | | |
| | | | 14 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 12 | | | | | | | 16.5 / 220.3 | | | | |
| | | 222 | 14 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 15 | | | | | | | 16.5 / 220.3 | | | | |
| | | 220 | | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 18 | | | | | | | 16.5 / 220.3 | | | | |
| | | | 12 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | 218 | 30 | 71 | | | | | | 16.5 / 220.3 | | | | |
| | | | 50/5" | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 19.4 | | | | | | | 16.5 / 220.3 | | | | |
| | | 216 | | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 20 | | | | | | | 16.5 / 220.3 | | | | |
| | | | 14 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | 214 | 50/4" | 100 | | | | | | 16.5 / 220.3 | | | | |
| | | | 23 | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |
| | | | 23.3 | | | | | | | 16.5 / 220.3 | | | | |
| | | 212 | | | | | | | | Residual, Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, relict rock texture, and rock fragments, medium dense, wet, (ML) | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2
19SWM-05

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gnT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-05

PAGE 2 OF 2

STATION: 605+84 **OFFSET:** 82 ft RT
LATITUDE: 38.943528° N **LONGITUDE:** 77.203419° W
SURFACE ELEVATION: 236.8 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | 25 | | | | | | | | | |
| <p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 8.0 ft DEPTH</p> <p>▼ STABILIZED AT 9.1 ft</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> <p>Bottom of borehole at 25.0 feet. Piezometer installed to the depth of 25.0 feet bgs (screened from 20.0 to 25.0 feet bgs). Bulk sample collected from 15.0 to 20.0 feet bgs and 20.0 to 25.0 feet bgs.</p> | | | | | | | | | | | LL | PI | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19SWM-05

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-07
PAGE 1 OF 2

STATION: 625+98 **OFFSET:** 108 ft RT
LATITUDE: 38.948221° N **LONGITUDE:** 77.199906° W
SURFACE ELEVATION: 273.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2019 - 06/19/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

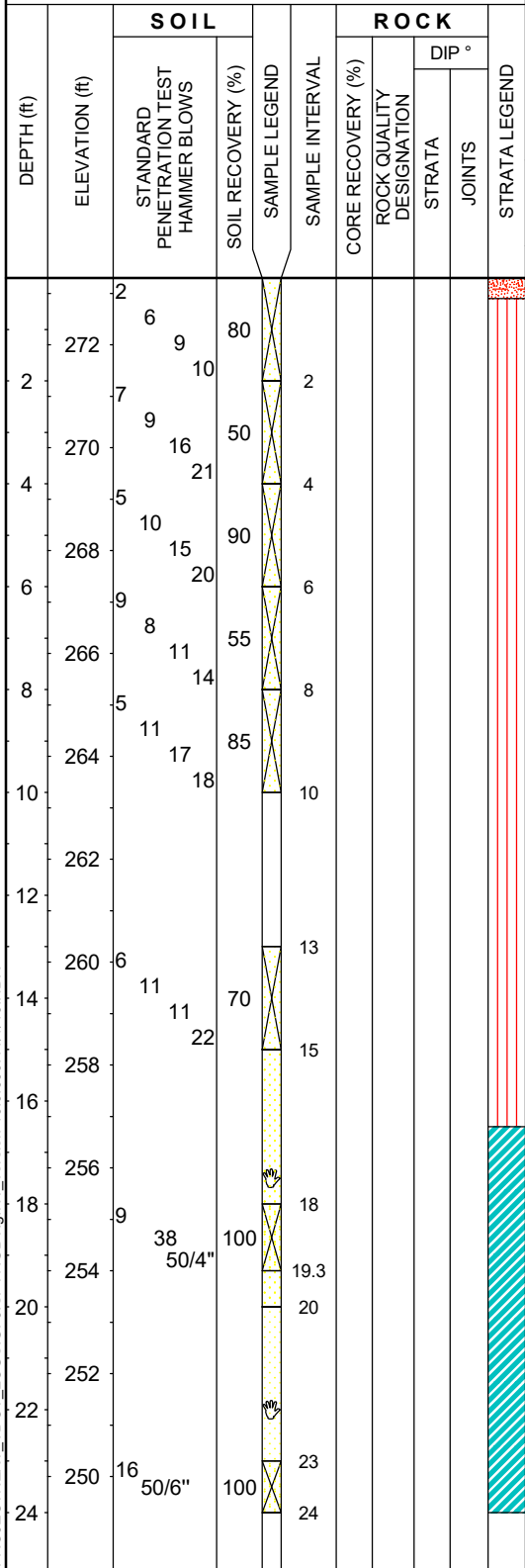
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 20.0 | |
| | | 20.6 | |
| | | 19.6 | |
| 40 | 14 | 16.2 | 54.6 |
| | | 14.1 | |
| | | 19.0 | |
| 52 | 25 | 17.5 | 66.8 |
| | | 13.7 | |
| | | 13.8 | |



SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2
19SWM-07



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-07

PAGE 2 OF 2

STATION: 625+98 OFFSET: 108 ft RT
 LATITUDE: 38.948221° N LONGITUDE: 77.199906° W
 SURFACE ELEVATION: 273.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/19/2019 - 06/19/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Amanda Thomason/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | <p>GROUND WATER</p> <p>NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | |
| | | | | | | | | | | <p>FIELD DESCRIPTION OF STRATA</p> <p>(screened from 19.0 to 24.0 feet bgs). Bulk sample collected from 15.0 to 20.0 feet bgs and 20.0 to 24.0 feet bgs.</p> | | | | LL | PI | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19SWM-07

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-08

PAGE 1 OF 2

STATION: 631+05 OFFSET: 69 ft RT
 LATITUDE: 38.949295° N LONGITUDE: 77.198808° W
 SURFACE ELEVATION: 283.4 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/20/2019 - 06/20/2019

LAB DATA

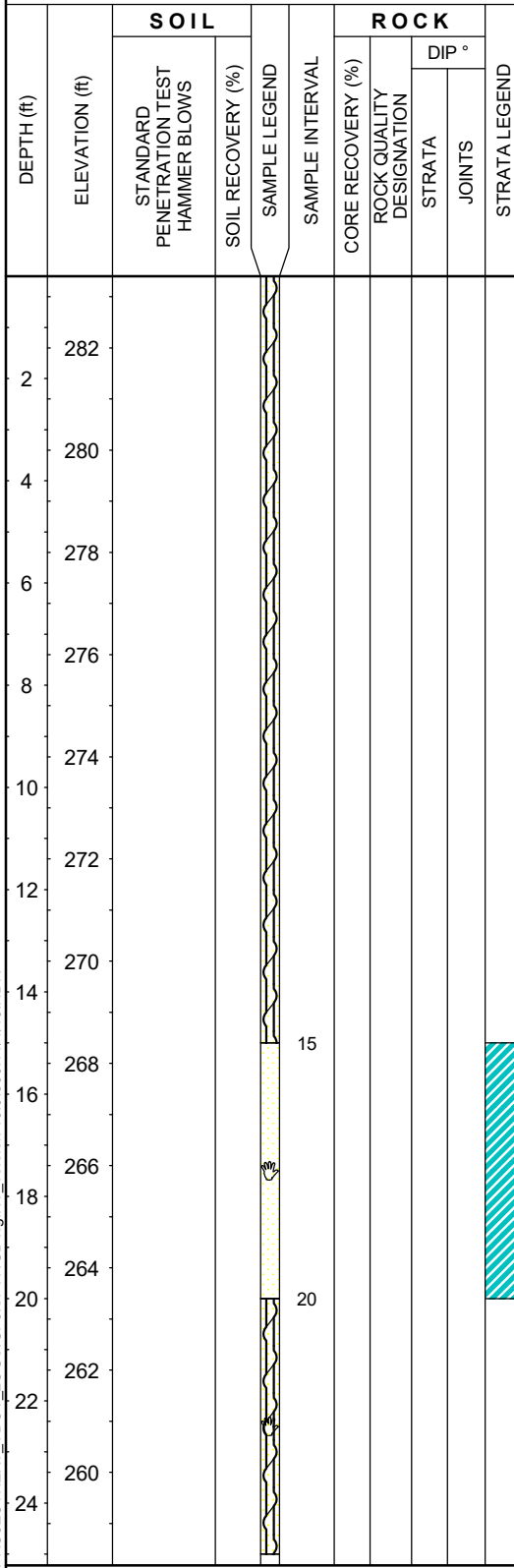
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



0.0 / 283.4
 Boring offset from 19X-N-RW11, only collected bulk samples.

15.0 / 268.4
Residual, Red-brown, FAT CLAY WITH SAND, contains mica and root fragments, moist, (CH)

REMARKS: Rig Type: Acker XLS Track Rig.

PAGE 1 OF 2

19SWM-08

SPT_LOG\W\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-08

PAGE 2 OF 2

STATION: 631+05 OFFSET: 69 ft RT
 LATITUDE: 38.949295° N LONGITUDE: 77.198808° W
 SURFACE ELEVATION: 283.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------------------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 06/20/2019 - 06/20/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Amanda Thomason/HDR | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 25 | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | | | | | | |
| | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | LL | PI | | | | |
| | | | | | | | | | | Bottom of borehole at 25.0 feet. | | | | | | | | |
| | | | | | | | | | | Auger probed to 25.0 bgs. Bulk sample collected from 15.0 to 20.0 feet and 20.0 to 25.0 feet bgs. Piezometer screen installed from 20.0 to 25.0 feet bgs. | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.

PAGE 2 OF 2

19SWM-08

SPT_LOG\W\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-09

PAGE 1 OF 2

STATION: 16+46 **OFFSET:** 87 ft LT
LATITUDE: 38.953754° N **LONGITUDE:** 77.192454° W
SURFACE ELEVATION: 302.7 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/19/2019 - 05/19/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: M.Fletcher/SaLUT inc.
Logger: Austin Morgan, HDR

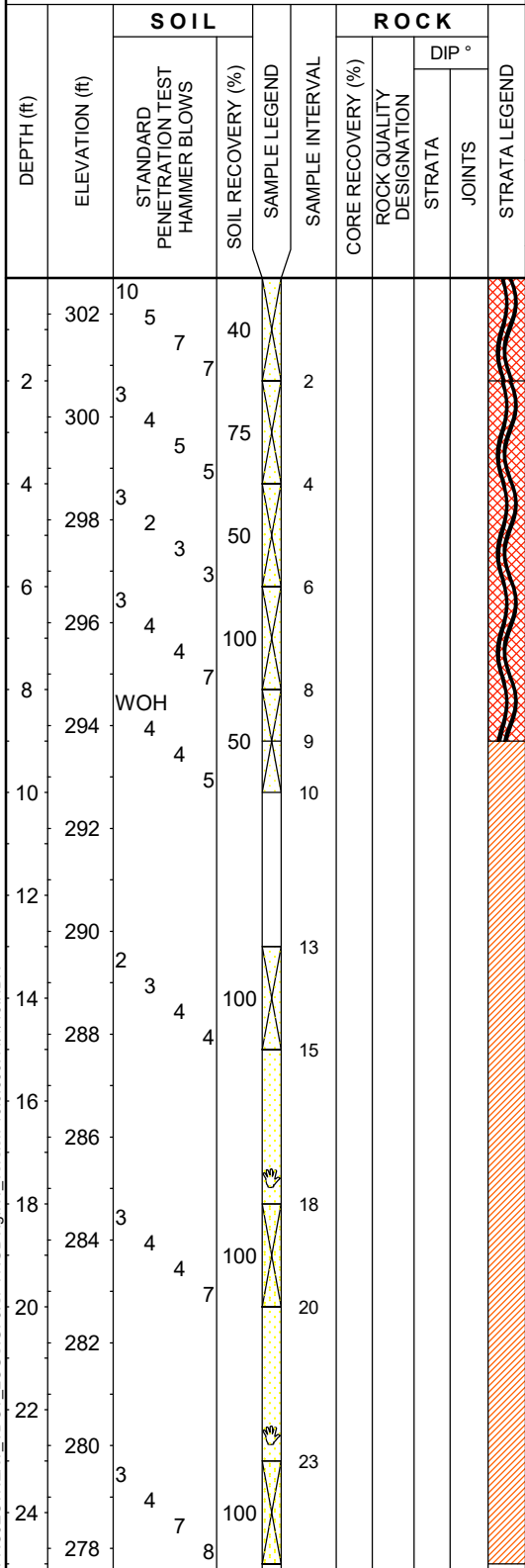
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 13.8 | |
| | | 24.8 | |
| 39 | 15 | 24.3 | 64.2 |
| | | 24.6 | |
| | | 22.0 | |
| | | | |
| | | 22.6 | |
| 44 | 19 | 21.6 | 67.4 |
| | | 31.5 | |
| 45 | 19 | 24.3 | 71.8 |
| | | 27.3 | |



SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 13.9 feet

PAGE 1 OF 2

19SWM-09



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-09

PAGE 2 OF 2

STATION: 16+46 OFFSET: 87 ft LT
 LATITUDE: 38.953754° N LONGITUDE: 77.192454° W
 SURFACE ELEVATION: 302.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/19/2019 - 05/19/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Austin Morgan, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | 25 | | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 25.0 feet. Boring backfilled with cuttings upon completion. Bulk sample collected at 15.0 to 20.0 feet bgs and 20.0 to 25.0 feet bgs. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 13.9 feet

PAGE 2 OF 2

19SWM-09

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-10

PAGE 1 OF 2

STATION: 6+02 **OFFSET:** 71 ft LT
LATITUDE: 38.955340° N **LONGITUDE:** 77.194529° W
SURFACE ELEVATION: 313.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/19/2019 - 05/19/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: M.Fletcher/SaLUT inc.
Logger: Austin Morgan, HDR

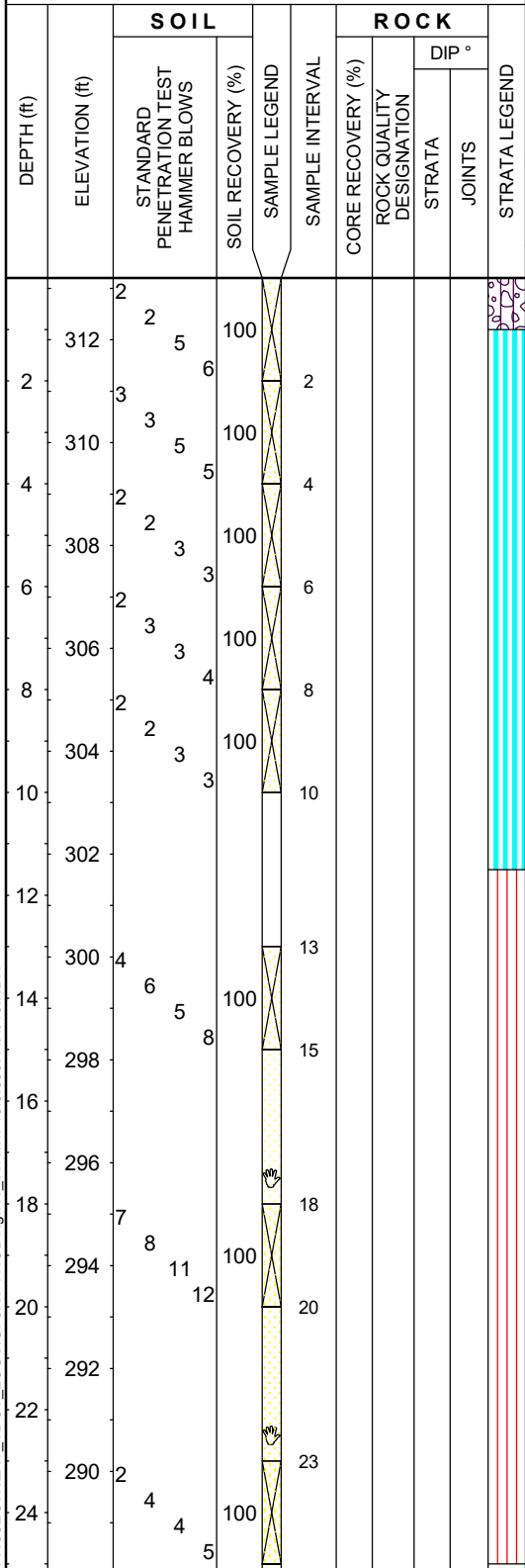
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 21.8 | |
| 51 | 15 | 32.8 | 89.9 |
| | | 17.5 | |
| | | 25.0 | |
| | | 37.7 | |
| | | 20.6 | |
| | | 21.3 | |
| 46 | 15 | 35.8 | 82.0 |
| | | 48.9 | |



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 14.3 feet

PAGE 1 OF 2

19SWM-10



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-10

PAGE 2 OF 2

STATION: 6+02 OFFSET: 71 ft LT
 LATITUDE: 38.955340° N LONGITUDE: 77.194529° W
 SURFACE ELEVATION: 313.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|--------------|------------------|----------------------|------------------------|--|--|--|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | LAB DATA | | | | | | | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | DIP ° | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | 25 | | | | | | | | | | | | | | |
| | | | | | | | | | | <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | |
| | | | | | | | | | | <p>FIELD DESCRIPTION OF STRATA LL PI</p> | | | | | | | | | |
| | | | | | | | | | | <p>Bottom of borehole at 25.0 feet. Boring backfilled with cuttings upon completion. Bulk sample collected at 15.0 to 20.0 feet bgs and 20.0 to 25.0 feet bgs.</p> | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 14.3 feet

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19SWM-10

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-11
PAGE 1 OF 2

STATION: 14+79 **OFFSET:** 27 ft RT
LATITUDE: 38.955646° N **LONGITUDE:** 77.192681° W
SURFACE ELEVATION: 288.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 07/16/2019 - 07/16/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: B.Strawderman/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 23.3 ft

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 3 | | 288 | 2 | 80 | | | | | |
| 2.5 | 2 | 286 | 2 | 70 | | | | | |
| | 4 | 284 | 10 | 15 | | | | | |
| | 6 | 282 | 6 | 5 | | | | | |
| | 8 | 280 | 5 | 0 | | | | | |
| | 10 | 278 | 6 | 0 | | | | | |
| 1.25 | 12 | 276 | 4 | 60 | | | | | |
| | 14 | 274 | 9 | 16 | | | | | |
| | 16 | 272 | | | | | | | |
| 1.5 | 18 | 270 | 4 | 100 | | | | | |
| | 20 | 268 | 8 | 11 | | | | | |
| | 22 | 266 | | | | | | | |
| 2.5 | 24 | 264 | 4 | 100 | | | | | |

0.0 / 288.9
 2.0" Topsoil
 0.2 / 288.7
Residual, Brown-red, LEAN CLAY WITH SAND, contains root fragments, mica, and rock fragments, firm, moist, (CL)
Residual, Dark-brown, LEAN CLAY WITH SAND, contains mica, firm, moist, (CL)
 4.0 / 284.9
Residual, Red-brown, fine SILTY SAND, contains mica, medium dense, moist, (SM)
 No Soil Recovery, only rock fragments in spoon tip
 No Soil Recovery
 11.5 / 277.4
Residual, Gray and brown, mottled, GRAVELLY SILT, contains mica, and relict rock texture, very stiff, moist, (ML)
Residual, Light gray-brown and black, mottled, SANDY SILT, contains mica and relict rock texture, very stiff, moist, (ML)
Residual, Orange-brown and black, mottled, SANDY SILT, contains mica and relict rock texture, very stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | 17.6 | |
| 48 | 22 | 26.6 | 74.3 |
| | | 15.2 | |
| | | | |
| | | 7.9 | |
| | | 1.1 | |
| | | 32.4 | |
| 46 | 18 | 18.8 | 69.0 |
| | | 38.8 | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19SWM-11

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-11
PAGE 2 OF 2

STATION: 14+79 **OFFSET:** 27 ft RT
LATITUDE: 38.955646° N **LONGITUDE:** 77.192681° W
SURFACE ELEVATION: 288.9 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | 25 | | | | | | | | | |
| <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 23.3 ft</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | | |
| <p>Bottom of borehole at 25.0 feet. Piezometer installed to the depth of 25.0 feet bgs (screened from 20.0 to 25.0 feet bgs). Bulk sample collected from 15.0 to 20.0 feet bgs and 20.0 to 25.0 feet bgs.</p> | | | | | | | | | | | | | | | |

Date(s) Drilled: 07/16/2019 - 07/16/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: B.Strawderman/SaLUT inc.
Logger: Amanda Thomason/HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19SWM-11

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-12

PAGE 1 OF 2

STATION: 14+36 **OFFSET:** 5 ft LT
LATITUDE: 38.960469° N **LONGITUDE:** 77.189410° W
SURFACE ELEVATION: 252.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/15/2019 - 05/15/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: J.Beavers/SaLUT inc.
Logger: Jacob Moorman, HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ▽ STABILIZED AT 13.1 ft

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 29.3 | |
| | | 24.1 | |
| | | 30.1 | |
| 40 | 11 | 19.4 | 57.6 |
| | | 36.4 | |
| | | 29.7 | |
| 39 | 6 | 30.4 | 72.7 |
| | | 26.7 | |

| DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 1 | | 1 | 35 | | | | | |
| 2 | 250 | 2 | 75 | | | | | |
| 4 | 248 | 1 | 85 | | | | | |
| 6 | 246 | 3 | 100 | | | | | |
| 8 | 244 | 1 | 100 | | | | | |
| 10 | 242 | 3 | 100 | | | | | |
| 12 | 240 | 3 | 100 | | | | | |
| 14 | 238 | 3 | 100 | | | | | |
| 16 | 236 | 6 | 100 | | | | | |
| 18 | 234 | 5 | 100 | | | | | |
| 20 | 232 | 20 | 100 | | | | | |
| 22 | 230 | 8 | 100 | | | | | |
| 24 | 228 | 10 | 100 | | | | | |

0.0 / 252.1
 3.0" Topsoil
 0.3 / 251.8
Residual, Dark brown to light brown, SANDY SILT, soft, moist, (ML)
Residual, Light brown to red-brown, SANDY SILT, firm, moist, (ML)
Residual, Light brown to red-brown, SANDY SILT, soft, moist, (ML)
Residual, Red-brown, SANDY SILT, stiff, moist, (ML)
Residual, Light brown and white, mottled, SANDY SILT, contains mica, firm, moist, (ML)
Residual, Light brown to yellow-orange, SANDY SILT, firm, moist, (ML)
Residual, Light brown to red-brown, SILT WITH SAND, contains mica, hard, moist, (ML)
Residual, Dark brown to red-brown, SILT WITH SAND, contains mica, hard, moist, (ML)

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19SWM-12



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-12

PAGE 2 OF 2

STATION: 14+36 OFFSET: 5 ft LT
 LATITUDE: 38.960469° N LONGITUDE: 77.189410° W
 SURFACE ELEVATION: 252.1 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|---|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| | | | | | | | | | | | | | |
| | | | | | 25 | | | | | | | | |
| <p>Date(s) Drilled: 05/15/2019 - 05/15/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Jacob Moorman, HDR</p> <p style="text-align: center;">GROUND WATER</p> <p style="text-align: center;">NOT ENCOUNTERED DURING DRILLING</p> <p>▼ STABILIZED AT 13.1 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p style="text-align: center;">Bottom of borehole at 25.0 feet. Piezometer installed to depth of 25 feet bgs (screened from 20.0 to 25.0 feet bgs). Bulk sample collected from 0.0 to 5.0 feet bgs and 5.0 to 10.0 feet bgs.</p> | | | | | | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19SWM-12

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-13

PAGE 2 OF 2

STATION: 22+86 **OFFSET:** 57 ft RT
LATITUDE: 38.963289° N **LONGITUDE:** 77.186776° W
SURFACE ELEVATION: 215.7 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | 25 | | | | | | | | | |
| <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | | |
| <p>Bottom of borehole at 25.0 feet. Peizometer installed to depth of 25.0 feet bgs (screen installed from 20.0 to 25.0 feet bgs). Bulk sample collected from 6.0 to 10.0 feet and 11.0 to 15.0 feet bgs.</p> | | | | | | | | | | | | | | | |

Date(s) Drilled: 07/19/2019 - 07/19/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: N.Chew/Connelly & Associates, inc.
Logger: Harsh Patel, HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19SWM-13

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-14
PAGE 1 OF 2

STATION: 29+29 **OFFSET:** 133 ft RT
LATITUDE: 38.963972° N **LONGITUDE:** 77.185593° W
SURFACE ELEVATION: 193.1 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 07/09/2019 - 07/09/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 ↓ STABILIZED AT 19.5 ft

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | SAMPLE INTERVAL | ROCK | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 1.75 | | 192 | 2 | 85 | | | | | |
| | 2 | 190 | 3 | 85 | 2 | | | | |
| | 3 | 188 | 4 | 90 | 4 | | | | |
| 1.75 | 6 | 186 | 6 | 100 | 6 | | | | |
| 2 | 8 | 184 | 8 | 100 | 8 | | | | |
| | 10 | 182 | 10 | 100 | 10 | | | | |
| 1.8 | 12 | 180 | 12 | 100 | 12 | | | | |
| | 14 | 178 | 14 | 100 | 14 | | | | |
| | 16 | 176 | 16 | 100 | 16 | | | | |
| | 18 | 174 | 18 | 100 | 18 | | | | |
| | 20 | 172 | 20 | 100 | 20 | | | | |
| | 22 | 170 | 22 | 100 | 22 | | | | |
| | 23.8 | 170 | 23.8 | 100 | 23.8 | | | | |

0.0 / 193.1
 2.0" Topsoil
 0.2 / 192.9
Residual, Red-brown, SANDY LEAN CLAY, contain mica, firm, moist, (CL)
 2.0 / 191.1
Residual, Brown and white, mottled, SILT WITH SAND, contain mica, very stiff, moist, (ML)
Residual, Brown, red and white, mottled, SILT WITH SAND, contains mica and rock fragments, very stiff, moist, (ML)
Residual, Brown, red and white, mottled, SILT WITH SAND, contains mica and rock fragments, very hard, moist, (ML)
Residual, Brown, red and white, mottled, SILT WITH SAND, contains mica and rock fragments, very stiff, moist, (ML)
Residual, Brown, red and white, mottled, SILT WITH SAND, contains mica and rock fragments, very hard, moist, (ML)
Residual, Brown, gray and white, mottled, SANDY SILT, contains mica and rock fragments, hard, moist, (ML)
Residual, Brown and white, mottled, SANDY SILT, contains mica and rock fragments, very hard, moist, (ML)
 21.5 / 171.6
lgn, Brown and white, mottled, SANDY SILT, contains mica and rock fragments, very hard, moist, (ML)
 Bottom of borehole at 23.8 feet.

| | | | |
|----|----|------|------|
| 47 | 23 | 24.7 | 67.1 |
| | | 16.1 | |
| | | 13.8 | |
| | | 12.8 | |
| 37 | 11 | 17.4 | 70.6 |
| | | 23.3 | |
| | | 22.5 | |
| | | 19.1 | |
| | | 10.5 | |
| | | 5.3 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19SWM-14

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-14

PAGE 2 OF 2

STATION: 29+29 **OFFSET:** 133 ft RT
LATITUDE: 38.963972° N **LONGITUDE:** 77.185593° W
SURFACE ELEVATION: 193.1 ft **COORD. DATUM:** NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | | | | | | | | | | |
| <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING ↓ STABILIZED AT 19.5 ft</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | LL | PI | | | |
| <p>Piezometer installed to depth of 25.0 feet bgs (screened from 18.8 to 23.8 feet bgs). Bulk samples collected from 6.0 to 10.0 feet and 10.0 to 15.0 feet bgs.</p> | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19SWM-14

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: STORM WATER MANAGEMENT

19SWM-15
PAGE 1 OF 2

STATION: 45+22 **OFFSET:** 217 ft LT
LATITUDE: 38.964218° N **LONGITUDE:** 77.181199° W
SURFACE ELEVATION: 193.2 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/28/2019 - 06/28/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 29 | 3 | 13.0 | 45.2 |
| 29 | NP | 12.4 | 36.2 |
| 30 | 9 | 28.2 | 56.0 |
| | | 11.9 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 21.0 ft DEPTH
 ▽ STABILIZED AT 6.2 ft

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| 29 | 3 | 13.0 | 45.2 |
| 29 | NP | 12.4 | 36.2 |
| 30 | 9 | 28.2 | 56.0 |
| | | 11.9 | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | 3 | 192 | 4 | 90 | | | | | |
| | 4 | 190 | 6 | 90 | | | | | |
| | 6 | 188 | 8 | 90 | | | | | |
| | 8 | 186 | 11 | 95 | | | | | |
| | 10 | 184 | 15 | 100 | | | | | |
| | 12 | 182 | 16 | 100 | | | | | |
| | 14 | 180 | 21 | 100 | | | | | |
| | 16 | 178 | 21 | 100 | | | | | |
| | 18 | 176 | 28 | 100 | | | | | |
| | 20 | 174 | 48 | 100 | | | | | |
| | 22 | 172 | 50/5" | 100 | | | | | |
| | 23 | 170 | 50/2" | 100 | | | | | |

0.0 / 193.2
 4.0" Topsoil
 0.3 / 192.9
Fill, Brown, fine to coarse SILTY SAND, contains mica and root fragments, medium dense, moist, (SM)
 2.0 / 191.2
Residual, Brown and white, mottled, fine to coarse SILTY SAND, contains mica and relic rock texture, very dense, moist, (SM)
Residual, Brown and white, mottled, fine to coarse SILTY SAND, contains mica and relic rock texture, very dense, moist, (SM)
 6.0 / 187.2
Igm, Brown and white, mottled, fine SILTY SAND, contains mica and relic rock texture, very dense, moist, (SM)
Igm, Brown and black, mottled, fine SILTY SAND, contains mica and relic rock texture, very dense, moist, (SM)

Igm, Brown and white, mottled, fine SILTY SAND, contains mica and relic rock texture, very dense, moist, (SM)

 15.9 / 177.3

Igm, Brown and white, mottled, SANDY LEAN CLAY, contains mica and relic rock texture, very hard, moist, (CL)

Igm, Brown and white, mottled, SANDY LEAN CLAY, contains mica and relic rock texture, very hard, wet, (CL)
 Bottom of borehole at 23.2 feet.

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19SWM-15

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gnT_version:10.0.000:11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: STORM WATER MANAGEMENT

19SWM-15

PAGE 2 OF 2

STATION: 45+22 OFFSET: 217 ft LT
 LATITUDE: 38.964218° N LONGITUDE: 77.181199° W
 SURFACE ELEVATION: 193.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | | | | | | | | | | |
| <p>Date(s) Drilled: 06/28/2019 - 06/28/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Amanda Thomason/HDR</p> <p style="text-align: center;">GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 21.0 ft DEPTH ▼ STABILIZED AT 6.2 ft</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p>Peizometer installed to depth of 23.2 (screened from 18.2 to 23.2 feet bgs). Bulk sample collected from 15.0 to 20.0 feet and 20.0 to 23.2 feet bgs.</p> | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19SWM-15

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W1

19X-BR09

PAGE 1 OF 2

STATION: 615+85 OFFSET: 34 ft RT
 LATITUDE: 38.946063° N LONGITUDE: 77.202069° W
 SURFACE ELEVATION: 240.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2019 - 04/17/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

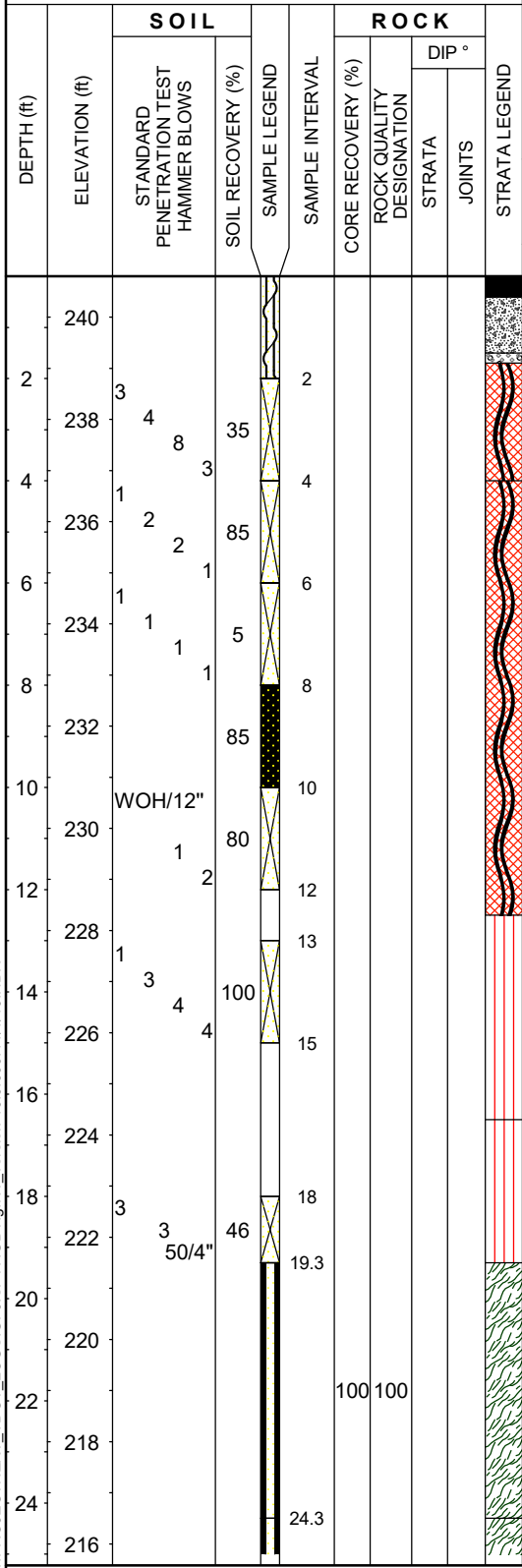
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 9.5 | 20.2 |
| | | 28.3 | |
| | | 30.3 | |
| | | 16.4 | |
| | | 16.6 | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 17 feet

PAGE 1 OF 2

19X-BR09

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W1

19X-BR09

PAGE 2 OF 2

STATION: 615+85 OFFSET: 34 ft RT
 LATITUDE: 38.946063° N LONGITUDE: 77.202069° W
 SURFACE ELEVATION: 240.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|--|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|----------|--------|--------------|------------------|----------------------|------------------------|--|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | LAB DATA | | | | | | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA | JOINTS | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) | | | |
| 26 | 214 | | | | | 100 | 56 | | | | | | | | | | | |
| 28 | 212 | | | | 29.3 | | | | | | | | | | | | | |
| <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>Slightly to moderately weathered, moderately hard, thin foliation, gray and white, SCHIST, moderately jointed, foliation dip of ~75 degrees, joint angle ranges from ~75-90 degrees</p> <p>28.0 / 212.8 Slightly to moderately weathered, moderately hard, thin foliation, gray and white, SCHIST, moderately jointed, foliation dip of ~75 degrees, joint angle ranges from ~75-90 degrees</p> <p>Auger refusal at 19.3 feet. Bottom of borehole at 29.3 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion.</p> | | | | | | | | | | LL | PI | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 17 feet

PAGE 2 OF 2

19X-BR09

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 617+85 **OFFSET:** 34 ft RT
LATITUDE: 38.946539° N **LONGITUDE:** 77.201734° W
SURFACE ELEVATION: 244.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2019 - 04/18/2019
Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: J.Beavers/SaLUT inc.
Logger: Harsh Patel, HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|-------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | DIP ° |
| | | 244 | | | | | | | | |
| 2 | 2 | 242.8 | 8 | 90 | | | | | | |
| 2 | 4 | 240.1 | 1 | 100 | | | | | | |
| 3 | 6 | 238.3 | 3 | 100 | | | | | | |
| 2 | 8 | 236.1 | 2 | 90 | | | | | | |
| | 10 | 234 | | | | | | | | |
| 2.5 | 12 | 232.3 | 3 | 85 | | | | | | |
| 14 | 14 | 230.6 | 6 | | | | | | | |
| 16 | 16 | 228 | | | | | | | | |
| 2.25 | 18 | 226.3 | 3 | 100 | | | | | | |
| | 20 | 224 | | | | | | | | |
| | 22 | 222 | | | | | | | | |
| 1.5 | 24 | 220 | 3 | 80 | | | | | | |

0.0 / 244.5
 6.0" Asphalt
 0.5 / 244.0
 18.0" Concrete
 2.0 / 242.5
Fill, Red, SANDY SILT, contains mica, stiff, moist, (ML)
Fill, Red, SANDY SILT, contains mica, soft, moist, (ML)
Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)
Fill, Red-brown, SANDY SILT, contains mica, firm, moist, (ML)
Fill, Red-brown, SANDY SILT, contains mica, stiff, moist, (ML)
 16.5 / 228.0
Alluvial, Gray-brown, LEAN CLAY, contains mica, stiff, moist, (CL)
 21.5 / 223.0
Alluvial, Gray, green and brown, SILT, contains mica, firm, moist, (ML)

| | | | |
|----|----|------|------|
| | | | |
| | | 32.8 | |
| 45 | 10 | 27.4 | 54.7 |
| | | 23.0 | |
| | | 21.7 | |
| | | 19.4 | |
| 38 | 14 | 31.0 | 85.4 |
| | | 27.1 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 54.1 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W1

19X-BR10

PAGE 2 OF 3

STATION: 617+85 OFFSET: 34 ft RT
 LATITUDE: 38.946539° N LONGITUDE: 77.201734° W
 SURFACE ELEVATION: 244.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2019 - 04/18/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline

SPT Method: Automatic Hammer

Other Test(s): Not Applicable

Driller: J.Beavers/SaLUT inc.

Logger: Harsh Patel, HDR

GROUND WATER

▼ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | | | | | | | | |
| | 26 | 218 | | | | | | | |
| | 28 | 216 | 16 18 18 50/4" | 17 | | | | | |
| | 30 | 214 | | | | | | | |
| | 32 | 212 | | | | | | | |
| | 34 | 210 | 45 50/4" | 38 | | | | | |
| | 36 | 208 | | | | | | | |
| 1.75 | 38 | 206 | 15 50/6" | 100 | | | | | |
| | 40 | 204 | | | | | | | |
| | 42 | 202 | 50/4" | 100 | | | | | |
| | 44 | 200 | | | | | | | |
| | 46 | 198 | | | | | | | |
| 1.5 | 48 | 196 | 25 34 45 50/5" | 26 | | | | | |
| | 50 | | | | | | | | |

26.5 / 218.0

Residual, Brown-black, SILT, contains mica and relict rock texture, hard, moist, (ML)

16.7

31.5 / 213.0

Igm, Brown-black, SANDY SILT, contains mica and rock fragments, very hard, wet, (ML)

11.0

Igm, Brown, SANDY SILT, contains mica, very hard, wet, (ML)

31 5 14.6 51.3

43
43.3

16.8

48

18.4

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 54.1 feet

PAGE 2 OF 3

19X-BR10

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gnT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: BRIDGE EXT-W1

19X-BR10

PAGE 3 OF 3

STATION: 617+85 **OFFSET:** 34 ft RT
LATITUDE: 38.946539° N **LONGITUDE:** 77.201734° W
SURFACE ELEVATION: 244.5 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/17/2019 - 04/18/2019
Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: J.Beavers/SaLUT inc.
Logger: Harsh Patel, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| | | 194 | | | | 49.9 | | | |
| | 52 | 192 | 50/4" | 100 | 53 53.3 | | | | |
| | 54 | 190 | | | | | | | |
| | 56 | 188 | | | | | | | |
| | 58 | 186 | 50/2" | 100 | 58 58.2 | | | | |
| | 60 | 184 | | | 59.5 | | | | |
| | 62 | 182 | | | | 94 | 40 | | |
| | 64 | 180 | | | 64.5 | | | | |
| | 66 | 178 | | | | 100 | 62 | | |
| | 68 | 176 | | | 69.5 | | | | |

Igm, Brown-gray, SANDY SILT, contains mica, very hard, wet, (ML) 12.7

Igm, Brown-gray, SANDY SILT, contains mica and rock fragments, very hard, wet, (ML) 7.5

59.5 / 185.0
 Moderately weathered to decomposed, moderately hard to soft, thin foliation, highly fractured, brown to dark brown SCHIST; foliation present with dip of 75 to 80 degrees

64.5 / 180.0
 Moderately to highly weathered, soft to moderately hard, thin foliation, highly fractured, brown to dark brown SCHIST; foliation present with dip of 60 to 80 degrees

Auger refusal at 59.5 feet.
 Bottom of borehole at 69.5 feet.
 Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion.

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 54.1 feet

PAGE 3 OF 3

19X-BR10

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:12/18/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: BRIDGE EXT-W2

19X-BR11

PAGE 1 OF 3

STATION: 217+64 **OFFSET:** 38 ft LT
LATITUDE: 38.946553° N **LONGITUDE:** 77.202253° W
SURFACE ELEVATION: 245.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/24/2019 - 06/24/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 22.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|--|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | |
| | | 244 | | | | | | | | |
| 2 | 3 | | | | | | | | | |
| 1.75 | 7 | 242 | 60 | | | | | | | |
| 4 | 6 | | | | | | | | | |
| 1.5 | 2 | 240 | 75 | | | | | | | |
| 6 | 5 | | | | | | | | | |
| 2 | 3 | 238 | 65 | | | | | | | |
| 8 | 5 | | | | | | | | | |
| 2.25 | 1 | 236 | 75 | | | | | | | |
| 10 | 2 | | | | | | | | | |
| | 3 | 234 | | | | | | | | |
| 12 | | | | | | | | | | |
| 2.25 | 2 | 232 | 100 | | | | | | | |
| 14 | 3 | | | | | | | | | |
| | 4 | 230 | | | | | | | | |
| 16 | 5 | | | | | | | | | |
| | | 228 | | | | | | | | |
| 18 | 2 | | | | | | | | | |
| 2.75 | 3 | 226 | 75 | | | | | | | |
| 20 | 9 | | | | | | | | | |
| | 11 | 224 | | | | | | | | |
| 22 | | | | | | | | | | |
| | 12 | 222 | | | | | | | | |
| 3 | 12 | | | | | | | | | |
| | 25 | 220 | 75 | | | | | | | |
| | 26 | | | | | | | | | |

0.0 / 245.0
 4.8" Asphalt
 0.4 / 244.6
 11.5" Concrete
 1.4 / 243.6
 6.5" Aggregate Subbase
 1.9 / 243.1
 Fill, Brown, SANDY SILT, contains mica, very stiff, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, firm, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, very stiff, moist, (ML)
 Fill, Brown, SANDY SILT, contains mica, firm, moist, (ML)
 11.5 / 233.5
 Alluvial, Gray-brown, SANDY LEAN CLAY, contains mica and rock fragments, stiff, moist, (CL)
 Alluvial, Gray-brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)
 Alluvial, Gray-brown, SANDY LEAN CLAY, contains mica and rock fragments, hard, wet, (CL)

| | | | |
|----|----|------|------|
| | | | |
| | | 15.1 | |
| 38 | 10 | 23.5 | 54.3 |
| | | 23.0 | |
| | | 24.8 | |
| 31 | 11 | 22.6 | 53.9 |
| | | 20.0 | |
| | | 8.8 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64 feet

PAGE 1 OF 3

19X-BR11

SPT_LOGABW\PROJECT\NEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W2

19X-BR11

PAGE 2 OF 3

STATION: 217+64 OFFSET: 38 ft LT
 LATITUDE: 38.946553° N LONGITUDE: 77.202253° W
 SURFACE ELEVATION: 245.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/24/2019 - 06/24/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▼ FIRST ENCOUNTERED AT 22.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|--|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | |
| | | | | | | | | | | |
| | 25 | | | | | | | | | |
| | 26 | | | | | | | | | |
| | 218 | | | | | | | | | |
| 2.5 | 28 | 10 | 34 | 70 | | | | | | |
| | 216 | | 42 | | | | | | | |
| | 30 | | 48 | | | | | | | |
| | 214 | | | | | | | | | |
| 0.25 | 32 | | | | | | | | | |
| | 212 | 32 | 50/4" | 100 | | | | | | |
| | 34 | | | | | | | | | |
| | 210 | | | | | | | | | |
| | 36 | | | | | | | | | |
| | 208 | | | | | | | | | |
| 0.75 | 38 | 8 | 4 | 85 | | | | | | |
| | 206 | | 14 | | | | | | | |
| | 40 | | 50 | | | | | | | |
| | 204 | | | | | | | | | |
| | 42 | | | | | | | | | |
| | 202 | 50/2" | | 100 | | | | | | |
| | 44 | | | | | | | | | |
| | 200 | | | | | | | | | |
| | 46 | | | | | | | | | |
| | 198 | | | | | | | | | |
| 2 | 48 | 50/4" | | 100 | | | | | | |
| | 196 | | | | | | | | | |
| | 50 | | | | | | | | | |

26.5 / 218.5

Residual, Brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains rock fragments, very dense, wet, (SM)

41.5 / 203.5

lgm, Brown, fine to coarse SILTY SAND, very dense, wet, (SM)

lgm, Brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64 feet

PAGE 2 OF 3

19X-BR11

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: BRIDGE EXT-W2

19X-BR11

PAGE 3 OF 3

STATION: 217+64 **OFFSET:** 38 ft LT
LATITUDE: 38.946553° N **LONGITUDE:** 77.202253° W
SURFACE ELEVATION: 245.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 06/24/2019 - 06/24/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 22.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 2.5 | 52 | 192 | 41 50/4" | 100 | 53 53.8 | | | | |
| 2.5 | 54 | 190 | | | | | | | |
| 2.5 | 56 | 188 | | | | | | | |
| 2.5 | 58 | 186 | 23 50/4" | 100 | 58 58.8 | | | | |
| 1.75 | 60 | 184 | | | | | | | |
| 1.75 | 62 | 182 | 50/4" | 100 | 63 63.3 | | | | |
| 1.25 | 64 | 180 | | | | | | | |
| 1.25 | 66 | 178 | | | | | | | |
| 1.25 | 68 | 176 | 50/5" | 100 | 68 68.4 | | | | |
| | 70 | | | | | | | | |

Igm, Brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

Igm, Red-brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

Igm, Brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM)

Igm, Red-brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

Bottom of borehole at 70.0 feet.
 Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion.

| | | | |
|----|----|------|------|
| NP | NP | 10.0 | 36.9 |
| | | 20.7 | |
| | | 14.5 | |
| 34 | 4 | 21.3 | 30.5 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64 feet

PAGE 3 OF 3

19X-BR11

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: BRIDGE EXT-W2

19X-BR12

PAGE 1 OF 3

STATION: 219+59 **OFFSET:** 37 ft LT
LATITUDE: 38.947019° N **LONGITUDE:** 77.201903° W
SURFACE ELEVATION: 249.9 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/19/2019 - 05/21/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.1 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | ELEVATION (ft) | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | JOINTS | STRATA LEGEND | FIELD DESCRIPTION OF STRATA | LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|-------|--------|--------|---------------|--|----|----|----------------------|------------------------|
| 0.0 | 249.9 | | | | | | | | | | 0.0 / 249.9 | | | | |
| 4.0 | | | | | | | | | | | 4.0" Asphalt | | | | |
| 0.3 | 249.6 | | | | | | | | | | 0.3 / 249.6 | | | | |
| 14.5 | | | | | | | | | | | 14.5" Concrete | | | | |
| 1.5 | 248.4 | | | | | | | | | | 1.5 / 248.4 | | | | |
| 7.0 | | | | | | | | | | | 7.0" Cement Treated Aggregate | | | 20.9 | |
| 2.1 | 247.8 | | | | | | | | | | Fill, Red-brown, SANDY SILT, soft, moist, (ML) | | | | |
| | | | | | | | | | | | Fill, Red-brown, SANDY SILT, contains mica, soft, moist, (ML) | | | 20.5 | |
| | | | | | | | | | | | Fill, Red-brown, SANDY SILT, firm, moist, (ML) | 36 | 8 | 19.7 | 53.7 |
| | | | | | | | | | | | Fill, Red-brown, SANDY SILT, contains mica, soft, moist, (ML) | | | 27.3 | |
| | | | | | | | | | | | Fill, Red-brown, SANDY SILT, contains mica, firm, moist, (ML) | | | 24.1 | |
| | | | | | | | | | | | Fill, Red-brown, SANDY SILT, contains mica, soft, moist, (ML) | | | 25.8 | |
| | | | | | | | | | | | 21.6 / 228.3 | | | | |
| | | | | | | | | | | | Alluvial, Gray, LEAN CLAY WITH SAND, contains mica and root fragments, firm, moist, (CL) | 35 | 11 | 27.0 | 79.3 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64.4 feet

PAGE 1 OF 3

19X-BR12

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W2

19X-BR12

PAGE 2 OF 3

STATION: 219+59 OFFSET: 37 ft LT
 LATITUDE: 38.947019° N LONGITUDE: 77.201903° W
 SURFACE ELEVATION: 249.9 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/19/2019 - 05/21/2019
 Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.1 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 224 | | | | 25.1 | | | |
| 28 | 222 | 5 | | | 28.1 | | | |
| 30 | 220 | 6 | 60 | | 29.1 | | | |
| 32 | 218 | | | | 30.1 | | | |
| 34 | 216 | 12 | | | 33.1 | | | |
| 36 | 214 | 13 | | | 34.1 | | | |
| 38 | 212 | 18 | 40 | | 35.1 | | | |
| 40 | 210 | 27 | | | 38.1 | | | |
| 42 | 208 | 50/5" | 0 | | 38.5 | | | |
| 44 | 206 | 30 | 100 | | 43.1 | | | |
| 46 | 204 | 50/5" | | | 44 | | | |
| 48 | 202 | 50/5" | 50 | | 48.1 | | | |
| 50 | 200 | | | | 48.5 | | | |

25.1 - 28.1: *Alluvial*, Gray, LEAN CLAY WITH SAND, contains mica and root fragments, wet, (CL)

28.1 - 29.1 / 220.8: *Alluvial*, Red-brown, fine SILTY GRAVEL WITH SAND, contains quartz fragments, wet, (GM)

29.1 - 34.1 / 215.8: *Residual*, Brown, SANDY SILT, contains mica, wet, (ML)

34.1 - 38.1 / 212: No Recovery

38.1 - 41.6 / 208.3: (Empty)

41.6 - 43.1 / 206: *lgm*, Brown, SANDY SILT, contains mica, very hard, moist, (ML)

43.1 - 48.1 / 202: (Empty)

48.1 - 48.5: (Empty)

| | | | |
|----|---|------|------|
| | | | |
| | | 10.0 | |
| | | 14.3 | |
| 29 | 1 | 12.1 | 69.2 |
| | | 14.0 | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64.4 feet

PAGE 2 OF 3

19X-BR12



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: BRIDGE EXT-W2

19X-BR12

PAGE 3 OF 3

STATION: 219+59 OFFSET: 37 ft LT
 LATITUDE: 38.947019° N LONGITUDE: 77.201903° W
 SURFACE ELEVATION: 249.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/19/2019 - 05/21/2019 | Drilling Method(s): 3.25" HSA w/ SPTs, NQ2 Wireline | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: N.Chew/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 28.1 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | | |
| 52 | 198 | 50/1" | 100 | 53 53.1 | | | | | | 1gm, Brown, SANDY SILT, contains mica, very hard, moist, (ML) 53.1 / 196.8 Decomposed to highly weathered, very soft, brown, SCHIST, moderately jointed, bedding dip at ~70-80 degrees, joint angles at ~45-60 degrees | | | | | | | | 9.5 | |
| 54 | 196 | | | | 16 | 0 | | | | | | | | | | | | | |
| 56 | 194 | | | | | | | | | | | | | | | | | | |
| 58 | 192 | 50/5" | 100 | 58.1 58.5 | | | | | | 58.1 / 191.8 | | | | | | | | | 10.9 |
| 60 | 190 | | | | | | | | | | | | | | | | | | |
| 62 | 188 | | | | | | | | | | | | | | | | | | |
| 64 | 186 | 50/4" | 100 | 63.1 63.4 | | | | | | | | | | | | | | | 12.8 |
| 66 | 184 | | | | | | | | | | | | | | | | | | |
| 68 | 182 | 50/2" | 100 | 68.1 68.3 | | | | | | | | | | | | | | | 17.9 |
| 70 | 180 | 50/4" | 100 | 70.1 70.4 | | | | | | | | | | | | | | | 15.8 |
| | | | | | | | | | | Bottom of borehole at 70.4 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 64.4 feet

PAGE 3 OF 3

19X-BR12



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P01

PAGE 1 OF 1

STATION: 1080+41
 LATITUDE: 38.936267° N
 SURFACE ELEVATION: 272.8 ft
 OFFSET: 45 ft RT
 LONGITUDE: 77.207453° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|---------------------------------------|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|-------|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/16/2019 - 04/16/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Joe Wallen, PE/HDR | 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 ° | | |
| | | | | | | | | | GROUND WATER | | | | | | | | | | | | |
| | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | | | | |
| | 272 | | | | | | | | 0.0 / 272.8 | | | | | | | | | | | | |
| | | | | | | | | | 7.8" Asphalt | | | | | | | | | | | | |
| 2 | | | | | | | | | 0.6 / 272.2 | | | | | | | | | | | | |
| | | | | | | | | | 10.0" Concrete | | | | | | | | | | | | |
| | 270 | 8 | | | 2.3 | | | | 1.5 / 271.3 | | | | | | | | | | | | |
| | | 7 | | | | | | | 5.0" Cement Treated Aggregate | | | | | | | | | | | | |
| 4 | | 4 | | | 4.3 | | | | 1.9 / 270.9 | | | | | | | 13.5 | | | | | |
| | | 6 | | | | | | | 3.0" Aggregate Subbase | | | | | | | | | | | | |
| | 268 | 4 | | | | | | | 2.1 / 270.7 | | | | | 32 | 6 | 16.2 | 44.2 | | | | |
| | | 4 | | | | | | | <i>Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)</i> | | | | | | | 17.8 | | | | | |
| 6 | | 4 | | | | | | | <i>Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)</i> | | | | | | | | | | | | |
| | 266 | 7 | | | 6.3 | | | | | | | | | | | | | | | | |
| | | 4 | | | | | | | | | | | | | | | | | | | |
| 8 | | 3 | | | 8.3 | | | | | | | | | | | 24.9 | | | | | |
| | | | | | | | | | Bottom of borehole at 8.3 feet. Boring backfilled with auger cuttings, hole plug, concrete, and bentonite chips upon completion. Bulk sample collected from 2.3 to 6.3 feet bgs. | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.3 feet

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19X-NOS-P01

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P03

PAGE 1 OF 1

STATION: 588+42
 LATITUDE: 38.939173° N
 SURFACE ELEVATION: 262.4 ft
 OFFSET: 68 ft RT
 LONGITUDE: 77.205932° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 262.4 | | | | | | | | 0.0 / 262.4 19.8" Asphalt | | | | |
| 1.7 | 260.7 | | | | | | | | 1.7 / 260.7 34.8" Aggregate Subbase | | | | |
| 4.3 | 258.1 | | | | | | | | 4.3 / 258.1 <i>Fill</i> , Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (ML) | 34 | 7 | 15.9 | 39.9 |
| | | | | | | | | | | | | 17.8 | |
| | | | | | | | | | | | | 21.7 | |
| 11.0 | 252 | | | | | | | | Bottom of borehole at 11.0 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips, and concrete upon completion. | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.8 feet

PAGE 1 OF 1

19X-NOS-P03

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS\GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



STATION: 594+48 OFFSET: 63 ft RT
 LATITUDE: 38.940707° N LONGITUDE: 77.205111° W
 SURFACE ELEVATION: 256.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---|---------------------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | Date(s) Drilled: 04/23/2019 - 04/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Russell Kanith, PG/HDR | 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 ° | | | | | | | | | | |
| | | 256 | | | | | | | | | | | | | | | | | |
| | 2 | 254.7 | 13 | | 2 | | | | | | | | | | | | | | |
| | 2.5 | 254 | 8 | | 2.2 | | | | | | | | | | | | | | |
| | 4 | 252 | 2 | | 4 | | | | | | | | | | | | | | |
| | 6 | 250 | 3 | | 5.2 | | | | | | | | | | | | | | |
| | 8 | | 3 | | 6 | | | | | | | | | | | | | | |
| | | | 3 | | 6 | | | | | | | | | | | | | | |
| | | | 3 | | 6 | | | | | | | | | | | | | | |
| | | | 4 | | 8 | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | | | | | | | |
| | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| | | | | | | | | | | 0.0 / 256.9 19.5" Asphalt | | | | | | | | | |
| | | | | | | | | | | 1.6 / 255.3 6.0" Aggregate Subbase | | | | | | | | | |
| | | | | | | | | | | 2.2 / 254.7 Fill, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains rock fragments, medium dense, moist, (SM) | | | | | | 30.8 | | | |
| | | | | | | | | | | 5.2 / 252.7 Fill, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, loose, moist, (SM) | | | | 35 | 10 | 17.1 | 39.2 | | |
| | | | | | | | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. Bulk sample collected from 2.2 to 5.2 feet bgs. | | | | | | 20.6 | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.8 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P05

PAGE 1 OF 1

STATION: 627+80 OFFSET: 29 ft RT
 LATITUDE: 38.948735° N LONGITUDE: 77.199699° W
 SURFACE ELEVATION: 272.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 272.3 | | | | | | | | 0.0 / 272.3 17.0" Asphalt | | | | |
| 1.4 | 270.9 | 22 | 30 | 1.5 | | | | | 1.4 / 270.9 7.0" Aggregate Subbase | | | | |
| 2.0 | 270.3 | 17 | 8 | 2 | | | | | 2.0 / 270.3 Residual, Brown, SANDY SILT, hard, moist, (ML) | | | 3.9 | |
| 4.4 | 268 | 9 | 55 | 3.5 | | | | | Residual, Brown, SANDY SILT, contains mica, very stiff, moist, (ML) | 38 | 10 | 11.2 | 56.3 |
| 6.0 | 266 | 7 | 60 | 5.5 | | | | | | | | 14.1 | |
| 7.5 | | 5 | | 7.5 | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.4 feet

PAGE 1 OF 1

19X-NOS-P05



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P06

PAGE 1 OF 1

STATION: 606+42
 LATITUDE: 38.943721° N
 SURFACE ELEVATION: 246.5 ft
 OFFSET: 39 ft RT
 LONGITUDE: 77.203471° W
 COORD. DATUM: NAD 83

| 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 | 246.5 | | | | | | | | 0.0 / 246.5 19.5" Asphalt | | | |
| 1.6 | 244.9 | | | | | | | | 1.6 / 244.9 28.5" Aggregate Subbase | | | |
| 2.4 | 244.1 | | | | | | | | 2.4 / 244.1 (SM) | | | |
| 4.0 | 242.0 | 4 | 65 | | 4 | | | | Fill, Dark brown to light brown, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | 20.1 |
| 6.0 | 240.0 | 3 | 30 | | 6 | | | | Fill, Dark brown to red-brown, fine to coarse SILTY SAND, loose, moist, (SM) | | | 19.3 |
| 8.0 | 238.0 | 4 | 75 | | 8 | | | | Fill, Light brown, fine to medium SILTY SAND, medium dense, moist, (SM) | | | 24.1 |
| 10.0 | | | | | 10 | | | | Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. Bulk sample collected from 4.0 to 7.0 feet bgs. | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.9 feet

PAGE 1 OF 1

19X-NOS-P06

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P07

PAGE 1 OF 1

STATION: 612+62 OFFSET: 39 ft RT
 LATITUDE: 38.945261° N LONGITUDE: 77.202547° W
 SURFACE ELEVATION: 240.9 ft COORD. DATUM: NAD 83

| 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 | 240 | | | | | | | | 0.0 / 240.9 14.0" Asphalt | | | |
| 2 | 238 | 10 | 40 | | | | | | 1.2 / 239.7 34.0" Aggregate Subbase | | | 1.3 |
| 4 | 236 | 2 | 75 | | | | | | 4.0 / 236.9 <i>Fill, Red-brown, fine to medium SILTY SAND, contains mica, loose, moist, (SM)</i> | | | 21.0 |
| 6 | 234 | 2 | 70 | | | | | | <i>Fill, Red, fine to medium SILTY SAND, loose, moist, (SM)</i> | | | 32.5 |
| 8 | | 3 | | | | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.4 feet

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19X-NOS-P07

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P09

PAGE 1 OF 1

STATION: 600+43
 LATITUDE: 38.942209° N
 SURFACE ELEVATION: 251.4 ft
 OFFSET: 54 ft RT
 LONGITUDE: 77.204294° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|----------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | LAB DATA | | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | DIP ° | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | | | | | | GROUND WATER | | | | | |
| | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | |
| | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | |
| | | | | | | | | 0.0 / 251.4 18.0" Asphalt | | | | | |
| 2 | 250 | | | | | | | 1.5 / 249.9 30.0" Aggregate Subbase | | | | | |
| 4 | 248 | 4 | 50 | | 4 | | | 4.0 / 247.4 <i>Fill</i> , Dark brown to red-brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 13.3 | 34.2 | |
| 6 | 246 | 4 | 4 | | 6 | | | | | | 24.2 | | |
| 8 | 244 | 10 | 7 | | 7 | | | | | | | | |
| 10 | 242 | 2 | 1 | | 8 | | | <i>Fill</i> , Red-brown, fine to coarse SILTY SAND, loose, moist, (SM) | | | 23.7 | | |
| | | 3 | 100 | | 10 | | | Bottom of borehole at 10.0 feet. Boring backfilled with auger cuttings, hole plug, and grout upon completion. Bulk sample collected from 4.0 to 7.0 feet. | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.3 feet

PAGE 1 OF 1

19X-NOS-P09

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS\GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P10

PAGE 1 OF 1

STATION: 633+86 OFFSET: 29 ft RT
 LATITUDE: 38.949917° N LONGITUDE: 77.198208° W
 SURFACE ELEVATION: 289.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|--|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/24/2019 - 04/25/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| | | | | | | | | | 0.0 / 289.6 | | | | | | | | | |
| | | | | | | | | | 17.5" Asphalt | | | | | | | | | |
| 2 | 288 | | | | | | | | 1.5 / 288.1 | | | | | | | | | |
| | | | | | | | | | 18.5" Aggregate Subbase | | | | | | | | | |
| 4 | 286 | 3 | 80 | | 3 | | | | 3.0 / 286.6 | | | | | 34 | 13 | 22.5 | 43.6 | |
| | | 3 | 4 | | 5 | | | | <i>Residual</i> , Dark brown to red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, loose, moist, (SC) | | | | | | | 1.2 | | |
| 6 | 284 | 3 | 4 | | 6 | | | | <i>Residual</i> , Red-brown, fine to coarse CLAYEY SAND WITH GRAVEL, medium dense, moist, (SC) | | | | | | | 19.2 | | |
| | | 3 | 5 | | 7 | | | | | | | | | | | | | |
| 8 | 282 | 4 | 8 | | 8 | | | | | | | | | | | 16.3 | | |
| | | 5 | 40 | | 9 | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. Bulk sample collected from 3.0 to 6.0 feet. | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.7 feet

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19X-NOS-P10



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P11

PAGE 1 OF 1

STATION: 639+94 OFFSET: 46 ft RT
 LATITUDE: 38.951085° N LONGITUDE: 77.196673° W
 SURFACE ELEVATION: 305.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | |
|--|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | FIELD DESCRIPTION OF STRATA | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | |
| <p style="text-align: center;">GROUND WATER</p> <p>NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | | | | |
| <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | LL | PI | |
| 0.0 | 305.6 | | | | | | | | 0.0 / 305.6 | | | |
| 12.5 | | | | | | | | | 12.5" Asphalt | | | |
| 1.0 | 304.6 | | | | | | | | 1.0 / 304.6 | | | |
| 23.5 | | | | | | | | | 23.5" Aggregate Subbase | | | |
| 3.0 | 302.6 | | | | | | | | 3.0 / 302.6 | | | |
| | | | | | | | | | <i>Residual</i> , Light brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 12.9 |
| | | | | | | | | | <i>Residual</i> , Light brown, fine SILTY SAND, medium dense, moist, (SM) | | | 27.5 |
| | | | | | | | | | | | | 14.1 |
| <p>Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion.</p> | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.6 feet

PAGE 1 OF 1

19X-NOS-P11

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P12

PAGE 1 OF 1

STATION: 645+72
 LATITUDE: 38.952327° N
 SURFACE ELEVATION: 307.4 ft
 OFFSET: 37 ft RT
 LONGITUDE: 77.195385° W
 COORD. DATUM: NAD 83

| 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: 04/24/2019 - 04/25/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Lance Martin, PE/HDR GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | |
| | 306 | 50/2" | 50 | 1.5 1.7 | | | | 0.0 / 307.4 17.0" Asphalt | | | | |
| 2 | | | | | | | | 1.4 / 306.0 9.4" Aggregate Subbase | | | 10.9 | |
| 4 | 304 | 6 | 0 | 3.5 | | | | 2.2 / 305.2 <i>Residual</i> , Brown, fine SILTY SAND, medium dense, moist, (SM) <i>Residual</i> , Brown, fine SILTY SAND, No Recovery, Gravel in spoon tip, medium dense, moist, (SM) | | | | |
| 6 | 302 | 3 | 7 | 5.5 | | | | <i>Residual</i> , Brown, fine SILTY SAND, contains mica, medium dense, moist, (SM) | | | 18.6 | |
| | 300 | 5 | 9 | 7.5 | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | | |

SPT_LOG\W\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.2 feet

PAGE 1 OF 1

19X-NOS-P12



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P13

PAGE 1 OF 1

STATION: 651+14
 LATITUDE: 38.953551° N
 SURFACE ELEVATION: 301.7 ft
 OFFSET: 56 ft RT
 LONGITUDE: 77.194266° W
 COORD. DATUM: NAD 83

| 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 | 301.7 | | | | | | | | 0.0 / 301.7 33.0" Asphalt | | | |
| 2.75 | 298.95 | | | | | | | | 2.75 / 298.95 9.0" Aggregate Subbase | | | |
| 3.5 | 298.2 | 4 | 70 | | 3.5 | | | | 3.5 / 298.2 <i>Residual</i> , Light brown to red-brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 20.5 |
| 5.5 | 296 | 6 | 15 | | 5.5 | | | | <i>Residual</i> , Light brown, fine to medium SILTY SAND, contains mica, dense, moist, (SM) | | | 10.9 |
| 7.5 | 294 | 10 | 28 | | 7.5 | | | | | | | 11.7 |
| 9.5 | | | | | | | | | Bottom of borehole at 9.5 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.8 feet

PAGE 1 OF 1

19X-NOS-P13

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P16

PAGE 1 OF 1

STATION: 657+79 OFFSET: 41 ft RT
 LATITUDE: 38.955220° N LONGITUDE: 77.193266° W
 SURFACE ELEVATION: 294.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 294.6 | | | | | | | | 0.0 / 294.6 27.0" Asphalt | | | | |
| 2.3 | 292.3 | | | | | | | | 2.3 / 292.3 9.0" "Aggregate Subbase | | | | |
| 3.0 | 291.6 | 2 | 85 | 3 | | | | | 3.0 / 291.6 <i>Residual</i> , Light brown to orange, SANDY LEAN CLAY, stiff, moist, (CL) | 38 | 22 | 29.6 | 59.7 |
| 5.9 | 289.6 | 5 | 7 | 5 | | | | | <i>Residual</i> , Orange, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL) | | | 27.9 | |
| 6.0 | 289.0 | 5 | 100 | 6 | | | | | | | | | |
| 7.0 | 288.0 | 7 | 8 | 7 | | | | | | | | | |
| 8.0 | 286.0 | 4 | 100 | 9 | | | | | <i>Residual</i> , Orange, SANDY LEAN CLAY, stiff, moist, (CL) | | | 24.9 | |
| 9.0 | | 7 | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. Bulk sample collected from 3.0 to 6.0 feet. | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.9 feet

PAGE 1 OF 1

19X-NOS-P16

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P18

PAGE 1 OF 1

STATION: 668+54 OFFSET: 48 ft RT
 LATITUDE: 38.958014° N LONGITUDE: 77.192025° W
 SURFACE ELEVATION: 274.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/29/2019 - 04/29/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | LL | PI | | | |
| | 274 | | | | | | | | 0.0 / 274.9 | 17.5" Asphalt | | | | | | | |
| 2 | | | | | | | | | 1.5 / 273.4 | 18.5" Aggregate Subbase | | | | | | | |
| | 272 | 3 | | | 3 | | | | 3.0 / 271.9 | <i>Residual</i> , Red-brown, black and white, mottled, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 17.9 | | | | |
| 4 | | 6 | | | | | | | | <i>Residual</i> , Red-brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 20.0 | | | | |
| | 270 | 7 | 85 | | 5 | | | | | | | | | | | | |
| 6 | | 8 | 15 | | | | | | | | | | | | | | |
| | 268 | 11 | 100 | | 7 | | | | | <i>Residual</i> , Red-brown, black and white, mottled, fine to coarse SILTY SAND, dense, moist, (SM) | | | 15.0 | | | | |
| 8 | | 12 | 16 | | | | | | | | | | | | | | |
| | 266 | 13 | 100 | | 9 | | | | | | | | | | | | |
| | | 17 | | | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | | | | | |

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.8 feet

PAGE 1 OF 1

19X-NOS-P18



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P19

PAGE 1 OF 1

STATION: 674+83
 LATITUDE: 38.959511° N
 SURFACE ELEVATION: 260.9 ft
 OFFSET: 32 ft RT
 LONGITUDE: 77.191039° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 260.9 | | | | | | | 0.0 / 260.9 16.0" Asphalt | | | | | |
| 1.3 | 259.6 | | | | | | | 1.3 / 259.6 20.0" Aggregate Subbase | | | | | |
| 3.0 | 257.9 | | | | | | | 3.0 / 257.9 <i>Residual</i> , Light brown to red-brown, SANDY LEAN CLAY, very stiff, moist, (CL) | 34 | 12 | 12.6 | 50.1 | |
| 5.9 | 256.0 | | | | | | | <i>Residual</i> , Red, SANDY LEAN CLAY, hard, moist, (CL) | | | 10.7 | | |
| 6.0 | 254.0 | | | | | | | <i>Residual</i> , Red, SANDY LEAN CLAY WITH GRAVEL, very stiff, moist, (CL) | | | 20.4 | | |
| 9.0 | 252.0 | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. Bulk sample collected from 3.0 to 6.0 feet. | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.9 feet

PAGE 1 OF 1

19X-NOS-P19



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P20

PAGE 1 OF 1

STATION: 681+07
 LATITUDE: 38.960676° N
 SURFACE ELEVATION: 247.6 ft
 OFFSET: 22 ft RT
 LONGITUDE: 77.189485° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/30/2019 - 04/30/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | |
| | | | | | | | | | 0.0 / 247.6 | 17.8" Asphalt | | | | | | | |
| 2 | 246 | | | | | | | | 1.5 / 246.1 | 18.3" Aggregate Subbase | | | | | | | |
| 4 | 244 | 7 | 6 | 70 | 3 | | | | 3.0 / 244.6 | <i>Residual</i> , Light brown and white, mottled, fine to coarse SILTY SAND, contains quartz fragments, medium dense, moist, (SM) | | | | | 18.2 | | |
| 6 | 242 | 5 | 8 | 10 | 5 | | | | | <i>Residual</i> , Light brown to gray, fine to coarse SILTY SAND, contains quartz fragments, medium dense, moist, (SM) | | | | | 18.5 | | |
| 8 | 240 | 2 | 5 | 6 | 7 | | | | | <i>Residual</i> , Light brown to yellow-orange, fine to coarse SILTY SAND, contains quartz fragments, loose, moist, (SM) | | | | | 38.6 | | |
| | | 2 | 2 | 90 | 9 | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | | | | | | |

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.3 feet

PAGE 1 OF 1

19X-NOS-P20



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P21

PAGE 1 OF 1

STATION: 687+21
 LATITUDE: 38.961506° N
 SURFACE ELEVATION: 235.3 ft
 OFFSET: 5 ft RT
 LONGITUDE: 77.187613° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| | 234 | | | | | | | 0.0 / 235.3 17.5" Asphalt | | | | | |
| 2 | | 12 | | 2.5 | | | | 1.5 / 233.8 10.0" Aggregate Subbase | | | | | |
| 4 | 232 | 10 | 45 | 3 | | | | 2.3 / 233.0 <i>Residual</i> , Brown, SANDY LEAN CLAY, very stiff, moist, (CL) | 35 | 12 | 12.4 | 56.6 | |
| 6 | 230 | 5 | 9 | 4.5 | | | | <i>Residual</i> , Brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL) | | | 15.3 | | |
| 8 | 228 | 3 | 50 | 6.5 | | | | | | | 15.6 | | |
| | | 6 | 9 | 8.5 | | | | Bottom of borehole at 8.5 feet. Boring backfilled with hole plug, bentonite chips and concrete upon completion. Bulk sample collected from 3.0 to 6.5 ft bgs. | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.1 feet

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19X-NOS-P21

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P22

PAGE 1 OF 1

STATION: 693+13 OFFSET: 12 ft RT
 LATITUDE: 38.962296° N LONGITUDE: 77.185792° W
 SURFACE ELEVATION: 222.7 ft COORD. DATUM: NAD 83

| 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 | | | | | |
| | 222 | | | | | | | | 0.0 / 222.7 17.0" Asphalt | | | |
| 2 | 220 | 11 | | | 2.5 | | | | 1.4 / 221.3 10.0" Aggregate Subbase | | | |
| 4 | 218 | 7 6 | 50 | | 4.5 | | | | 2.2 / 220.5 <i>Residual</i> , Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | | | 16.7 |
| 6 | 216 | 4 5 | 80 | | 6.5 | | | | <i>Residual</i> , Red-brown, fine to coarse SILTY SAND, contains mica, loose, moist, (SM) | | | 19.2 |
| 8 | | 3 4 | 90 | | 8.5 | | | | Bottom of borehole at 8.5 feet. Boring backfilled with hole plug, bentonite chips and concrete upon completion. | | | 19.4 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 6.1 feet

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19X-NOS-P22

SPT_LOG\W\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P23

PAGE 1 OF 1

STATION: 699+13
 LATITUDE: 38.963098° N
 SURFACE ELEVATION: 210.3 ft
 OFFSET: 39 ft RT
 LONGITUDE: 77.183947° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 210.3 | | | | | | | | 0.0 / 210.3 17.0" Asphalt | | | | |
| 2.2 | 208.9 | | | | | | | | 1.4 / 208.9 10.0" Aggregate Subbase | | | | |
| 4.9 | 206.1 | 9 | 80 | | 2.5 | | | | 2.2 / 206.1 <i>Residual</i> , Brown and white, SANDY SILT, contains quartz fragments, stiff, moist, (ML) | | | 16.7 | |
| 6.5 | 204.1 | 4 | 8 | | 4.5 | | | | <i>Residual</i> , Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML) | | | 15.1 | 68.9 |
| 8.5 | 202.1 | 6 | 10 | | 6.5 | | | | Bottom of borehole at 8.5 feet. Boring backfilled with hole plug, bentonite chips and concrete upon completion. | | | 14.4 | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.9 feet

PAGE 1 OF 1

19X-NOS-P23



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P24

PAGE 1 OF 1

STATION: 705+11
 LATITUDE: 38.963991° N
 SURFACE ELEVATION: 196.0 ft
 OFFSET: 53 ft RT
 LONGITUDE: 77.182155° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 04/30/2019 - 05/01/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 2 | 194 | | | | | | | | 0.0 / 196.0 | | | | | | | | | |
| | | | | | | | | | 7.0" Asphalt | | | | | | | | | |
| | | | | | | | | | 0.6 / 195.4 | | | | | | | | | |
| | | | | | | | | | 10.0" Concrete | | | | | | | | | |
| | | | | | | | | | 1.4 / 194.6 | | | | | | | | | |
| | | | | | | | | | 5.5" Cement Treated Aggregate | | | | | | | | | |
| | | | | | | | | | 1.9 / 194.1 | | | | | | | | | |
| 4 | 192 | 8 | 90 | | | | | | 13.5" Aggregate Subbase | | | | | 31 | 8 | 12.2 | 45.3 | |
| | | 11 | 10 | | | | | | 3.0 / 193.0 | | | | | | | | | |
| | | 3 | 100 | | | | | | <i>Residual</i> , Light brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | | | | | | | |
| 6 | 190 | 4 | 23 | | | | | | <i>Residual</i> , Light brown, fine to coarse SILTY SAND, dense, moist, (SM) | | | | | | | 9.5 | | |
| | | 12 | 38 | | | | | | <i>Residual</i> , Light brown and white, mottled, fine to medium SILTY SAND, very dense, moist, (SM) | | | | | | | 12.2 | | |
| 8 | 188 | 36 | 100 | | | | | | | | | | | | | | | |
| | | 28 | 50/6" | | | | | | | | | | | | | | | |
| | | 50/6" | | | | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. Bulk sample collected from 3.0 to 6.0 feet. | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.9 feet

PAGE 1 OF 1

19X-NOS-P24



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P25

PAGE 1 OF 1

STATION: 49+30 OFFSET: 89 ft LT
 LATITUDE: 38.965499° N LONGITUDE: 77.180419° W
 SURFACE ELEVATION: 172.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|--|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/01/2019 - 05/01/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| | | | | | | | | | | LL | PI | | | | | | | |
| | 172 | | | | | | | | 0.0 / 172.9 | | | | | | | | | |
| | | | | | | | | | 11.5" Asphalt | | | | | | | | | |
| 2 | | 12 | | | 2 | | | | 1.0 / 171.9 | | | | | | | | | |
| | | 8 | | | | | | | 12.5" Aggregate Subbase | | | | | | | | | |
| 4 | | 8 | | | 4 | | | | 2.0 / 170.9 | | | | | | | 13.9 | 66.6 | |
| | | 11 | | | | | | | <i>Residual</i> , Light brown and white, mottled, SANDY SILT, very stiff, moist, (ML) | | | | | | | | | |
| 6 | | 17 | | | 6 | | | | 6.0 / 166.9 | | | | | | | 11.5 | | |
| | | 21 | | | | | | | <i>Residual</i> , Light brown and white, mottled, SANDY SILT, very hard, moist, (ML) | | | | | | | | | |
| 6 | | 30 | | | 6 | | | | 6.0 / 166.9 | | | | | | | 10.1 | | |
| | | 33 | | | | | | | <i>Igm</i> , Light brown and white, mottled, SANDY SILT, very hard, moist, (ML) | | | | | | | | | |
| 6 | | 40 | | | 6 | | | | Bottom of borehole at 7.3 feet. | | | | | | | | | |
| | | 50/4" | | | 7.3 | | | | Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5 feet

PAGE 1 OF 1

19X-NOS-P25

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-NOS-P26

PAGE 1 OF 1

STATION: 55+00 OFFSET: 63 ft LT
 LATITUDE: 38.966914° N LONGITUDE: 77.179722° W
 SURFACE ELEVATION: 155.2 ft COORD. DATUM: NAD 83

| 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 | | | | | |
| | 154 | 12 | 85 | 2 | | | | 0.0 / 155.2 4.5" Asphalt | | | | |
| 2 | 152 | 28 | 40 | 4 | | | | 0.4 / 154.8 19.5" Aggregate Subbase | | | | |
| 4 | 150 | 40 | 44 | 6 | | | | 1.6 / 153.6 <i>Residual</i> , Light, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM) | | | 8.0 | |
| 6 | 148 | 20 | 90 | 7.9 | | | | Bottom of borehole at 7.9 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug and concrete upon completion. | | | 7.7 | |
| | | 30 | 42 | | | | | | | | 10.0 | |
| | | 12 | 26 | | | | | | | | | |
| | | 40 | 95 | | | | | | | | | |
| | | 50/5" | | | | | | | | | | |

Date(s) Drilled: 05/01/2019 - 05/01/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.1 feet

PAGE 1 OF 1

19X-NOS-P26

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: RETAINING WALL 03

19X-N-RW01

PAGE 1 OF 2

STATION: 1077+29 **OFFSET:** 53 ft RT
LATITUDE: 38.935469° N **LONGITUDE:** 77.207863° W
SURFACE ELEVATION: 276.3 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 05/20/2019 - 05/20/2019
Drilling Method(s): 3.25" HSA w/ SPTs
SPT Method: Automatic Hammer
Other Test(s): Not Applicable
Driller: M.Fletcher/SaLUT inc.
Logger: Austin Morgan, HDR

LAB DATA

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 276 | | | | | | | | |
| 274 | 4 | 4 | 90 | | | | | |
| 272 | 5 | 5 | 100 | | | | | |
| 270 | 2 | 4 | 65 | | | | | |
| 268 | 2 | 5 | 65 | | | | | |
| 266 | 10 | 10 | 90 | | | | | |
| 264 | | | | | | | | |
| 262 | 2 | 3 | 35 | | | | | |
| 260 | | | | | | | | |
| 258 | 2 | 3 | 100 | | | | | |
| 256 | | | | | | | | |
| 254 | 2 | 1 | 100 | | | | | |
| 252 | | | | | | | | |

| | | | | |
|--------------|---|----|------|------|
| 0.0 / 276.3 | 3.5" Asphalt | | | |
| 0.3 / 276.0 | 14.5" Concrete | | | |
| 1.5 / 274.8 | 6.0" Aggregate Subbase | | 15.5 | |
| 2.0 / 274.3 | Fill, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | 35 | 4 | 24.5 |
| | Fill, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | | | 49.0 |
| 6.0 / 270.3 | Residual, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM) | | | 14.5 |
| | Residual, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM) | | | 11.9 |
| | Residual, Red-brown to gray, fine to coarse SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM) | | | 13.7 |
| | Residual, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica, loose, moist, (SM) | | | 19.4 |
| | Residual, Brown, fine to coarse SILTY SAND WITH GRAVEL, contains mica and quartz fragments, medium dense, moist, (SM) | | | 17.3 |
| 21.5 / 254.8 | Residual, Red-brown, SANDY SILT, contains mica, firm, moist, (ML) | 27 | 3 | 29.3 |
| | | | | 59.1 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19X-N-RW01

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW01

PAGE 2 OF 2

STATION: 1077+29 OFFSET: 53 ft RT
 LATITUDE: 38.935469° N LONGITUDE: 77.207863° W
 SURFACE ELEVATION: 276.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| | | | | | | | | | Date(s) Drilled: 05/20/2019 - 05/20/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: M.Fletcher/SaLUT inc. Logger: Austin Morgan, HDR GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | |
| 26 | 250 | | | | 25 | | | | 26.5 / 249.8 | | | | |
| 28 | 248 | 50/5" | 100 | ⊗ | 28 28.4 | | | | <i>Residual, Brown, SILTY SAND, very dense, moist, (SM)</i> | | | 16.0 | |
| 30 | 246 | | | | | | | | | | | | |
| 32 | 244 | 50/0" | | | 33 | | | | Auger refusal at 33.0 feet. Bottom of borehole at 33.0 feet. Boring backfilled with grout upon completion. | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19X-N-RW01

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW02

PAGE 1 OF 3

STATION: 1082+82 OFFSET: 46 ft RT
 LATITUDE: 38.936875° N LONGITUDE: 77.207122° W
 SURFACE ELEVATION: 270.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/16/2019 - 04/16/2019

LAB DATA

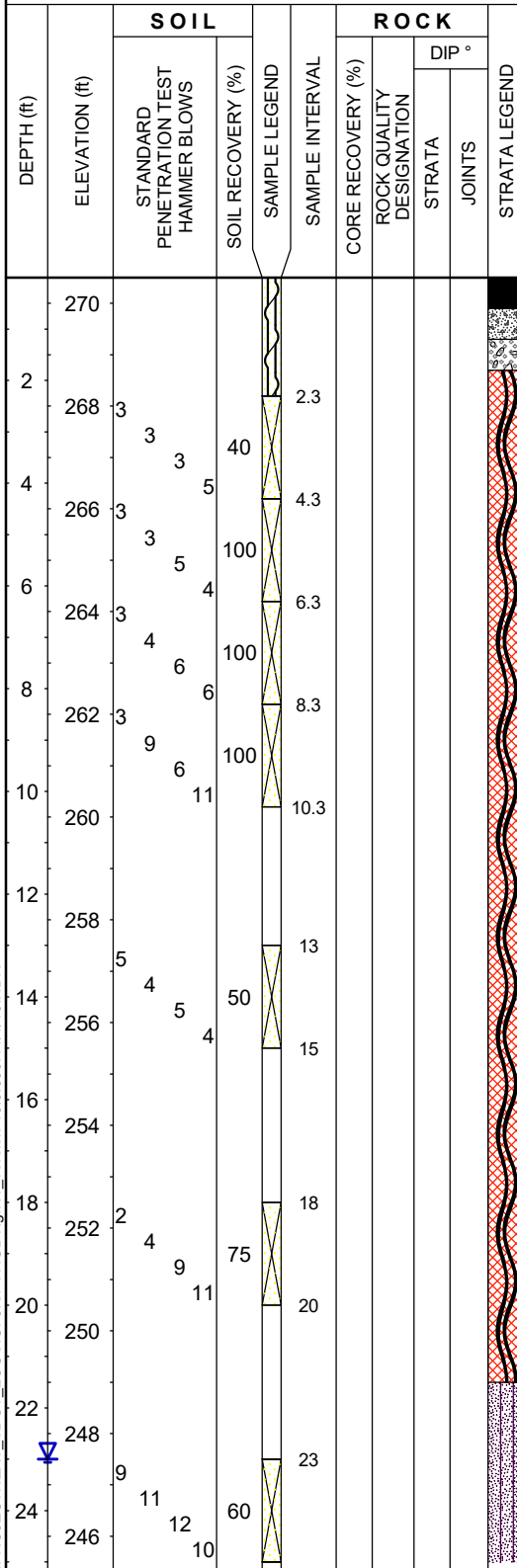
Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 40 | 11 | 19.1 | 43.6 |
| | | 24.2 | |
| | | 17.6 | |
| | | 20.7 | |
| | | 17.4 | |
| | | 26.4 | |
| 30 | 7 | 10.8 | 19.6 |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | ROCK | STRATA LEGEND | LAB DATA |
|------------|----------------|--|------|------------------------|----------|
| 0.0 | 270.5 | | | 0.0 / 270.5 | |
| 7.8 | | | | 7.8" Asphalt | |
| 0.6 | 269.9 | | | 0.6 / 269.9 | |
| 6.8 | | | | 6.8" Concrete | |
| 1.2 | 269.3 | | | 1.2 / 269.3 | |
| 6.5 | | | | 6.5" Aggregate Subbase | |
| 1.8 | 268.7 | | | 1.8 / 268.7 | |
| | | Fill, Brown, fine to coarse SILTY SAND, contains mica, loose, moist, (SM) | | | |
| | | Fill, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | | | |
| 21.5 | 249.0 | | | 21.5 / 249.0 | |
| | | Alluvial, Brown, fine to coarse SILTY SAND WITH GRAVEL, dense, wet, (SM) | | | |



SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37.2 feet

PAGE 1 OF 3

19X-N-RW02



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW02

PAGE 2 OF 3

STATION: 1082+82 OFFSET: 46 ft RT
 LATITUDE: 38.936875° N LONGITUDE: 77.207122° W
 SURFACE ELEVATION: 270.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/16/2019 - 04/16/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| 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 | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | 244 | | | | | | | | 26.5 / 244.0 | | | | |
| 28 | 242 | 7 | | | | | | | <i>Residual</i> , Brown, fine to coarse SILTY SAND, dense, wet, (SM) | | | 29.5 | |
| 30 | 240 | 15 | 22 | 65 | | | | | | | | | |
| 32 | 238 | | | | | | | | | | | | |
| 34 | 236 | 8 | 13 | 65 | | | | | <i>Residual</i> , Brown, fine to coarse SILTY SAND, contains relict rock texture, dense, wet, (SM) | | | 28.5 | |
| 36 | 234 | | | | | | | | | | | | |
| 38 | 232 | 8 | 7 | 100 | | | | | <i>Residual</i> , Brown, fine to coarse SILTY SAND, contains relict rock texture, medium dense, wet, (SM) | | | 22.4 | |
| 40 | 230 | | 13 | | | | | | | | | | |
| 42 | 228 | | | | | | | | 41.5 / 229.0 | | | | |
| 44 | 226 | 50/6" | | 100 | | | | | <i>lgm</i> , Brown, fine to coarse SILTY SAND, contains relict rock texture, very dense, wet, (SM) | 32 | 6 | 17.8 | 40.7 |
| 46 | 224 | | | | | | | | | | | | |
| 48 | 224 | 50/2" | | 100 | | | | | 46.5 / 224.0 | | | | |
| | | | | | | | | | <i>lgm</i> , Brown, fine to coarse CLAYEY GRAVEL, very dense, wet, (GC) | | | 18.7 | |
| | | | | | | | | | Bottom of borehole at 48.2 feet. Boring backfilled with hole plug, bentonite chips and | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37.2 feet

PAGE 2 OF 3

19X-N-RW02

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW02

PAGE 3 OF 3

STATION: 1082+82 OFFSET: 46 ft RT
 LATITUDE: 38.936875° N LONGITUDE: 77.207122° W
 SURFACE ELEVATION: 270.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|--|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| Date(s) Drilled: 04/16/2019 - 04/16/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: M.Fletcher/SaLUT inc. Logger: Joe Wallen, PE/HDR | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 23.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | LL | PI | | | | |
| concrete upon completion. | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 37.2 feet

PAGE 3 OF 3

19X-N-RW02

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 1088+84 OFFSET: 46 ft RT
 LATITUDE: 38.938406° N LONGITUDE: 77.206322° W
 SURFACE ELEVATION: 265.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|--------|---------------|--|---|------------------------------|-------------------------------|-------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | | STRATA LEGEND | Date(s) Drilled: 04/16/2019 - 04/16/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Harsh Patel, HDR | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| | | 264 | | | | | | | | | 0.0 / 265.2 | 12.0" Asphalt | | | | | | | | |
| 1 | 2 | | 20 | | 2 | | | | | | 1.0 / 264.2 | 8.0" Aggregate Subbase | | | | | | | | |
| | | 262 | 7 | 75 | 3 | | | | | | 1.7 / 263.5 | Fill, Gray, fine to coarse SILTY SAND, moist, (SM) | | | | | | | | |
| 0.5 | 4 | | 2 | 6 | 4 | | | | | | 3.0 / 262.2 | Fill, Brown, SANDY SILT, contains mica, moist, (ML) | | | | | | 12.3 | | |
| | | 260 | 5 | 25 | 5 | | | | | | | Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | | | | 19.5 | | |
| 2 | 6 | | 2 | 7 | 6 | | | | | | | Fill, Brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | | | | | | |
| | | 258 | 4 | 80 | 6 | | | | | | | | | | | | 36 | 10 | 21.7 | 59.1 |
| 1 | 8 | | 3 | 7 | 8 | | | | | | | | | | | | | | 21.8 | |
| | | 256 | 8 | 25 | 10 | | | | | | | | | | | | | | | |
| | | 254 | | | | | | | | | | | | | | | | | | |
| | | 252 | 3 | | 13 | | | | | | | | | | | | | | | |
| | | 250 | 4 | 20 | 15 | | | | | | | | | | | | | | | |
| | | 248 | | | | | | | | | 16.5 / 248.7 | Alluvial, Light gray, FAT CLAY WITH SAND, contains mica, stiff, moist, (CH) | | | | | | | | |
| 2.5 | 18 | | 2 | | 18 | | | | | | | | | | | | | | | |
| | | 246 | 3 | 50 | 20 | | | | | | | | | | | | | | | |
| | | 244 | 4 | 6 | 20 | | | | | | | | | | | | | | | |
| | | 242 | 6 | | 23 | | | | | | | | | | | | | | | |
| 2 | 24 | | 4 | 60 | 23 | | | | | | 21.5 / 243.7 | Residual, Brown, SANDY SILT, contains mica, stiff, wet, (ML) | | | | | | 20.2 | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 31.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW04

PAGE 1 OF 2

STATION: 591+54
 LATITUDE: 38.939963° N
 SURFACE ELEVATION: 259.3 ft
 OFFSET: 66 ft RT
 LONGITUDE: 77.205512° W
 COORD. DATUM: NAD 83

FIELD DATA

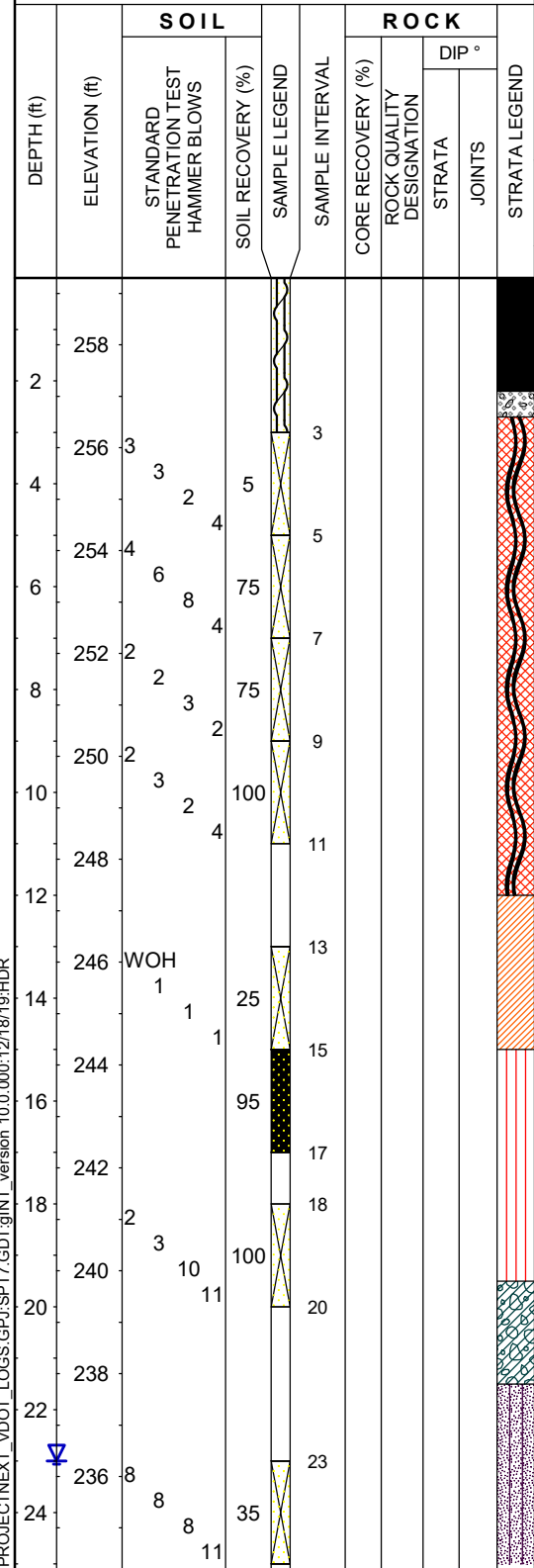
Date(s) Drilled: 04/18/2019 - 04/18/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA



| DEPTH (ft) | ELEVATION (ft) | SOIL | ROCK | STRATA | LAB DATA |
|------------|----------------|------|------|---|-----------------|
| 0.0 | 259.3 | | | 26.0" Asphalt | |
| 2.2 | 257.1 | | | 6.0" Aggregate Subbase | |
| 2.7 | 256.6 | | | Fill, Brown, SILT WITH GRAVEL, contains mica, firm, moist, (ML) | 15.2 |
| 2.7 | 256.6 | | | Fill, Brown, SILT WITH GRAVEL, contains mica, very stiff, moist, (ML) | 13.1 |
| 2.7 | 256.6 | | | Fill, Brown, SILT, contains mica, firm, moist, (ML) | 21.3 |
| 2.7 | 256.6 | | | Fill, Brown, SILT, contains mica, firm, moist, (ML) | 26.3 |
| 12.0 | 247.3 | | | Alluvial, Brown, SANDY LEAN CLAY, contains mica, soft, moist, (CL) | 43 21 25.9 69.9 |
| 15.0 | 244.3 | | | Brown, SILT WITH SAND, Shelby Tube collected from 15.0 to 17.0 ft bgs, (ML) | 41 14 34.9 81.4 |
| 19.5 | 239.8 | | | Alluvial, Brown and gray, mottled, SILT WITH SAND, very stiff, moist, (ML) | 19.3 |
| 19.5 | 239.8 | | | Alluvial, Gray, fine to coarse CLAYEY GRAVEL WITH SAND, moist, (GC) | |
| 21.5 | 237.8 | | | Residual, Brown, SILTY SAND WITH GRAVEL, contains mica, medium dense, moist, (SM) | 38 10 13.6 29.5 |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 15.8 feet

PAGE 1 OF 2

19X-N-RW04

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:12/18/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW04

PAGE 2 OF 2

STATION: 591+54
 LATITUDE: 38.939963° N
 SURFACE ELEVATION: 259.3 ft
 OFFSET: 66 ft RT
 LONGITUDE: 77.205512° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| 234 | | | | | | | | | | | | | |
| 26 | | | | | | | | | 26.5 / 232.8 | | | | |
| 28 | 50/5" | 75 | 28 | 28.4 | | | | | <i>lgm</i> , Brown, SILT WITH GRAVEL, contains relict rock texture and mica, very hard, moist, (ML) | | | 16.8 | |
| 230 | | | | | | | | | | | | | |
| 228 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 226 | 50/6" | 100 | 33 | 33.5 | | | | | <i>lgm</i> , Brown, SILT, contains relict rock texture and mica, very hard, moist, (ML) | | | 19.4 | |
| 34 | | | | | | | | | | | | | |
| 224 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 222 | | | | | | | | | | | | | |
| 38 | 50/4" | 100 | 38 | 38.3 | | | | | Bottom of borehole at 38.3 feet. Boring backfilled with auger cuttings, spider plug, hole plug, and concrete upon completion. | | | 15.9 | |

GROUND WATER
 FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 15.8 feet

PAGE 2 OF 2

19X-N-RW04



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW05

PAGE 1 OF 2

STATION: 597+47
 LATITUDE: 38.941461° N
 SURFACE ELEVATION: 254.1 ft
 OFFSET: 59 ft RT
 LONGITUDE: 77.204702° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/30/2019 - 06/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

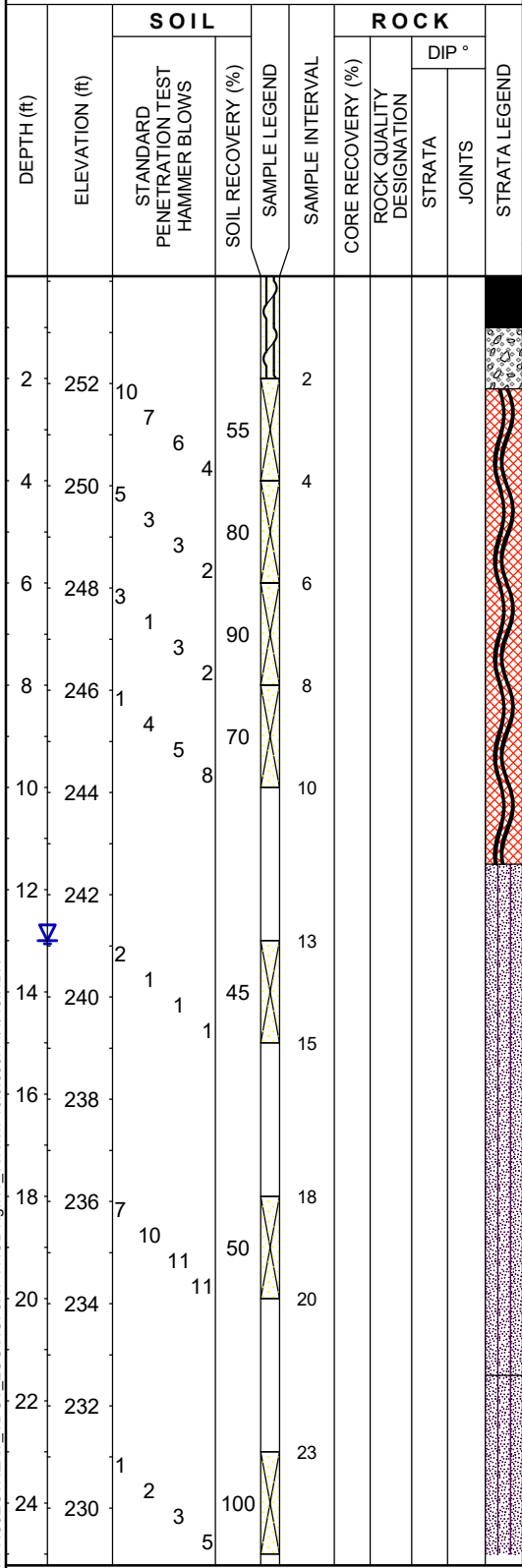
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| 33 | 7 | 20.1 | 45.0 |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 19.8 feet

PAGE 1 OF 2

19X-N-RW05

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW05

PAGE 2 OF 2

STATION: 597+47
 LATITUDE: 38.941461° N
 SURFACE ELEVATION: 254.1 ft
 OFFSET: 59 ft RT
 LONGITUDE: 77.204702° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/30/2019 - 06/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 13.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 25 | | | | | | | | |
| 26 | 228 | | | | | | | |
| 28 | 226 | 2 | 75 | | | | | |
| 30 | 224 | 5 13 33 | | | | | | |
| 32 | 222 | | | | | | | |
| 34 | 220 | 7 14 35 50/4" | 89 | | | | | |
| 36 | 218 | | | | | | | |
| 38 | 216 | 29 50/1" | 100 | | | | | |
| 40 | 214 | | | | | | | |
| 42 | 212 | | | | | | | |
| 44 | 210 | 17 50/4" | 100 | | | | | |
| 46 | 208 | | | | | | | |
| 48 | 206 | 50/5" | 75 | | | | | |

25

26

28

30

32

34

36

38

40

42

44

46

48

Bottom of borehole at 48.4 feet.
 Boring backfilled with auger cuttings, hole plug, grout, and concrete upon completion.

Residual, Red-brown, fine to coarse SILTY SAND, contains mica, medium dense, wet, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM)

36.5 / 217.6

lgm, Brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM)

| | | | |
|----|---|------|------|
| | | | |
| | | 19.3 | |
| 31 | 5 | 8.6 | 34.0 |
| | | | |
| | | 17.6 | |
| | | | |
| | | 17.8 | |
| | | | |
| | | 13.4 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 19.8 feet

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19X-N-RW05

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



STATION: 603+55 OFFSET: 91 ft RT
 LATITUDE: 38.942947° N LONGITUDE: 77.203724° W
 SURFACE ELEVATION: 238.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/12/2019 - 07/12/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 7.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 1 | 0.5 | 238 | 1 | 60 | | | | | |
| | 1 | 236 | 1 | 100 | | | | | |
| | 2 | 234 | 2 | 95 | | | | | |
| | 4 | 232 | 4 | 70 | | | | | |
| | 6 | 230 | 13 | 85 | | | | | |
| | 10 | 228 | 19 | | | | | | |
| | 12 | 226 | | | | | | | |
| | 14 | 224 | 10 | 5 | | | | | |
| | 16 | 222 | | | | | | | |
| | 18 | 220 | 31 | 50 | | | | | |
| | 20 | 218 | | | | | | | |
| | 22 | 216 | | | | | | | |
| 4 | 24 | 214 | 50/4" | 100 | 23 | | | | |

| | | | | |
|--|----|----|------|------|
| 0.0 / 238.3 1.0" Topsoil | | | | |
| 0.1 / 238.2 Alluvial, Brown, SILT, contains mica, soft, moist, (ML) | | | 24.6 | |
| 2.0 / 236.3 Alluvial, Gray to brown, LEAN CLAY WITH SAND, soft, moist, (CL) | 38 | 15 | 31.7 | 84.2 |
| Alluvial, Gray to brown, LEAN CLAY WITH SAND, stiff, moist, (CL) | | | 23.2 | |
| 6.0 / 232.3 Alluvial, Gray, fine to coarse CLAYEY GRAVEL, contains mica, medium dense, moist to wet, (GC) | | | 9.3 | |
| 8.0 / 230.3 Alluvial, Gray, LEAN CLAY, wet, (CL) | | | 16.9 | |
| 8.5 / 229.8 Residual, Brown, GRAVELLY SILT, contains rock fragments, hard, wet, (ML) | | | | |
| Residual, Brown, GRAVELLY SILT, very stiff, wet, (ML) | | | 18.5 | |
| 16.5 / 221.8 | | | | |
| Igm, Red-brown, SILT WITH GRAVEL, contains mica, rock fragments, and relict rock texture, very hard, wet, (ML) | | | 11.2 | |
| Igm, Gray, SILT, contains mica and relict rock texture, very hard, wet, (ML) | | | 15.2 | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 603+55 OFFSET: 91 ft RT
 LATITUDE: 38.942947° N LONGITUDE: 77.203724° W
 SURFACE ELEVATION: 238.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|---------------|------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS | STRATA LEGEND | |
| 4.8 | 26 | 212 | | | | | | | | | | | | | | | |
| | 28 | 210 | 50/2" | 100 | 28 28.2 | | | | | | | | | | | | 14.4 |
| | 30 | 208 | | | | | | | | | | | | | | | |
| | 32 | 206 | | | | | | | | | | | | | | | |
| 4.8 | | | 50/4" | 100 | 33 33.3 | | | | | | | | | | | | 15.4 |
| FIELD DESCRIPTION OF STRATA 1gm, Gray, GRAVELLY SILT, contains rock fragments and mica, very hard, wet, (ML) | | | | | | | | | | | LL | PI | | | | | |
| Bottom of borehole at 33.3 feet. Boring backfilled with auger cuttings upon completion. | | | | | | | | | | | | | | | | | |

Date(s) Drilled: 07/12/2019 - 07/12/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 7.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



STATION: 609+41 OFFSET: 93 ft RT
 LATITUDE: 38.944400° N LONGITUDE: 77.202852° W
 SURFACE ELEVATION: 232.9 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|----------|--------------|------------------|----------------------|------------------------|--|--|--|--|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | LAB DATA | | | | | | | | |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | JOINTS | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) | | | | |
| 2.25 | 28 | 206 | 50/5" | 100 | 28 28.4 | | | | | | | | | | | | | | |
| 1 | 200 | 204 | 50/6" | 100 | 33 33.5 | | | | | | | | | | | | | | |
| | 38 | 198 | 50/2" | 50 | 38 38.2 | | | | | | | | | | | | | | |
| | 194 | 194 | | | | | | | | | | | | | | | | | |

Date(s) Drilled: 07/10/2019 - 07/10/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 8.0 ft DEPTH
 STABILIZED AT 4.9 ft

FIELD DESCRIPTION OF STRATA

31.5 / 201.4

Igm, Brown and black, mottled, SANDY SILT, contains mica and relict rock texture, very hard, wet, (ML)

Igm, Brown, LEAN CLAY, contains mica and relict rock texture, very hard, wet, (CL)

Igm, Brown and gray, mottled, LEAN CLAY, contains mica and relict rock texture, very dense, wet, (CL)

Bottom of borehole at 39.0 feet.
 Boring backfilled with auger cuttings upon completion.

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW08

PAGE 1 OF 2

STATION: 615+18
 LATITUDE: 38.945849° N
 SURFACE ELEVATION: 234.9 ft
 OFFSET: 76 ft RT
 LONGITUDE: 77.202043° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/05/2019 - 07/05/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: B.Strawderman/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 6 | 234 | 4 | 30 | | | | | |
| 2 | 232 | 3 | 60 | | | | | |
| 4 | 230 | 1 | 70 | | | | | |
| 6 | 228 | 2 | 90 | | | | | |
| 8 | 226 | 3 | 80 | | | | | |
| 10 | 224 | | | | | | | |
| 12 | 222 | 2 | | | | | | |
| 14 | 220 | 3 | 85 | | | | | |
| 16 | 218 | | | | | | | |
| 18 | 216 | 22 | 68 | | | | | |
| 20 | 214 | 45 | | | | | | |
| 22 | 212 | 20 | 54 | | | | | |
| 24 | 210 | 30 | | | | | | |

| | | | | | |
|--------------|--|----|----|------|------|
| 0.0 / 234.9 | <i>Fill</i> , Red-brown, fine to coarse CLAYEY GRAVEL, contains rock fragments and mica, medium dense, moist, (GC) | | | 12.1 | |
| 2.0 / 232.9 | <i>Fill</i> , Red-brown, SANDY SILT, contains rock fragments, mica, and relict rock texture, stiff, moist, (ML) | 45 | 13 | 23.5 | 62.1 |
| 4.0 / 230.9 | <i>Alluvial</i> , Gray, LEAN CLAY, contains mica, soft, moist, (CL) | | | 28.6 | |
| | <i>Alluvial</i> , Gray, LEAN CLAY, contains mica and relict rock texture, firm, moist, (CL) | 48 | 23 | 34.2 | 86.3 |
| 8.0 / 226.9 | <i>Alluvial</i> , Light-gray, fine SILT WITH SAND, stiff, moist, (ML) | | | 15.0 | |
| | <i>Alluvial</i> , Dark-gray, fine SILT WITH SAND, firm, moist, (ML) | 37 | 5 | 33.6 | 70.3 |
| 16.5 / 218.4 | <i>Residual</i> , Gray, fine SANDY SILT, contains mica, very hard, moist, (ML) | | | 18.4 | |
| 21.5 / 213.4 | <i>Igm</i> , Gray, fine SANDY SILT, very hard, moist, (ML) | 30 | 4 | 13.3 | 59.5 |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 2

19X-N-RW08

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 03

19X-N-RW08

PAGE 2 OF 2

STATION: 615+18
 LATITUDE: 38.945849° N
 SURFACE ELEVATION: 234.9 ft
 OFFSET: 76 ft RT
 LONGITUDE: 77.202043° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---------------------------------------|------------------------------|-------------------------------|-----------------------------------|-----------------------------|--------------|------------------|----------------------|------------------------|-------|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 07/05/2019 - 07/05/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: B.Strawderman/SaLUT inc. | Logger: Amanda Thomason/HDR | 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 ° | |
| 26 | | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | LL | PI | | |
| 28 | 50/4" | 100 | 28 | 28.3 | | | | | <i>lgm</i> , Brown, fine SANDY SILT, very hard, moist, (ML) | | | | | | | | | | 8.5 | |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | | |
| 34 | 50/4" | 33 | 33 | 33.3 | | | | | <i>lgm</i> , Brown, fine SANDY SILT, very hard, wet, (ML) | | | | | | | | | | 11.5 | |
| 36 | | | | | | | | | | | | | | | | | | | | |
| 198 | 50/2" | 100 | 37 | 37.2 | | | | | <i>lgm</i> , Gray, fine SANDY SILT, contains mica, very hard, wet, (ML) Auger refusal at 37.2 feet. Bottom of borehole at 37.2 feet. Boring backfilled with auger cuttings. | | | | | | | | | | 19.0 | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-N-RW08



STATION: 625+16 OFFSET: 92 ft RT
 LATITUDE: 38.948078° N LONGITUDE: 77.200129° W
 SURFACE ELEVATION: 264.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2020 - 06/20/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 26.0 ft DEPTH
 STABILIZED AT 22.5 ft

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 3 | | | 1 | | | | | | |
| | | | 6 | 75 | | | | | |
| | | | 7 | | | | | | |
| 4.5 | 2 | 262 | 5 | 9 | 2 | | | | |
| | | | 11 | 80 | | | | | |
| | | | 14 | | | | | | |
| 4.5 | 4 | 260 | 8 | 16 | 4 | | | | |
| | | | 8 | | | | | | |
| | | | 13 | 85 | | | | | |
| | | | 14 | | | | | | |
| 3.25 | 6 | 258 | 4 | 14 | 6 | | | | |
| | | | 5 | | | | | | |
| | | | 8 | 90 | | | | | |
| | | | 9 | | | | | | |
| 2.5 | 8 | 256 | 4 | 9 | 8 | | | | |
| | | | 7 | | | | | | |
| | | | 12 | 85 | | | | | |
| | | | 15 | | | | | | |
| 10 | 10 | 254 | | | 10 | | | | |
| | | | 10 | | | | | | |
| | | | 50/6" | 100 | 13 | | | | |
| | | | | | 14 | | | | |
| 16 | 16 | 248 | | | | | | | |
| | | | 18 | | 18 | | | | |
| | | | 31 | 100 | | | | | |
| | | | 50/6" | | 19.5 | | | | |
| 20 | 20 | 244 | | | | | | | |
| | | | 22 | | | | | | |
| | | | 25 | | 23 | | | | |
| | | | 50/5" | 89 | 23.9 | | | | |

0.0 / 264.0
 3.0" Topsoil

0.3 / 263.7
Residual, Red-brown, LEAN CLAY WITH SAND, contains mica, root fragments, and rock fragments, very stiff, moist, (CL)
Residual, Red-brown, LEAN CLAY WITH SAND, contains mica, root fragments, and rock fragments, hard, moist, (CL)
Residual, Red-brown to dark brown, LEAN CLAY WITH SAND, contains mica, relic rock texture, root fragments, and rock fragments, very stiff, moist, (CL)
Residual, Red-brown, LEAN CLAY WITH SAND, contains mica, relic rock texture, root fragments, and rock fragments, very stiff, moist, (CL)

8.0 / 256.0
Residual, Brown, SILT, contains mica, relic rock texture, root fragments, and rock fragments, very stiff, moist, (ML)

11.5 / 252.5

lgn, Light brown, fine to coarse SILTY SAND, contains mica, relict rock texture, root fragments, and rock fragments, very dense, moist, (SM)

| | | | |
|----|----|------|------|
| 42 | 17 | 16.6 | 75.0 |
| | | 11.5 | |
| | | 22.6 | |
| | | 20.1 | |
| | | 12.9 | |
| | | 8.8 | |
| | | 10.5 | |
| | | 9.6 | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.000:11/19:HDR



STATION: 625+16 OFFSET: 92 ft RT
 LATITUDE: 38.948078° N LONGITUDE: 77.200129° W
 SURFACE ELEVATION: 264.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/19/2020 - 06/20/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

LAB DATA

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 26.0 ft DEPTH
 ▽ STABILIZED AT 22.5 ft

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 34 | 5 | 9.0 | 40.9 |
| | | 9.5 | |
| | | 7.1 | |
| | | 9.7 | |
| | | 11.6 | |

FIELD DESCRIPTION OF STRATA

Igm, Light brown, fine to coarse SILTY SAND, contains mica, relict rock texture, and rock fragments, very dense, wet, (SM)

Bottom of borehole at 48.8 feet.
 Boring backfilled with auger cuttings upon

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 238 | 43 50/5" | 100 | | | | | |
| | 26 | 238 | | | | | | | |
| | 28 | 236 | | | | | | | |
| | 30 | 234 | | | | | | | |
| | 32 | 232 | | | | | | | |
| | 34 | 230 | 32 50/4" | 88 | | | | | |
| | 36 | 228 | | | | | | | |
| | 38 | 226 | 50/5" | 100 | | | | | |
| | 40 | 224 | | | | | | | |
| | 42 | 222 | | | | | | | |
| | 44 | 220 | 50/6" | 100 | | | | | |
| | 46 | 218 | | | | | | | |
| | 48 | 216 | 25 50/4" | 100 | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501 **19X-N-RW10**
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 04 **PAGE 3 OF 3**

STATION: 625+16 OFFSET: 92 ft RT
 LATITUDE: 38.948078° N LONGITUDE: 77.200129° W
 SURFACE ELEVATION: 264.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|--------|--------------|------------------|----------------------|------------------------|-------|---------------|
| PKT. PENETROMETER (tsf) | 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 | | | | | DIP ° | STRATA LEGEND |
| | | | | | | | | | | | | | | | | |
| <p>Date(s) Drilled: 06/19/2020 - 06/20/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Amanda Thomason/HDR</p> <p>GROUND WATER ▾ FIRST ENCOUNTERED AT 26.0 ft DEPTH ▾ STABILIZED AT 22.5 ft</p> <p>FIELD DESCRIPTION OF STRATA</p> <p>completion.</p> | | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 630+97 OFFSET: 80 ft RT
 LATITUDE: 38.949258° N LONGITUDE: 77.198800° W
 SURFACE ELEVATION: 283.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/18/2019 - 06/18/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | SAMPLE INTERVAL | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|--------|---------------|-------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | DIP ° |
| 2 | | 282 | 4 | 75 | | | | | | | |
| 3.5 | 2 | 280 | 5 | 95 | 2 | | | | | | |
| 2 | 4 | 278 | 3 | 85 | 4 | | | | | | |
| 2.5 | 6 | 276 | 6 | 85 | 6 | | | | | | |
| 1.25 | 8 | 274 | 3 | 75 | 8 | | | | | | |
| | 10 | 272 | 4 | 90 | 10 | | | | | | |
| 2 | 14 | 268 | 8 | 100 | 15 | | | | | | |
| | 16 | 266 | 3 | 100 | 18 | | | | | | |
| 2 | 18 | 264 | 5 | 100 | 20 | | | | | | |
| | 20 | 262 | 8 | 100 | 23 | | | | | | |
| 1.75 | 22 | 260 | 3 | 100 | 23 | | | | | | |
| | 24 | | 5 | 100 | | | | | | | |

0.0 / 283.3
 2.0" Topsoil

0.2 / 283.1
 Fill, Red-orange, SANDY LEAN CLAY, contains mica, rock fragments, and root fragments, stiff, moist, (CL)
 Fill, Red-brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)
 Fill, Dark brown to light brown, SANDY LEAN CLAY, contains mica and rock fragments, very stiff, moist, (CL)
 Fill, Red-brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)

8.0 / 275.3
 Residual, Red-brown, SANDY SILT, contains mica, very stiff, moist, (ML)

Residual, Red-brown, SANDY SILT, contains mica and relict rock texture, very stiff, moist, (ML)

Residual, Red-brown, SANDY SILT, contains mica and relict rock texture, very stiff, moist, (ML)

Residual, Red-brown and black, mottled, SANDY SILT, contains mica and relict rock texture, stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | 19.1 | |
| | | 16.9 | |
| 35 | 13 | 15.2 | 66.1 |
| | | 25.1 | |
| | | 20.1 | |
| | | 27.5 | |
| 47 | 11 | 28.3 | 64.6 |
| | | 31.4 | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



STATION: 630+97 OFFSET: 80 ft RT
 LATITUDE: 38.949258° N LONGITUDE: 77.198800° W
 SURFACE ELEVATION: 283.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/18/2019 - 06/18/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | 25 | 258 | | | | | | | |
| | 26 | | | | | | | | |
| 2.5 | 28 | 256 | 3 | | | | | | |
| | 28 | 254 | 10 | 100 | | | | | |
| | 30 | | 15 | 20 | | | | | |
| | 32 | 252 | | | | | | | |
| 2.75 | 33 | 250 | 6 | | | | | | |
| | 34 | | 11 | 100 | | | | | |
| | 35 | 248 | 27 | 48 | | | | | |
| | 36 | | | | | | | | |
| | 38 | 246 | 14 | | | | | | |
| 3.25 | 38 | | 31 | 100 | | | | | |
| | 40 | 244 | 50/6" | | | | | | |
| | 42 | | | | | | | | |
| 2 | 43 | 240 | 11 | | | | | | |
| | 44 | | 18 | 94 | | | | | |
| | 44.8 | 238 | 48 | 50/4" | | | | | |
| | 46 | | | | | | | | |
| | 48 | 236 | 13 | | | | | | |
| 3 | 48 | | 24 | 100 | | | | | |
| | 49.8 | 234 | 45 | 50/4" | | | | | |

Residual, Brown and black, mottled, SANDY SILT, contains mica and relict rock texture, hard, moist, (ML)

Residual, Light brown, SANDY SILT, contains mica and relict rock texture, hard, moist, (ML)

36.5 / 246.8

lgm, Light brown, SILT WITH SAND, contains mica and relict rock texture, very hard, wet, (ML)

| | | | |
|----|----|------|------|
| | | | |
| | | 31.5 | |
| | | 18.9 | |
| 45 | 12 | 30.4 | 77.3 |
| | | 29.5 | |
| | | 22.3 | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42.2 feet



PROJECT #: 0495-029-419 R-201, C-501 **19X-N-RW11**
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 04 **PAGE 3 OF 3**

STATION: 630+97 OFFSET: 80 ft RT
 LATITUDE: 38.949258° N LONGITUDE: 77.198800° W
 SURFACE ELEVATION: 283.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|--------|--------------|------------------|----------------------|------------------------|-------|
| PKT. PENETROMETER (tsf) | 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 | | | | | DIP ° |
| | | | | | | | | | | | | | | | |
| <p>Date(s) Drilled: 06/18/2019 - 06/18/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: J.Beavers/SaLUT inc. Logger: Amanda Thomason/HDR</p> <p>GROUND WATER FIRST ENCOUNTERED AT 38.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 49.9 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42.2 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW12

PAGE 1 OF 2

STATION: 637+12
 LATITUDE: 38.950486° N
 SURFACE ELEVATION: 299.1 ft
 OFFSET: 63 ft RT
 LONGITUDE: 77.197314° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/18/2019 - 06/18/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

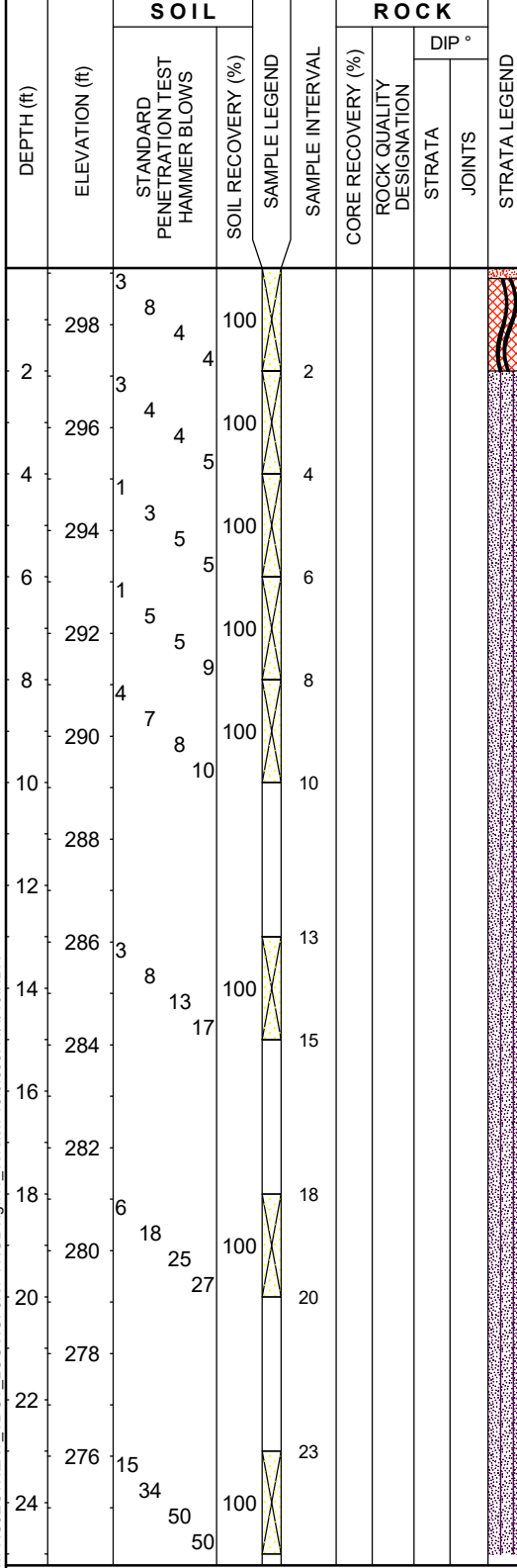
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 4.7 | 15.0 |
| | | 16.5 | |
| | | 18.1 | |
| | | 19.3 | |
| | | 16.9 | |
| 45 | 8 | 15.6 | 46.8 |
| | | 9.3 | |

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI |
|----|----|
| | |
| | |
| | |
| | |
| | |
| 45 | 8 |
| | |



0.0 / 299.1
 2.0" Topsoil

0.2 / 298.9
 Fill, Brown and gray, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM)

2.0 / 297.1
 Residual, Brown, fine to coarse SILTY SAND, contains mica and root fragments, medium dense, moist, (SM)

Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Brown and black, fine to coarse SILTY SAND, contains mica and relict rock texture, medium dense, moist, (SM)

Residual, Brown and black, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 35.9 feet

PAGE 1 OF 2

19X-N-RW12

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW12

PAGE 2 OF 2

STATION: 637+12
 LATITUDE: 38.950486° N
 SURFACE ELEVATION: 299.1 ft
 OFFSET: 63 ft RT
 LONGITUDE: 77.197314° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/18/2019 - 06/18/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Joe Wallen, PE/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 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 ° | |
| 25 | | | | | | | | |
| 26 | | | | | | | | |
| 27.2 | | | | | | | | |
| 28 | 26 | 50/6" | 100 | 28 | | | | |
| 27.0 | | | | 29 | | | | |
| 30 | | | | | | | | |
| 26.8 | | | | | | | | |
| 32 | | | | | | | | |
| 26.6 | 20 | 33 | 100 | 33 | | | | |
| 34 | 33 | 50/6" | | 34.5 | | | | |
| 26.4 | | | | | | | | |
| 36 | | | | | | | | |
| 26.2 | | | | | | | | |
| 38 | 35 | 50/5" | 100 | 38 | | | | |
| 26.0 | | | | 38.9 | | | | |
| 40 | | | | | | | | |
| 25.8 | | | | | | | | |
| 42 | | | | | | | | |
| 25.6 | 4 | 33 | 85 | 43 | | | | |
| 44 | | 50/4" | | 44.3 | | | | |

26.5 / 272.6

Igm, Brown and black, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

8.4

Igm, Brown and black, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

33 5 6.5 38.3

Igm, Brown and gray, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

8.2

Igm, Brown and gray, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

9.6

Bottom of borehole at 44.3 feet.
 Boring backfilled with auger cuttings upon completion.

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 35.9 feet

PAGE 2 OF 2

19X-N-RW12

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ-SPT7.GDT.gINT_ version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW13

PAGE 1 OF 3

STATION: 642+94
 LATITUDE: 38.951606° N
 SURFACE ELEVATION: 310.5 ft
 OFFSET: 104 ft RT
 LONGITUDE: 77.195817° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/22/2019 - 05/22/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 41 | 12 | 19.8 | 64.0 |
| | | 31.4 | |
| | | 13.6 | |
| | | 22.8 | |
| | | 24.9 | |
| | | 27.5 | |
| | | 22.4 | |
| | | 30.2 | |

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° |
| 310 | 2 | 2 | 65 | | | | | |
| | | 2 | | | | | | |
| | | 2 | | | | | | |
| 308 | 2 | 9 | 20 | | | | | |
| | | 9 | | | | | | |
| | | 10 | | | | | | |
| 306 | 5 | 5 | 80 | | | | | |
| | | 6 | | | | | | |
| | | 6 | | | | | | |
| 304 | 3 | 3 | 5 | | | | | |
| | | 6 | | | | | | |
| | | 7 | | | | | | |
| 302 | 5 | 9 | 60 | | | | | |
| | | 13 | | | | | | |
| | | 13 | | | | | | |
| 300 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 298 | | | | | | | | |
| | | 3 | | | | | | |
| | | 6 | | | | | | |
| 296 | | 10 | 90 | | | | | |
| | | 12 | | | | | | |
| | | | | | | | | |
| 294 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 292 | | 6 | | | | | | |
| | | 7 | | | | | | |
| | | 12 | 100 | | | | | |
| | | 15 | | | | | | |
| 290 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 288 | | | | | | | | |
| | | 10 | | | | | | |
| | | 20 | | | | | | |
| 286 | | 28 | 100 | | | | | |
| | | 40 | | | | | | |

0.0 / 310.5
Residual, Red-brown, SANDY SILT, contains rock fragments, firm, moist, (ML)

Residual, Light-brown to red-brown, SANDY SILT, contains organic matter, very stiff, moist, (ML)

Residual, Light-brown to red-brown, SANDY SILT, contains organic matter, stiff, moist, (ML)

Residual, Light-brown to red-brown, SANDY SILT, contains quartz fragments, stiff, moist, (ML)

Residual, Light-brown to red-orange, SANDY SILT, very stiff, moist, (ML)

Residual, Red-orange, SANDY SILT, contains organic matter, very stiff, moist, (ML)

Residual, Red-brown and black, mottled, SANDY SILT, contains organic matter, very hard, moist, (ML)

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39.8 feet

PAGE 1 OF 3

19X-N-RW13

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW13

PAGE 2 OF 3

STATION: 642+94
 LATITUDE: 38.951606° N
 SURFACE ELEVATION: 310.5 ft
 OFFSET: 104 ft RT
 LONGITUDE: 77.195817° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/22/2019 - 05/22/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|

| 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 | | | | | | |
| 25 | | | | | | | | | | | | | |
| 26 | 284 | | | | | | | | | | | | |
| 28 | 282 | 12 20 38 41 | 100 | X | | | | | <i>Residual, Yellow-orange and black, mottled, SANDY SILT, contains mica, very hard, moist, (ML)</i> | | | 21.7 | |
| 30 | 280 | | | | | | | | | | | | |
| 32 | 278 | | | | | | | | | | | | |
| 34 | 276 | 6 18 26 30 | 100 | X | | | | | <i>Residual, Yellow-orange and black, mottled, SANDY SILT, contains mica, hard, moist, (ML)</i> | | | 34.3 | |
| 36 | 274 | | | | | | | | | | | | |
| 38 | 272 | 13 24 40 50/6" | 100 | X | | | | | <i>Residual, Yellow-orange and black, mottled, SANDY SILT, contains mica, very hard, moist, (ML)</i> | | | 23.4 | |
| 40 | 270 | | | | | | | | | | | | |
| 42 | 268 | | | | | | | | 41.5 / 269.0 | | | | |
| 44 | 266 | 13 30 50/4" | 108 | X | | | | | <i>lgm, Light-brown and black, mottled, SANDY SILT, contains mica, very hard, wet, (ML)</i> | 36 | 6 | 21.9 | 56.4 |
| 46 | 264 | | | | | | | | | | | | |
| 48 | 262 | 20 39 50/4" | 100 | X | | | | | | | | 19.7 | |
| 50 | | | | | | | | | | | | | |

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39.8 feet

PAGE 2 OF 3

19X-N-RW13



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW13

PAGE 3 OF 3

STATION: 642+94 OFFSET: 104 ft RT
 LATITUDE: 38.951606° N LONGITUDE: 77.195817° W
 SURFACE ELEVATION: 310.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|-------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/22/2019 - 05/22/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 43.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings. | | | | LL | PI | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39.8 feet

PAGE 3 OF 3

19X-N-RW13

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW14

PAGE 1 OF 3

STATION: 14+76
 LATITUDE: 38.952768° N
 SURFACE ELEVATION: 308.0 ft
 OFFSET: 34 ft RT
 LONGITUDE: 77.194536° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/23/2019 - 04/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

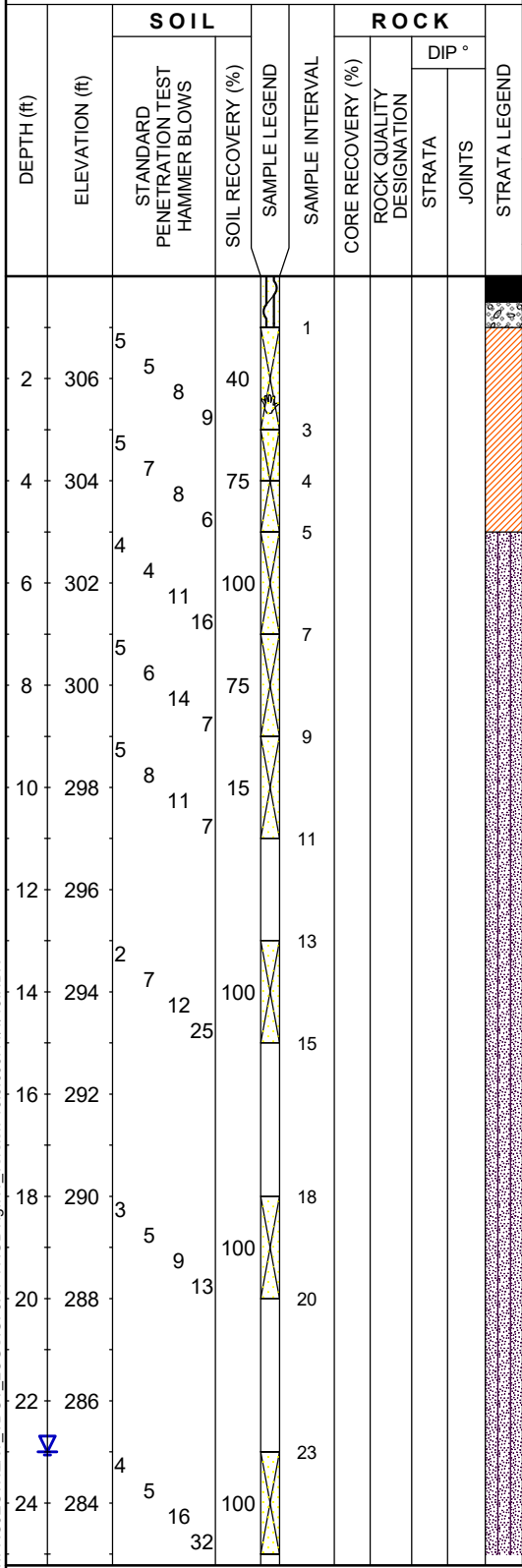
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 38 | 15 | 2.6 | 59.1 |
| | | 12.3 | |
| | | 15.7 | |
| | | 15.1 | |
| | | 11.6 | |
| | | 18.4 | |
| | | 20.1 | |
| 38 | 7 | 17.7 | 43.3 |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 22 feet

PAGE 1 OF 3

19X-N-RW14

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW14

PAGE 2 OF 3

STATION: 14+76 OFFSET: 34 ft RT
 LATITUDE: 38.952768° N LONGITUDE: 77.194536° W
 SURFACE ELEVATION: 308.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/23/2019 - 04/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

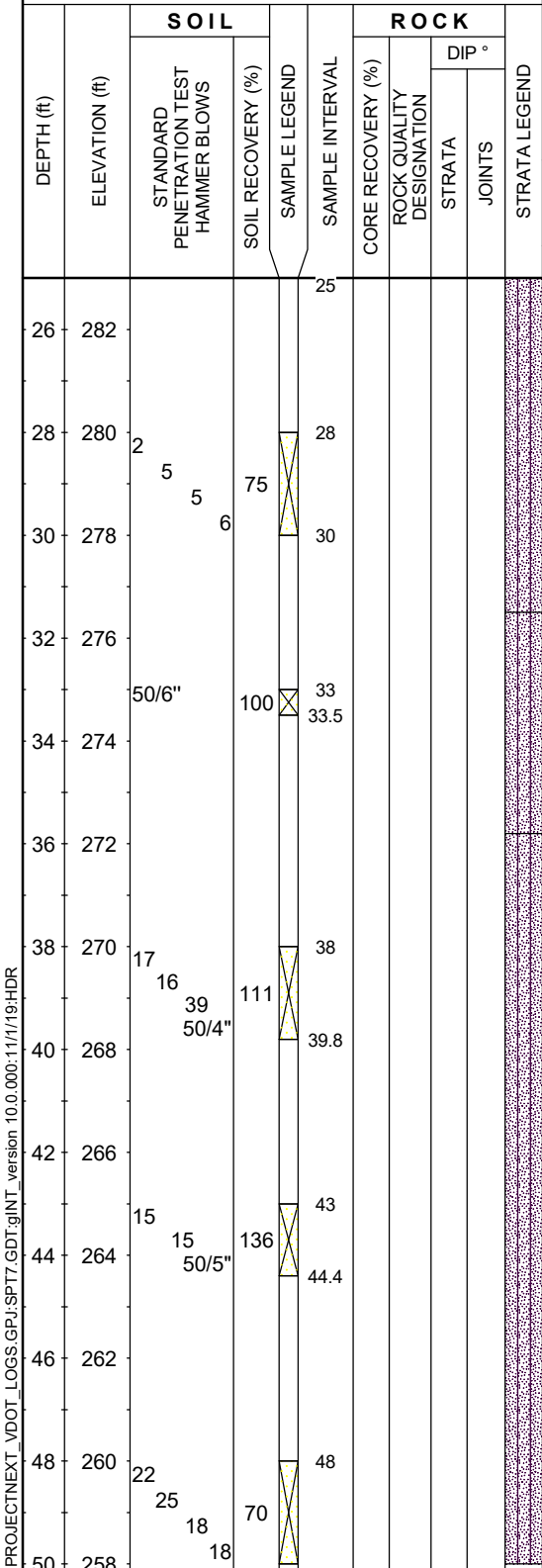
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 23.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



Residual, Light brown to light gray, fine to medium SILTY SAND, medium dense, wet, (SM)

Igm, Light brown, fine to coarse SILTY SAND, very dense, wet, (SM)

Igm, Light brown to dark brown, fine to medium SILTY SAND, very dense, wet, (SM)

Igm, Light brown to dark brown, fine to coarse SILTY SAND, very dense, wet, (SM)

32.1

17.6

21.1

17.0

22.1

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 22 feet

PAGE 2 OF 3

19X-N-RW14



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW14

PAGE 3 OF 3

STATION: 14+76 OFFSET: 34 ft RT
 LATITUDE: 38.952768° N LONGITUDE: 77.194536° W
 SURFACE ELEVATION: 308.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|--------------------------------|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 04/23/2019 - 04/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Jacob Moorman, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 23.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings, holeplug, and grout upon completion. Bulk sample collected from 1.0 to 4.0 feet. | | | | LL | PI | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 22 feet

PAGE 3 OF 3

19X-N-RW14

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 14+60 OFFSET: 1 ft RT
 LATITUDE: 38.955609° N LONGITUDE: 77.192784° W
 SURFACE ELEVATION: 297.3 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/28/2019 - 04/29/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

GROUND WATER
 FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 296 | 8 | 80 | | | | | |
| 1 | 2 | 294 | 3 | 70 | | | | | |
| 1 | 4 | 292 | 3 | 90 | | | | | |
| 1.75 | 6 | 290 | 5 | 95 | | | | | |
| 2 | 8 | 288 | 6 | 85 | | | | | |
| | 10 | 286 | 9 | | | | | | |
| | 12 | 284 | 2 | | | | | | |
| | 14 | 282 | 3 | 65 | | | | | |
| | 16 | 280 | 5 | | | | | | |
| | 18 | 278 | 2 | 100 | | | | | |
| | 20 | 276 | 4 | | | | | | |
| | 22 | 274 | 6 | | | | | | |
| | 24 | 273 | 3 | 100 | | | | | |

0.0 / 297.3
Fill, Gray, fine SILTY GRAVEL, loose, moist, (GM)

0.3 / 297.0
Fill, Brown, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM)

2.0 / 295.3
Residual, Brown, SANDY SILT, contains mica, firm, moist, (ML)
Residual, Brown, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Brown, SANDY SILT, contains mica, very stiff, moist, (ML)

Residual, Brown, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Brown, SANDY SILT, contains mica, firm, moist, (ML)

Residual, Brown to light brown, SANDY SILT, contains mica and rock fragments, very stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | | |
| 39 | 12 | 18.6 | 59.9 |
| | | 22.5 | |
| | | 18.2 | |
| | | 22.0 | |
| | | 22.8 | |
| | | 35.1 | |
| | | 22.8 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW16

PAGE 1 OF 3

STATION: 665+65 OFFSET: 50 ft RT
 LATITUDE: 38.957259° N LONGITUDE: 77.192331° W
 SURFACE ELEVATION: 281.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 04/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| LL | PI | | |

GROUND WATER
 FIRST ENCOUNTERED AT 29.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| 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 | 281.5 | | | | | | | | 16.0" Asphalt | | | | |
| 1.3 | 280.2 | | | | | | | | 8.0" Aggregate Subbase | | | 12.3 | |
| 2.0 | 279.5 | | | | | | | | Fill, Brown, fine to coarse SILTY GRAVEL, moist, (GM) | | | 38.4 | |
| 3.0 | 278.5 | | | | | | | | Residual, Brown, SANDY ELASTIC SILT, moist, (MH) | | | 38.3 | |
| | | | | | | | | | Residual, Brown, SANDY ELASTIC SILT, very stiff, moist, (MH) | | | 39.8 | |
| | | | | | | | | | Residual, Brown, SANDY ELASTIC SILT, stiff, moist, (MH) | | | | |
| | | | | | | | | | Residual, Brown, SANDY ELASTIC SILT, very stiff, moist, (MH) | | | | |
| | | | | | | | | | Residual, Brown to light brown, SANDY ELASTIC SILT, contains rock fragments, stiff, moist, (MH) | 51 | 12 | 36.3 | 69.5 |
| | | | | | | | | | Residual, Light-brown, SANDY SILT, contains rock fragments and mica, hard, moist, (ML) | | | 10.6 | |
| | | | | | | | | | Residual, Light-brown, SANDY SILT, contains rock fragments and mica, hard, moist, (ML) | | | 19.8 | |

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

PAGE 1 OF 3

19X-N-RW16



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW16

PAGE 2 OF 3

STATION: 665+65 OFFSET: 50 ft RT
 LATITUDE: 38.957259° N LONGITUDE: 77.192331° W
 SURFACE ELEVATION: 281.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 04/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Lance Martin, PE/HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 29.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 25 | 256 | | | | | | | |
| 26 | 254 | 12 | 33 | 50/5" | 100 | 28 | 29.4 | |
| 28 | 252 | | | | | | | |
| 30 | 250 | | | | | | | |
| 32 | 248 | 28 | 50/5" | | 100 | 33 | 33.9 | |
| 34 | 246 | | | | | | | |
| 36 | 244 | | | | | | | |
| 38 | 242 | 23 | 50/4" | | 100 | 38 | 38.8 | |
| 40 | 240 | | | | | | | |
| 42 | 238 | 17 | 50/4" | | 100 | 43 | 43.8 | |
| 44 | 236 | | | | | | | |
| 46 | 234 | | | | | | | |
| 48 | 232 | 13 | 14 | 25 | 75 | 48 | | |
| 50 | | 35 | | | | | | |

26.5 / 255.0

lgm, Light-brown, SANDY SILT, contains rock fragments, very hard, moist to wet, (ML)

lgm, Light-brown, SANDY SILT, contains rock fragments, very hard, wet, (ML)

lgm, Light-brown, SANDY SILT, contains rock fragments, hard, wet, (ML)

| | | | |
|----|----|------|------|
| 37 | 10 | 11.2 | 51.9 |
|----|----|------|------|

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

PAGE 2 OF 3

19X-N-RW16



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW16

PAGE 3 OF 3

STATION: 665+65 OFFSET: 50 ft RT
 LATITUDE: 38.957259° N LONGITUDE: 77.192331° W
 SURFACE ELEVATION: 281.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|---|---------------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------|--------------|------------------|----------------------|------------------------|--------|--------|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 04/30/2019 - 04/30/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Beavers/SaLUT inc. | Logger: Lance Martin, PE/HDR | 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 | | |
| | 15 | 30 | 100 | | | | | | | <p>GROUND WATER</p> <p>▼ FIRST ENCOUNTERED AT 29.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> <p><i>lgm</i>, Light-brown, SANDY SILT, contains rock fragments, very hard, wet, (ML)</p> <p>Bottom of borehole at 51.3 feet. Boring backfilled with auger cuttings, spider plug, and grout upon completion.</p> | | | | | | | | | | | | | |
| | | 50/4" | | | 50 | | | | | | | | | | | | | 14.2 | | | | | |
| | | | | | 51.3 | | | | | | | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 45 feet

PAGE 3 OF 3

19X-N-RW16



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW17

PAGE 1 OF 3

STATION: 671+71
 LATITUDE: 38.958800° N
 SURFACE ELEVATION: 267.4 ft
 OFFSET: 38 ft RT
 LONGITUDE: 77.191612° W
 COORD. DATUM: NAD 83

FIELD DATA

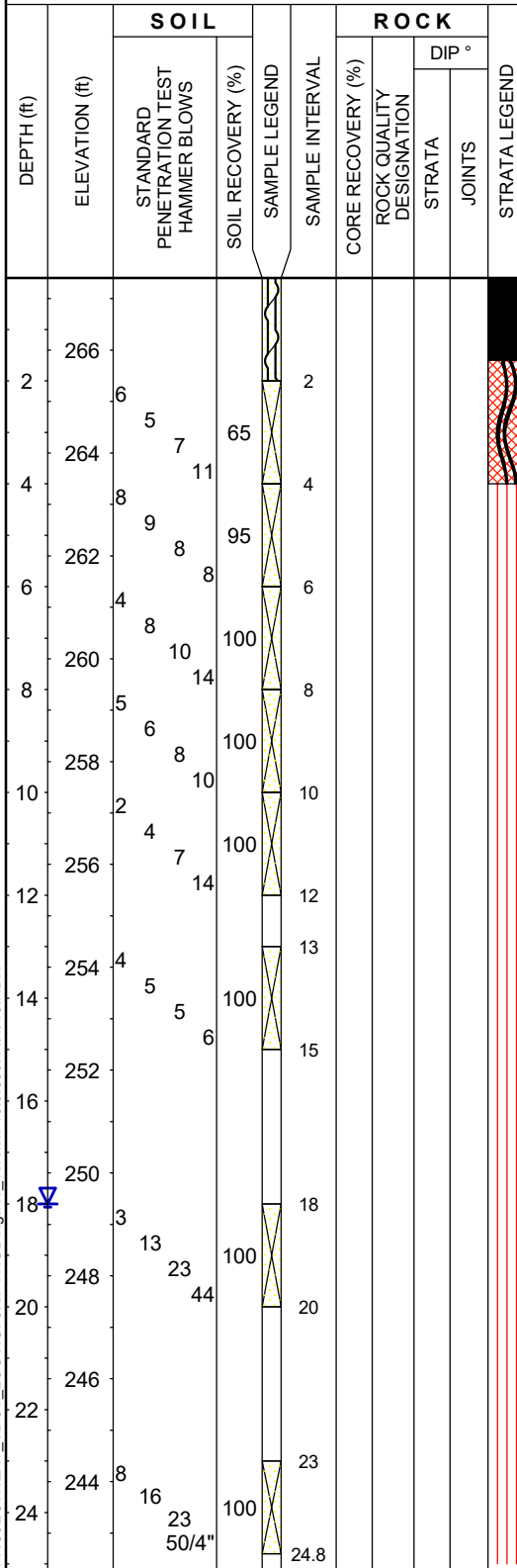
Date(s) Drilled: 05/30/2019 - 05/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 18.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA



REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29.3 feet

PAGE 1 OF 3

19X-N-RW17

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW17

PAGE 2 OF 3

STATION: 671+71
 LATITUDE: 38.958800° N
 SURFACE ELEVATION: 267.4 ft
 OFFSET: 38 ft RT
 LONGITUDE: 77.191612° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/30/2019 - 05/30/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: M.Fletcher/SaLUT inc.
 Logger: Andy Lewis, S&ME

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

GROUND WATER
 FIRST ENCOUNTERED AT 18.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 242 | | | | | | | | |
| 26 | | | | | | | | |
| 240 | | | | | | | | |
| 28 | | 15 | | 28 | | | | |
| 238 | | 25 | | | | | | |
| 30 | | 44 | 100 | 29.9 | | | | |
| 236 | | 50/5" | | | | | | |
| 32 | | | | | | | | |
| 234 | | 13 | | 33 | | | | |
| 34 | | 33 | 100 | 34.4 | | | | |
| 36 | | 50/5" | | | | | | |
| 232 | | | | | | | | |
| 230 | | | | | | | | |
| 38 | | 24 | | 38 | | | | |
| 228 | | 22 | 80 | 40 | | | | |
| 40 | | 42 | | | | | | |
| 226 | | 50/6" | | | | | | |
| 42 | | | | | | | | |
| 224 | | 16 | | 43 | | | | |
| 44 | | 40 | 50 | 44.4 | | | | |
| 222 | | 50/5" | | | | | | |
| 46 | | | | | | | | |
| 220 | | | | | | | | |
| 48 | | 16 | 100 | 48 | | | | |
| | | 50/4" | | 48.8 | | | | |

Residual, Red-brown, SANDY SILT, contains mica, very hard, wet, (ML)

31.5 / 235.9

lgm, Red-brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM)

lgm, Red-brown, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM)

Bottom of borehole at 48.8 feet.
 Boring backfilled with auger cuttings, bentonite chips, hole

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 20.4 | |
| | | 22.5 | |
| 33 | 7 | 18.0 | 44.3 |
| | | 18.8 | |
| | | 16.2 | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29.3 feet

PAGE 2 OF 3

19X-N-RW17

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16

19X-N-RW17

PAGE 3 OF 3

STATION: 671+71 OFFSET: 38 ft RT
 LATITUDE: 38.958800° N LONGITUDE: 77.191612° W
 SURFACE ELEVATION: 267.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---------------------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/30/2019 - 05/30/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: M.Fletcher/SaLUT inc. | Logger: Andy Lewis, S&ME | 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 | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 18.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA plug, and concrete upon completion. | | | | | | LL | PI | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 29.3 feet

PAGE 3 OF 3

19X-N-RW17

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16/18

19X-N-RW18

PAGE 1 OF 3

STATION: 11+65
 LATITUDE: 38.959958° N
 SURFACE ELEVATION: 274.0 ft

OFFSET: 17 ft RT
 LONGITUDE: 77.190102° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/14/2019 - 05/14/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

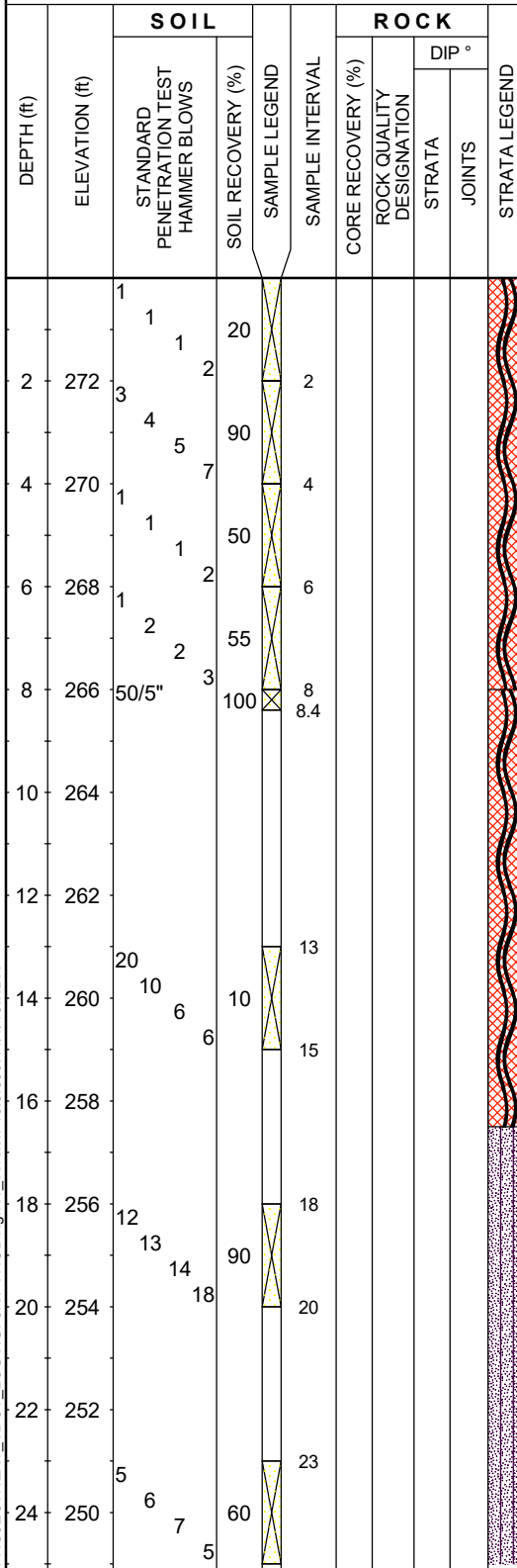
LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| 39 | 14 | 22.5 | 50.6 |

GROUND WATER
 FIRST ENCOUNTERED AT 39.0 ft DEPTH
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | 20.2 | |
| | | 25.3 | |
| | | 22.5 | 50.6 |
| | | 26.0 | |
| | | 14.6 | |
| | | 24.2 | |



REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19X-N-RW18

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16/18

19X-N-RW18

PAGE 2 OF 3

STATION: 11+65 OFFSET: 17 ft RT
 LATITUDE: 38.959958° N LONGITUDE: 77.190102° W
 SURFACE ELEVATION: 274.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/14/2019 - 05/14/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Beavers/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| 40 | 10 | 14.0 | 46.8 |
| | | 16.9 | |
| | | 17.9 | |
| | | 16.4 | |
| | | 26.5 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 39.0 ft DEPTH
 DRY AFTER 24 HRS

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|

| 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 ° | | STRATA |
| 25 | | | | | | | | | | |
| 26 | 248 | | | | | | | | | |
| 28 | 246 | 12 | | | | | | | | |
| | | 13 | | | | | | | | |
| | | 26 | | | | | | | | |
| | | 50/5" | 100 | | | | | | | |
| 30 | 244 | | | | | | | | | |
| | | | | | | | | | | |
| 32 | 242 | | | | | | | | | |
| | | | | | | | | | | |
| 34 | 240 | 12 | | | | | | | | |
| | | 15 | | | | | | | | |
| | | 20 | | | | | | | | |
| | | 25 | 100 | | | | | | | |
| 36 | 238 | | | | | | | | | |
| | | | | | | | | | | |
| 38 | 236 | 8 | | | | | | | | |
| | | 14 | | | | | | | | |
| | | 14 | | | | | | | | |
| | | 18 | 100 | | | | | | | |
| 40 | 234 | | | | | | | | | |
| | | | | | | | | | | |
| 42 | 232 | | | | | | | | | |
| | | | | | | | | | | |
| 44 | 230 | 17 | | | | | | | | |
| | | 35 | | | | | | | | |
| | | 50/4" | 100 | | | | | | | |
| 46 | 228 | | | | | | | | | |
| | | | | | | | | | | |
| 48 | 226 | 3 | | | | | | | | |
| | | 4 | | | | | | | | |
| | | 5 | | | | | | | | |
| | | 15 | | | | | | | | |
| 50 | 224 | 8 | | | | | | | | |

Residual, Light brown to yellow-orange, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

Residual, Light brown to yellow-orange, fine to coarse SILTY SAND, contains mica, dense, moist, (SM)

Residual, Light gray to light brown, mottled, fine to coarse SILTY SAND, contains mica, dense, moist to wet, (SM)

Residual, Brown, orange and white, mottled, fine to coarse SILTY SAND, contains mica and rock fragments, very dense, wet, (SM)

Residual, Light brown to orange, fine to coarse SILTY SAND, medium dense, wet, (SM)

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 3

19X-N-RW18

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 16/18

19X-N-RW18

PAGE 3 OF 3

STATION: 11+65 OFFSET: 17 ft RT
 LATITUDE: 38.959958° N LONGITUDE: 77.190102° W
 SURFACE ELEVATION: 274.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | |
| | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 39.0 ft DEPTH DRY AFTER 24 HRS | | | | | |
| | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled filled with auger cuttings upon completion. | | | | | |
| | | | | | | | | LL | PI | | | | |

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19X-N-RW18

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 19

19X-N-RW20

PAGE 1 OF 2

STATION: 690+31
 LATITUDE: 38.961761° N
 SURFACE ELEVATION: 219.6 ft
 OFFSET: 72 ft RT
 LONGITUDE: 77.186545° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/24/2019 - 05/24/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

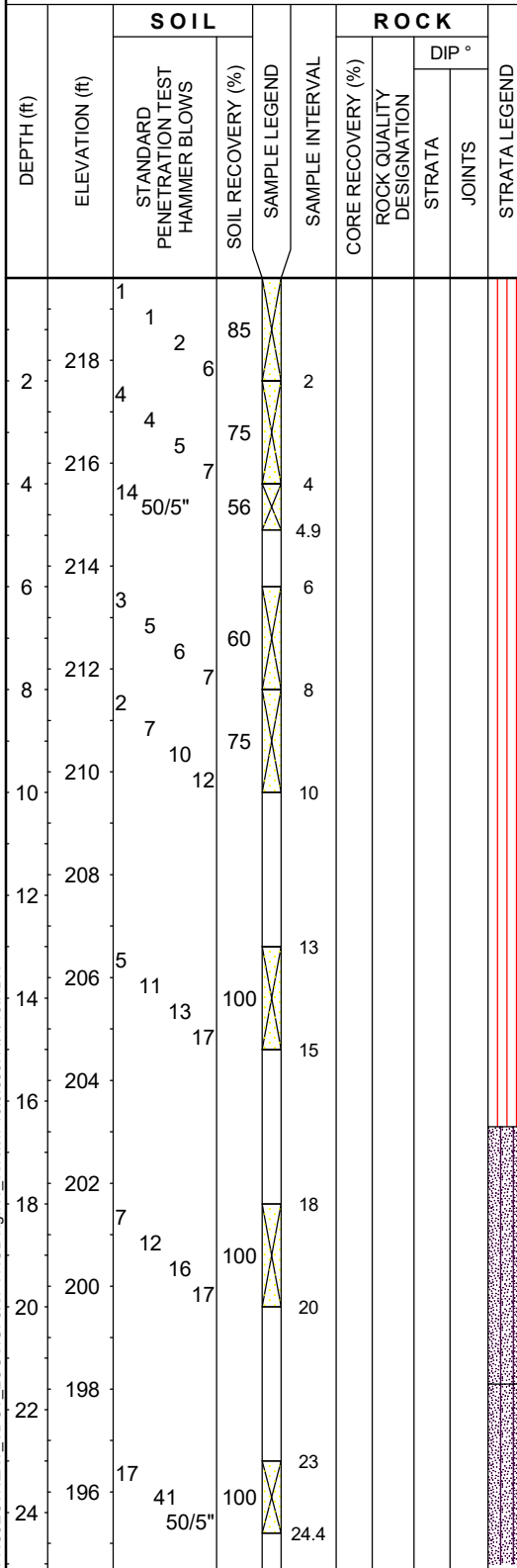
LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | 19.2 | |
| 38 | 11 | 21.3 | 74.3 |
| | | 21.2 | |
| | | 13.0 | |
| | | 13.4 | |
| 44 | 9 | 20.2 | 73.4 |
| | | 13.6 | |
| | | 10.3 | |



0.0 / 219.6
Residual, Light brown, SILT WITH SAND, contains mica, soft, moist, (ML)

218
Residual, Light brown to red-brown, SILT WITH SAND, contains mica, stiff, moist, (ML)

216
Residual, Red-brown and black, mottled, SILT WITH SAND, contains mica, very hard, moist, (ML)

214
Residual, Light brown, SILT WITH SAND, contains mica, stiff, moist, (ML)

212
Residual, Red-brown and black, mottled, SILT WITH SAND, contains mica, very stiff, moist, (ML)

210
Residual, Red-brown and black, mottled, SILT WITH SAND, contains mica, hard, moist, (ML)

208

 16.5 / 203.1

202
Residual, Light brown, black and white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, dense, moist, (SM)

200

 21.5 / 198.1

198
lgm, Light brown, black and white, mottled, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

196
 24.4

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 43.7 feet

PAGE 1 OF 2

19X-N-RW20

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 19

19X-N-RW20

PAGE 2 OF 2

STATION: 690+31
 LATITUDE: 38.961761° N
 SURFACE ELEVATION: 219.6 ft
 OFFSET: 72 ft RT
 LONGITUDE: 77.186545° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/24/2019 - 05/24/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

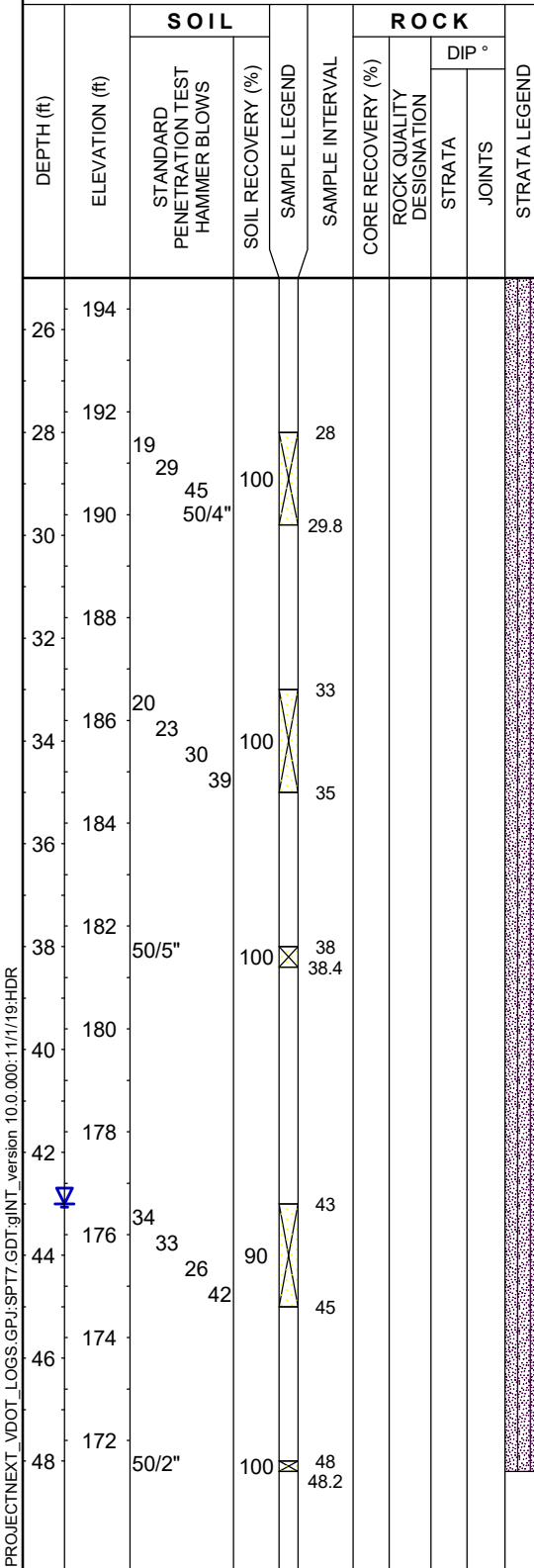
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



lgm, Light brown, black and white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, very dense, moist, (SM)

lgm, Light brown, black and white, mottled, fine to coarse SILTY SAND, contains mica and quartz fragments, very dense, wet, (SM)

Bottom of borehole at 48.2 feet.
 Boring backfilled with auger cuttings upon completion.

10.7

12.4

13.0

29.2

15.9

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 43.7 feet

PAGE 2 OF 2

19X-N-RW20

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 26

19X-N-RW21

PAGE 1 OF 2

STATION: 15+22
 LATITUDE: 38.962538° N
 SURFACE ELEVATION: 217.9 ft

OFFSET: 16 ft LT
 LONGITUDE: 77.184741° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/23/2019 - 05/24/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

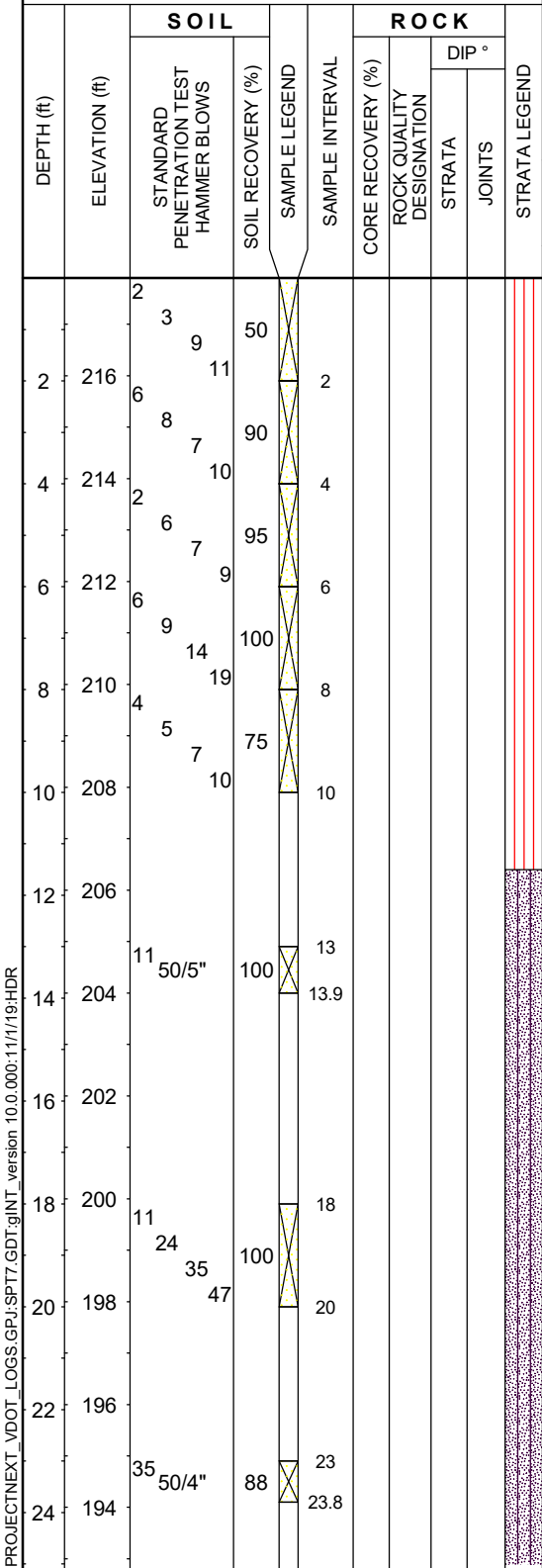
| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 39.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|--|--|
| LL | PI | | |
|----|----|--|--|



0.0 / 217.9
Residual, Light brown to dark brown, SANDY SILT, contains organic matter, very stiff, moist, (ML)

Residual, Light brown, SANDY SILT, very stiff, moist, (ML)

Residual, Light brown, SANDY SILT, very stiff, moist, (ML)

Residual, Light brown, SANDY SILT, contains quartz fragments and mica, hard, moist, (ML)

Residual, Light brown and white, mottled, SANDY SILT, contains quartz fragments, very stiff, moist, (ML)

11.5 / 206.4
Igm, Light brown and white, mottled, fine to coarse SILTY SAND, very dense, moist, (SM)

| | | | |
|--|--|------|--|
| | | 35.7 | |
|--|--|------|--|

| | | | |
|--|--|------|--|
| | | 18.3 | |
|--|--|------|--|

| | | | |
|----|---|------|------|
| 30 | 5 | 15.2 | 52.2 |
|----|---|------|------|

| | | | |
|--|--|------|--|
| | | 16.4 | |
|--|--|------|--|

| | | | |
|--|--|------|--|
| | | 15.1 | |
|--|--|------|--|

| | | | |
|--|--|------|--|
| | | 25.6 | |
|--|--|------|--|

| | | | |
|--|--|------|--|
| | | 17.5 | |
|--|--|------|--|

| | | | |
|--|--|------|--|
| | | 14.2 | |
|--|--|------|--|

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39.8 feet

PAGE 1 OF 2

19X-N-RW21

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 26

19X-N-RW21

PAGE 2 OF 2

STATION: 15+22
 LATITUDE: 38.962538° N
 SURFACE ELEVATION: 217.9 ft
 OFFSET: 16 ft LT
 LONGITUDE: 77.184741° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/23/2019 - 05/24/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 39.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 192 | | | | | | | |
| 28 | 190 | 50/5" | 100 | 28 28.4 | | | | |
| 30 | 188 | | | | | | | |
| 32 | 186 | | | | | | | |
| 34 | 184 | 50/4" | 100 | 33 33.3 | | | | |
| 36 | 182 | | | | | | | |
| 38 | 180 | 20 50/6" | 67 | 38 39.5 | | | | |
| 40 | 178 | | | | | | | |
| 42 | 176 | | | | | | | |
| 44 | 174 | 50/1" | 100 | 43 43.1 | | | | |
| 46 | 172 | | | | | | | |
| 48 | 170 | 50/1" | 100 | 48 48.1 | | | | |

25.9 / 192.0

Igm, Light brown, fine to coarse CLAYEY SAND, very dense, moist, (SC) 19.0

Igm, Light brown, fine to coarse CLAYEY SAND, contains quartz fragments and mica, very dense, moist, (SC) 5.3

Igm, Light brown, fine to coarse CLAYEY SAND, contains mica, very dense, moist to wet, (SC) 33 10 15.9 39.7

Igm, Light brown, fine to coarse CLAYEY SAND, very dense, wet, (SC) 28.2

14.1

Bottom of borehole at 48.1 feet.
 Boring backfilled with auger cuttings upon completion.

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39.8 feet

PAGE 2 OF 2

19X-N-RW21



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 27

19X-N-RW22

PAGE 1 OF 2

STATION: 19+54
 LATITUDE: 38.962931° N
 SURFACE ELEVATION: 215.8 ft

OFFSET: 12 ft RT
 LONGITUDE: 77.183311° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/23/2019 - 05/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| 29 | 8 | 14.9 | 61.5 |
| | | 23.3 | |
| | | 13.4 | |
| | | 14.2 | |
| | | 12.1 | |
| 31 | 6 | 19.4 | 48.8 |
| | | 13.8 | |

GROUND WATER
 FIRST ENCOUNTERED AT 28.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 1 | | 3 | 65 | | | | | |
| 2 | 214 | 2 | 7 | | 2 | | | |
| 4 | 212 | 3 | 9 | | 4 | | | |
| 6 | 210 | 5 | 10 | | 6 | | | |
| 8 | 208 | 7 | 13 | | 8 | | | |
| 10 | 206 | 9 | 15 | | 10 | | | |
| 12 | 204 | 10 | | | 13 | | | |
| 14 | 202 | 11 | 13 | | 15 | | | |
| 16 | 200 | 10 | | | 18 | | | |
| 18 | 198 | 9 | 65 | | 20 | | | |
| 20 | 196 | 10 | | | 23 | | | |
| 22 | 194 | 50/6" | 100 | | 23.5 | | | |

0.0 / 215.8
Residual, Light brown, SANDY LEAN CLAY, stiff, moist, (CL)

4.0 / 211.8
Residual, Light brown and white, mottled, fine to coarse SILTY SAND, medium dense, moist, (SM)

21.5 / 194.3
lgm, Light brown, fine to coarse SILTY SAND, very dense, moist, (SM)

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 1 OF 2

19X-N-RW22

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 27

19X-N-RW22

PAGE 2 OF 2

STATION: 19+54
 LATITUDE: 38.962931° N
 SURFACE ELEVATION: 215.8 ft
 OFFSET: 12 ft RT
 LONGITUDE: 77.183311° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/23/2019 - 05/23/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT inc.
 Logger: Jacob Moorman, HDR

LAB DATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 190 | | | | | | | |
| 28 | 188 | 50/5" | 100 | 28 28.4 | | | | |
| 30 | 186 | | | | | | | |
| 32 | 184 | | | | | | | |
| 34 | 182 | 27 50/5" | 71 | 33 34.4 | | | | |
| 36 | 180 | | | | | | | |
| 38 | 178 | 50/2" | 100 | 38 38.2 | | | | |
| 40 | 176 | | | | | | | |
| 42 | 174 | | | | | | | |
| 44 | 172 | 50/1" | 100 | 43 43.1 | | | | |
| 46 | 170 | | | | | | | |
| 48 | 168 | 50/2" | 100 | 48 48.2 | | | | |

lgm, Light brown and white, mottled, fine to medium SILTY SAND, very dense, wet, (SM)

lgm, Light brown and white, mottled, fine to medium SILTY SAND, Contains rock fragments and mica, very dense, wet, (SM)

Bottom of borehole at 48.2 feet.
 Boring backfilled with auger cuttings upon completion.

REMARKS: Rig Type: Acker XLS Track Rig.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 42 feet

PAGE 2 OF 2

19X-N-RW22

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ.SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW24

PAGE 1 OF 2

STATION: 46+80
 LATITUDE: 38.964820° N
 SURFACE ELEVATION: 181.6 ft
 OFFSET: 130 ft LT
 LONGITUDE: 77.180921° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/23/2019 - 06/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 | |
| 7 | 180 | 14 | 65 | 0.5 | | | Asphalt |
| 2 | 178 | 18 | 23 | 2.5 | | | |
| 4 | 176 | 7 | 50 | 4.5 | | | Aggregate Subbase |
| 6 | 174 | 11 | 12 | 6.5 | | | |
| 8 | 172 | 17 | 100 | 8.5 | | | Silty Sand with Gravel |
| 10 | 170 | 23 | 85 | 10.5 | | | |
| 12 | 168 | 4 | 100 | 13.5 | | | Silty Sand |
| 14 | 166 | 14 | 100 | 15.5 | | | |
| 16 | 164 | 9 | 100 | 18.5 | | | Silty Sand |
| 18 | 162 | 13 | 90 | 20.5 | | | |
| 20 | 160 | 24 | 90 | 23.5 | | | Silty Sand |
| 22 | 158 | 40 | 90 | | | | |
| 24 | 158 | 18 | 90 | | | | |

0.0 / 181.6
 2.0" Asphalt
 0.2 / 181.4
 4.0" Aggregate Subbase
 0.5 / 181.1
Fill, Red-orange, fine to coarse SILTY SAND WITH GRAVEL, dense, moist, (SM)
Fill, Red-orange, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM)
 6.5 / 175.1
Residual, Brown, fine to coarse SILTY SAND, contains rock fragments, very dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)
Residual, Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM)
Residual, Light brown and white, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

| | | | |
|----|---|------|------|
| | | | |
| | | 6.1 | |
| 32 | 6 | 9.7 | 32.3 |
| | | 16.1 | |
| | | 16.7 | |
| 34 | 6 | 15.1 | 43.2 |
| | | 19.9 | |
| | | 11.6 | |
| | | 16.0 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-N-RW24

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-N-RW24

PAGE 2 OF 2

STATION: 46+80 OFFSET: 130 ft LT
 LATITUDE: 38.964820° N LONGITUDE: 77.180921° W
 SURFACE ELEVATION: 181.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/23/2019 - 06/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 15.1 | |
| | | 16.1 | |
| 31 | 4 | 12.3 | 48.9 |
| | | 15.8 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 156 | 30 | | 25.5 | | | | |
| 28 | 154 | 14 | | 28.5 | | | | |
| 30 | 152 | 14 10 32 | 90 | 30.5 | | | | |
| 32 | 150 | | | 31.5 / 150.1 | | | | |
| 34 | 148 | 50/5" | 100 | 33.5 33.9 | | | | |
| 38 | 144 | 17 50/4" | 100 | 38.5 39.3 | | | | |
| 40 | 140 | 50/4" | 100 | 41.5 41.8 | | | | |

Residual, Red-brown and white, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, dense, moist, (SM)

31.5 / 150.1

lgm, Red-brown and white, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

lgm, Red-brown and white, mottled, fine to coarse SILTY SAND, contains mica and relict rock texture, very dense, wet, (SM)

Auger refusal at 41.8 feet.
 Bottom of borehole at 41.8 feet.
 Boring backfilled with auger cuttings, hole plug, and concrete upon completion.

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 2 OF 2

19X-N-RW24

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P23

PAGE 1 OF 1

STATION: 54+54
 LATITUDE: 38.966885° N
 SURFACE ELEVATION: 153.0 ft
 OFFSET: 218 ft LT
 LONGITUDE: 77.180287° W
 COORD. DATUM: NAD 83

| 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 | 153.0 | | | | | | | | 0.0 / 153.0 9.0" Asphalt | | | |
| 0.7 | 152.3 | | | | | | | | 0.7 / 152.3 23.4" Aggregate Base | | | 5.6 |
| 2.7 | 150.3 | | | | | | | | 2.7 / 150.3 Fill, Tan-brown, fine to coarse SILTY SAND, contains stone fragments and mica, medium dense, moist, (SM) | | | 15.1 |
| 4.7 | 148.4 | | | | | | | | | | | 19.0 |
| 6.7 | 146.4 | | | | | | | | Fill, Tan-brown, fine to coarse SILTY SAND, contains stone fragments and mica, loose, moist, (SM) | | | 20.5 |
| 8.7 | | | | | | | | | Bottom of borehole at 8.7 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-SOS-P23

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P25

PAGE 1 OF 1

STATION: 305+83
 LATITUDE: 38.964301° N
 SURFACE ELEVATION: 188.7 ft
 OFFSET: 90 ft LT
 LONGITUDE: 77.182586° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|-----------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | | STRATA LEGEND | Date(s) Drilled: 06/20/2019 - 06/20/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: Hector/Connelly & Associates, inc. | Logger: Mark Tilashalski, PE/S&ME | 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 | | | | | | | | | | | |
| | | | | | | | | | | | GROUND WATER | | | | | | | | | |
| | | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| 0.0 | 188.7 | | | | | | | | | | 6.5" Asphalt | | | | | | | | | |
| 0.5 | 188.2 | | | | | | | | | | 12.0" Aggregate Subbase | | | | | | | | | |
| 1.5 | 187.2 | 16 | 50 | | 2 | | | | | | Fill, Tan and gray, fine to coarse POORLY GRADED SAND WITH GRAVEL, dense, moist, (SP) | | | | | | 7.1 | | | |
| 4.0 | 184.7 | 8 | 55 | | 4 | | | | | | Fill, Gray, fine to coarse SILTY GRAVEL WITH SAND, medium dense, moist, (GM) | | | | | | 8.7 | 14.7 | | |
| 6.0 | | 5 | 19 | | 6 | | | | | | Bottom of borehole at 6.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet

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19X-SOS-P25

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P26

PAGE 1 OF 1

STATION: 299+35 OFFSET: 91 ft LT
 LATITUDE: 38.963440° N LONGITUDE: 77.184502° W
 SURFACE ELEVATION: 209.6 ft COORD. DATUM: NAD 83

| 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: 06/20/2019 - 06/20/2019 | | | | | | | | | | LAB DATA | | | |
| Drilling Method(s): 3.25" HSA w/ SPTs | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING | | | |
| SPT Method: Automatic Hammer | | | | | | | | | | NO LONG TERM MEASUREMENTS TAKEN | | | |
| Other Test(s): Not Applicable | | | | | | | | | | | | | |
| Driller: Hector/Connelly & Associates, inc. | | | | | | | | | | | | | |
| Logger: Mark Tilashalski, PE/S&ME | | | | | | | | | | | | | |
| GROUND WATER | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | | | | |
| 0.0 | 209.6 | | | | | | | | | | | | |
| 6.0" | | | | | | | | | | | | | |
| 0.5 | 209.1 | | | | | | | | | | | | |
| 16.0" | | | | | | | | | | | | | |
| 1.9 | 207.7 | 5 | 50 | | | | | | | 29 | 6 | 13.9 | 39.3 |
| Fill, Brown and gray, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | | | | | | | | | | | |
| 6 | 204 | 6 | 75 | | | | | | | | | 12.5 | |
| Fill, Brown, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | | | | | | | | | | | |
| Bottom of borehole at 6.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | | | | | | | | | | | |

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-SOS-P26



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P27

PAGE 1 OF 1

STATION: 293+56 OFFSET: 48 ft LT
 LATITUDE: 38.962656° N LONGITUDE: 77.186276° W
 SURFACE ELEVATION: 222.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 222.7 | | | | | | | | 0.0 / 222.7 | | | | |
| | | | | | | | | | 9.0" Asphalt | | | | |
| 0.9 | 221.8 | | | | | | | | 6.0" Aggregate Subbase | | | | |
| 1.3 | 221.4 | | | | | | | | 1.3 / 221.4 | | | | |
| | | | | | | | | | Fill, Brown, fine to coarse CLAYEY SAND, contains mica, medium dense, moist, (SC) | | | 16.2 | |
| 3.5 | | | | | | | | | | 34 | 12 | 1.4 | 49.5 |
| 5.5 | | | | | | | | | | | | 17.6 | |
| 7.5 | | | | | | | | | | | | 14.9 | |
| | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. Bulk sample collected from 1.5 to 7.5 feet bgs. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-SOS-P27

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P28

PAGE 1 OF 1

STATION: 287+95 OFFSET: 33 ft LT
 LATITUDE: 38.961897° N LONGITUDE: 77.188008° W
 SURFACE ELEVATION: 235.2 ft COORD. DATUM: NAD 83

| 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 | 235.2 | | | | | | | | 0.0 / 235.2 | | | |
| 0.8 | 234.4 | | | | | | | | 10.0" Asphalt | | | |
| 1.8 | 233.4 | | | | | | | | 12.0" Aggregate Subbase | | | |
| 1.8 - 2.0 | 233.4 | 5 | 75 | X | 2 | | | | 1.8 / 233.4 Fill, Brown, fine to coarse SILTY SAND, trace gravel, contains mica, medium dense, moist, (SM) | | | 16.1 |
| 2.0 - 2.5 | 232.0 | 6 | 7 | X | 4 | | | | | | | |
| 2.5 - 3.0 | 230.0 | 6 | 100 | X | 6 | | | | | | | 16.5 |
| 3.0 - 3.5 | 228.0 | 7 | 100 | X | 8 | | | | | | | 15.0 |
| 3.5 - 4.0 | | 11 | | X | | | | | | | | |
| 4.0 - 4.5 | | 12 | | X | | | | | | | | |
| 8.0 | | | | | | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | |

Date(s) Drilled: 06/21/2019 - 06/21/2019
 Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Austin Morgan, HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

SPT_LOG\W\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 1

19X-SOS-P28



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P30

PAGE 1 OF 1

STATION: 276+03 OFFSET: 78 ft LT
 LATITUDE: 38.959971° N LONGITUDE: 77.191469° W
 SURFACE ELEVATION: 266.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 266.4 | | | | | | | 0.0 / 266.4 3.5" Asphalt | | | | | |
| 0.3 | 266.1 | | | | | | | 0.3 / 266.1 12.0" Aggregate Subbase | | | | | |
| 1.3 | 265.1 | 10 | 40 | 1.3 | | | | 1.3 / 265.1 Fill, fine POORLY GRADED GRAVEL WITH SILT AND SAND, medium dense, moist, (GP-GM) | | | 1.9 | 6.4 | |
| 5.3 | | 5 | 30 | 3.3 | | | | | | | 2.6 | | |
| 6.2 | | 10 | 14 | 5.3 | | | | | | | 6.2 | | |
| 7.3 | | 11 | 25 | 7.3 | | | | | | | | | |
| | | 6 | 6 | | | | | | Bottom of borehole at 7.3 feet. Backfilled with auger cuttings and grout upon completion. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 2.5 feet

PAGE 1 OF 1

19X-SOS-P30

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P32

PAGE 1 OF 1

STATION: 264+41
 LATITUDE: 38.957020° N
 SURFACE ELEVATION: 283.2 ft
 OFFSET: 103 ft LT
 LONGITUDE: 77.193220° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|---|------------------------------|-------------------------------|--|----------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 06/20/2019 - 06/20/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: E.Pozas/Connelly & Associates, inc. | Logger: Jacob Moorman, HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| | 282 | | | | | | | | 0.0 / 283.2 | | | | | | | | | |
| | 2 | | | | | | | | 8.5" Asphalt | | | | | | | | | |
| | 280 | 4 | | | | | | | 0.7 / 282.5 | | | | | | | | | |
| | 4 | 5 | | | | | | | 12.0" Aggregate Subbase | | | | | | | | | |
| | 278 | 3 | 8 | 90 | | | | | 1.7 / 281.5 | | | | | | | | | |
| | 6 | 5 | 8 | | | | | | <i>Residual</i> , Red-brown, light brown and dark brown, mottled, SANDY SILT, contains mica, very stiff, moist, (ML) | | | | | | | 17.7 | | |
| | 276 | 10 | 7 | 70 | | | | | <i>Residual</i> , Red-brown, light brown and dark brown, mottled, SANDY SILT, contains mica, very stiff, moist, (ML) | | | | | 40 | 6 | 18.7 | 66.6 | |
| | 8 | 12 | 12 | | | | | | <i>Residual</i> , Red-brown, light brown and dark brown, mottled, SANDY SILT, contains mica, hard, moist, (ML) | | | | | | | 19.2 | | |
| | | 15 | | 100 | | | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet

PAGE 1 OF 1

19X-SOS-P32

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P33

PAGE 1 OF 1

STATION: 260+72
 LATITUDE: 38.956088° N
 SURFACE ELEVATION: 299.1 ft
 OFFSET: 130 ft LT
 LONGITUDE: 77.193709° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/17/2019 - 07/17/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

LL PI

| | | | | |
|-----|---|-----|----|----|
| 2 | | | | |
| 298 | 2 | 85 | | |
| 296 | 3 | 80 | 43 | 12 |
| 294 | 3 | 90 | | |
| 292 | 7 | 100 | 48 | 21 |
| 290 | 4 | 90 | | |
| 288 | | | | |
| 286 | 4 | 100 | | |
| | 7 | | | |
| | | | | |

0.0 / 299.1
 2.0" Topsoil
 0.2 / 298.9
Residual, Red-orange, SANDY SILT, contains rock fragments, root fragments, and mica, firm, moist, (ML)
Residual, Red-orange to brown, SANDY SILT, contains rock fragments, root fragments, and mica, stiff, moist, (ML)
 4.0 / 295.1
Residual, Red-orange, SANDY LEAN CLAY, contains mica, stiff, moist, (CL)
Residual, Red-orange, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)
Residual, Red-orange and white, mottled, SANDY LEAN CLAY, contains mica and relict rock texture, stiff, moist, (CL)
Residual, Red-orange to white, SANDY LEAN CLAY, contains mica and relict rock texture, stiff, moist, (CL)

Bottom of borehole at 15.0 feet.
 Boring backfilled with auger cuttings, a hole plug, and aggregate upon completion. Bulk samples collected from 0.0 to 5.0 feet and 5.0 to 10.0 feet bgs.

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 11.9 feet

PAGE 1 OF 1

19X-SOS-P33



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P34

PAGE 1 OF 1

STATION: 259+25 OFFSET: 51 ft LT
 LATITUDE: 38.955643° N LONGITUDE: 77.193624° W
 SURFACE ELEVATION: 290.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 290.7 | | | | | | | 0.0 / 290.7 | | | | | |
| 0.6 | 290.1 | | | | | | | 7.5" Asphalt | | | | | |
| 1.5 | 289.2 | | | | | | | 0.6 / 290.1 | | | | | |
| 1.5 | 289.2 | | | | | | | 10.5" Aggregate Subbase | | | | | |
| 1.5 | 289.2 | | | | | | | 1.5 / 289.2 | | | 18.4 | | |
| 3.5 | | | | | | | | <i>Residual</i> , Light brown to yellow-orange, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, medium dense, moist, (SC) | 34 | 11 | 8.9 | 34.8 | |
| 5.5 | | | | | | | | <i>Residual</i> , Yellow-orange and dark-brown, mottled, fine to coarse CLAYEY SAND WITH GRAVEL, contains mica, medium dense, moist, (SC) | | | 19.9 | | |
| 7.5 | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. Bulk sample collected from 1.5 to 5.5 feet bgs. | | | 22.2 | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 1

19X-SOS-P34

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P35

PAGE 1 OF 1

STATION: 253+41
 LATITUDE: 38.954189° N
 SURFACE ELEVATION: 297.0 ft
 OFFSET: 41 ft LT
 LONGITUDE: 77.194439° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | 296 | 5 | | | 1.5 | | | | 0.0 / 297.0 4.0" Asphalt | | | | |
| 2 | 294 | 4 | | | 3.5 | | | | 0.3 / 296.7 3.0" Concrete | | | | |
| 4 | 292 | 5 | | | 5.5 | | | | 0.6 / 296.4 10.0" Aggregate Subbase | | | 2.2 | |
| 6 | 290 | 8 | | | 7.5 | | | | 1.4 / 295.6 Fill, Gray, POORLY GRADED GRAVEL, loose, moist, (GP) | NP | NP | 23.0 | 43.3 |
| | | | | | | | | | 3.5 / 293.5 Residual, White and black, mottled, fine to medium SILTY SAND, contains mica and quartz fragments, medium dense, moist, (SM) | | | 21.5 | |
| | | | | | | | | | Residual, White to light gray, fine to medium SILTY SAND, contains mica and quartz fragments, medium dense, moist, (SM) | | | | |
| | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, hole plug and concrete upon completion. Bulk sample collected from 3.5 to 7.5 feet bgs. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 6 feet

PAGE 1 OF 1

19X-SOS-P35

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P36

PAGE 1 OF 1

STATION: 252+43
 LATITUDE: 38.953991° N
 SURFACE ELEVATION: 298.5 ft
 OFFSET: 69 ft LT
 LONGITUDE: 77.194689° W
 COORD. DATUM: NAD 83

| 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 | | | | |
| <p>Date(s) Drilled: 06/16/2019 - 06/16/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: E.Pozas/Connelly & Associates, inc. Logger: Jacob Moorman, HDR</p> <p>GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA</p> | | | | | | | | | | | | | |
| 2 | 298 | 2 | 60 | | | | | | | | | | |
| 3 | | 3 | | | | | | | | | | | |
| 2 | | 2 | | | | | | | | | | | |
| 5 | 296 | 5 | 90 | | | | | | | 35 | 8 | 14.3 | 52.6 |
| 13 | | 13 | | | | | | | | | | | |
| 19 | | 19 | | | | | | | | | | | |
| 22 | | 22 | | | | | | | | | | | |
| 4 | 294 | 4 | 90 | | | | | | | | | | |
| 5 | | 5 | | | | | | | | | | | |
| 11 | | 11 | | | | | | | | | | | |
| 10 | | 10 | | | | | | | | | | | |
| 10 | | 10 | | | | | | | | | | | |
| 6 | | 6 | | | | | | | | | | | |
| <p>Bottom of borehole at 6.0 feet. Boring backfilled using auger cuttings upon completion. Bulk sample collected from 0.0 to 3.0 feet bgs.</p> | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet

PAGE 1 OF 1

19X-SOS-P36

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P37

PAGE 1 OF 1

STATION: 246+97 OFFSET: 57 ft LT
 LATITUDE: 38.952729° N LONGITUDE: 77.195673° W
 SURFACE ELEVATION: 304.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|---|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|-------|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/14/2019 - 05/14/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 ° | | |
| | | | | | | | | | | GROUND WATER | | | | | | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | | | | |
| 2 | 302 | 3 | 35 | 85 | 2 | | | | 0.0 / 304.0 | 11.3" Asphalt | | | | | | | | | | | |
| | | | 15 | 7 | | | | | 0.9 / 303.1 | 8.0" Aggregate Subbase | | | | | | | | | | | |
| 4 | 300 | 4 | 5 | 90 | 4 | | | | 1.6 / 302.4 | Fill, Brown, LEAN CLAY WITH SAND, very hard, moist, (CL) | | | | | | 20.4 | | | | | |
| | | | 6 | 7 | | | | | | Fill, Brown, LEAN CLAY WITH SAND, contains organic matter, stiff, moist, (CL) | | | | 40 | 15 | 20.6 | 72.4 | | | | |
| 6 | 298 | 6 | 8 | 95 | 6 | | | | | Fill, Brown, LEAN CLAY WITH SAND, hard, moist, (CL) | | | | | | 24.5 | | | | | |
| 8 | 296 | 8 | 17 | 14 | 8 | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3.6 feet

PAGE 1 OF 1

19X-SOS-P37



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P38

PAGE 1 OF 1

STATION: 240+92 OFFSET: 51 ft LT
 LATITUDE: 38.951449° N LONGITUDE: 77.196992° W
 SURFACE ELEVATION: 303.0 ft COORD. DATUM: NAD 83

| 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 | 302 | | | | | | | | 0.0 / 303.0 3.5" Asphalt | | | |
| 2 | 300 | 8 | 65 | | | | | | 0.3 / 302.7 8.5" Concrete | | | |
| 4 | 298 | 9 | 8 | | | | | | 1.0 / 302.0 11.0" Aggregate Subbase | | | 4.8 |
| 6 | 296 | 3 | 75 | | | | | | 1.9 / 301.1 <i>Residual</i> , Light brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | | | 7.3 |
| 8 | | 4 | 75 | | | | | | Bottom of borehole at 8.0 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and concrete upon completion. Bulk sample collected from 2.0 to 8.0 ft bgs. | | | 12.1 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4 feet

PAGE 1 OF 1

19X-SOS-P38

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P39

PAGE 1 OF 1

STATION: 234+67
 LATITUDE: 38.950218° N
 SURFACE ELEVATION: 289.7 ft
 OFFSET: 43 ft LT
 LONGITUDE: 77.198510° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|--|---|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/15/2019 - 05/15/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | | | |
| 2 | 288.4 | 6 | 85 | 1.5 | | | | 0.0 / 289.7 3.0" Asphalt | | | | | | 40 | 13 | 23.2 | 62.7 | |
| 4 | 286.3 | 4 | 85 | 3.5 | | | | 0.3 / 289.4 8.8" Concrete | | | | | | | | | | |
| 6 | 284.4 | 4 | 100 | 7.5 | | | | 1.0 / 288.7 5.7" Cement Treated Aggregate | | | | | | | | | | |
| | | | | | | | | 1.5 / 288.2 Fill, Brown, SANDY SILT, contains mica, very stiff, moist, (SM) | | | | | | | | 28.4 | | |
| | | | | | | | | Fill, Brown, SANDY SILT, contains mica, stiff, moist, (SM) | | | | | | | | | 17.1 | |
| | | | | | | | | | | Bottom of borehole at 7.5 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3.6 feet

PAGE 1 OF 1

19X-SOS-P39



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P40

PAGE 1 OF 1

STATION: 228+75
 LATITUDE: 38.949046° N
 SURFACE ELEVATION: 274.5 ft
 OFFSET: 39 ft LT
 LONGITUDE: 77.199962° W
 COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | 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 | | | | | | |
| | 274 | | | | | | | | 0.0 / 274.5 4.8" Asphalt | | | | |
| 2 | 272 | 5 15 36 | 70 | 1.5 2 | | | | | 0.4 / 274.1 7.0" Concrete | | | | |
| 4 | 270 | 7 43 50 1/4" | 92 | 3.5 4.8 | | | | | 1.0 / 273.5 5.0" Cement Treated Aggregate | | | 13.1 | |
| 6 | | 48 50 1/4" | 100 | 5.5 6.3 | | | | | 1.4 / 273.1 Residual, Brown, LEAN CLAY WITH SAND, contains mica and quartz fragments, very stiff, moist, (CL) | 42 | 22 | 9.0 6.6 | 73.5 |
| | | | | | | | | | 3.5 / 271.0 lgm, Brown, LEAN CLAY WITH SAND, contains mica and quartz fragments, very hard, moist, (CL) | | | 9.0 | |
| | | | | | | | | | Bottom of borehole at 6.3 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and concrete upon completion. Bulk sample collected from 2.0 to 5.5 ft bgs. | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5 feet

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19X-SOS-P40

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P41

PAGE 1 OF 1

STATION: 222+96 OFFSET: 39 ft LT
 LATITUDE: 38.947798° N LONGITUDE: 77.201252° W
 SURFACE ELEVATION: 258.7 ft COORD. DATUM: NAD 83

| 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 | 258.7 | | | | | | | | 0.0 / 258.7 | | | |
| 0.5 | 258.2 | | | | | | | | 6.0" Asphalt | | | |
| 1.0 | 257.7 | | | | | | | | 0.5 / 258.2 6.5" Concrete | | | |
| 1.6 | 257.1 | | | | | | | | 1.0 / 257.7 6.5" Cement Treated Aggregate | | | 25.2 |
| 3.6 | | | | | | | | | 1.6 / 257.1 Fill, Brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 20.1 |
| 5.6 | | | | | | | | | Fill, Brown, fine to coarse SILTY SAND, loose, moist, (SM) | | | 21.5 |
| 7.6 | | | | | | | | | Bottom of borehole at 7.6 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and concrete upon completion. Bulk sample collected from 2.0 to 5.5 ft bgs. | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 6.4 feet

PAGE 1 OF 1

19X-SOS-P41

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P42

PAGE 1 OF 1

STATION: 211+95 OFFSET: 40 ft LT
 LATITUDE: 38.945155° N LONGITUDE: 77.203162° W
 SURFACE ELEVATION: 242.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--|--|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/08/2019 - 05/08/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 ° |
| | | | | | | | | | GROUND WATER | | | | | | | | | | |
| | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | | |
| | 242 | | | | | | | | 0.0 / 242.7 | 22.0" Asphalt | | | | | | | | | |
| 2 | | | | | | | | | 1.8 / 240.9 | 12.0" Crushed Aggregate | | | | | | | | | |
| 4 | 240 | 7 | 8 | 50 | 2.8 | | | | 2.8 / 239.9 | Fill, Brown, SANDY SILT, very stiff, moist, (ML) | | | | | | 42 | 12 | 18.3 | 51.1 |
| 6 | 238 | 3 | 7 | 7 | 4.8 | | | | | Fill, Brown, SANDY SILT, stiff, moist, (ML) | | | | | | | | 21.1 | |
| 8 | 236 | 5 | 3 | 4 | 6.8 | | | | | | | | | | | | | 22.3 | |
| | 234 | 4 | 4 | 100 | 8.8 | | | | | Bottom of borehole at 8.8 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and concrete upon completion. Bulk sample collected from 2.8 to 6.8 ft bgs. | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 5.9 feet

PAGE 1 OF 1

19X-SOS-P42

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ-SPT7.GDT\GINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P43

PAGE 1 OF 1

STATION: 205+89 OFFSET: 50 ft LT
 LATITUDE: 38.943653° N LONGITUDE: 77.204091° W
 SURFACE ELEVATION: 250.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | |
|---|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|--------------|----------|--------|---------------------------------|---------------------------------|--|--|--|------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | GROUND WATER | | | | | | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | DIP ° | STRATA | JOINTS | NOT ENCOUNTERED DURING DRILLING | NO LONG TERM MEASUREMENTS TAKEN | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | LL | PI | MOISTURE CONTENT (%) | | | | | |
| 0.0 | 250.4 | | | | | | | | | | | | | | | | |
| 1.5 | 248.9 | | | | | | | | | | | | | | | | |
| 2.9 | 247.5 | 5 | 95 | | 3 | | | | | | | | | | | | 19.5 |
| 6.0 | 244.0 | 4 | 85 | | 5 | | | | | | | | | | | | 21.2 |
| 8.0 | 242.0 | 4 | 100 | | 7 | | | | | | | | | | | | 23.9 |
| 9.0 | | 6 | | | 9 | | | | | | | | | | | | |
| Bottom of borehole at 9.0 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 4.7 feet

PAGE 1 OF 1

19X-SOS-P43

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P44

PAGE 1 OF 1

STATION: 199+83 OFFSET: 60 ft LT
 LATITUDE: 38.942151° N LONGITUDE: 77.205008° W
 SURFACE ELEVATION: 258.3 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | FIELD DESCRIPTION OF STRATA | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | | | | | |
| 0.0 | 258.3 | | | | | | | | 0.0 / 258.3 14.0" Asphalt | | | |
| 1.6 | 256.7 | | | | | | | | 1.6 / 256.7 24.0" Aggregate Subbase | | | |
| 3.6 | 254.7 | 6 | 65 | | | | | | 3.6 / 254.7 <i>Residual</i> , Brown, fine to coarse SILTY SAND, contains mica, medium dense, moist, (SM) | | | 13.1 |
| 6.0 | 252.3 | 10 | 95 | | | | | | <i>Residual</i> , Brown, fine to coarse SILTY SAND, contains mica, dense, moist, (SM) | | | 11.2 |
| 8.0 | 250.3 | 50/5" | 100 | | | | | | 8.0 / 250.3 <i>lgm</i> , Brown, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM) Bottom of borehole at 8.4 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | 8.0 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 6.8 feet

PAGE 1 OF 1

19X-SOS-P44

SPT_LOG\PROJECT\NEXT_VDOT_LOGS\GP\J\SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: ROADWAY

19X-SOS-P45

PAGE 1 OF 1

STATION: 194+03 OFFSET: 67 ft LT
 LATITUDE: 38.940709° N LONGITUDE: 77.205872° W
 SURFACE ELEVATION: 266.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|-------|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/14/2019 - 05/14/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 ° | | |
| | | | | | | | | | GROUND WATER | | | | | | | | | | | | |
| | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | | | LL | PI | | | | | |
| | | | | | | | | | 0.0 / 266.0 19.5" Asphalt | | | | | | | | | | | | |
| 2 | 264 | 12 | | | 2.5 | | | | 1.6 / 264.4 11.0" Aggregate Subbase | | | | | | | | | | | | |
| 4 | 262 | 9 11 | | | 4.5 | | | | 2.5 / 263.5 Fill, Brown, SILT WITH SAND, contains mica, very stiff, moist, (ML) | | | | 25.6 | | | | | | | | |
| 6 | 260 | 8 13 13 | | | 6.5 | | | | Fill, Brown, SILT WITH SAND, contains mica, hard, moist, (ML) | | | | 40 | 6 | 27.8 | 72.4 | | | | | |
| 8 | 258 | 10 12 15 14 | | | 8.5 | | | | | | | | | | | 32.8 | | | | | |
| | | | | | | | | | Bottom of borehole at 8.5 feet. Boring backfilled with auger cuttings, bentonite chips, hole plug, and concrete upon completion. | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-SOS-P45

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 47+50 OFFSET: 409 ft LT
 LATITUDE: 38.965318° N LONGITUDE: 77.181768° W
 SURFACE ELEVATION: 229.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/31/2019 - 07/31/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT, Inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | SAMPLE INTERVAL | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 228 | 3 | 25 | 2 | | | | | |
| | | 226 | 5 | 45 | 4 | | | | | |
| | | 224 | 7 | 35 | 6 | | | | | |
| | | 222 | 11 | 15 | 7 | | | | | |
| | | 220 | 14 | 21 | 8 | | | | | |
| | | 218 | 17 | 31 | 9 | | | | | |
| | | 216 | 22 | 25 | 10 | | | | | |
| | | 214 | 22 | 30 | 11 | | | | | |
| | | 212 | 13 | 25 | 12 | | | | | |
| | | 210 | 22 | 27 | 13 | | | | | |
| | | 208 | 27 | 35 | 14 | | | | | |
| | | 206 | 24 | 50/6" | 15 | | | | | |

0.0 / 229.8
Residual, Brown, SILT WITH GRAVEL, contains root fragments, rock fragments, and mica, stiff, moist, (ML)

Residual, Brown, SILT, contains root fragments, rock fragments, and mica, very stiff, moist, (ML)

4.0 / 225.8
Residual, Red-brown and black, mottled, fine SILTY SAND, contains mica and relict rock texture, dense, moist, (SM)

Residual, Red-brown, fine SILTY SAND, contains mica and relict rock texture, dense, moist, (SM)

Residual, Red-brown, fine SILTY SAND, contains mica, rock fragments, and relict rock texture, very dense, moist, (SM)

Residual, Red-brown, pink and white, mottled, fine SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

21.5 / 208.3
Igm, Brown to white, SILT, contains mica and relict rock texture, very hard, moist, (ML)

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40.6 feet

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 47+50 OFFSET: 409 ft LT
 LATITUDE: 38.965318° N LONGITUDE: 77.181768° W
 SURFACE ELEVATION: 229.8 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/31/2019 - 07/31/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: W.Massey/SaLUT, Inc.
 Logger: Amanda Thomason/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

FIELD DESCRIPTION OF STRATA

LL PI

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | 26 | 204 | | | | | | | |
| 0.75 | 28 | 202 | 18 | 80 | 28 | | | | |
| | | | 25 | | | | | | |
| | | | 36 | | | | | | |
| | 30 | 200 | 46 | | 30 | | | | |
| | 32 | 198 | | | | | | | |
| 0.5 | 34 | 196 | 19 | 89 | 33 | | | | |
| | | | 50/5" | | 33.9 | | | | |
| | 36 | 194 | | | | | | | |
| | 38 | 192 | 24 | 100 | 38 | | | | |
| | | | 50/4" | | 38.8 | | | | |
| | 40 | 190 | | | | | | | |
| | 42 | 188 | | | | | | | |
| 1 | 44 | 186 | 28 | 90 | 43 | | | | |
| | | | 31 | | | | | | |
| | | | 28 | | | | | | |
| | 46 | 184 | 36 | | 45 | | | | |
| | 48 | 182 | 13 | 100 | 48 | | | | |
| 2 | | | 10 | | | | | | |
| | | | 10 | | | | | | |
| | 50 | 180 | 11 | | | | | | |

Igm, Brown and brown, mottled, SILT, contains mica and relict rock texture, very hard, moist, (ML)

36.5 / 193.3

Igm, Gray, black and white, mottled, fine SILTY SAND, contains mica and relict rock texture, very dense, moist, (SM)

41.5 / 188.3

Igm, Brown, black and white, SILT, contains mica and relict rock texture, very hard, moist, (ML)

Igm, Brown, black and white, SILT, contains mica and relict rock texture, very stiff, moist, (ML)

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40.6 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-S-RW24
 PAGE 3 OF 3

STATION: 47+50 OFFSET: 409 ft LT
 LATITUDE: 38.965318° N LONGITUDE: 77.181768° W
 SURFACE ELEVATION: 229.8 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|--------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | |
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | STRATA | | | | JOINTS |
| | | | | | | 50 | | | | | | | | |
| <p>Date(s) Drilled: 07/31/2019 - 07/31/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: W.Massey/SaLUT, Inc. Logger: Amanda Thomason/HDR</p> <p style="text-align: center;">GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN</p> <p style="text-align: center;">FIELD DESCRIPTION OF STRATA</p> <p style="text-align: center;">Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | |

REMARKS: Rig Type: Mobile B-57 Truck.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 40.6 feet

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19X-S-RW24

SPT_LOGAW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 10+26 OFFSET: 104 ft RT
 LATITUDE: 38.964232° N LONGITUDE: 77.183252° W
 SURFACE ELEVATION: 243.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/02/2019 - 05/02/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | 6.7 | |
| | | 6.2 | |
| | | 7.4 | |
| | | 7.8 | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| | 26 | | | | | | | | |
| | 216 | | | | | | | | |
| | 28 | 50/6" | 100 | 28 | | | | | |
| | 214 | | | 28.5 | | | | | |
| | 30 | | | | | | | | |
| | 212 | | | | | | | | |
| | 32 | | | | | | | | |
| | 210 | 39 50/6" | 100 | 33 | | | | | |
| | 34 | | | 34 | | | | | |
| | 208 | | | | | | | | |
| | 36 | | | | | | | | |
| | 206 | | | | | | | | |
| | 38 | 50/1" | 100 | 38 | | | | | |
| | 204 | | | 38.1 | | | | | |
| | 40 | | | | | | | | |
| | 202 | 50/6" | 100 | 40.5 | | | | | |
| | | | | 41 | | | | | |

lgm, Brown, white and black, SANDY SILT, contains mica and relict rock texture, very hard, moist, (ML)

Bottom of borehole at 41.0 feet.
 Boring backfilled with auger cuttings upon completion.

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
LOCATION: I-495 Northern Ext., Fairfax Cou.
STRUCTURE: RETAINING WALL

19X-S-RW26

PAGE 1 OF 3

STATION: 16+26 **OFFSET:** 33 ft RT
LATITUDE: 38.963305° N **LONGITUDE:** 77.184990° W
SURFACE ELEVATION: 211.0 ft **COORD. DATUM:** NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 04/30/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

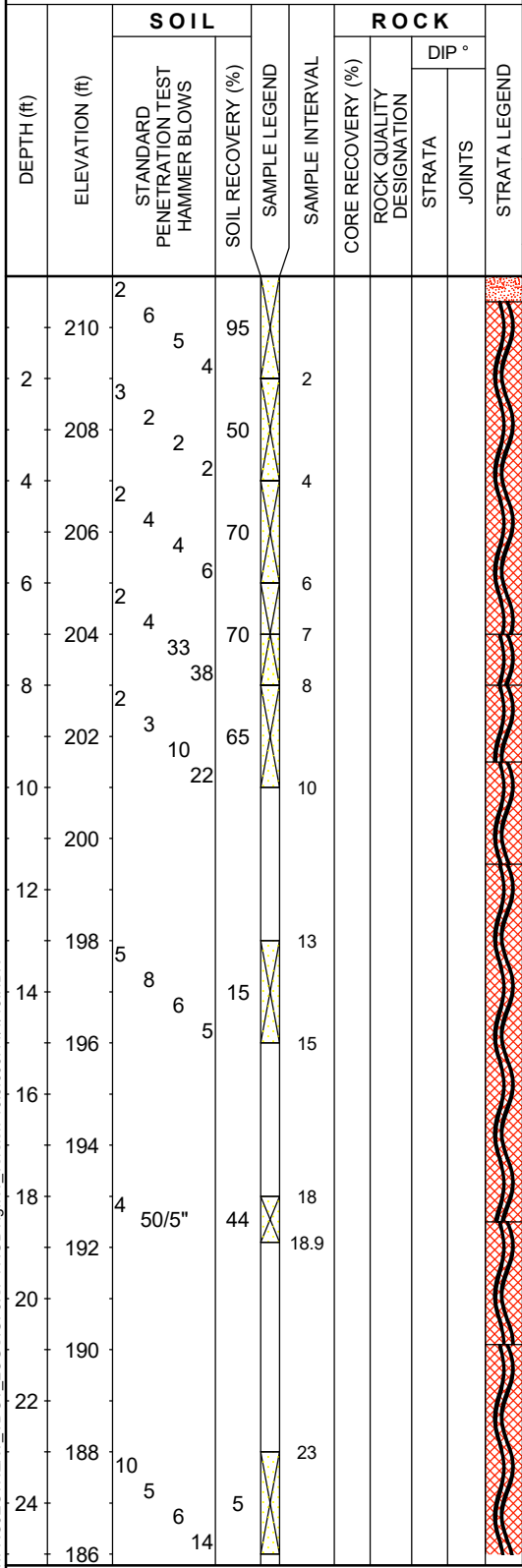
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | | |
| | | | |
| | | | |
| | | | |

GROUND WATER

☒ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|
| | | | |
| | | | |
| | | | |
| | | | |



0.0 / 211.0
 6.0" Topsoil

0.5 / 210.5
 Fill, Brown, fine to coarse CLAYEY SAND, medium dense, moist, (ML)

2.0 / 208.0
 Fill, Brown, fine to coarse CLAYEY SAND, loose, moist, (SC)

4.0 / 206.0
 Fill, Brown, fine to coarse CLAYEY SAND, medium dense, moist, (SC)

7.0 / 204.0
 Fill, Black and gray, fine to coarse POORLY GRADED GRAVEL WITH SAND, contains asphalt fragments, moist, (GP)

8.0 / 203.0
 Fill, Brown, SILT, contains asphalt fragments, very stiff, moist, (ML)

9.5 / 201.5
 Fill, Gray, fine to coarse POORLY GRADED GRAVEL WITH SAND, moist, (GP)

11.5 / 199.5
 Fill, Brown, SILT WITH GRAVEL, contains mica, very stiff, moist, (ML)

18.5 / 192.5
 Fill, Gray, fine to coarse POORLY GRADED GRAVEL WITH SAND, very dense, moist, (GP)

20.9 / 190.1
 Fill, Brown, SILT WITH SAND, stiff, moist, (ML)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 50 feet

PAGE 1 OF 3

19X-S-RW26

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS\GP\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-S-RW26

PAGE 2 OF 3

STATION: 16+26
 LATITUDE: 38.963305° N
 SURFACE ELEVATION: 211.0 ft
 OFFSET: 33 ft RT
 LONGITUDE: 77.184990° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/30/2019 - 04/30/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Joe Wallen, PE/HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | 21.3 | |
| 35 | 5 | 21.0 | 50.5 |
| | | 16.9 | |
| | | 15.9 | |
| | | 13.5 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 48.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 25 | | | | | | | | |
| 26 | 184 | | | | | | | |
| 28 | 182 | 9 | 11 | 8 | 10 | | | |
| 30 | 180 | | | | | | | |
| 32 | 178 | 5 | 8 | 11 | 16 | | | |
| 34 | 176 | | | | | | | |
| 36 | 174 | | | | | | | |
| 38 | 172 | 11 | 26 | 43 | 50/5" | 100 | | |
| 40 | 170 | | | | | | | |
| 42 | 168 | 18 | 28 | 28 | 29 | 90 | | |
| 44 | 166 | | | | | | | |
| 46 | 164 | | | | | | | |
| 48 | 162 | 26 | 18 | 11 | 40 | | | |
| 50 | | | | | | | | |

Fill, Brown, SILT, very stiff, moist, (ML)

31.5 / 179.5

Residual, Brown, white and black, SANDY SILT, contains mica and relict rock texture, very stiff, moist, (ML)

Residual, Brown, white and black, SANDY SILT, contains mica and relict rock texture, very hard, moist, (ML)

Residual, Brown, SANDY SILT WITH GRAVEL, contains mica and relict rock texture, hard, wet, (ML)

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ.SPT7.GDT.gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 50 feet

PAGE 2 OF 3

19X-S-RW26



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-S-RW26

PAGE 3 OF 3

STATION: 16+26 OFFSET: 33 ft RT
 LATITUDE: 38.963305° N LONGITUDE: 77.184990° W
 SURFACE ELEVATION: 211.0 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--|--------------|------------------|----------------------|------------------------|-------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | 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 ° |
| | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | |
| | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 48.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | |
| | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion. | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 50 feet

PAGE 3 OF 3

19X-S-RW26

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 39+51 OFFSET: 59 ft LT
 LATITUDE: 38.962782° N LONGITUDE: 77.187884° W
 SURFACE ELEVATION: 214.7 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/12/2019 - 07/12/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: R.Carreno/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 214 | WOH/12" | | | | | | |
| 1.5 | 2 | 212 | 2 | 40 | | | | | |
| | 3 | 210 | 3 | 70 | | | | | |
| 0.5 | 4 | 208 | 2 | 90 | | | | | |
| 2.5 | 6 | 206 | 4 | 85 | | | | | |
| 1 | 8 | 204 | 3 | 100 | | | | | |
| | 10 | 202 | 5 | 75 | | | | | |
| | 12 | 200 | 6 | 100 | | | | | |
| | 14 | 198 | 6 | | | | | | |
| 1.3 | 18 | 196 | 2 | | | | | | |
| | 20 | 194 | 3 | | | | | | |
| | 22 | 192 | 3 | | | | | | |
| 2.3 | 23 | 190 | 2 | | | | | | |
| | 24 | | 3 | | | | | | |

0.0 / 214.7
 3.0" Topsoil

0.3 / 214.4
 Fill, Dark brown, SILT WITH SAND, contains mica, soft, moist, (ML)

2.0 / 212.7
 Residual, Brown and white, mottled, SANDY SILT, contains mica, stiff, moist, (ML)
 Residual, Brown and white, mottled, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Brown, white and gray, mottled, SANDY SILT, contains mica, very stiff, moist, (ML)

Residual, Brown, white and gray, mottled, SANDY SILT, contains quartz fragments and mica, stiff, moist, (ML)

Residual, Red-brown and white, SANDY SILT, contains quartz fragments and mica, very stiff, moist, (ML)

Residual, Brown and white, mottled, SANDY SILT, contains mica, firm, moist, (ML)

Residual, Red-brown, SILT WITH SAND, contains mica, stiff, moist, (ML)

| | | | |
|----|----|------|------|
| | | | |
| | | 23.6 | |
| | | 18.7 | |
| 39 | 10 | 18.3 | 56.5 |
| | | 17.9 | |
| | | 19.1 | |
| | | 21.4 | |
| | | 22.6 | |
| | | 19.7 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



STATION: 39+51 OFFSET: 59 ft LT
 LATITUDE: 38.962782° N LONGITUDE: 77.187884° W
 SURFACE ELEVATION: 214.7 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 07/12/2019 - 07/12/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: R.Carreno/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 43.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |
| | | | |
| | | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | | | | | | | | |
| 1 | 28 | 186 | 5 | 95 | | | | | |
| 2.5 | 34 | 180 | 15 | 100 | | | | | |
| 1.9 | 40 | 174 | 23 | 100 | | | | | |
| 2.5 | 44 | 170 | 10 | 80 | | | | | |
| | 48 | 166 | 8 | 89 | | | | | |

Residual, Light brown, white and black, mottled, SANDY SILT, contains quartz fragments, relict rock texture, and mica, very stiff, moist, (ML)

Residual, Light brown, white and black, mottled, SANDY SILT, contains mica, hard, moist, (ML)

Residual, Light brown, white and black, mottled, SANDY SILT, contains quartz fragments and mica, very hard, moist, (ML)

Residual, Light brown, white and black, mottled, SANDY SILT, contains mica, hard, wet, (ML)

Residual, Light brown, white and black, mottled, SANDY SILT, contains mica, very hard, wet, (ML)

| | | | |
|----|---|------|------|
| | | | |
| | | 14.7 | |
| | | 16.1 | |
| | | 15.3 | |
| | | 17.6 | |
| 32 | 7 | 10.9 | 59.2 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 10

19X-S-RW27

PAGE 3 OF 3

STATION: 39+51 OFFSET: 59 ft LT
 LATITUDE: 38.962782° N LONGITUDE: 77.187884° W
 SURFACE ELEVATION: 214.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|---|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | | | | | | | | | | |
| <p>Date(s) Drilled: 07/12/2019 - 07/12/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: R.Carreno/Connelly & Associates, inc. Logger: Harsh Patel, HDR</p> | | | | | | | | | | | | | | | |
| <p>GROUND WATER FIRST ENCOUNTERED AT 43.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> | | | | | | | | | | | | | | | |
| <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 49.8 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | LL | PI | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-S-RW27

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW28

PAGE 1 OF 3

STATION: 33+53 OFFSET: 13 ft LT
 LATITUDE: 38.961616° N LONGITUDE: 77.189078° W
 SURFACE ELEVATION: 243.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/23/2019 - 04/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| | | 28.5 | |
| 39 | 15 | 20.2 | |
| | | 22.8 | |
| 52 | 22 | 27.3 | 81.3 |
| | | 17.6 | |
| | | 19.6 | |
| | | 18.4 | |
| | | 13.1 | |

GROUND WATER
 FIRST ENCOUNTERED AT 35.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 1 | 243.6 | 4 | 45 | | | | | |
| 2 | 242 | 2 | 6 | | | | | |
| 3 | 240 | 3 | 95 | | | | | |
| 4 | 238 | 2 | 5 | | | | | |
| 6 | 236 | 3 | 100 | | | | | |
| 8 | 234 | 1 | 85 | | | | | |
| 10 | 232 | 3 | 100 | | | | | |
| 12 | 230 | 5 | 100 | | | | | |
| 14 | 228 | 7 | 100 | | | | | |
| 16 | 226 | 8 | 100 | | | | | |
| 18 | 224 | 12 | 100 | | | | | |
| 20 | 222 | 15 | 100 | | | | | |
| 22 | 220 | 3 | 100 | | | | | |
| 24 | 220 | 7 | 100 | | | | | |

0.0 / 243.6
 5.0" Topsoil

0.3 / 243.3
Fill, Brown to red-brown, SANDY LEAN CLAY, stiff, moist, (CL)

Fill, Red-brown, SANDY LEAN CLAY, contains mica, stiff, moist, (CL)

Fill, Red-brown, SANDY LEAN CLAY, contains mica, firm, moist, (CL)

6.0 / 237.6
Residual, Brown, ELASTIC SILT WITH SAND, very stiff, moist, (MH)

8.0 / 235.6
Residual, Red-brown to brown, SANDY SILT, contains mica, stiff, moist, (ML)

Residual, Red-brown to brown, SANDY SILT, contains mica, very stiff, moist, (ML)

Residual, Brown and white, SANDY SILT, very stiff, moist, (ML)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 1 OF 3

19X-S-RW28

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS.GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW28

PAGE 2 OF 3

STATION: 33+53
 LATITUDE: 38.961616° N
 SURFACE ELEVATION: 243.6 ft
 OFFSET: 13 ft LT
 LONGITUDE: 77.189078° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/23/2019 - 04/23/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | 26.5 | 17.4 |
| 36 | 7 | 12.5 | 55.8 |
| | | 12.7 | |
| | | 16.0 | |

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 35.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | | |
|----|----|----------------------|------------------------|
| LL | PI | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|----|----|----------------------|------------------------|

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 25 | 218 | | | | | | | |
| 26 | 216 | 3 | | | | | | |
| 28 | 214 | 3 | 100 | | | | | |
| 30 | 212 | 6 | | | | | | |
| 32 | 210 | 3 | | | | | | |
| 34 | 208 | 7 | 100 | | | | | |
| 35 | 206 | 12 | | | | | | |
| 36 | 204 | 19 | | | | | | |
| 38 | 202 | 16 | 100 | | | | | |
| 40 | 200 | 34 | | | | | | |
| 42 | 198 | 50/5" | | | | | | |
| 44 | 196 | 16 | 100 | | | | | |
| 46 | 194 | 32 | | | | | | |
| 48 | 192 | 50/5" | | | | | | |
| 50 | 190 | 8 | 70 | | | | | |

Residual, Brown and white, SANDY SILT, firm, moist, (ML)

Residual, Brown and white, SANDY SILT, very stiff, wet, (ML)

36.5 / 207.1

Igm, Brown, SANDY SILT, very hard, moist, (ML)

Igm, Brown, SANDY SILT, contains mica, very hard, moist, (ML)

Igm, Brown, SANDY SILT, contains mica, hard, moist, (ML)

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

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19X-S-RW28

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW28

PAGE 3 OF 3

STATION: 33+53 OFFSET: 13 ft LT
 LATITUDE: 38.961616° N LONGITUDE: 77.189078° W
 SURFACE ELEVATION: 243.6 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 04/23/2019 - 04/23/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: N.Chew/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | 50 | | | | | | | | | | | | | | |
| | | | | | | | | | | GROUND WATER FIRST ENCOUNTERED AT 35.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion. Bulk sample collected from 3.0 to 6.0 feet bgs. | | | | LL | PI | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

PAGE 3 OF 3

19X-S-RW28

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:GINT_version 10.0.000:11/11/19:HDR



STATION: 27+56 OFFSET: 13 ft LT
 LATITUDE: 38.960658° N LONGITUDE: 77.190785° W
 SURFACE ELEVATION: 279.1 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 04/22/2019 - 04/22/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: N.Chew/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 38.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)
 FINES CONTENT #200 (%)

| PKT. PENETROMETER (tsf) | 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 / 279.1 | | | | |
| | | | | | | | | | | 5.0" Topsoil | | | | |
| 2 | 2.5 | 278 | 4 | 55 | | 1.5 | | | | 0.4 / 278.7 | | | 13.8 | |
| | | | 4 | | | 2 | | | | Brown, SANDY SILT, contains mica, firm, moist, (ML) | | | | |
| | | | 4 | | | | | | | <i>Residual</i> , Brown, SANDY SILT, contains mica, very stiff, moist, (ML) | | | 17.8 | |
| | | 276 | 3 | 70 | | | | | | | | | | |
| | | | 14 | | | 4 | | | | <i>Residual</i> , Red-brown, SANDY SILT, contains mica and wood fragments, stiff, moist, (ML) | | | 21.4 | |
| | | | 12 | | | | | | | | | | | |
| | | 274 | 4 | 60 | | 6 | | | | | | | | |
| | | | 5 | | | | | | | <i>Residual</i> , Brown, SANDY SILT, contains mica, stiff, moist, (ML) | | | 18.3 | |
| | | | 5 | | | | | | | | | | | |
| | | 272 | 3 | 90 | | 8 | | | | | | | | |
| | | | 4 | | | | | | | <i>Residual</i> , Brown, SANDY SILT, contains mica, firm, moist, (ML) | | | | |
| | | | 4 | | | | | | | | | | | |
| | | 270 | 1 | 40 | | 10 | | | | | | | | |
| | | | 2 | | | | | | | | | | | |
| | | | 3 | | | | | | | | | | | |
| | | | 3 | | | | | | | | | | | |
| | | 268 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 266 | 1 | | | 13 | | | | | | | | |
| | | | 3 | | | | | | | | | | | |
| | | | 5 | 100 | | 14.5 | | | | | | | | |
| | | | 6 | | | 15 | | | | 14.5 / 264.6 | | | 17.1 | |
| | | 264 | | | | | | | | <i>Residual</i> , Red-brown, LEAN CLAY, stiff, moist, (ML) | | | | |
| | | | | | | | | | | | | | | |
| | | 262 | | | | | | | | 16.5 / 262.6 | | | | |
| | | | | | | | | | | | | | | |
| | | 260 | 3 | | | 18 | | | | | | | | |
| | | | 3 | | | | | | | <i>Residual</i> , Red-brown and gray, mottled, SANDY SILT, contains mica, stiff, moist, (ML) | | | 18.9 | |
| | | | 6 | 90 | | | | | | | | | | |
| | | | 6 | | | | | | | | | | | |
| | | 258 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | 256 | 3 | | | 23 | | | | | | | | |
| | | | 3 | | | | | | | | | | | |
| | | | 5 | 90 | | | | | | | | | 23.0 | |
| | | | 8 | | | | | | | | | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 33 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW29

PAGE 3 OF 3

STATION: 27+56 OFFSET: 13 ft LT
 LATITUDE: 38.960658° N LONGITUDE: 77.190785° W
 SURFACE ELEVATION: 279.1 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | |
|--|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|--------|--------------|------------------|----------------------|------------------------|--------|
| PKT. PENETROMETER (tsf) | 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 | | | | | JOINTS |
| | | | | | | 50 | | | | | | | | | |
| <p>Date(s) Drilled: 04/22/2019 - 04/22/2019 Drilling Method(s): 3.25" HSA w/ SPTs SPT Method: Automatic Hammer Other Test(s): Not Applicable Driller: N.Chew/Connelly & Associates, inc. Logger: Harsh Patel, HDR</p> <p>GROUND WATER FIRST ENCOUNTERED AT 38.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN</p> <p>FIELD DESCRIPTION OF STRATA Bottom of borehole at 50.0 feet. Boring backfilled with auger cuttings upon completion.</p> | | | | | | | | | | | | | | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 33 feet

PAGE 3 OF 3

19X-S-RW29

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW30

PAGE 1 OF 2

STATION: 273+01 OFFSET: 91 ft LT
 LATITUDE: 38.959268° N LONGITUDE: 77.192118° W
 SURFACE ELEVATION: 275.7 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/06/2019 - 05/06/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

GROUND WATER

▼ FIRST ENCOUNTERED AT 28.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 8 | 274 | 12 | 85 | | 2 | | | |
| 2 | 272 | 2 | 80 | | 4 | | | |
| 4 | 270 | 5 | 80 | | 6 | | | |
| 6 | 268 | 7 | 75 | | 8 | | | |
| 8 | 266 | 8 | 95 | | 8 | | | |
| 10 | 264 | 6 | 100 | | 10 | | | |
| 12 | 262 | 45 | 100 | | 13 | | | |
| 14 | 260 | 50/4" | 100 | | 13.8 | | | |
| 16 | 258 | 18 | 100 | | 18 | | | |
| 18 | 256 | 25 | 100 | | 19.4 | | | |
| 20 | 254 | 50/5" | 100 | | 23 | | | |
| 22 | 252 | 9 | 100 | | 23 | | | |
| 24 | | 12 | 100 | | | | | |
| | | 16 | | | | | | |
| | | 18 | | | | | | |

0.0 / 275.7
Fill, Gray-brown, fine POORLY GRADED GRAVEL WITH SAND, dense, moist, (GP)

2.0 / 273.7
Residual, Brown, gray and pink, mottled, fine to medium SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Brown and gray, mottled, fine to medium SILTY SAND, contains mica, medium dense, moist, (SM)

11.5 / 264.2
Igm, Brown, gray and black, stratified, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

Igm, Brown, gray and black, stratified, fine to coarse SILTY SAND, contains mica, very dense, moist, (SM)

Igm, Brown and black, stratified, fine to coarse SILTY SAND, contains mica, dense, moist, (SM)

| | | | |
|----|---|------|------|
| | | | 4.7 |
| 39 | 7 | 16.9 | 48.4 |
| | | 8.2 | |
| | | 15.8 | |
| | | 20.9 | |
| | | 7.0 | |
| 40 | 9 | 13.7 | 33.4 |
| | | 18.5 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39 feet

PAGE 1 OF 2

19X-S-RW30

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GPJ\SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 17

19X-S-RW30

PAGE 2 OF 2

STATION: 273+01 OFFSET: 91 ft LT
 LATITUDE: 38.959268° N LONGITUDE: 77.192118° W
 SURFACE ELEVATION: 275.7 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | LAB DATA | | | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|--------------------------|--------------|------------------|----------------------|------------------------|-------|------|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | Date(s) Drilled: 05/06/2019 - 05/06/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Harsh Patel, HDR | 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 ° | | |
| 25 | | | | | | | | | GROUND WATER | | | | | | | | | | | | |
| | | | | | | | | | ▽ FIRST ENCOUNTERED AT 28.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | | | | |
| | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | | | | |
| 26 | 250 | | | | | | | | <i>lgm</i> , Brown and black, stratified, fine to coarse SILTY SAND, contains mica, very dense, wet, (SM) | | | | | | | | | | | | |
| 28 | 248 | 18 | | | 28 | | | | | | | | | | | | | | | | |
| 30 | 246 | 35 50 | 100 | | 30 | | | | | | | | | | | | | | | 12.5 | |
| 32 | 244 | | | | | | | | | | | | | | | | | | | | |
| 34 | 242 | 23 50/5" | | | 33 33.9 | | | | | | | | | | | | 12.0 | | | | |
| 36 | 240 | | | | | | | | | | | | | | | | | | | | |
| 38 | 238 | 47 50/5" | | | 38 38.9 | | | | | | | | | | | | 12.6 | | | | |
| 40 | 236 | 50/1" | | | 41 41.1 | | | | | | | | | | | | | | | | |
| | | | | | | | | | Auger refusal at 41.0 feet. Bottom of borehole at 41.1 feet. Boring backfilled with auger cuttings, bentonite chips, and hole plug upon completion. | | | | | | | | | | | | |

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 39 feet

PAGE 2 OF 2

19X-S-RW30



STATION: 267+42 OFFSET: 92 ft LT
 LATITUDE: 38.957796° N LONGITUDE: 77.192858° W
 SURFACE ELEVATION: 280.4 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/07/2019 - 05/07/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Harsh Patel, HDR

GROUND WATER
 FIRST ENCOUNTERED AT 32.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| | | 280 | | | | | | | |
| 1.75 | 4 | 278 | 3 | 85 | | | | | 1 |
| 2 | 3 | 276 | 3 | 90 | | | | | 3 |
| 1.5 | 2 | 274 | 4 | 100 | | | | | 5 |
| 4 | 3 | 272 | 4 | 85 | | | | | 7 |
| 1.5 | 3 | 270 | 4 | 90 | | | | | 9 |
| 6 | 6 | 268 | 10 | | | | | | 11 |
| 1.5 | 6 | 266 | 13 | 100 | | | | | 13 |
| 8 | 8 | 264 | 14 | | | | | | 15 |
| 2.5 | 3 | 262 | 4 | 100 | | | | | 18 |
| 10 | 4 | 260 | 8 | | | | | | 20 |
| 22 | 12 | 258 | 12 | | | | | | 23 |
| 1 | 8 | 256 | 11 | 100 | | | | | 23 |
| 24 | 11 | | 12 | | | | | | |
| | 13 | | 13 | | | | | | |

| | | | | |
|--|----|----|------|------|
| 0.0 / 280.4 | | | | |
| 5.0" Asphalt | | | | |
| 0.4 / 280.0 | | | | |
| 7.0" Aggregate | | | 24.0 | |
| 1.0 / 279.4 | | | | |
| Residual, Brown and red, mottled, SILT, firm, moist, (ML) | | | | |
| Residual, Brown, red and white, mottled, SILT, stiff, moist, (ML) | | | 29.4 | |
| | | | | |
| | | | 21.9 | |
| Residual, Brown and white, mottled, SANDY SILT, contains quartz fragments, very stiff, moist, (ML) | | | | |
| | 46 | 13 | 22.7 | 64.6 |
| | | | | |
| | | | 12.4 | |
| Residual, Brown, gray and white, mottled, SANDY SILT, hard, moist, (ML) | | | | |
| | | | 17.2 | |
| Residual, Brown, gray and white, mottled, SILT WITH SAND, contains quartz fragments, very stiff, moist, (ML) | | | | |
| | | | 19.6 | |
| | | | | |
| Residual, Brown, white and pink, mottled, SILT WITH SAND, contains mica, very stiff, moist, (ML) | | | | |
| | 48 | 12 | 30.3 | 71.1 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 38 feet

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 267+42 OFFSET: 92 ft LT
 LATITUDE: 38.957796° N LONGITUDE: 77.192858° W
 SURFACE ELEVATION: 280.4 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|--------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/07/2019 - 05/07/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Harsh Patel, HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | GROUND WATER ▽ FIRST ENCOUNTERED AT 32.0 ft DEPTH NO LONG TERM MEASUREMENTS TAKEN | | | | | | | | | |
| | | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | | LL | PI | | | | |
| 1.5 | 28 | 252 | 9 | 100 | | | | | | | Residual, Brown, gray and white, mottled, SANDY SILT, contains mica, very stiff, moist, (ML) | | | | | | 18.3 | | | |
| 1 | 34 | 246 | 8 | 95 | | | | | | | Residual, Brown and gray, mottled, SANDY SILT, contains mica, hard, wet, (ML) | | | | 44 | 11 | 25.8 | 64.1 | | |
| | 36 | 244 | | | | | | | | | 36.5 / 243.9 | | | | | | | | | |
| 3 | 38 | 242 | 20 | 79 | | | | | | | lgm, Brown, gray and white, stratified, SILT, contains mica and relict rock texture, very hard, wet, (ML) | | | | | | 11.3 | | | |
| | 40 | 240 | | | | | | | | | | | | | | | | | | |
| | 42 | 238 | 50/2" | 100 | | | | | | | lgm, Brown and gray, stratified, SILT, contains mica and relict rock texture, very hard, wet, (ML) Auger refusal at 43.0 feet. Bottom of borehole at 43.2 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. | | | | | | 16.1 | | | |

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 38 feet



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 08

19X-S-RW33

PAGE 1 OF 2

STATION: 252+05 OFFSET: 159 ft LT
 LATITUDE: 38.954025° N LONGITUDE: 77.195029° W
 SURFACE ELEVATION: 309.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/12/2019 - 06/12/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

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 (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | |
| 2 | 308 | 8 | 80 | | | | | 1 |
| 4 | 306 | 4 | 75 | | | | | 3 |
| 6 | 304 | 6 | 25 | | | | | 5 |
| 8 | 302 | 6 | 60 | | | | | 7 |
| 10 | 300 | 3 | 90 | | | | | 9 |
| 12 | 298 | 7 | | | | | | 11 |
| 14 | 296 | 4 | 85 | | | | | 13 |
| 16 | 294 | 4 | | | | | | 15 |
| 18 | 292 | 4 | 85 | | | | | 18 |
| 20 | 290 | 3 | | | | | | 20 |
| 22 | 288 | | | | | | | |
| 24 | 286 | 6 | 90 | | | | | 23 |

| | | | |
|--|----|---|------|
| 0.0 / 309.6 | | | |
| 4.0" Asphalt | | | |
| 0.3 / 309.3 | | | |
| 8.0" Aggregate Subbase | 40 | 7 | 17.5 |
| 1.0 / 308.6 | | | |
| Fill, Red-brown, fine to coarse SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | 15.9 |
| Fill, Red-brown to dark brown, fine to coarse SILTY SAND, medium dense, moist, (SM) | | | 12.6 |
| | | | 20.4 |
| | | | 10.6 |
| 12.0 / 297.6 | | | |
| Residual, Light brown and white, mottled, SANDY SILT, contains mica and quartz fragments, stiff, moist, (ML) | | | 26.9 |
| | | | |
| Residual, Light brown and white, mottled, SANDY SILT, firm, moist, (ML) | | | 36.4 |
| | | | |
| Residual, Light brown and white, mottled, SANDY SILT, contains mica, stiff, moist, (ML) | 41 | 5 | 23.0 |
| | | | 53.9 |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet

PAGE 1 OF 2

19X-S-RW33

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 08

19X-S-RW33

PAGE 2 OF 2

STATION: 252+05 OFFSET: 159 ft LT
 LATITUDE: 38.954025° N LONGITUDE: 77.195029° W
 SURFACE ELEVATION: 309.6 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 06/12/2019 - 06/12/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Jacob Moorman, HDR

| | | | |
|--------------|------------------|----------------------|------------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
| | | | |

GROUND WATER

▼ FIRST ENCOUNTERED AT 33.0 ft DEPTH
 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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | | STRATA |
| 25 | 284 | | | | | | | | | |
| 26 | 282 | 6 | 90 | | | | | | | |
| 28 | 280 | 8 | 14 | | | | | | | |
| 30 | 278 | | | | | | | | | |
| 32 | 276 | 6 | 100 | | | | | | | |
| 34 | 274 | 22 | 50/4" | | | | | | | |
| 36 | | | | | | | | | | |

Residual, Light brown, white and black, mottled, SANDY SILT, very stiff, moist, (ML)

26.6

Residual, Light brown and dark brown, mottled, SANDY SILT, very hard, wet, (ML)

33 6 18.6 52.2

Auger refusal at 36.0 feet.
 Bottom of borehole at 36.0 feet.
 Boring backfilled with auger cuttings, hole plug, and concrete upon completion.

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 3 feet

PAGE 2 OF 2

19X-S-RW33

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 05

19X-S-RW34

PAGE 1 OF 2

STATION: 225+83
 LATITUDE: 38.948497° N
 SURFACE ELEVATION: 268.0 ft
 OFFSET: 77 ft LT
 LONGITUDE: 77.200742° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/21/2019 - 05/22/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Mitch Jennings, S&ME

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 7 | | 7 | 40 | | | | | |
| 2 | 266 | 7 | 10 | 2 | | | | |
| 4 | 264 | 7 | 14 | 4 | | | | |
| 6 | 262 | 7 | 11 | 6 | | | | |
| 8 | 260 | 3 | 12 | 8 | | | | |
| 10 | 258 | 7 | 17 | 10 | | | | |
| 12 | 256 | | | | | | | |
| 14 | 254 | 9 | 17 | 13 | | | | |
| 16 | 252 | | | | | | | |
| 18 | 250 | 6 | 13 | 18 | | | | |
| 20 | 248 | 15 | 19 | 20 | | | | |
| 22 | 246 | | | | | | | |
| 24 | 244 | 10 | 22 | 23 | | | | |

0.0 / 268.0
 1.0" Topsoil

0.1 / 267.9
Fill, Light brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)
Fill, Red-brown, SANDY LEAN CLAY, contains mica, very stiff, moist, (CL)

4.0 / 264.0
Residual, Red-brown, fine to medium SILTY SAND, contains mica, medium dense, moist, (SM)

Residual, Red-brown, fine to medium SILTY SAND, contains mica, dense, moist, (SM)

Residual, Light brown, fine to medium SILTY SAND, contains mica, dense, moist, (SM)

Residual, Light brown, fine to medium SILTY SAND, contains mica, very dense, moist, (SM)

| | | | |
|----|----|------|------|
| | | 15.9 | |
| 42 | 20 | 18.0 | 57.1 |
| | | 8.7 | |
| | | 8.5 | |
| | | 7.0 | |
| | | 7.8 | |
| | | 11.2 | |
| | | 10.9 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 35 feet

PAGE 1 OF 2

19X-S-RW34

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL 05

19X-S-RW34

PAGE 2 OF 2

STATION: 225+83 OFFSET: 77 ft LT
 LATITUDE: 38.948497° N LONGITUDE: 77.200742° W
 SURFACE ELEVATION: 268.0 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/21/2019 - 05/22/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: E.Pozas/Connelly & Associates, inc.
 Logger: Mitch Jennings, S&ME

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 26 | 242 | | | | 25 | | | |
| 28 | 240 | 12 17 21 | 100 | X | 28 | | | |
| 30 | 238 | 28 | | X | 30 | | | |
| 32 | 236 | | | | 31.5 / 236.5 | | | |
| 34 | 234 | 19 50/5" | 100 | X | 33 33.9 | | | |
| 36 | 232 | | | | | | | |
| 38 | 230 | 42 50/4" | 100 | X | 38 38.8 | | | |
| 40 | 228 | | | | | | | |
| 42 | 226 | | | | | | | |
| 44 | 224 | 50/5" | 100 | X | 43 43.4 | | | |
| 46 | 222 | | | | | | | |
| 48 | 220 | 48 50/5" | 100 | X | 48 48.9 | | | |

Residual, Light brown, fine to medium SILTY SAND, contains mica, dense, moist, (SM)

Igm, Light brown, SANDY SILT, contains mica, very hard, moist, (ML)

Igm, Light brown, SANDY SILT, contains mica, very hard, moist, (ML)

Igm, Light brown, SANDY SILT, contains mica, very hard, moist, (ML)

Igm, Light brown, SANDY SILT, contains mica and quartz fragments, very hard, moist, (ML)

Bottom of borehole at 48.9 feet.
 Boring backfilled with auger cuttings upon completion.

| | | | |
|----|---|------|------|
| | | | |
| | | 14.9 | |
| | | 7.4 | |
| 36 | 7 | 10.3 | 56.8 |
| | | 6.2 | |
| | | 10.0 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 35 feet

PAGE 2 OF 2

19X-S-RW34

SPT_LOGBWV:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR



STATION: 208+82 OFFSET: 45 ft LT
 LATITUDE: 38.944379° N LONGITUDE: 77.203646° W
 SURFACE ELEVATION: 246.5 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/08/2019 - 05/08/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 14.0 ft DEPTH
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) | FINES CONTENT #200 (%) |
|--------------|------------------|----------------------|------------------------|
| LL | PI | | |

| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | ROCK | | | | STRATA LEGEND | |
|-------------------------|------------|----------------|--|-------------------|-------------------|--------------------------|--------|--------|---------------|--|
| | | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | JOINTS | | |
| | | 246 | | | | | | | | |
| 2 | | 244 | | | | | | | | |
| 4 | 7 | 242 | 13 | 35 | | | | | | |
| 5 | 8 | 240 | 40 | 8 | | | | | | |
| 6 | 12 | 240 | 7 | 35 | | | | | | |
| 1.25 | 6 | 238 | 5 | 65 | | | | | | |
| 8 | 6 | 236 | 6 | 7 | | | | | | |
| 1 | 4 | 234 | 4 | 55 | | | | | | |
| 10 | 4 | 232 | 4 | 5 | | | | | | |
| 12 | 5 | 230 | | | | | | | | |
| 0.5 | 1 | 228 | 1 | 60 | | | | | | |
| 14 | 2 | 226 | 2 | 2 | | | | | | |
| 16 | 2 | 224 | | | | | | | | |
| 18 | 7 | 222 | 12 | 70 | | | | | | |
| 20 | 24 | | 24 | 23 | | | | | | |
| 22 | 23 | | | | | | | | | |
| 24 | 19 | | 19 | 23 | | | | | | |
| | 24 | | 24 | 21 | | | | | | |
| | 20 | | 20 | 20 | | | | | | |
| | 20 | | 20 | 20 | | | | | | |
| | 20 | | 20 | 20 | | | | | | |

| | | | | |
|---|----|----|------|------|
| 0.0 / 246.5 17.0" Asphalt | | | | |
| 1.4 / 245.1 12.0" Aggregate Subbase | | | | |
| 2.4 / 244.1 Fill, Brown, fine to medium SILTY SAND WITH GRAVEL, very dense, moist, (SM) | | | 5.1 | |
| Fill, Brown, fine to medium SILTY SAND WITH GRAVEL, medium dense, moist, (SM) | | | 14.0 | |
| 7.5 / 239.0 Fill, Red-brown, SANDY SILT, stiff, moist, (ML) | | | 20.7 | |
| Fill, Red-brown, SANDY SILT, stiff, moist, (ML) | 39 | 13 | 22.1 | 55.8 |
| 12.0 / 234.5 Alluvial, Brown to gray, LEAN CLAY, contains root fragments, soft, moist to wet, (CL) | 37 | 15 | 32.6 | 89.4 |
| 19.0 / 227.5 Residual, Brown, fine to medium SILTY SAND WITH GRAVEL, wet, (SM) | | | 13.2 | |
| Residual, Brown, fine to medium SILTY SAND WITH GRAVEL, contains mica, very dense, wet, (SM) | | | 10.7 | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



STATION: 208+82 OFFSET: 45 ft LT
 LATITUDE: 38.944379° N LONGITUDE: 77.203646° W
 SURFACE ELEVATION: 246.5 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | | LAB DATA | | | | | | | | | |
|-------------------------|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|---|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|
| PKT. PENETROMETER (tsf) | DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/08/2019 - 05/08/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | 26 | 220 | | | | 25 | | | | | | | | | | | | | | |
| | 28 | 218 | 29 47 50/4" | 100 | 28 29.3 | | | | | | | 26.5 / 220.0 | | | | | | | 7.4 | |
| | 30 | 216 | | | | | | | | | | 31.2 / 215.3 | | | | | | | | |
| | 32 | 214 | 50/2" | 100 | 33 33.2 | | | | | | | Auger refusal at 33.2 feet. Bottom of borehole at 33.2 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. | | | | | | 17.1 | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)

SPT_LOGABW:PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version:10.0.0.000:11/1/19:HDR



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-S-RW37

PAGE 1 OF 2

STATION: 196+86 OFFSET: 65 ft LT
 LATITUDE: 38.941414° N LONGITUDE: 77.205456° W
 SURFACE ELEVATION: 262.2 ft COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 05/13/2019 - 05/14/2019

LAB DATA

Drilling Method(s): 3.25" HSA w/ SPTs
 SPT Method: Automatic Hammer
 Other Test(s): Not Applicable
 Driller: J.Martinez/Connelly & Associates, inc.
 Logger: Lance Martin, PE/HDR

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | |
| 0 | 262 | | | | | | | |
| 2 | 260 | | | | | | | |
| 4 | 258 | 11, 10, 30 | 70 | 3 | | | | |
| 6 | 256 | 10, 22, 24 | 70 | 5 | | | | |
| 8 | 254 | 23, 24, 26 | 100 | 7 | | | | |
| 10 | 252 | 7, 14, 16 | 100 | 9 | | | | |
| 12 | 250 | | | | | | | |
| 14 | 248 | 9, 16, 16 | 100 | 13 | | | | |
| 16 | 246 | | | | | | | |
| 18 | 244 | 8, 14, 17 | 100 | 18 | | | | |
| 20 | 242 | 19 | | 20 | | | | |
| 22 | 240 | | | | | | | |
| 24 | 238 | 34, 50/1" | 100 | 23, 23.6 | | | | |

| | | | | |
|--|----|---|------|------|
| 0.0 / 262.2 18.0" Asphalt | | | | |
| 1.5 / 260.7 12.0" Aggregate Subbase | | | | |
| 2.5 / 259.7 <i>Residual</i> , Light brown, SANDY SILT, contains mica, hard, moist, (ML) | | | 6.1 | |
| <i>Residual</i> , Light brown, SANDY SILT, contains mica, very hard, moist, (ML) | 33 | 8 | 10.4 | 52.7 |
| | | | 11.0 | |
| | | | 10.4 | |
| <i>Residual</i> , Light brown, SANDY SILT, trace gravel, contains mica, hard, moist, (ML) | | | 24.2 | |
| | | | | |
| <i>Residual</i> , Light brown, SANDY SILT, contains mica, hard, moist, (ML) | | | 19.2 | |
| | | | | |
| <i>Residual</i> , Light brown, SANDY SILT, contains mica and quartz fragments, hard, moist, (ML) | 42 | 8 | 23.3 | 61.3 |
| | | | | |
| 21.5 / 240.7 | | | | |
| <i>lgm</i> , Light brown, SANDY SILT, contains mica, very dense, moist, (ML) | | | 8.2 | |

SPT_LOGBW\PROJECT\NEXT_VDOT_LOGS\GP-J-SPT7.GDT\gINT_version 10.0.000:11/11/19:HDR

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 23.7 feet

PAGE 1 OF 2

19X-S-RW37



PROJECT #: 0495-029-419 R-201, C-501
 LOCATION: I-495 Northern Ext., Fairfax Cou.
 STRUCTURE: RETAINING WALL

19X-S-RW37

PAGE 2 OF 2

STATION: 196+86 OFFSET: 65 ft LT
 LATITUDE: 38.941414° N LONGITUDE: 77.205456° W
 SURFACE ELEVATION: 262.2 ft COORD. DATUM: NAD 83

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------------|------------------------------|-------------------------------|---|------------------------------|--------------|------------------|----------------------|------------------------|-------|--------------|--|--|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 05/13/2019 - 05/14/2019 | Drilling Method(s): 3.25" HSA w/ SPTs | SPT Method: Automatic Hammer | Other Test(s): Not Applicable | Driller: J.Martinez/Connelly & Associates, inc. | Logger: Lance Martin, PE/HDR | 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 | | | | | | | | | | | | DIP ° | GROUND WATER | | |
| | | 50/0" | | | 25 | | | | | FIELD DESCRIPTION OF STRATA Auger refusal at 25.0 feet. Bottom of borehole at 25.0 feet. Boring backfilled with auger cuttings, hole plug, bentonite chips and grout upon completion. Bulk sample collected from 3.0 to 7.0 feet bgs. | | | | | | | | | | LL | PI | | |

REMARKS: Rig Type: Diedrich D-50 Track.
 Soil relative density and consistency based on N60 values. (Field SPT N-Values corrected for hammer energy)
 Cave-in Depth at 23.7 feet

PAGE 2 OF 2

19X-S-RW37

SPT_LOGBW\PROJECTNEXT_VDOT_LOGS.GPJ:SPT7.GDT:gINT_version 10.0.000:11/11/19:HDR

Rock Core Photographs



Boring 19DTR-BR01 – 40.0 to 50.0 feet
 Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|---------------------|------------|------------|
| 19DTR-BR01 | 1 | 40.0 – 45.0' = 5.0' | 3.8' = 76% | 1.8' = 36% |
| 19DTR-BR01 | 2 | 45.0 – 50.0' = 5.0' | 4.0' = 80% | 0.7' = 14% |



Boring 19DTR-BR02 – 45.0 to 60.0 feet

Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|---------------------|------------|------------|
| 19DTR-BR02 | 1 | 45.0 – 50.0' = 5.0' | 2.0' = 40% | 0.4' = 8% |
| 19DTR-BR02 | 2 | 50.0 – 55.0' = 5.0' | 1.8' = 35% | 1.3' = 26% |
| 19DTR-BR02 | 3 | 55.0 – 60.0' = 5.0' | 4.0' = 80% | 1.8' = 36% |



Boring 19GWP-RW13 – 56.0 to 67 feet
Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|----------------------|-------------|------------|
| 19GWP-RW13 | 1 | 556.0 – 60.0' = 4.0' | 3.4' = 84% | 2.5' = 62% |
| 19GWP-RW13 | 2 | 60.0 – 65.0' = 5.0' | 4.0' = 80% | 3.1' = 62% |
| 19GWP-RW13 | 3 | 65.0 – 67.0' = 2.0' | 2.0' = 100% | 1.8' = 88% |



Boring 19DTR-BR04 – 55.0 to 65.0 feet
Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|---------------|------------|---------------------|-----------------|------------|
| 17XP-59 | 1 | 55.0 – 60.0' = 5.0' | 4.0' = 80% | 1.9' = 38% |
| 17XP-59 | 2 | 60.0 – 65.0' = 5.0' | 4.7' = 94% | 3.2' = 64% |



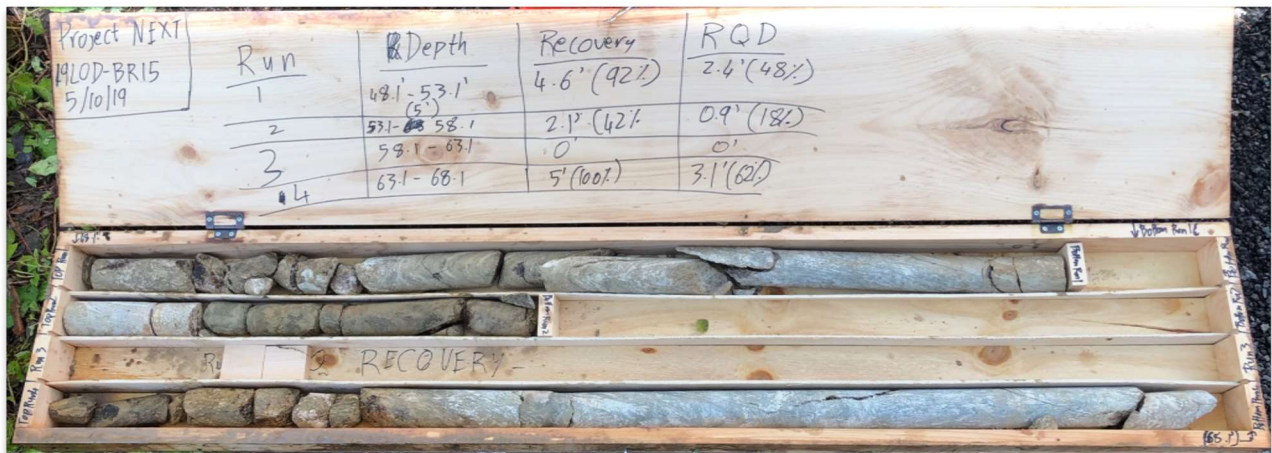
Boring 19GWP-BR22 – 51.2 to 61.2 feet
 Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|---------------------|------------|------------|
| 19GWP-BR27 | 1 | 51.2 – 56.2' = 5.0' | 4.7' = 94% | 3.8' = 76% |
| 19GWP-BR27 | 2 | 56.2 – 61.2' = 5.0' | 2.5' = 50% | 1.4' = 28% |



Boring 19GWP-BR17 – 47.9 to 55.0 feet
Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|---------------|------------|---------------------|-----------------|------------|
| 19GWP-BR17 | 1 | 47.9 – 50.0' = 5.0' | 2.1' = 100% | 1.0' = 48% |
| 19GWP-BR17 | 2 | 50.0 – 55.0' = 5.0' | 4.5' = 90% | 1.8' = 35% |



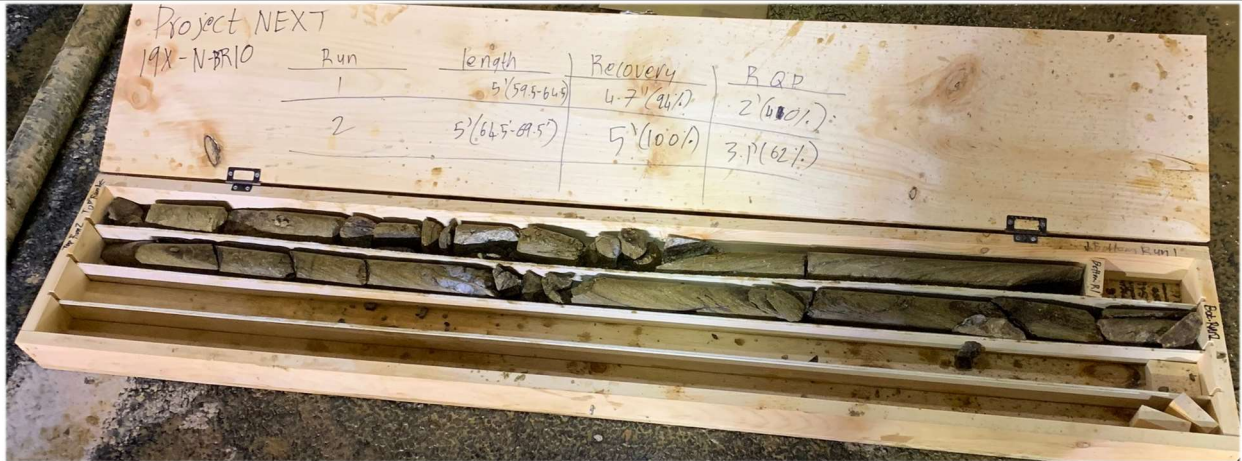
Boring 19LOD-BR15 – 48.1 to 68.1 feet
Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|---------------------|-------------|------------|
| 19LOD-BR15 | 1 | 48.1 – 53.1' = 5.0' | 4.6' = 92% | 1.9' = 38% |
| 19LOD-BR15 | 2 | 53.1 – 58.1' = 5.0' | 2.1' = 42% | 3.2' = 64% |
| 19LOD-BR15 | 3 | 58.1 – 63.1' = 5.0' | 0.0' = 0% | 0.0' = 0% |
| 19LOD-BR15 | 4 | 63.1 – 68.1' = 5.0' | 5.0' = 100% | 3.1' = 62% |



Boring 19X-BR09 – 19.3 – 29.3 feet
 Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|----------|-----|---------------------|-------------|------------|
| 19X-BR09 | 1 | 19.3 – 24.3' = 5.0' | 5.0' = 100% | 5.0' = 38% |
| 19X-BR09 | 2 | 24.3 – 29.3' = 5.0' | 5.0' = 100% | 2.8' = 56% |



Boring 19X-BR10 – 59.5 to 69.5 feet
 Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|------------|-----|---------------------|-------------|------------|
| 19X-N-BR10 | 1 | 59.5 – 64.5' = 5.0' | 4.7' = 94% | 2.0' = 40% |
| 19X-N-BR10 | 2 | 64.5 – 69.5' = 5.0' | 5.0' = 100% | 3.1' = 62% |



PHOTO UNAVAILABLE

Boring 19GWP-BR23 – 40.0 to 50.0 feet
Box 1 of 1

| BORING | RUN | LENGTH | RECOVERY | RQD |
|---------------|------------|---------------------|-----------------|------------|
| 19GWP-BR23 | 1 | 40.0 – 45.0' = 5.0' | 3.8' = 77% | 2.9' = 60% |
| 19GWP-BR23 | 2 | 45.0 – 50.0' = 5.0' | 3.9' = 78% | 2.2' = 44% |



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-1
PAGE 1 OF 1

STATION: 128+74
NORTHING: ft
SURFACE ELEVATION: 0.0 ft
OFFSET: 13' LT
Easting: ft
COORD. DATUM:

FIELD 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 | STRATA | |
| 1 | | | | | 1.19 | | | | |
| 2 | -2 | 19 | 56 | | | | | | |
| 3 | | 14 | | 60 | | | | | |
| 4 | -4 | 8 | 2 | | 3.19 | | | | |
| 5 | | 5 | 4 | 85 | | | | | |
| | | 7 | | | 5.19 | | | | |

Date(s) Drilled: 4/15/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | DESCRIPTION |
|------------|---|
| 0.0 / 0.0 | 4.8" Asphalt Concrete |
| 0.4 / -0.4 | 9.7" Hydraulic Cement Concrete |
| 1.2 / -1.2 | +13.5" Cement Treated Aggregate |
| 2.3 / -2.3 | Orange brown SILT with fine sand and fine rounded gravel, slightly micaceous, very stiff to stiff, moist, FILL (ML) - stiff below 3.2' |

| LL | PI |
|----|----|
| | |

Boring Terminated at 5.2'

SPT_LOG:0485 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig. The thickness of the CTA is estimated; the precise bottom of the CTA layer could not be determined from the sample recovery or sidewall of the borehole

PAGE 1 OF 1
NI-1



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-2
PAGE 1 OF 1

STATION: 132+54
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 13' LT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

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 | | STRATA | JOINTS |
| 1 | | | | | 1.57 | | | | | |
| 2 | -2 | 3 | | | | | | | | |
| 3 | | 9 | 90 | | | | | | | |
| 4 | -4 | 6 | | | 3.57 | | | | | |
| 5 | | 6 | 85 | | | | | | | |
| | | 8 | | | 5.57 | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | DESCRIPTION | LL | PI | MOISTURE CONTENT (%) |
|---------------------------|--|----|----|----------------------|
| 0.0 / 0.0 | 5.4" Asphalt Concrete | | | |
| 0.5 / -0.5 | 7.5" Hydraulic Cement Concrete | | | |
| 1.1 / -1.1 | 6.4" Cement Treated Aggregate | | | |
| 1.6 / -1.6 | Dark yellow brown silty/clayey f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM/SC) | | | 21.5 |
| 2.1 / -2.1 | Brown to orange brown SILT/lean CLAY with f-m sand, trace fine quartz fragments, micaceous, stiff, moist, FILL (ML/CL) | | | |
| 2.7 / -2.7 | Orange brown with minor grey SILT, trace fine sand, micaceous, stiff, moist, possible FILL (ML) | | | 19.2 |
| Boring Terminated at 5.6' | | | | |

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| | | |
| | | 21.5 |
| | | 19.2 |

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NI-2

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:02101:1:12/2/13



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-3
PAGE 1 OF 1

STATION: 136+90
NORTHING: ft
SURFACE ELEVATION: 0.0 ft
OFFSET: 11' LT
Easting: ft
COORD. DATUM:

FIELD 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 | STRATA | |
| 1 | | | | | | | | | |
| 2 | -2 | 6 | | | 1.6 | | | | |
| 3 | | 7 | 75 | | | | | | |
| 4 | -4 | 6 | 8 | | 3.6 | | | | |
| 5 | | 9 | 65 | | | | | | |
| | | 14 | | | | | | | |
| | | 19 | | | 5.6 | | | | |

Date(s) Drilled: 4/15/13

Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | DESCRIPTION | LL | PI | MOISTURE CONTENT (%) |
|------------|--|----|----|----------------------|
| 0.0 / 0.0 | 4.5" Asphalt Concrete | | | |
| 0.4 / -0.4 | 7.5" Hydraulic Cement Concrete | | | |
| 1.0 / -1.0 | 7.0" Cement Treated Aggregate | | | |
| 1.6 / -1.6 | Red orange brown and dark yellow brown with minor grey SILT/lean CLAY, occasional trace of fine sand, slightly micaceous, stiff, moist, FILL (ML/CL) | | | 18.0 |
| 3.6 / -3.6 | Tan and red orange brown with minor grey and black SILT trace fine sand, micaceous, very stiff, moist (decomposed SCHIST) (ML) - moderate foliation/schistosity in sample from 3.6' to 5.6' | | | 7.9 |
| 5.6 | Boring Terminated at 5.6' | | | |

SPT_LOG-0495 SHOULDER BORINGS 4-2013.GPJ-8.30.003:021011-12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NI-3



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NI-4
 PAGE 1 OF 1

STATION: 142+40
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 10' LT
 Easting: ft
 COORD. DATUM:

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|---|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|---------------------------------|---------------------------------|--------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | GROUND WATER | | | |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | DIP ° | NOT ENCOUNTERED DURING DRILLING | NO LONG TERM MEASUREMENTS TAKEN | LIQUID LIMIT |
| Date(s) Drilled: 4/15/13 Drilling Method(s): 2.25" HSA SPT Method: Automatic Hammer Other Test(s): Driller: C. Haines Logger: C. Regotti | | | | | | | | | | | | | |
| FIELD DESCRIPTION OF STRATA | | | | | | | | | | LL | PI | | |
| 1 | -1 | | | | | | | | | 0.0 / 0.0 | | | |
| | | | | | | | | | | 5.7" Asphalt Concrete | | | |
| | | | | | | | | | | 0.5 / -0.5 | | | |
| | | | | | | | | | | 7.5" Hydraulic Cement Concrete | | | |
| | | | | | | | | | | 1.1 / -1.1 | | | |
| | | | | | | | | | | 6.2" Cement Treated Aggregate | | | |
| 2 | -2 | 4 | | | 1.52 | | | | | 1.6 / -1.6 | | | |
| | | 6 | 80 | | | | | | | Orange brown with grey SILT with fine sand, trace f-c gravel, slightly micaceous, stiff, moist, FILL (ML) | | | 21.0 |
| 3 | -3 | 6 | | | | | | | | | | | |
| | | 6 | | | 3.52 | | | | | | | | |
| | | 3 | | | | | | | | - orange brown, with f-c quartz fragments below 3.5' | | | |
| | | 5 | 85 | | | | | | | | | | 16.8 |
| | | 7 | | | | | | | | | | | |
| | | 10 | | | 5.52 | | | | | | | | |
| Boring Terminated at 5.5' | | | | | | | | | | | | | |

SPT LOG-0495 SHOULDER BORINGS 4-2013.GPJ-8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
 NI-4



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-5
PAGE 1 OF 1

STATION: 159+12
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 9' LT
Easting: ft
COORD. DATUM:

FIELD DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | |
| 1 | 6 | | | 1.29 | | | | |
| 2 | -2 | 4 | 65 | | | | | |
| 3 | | 5 | | | | | | |
| 4 | -4 | 6 | | 3.29 | | | | |
| 5 | | 9 | 85 | | | | | |
| | | 11 | | 5.29 | | | | |

Date(s) Drilled: 4/16/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | DESCRIPTION | MOISTURE CONTENT (%) |
|------------|--|----------------------|
| 0.0 / 0.0 | 4.9" Asphalt Concrete | |
| 0.4 / -0.4 | 8.0" Hydraulic Cement Concrete | |
| 1.1 / -1.1 | +2.5" Cement Treated Aggregate | |
| 1.3 / -1.3 | Red orange brown with minor grey SILT with fine sand, trace fine gravel, micaceous, stiff, moist, FILL (ML) | 24.0 |
| 3.3 / -3.3 | Orange brown with minor black SILT, trace fine sand, slightly micaceous, stiff, moist (probable decomposed SCHIST/PHYLLITE) (ML) - mild foliation and thin, black oxide stringers in sample from 3.3' to 5.3' | 6.1 |

Boring Terminated at 5.3'

SPT_LOG-0495 SHOULDER BORINGS 4-2013.GPJ-8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig. The thickness of the CTA is estimated; the precise bottom of the CTA layer could not be determined

PAGE 1 OF 1
NI-5



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-7
PAGE 1 OF 1

STATION: 171+75
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 9' LT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/16/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | |
| 1 | 7 | | | 1.07 | | | | |
| 2 | -2 | 6 | 65 | | | | | |
| 3 | 3 | 8 | | 3.07 | | | | |
| 4 | -4 | 3 | 85 | | | | | |
| 5 | | 5 | | 5.07 | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 4.3" Asphalt Concrete
 0.4 / -0.4
 8.6" Hydraulic Cement Concrete
 1.1 / -1.1
 3.5" Crushed Aggregate
 1.4 / -1.4
 Brown silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM)
 2.0 / -2.0
 Dark yellow brown SILT with f-m sand, slightly micaceous, stiff, moist, possible FILL (ML)
 - mild foliation and thin, black oxide stringers in sample from 3.1' to 5.1'
 3.1 / -3.1
 Orange brown with minor black SILT, trace f-m sand, slightly micaceous, firm, moist (possible decomposed SCHIST/PHYLLITE) (ML)
 - thin, black oxide stringers in sample from 3.1' to 5.1'
 Boring Terminated at 5.1'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

11.3
 34.3

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NI-7



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-8
PAGE 1 OF 1

STATION: 175+50
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 11' LT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/16/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | |
| 1 | 6 | 3 | 65 | 1.07 | | | | |
| 2 | -2 | 7 | 7 | 3.07 | | | | |
| 3 | 3 | 4 | 9 | 5.07 | | | | |
| 4 | -4 | 14 | | | | | | |
| 5 | | | | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| DEPTH (ft) | DESCRIPTION | LL | PI | MOISTURE CONTENT (%) |
|------------|--|----|----|----------------------|
| 0.0 / 0.0 | 5.3" Asphalt Concrete | | | |
| 0.4 / -0.4 | 7.6" Hydraulic Cement Concrete | | | |
| 1.1 / -1.1 | 3.0" Crushed Aggregate | | | |
| 1.3 / -1.3 | Brown SILT with f-m sand, trace fine subrounded gravel, stiff, moist, FILL (ML) | | | 16.4 |
| 3.1 / -3.1 | Red orange brown with grey and minor black SILT with f-c sand, trace fine, friable rock fragments, slightly micaceous, stiff, moist (possible decomposed SCHIST/PHYLLITE) (ML) -- mild foliation in sample from 3.1' to 5.1' | | | 15.4 |

Boring Terminated at 5.1'

SPT_LOG-0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

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NI-8



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NI-9
 PAGE 1 OF 1

STATION: 184+35
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 13' LT
 Easting: ft
 COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/16/13
 Drilling Method(s): 2.25" HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: C. Haines
 Logger: C. Regotti

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 | |
| 1 | | | | | | | | |
| 2 | -2 | 4 | | | 1.7 | | | |
| 3 | | 6 | 75 | | | | | |
| 4 | -4 | 4 | | | 3.7 | | | |
| 5 | | 9 | 80 | | | | | |
| | | 10 | | | 5.7 | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

| | | |
|---|--|------|
| 0.0 / 0.0 | | |
| 6.0" Asphalt Concrete | | |
| 0.5 / -0.5 | | |
| 8.9" Hydraulic Cement Concrete | | |
| 1.2 / -1.2 | | |
| 6.3" Cement Treated Aggregate | | |
| 1.8 / -1.8 | | |
| Dark yellow brown silty f-c SAND with f-c rounded gravel, medium dense, moist, FILL (SM) | | 20.8 |
| 2.2 / -2.2 | | |
| Red orange brown with grey and minor black SILT with fine sand (occasional f-c sand), micaceous, stiff, moist (probable decomposed SCHIST) (ML) | | |
| - strong foliation/schistosity in sample from 2.2' to 3.7' | | |
| - light orange brown with grey below 3.7' | | 17.0 |

Boring Terminated at 5.7'

| | | |
|--------------|------------------|----------------------|
| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| LL | PI | |

SPT LOG-0485 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
 NI-9



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-10
PAGE 1 OF 1

STATION: 189+49
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 11' LT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/16/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

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 | | STRATA | JOINTS |
| 1 | | | | | | | | | | |
| 2 | -2 | 4 | | | 1.71 | | | | | |
| 3 | | 7 | 45 | | | | | | | |
| 4 | -4 | 6 | | | 3.71 | | | | | |
| 5 | | 10 | 75 | | | | | | | |
| | | 12 | | | 5.71 | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 5.6" Asphalt Concrete
 0.5 / -0.5
 8.9" Hydraulic Cement Concrete
 1.2 / -1.2
 6.0" Cement Treated Aggregate
 1.7 / -1.7
 Dark yellow brown silty f-c SAND with f-c rounded gravel, medium dense, moist, FILL (SM)
 2.2 / -2.2
 Brown, red orange brown and black SILT with f-m sand, slightly micaceous, stiff to very stiff, moist, possible FILL (ML) -- very stiff below 3.7'
 Boring Terminated at 5.7'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

22.1
 15.5

REMARKS: Rig Type: CME 45B Truck Rig.

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NI-10

SPT LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NI-11
PAGE 1 OF 1

STATION: 196+97
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 11' LT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/16/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

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 | | STRATA | JOINTS |
| 1 | | 5 | | | 1.38 | | | | | |
| 2 | -2 | 8 | 80 | | | | | | | |
| 3 | | 6 | | | 3.38 | | | | | |
| 4 | -4 | 5 | 85 | | | | | | | |
| 5 | | 4 | | | 5.38 | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 5.3" Asphalt Concrete
 0.4 / -0.4
 6.3" Hydraulic Cement Concrete
 1.0 / -1.0
 5.0" Cement Treated Aggregate
 1.4 / -1.4
 Dark yellow brown silty f-c SAND with f-c rounded gravel, medium dense, moist, FILL (SM)
 2.4 / -2.4
 Brown SILT with f-m sand, trace f-c quartz fragments, micaceous, stiff, moist, possible FILL (ML)

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

18.2
 16.5

Boring Terminated at 5.4'

SPT_LOG-0495 SHOULDER BORINGS 4-2013.GPJ-8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

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NI-11



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-1
 PAGE 1 OF 1

STATION: 128+74
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 44' RT
 Easting: ft
 COORD. DATUM:

| FIELD DATA | | | | | | | | | | LAB DATA | | | | | | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|-------------------------------|--------------------------------|----------------|--------------------|--------------------|--|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 4/14/13 | Drilling Method(s): 2.25" HSA | SPT Method: Automatic Hammer | Other Test(s): | Driller: C. Haines | Logger: C. Regotti | GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | | | | | | | |
| 1 | 5 | 5 | 85 | 0.9 | | | | | 0.0 / 0.0 | 3.4" Asphalt Concrete | 0.3 / -0.3 | 7.5" Hydraulic Cement Concrete | | | | | | | |
| 2 | -2 | 5 | 85 | 4 | | | | | 0.9 / -0.9 | 4.0" Crushed Aggregate | 1.2 / -1.2 | | | | | | | 23.3 | |
| 3 | | 2 | | 2.9 | | | | | 2.9 / -2.9 | Red orange brown with minor grey SILT, trace fine sand, slightly micaceous, firm, moist, FILL (ML) | | | | | | | | | |
| 4 | -4 | 3 | 90 | 3 | | | | | | | | | | | | | | 25.0 | |
| | | 3 | | 4.9 | | | | | | | | | | | | | | | |
| | | | | | | | | | | Boring Terminated at 4.9' | | | | | | | | | |

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
 NO-1

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-2
 PAGE 1 OF 1

STATION: 132+54
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 44' RT
 Easting: ft
 COORD. DATUM:

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 4/14/13 Drilling Method(s): 2.25" HSA SPT Method: Automatic Hammer Other Test(s): Driller: C. Haines Logger: C. Regotti | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | |
| | | | | | | | | | | GROUND WATER NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | |
| 1 | | 6 | | | 1.03 | | | | | 0.0 / 0.0 4.1" Asphalt Concrete | | | |
| | | | | | | | | | | 0.3 / -0.3 8.1" Hydraulic Cement Concrete | | | |
| 2 | -2 | 6 | 75 | | | | | | | 1.0 / -1.0 4.0" Crushed Aggregate | | | |
| | | | | | | | | | | 1.4 / -1.4 Dark yellow brown silty f-c SAND with f-c rounded gravel, loose, moist, FILL (SM) | | | 25.1 |
| 3 | | 3 | | | 3.03 | | | | | 1.9 / -1.9 Dark yellow brown SILT with f-m sand, slightly micaceous, stiff, moist, FILL (ML) | | | |
| 4 | -4 | 4 | | | | | | | | | | | 19.4 |
| | | | | | | | | | | | | | |
| 5 | | 6 | | | 5.03 | | | | | | | | |
| | | | | | | | | | | Boring Terminated at 5.0' | | | |

SPT LOG-0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003.021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-2



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NO-3
PAGE 1 OF 1

STATION: 136+90
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 44' RT
Easting: ft
COORD. DATUM:

| FIELD DATA | | | | | | | | | | LAB DATA | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|--|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | Date(s) Drilled: 4/14/13 Drilling Method(s): 2.25" HSA SPT Method: Automatic Hammer Other Test(s): Driller: C. Haines Logger: C. Regotti | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | |
| | | | | | | | | | | GROUND WATER | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | | | |
| 1 | | | | | | | | | | 0.0 / 0.0 4.8" Asphalt Concrete | | | |
| | | | | | | | | | | 0.4 / -0.4 8.2" Hydraulic Cement Concrete | | | |
| 2 | -2 | 5 | | | 1.65 | | | | | 1.1 / -1.1 7.0" Cement Treated Aggregate | | | |
| | | 4 | | | | | | | | 1.7 / -1.7 Orange brown silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM) | | | |
| 3 | | 6 | 80 | | | | | | | 2.3 / -2.3 Tan with yellow brown and black SILT, trace fine sand, micaceous, stiff, moist, possible FILL (ML) | | | 8.2 |
| | | 6 | | | 3.65 | | | | | | | | |
| 4 | -4 | 4 | | | | | | | | 3.7 / -3.7 Tan and orange brown with minor black and grey SILT with fine sand, micaceous, stiff, moist (probable decomposed SCHIST) (ML) -- moderate foliation/schistosity in sample from 3.7' to 5.7' | | | 13.0 |
| | | 5 | | | | | | | | | | | |
| 5 | | 6 | 80 | | | | | | | | | | |
| | | 8 | | | 5.65 | | | | | | | | |
| | | | | | | | | | | Boring Terminated at 5.7' | | | |

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-3

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-4
 PAGE 1 OF 1

STATION: 142+40
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 47' RT
 Easting: ft
 COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/14/13
 Drilling Method(s): 2.25" HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: C. Haines
 Logger: C. Regotti

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 | |
| 1 | | | | | | | | |
| 2 | -2 | 7 | | | 1.58 | | | |
| 3 | | 4 | 80 | | | | | |
| 4 | -4 | 2 | | | 3.58 | | | |
| 5 | | 3 | 90 | | | | | |
| 6 | | 5 | | | 5.58 | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 4.3" Asphalt Concrete
 0.4 / -0.4
 9.1" Hydraulic Cement Concrete
 1.1 / -1.1
 5.7" Cement Treated Aggregate
 1.6 / -1.6
 Orange brown silty f-c SAND with f-c subrounded gravel, loose, moist, FILL (SM)
 2.2 / -2.2
 Orange red brown with yellow brown SILT with fine sand, micaceous, firm, moist, FILL (ML)
 -- orange brown below 3.6'
 Boring Terminated at 5.6'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

| | | |
|--|--|------|
| | | 22.9 |
| | | 18.8 |

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-4

SPT LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NO-5
PAGE 1 OF 1

STATION: 159+12
NORTHING: ft
SURFACE ELEVATION: 0.0 ft
OFFSET: 48' RT
Easting: ft
COORD. DATUM:

| FIELD DATA | | | | | | | | | | LAB DATA | | | | |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|--------|---------------|---|-----------------------------|--------------|------------------|----------------------|
| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | | STRATA LEGEND | GROUND WATER | FIELD DESCRIPTION OF STRATA | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | | | | | | |
| | | | | | | | | | | NOT ENCOUNTERED DURING DRILLING NO LONG TERM MEASUREMENTS TAKEN | | | | |
| | | | | | | | | | | FIELD DESCRIPTION OF STRATA | LL | PI | | |
| 1 | | | | | | | | | | 0.0 / 0.0 12.0" Asphalt Concrete | | | | |
| 2 | -2 | 10 | | | 1.99 | | | | | 1.0 / -1.0 8.0" Hydraulic Cement Concrete | | | | |
| 3 | | 9 | | | 75 | | | | | 1.7 / -1.7 4.0" Crushed Aggregate | | | | |
| 4 | -4 | 13 | | | 9 | | | | | 2.0 / -2.0 Orange brown silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM) | | | 17.4 | |
| 5 | | 9 | | | 3.99 | | | | | 4.0 / -4.0 Red brown SILT with fine sand, micaceous, mixed with fine CRUSHED AGGREGATE, very stiff/medium dense, moist, FILL (ML/SM) | | | 19.4 | |
| 6 | -6 | 5 | | | 15 | | | | | | | | | |
| | | 17 | | | | | | | | | | | | |
| | | 45 | | | | | | | | | | | | |
| | | | | | | | | | | Boring Terminated at 6.0' | | | | |

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-5

SPT_LOG:0485 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-6
 PAGE 1 OF 1

STATION: 166+74
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 49' RT
 Easting: ft
 COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
 Drilling Method(s): 2.25" HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: C. Haines
 Logger: C. Regotti

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 | |
| 1 | | | | | | | | |
| 2 | -2 | 12 | | | 2.04 | | | |
| 3 | | 14 | 75 | | | | | |
| 4 | -4 | 3 | 6 | | 4.04 | | | |
| 5 | | 2 | 80 | | | | | |
| 6 | -6 | 4 | | | 6.04 | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 11.5" Asphalt Concrete

1.0 / -1.0
 7.0" Hydraulic Cement Concrete

1.5 / -1.5
 6.0" Cement Treated Aggregate

2.0 / -2.0
 Orange brown silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM)

3.3 / -3.3
 Orange brown with black SILT/lean CLAY, trace fine sand, stiff to firm, moist (possible decomposed PHYLLITE) (ML/CL)
 - firm below 4'
 - occasional mild foliation and thin, black oxide stringers in sample from 4' to 6'

Boring Terminated at 6.0'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

22.6

37.1

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-6

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-7
 PAGE 1 OF 1

STATION: 171+75
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 49' RT
 Easting: ft
 COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
 Drilling Method(s): 2.25" HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: C. Haines
 Logger: C. Regotti

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 | | STRATA | JOINTS |
| 1 | | | | | | | | | | |
| 2 | -2 | 8 | | | 1.81 | | | | | |
| 3 | | 12 | 85 | | | | | | | |
| 4 | -4 | 3 | | | 3.81 | | | | | |
| 5 | | 3 | 85 | | | | | | | |
| | | 5 | | | 5.81 | | | | | |
| | | 6 | | | | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 12.5" Asphalt Concrete

1.0 / -1.0
 9.3" Hydraulic Cement Concrete

1.8 / -1.8
 4.5" Crushed Aggregate (possible Cement Treated Aggregate; very weak positive reaction for the presence of cement)

2.2 / -2.2
 Orange brown silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM)

3.8 / -3.8
 Orange brown with minor yellow brown and black SILT, trace fine sand, slightly micaceous, firm, moist (possible decomposed PHYLLITE) (ML)
 - occasional mild foliation and thin, black oxide stringers in sample from 3.8' to 5.8'

Boring Terminated at 5.8'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

7.8
 39.2

SPT LOG-0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-7



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NO-8
PAGE 1 OF 1

STATION: 175+50
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 59' RT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

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 | | STRATA | JOINTS |
| 1 | | 8 | | | 1.46 | | | | | |
| 2 | -2 | 7 | 75 | | | | | | | |
| 3 | | 8 | | | | | | | | |
| 4 | -4 | 2 | 90 | | 3.46 | | | | | |
| 5 | | 4 | | | | | | | | |
| | | 5 | | | 5.46 | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 4.9" Asphalt Concrete
 0.4 / -0.4
 7.7" Hydraulic Cement Concrete
 1.1 / -1.1
 5.1" Cement Treated Aggregate
 1.5 / -1.5
 Orange brown and tan silty f-c SAND with f-c subrounded gravel, medium dense, moist, FILL (SM)
 3.3 / -3.3
 Orange red brown SILT, occasional traces of f-m sand, slightly micaceous, firm, moist (possible decomposed SCHIST/PHYLLITE) (ML)
 -- red brown with orange, yellow and black, mild to moderate foliation/schistosity in sample from 3.5' to 5.5'
 Boring Terminated at 5.5'

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

LL PI

16.0

40.1

SPT_LOG-0495 SHOULDER BORINGS 4-2013.GPJ.8.30.003:021011.12/2/13

REMARKS: Rig Type: CME 45B Truck Rig. The HCC portion of the pavement core was misplaced after coring; no core photo of the HCC portion exists

PAGE 1 OF 1
NO-8



PROJECT #: I-495 Bus on Shoulders
LOCATION: FAIRFAX COUNTY
STRUCTURE: ROADWAY

NO-9
PAGE 1 OF 1

STATION: 184+35
NORTHING: ft
SURFACE ELEVATION: 0.0 ft

OFFSET: 58' RT
Easting: ft
COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
Drilling Method(s): 2.25" HSA
SPT Method: Automatic Hammer
Other Test(s):
Driller: C. Haines
Logger: C. Regotti

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND |
|------------|----------------|--|-------------------|-----------------|-------------------|--------------------------|--------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | STRATA | |
| 1 | 12 | | | 0.47 | | | | |
| 2 | -2 | 17 | 70 | | | | | |
| 3 | 6 | 17 | | 2.47 | | | | |
| 4 | -4 | 9 | 60 | | | | | |
| | | 7 | | 4.47 | | | | |
| | | 6 | | | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 5.5" Asphalt Concrete
 0.5 / -0.5
 35.3" Crushed Aggregate
 3.4 / -3.4
 White with minor light orange and yellow brown fine sandy SILT, micaceous, very stiff, moist (possible decomposed SCHIST/QUARTZITE) (ML)

Boring Terminated at 4.8'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

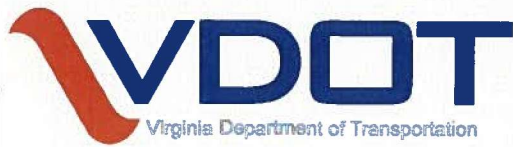
6.1

26.3

SPT_LOG:0495 SHOULDER BORINGS 4-2013.GPJ:8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

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NO-9



PROJECT #: I-495 Bus on Shoulders
 LOCATION: FAIRFAX COUNTY
 STRUCTURE: ROADWAY

NO-10
 PAGE 1 OF 1

STATION: 189+49
 NORTHING: ft
 SURFACE ELEVATION: 0.0 ft

OFFSET: 58' RT
 Easting: ft
 COORD. DATUM:

FIELD DATA

Date(s) Drilled: 4/15/13
 Drilling Method(s): 2.25" HSA
 SPT Method: Automatic Hammer
 Other Test(s):
 Driller: C. Haines
 Logger: C. Regotti

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 | |
| 1 | 9 | 18 | 70 | 0.48 | | | | |
| 2 | -2 | 18 | 12 | 2.48 | | | | |
| 3 | 3 | 5 | 80 | | | | | |
| 4 | -4 | 6 | 8 | 4.48 | | | | |

GROUND WATER
 NOT ENCOUNTERED DURING DRILLING
 NO LONG TERM MEASUREMENTS TAKEN

FIELD DESCRIPTION OF STRATA

0.0 / 0.0
 5.8" Asphalt Concrete
 0.5 / -0.5
 16.0" Crushed Aggregate

1.8 / -1.8
 Tan yellow brown with minor grey SILT with f-m sand, micaceous, hard, moist (possible decomposed SCHIST) (ML) - stiff below 2.5'

Boring Terminated at 4.5'

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |
| | | 15.0 |
| | | 20.0 |

SPT LOG-0485 SHOULDER BORINGS 4-2013.GPJ-8.30.003:021011:12/2/13

REMARKS: Rig Type: CME 45B Truck Rig.

PAGE 1 OF 1
NO-10



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A1

11BH-001

PAGE 1 OF 2

STATION: I-495 SB 666+08
 LATITUDE: 38.946308° N
 SURFACE ELEVATION: 229.8 ft

OFFSET: 72' Lt
 LONGITUDE: 77.200056° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/5/11 - 10/5/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 7.0 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 | 229.8 | WOH 1 | 85 | | | | | |
| 2 | 229.5 | 2 | 85 | | | | | |
| 4 | 229.5 | 2 | 85 | | | | | |
| 6 | 229.5 | 3 | 85 | | | | | |
| 8 | 229.5 | 5 | 75 | | | | | |
| 10 | 229.5 | 14 | 75 | | | | | |
| 12 | 229.5 | 16 | 75 | | | | | |
| 14 | 229.5 | 10 | 75 | | | | | |
| 16 | 229.5 | 7 | 65 | | | | | |
| 18 | 229.5 | 13 | 65 | | | | | |
| 20 | 229.5 | 13 | 65 | | | | | |
| 22 | 229.5 | 8 | 60 | | | | | |
| 24 | 229.5 | 10 | 60 | | | | | |
| 26 | 229.5 | 14 | 60 | | | | | |
| 28 | 229.5 | 18 | 60 | | | | | |
| 30 | 229.5 | 220 | 60 | | | | | |
| 32 | 229.5 | 225 | 60 | | | | | |
| 34 | 229.5 | 225 | 60 | | | | | |
| 36 | 229.5 | 225 | 60 | | | | | |
| 38 | 229.5 | 225 | 60 | | | | | |
| 40 | 229.5 | 225 | 60 | | | | | |
| 42 | 229.5 | 225 | 60 | | | | | |
| 44 | 229.5 | 225 | 60 | | | | | |
| 46 | 229.5 | 225 | 60 | | | | | |
| 48 | 229.5 | 225 | 60 | | | | | |
| 50 | 229.5 | 225 | 60 | | | | | |
| 52 | 229.5 | 225 | 60 | | | | | |
| 54 | 229.5 | 225 | 60 | | | | | |
| 56 | 229.5 | 225 | 60 | | | | | |
| 58 | 229.5 | 225 | 60 | | | | | |
| 60 | 229.5 | 225 | 60 | | | | | |
| 62 | 229.5 | 225 | 60 | | | | | |
| 64 | 229.5 | 225 | 60 | | | | | |
| 66 | 229.5 | 225 | 60 | | | | | |
| 68 | 229.5 | 225 | 60 | | | | | |
| 70 | 229.5 | 225 | 60 | | | | | |
| 72 | 229.5 | 225 | 60 | | | | | |
| 74 | 229.5 | 225 | 60 | | | | | |
| 76 | 229.5 | 225 | 60 | | | | | |
| 78 | 229.5 | 225 | 60 | | | | | |
| 80 | 229.5 | 225 | 60 | | | | | |
| 82 | 229.5 | 225 | 60 | | | | | |
| 84 | 229.5 | 225 | 60 | | | | | |
| 86 | 229.5 | 225 | 60 | | | | | |
| 88 | 229.5 | 225 | 60 | | | | | |
| 90 | 229.5 | 225 | 60 | | | | | |
| 92 | 229.5 | 225 | 60 | | | | | |
| 94 | 229.5 | 225 | 60 | | | | | |
| 96 | 229.5 | 225 | 60 | | | | | |
| 98 | 229.5 | 225 | 60 | | | | | |
| 100 | 229.5 | 225 | 60 | | | | | |
| 102 | 229.5 | 225 | 60 | | | | | |
| 104 | 229.5 | 225 | 60 | | | | | |
| 106 | 229.5 | 225 | 60 | | | | | |
| 108 | 229.5 | 225 | 60 | | | | | |
| 110 | 229.5 | 225 | 60 | | | | | |
| 112 | 229.5 | 225 | 60 | | | | | |
| 114 | 229.5 | 225 | 60 | | | | | |
| 116 | 229.5 | 225 | 60 | | | | | |
| 118 | 229.5 | 225 | 60 | | | | | |
| 120 | 229.5 | 225 | 60 | | | | | |
| 122 | 229.5 | 225 | 60 | | | | | |
| 124 | 229.5 | 225 | 60 | | | | | |
| 126 | 229.5 | 225 | 60 | | | | | |
| 128 | 229.5 | 225 | 60 | | | | | |
| 130 | 229.5 | 225 | 60 | | | | | |
| 132 | 229.5 | 225 | 60 | | | | | |
| 134 | 229.5 | 225 | 60 | | | | | |
| 136 | 229.5 | 225 | 60 | | | | | |
| 138 | 229.5 | 225 | 60 | | | | | |
| 140 | 229.5 | 225 | 60 | | | | | |
| 142 | 229.5 | 225 | 60 | | | | | |
| 144 | 229.5 | 225 | 60 | | | | | |
| 146 | 229.5 | 225 | 60 | | | | | |
| 148 | 229.5 | 225 | 60 | | | | | |
| 150 | 229.5 | 225 | 60 | | | | | |
| 152 | 229.5 | 225 | 60 | | | | | |
| 154 | 229.5 | 225 | 60 | | | | | |
| 156 | 229.5 | 225 | 60 | | | | | |
| 158 | 229.5 | 225 | 60 | | | | | |
| 160 | 229.5 | 225 | 60 | | | | | |
| 162 | 229.5 | 225 | 60 | | | | | |
| 164 | 229.5 | 225 | 60 | | | | | |
| 166 | 229.5 | 225 | 60 | | | | | |
| 168 | 229.5 | 225 | 60 | | | | | |
| 170 | 229.5 | 225 | 60 | | | | | |
| 172 | 229.5 | 225 | 60 | | | | | |
| 174 | 229.5 | 225 | 60 | | | | | |
| 176 | 229.5 | 225 | 60 | | | | | |
| 178 | 229.5 | 225 | 60 | | | | | |
| 180 | 229.5 | 225 | 60 | | | | | |
| 182 | 229.5 | 225 | 60 | | | | | |
| 184 | 229.5 | 225 | 60 | | | | | |
| 186 | 229.5 | 225 | 60 | | | | | |
| 188 | 229.5 | 225 | 60 | | | | | |
| 190 | 229.5 | 225 | 60 | | | | | |
| 192 | 229.5 | 225 | 60 | | | | | |
| 194 | 229.5 | 225 | 60 | | | | | |
| 196 | 229.5 | 225 | 60 | | | | | |
| 198 | 229.5 | 225 | 60 | | | | | |
| 200 | 229.5 | 225 | 60 | | | | | |
| 202 | 229.5 | 225 | 60 | | | | | |
| 204 | 229.5 | 225 | 60 | | | | | |
| 205 | 229.5 | 225 | 60 | | | | | |

| DEPTH (ft) | ELEVATION (ft) | FIELD DESCRIPTION OF STRATA | LL | PI | MOISTURE CONTENT (%) |
|------------|----------------|--|----|----|----------------------|
| 0.0 | 229.8 | 3.6" GRASS and TOPSOIL TOPS | | | 20.1 |
| 0.3 | 229.5 | FILL, consisting of red-brown, sandy SILT, contains quartz gravel and fragments, concrete fragments from 0.5' to 1.5', soft, moist ML , FL | | | 39.7 |
| | | SAME, no quartz gravel, firm | | | 10.1 |
| | | SAME, contains quartz gravel and fragments, very stiff | | | 14.2 |
| 6.0 | 223.8 | Tan, fine silty SAND, with gravel, very stiff, wet SM | 39 | 12 | 29.4 |
| 10.0 | 219.8 | Red-brown, lean CLAY, with sand, very stiff, wet CL | | | 18.0 |
| 12.0 | 217.8 | Brown, sandy SILT, hard, wet ML | | | 13.3 |
| 17.0 | 212.8 | Tan, gray, sandy highly weathered SCHIST, trace of gravel, moist HWR | | | 13.6 |

REMARKS: Rig Type: CME 55. N: 468,648.0
 E: 3,650,047.9

PAGE 1 OF 2

11BH-001

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A1

11BH-001

PAGE 2 OF 2

STATION: I-495 SB 666+08
 LATITUDE: 38.946308° N
 SURFACE ELEVATION: 229.8 ft

OFFSET: 72' Lt
 LONGITUDE: 77.200056° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/5/11 - 10/5/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 7.0 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 | DIP ° | |
| 26 | | | | | | | | | |
| 28 | 17 | 83/5 | 100 | | 28.5 | | | | |
| 30 | 200 | | | | 29.4 | | | | |
| 32 | | | | | | | | | |
| 34 | 32 | 48 | 80 | | 33.5 | | | | |
| | 195 | 48 | | | 35 | | | | |

Boring terminated at 35.0' on 10-4-11.

REMARKS: Rig Type: CME 55. N: 468,648.0
 E: 3,650,047.9

PAGE 2 OF 2

11BH-001

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A1

11BH-002

PAGE 2 OF 2

STATION: I-495 SB 669+87
 LATITUDE: 38.947240° N
 SURFACE ELEVATION: 233.0 ft

OFFSET: 84' Lt
 LONGITUDE: 77.201918° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/5/11 - 10/5/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 15.5 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 | DIP ° | |
| 26 | 205 | | | | | | | | |
| | 26 | 50 | 80 | 28.5 | | | | | |
| 30 | 24 | | | 30 | | | | | |
| 32 | 200 | | | | | | | | |
| 34 | 14 | 43 | 80 | 33.5 | | | | | |
| | 45 | | | 35 | | | | | |

Boring terminated at 35.0' on 10-4-11.

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | 8.4 |
| | | 12.9 |

REMARKS: Rig Type: CME 55. N: 468,989.8
 E: 3,650,224.6

PAGE 2 OF 2

11BH-002

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A1

11BH-003

PAGE 1 OF 2

STATION: I-495 SB 701+77
 LATITUDE: 38.947680° N
 SURFACE ELEVATION: 233.6 ft

OFFSET: 83' Lt
 LONGITUDE: 77.201539° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/5/11 - 10/5/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.0 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 ° | |
| 1 | 233.6 | 1 | 65 | | | | | |
| 2 | 233.3 | 2 | 2 | | | | | |
| 3 | | 3 | | | | | | |
| 4 | 230 | 4 | 90 | 4 | | | | |
| 5 | | 5 | 85 | | | | | |
| 6 | | 4 | 4 | 6 | | | | |
| 7 | | 4 | 10 | | | | | |
| 8 | 225 | 3 | 5 | 8 | | | | |
| 9 | | 3 | 10 | | | | | |
| 10 | | 3 | 10 | 10 | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | 220 | 19 | 20 | 13.5 | | | | |
| 14 | | 10 | 14 | 15 | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | 215 | 20 | 90 | 18.5 | | | | |
| 19 | | 50/6 | | 19.5 | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | 210 | 12 | 100 | 23.5 | | | | |
| 25 | | 32 | 50 | | | | | |

| | | | |
|--|--|--|------|
| 0.0 / 233.6 3" TOPSOIL TOPS | | | 23.2 |
| 0.3 / 233.3 Red, brown, fine silty SAND, very loose, moist SM | | | |
| SAME, contains quartz gravel and fragments, loose | | | 22.1 |
| 5.0 / 228.6 Brown, gray, sandy SILT, stiff, moist ML | | | 31.1 |
| SAME, firm | | | 28.4 |
| 7.5 / 226.1 Gray, fine SAND, with silt and gravel, loose, moist SM | | | 30.9 |
| 12.0 / 221.6 Gray, fine clayey SAND, medium dense, wet SC | | | 34.3 |
| 16.0 / 217.6 Tan, brown, sandy SILT, exhibits relic rock structure, hard, moist ML | | | 11.1 |
| 19.0 / 214.6 Tan, sandy highly weathered SCHIST, contains quartz gravel and fragments, moist HWR | | | 7.0 |

REMARKS: Rig Type: CME 55. N: 469,151.6
 E: 3,650,330.2

PAGE 1 OF 2

11BH-003

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A1

11BH-003

PAGE 2 OF 2

STATION: I-495 SB 701+77
 LATITUDE: 38.947680° N
 SURFACE ELEVATION: 233.6 ft

OFFSET: 83' Lt
 LONGITUDE: 77.201539° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/5/11 - 10/5/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 19.0 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 | DIP ° | | JOINTS |
| | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | 205 | 12 | 64 | 36/4 | 100 | | | | | |
| 28.5 | | | | | | | | | | |
| 29.8 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | 200 | 100/5 | 0 | | | | | | | |
| 33.5 | | | | | | | | | | |
| 33.9 | | | | | | | | | | |

Boring terminated at 33.9' on 10-4-11.

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | 6.8 |
| | | 10.6 |

REMARKS: Rig Type: CME 55. N: 469,151.6
 E: 3,650,330.2

PAGE 2 OF 2

11BH-003

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-004

PAGE 1 OF 2

STATION: Wall 10+09
 LATITUDE: 38.948199° N
 SURFACE ELEVATION: 252.3 ft

OFFSET: 13' Lt
 LONGITUDE: 77.201049° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/4/11 - 10/4/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | | 1 | 65 | | | | | |
| 2 | 250 | 2 | | 2 | | | | |
| 3 | | 3 | | | | | | |
| 4 | | 5 | 90 | | | | | |
| 5 | | 6 | | 4 | | | | |
| 6 | | 8 | | | | | | |
| 7 | | 7 | 85 | | | | | |
| 8 | 245 | 9 | | 6 | | | | |
| 9 | | 10 | 75 | | | | | |
| 10 | | 14 | | 8 | | | | |
| 11 | | 17 | | | | | | |
| 12 | | 17 | 75 | | | | | |
| 13 | | 22 | | 10 | | | | |
| 14 | 240 | 23 | | | | | | |
| 15 | | 12 | | 13.5 | | | | |
| 16 | | 24 | 80 | | | | | |
| 17 | | 21 | | 15 | | | | |
| 18 | 235 | | | | | | | |
| 19 | | 13 | | 18.5 | | | | |
| 20 | | 20 | 87 | | | | | |
| 21 | | 26 | | 20 | | | | |
| 22 | 230 | | | | | | | |
| 23 | | | | | | | | |
| 24 | | 47 | 53/5 | 23.5 | | | | |
| 25 | | | 144 | 24.4 | | | | |

0.0 / 252.3
 2" TOPSOIL TOPS
 0.2 / 252.1
 Brown, sandy SILT, trace of gravel, soft, moist **ML**

2.0 / 250.3
 Brown, fine silty SAND, contains trace mica, medium dense, moist **SM**

4.0 / 245.0
 SAME, dense

13.5 / 240.0
 SAME, contains quartz gravel and fragments

17.0 / 235.3
 Tan, brown, sandy SILT, hard, moist **ML**

22.0 / 230.3
 Tan, sandy highly weathered SCHIST, contains trace mica and trace rock fragments, moist **HWR**

| DEPTH (ft) | LL | PI | MOISTURE CONTENT (%) |
|-------------|----|----|----------------------|
| 0.0 - 0.2 | | | 17.1 |
| 2.0 - 4.0 | | | 11.5 |
| 4.0 - 13.5 | | | 12.8 |
| 13.5 - 17.0 | | | 9.2 |
| 17.0 - 22.0 | | | 11.0 |
| 22.0 - 24.4 | | | 5.0 |
| 17.0 - 20.0 | | | 9.0 |
| 22.0 - 24.4 | | | 7.2 |

REMARKS: Rig Type: CME 55. N: 469,342.5
 E: 3,650,466.7

PAGE 1 OF 2

11BH-004

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-004

PAGE 2 OF 2

STATION: Wall 10+09
 LATITUDE: 38.948199° N
 SURFACE ELEVATION: 252.3 ft

OFFSET: 13' Lt
 LONGITUDE: 77.201049° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/4/11 - 10/4/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

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 ° | | JOINTS |
| 26 | 225 | 15 | 50/5 | 133 | 28.5 | | | | | |
| 28 | | | | | 29.4 | | | | | |
| 30 | | | | | | | | | | |
| 32 | 220 | 24 | 53/3 | 150 | 33.5 | | | | | |
| 34 | | | | | 34.3 | | | | | |

GROUND WATER
 NOT ENCOUNTERED

FIELD DESCRIPTION OF STRATA

| LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|--------------|------------------|----------------------|
| LL | PI | |

6.0

6.1

Boring terminated at 34.3' on 10-3-11.

REMARKS: Rig Type: CME 55. N: 469,342.5
 E: 3,650,466.7

PAGE 2 OF 2

11BH-004

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-006

PAGE 1 OF 2

STATION: Wall 14+27
 LATITUDE: 38.949069° N
 SURFACE ELEVATION: 286.4 ft

OFFSET: 6' Rt
 LONGITUDE: 77.200235° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/4/11 - 10/4/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | 285 | 2 | 85 | 2 | | | | |
| 4 | 285 | 4 | 85 | 4 | | | | |
| 6 | 285 | 5 | 85 | 6 | | | | |
| 8 | 285 | 7 | 85 | 8 | | | | |
| 10 | 285 | 10 | 85 | 10 | | | | |
| 12 | 275 | 13.5 | 85 | 13.5 | | | | |
| 14 | 275 | 15 | 85 | 15 | | | | |
| 16 | 270 | 18.5 | 85 | 18.5 | | | | |
| 18 | 270 | 20 | 85 | 20 | | | | |
| 20 | 265 | 23.5 | 85 | 23.5 | | | | |
| 22 | 265 | 100 | 85 | | | | | |
| 24 | 265 | 12 | 100 | | | | | |

0.0 / 286.4
 2.4" TOPSOIL TOPS

0.2 / 286.2
 Red-brown, lean CLAY, with sand, firm, moist **CL**

4.0 / 282.4
 Tan, fine silty SAND, medium dense, moist **SM**

SAME, olive

SAME, contains quartz gravel and fragments

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| 49 | 21 | 23.1 |
| | | 17.8 |
| | | 13.0 |
| | | 7.6 |
| | | 10.4 |
| | | 8.3 |
| | | 7.4 |
| | | 9.7 |

REMARKS: Rig Type: CME 55. N: 469,662.7
 E: 3,650,693.9

PAGE 1 OF 2

11BH-006

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-006

PAGE 2 OF 2

STATION: Wall 14+27
 LATITUDE: 38.949069° N
 SURFACE ELEVATION: 286.4 ft

OFFSET: 6' Rt
 LONGITUDE: 77.200235° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/4/11 - 10/4/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | | JOINTS |
| | | | | | | | | | | 25 |
| 26 | 260 | | | | | | | | | |
| 28 | | 5 | | | | | | | | 28.5 |
| 30 | | 6 | 87 | | | | | | | 30 |
| 32 | 255 | | | | | | | | | |
| 34 | | 5 | | | | | | | | 33.5 |
| | | 12 | 100 | | | | | | | 35 |
| | | 14 | | | | | | | | |

SAME, no gravel

Boring terminated at 35.0' on 10-3-11.

17.5

12.4

REMARKS: Rig Type: CME 55. N: 469,662.7
 E: 3,650,693.9

PAGE 2 OF 2

11BH-006

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-007

PAGE 1 OF 2

STATION: Wall 16+17
 LATITUDE: 38.949421° N
 SURFACE ELEVATION: 278.3 ft

OFFSET: 20' Rt
 LONGITUDE: 77.199753° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/4/11 - 10/4/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | |
| 2 | 278.3 | 3 | 25 | | | | | | |
| 2 | 275 | 4 | 40 | | | | | | |
| 4 | 270 | 7 | 40 | | | | | | |
| 6 | | 6 | 40 | | | | | | |
| 8 | | 6 | 40 | | | | | | |
| 10 | | 10 | 90 | | | | | | |
| 12 | 265 | 9 | 100 | | | | | | |
| 14 | | 15 | 100 | | | | | | |
| 16 | | | | | | | | | |
| 18 | 260 | 5 | 100 | | | | | | |
| 20 | | 10 | 100 | | | | | | |
| 22 | | | | | | | | | |
| 24 | 255 | 19 | 100 | | | | | | |

| | | | |
|--|--|--|------|
| 0.0 / 278.3 3.6" TOPSOIL TOPS | | | 36.7 |
| 0.3 / 278.0 Brown, sandy SILT, firm, wet ML | | | 29.4 |
| SAME, stiff, exhibits relic rock structure, moist | | | 17.5 |
| 5.5 / 272.8 Brown, fine SAND, with clay, exhibits relic rock structure, medium dense, moist SC | | | 20.7 |
| 8.5 / 269.8 Brown, orange, sandy SILT, exhibits relic rock structure, very stiff, moist ML | | | 10.6 |
| 12.0 / 266.3 Brown, fine silty SAND, contains trace mica, exhibits relic rock structure, dense, moist SM | | | 13.8 |
| SAME, medium dense | | | 23.8 |
| SAME, dense | | | 19.2 |

REMARKS: Rig Type: CME 55. N: 469,792.8
 E: 3,650,829.1

PAGE 1 OF 2

11BH-007

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-008

PAGE 1 OF 2

STATION: Wall 18+00
 LATITUDE: 38.949720° N
 SURFACE ELEVATION: 270.1 ft

OFFSET: 6' Lt
 LONGITUDE: 77.199302° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/3/11 - 10/3/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

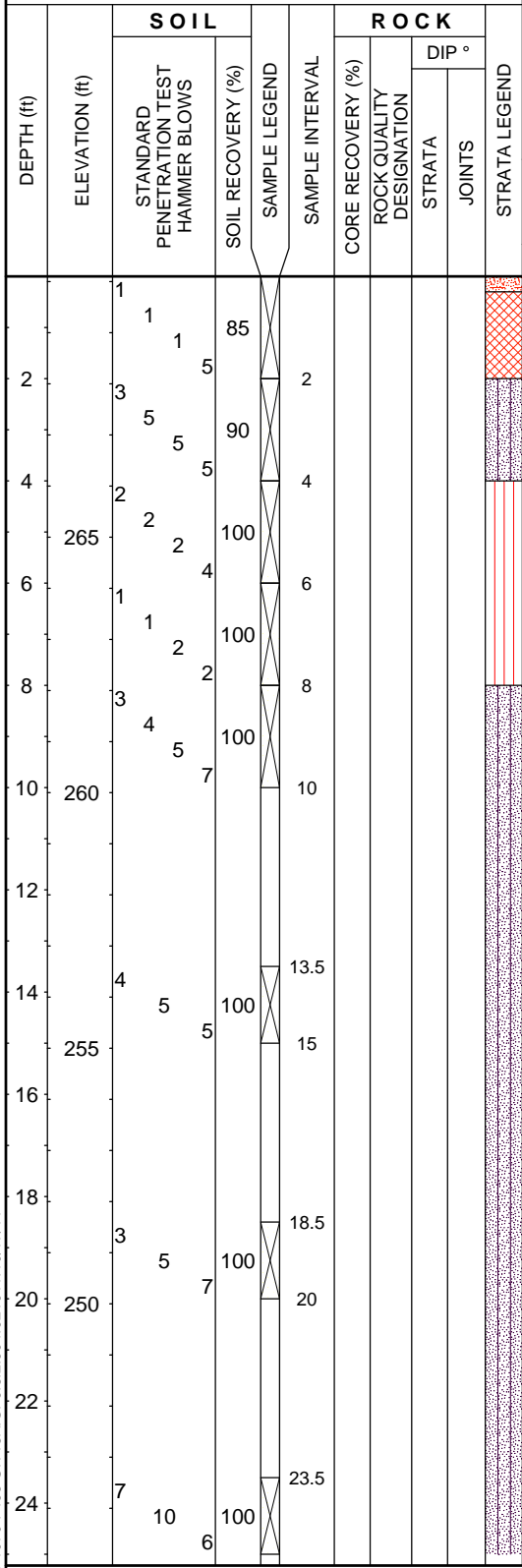
LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 26.0 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: CME 55. N: 469,903.6
 E: 3,650,955.8

PAGE 1 OF 2

11BH-008

SPT_LOG-36-1070 I-495 SW13A GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-008

PAGE 2 OF 2

STATION: Wall 18+00
 LATITUDE: 38.949720° N
 SURFACE ELEVATION: 270.1 ft

OFFSET: 6' Lt
 LONGITUDE: 77.199302° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/3/11 - 10/3/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

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 | DIP ° | | STRATA |
| 25 | | | | | | | | | | |
| 26 | 240 | 49 | 100 | | 28.5 | | | | | |
| 29 | | | | | | | | | | |
| 30 | | 33 | | | 30 | | | | | |
| 32 | | | | | | | | | | |
| 34 | | 12 | 107 | | 33.5 | | | | | |
| | | 45 | | | 34.9 | | | | | |
| | | 55/5 | | | | | | | | |

29.0 / 241.1
 Brown, sandy highly weathered SCHIST, moist **HWR**

14.0
 16.1

Boring terminated at 34.9' on 9-30-11.

REMARKS: Rig Type: CME 55. N: 469,903.6
 E: 3,650,955.8

PAGE 2 OF 2

11BH-008

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-009

PAGE 1 OF 2

STATION: Wall 19+43
 LATITUDE: 38.950018° N
 SURFACE ELEVATION: 269.2 ft

OFFSET: 10' Lt
 LONGITUDE: 77.198973° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/3/11 - 10/3/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: M. Rayl

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 34.0 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 | STRATA | JOINTS | |
| 1 | | | | | | | | | |
| 2 | 265 | 1 | 55 | 2 | | | | | |
| 4 | 265 | 4 | 100 | 4 | | | | | |
| 6 | | 5 | 100 | 6 | | | | | |
| 8 | 260 | 2 | 60 | 6 | | | | | |
| 10 | | 3 | 4 | 8 | | | | | |
| 12 | | 4 | 100 | 8 | | | | | |
| 14 | 255 | 5 | 100 | 10 | | | | | |
| 16 | | 5 | | 10 | | | | | |
| 18 | 250 | 3 | 100 | 13.5 | | | | | |
| 20 | | 8 | 100 | 15 | | | | | |
| 22 | | 8 | | 15 | | | | | |
| 24 | 245 | 6 | 80 | 23.5 | | | | | |
| | | 14 | | | | | | | |

0.0 / 269.2
 6" TOPSOIL TOPS

0.5 / 268.7
 FILL, consisting of red-brown, fine silty SAND, trace of quartz gravel, contains trace rootlets and trace mica, very loose, moist **SM, FL**

2.0 / 267.2
 Tan, fine silty SAND, trace of quartz gravel, contains trace rootlets and trace mica, medium dense, moist **SM**

4.7 / 264.5
 Gray, SILT, with sand, contains trace mica, stiff, moist **ML**

6.0 / 263.2
 Red-brown, fine silty SAND, contains trace mica, loose, moist **SM**

12.0 / 257.2
 Tan, brown, SILT, with sand, contains trace mica, exhibits relic rock structure, stiff, moist **ML**

SAME, tan, brown, black, very stiff

| DEPTH (ft) | LL | PI | MOISTURE CONTENT (%) |
|------------|----|----|----------------------|
| 2 | | | 20.5 |
| 4 | | | 13.5 |
| 6 | | | 22.7 |
| 8 | | | 24.1 |
| 10 | | | 28.5 |
| 14 | | | 19.0 |
| 18 | | | 19.5 |
| 24 | | | 25.4 |

REMARKS: Rig Type: CME 55. N: 470,013.3
 E: 3,651,047.9

PAGE 1 OF 2

11BH-009

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-009

PAGE 2 OF 2

STATION: Wall 19+43
 LATITUDE: 38.950018° N
 SURFACE ELEVATION: 269.2 ft

OFFSET: 10' Lt
 LONGITUDE: 77.198973° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/3/11 - 10/3/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: M. Rayl

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 34.0 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 | DIP ° | |
| | | | | | | | | | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 27 | | 9 | | | | | | | |
| 28 | | 18 | | | | | | | |
| 28.5 | | | 80 | | | | | | |
| 29 | | | | | | | | | |
| 30 | 240 | 23 | | | | | | | |
| 31 | | | | | | | | | |
| 32 | | | | | | | | | |
| 33 | | | | | | | | | |
| 33.5 | | 10 | | | | | | | |
| 34 | 235 | 19 | 80 | | | | | | |
| 35 | | 30 | | | | | | | |

27.0 / 242.2
 Tan, brown, silty SAND, dense, moist **SM**

SAME, brown, white, black

Boring terminated at 35.0' on 9-30-11.

22.7

18.5

REMARKS: Rig Type: CME 55. N: 470,013.3
 E: 3,651,047.9

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SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-010

PAGE 1 OF 2

STATION: Wall 20+65
 LATITUDE: 38.950269° N
 SURFACE ELEVATION: 271.7 ft

OFFSET: 10' Lt
 LONGITUDE: 77.198688° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 9/30/11 - 9/30/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

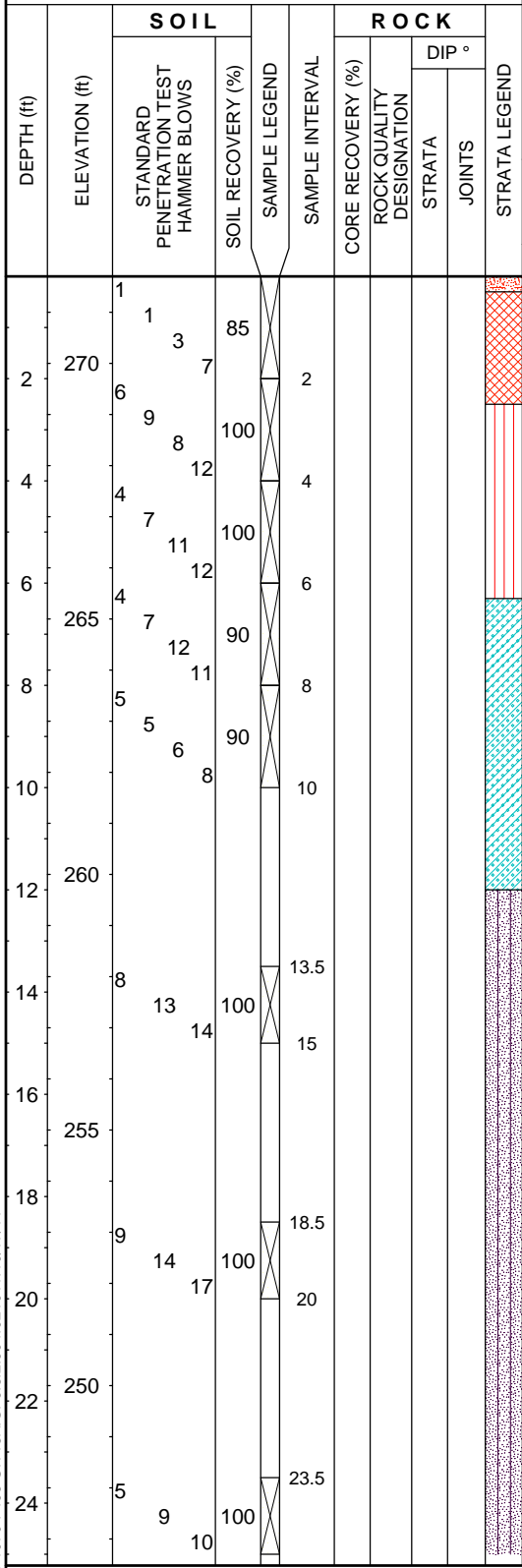
LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 42.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: CME 55. N: 470,106.1
 E: 3,651,127.6

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SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-011

PAGE 1 OF 2

STATION: Wall 22+27
 LATITUDE: 38.953667° N
 SURFACE ELEVATION: 286.3 ft

OFFSET: 14' Lt
 LONGITUDE: 77.198268° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 9/30/11 - 9/30/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: M. Rayl

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | |
| 1 | 285 | 1 | 65 | | | | | | |
| 2 | | 3 | 7 | | | | | | |
| | | 6 | 100 | | | | | | |
| 4 | | 7 | 12 | | | | | | |
| | | 9 | 15 | | | | | | |
| 6 | 280 | 11 | 12 | | | | | | |
| | | 12 | 65 | | | | | | |
| 8 | | 5 | 11 | | | | | | |
| | | 5 | 100 | | | | | | |
| 10 | | 6 | 8 | | | | | | |
| 12 | 275 | | | | | | | | |
| 14 | | 8 | 13.5 | | | | | | |
| | | 13 | 87 | | | | | | |
| 16 | 270 | 14 | 15 | | | | | | |
| 18 | | | | | | | | | |
| 20 | | 9 | 18.5 | | | | | | |
| | | 14 | 133 | | | | | | |
| 22 | 265 | 17 | 20 | | | | | | |
| 24 | | 5 | 23.5 | | | | | | |
| | | 9 | 53 | | | | | | |
| | | 10 | | | | | | | |

0.0 / 286.3
 3" TOPSOIL TOPS

0.3 / 286.0
 FILL, consisting of brown, sandy CLAY, contains trace mica, soft, moist **CL**, FL
 SAME, red-brown, contains concrete from 3.6' to 3.7', stiff

6.5 / 279.8
 Orange, brown, fine silty SAND, contains trace mica, medium dense, moist **SM**

SAME, tan

19.0 / 267.3
 Tan, fine SAND, with silt, contains trace mica, dense, moist **SM**

SAME, medium dense

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | 16.6 |
| 42 | 16 | 17.3 |
| | | 16.2 |
| | | 14.9 |
| | | 17.5 |
| | | 11.2 |
| | | 16.5 |
| | | 23.3 |

REMARKS: Rig Type: CME 55. N: 470,224.5
 E: 3,651,240.0

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11BH-011

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-012

PAGE 1 OF 2

STATION: Wall 24+00
 LATITUDE: 38.950874° N
 SURFACE ELEVATION: 294.8 ft

OFFSET: 33' Rt
 LONGITUDE: 77.197829° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/6/11 - 10/6/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | |
| 1 | 294.8 | 2 | 25 | | | | | | |
| 2 | 294.3 | 2 | 4 | | | | | | |
| 4 | 291.3 | 3 | 10 | | | | | | |
| 6 | 290 | 7 | 7 | | | | | | |
| 8 | 285 | 6 | 7 | | | | | | |
| 10 | 285 | 7 | 9 | | | | | | |
| 14 | 280 | 6 | 10 | | | | | | |
| 18 | 275 | 17 | 38 | | | | | | |
| 20 | 275 | 47 | 47 | | | | | | |
| 24 | 270 | 34 | 51 | | | | | | |
| 24 | 270 | 31 | 100 | | | | | | |

0.0 / 294.8
 6" GRASS and TOPSOIL TOPS

0.5 / 294.3
 Red-brown, fine silty SAND, contains trace gravel and trace mica, loose, moist **SM**

3.5 / 291.3
 Tan, fine SAND, with silt, medium dense, exhibits relic rock structure below 4.5', moist **SM**

SAME, red-brown

SAME, tan, gray

18.0 / 276.8
 Tan, gray, highly weathered SCHIST, contains highly weathered schist rock fragments and trace mica, moist **HWR**

| DEPTH (ft) | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|-----------------|--------------|------------------|----------------------|
| 0.0 / 294.8 | | | 29.0 |
| 0.5 / 294.3 | | | 11.1 |
| 3.5 / 291.3 | | | 14.4 |
| SAME, red-brown | | | 18.6 |
| SAME, tan, gray | | | 13.9 |
| 18.0 / 276.8 | | | 8.4 |
| 24 | | | 9.6 |

REMARKS: Rig Type: CME 55. N: 470,329.8
 E: 3,651,368.7

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11BH-012

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-012

PAGE 2 OF 2

STATION: Wall 24+00
 LATITUDE: 38.950874° N
 SURFACE ELEVATION: 294.8 ft

OFFSET: 33' Rt
 LONGITUDE: 77.197829° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/6/11 - 10/6/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | | JOINTS |
| | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | 35 | 65/4 | 100 | 28.5 | | | | | |
| 30 | 265 | | | | 29.3 | | | | | |
| 32 | | | | | | | | | | |
| 34 | 100 | | | 100 | 33.5 | | | | | |
| | 260 | | | | 34 | | | | | |

Boring terminated at 34.0' on 10-6-11.

REMARKS: Rig Type: CME 55. N: 470,329.8
 E: 3,651,368.7

PAGE 2 OF 2

11BH-012

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-013

PAGE 1 OF 2

STATION: Wall 26+12
 LATITUDE: 38.951344° N
 SURFACE ELEVATION: 314.0 ft

OFFSET: 2' Rt
 LONGITUDE: 77.197379° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/6/11 - 10/6/11

LAB DATA

Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

GROUND WATER
 NOT ENCOUNTERED

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 LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 1 | | 3 | 75 | | | | | | |
| 2 | | 3 | 75 | | | | | | |
| 4 | 310 | 3 | 75 | | | | | | |
| 6 | | 4 | 75 | | | | | | |
| 8 | | 4 | 75 | | | | | | |
| 10 | 305 | 20 | 75 | | | | | | |
| 12 | | | | | | | | | |
| 14 | 300 | 7 | 80 | | | | | | |
| 16 | | | | | | | | | |
| 18 | 295 | 15 | 100 | | | | | | |
| 20 | | 30 | 100 | | | | | | |
| 22 | | | | | | | | | |
| 24 | 290 | 23 | 100 | | | | | | |

0.0 / 314.0
 4.8" TOPSOIL TOPS

0.4 / 313.6
 Red-brown, fine silty SAND, trace of quartz gravel, exhibits relic rock structure, loose, moist **SM**

3.0 / 311.0
 White, fine SAND, with silt, contains trace mica, loose, moist **SM**

SAME, white, tan

SAME, with quartz gravel, dense

12.0 / 302.0
 White, tan, fine silty SAND, trace of quartz gravel, contains trace mica, medium dense, moist **SM**

19.0 / 295.0
 White, tan, fine to medium SAND, with silt, contains quartz gravel and fragments, very dense, moist **SM**

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | 11.1 |
| | | 14.7 |
| | | 14.5 |
| | | 9.7 |
| | | 3.9 |
| | | 10.3 |
| | | 5.7 |
| | | 6.5 |

REMARKS: Rig Type: CME 55. N: 470,502.6
 E: 3,651,494.3

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11BH-013

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-013

PAGE 2 OF 2

STATION: Wall 26+12
 LATITUDE: 38.951344° N
 SURFACE ELEVATION: 314.0 ft

OFFSET: 2' Rt
 LONGITUDE: 77.197379° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/6/11 - 10/6/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 NOT ENCOUNTERED

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 | DIP ° | | JOINTS |
| | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | 285 | 28 | 42 | 100 | 28.5 | | | | | |
| 30 | | 58 | | | 30 | | | | | |
| 32 | | | | | | | | | | |
| 34 | 280 | 12 | 29 | 67 | 33.5 | | | | | |
| | | 71 | | | 35 | | | | | |

FIELD DESCRIPTION OF STRATA

5.9
7.7

Boring terminated at 35.0' on 10-6-11.

REMARKS: Rig Type: CME 55. N: 470,502.6
 E: 3,651,494.3

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SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-014

PAGE 1 OF 2

STATION: Wall 28+37
 LATITUDE: 38.951754° N
 SURFACE ELEVATION: 292.9 ft

OFFSET: 17' Lt
 LONGITUDE: 77.196842° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/7/11 - 10/7/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.5 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 | DIP ° | |
| 1 | | | | | | | | | |
| 2 | 290 | 2 | 75 | | | | | | |
| 4 | | 2 | 75 | | | | | | |
| 6 | | 3 | 90 | | | | | | |
| 8 | 285 | 5 | 65 | | | | | | |
| 10 | | 8 | 90 | | | | | | |
| 12 | 280 | 8 | | | | | | | |
| 14 | | 10 | 100 | | | | | | |
| 16 | | 11 | | | | | | | |
| 18 | 275 | 13.5 | | | | | | | |
| 20 | | 15 | 100 | | | | | | |
| 22 | | 15 | | | | | | | |
| 24 | 270 | 18.5 | | | | | | | |
| 26 | | 20 | | | | | | | |
| 28 | | 23.5 | | | | | | | |
| 30 | | 27 | 100 | | | | | | |

0.0 / 292.9
 4.8" TOPSOIL TOPS
 0.4 / 292.5
 Red-brown, fine silty SAND, loose, moist **SM**

4.0 / 288.9
 Red-brown, white, black, sandy SILT, firm, moist **ML**

SAME, very stiff

SAME, hard

| LL | PI | MOISTURE CONTENT (%) |
|----|----|----------------------|
| | | 27.3 |
| | | 25.5 |
| | | 28.1 |
| | | 24.5 |
| | | 21.6 |
| | | 19.1 |
| | | 19.0 |
| | | 20.3 |

REMARKS: Rig Type: CME 55. N: 470,654.1
 E: 3,651,644.9

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11BH-014

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-014

PAGE 2 OF 2

STATION: Wall 28+37
 LATITUDE: 38.951754° N
 SURFACE ELEVATION: 292.9 ft

OFFSET: 17' Lt
 LONGITUDE: 77.196842° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/7/11 - 10/7/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 33.5 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 | DIP ° | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | 265 | 7 | | | | | | | |
| 30 | | 21 | 100 | 28.5 | | | | | |
| | | 22 | | 30 | | | | | |
| 32 | | | | | | | | | |
| 34 | 260 | 4 | | | | | | | |
| | | 6 | 100 | 33.5 | | | | | |
| | | 12 | | 35 | | | | | |

SAME, brown, black, exhibits relic rock structure, very stiff, wet

Boring terminated at 35.0' on 10-7-11.

21.8

24.5

REMARKS: Rig Type: CME 55. N: 470,654.1
 E: 3,651,644.9

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11BH-014

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-015

PAGE 1 OF 2

STATION: Wall 29+72
 LATITUDE: 38.952027° N
 SURFACE ELEVATION: 288.5 ft

OFFSET: 15' Lt
 LONGITUDE: 77.196525° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/7/11 - 10/7/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 32.0 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 | DIP ° | |
| 1 | 288.5 | 1 | 75 | | | | | | |
| 2 | 285 | 2 | 75 | | | | | | |
| 4 | 285 | 4 | 75 | | | | | | |
| 6 | 285 | 6 | 75 | | | | | | |
| 8 | 280 | 8 | 75 | | | | | | |
| 10 | 280 | 10 | 75 | | | | | | |
| 12 | 275 | 12 | 75 | | | | | | |
| 14 | 275 | 14 | 53 | | | | | | |
| 16 | 275 | 16 | 53 | | | | | | |
| 18 | 270 | 18 | 100 | | | | | | |
| 20 | 270 | 20 | 100 | | | | | | |
| 22 | 265 | 22 | 100 | | | | | | |
| 24 | 265 | 24 | 100 | | | | | | |

| | | |
|---|----|------|
| 0.0 / 288.5 2.4" TOPSOIL TOPS | | |
| 0.2 / 288.3 FILL, consisting of red-brown, fine silty SAND, very loose, moist SM , FL SAME, medium dense | | 18.6 |
| | | 25.1 |
| 5.0 / 283.5 Tan, sandy SILT, very stiff, moist ML | NP | 12.1 |
| SAME, tan, white | | 13.3 |
| 8.0 / 280.5 Tan, sandy SILT, exhibits relic rock structure very stiff, moist ML | | 12.2 |
| | | 10.2 |
| SAME, contains trace mica, hard | | 11.7 |
| | | 17.7 |

REMARKS: Rig Type: CME 55. N: 470,754.9
 E: 3,651,733.5

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11BH-015

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-015

PAGE 2 OF 2

STATION: Wall 29+72
 LATITUDE: 38.952027° N
 SURFACE ELEVATION: 288.5 ft

OFFSET: 15' Lt
 LONGITUDE: 77.196525° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/7/11 - 10/7/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 32.0 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 | DIP ° | |
| | | | | | | | | | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | 260 | 6 | | | | | | | |
| | | 21 | 100 | | 28.5 | | | | |
| 30 | | 23 | | | 30 | | | | |
| 32 | | | | | | | | | |
| 34 | 255 | 23 | | | 33.5 | | | | |
| | | 53 | 100 | | 34.8 | | | | |
| | | 47/3 | | | | | | | |

SAME, hard

32.0 / 256.5
 Tan, sandy highly weathered SCHIST, moist HWR

Boring terminated at 34.8' on 10-7-11.

20.0

17.2

REMARKS: Rig Type: CME 55. N: 470,754.9
 E: 3,651,733.5

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11BH-015

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-016

PAGE 1 OF 2

STATION: Wall 31+23
 LATITUDE: 38.952349° N
 SURFACE ELEVATION: 286.0 ft

OFFSET: 13' Lt
 LONGITUDE: 77.196199° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.0 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 | STRATA | JOINTS | |
| 2 | 285 | 2 | 85 | 2 | | | | | |
| 3 | | 3 | | | | | | | |
| 4 | | 4 | | | | | | | |
| 5 | | 5 | | | | | | | |
| 6 | 280 | 6 | 100 | 6 | | | | | |
| 7 | | 7 | | | | | | | |
| 8 | | 8 | | | | | | | |
| 9 | | 9 | | | | | | | |
| 10 | | 10 | | | | | | | |
| 11 | 275 | 11 | | | | | | | |
| 12 | | 12 | | | | | | | |
| 13 | | 13 | | | | | | | |
| 14 | | 14 | 87 | 13.5 | | | | | |
| 15 | | 15 | | 15 | | | | | |
| 16 | 270 | 16 | | | | | | | |
| 17 | | 17 | | | | | | | |
| 18 | | 18 | | | | | | | |
| 19 | | 19 | | | | | | | |
| 20 | | 20 | 100 | 18.5 | | | | | |
| 21 | 265 | 21 | | | | | | | |
| 22 | | 22 | | | | | | | |
| 23 | | 23 | | | | | | | |
| 24 | | 24 | 67 | 23.5 | | | | | |

0.0 / 286.0
 3.6" GRASS and TOPSOIL TOPS

0.3 / 285.7
 FILL, consisting of red-brown, sandy SILT, contains trace mica, firm, moist ML, FL

2.0 / 284.0
 Red-brown, fine silty SAND, contains trace mica, loose, moist SM

SAME, tan

SAME, exhibits relic rock structure

SAME, contains highly weathered schist rock fragments, medium dense

SAME, loose

REMARKS: Rig Type: CME 45. N: 470,873.4
 E: 3,651,824.6

PAGE 1 OF 2

11BH-016

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-016

PAGE 2 OF 2

STATION: Wall 31+23
 LATITUDE: 38.952349° N
 SURFACE ELEVATION: 286.0 ft

OFFSET: 13' Lt
 LONGITUDE: 77.196199° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 27.0 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 | DIP ° | | JOINTS |
| | | | | | | | | | | 25 |
| 26 | 260 | | | | | | | | | |
| | | 6 | | | | | | | | 28.5 |
| 28 | | 11 | 100 | | | | | | | |
| | | 12 | | | | | | | | 30 |
| 30 | 255 | | | | | | | | | |
| 32 | | | | | | | | | | |
| | | 14 | | | | | | | | 33.5 |
| 34 | | 21 | 53 | | | | | | | |
| | | 18 | | | | | | | | 35 |

SAME, medium dense

SAME, dense

Boring terminated at 35.0' on 10-11-11.

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11

REMARKS: Rig Type: CME 45. N: 470,873.4
 E: 3,651,824.6

PAGE 2 OF 2

11BH-016



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-017

PAGE 1 OF 2

STATION: Wall 32+77
 LATITUDE: 38.951344° N
 SURFACE ELEVATION: 286.1 ft

OFFSET: 13' Lt
 LONGITUDE: 77.196002° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 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 | STRATA | JOINTS | |
| 2 | 285 | 2 | 75 | | | | | | |
| 2 | | 3 | | | | | | | |
| 2 | | 4 | | 2 | | | | | |
| 4 | | 4 | 35 | | | | | | |
| 4 | | 5 | | | | | | | |
| 4 | | 6 | | 4 | | | | | |
| 6 | 280 | 4 | 40 | | | | | | |
| 6 | | 5 | | 6 | | | | | |
| 8 | | 3 | 100 | | | | | | |
| 8 | | 7 | | 8 | | | | | |
| 10 | | 6 | 100 | | | | | | |
| 10 | | 11 | | 10 | | | | | |
| 12 | 275 | 16 | | | | | | | |
| 14 | | 6 | | 13.5 | | | | | |
| 14 | | 5 | 20 | | | | | | |
| 16 | 270 | 6 | | 15 | | | | | |
| 18 | | 9 | | 18.5 | | | | | |
| 20 | | 12 | 100 | | | | | | |
| 20 | 265 | 20 | | 20 | | | | | |
| 22 | | | | | | | | | |
| 24 | | 8 | | 23.5 | | | | | |
| 24 | | 18 | 100 | | | | | | |
| | | 42 | | | | | | | |

0.0 / 286.1
 2.4" GRASS and TOPSOIL TOPS

0.2 / 285.9
 FILL, consisting of red-brown, fine silty SAND, contains trace mica, loose, moist **SM**, FL

2.0 / 284.1
 Brown, fine silty SAND, contains trace rootlets, loose, moist **SM**

SAME, red-brown, contains quartz gravel and fragments

SAME, brown

SAME, tan, medium dense

12.0 / 274.1
 Tan, sandy SILT, stiff, moist **ML**

18.5 / 267.6
 Tan, fine silty SAND, contains trace mica, dense, moist **SM**

SAME, contains highly weathered schist rock fragments

REMARKS: Rig Type: CME 45. N: 470,968.5
 E: 3,651,879.4

PAGE 1 OF 2

11BH-017

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-017

PAGE 2 OF 2

STATION: Wall 32+77
 LATITUDE: 38.951344° N
 SURFACE ELEVATION: 286.1 ft

OFFSET: 13' Lt
 LONGITUDE: 77.196002° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 23.0 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 | DIP ° | | STRATA | JOINTS | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |
| 26 | 260 | 39 | | | | | | | | | | | | | | | | | |
| 27 | | 27 | 100 | | | | | | | | | | | | | | | | |
| 28 | | 45 | | | | | | | | | | | | | | | | | |
| 28.5 | | 17 | | | | | | | | | | | | | | | | | |
| 29 | | 24 | 100 | | | | | | | | | | | | | | | | |
| 30 | | 45 | | | | | | | | | | | | | | | | | |
| 30 | 255 | | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | |
| 33.5 | | 28 | | | | | | | | | | | | | | | | | |
| 34 | | 29 | 100 | | | | | | | | | | | | | | | | |
| 35 | | 30 | | | | | | | | | | | | | | | | | |

SAME, white

Boring terminated at 35.0' on 10-11-11.

REMARKS: Rig Type: CME 45. N: 470,968.5
 E: 3,651,879.4

PAGE 2 OF 2

11BH-017

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-018

PAGE 1 OF 2

STATION: Wall 34+30
 LATITUDE: 38.952972° N
 SURFACE ELEVATION: 299.0 ft

OFFSET: 10' Lt
 LONGITUDE: 77.028880° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

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 | | | ROCK | | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 2 | | 2 | 40 | | | | | | |
| 2 | | 3 | | | | | | | |
| 4 | | 4 | | | | | | | |
| 4 | 295 | 4 | 35 | | | | | | |
| 6 | | 6 | | | | | | | |
| 6 | | 7 | 50 | | | | | | |
| 8 | | 8 | | | | | | | |
| 8 | | 10 | 75 | | | | | | |
| 10 | 290 | 7 | 65 | | | | | | |
| 12 | | | | | | | | | |
| 14 | 285 | 3 | 100 | | | | | | |
| 16 | | 6 | | | | | | | |
| 18 | | 9 | | | | | | | |
| 18 | 280 | 10 | 87 | | | | | | |
| 20 | | 14 | | | | | | | |
| 20 | | 13 | | | | | | | |
| 22 | | | | | | | | | |
| 24 | 275 | 13 | 100 | | | | | | |
| 24 | | 31 | 50 | | | | | | |

0.0 / 299.0
 2.4" GRASS and TOPSOIL TOPS

0.2 / 298.8
 FILL, consisting of brown, orange, fine silty SAND, contains trace mica, loose, moist **SM**, FL

5.0 / 294.0
 Brown, white, fine silty SAND, exhibits relic rock structure loose, moist **SM**

SAME, medium dense

9.0 / 290.0
 Tan, white, fine SAND, with silt, exhibits relic rock structure medium dense, moist **SM**

24.0 / 275.0
 Tan, gray, silty highly weathered SCHIST, moist **HWR**

REMARKS: Rig Type: CME 55. N: 471,102.9
 E: 3,652,004.7

PAGE 1 OF 2

11BH-018

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-018

PAGE 2 OF 2

STATION: Wall 34+30
 LATITUDE: 38.952972° N
 SURFACE ELEVATION: 299.0 ft

OFFSET: 10' Lt
 LONGITUDE: 77.028880° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/11/11 - 10/11/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

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 | | | ROCK | | | | STRATA LEGEND |
|------------|----------------|--|-------------------|---------------|-----------------|-------------------|--------------------------|-------|---------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE LEGEND | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP ° | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | 270 | 22 | 33 | 100 | 28.5 | | | | |
| 30 | | 50 | | | 30 | | | | |
| 32 | | | | | | | | | |
| 34 | 265 | 23 | 31 | 87 | 33.5 | | | | |
| 36 | | 37 | | | 35 | | | | |
| 38 | | | | | | | | | |
| 40 | 260 | 13 | 23 | 100 | 38.5 | | | | |
| | | 40 | | | 40 | | | | |

Boring terminated at 40.0' on 10-11-11.

REMARKS: Rig Type: CME 55. N: 471,102.9
 E: 3,652,004.7

PAGE 2 OF 2

11BH-018

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-019

PAGE 1 OF 2

STATION: Wall 36+87
 LATITUDE: 38.953388° N
 SURFACE ELEVATION: 299.1 ft

OFFSET: 10' Rt
 LONGITUDE: 77.195319° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/10/11 - 10/10/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 34.0 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 | | 2 | 50 | | | | | |
| 2 | | 2 | 2 | 2 | | | | |
| 4 | | 4 | 2 | | | | | |
| 4 | | 3 | 35 | | | | | |
| 4 | 295 | 4 | 5 | 4 | | | | |
| 6 | | 6 | 65 | | | | | |
| 6 | | 6 | 8 | 6 | | | | |
| 8 | | 5 | 65 | | | | | |
| 8 | | 7 | 8 | 8 | | | | |
| 8 | 290 | 3 | 8 | | | | | |
| 10 | | 7 | 50 | | | | | |
| 10 | | 8 | 8 | 10 | | | | |
| 12 | | | | | | | | |
| 14 | 285 | 3 | 100 | 13.5 | | | | |
| 14 | | 4 | 6 | 15 | | | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 18 | 280 | 5 | 67 | 18.5 | | | | |
| 20 | | 8 | 13 | 20 | | | | |
| 22 | | | | | | | | |
| 24 | 275 | 13 | 87 | 23.5 | | | | |
| 24 | | 31 | 37 | | | | | |

0.0 / 299.1
 6" GRASS and TOPSOIL TOPS

0.5 / 298.6
 FILL, consisting of brown, fine SAND, with silt, trace of gravel, contains trace mica, loose, moist **SM**, FL

2.0 / 297.1
 FILL, consisting of red-brown, silty SAND, loose, moist **SM**, FL

4.0 / 295.1
 Red-brown, fine silty SAND, contains trace mica, medium dense, moist **SM**

12.0 / 287.1
 Brown, sandy SILT, stiff, moist **ML**

17.0 / 282.1
 Brown, fine silty SAND, contains quartz gravel and fragments, medium dense, moist **SM**

23.0 / 276.1
 Brown, sandy highly weathered SCHIST, contains trace mica, exhibits relic rock structure, moist **HWR**

REMARKS: Rig Type: CME 55. N: 471,255.6
 E: 3,652,070.7

PAGE 1 OF 2

11BH-019

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-019

PAGE 2 OF 2

STATION: Wall 36+87
 LATITUDE: 38.953388° N
 SURFACE ELEVATION: 299.1 ft

OFFSET: 10' Rt
 LONGITUDE: 77.195319° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/10/11 - 10/10/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 34.0 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 | DIP ° | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 28.5 | 270 | 11 | 26 | 100 | 28.5 | | | | |
| 30 | | 55 | | | 30 | | | | |
| 32 | | | | | | | | | |
| 33.5 | | | | | | | | | |
| 34 | 265 | 10 | 28 | 100 | 33.5 | | | | |
| 35 | | 72 | | | 35 | | | | |
| 36 | | | | | | | | | |
| 36.2 | 38 | 62/5 | | 100 | 36.2 | | | | |
| 37.1 | | | | | 37.1 | | | | |

Boring terminated at 37.1' on 10-10-11.

REMARKS: Rig Type: CME 55. N: 471,255.6
 E: 3,652,070.7

PAGE 2 OF 2

11BH-019

SPT_LOG:36-1070 I-495 SW13A.GP:8.2.904:021011:10/17/11



PROJECT #: 0495-029-874,P101,6501 (FO)
 LOCATION: I-495 HOT LANES
 STRUCTURE: SW-13A

11BH-020

PAGE 1 OF 2

STATION: Wall 37+07
 LATITUDE: 38.953710° N
 SURFACE ELEVATION: 301.0 ft

OFFSET: 5' Lt
 LONGITUDE: 77.195208° W
 COORD. DATUM: NAD 83

FIELD DATA

Date(s) Drilled: 10/10/11 - 10/10/11
 Drilling Method(s): 3.25" HSA
 SPT Method: automatic hammer
 Other Test(s):
 Driller: CONNELLY & ASSOCIATES
 Logger: C. Egan

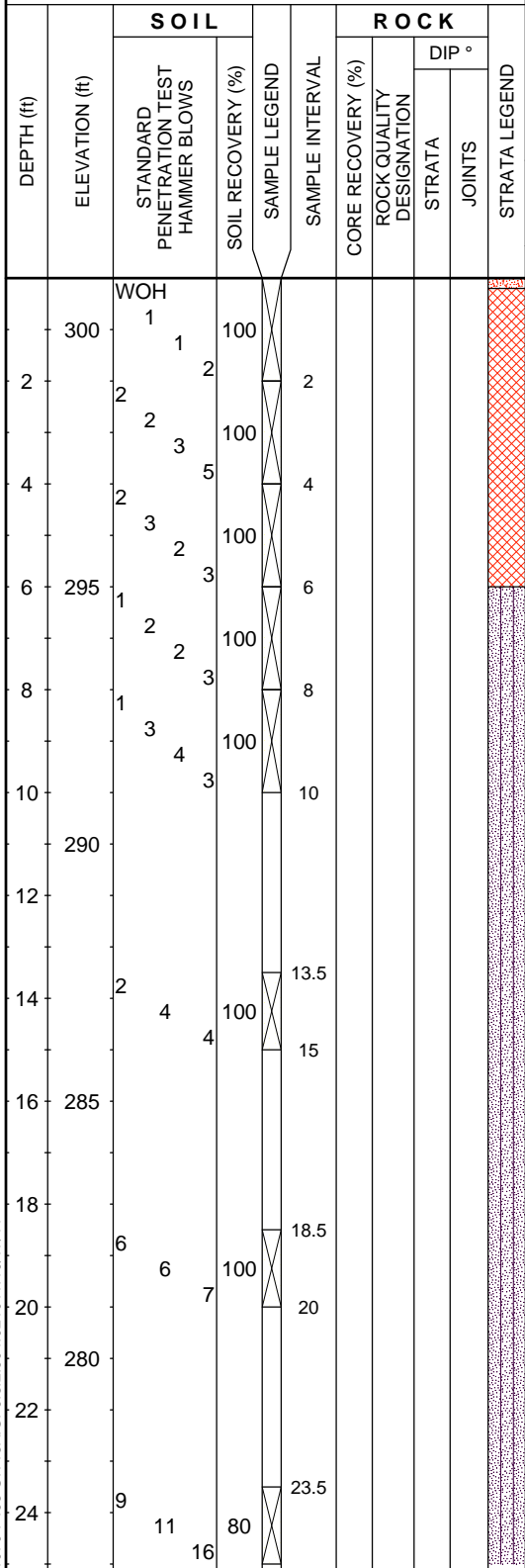
LAB DATA

LIQUID LIMIT
 PLASTICITY INDEX
 MOISTURE CONTENT (%)

GROUND WATER
 ▽ FIRST ENCOUNTERED AT 28.5 ft DEPTH

FIELD DESCRIPTION OF STRATA

LL PI



REMARKS: Rig Type: CME 55. N: 471,373.2
 E: 3,652,099.5

PAGE 1 OF 2

11BH-020

SPT_LOG:36-1070 I-495 SW13A.GPJ:8.2.904:021011:10/17/11



PROJECT #: 3551-09-1257
LOCATION: I-495 Beltway/DTR/DAAR
STRUCTURE: RW-7

09BH-RW-07

PAGE 1 OF 1

STATION:
LATITUDE: 38.942826 °N
SURFACE ELEVATION: 242.5 ft

OFFSET:
LONGITUDE: 77.204690 °W
COORD. DATUM: NAD 83

FIELD DATA

LAB DATA

| DEPTH (ft) | ELEVATION (ft) | SOIL | | | ROCK | | | STRATA LEGEND | DESCRIPTION OF STRATA | LIQUID LIMIT | PLASTICITY INDEX | MOISTURE CONTENT (%) |
|------------|----------------|--|-------------------|----------------------|-------------------|--------------------------|-----|---------------|--|--------------|------------------|----------------------|
| | | STANDARD PENETRATION TEST HAMMER BLOWS | SOIL RECOVERY (%) | SAMPLE INTERVAL | CORE RECOVERY (%) | ROCK QUALITY DESIGNATION | DIP | | | | | |
| | | | | | | | | | | | | |
| 0 | 242.5 | 1 | 100 | 0 | | | | | 0.0 / 242.5 7" TOPSOIL | | | 19.2 |
| 2 | 240 | 1 | 100 | 2 | | | | | 0.6 / 241.9 Brown fine to medium sandy SILT, trace of fine subangular gravel, contains organics, soft, moist (ML) | | | 25.6 |
| 4 | | 1 | 100 | 4 | | | | | 2.4 / 240.1 Gray brown fine sandy CLAY, contains mica and organics, soft, wet (CL) | | | |
| 6 | | 1 | 0 | 6 | | | | | SAME, description determined from auger cuttings | | | |
| 8 | 235 | 3 | 70 | 8 | | | | | 6.0 / 236.5 Brown fine to medium sandy SILT, trace of fine subangular quartz gravel, hard, moist (ML) | | | 6.4 |
| 10 | | 16 | 100 | 8.5 | | | | | 7.2 / 235.3 Gray tan fine to medium silty SAND, contains mica, dense, moist (SM) | | | |
| 12 | 230 | 31 | | | | | | | 8.0 / 234.5 Gray tan fine to medium silty SAND, contains mica, very dense, moist (SM) (partially weathered SCHIST) | | | 2.6 |
| 14 | | 100/1.25" | 100 | 13.5 13.6 14.5 | 100 | 100 | | | 13.5 / 229.0 Slightly weathered, hard, moderately fractured green gray SCHIST; joint angles at 45° to 55° Compressive Strength = 1,970 psi | | | |
| 16 | | | | | | | | | 14.5 / 228.0 SAME, highly weathered from 18.1' to 18.3', no recovery from 18.3' to 18.5', high angle fractures from 15.8' to 16.2' and 17.0' to 17.5' | | | |
| 18 | 225 | | | 19.5 | 96 | 40 | | | 19.5 / 223.0 SAME, no recovery from 22.5' to 23.6', jointing at 5° to 50° | | | |
| 20 | | | | | 85 | 63 | | | | | | |
| 22 | 220 | | | 23.6 | | | | | | | | |
| | | | | | | | | | Boring terminated 23.6' on 7/6/2009 | | | |

REMARKS: RIG TYPE: CME 55 Track Rig. Hammer efficiency = 74.5%.
 Water level 3.0' upon completion of boring on 7/6/2009. Cave depth of 9.2' on 7/6/2009. Cave depth of 9.0' on 7/7/2009. Boring offset 10.8' west of staked location.

PAGE 1 OF 1

09BH-RW-07

SPT_LOG:3551-09-1257 I495 BELTWAY-DTR-DAAR.GPJ:8.2.003:050307:7/28/09



**SOIL BORING
KEY TO FIELD LOGGING**

ORDER OF SOIL DESCRIPTION

- | | |
|--------------------------------------|---|
| 1. Geologic Origin – | See Table 1 on page 2 |
| 2. Color – | Comprises more than 50% of the sample, to be written in ALL CAPS |
| 3. Primary/Major Grain Size – | “ and ”: 30% to 50% of the minor grain size |
| 4. Modifying Term – | “ some ”: 15% to 30% of the minor grain size “ little ”: 5% to 15% of the minor grain size “ trace ”: 5% or less of the minor grain size |
| 5. Secondary Component(s) – | Can have up to two, but total must not exceed 100% |
| 6. Contains – | See Table 2 on page 2 |
| 7. Soil Density/Consistency – | “ dry ”: Absence of moisture, dusty, dry to the touch |
| 8. Moisture Content – | “ moist ”: Damp but no visible water “ wet ”: Visible free water, usually soil is below water table |

EXAMPLES OF SOIL DESCRIPTION:

- Residual, Yellow-brown, fine, SANDY ELASTIC SILT, trace gravel, slightly micaceous medium stiff, moist (MH)
- Fill, Brown and gray, fine to coarse, SILTY SAND RUBBLE FILL, trace gravel, contains glass, brick and rock fragments, contains pockets of fat clay, loose, moist (SM)

OTHER INFORMATION TO BE PROVIDED ON FIELD LOG:

- Include logger’s and driller’s first and last name and company
- Provide type of drill rig, size of augers, type of hammer (automatic or manual)
- Indicate field offset direction and distance from staked location, if applicable
- Identify type of ground cover (leaf litter, asphalt, topsoil), and provide depth in inches (i.e., Topsoil 4”)
- Pavement – record thickness of pavement and aggregate subbase in inches (i.e., Asphalt 5”, Aggregate subbase 12”)
- Indicate if material is **Fill or Potential Fill**
- Record depth to water and cave in at time of boring (TOB) (and after 24-hours, if applicable)
- Auger; refusal depth, spoon, or roller cone bit; if applicable (i.e., AR at 14.6 ft)
- Boring termination depth (i.e., BOH 20.0 ft)
- Note backfill methods
- Include comments regarding location, if applicable (i.e., located in shoulder, adjacent to stream, bridge approach, etc.)
- Use shovel for determining thickness of topsoil

“CONTAINS”:

Under “Comments”, note the presence of shell fragments, wood fragments, type/condition of organics (roots/root fragments, branches, leaves, grass/decomposed, fresh, etc.), unusual odors, contamination by other man-made materials (construction material, concrete, asphalt pavement debris, wire, brick, glass, etc.). If the portion of the foreign matter represents more than 30% (by weight) of the soil component, then include statements such as “contains heavy concentrations of _____”.

When noting **mica content**, eliminate the word “contains” and use one of the following expressions: *slightly micaceous* (few shiny flakes), *micaceous* (common throughout soil), or *highly micaceous* (soil is almost all mica).

“Contains” should also be used to identify lenses, layers, or pockets of distinctly different material than the parent soil of the sample. See descriptions below:

| <u>Description</u> | <u>Criteria</u> |
|---------------------------|---|
| Frequent | More than one per foot of thickness |
| Interbedded | Alternating soil layers of different composition |
| Layer | Material lying essentially parallel to the surfaces against which it was formed (generally 1 to 6 inches) |
| Lens | A lenticular deposit, larger than a pocket (generally less than 1 inch thick) |
| Occasional | One or less per foot of thickness |
| Parting | A very thin granular layer |
| Pocket | Small erratic deposits that are isolated within the total soil matrix |
| Seam | A thin layer separating two distinctive layers of different composition or greater magnitude |
| Stratified | Alternating layers of varying material or color |
| Stratum | A stratigraphic unit |

SAMPLE TYPES S: Split Spoon ST: Shelby Tube (Examples: S-1, S-2, ST-1, S-3, etc.)

COMPONENT **DISTINGUISHED FEATURES**

Boulders Larger than 12” (300 mm)



**SOIL BORING
KEY TO FIELD LOGGING**

Cobbles

3" to 12" (75 mm to 12 mm)

Gravel

Larger than No. 4 sieve and smaller than a 3" sieve
 Described with any of the following terms (or any combination):
 Fine 3/8" to No. 4 use fine, coarse, or fine to coarse (9.5 mm to 4.75 mm) sieve
 Coarse 3" to 3/4" (75 mm to 19 mm) sieve
Use fine, coarse, or fine to coarse; do not use medium
Provide angular or rounded

Sand

The finest sand grains are just visible to the naked eye; while the largest would pass a No. 4 (4.75mm) sieve (pinhead size). Described with any of the following terms (or any combination):
 Fine No. 40 to No. 200 (0.42 mm to 0.075 mm) sieve
 Medium No. 10 to No. 40 (2.0 mm to 0.42 mm) sieve
 Coarse No. 4 to No. 10 (4.75 mm to 2.0 mm) sieve
Use fine to coarse, fine to medium, medium to coarse, etc.

Silt

Lumps are easily crumbled when are dried
 Feels gritty between the teeth
 A moist pat when shaken in the palm of the hand will appear shiny wet
 When squeezed it will appear dry and dull
Identify whether SILT (ML) or elastic SILT (MH)

Clay

Lumps are comparatively hard when air- dried
 Threads (1/8" diameter) of considerable length will support their own weight when held by one end
 A moist pat will appear the same whether shaken in the palm of the hand or squeezed.
Identify whether lean CLAY (CL) or fat CLAY (CH)

TABLE 1: GEOLOGIC ORIGIN

| | |
|---|--|
| Residual | Unconsolidated or partly weathered parent material, developed in place by weathering |
| Palustrine | Material grown or deposited in a marsh or marsh-like environment |
| Alluvial | Material deposited by a stream or running water |
| Fill | Distinguish between trash fill and rubble fill |
| Intermediate Geomaterials (IGM) | Describes material as it transactions between soil and rock, and vice-versa. See below* |
| *Residual material (has rock structure) w/ SPT N-Values > 50 blows per 6" | |
| *Strength is greater than soil and less than the weathered rock | |

TABLE 2: COLOR (not limited to...)

| | | | | | | |
|--|------------|------------|--------------|--------------|-----------|-------|
| Brown | Gray | Black | Orange | Yellow | Blue | Green |
| Red-brown | Gray-brown | Green-gray | Orange-brown | Yellow-brown | Blue-gray | Red |
| Use "Light" and "Dark" as modifiers | | | | | | |
| "Mottled" – irregularly marked with spots or patches of different colors; i.e. brown with gray mottles | | | | | | |

TABLE 3: RELATIVE DENSITY / CONSISTENCY TABLE

| Sands | | Silts and Clays | | | |
|---------|------------------|-----------------|--|--|-------------|
| N60 | Relative Density | N60 | Field Test* | Unconfined Compressive Strength (tsf –e.g., from Pocket Penetrometer)* | Consistency |
| 0-3 | Very Loose | 0-1 | Extruded between fingers when squeezed | <0.25 | Very Soft |
| 4-9 | Loose | 2-4 | Molded by light finger pressure | 0.25-0.5 | Soft |
| 10-29 | Medium Dense | 5-8 | Molded by strong finger pressure | 0.5-1.0 | Firm |
| 30-50 | Dense | 9-15 | Readily indented by thumb but penetrated with great effort | 1.0-2.0 | Stiff |
| Over 50 | Very Dense | 16-30 | Readily indented by thumbnail | 2.0-4.0 | Very Stiff |
| | | 31-60 | Indented with difficulty by thumbnail | Over 4.0 | Hard |
| | | Over 60 | - | - | Very Hard |



**ROCK CORING
KEY TO FIELD LOGGING**

| |
|---|
| ORDER FOR ROCK DESCRIPTIONS |
| Degree of Weathering; Hardness; Thickness of Bedding; Color; ROCK TYPE (all caps); Degree of Fracturing/Jointing Inclusions, Minor Rock Types, and Minerals; Other Features; Stratum RQD (SRQD) Provide Relative Bedding Dip and Relative Discontinuity Dip in "Comments" column on log. |

| | |
|---|---|
| DEGREE OF WEATHERING (can be range of weathering) | |
| Unweathered | No evidence of any chemical or mechanical alteration |
| Slightly Weathered | Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered |
| Moderately Weathered | Discoloring evident, surface pitted and altered, with alteration penetrating well below rock surfaces, weathering "halos" evident; 10 to 50 % of the rock altered |
| Highly Weathered | Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some minerals leached away |
| Decomposed | Rock reduced to a soil with relict rock structure (i.e., Saprolite), generally molded and crumbled by hand |
| Friability should be noted – rock may not be decomposed, but could be susceptible to piping in cut sections | |

| | |
|--|---|
| HARDNESS (can be range of hardness) | |
| Very Soft | Can be deformed by hand |
| Soft | Can be scratched with a fingernail |
| Moderately Hard | Can be scratched easily with a knife |
| Hard | Can be scratched with difficulty with a knife |
| Very Hard | Cannot be scratched with a knife |

| | |
|---|---|
| THICKNESS OF BEDDING (can be range of thickness) | |
| Thin Bedded | Beds 0.3 foot (0.1 meter) thick, or less |
| Medium Bedded | Beds more than 0.3 ft to 1 ft (0.1m to 0.3 meter) thick |
| Thick Bedded | Beds more than 1 ft to 3 ft (0.3m to 1 meter) thick |
| Massive | Beds more than 3 ft (1 meter) thick |
| No Apparent Bedding | N/A |

| | | | |
|---|----------------|---------------|---|
| COLOR (not limited to...) May use "Light" and "Dark" as modifiers | White Black | Gray Brown | Need color dry and wet; hyphenated for compound colors |
|---|----------------|---------------|---|

| | | |
|---|--|----------------|
| ROCK TYPE Example: sandstone, coal, silty shale, clayshale, etc. | Inclusions, minor rock types, & minerals | Other Features |
|---|--|----------------|

| | |
|---|-----------------------------------|
| DEGREE OF FRACTURING and/or JOINTING (can be range of fracturing/jointing) | |
| Very Widely Fractured / Jointed | At spacing greater than 10 feet. |
| Slightly Fractured / Jointed | At spacing of 3 to 10 feet. |
| Moderately Fractured / Jointed | At spacing of 1 to 3 feet. |
| Highly Fractured / Jointed | At spacing of 2 inches to 1 foot. |
| Intensely Fractured / Jointed | At spacing of less than 2 inches. |

| | |
|--------------------|--|
| Description | Criteria |
| Banded | Approximately parallel bands of varying color |
| Streaked | Randomly oriented streaks of color |
| Stained | Local color variations associated with other features (i.e., bedding, fractures) |



**ROCK CORING
KEY TO FIELD LOGGING**

| |
|--|
| <p>RECOVERY (REC) – 0% to 100% Length of rock pieces (tenths of feet) divided by Length of run (tenths of feet) Example: 2.0 feet / 5.0 feet = 40%</p> |
| <p>ROCK QUALITY DESIGNATION (RQD) – 0% to 100% Length of rock pieces of 4 inches or greater (tenths of feet) divided by Length of run (tenths of feet) Example: 0.5 feet + 0.7 feet + 0.5 feet / 4.0 feet = 1.7 feet / 4.0 feet = 42%</p> |
| <p>STRATUM ROCK QUALITY DESIGNATION (SRQD) – 0% to 100% Length of rock pieces of 4 inches or greater in stratum (tenths of feet) divided by Thickness of stratum (tenths of feet) Example: 1.0 feet + 2.0 feet + 6.0 feet / 15.0 feet = 60%</p> |
| <p>RELATIVE (BEDDING) DIP (RD) – 0 to 90°</p> |
| <p>RELATIVE DISCONTINUITY DIP (RDD) – 0 to 90°</p> |

- OTHER INFORMATION TO BE PROVIDED ON FIELD LOG:**
- Note casing/auger size and depth, if applicable
 - Note core bit type and diameter
 - Note coring method (i.e., NQ2 wireline)
 - Note solid or split-inner barrel
 - Document Recovery and RQD in both feet and percentage
 - Document water loss, if applicable
 - Identify and mark on core if the breaks are mechanical, note on log probable, or possible mechanical breaks (i.e., caused by drilling or extracting out of core barrel)
 - Provide grain size – fine to coarse
 - Note clay seams, voids, etc. (put cardboard spacer in box denoting void)
 - Provide penetration rate per foot

ROCK MASS RATING (RMR) – Rock Discontinuity Condition Parameters (Note: English conversions are approximate.)
Determined in the field on discontinuities; Value for each parameter can be a range (i.e., 4 - 5)

| PARAMETER | RATING VALUE | | | | |
|---|--------------|----------------------|--------------------------|--------------------------|-------------------|
| Length – l Note: Typically use a default value of 4 | < 3 feet | 3 – 10 feet | 10 – 30 feet | 30 – 60 feet | > 60 feet |
| | 6 | 4 | 2 | 1 | 0 |
| Separation – s | None | < 0.1 mm (1/250") | 0.1-1 mm (1/64-1/32") | 1 – 5 mm (1/32-3/16") | > 5 mm (3/16") |
| | | 6 | 5 | 4 | 1 |
| Roughness – r | Very Rough | Rough | Slightly Rough | Smooth | Slickensided |
| | 6 | 5 | 3 | 1 | 0 |
| Infilling – i | None | Hard Infilling | | Soft Infilling | |
| | | < 5 mm (3/16") | > 5 mm (3/16") | < 5 mm (3/16") | > 5 mm (3/16") |
| | | 6 | 4 | 2 | 2 |
| Weathering – w | Unweathered | Slightly Weathered | Moderately Weathered | Severely Weathered | Decomposed |
| | 6 | 5 | 3 | 1 | 0 |

Moderately weathered, hard, thick bedded, yellow-brown, coarse SANDSTONE; gray, soft shale from 23.2' to 25.1'.
Slightly weathered, moderately hard, moderately jointed, light-gray, vuggy DOLOSTONE; occasional pyrite crystals on very rough joints with typical joint separation of 1/32 in and dip of 14 degrees.

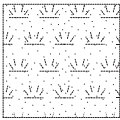
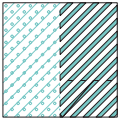
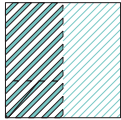
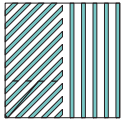
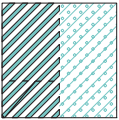
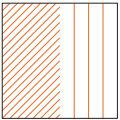
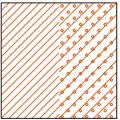
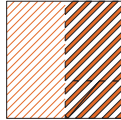
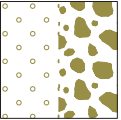

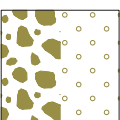
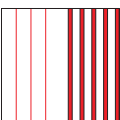
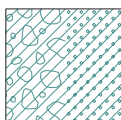
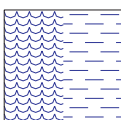
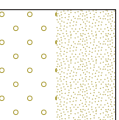
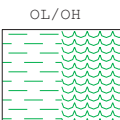
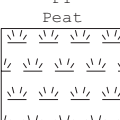
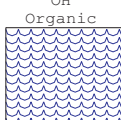
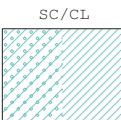


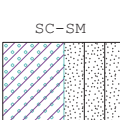
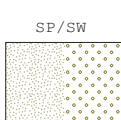
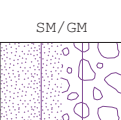
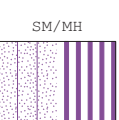
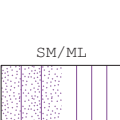
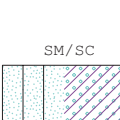


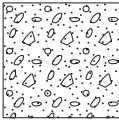
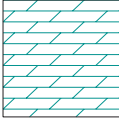
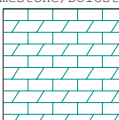
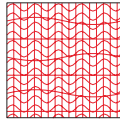


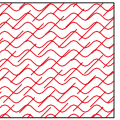
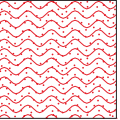
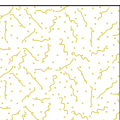

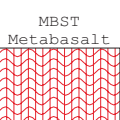
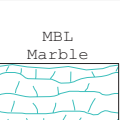


MATERIAL AND SAMPLE SYMBOLS LIST

| Pavement/Soils | | | | Sedimentary Rocks | | Igneous Rocks | Metamorphic Rocks | Sampling |
|---------------------------|----------------------------------|--------------------------|--------------------------------|--------------------------------|--|---------------------------|----------------------------------|--------------------|
| <p>ASPH - ASPHALT PVT</p> | <p>GP - Poorly-graded Gravel</p> | <p>MH - Elastic Silt</p> | <p>SC - Clayey Sand</p> | <p>CGL - Conglomerate</p> | <p>SE - Shell Bed</p> | <p>AND - Andesite</p> | <p>GGE - Gouge</p> | <p>SPT</p> |
| <p>CH - Fat Clay</p> | <p>GP-GC</p> | <p>MH/CH</p> | <p>SM - Silty Sand</p> | <p>CLST - Cherty Limestone</p> | <p>SHL - Shale</p> | <p>BST - Basalt</p> | <p>GNS - Gneiss</p> | <p>Core</p> |
| <p>CL - Lean Clay</p> | <p>GP-GM</p> | <p>MH/ML</p> | <p>SP - Poorly-Graded Sand</p> | <p>COL - Coal</p> | <p>SLS - Siltstone</p> | <p>DBS - Diabase</p> | <p>MYL - Mylonite</p> | <p>Auger</p> |
| <p>CL-ML</p> | <p>GW - Well-Graded Gravel</p> | <p>MH/SM</p> | <p>SP-SC</p> | <p>MST - Mudstone</p> | <p>SST - Sandstone</p> | <p>DRT - Diorite</p> | <p>PHY - Phyllite</p> | <p>Vane</p> |
| <p>CONC- CONCRETE PVT</p> | <p>GW-GC</p> | <p>ML - Silt</p> | <p>SP-SM</p> | <p>GWK - Graywacke</p> | <p>SST-SHL - Interbedded Sandstone/Shale</p> | <p>GBR - Gabbro</p> | <p>SCH - Schist</p> | <p>Undisturbed</p> |
| <p>FL - Fill</p> | <p>GW-GM</p> | <p>ML/CL</p> | <p>SW - Well-Graded Sand</p> | <p>LST - Limestone</p> | <p>SST-SLS - Interbedded Sandstone/Siltstone</p> | <p>GRD - Granodiorite</p> | <p>SLT - Slate</p> | <p>Grab</p> |
| <p>GC - Clayey Gravel</p> | <p>GM/GP</p> | <p>ML/GM</p> | <p>SW-SC</p> | <p>UCY - Underclay</p> | <p>SHLS-Shaly Limestone</p> | <p>GRN Granite</p> | <p>Misc.</p> | <p>No Recovery</p> |
| <p>GC-GM</p> | <p>GM/ML</p> | <p>ML/SM</p> | <p>SHDS Shaly Dolostone</p> | <p>MSH Silty Shale</p> | <p>POR - Porphyry</p> | <p>CAV - Cavity</p> | <p>HWR Highly Weathered Rock</p> | <p>Other</p> |
| <p>GM - Silty Gravel</p> | <p>GM/SM</p> | <p>SW-SM</p> | <p>CHK Chalk</p> | <p>SSHL Sandy Shale</p> | <p>RHY - Rhyolite</p> | <p>BRC - Breccia</p> | | |



MATERIAL AND SAMPLE SYMBOLS LIST

| Pavement/Soils | Sedimentary Rocks | Igneous Rocks | Metamorphic Rocks | Sampling |
|---|---|--|--|----------|
| <p>TOPS-TOPSOIL</p>  <p>SC/CH</p>  <p>CH/CL</p>  <p>CH/MH</p>  <p>CH/SC</p>  <p>CL/ML</p>  <p>CL/SC</p>  <p>CL/CH</p>  <p>GP/GW</p>  <p>CRA Crushed Aggregate</p>  <p>GW/GP</p>  <p>ML/MH</p>  <p>GC/SC</p>  <p>OH/OL</p>  <p>GP/SP</p>  <p>OL/OH</p>  <p>PT Peat</p>  <p>OH Organic</p>  <p>SC/CL</p>  <p>OL Organic</p>  <p>SC/GC</p>  <p>SC-SM</p>  <p>SP/SW</p>  <p>SM/GM</p>  <p>SM/MH</p>  <p>SM/ML</p>  <p>SM/SC</p>  <p>SP/GP</p>  <p>SW/SP</p>  | <p>BLD-Boulder Bed</p>  <p>DLS Dolostone</p>  <p>LST-DLS-Interbedded Limestone/Dolostone</p>  | <p>CHT Charnockite</p>  <p>DLS Dolostone</p>  <p>LST-DLS-Interbedded Limestone/Dolostone</p>  | <p>MSLS Metasiltstone</p>  <p>MSST Metasandstone</p>  <p>QZT - Quartzite</p>  <p>SPS Soapstone</p>  <p>MBST Metabasalt</p>  <p>MBL Marble</p>  | |



PROJECT NEXT

APPENDIX C

PAVEMENT EXPLORATION DATA

Figure C-1: 495 NB Summary of Pavement Thickness from Cores and GPR Survey

Figure C-2: 495 SB Summary of Pavement Thickness from Cores and GPR Survey

Table C-1: Joint Condition Survey Results

Table C-2: Observed Pavement Distress

Pavement Core Logs – HDR 2019

Infrasense GPR Survey Results

PTS Pavement Joint Condition Survey and NDT Testing Results

Figure C-1: 495 NB Summary of Pavement Thickness from Cores and GPR Survey

Legend: Inside Shoulder Travel Lane 1 Travel Lane 2 Travel Lane 3 Travel Lane 4 Outside Shoulder



Figure C-1: 495 NB Summary of Pavement Thickness from Cores and GPR Survey



Figure C-2: 495 SB Summary of Pavement Thickness from Cores and GPR Survey

Legend: Inside Shoulder | Travel Lane 1 | Travel Lane 2 | Travel Lane 3 | Travel Lane 4 | Outside Shoulder

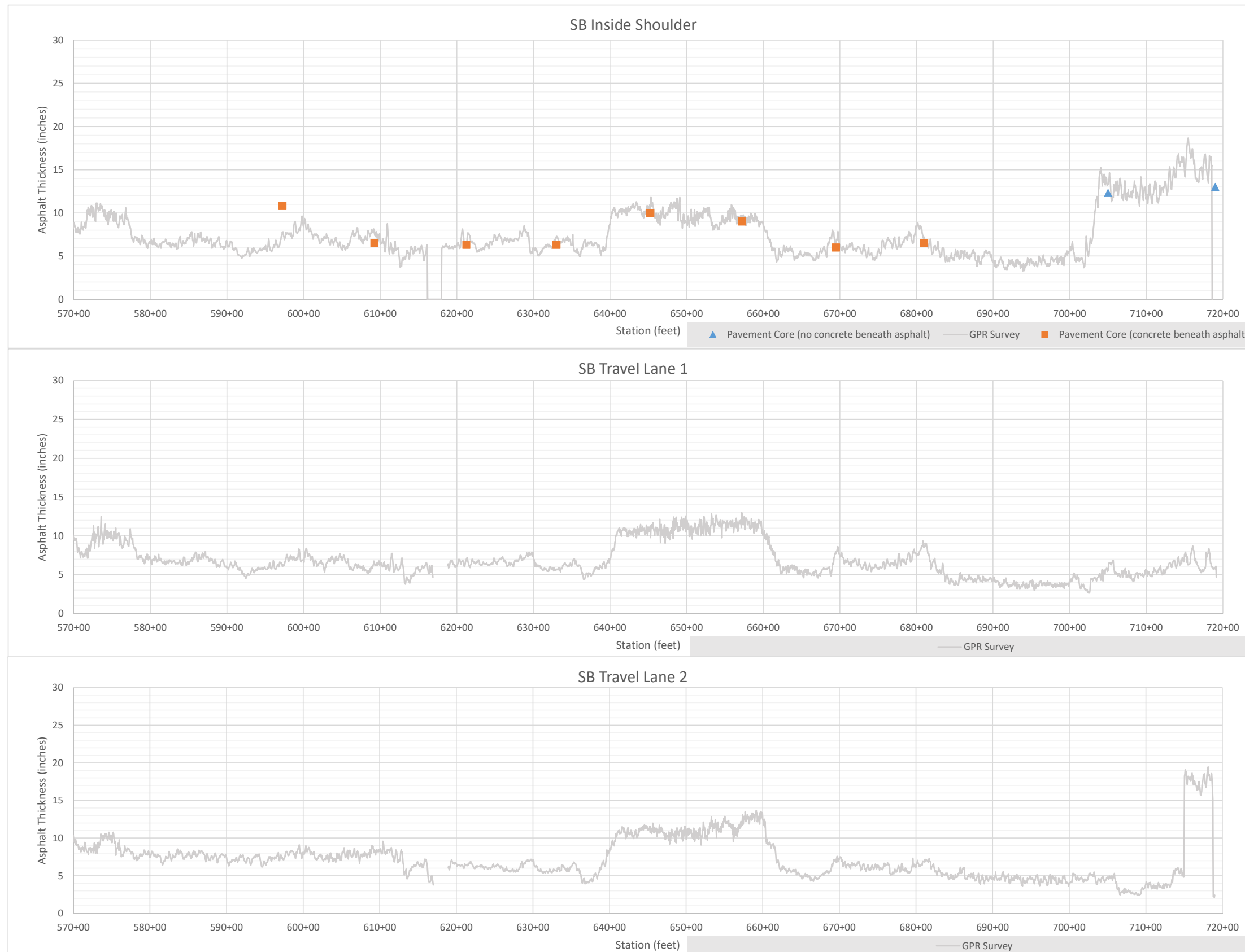


Figure C-2: 495 SB Summary of Pavement Thickness from Cores and GPR Survey

Legend: Inside Shoulder Travel Lane 1 Travel Lane 2 Travel Lane 3 Travel Lane 4 Outside Shoulder

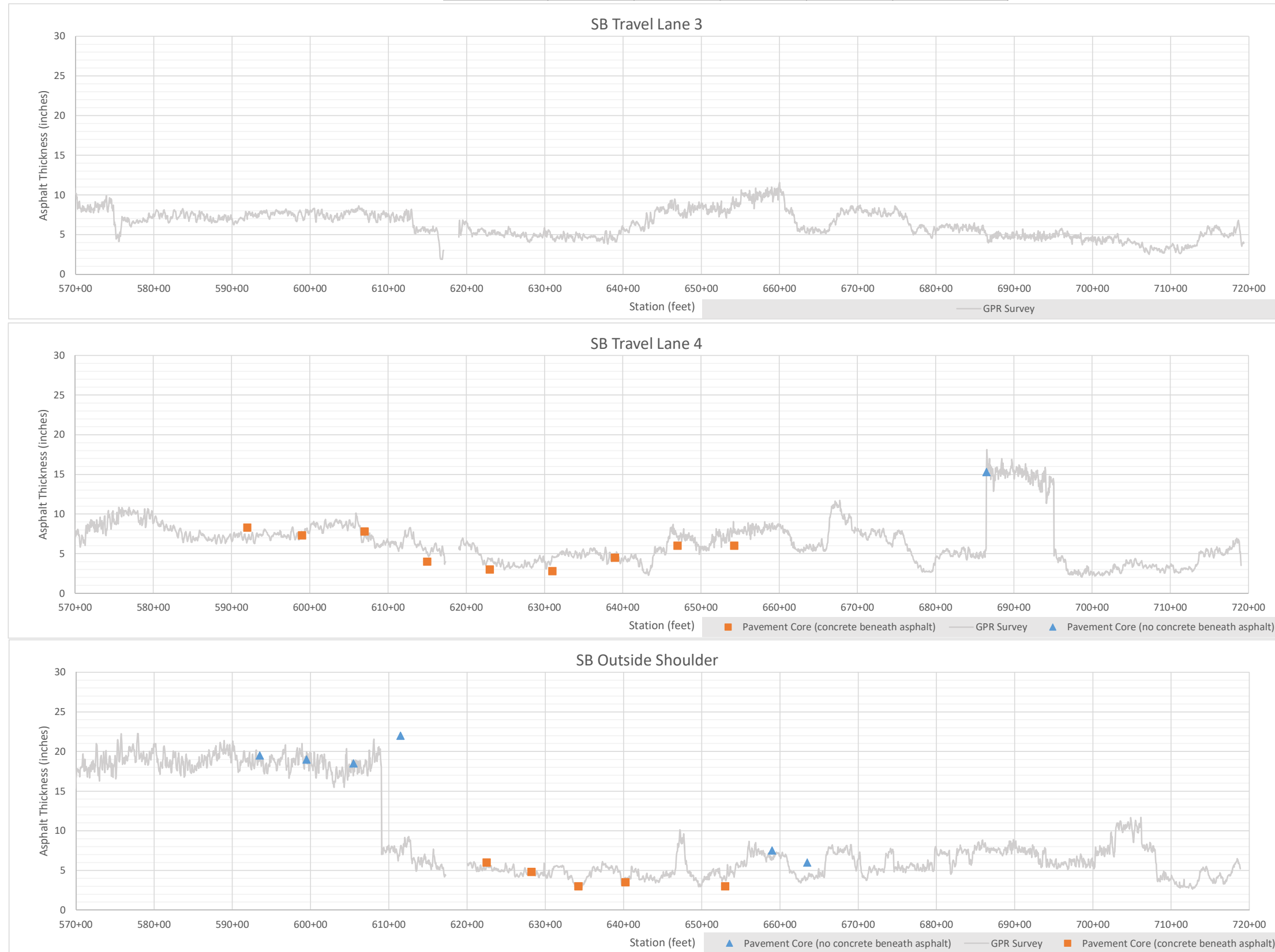




Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 1 | 718+61 | S1,L1 | 1 | 22.0' | 0.30 | | | |
| 2 | 718+61 | L2,L3,L4,S2 | 3 | 46.0' | 10.00 | | | |
| 3 | 717+84 | L3 | 3 | 6.0' | 6.00 | | | |
| 4 | 717+60 | L3 | 3 | 5.0' | 4.00 | | | |
| 5 | 717+35 | L3,L4 | 3 | 24.0' | 10.00 | | | |
| 6 | 716+81 | L2 | 1 | 5.0' | 0.50 | L2 | | 66% |
| 7 | 716+81 | L3,L4 | 3 | 24.0' | 8.00 | | | |
| 8 | 716+32 | L3,L4 | 1 | 24.0' | 0.35 | | | |
| 9 | 715+32 | L3,R1 | 1 | 16.0' | 0.50 | | | |
| 10 | 715+32 | L4 | 3 | 12.0' | 6.00 | | | |
| 11 | 715+29 | L2,L3,L4 | 1 | 36.0' | 0.25 | L2 | | 56% |
| 12 | 714+77 | L3,R1 | 1 | 15.0' | 0.35 | | | |
| 13 | 714+77 | L4 | 3 | 12.0' | 8.00 | | | |
| 14 | 714+27 | L3,L4 | 1 | 24.0' | 0.30 | | | |
| 15 | 712+97 | L3,L4 | 1 | 24.0' | 0.20 | | | |
| 16 | 712+17 | L3,L4 | 1 | 24.0' | 0.35 | | | |
| 17 | 711+84 | L2 | 1 | 12.0' | 0.25 | L2 | | 76% |
| 18 | 711+45 | L4 | 1 | 12.0' | 0.35 | | | |
| 19 | 711+40 | L2 | 1 | 12.0' | 0.25 | L2 | | 87% |
| 20 | 711+11 | L1,L2 | 1 | 14.0' | 0.50 | L2 | | 82% |
| 21 | 710+62 | L4 | 1 | 12.0' | 0.35 | | | |
| 22 | 710+57 | L2 | 1 | 12.0' | 0.50 | L2 | | 79% |
| 23 | 710+12 | L1,L2,L3,L4 | 1 | 28.0' | 0.30 | L2 | | 77% |
| 24 | 709+82 | L1,L2 | 1 | 7.0' | 0.50 | L2 | | 82% |
| 25 | 709+63 | L1,L2 | 1 | 12.0' | 0.25 | L2 | | 78% |
| 26 | 709+11 | L2,L3,L4 | 1 | 36.0' | 0.50 | L2 | | 77% |
| 27 | 708+11 | L3,L4 | 1 | 24.0' | 0.45 | | | |
| 28 | 708+08 | L1,L2 | 1 | 14.0' | 0.35 | L2 | | 81% |
| 29 | 707+74 | L1,L2 | 1 | 14.0' | 0.50 | L2 | | 79% |
| 30 | 707+05 | L4 | 1 | 12.0' | 0.50 | | | |
| 31 | 706+97 | L1,L2 | 1 | 14.0' | 0.40 | L2 | | 74% |
| 32 | 706+57 | L1,L2 | 1 | 14.0' | 0.35 | L2 | | 78% |
| 33 | 706+57 | L3,L4 | 3 | 15.0' | 7.00 | | | |
| 34 | 706+06 | L3,L4 | 1 | 16.0' | 0.50 | | | |
| 35 | 706+02 | L1,L2 | 1 | 14.0' | 0.35 | L2 | | 68% |
| 36 | 705+50 | L1,L2 | 1 | 14.0' | 0.25 | L2 | | 69% |
| 37 | 704+87 | L1 | 1 | 3.0' | 0.35 | L1 | 68% | |
| 38 | 704+52 | L3,L4 | 3 | 22.0' | 5.00 | | | |
| 39 | 704+40 | L1,L2 | 1 | 15.0' | 0.50 | L2 | | 69% |
| 40 | 704+05 | S1,L1 | 1 | 14.0' | 0.50 | L1 | 63% | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 41 | 703+35 | L1,L2 | 1 | 7.0' | 0.40 | L1,L2 | 66% | 62% |
| 42 | 701+95 | L4 | 1 | 12.0' | 0.35 | | | |
| 43 | 701+43 | S1,L1 | 1 | 17.0' | 0.50 | L1 | 80% | |
| 44 | 701+43 | L2,L3 | 3 | 17.0' | 12.00 | L2 | | 68% |
| 45 | 701+03 | L1 | 1 | 12.0' | 0.50 | L1 | 73% | |
| 46 | 700+93 | L3,L4 | 1 | 22.0' | 0.40 | | | |
| 47 | 700+92 | L2 | 1 | 12.0' | 0.35 | L2 | | 72% |
| 48 | 700+53 | L1 | 1 | 12.0' | 0.50 | L1 | 68% | |
| 49 | 700+46 | S1 | 1 | 10.0' | 0.35 | | | |
| 50 | 700+42 | L4 | 3 | 12.0' | 3.00 | | | |
| 51 | 700+13 | S1,L1 | 1 | 22.0' | 0.25 | L1 | 73% | |
| 52 | 699+92 | L4 | 3 | 12.0' | 4.00 | | | |
| 53 | 699+50 | S1,L1 | 1 | 11.0' | 0.50 | | | |
| 54 | 699+45 | L1,L2 | 3 | 24.0' | 10.00 | L1,L2 | 78% | 65% |
| 55 | 699+43 | L3 | 1 | 12.0' | 0.50 | | | |
| 56 | 699+43 | L4 | 3 | 12.0' | 3.00 | | | |
| 57 | 699+43 | S2 | 1 | 9.0' | 0.50 | | | |
| 58 | 698+91 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 59 | 698+54 | S1,L1,L2 | 1 | 34.0' | 0.50 | L1,L2 | 82% | 70% |
| 60 | 697+92 | L3 | 1 | 12.0' | 0.40 | | | |
| 61 | 697+92 | L4 | 3 | 12.0' | 11.00 | | | |
| 62 | 697+90 | L1,L2 | 1 | 24.0' | 0.50 | L1,L2 | 76% | 80% |
| 63 | 697+70 | L1 | 1 | 12.0' | 0.50 | L1 | 85% | |
| 64 | 697+42 | S1 | 1 | 12.0' | 0.25 | | | |
| 65 | 697+41 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 66 | 697+17 | L1 | 1 | 12.0' | 0.35 | L1 | 74% | |
| 67 | 696+92 | L3,L4,S2 | 3 | 26.0' | 15.00 | | | |
| 68 | 696+43 | S1,L1,L2 | 1 | 35.0' | 0.50 | L1,L2 | 77% | 79% |
| 69 | 696+41 | L3,L4 | 3 | 24.0' | 8.00 | | | |
| 70 | 696+31 | S1 | 1 | 5.0' | 0.35 | | | |
| 71 | 696+11 | L1 | 1 | 12.0' | 0.25 | L1 | 80% | |
| 72 | 695+92 | L4 | 3 | 12.0' | 7.00 | | | |
| 73 | 695+82 | L1 | 1 | 12.0' | 0.50 | | | |
| 74 | 695+60 | S1,L1 | 1 | 25.0' | 0.50 | | | |
| 75 | 695+46 | L1 | 1 | 12.0' | 0.25 | L1 | 73% | |
| 76 | 695+42 | L2 | 1 | 12.0' | 0.35 | L2 | | 71% |
| 77 | 695+23 | L1 | 1 | 9.0' | 0.35 | L1 | 80% | |
| 78 | 695+13 | L4 | 1 | 12.0' | 0.50 | | | |
| 79 | 695+03 | L1 | 1 | 12.0' | 0.50 | L1 | 80% | |
| 80 | 694+77 | L3,L4,S2 | 1 | 33.0' | 0.50 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 81 | 694+64 | L2,L4 | 1 | 24.0' | 0.50 | L2 | | 73% |
| 82 | 694+64 | S1,L1 | 3 | 23.0' | 8.00 | L1 | 76% | |
| 83 | 694+52 | L4 | 1 | 12.0' | 0.35 | | | |
| 84 | 694+45 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 85 | 694+41 | L2 | 1 | 12.0' | 0.50 | L2 | | 68% |
| 86 | 694+29 | L4 | 3 | 12.0' | 11.00 | | | |
| 87 | 693+92 | S1,L1,L2,L3 | 1 | 47.0' | 0.50 | L1,L2 | 72% | 52% |
| 88 | 693+49 | S1 | 1 | 11.0' | 0.25 | | | |
| 89 | 693+43 | L1,L2 | 1 | 20.0' | 0.50 | L1,L2 | 79% | 77% |
| 90 | 693+03 | S1,L1 | 1 | 18.0' | 0.35 | L1 | 80% | |
| 91 | 692+92 | L3 | 1 | 12.0' | 0.50 | | | |
| 92 | 692+48 | L1 | 3 | 12.0' | 8.00 | L1 | 54% | |
| 93 | 692+42 | L2 | 3 | 12.0' | 5.00 | L2 | | 60% |
| 94 | 691+91 | L2 | 1 | 12.0' | 0.50 | L2 | | 51% |
| 95 | 691+86 | S1,L1 | 1 | 23.0' | 0.50 | L1 | 84% | |
| 96 | 691+55 | L2 | 1 | 12.0' | 0.50 | L2 | | 51% |
| 97 | 691+45 | L1 | 1 | 12.0' | 0.35 | L1 | 85% | |
| 98 | 691+10 | L1 | 1 | 12.0' | 0.25 | L1 | 83% | |
| 99 | 690+91 | L2 | 1 | 12.0' | 0.35 | L2 | | 55% |
| 100 | 690+67 | S1 | 1 | 12.0' | 0.25 | | | |
| 101 | 690+51 | L1 | 1 | 12.0' | 0.50 | L1 | 61% | |
| 102 | 690+44 | L3 | 3 | 12.0' | 7.00 | | | |
| 103 | 690+40 | L2 | 1 | 12.0' | 0.50 | L2 | | 64% |
| 104 | 690+23 | S2 | 1 | 4.0' | 0.50 | | | |
| 105 | 690+04 | L1 | 1 | 12.0' | 0.50 | L1 | 67% | |
| 106 | 689+89 | L2 | 1 | 12.0' | 0.50 | L2 | | 81% |
| 107 | 689+86 | S1 | 1 | 12.0' | 0.35 | | | |
| 108 | 689+70 | L1 | 1 | 12.0' | 0.50 | L1 | 80% | |
| 109 | 689+60 | L3 | 3 | 12.0' | 12.00 | | | |
| 110 | 689+40 | L2 | 1 | 12.0' | 0.50 | L2 | | 61% |
| 111 | 689+34 | L1 | 1 | 12.0' | 0.50 | L1 | 86% | |
| 112 | 688+59 | L1 | 1 | 12.0' | 0.35 | L1 | 81% | |
| 113 | 688+41 | L1 | 1 | 12.0' | 0.50 | L1 | 72% | |
| 114 | 688+41 | L2,L3 | 1 | 24.0' | 12.00 | L2 | | 76% |
| 115 | 688+12 | S1,L1 | 1 | 18.0' | 0.50 | L1 | 75% | |
| 116 | 687+92 | L3 | 3 | 12.0' | 8.00 | | | |
| 117 | 687+91 | S1,L1 | 1 | 24.0' | 0.50 | L1 | 81% | |
| 118 | 687+91 | L2 | 3 | 12.0' | 8.00 | L2 | | 78% |
| 119 | 687+65 | S1 | 1 | 12.0' | 0.25 | | | |
| 120 | 687+51 | L1 | 1 | 12.0' | 0.35 | L1 | 70% | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 121 | 687+41 | L3 | 3 | 12.0' | 8.00 | | | |
| 122 | 687+15 | L1 | 1 | 12.0' | 0.50 | L1 | 71% | |
| 123 | 687+15 | L2,L3,L4 | 3 | 36.0' | 12.00 | L2 | | 82% |
| 124 | 686+97 | L1 | 1 | 12.0' | 0.25 | L1 | 97% | |
| 125 | 686+77 | L1 | 1 | 12.0' | 0.35 | L1 | 89% | |
| 126 | 686+74 | S1 | 1 | 11.0' | 0.25 | | | |
| 127 | 686+60 | L2,L3,L4 | 3 | 29.0' | 10.00 | L2 | | 71% |
| 128 | 686+11 | L1 | 1 | 12.0' | 0.50 | L1 | 73% | |
| 129 | 686+11 | L2,L3,L4 | 3 | 25.0' | 10.00 | L2 | | 74% |
| 130 | 686+05 | S1 | 1 | 11.0' | 0.25 | | | |
| 131 | 685+89 | L1 | 1 | 12.0' | 0.35 | L1 | 74% | |
| 132 | 685+25 | L2,L3 | 3 | 24.0' | 12.00 | L2 | | 50% |
| 133 | 685+23 | L1 | 1 | 12.0' | 0.50 | L1 | 48% | |
| 134 | 685+15 | L2,L3 | 3 | 24.0' | 20.00 | L2 | | 27% |
| 135 | 685+13 | S1 | 1 | 11.0' | 0.50 | | | |
| 136 | 685+13 | L1 | 3 | 12.0' | 15.00 | L1 | 49% | |
| 137 | 684+71 | L4 | 3 | 12.0' | 6.00 | | | |
| 138 | 684+39 | L1 | 1 | 12.0' | 0.35 | L1 | 73% | |
| 139 | 684+08 | S1,L3 | 1 | 23.0' | 0.50 | | | |
| 140 | 684+08 | L1,L2,L4 | 3 | 36.0' | 12.00 | L1,L2 | 59% | 74% |
| 141 | 683+80 | S1 | 1 | 11.0' | 0.25 | | | |
| 142 | 683+72 | L1,L2,L3,L4 | 3 | 48.0' | 16.00 | L1,L2 | 85% | 72% |
| 143 | 683+28 | S1 | 3 | 11.0' | 1.00 | | | |
| 144 | 683+20 | L3 | 1 | 12.0' | 0.50 | | | |
| 145 | 683+20 | L1,L2,L4 | 3 | 36.0' | 7.00 | L1,L2 | 83% | 66% |
| 146 | 682+94 | S1 | 1 | 11.0' | 0.25 | | | |
| 147 | 682+52 | S1,L1,L2 | 1 | 26.0' | 0.50 | L1,L2 | 82% | 48% |
| 148 | 682+24 | L1,L2,L3 | 1 | 36.0' | 0.50 | L1,L2 | 61% | 53% |
| 149 | 682+24 | L4 | 3 | 12.0' | 6.00 | | | |
| 150 | 682+01 | S1,L1,L2 | 1 | 35.0' | 0.50 | L1,L2 | 76% | 70% |
| 151 | 681+76 | L4 | 1 | 12.0' | 0.50 | | | |
| 152 | 681+25 | S1,L1,L2,L3 | 1 | 47.0' | 0.50 | L1,L2 | 76% | 72% |
| 153 | 681+25 | L4,S2 | 3 | 19.0' | 5.00 | | | |
| 154 | 680+83 | L3 | 1 | 12.0' | 0.50 | | | |
| 155 | 680+83 | L4,S2 | 3 | 17.0' | 5.00 | | | |
| 156 | 680+72 | S1,L1,L2 | 1 | 30.0' | 0.50 | L1,L2 | 47% | 66% |
| 157 | 680+40 | L1 | 1 | 3.0' | 0.35 | L1 | 59% | |
| 158 | 680+21 | L4,S2 | 3 | 16.0' | 8.00 | | | |
| 159 | 680+02 | S1,L1,L2 | 1 | 35.0' | 0.50 | L1,L2 | 62% | 70% |
| 160 | 679+85 | L3,L4,S2 | 3 | 34.0' | 10.00 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 161 | 679+40 | S1,L1,L2 | 1 | 29.0' | 0.50 | L1,L2 | 75% | 63% |
| 162 | 679+10 | S1 | 1 | 11.0' | 11.00 | | | |
| 163 | 679+10 | L1,L2,L3,L4,S2 | 3 | 58.0' | 14.00 | L1,L2 | 49% | 83% |
| 164 | 679+00 | S1,L1,L2 | 3 | 29.0' | 6.00 | L1,L2 | 64% | 84% |
| 165 | 678+85 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 166 | 678+35 | L3,L4 | 3 | 22.0' | 10.00 | | | |
| 167 | 678+25 | L2 | 1 | 12.0' | 0.50 | L2 | | 67% |
| 168 | 678+20 | S1,L1 | 1 | 23.0' | 0.35 | L1 | 69% | |
| 169 | 678+90 | L4 | 3 | 3.0' | 4.00 | | | |
| 170 | 677+75 | S1,L1,L2 | 1 | 25.0' | 0.50 | L2 | | 77% |
| 171 | 677+62 | L4 | 3 | 3.0' | 4.00 | | | |
| 172 | 677+50 | S1,L1,L2 | 1 | 28.0' | 0.50 | L1,L2 | 56% | 79% |
| 173 | 677+35 | S1 | 1 | 9.0' | 0.25 | | | |
| 174 | 677+32 | L4 | 3 | 4.0' | 3.00 | | | |
| 175 | 677+25 | L2,L3,L4 | 1 | 29.0' | 0.50 | L2 | | 79% |
| 176 | 676+80 | S1,L1 | 1 | 22.0' | 0.35 | L1 | 74% | |
| 177 | 676+60 | L4 | 3 | 5.0' | 4.00 | | | |
| 178 | 676+20 | S1,L1 | 1 | 22.0' | 0.35 | L1 | 67% | |
| 179 | 676+00 | L3,L4,S2 | 1 | 26.0' | 0.50 | | | |
| 180 | 675+85 | S1,L1,L2 | 1 | 33.0' | 0.50 | L1,L2 | 68% | 75% |
| 181 | 675+15 | S1,L1 | 1 | 23.0' | 0.25 | L1 | 75% | |
| 182 | 675+00 | S1,L1,L2,L4 | 1 | 28.0' | 0.50 | L1,L2 | 72% | 63% |
| 183 | 674+88 | S1 | 1 | 11.0' | 0.25 | | | |
| 184 | 674+70 | S1,L1,L2 | 1 | 29.0' | 0.50 | L1,L2 | 69% | 63% |
| 185 | 674+58 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 186 | 674+30 | S1,L1,L2 | 1 | 29.0' | 0.35 | L1,L2 | 66% | 75% |
| 187 | 674+00 | L1,L2 | 1 | 15.0' | 0.50 | L1,L2 | 56% | 64% |
| 188 | 673+70 | S1,L1,L2 | 1 | 28.0' | 0.50 | L1,L2 | 63% | 70% |
| 189 | 673+57 | L1,L2,L3,L4 | 3 | 42.0' | 6.00 | L1,L2 | 68% | 75% |
| 190 | 673+30 | S1,L1 | 1 | 23.0' | 0.35 | L1 | 77% | |
| 191 | 673+13 | S1,L1,L2 | 1 | 30.0' | 0.35 | L1,L2 | 67% | 63% |
| 192 | 673+00 | L4,S2 | 1 | 7.0' | 0.50 | | | |
| 193 | 672+90 | L1,L2 | 1 | 12.0' | 0.25 | L1,L2 | 68% | 72% |
| 194 | 672+65 | L1,L2 | 1 | 24.0' | 0.35 | L1 | 65% | |
| 195 | 672+50 | S2 | 1 | 4.0' | 0.50 | | | |
| 196 | 672+27 | L4,S2 | 3 | 9.0' | 4.00 | | | |
| 197 | 672+25 | S1,L1 | 1 | 17.0' | 0.25 | L1 | 58% | |
| 198 | 672+13 | L1,L2,L3,L4 | 1 | 37.0' | 0.50 | L1,L2 | 62% | 68% |
| 199 | 672+00 | S1,L1 | 1 | 17.0' | 0.35 | L1 | 65% | |
| 200 | 671+70 | S1,L1,L2 | 1 | 20.0' | 0.35 | L1,L2 | 53% | 65% |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 201 | 671+40 | L4,S2 | 3 | 9.0' | 6.00 | | | |
| 202 | 671+36 | S1 | 1 | 10.0' | 0.13 | | | |
| 203 | 671+22 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 204 | 671+13 | S1,L1,L2 | 1 | 25.0' | 0.50 | L1,L2 | 68% | 70% |
| 205 | 671+00 | L4 | 1 | 3.0' | 0.13 | | | |
| 206 | 670+88 | S1 | 1 | 5.0' | 0.13 | | | |
| 207 | 670+75 | L4,S2 | 3 | 9.0' | 4.00 | | | |
| 208 | 670+70 | L3,L4 | 1 | 17.0' | 0.50 | | | |
| 209 | 670+60 | L1,L2 | 1 | 10.0' | 0.35 | L2 | | 63% |
| 210 | 670+42 | S1,L1,L2 | 1 | 25.0' | 0.35 | L1,L2 | 64% | 66% |
| 211 | 670+25 | L3,L4 | 1 | 20.0' | 0.50 | | | |
| 212 | 670+23 | S1,L1,L2 | 1 | 34.0' | 0.50 | L1,L2 | 56% | 65% |
| 213 | 670+17 | L4,S2 | 1 | 6.0' | 0.35 | | | |
| 214 | 669+89 | S1,L1,L2 | 1 | 26.0' | 0.25 | L1,L2 | 77% | 65% |
| 215 | 669+86 | L4 | 1 | 4.0' | 0.35 | | | |
| 216 | 669+52 | S1 | 1 | 5.0' | 0.35 | | | |
| 217 | 669+52 | L1,L2,L3,L4,S2 | 3 | 53.0' | 12.00 | L1,L2 | 52% | 67% |
| 218 | 669+26 | L4,S2 | 1 | 8.0' | 0.35 | | | |
| 219 | 668+97 | L1,L2 | 1 | 15.0' | 0.35 | L1,L2 | 73% | 76% |
| 220 | 668+84 | L3,L4 | 1 | 17.0' | 0.50 | | | |
| 221 | 668+76 | S1,L1,L2 | 1 | 27.0' | 0.50 | L1,L2 | 74% | 77% |
| 222 | 668+44 | S1,L1 | 1 | 22.0' | 0.25 | L1 | 72% | |
| 223 | 668+44 | L2 | 3 | 4.0' | 6.00 | L2 | | 73% |
| 224 | 668+18 | S1,L1,L2 | 1 | 28.0' | 0.50 | L1,L2 | 68% | 77% |
| 225 | 667+95 | S1,L1,L2 | 1 | 26.0' | 0.50 | L1,L2 | 78% | 82% |
| 226 | 667+89 | L4,S2 | 1 | 16.0' | 0.25 | | | |
| 227 | 667+89 | L3 | 3 | 12.0' | 3.00 | | | |
| 228 | 667+80 | S1,L1,L2 | 1 | 26.0' | 0.35 | L1,L2 | 82% | 79% |
| 229 | 667+59 | S1,L1,L2 | 1 | 26.0' | 0.25 | L1,L2 | 70% | 75% |
| 230 | 667+39 | L4 | 1 | 3.0' | 0.25 | | | |
| 231 | 666+92 | S1,L1 | 3 | 22.0' | 1.00 | L1 | 78% | |
| 232 | 666+89 | L2,L3,L4 | 1 | 36.0' | 0.50 | L2 | | 90% |
| 233 | 666+55 | S1,L1,L2 | 1 | 25.0' | 0.50 | L1,L2 | 75% | 81% |
| 234 | 666+39 | L3 | 1 | 12.0' | 0.50 | | | |
| 235 | 666+39 | L4 | 3 | 12.0' | 6.00 | | | |
| 236 | 666+26 | S1,L1,L2 | 1 | 26.0' | 0.50 | L1,L2 | 80% | 84% |
| 237 | 666+03 | S1,L1,L2 | 1 | 26.0' | 0.25 | L1,L2 | 84% | 83% |
| 238 | 665+89 | S2 | 1 | 9.0' | 0.50 | | | |
| 239 | 665+89 | L3,L4 | 3 | 24.0' | 6.00 | | | |
| 240 | 665+59 | L3,L4 | 1 | 24.0' | 0.50 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 241 | 665+36 | L4 | 1 | 4.0' | 0.35 | | | |
| 242 | 665+28 | S1,L1,L2 | 1 | 26.0' | 0.50 | L1,L2 | 85% | 81% |
| 243 | 665+10 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 244 | 664+99 | L4 | 3 | 6.0' | 4.00 | | | |
| 245 | 664+88 | S1,L1,L2 | 1 | 27.0' | 0.35 | L1,L2 | 80% | 90% |
| 246 | 664+60 | L3,L4 | 1 | 14.0' | 0.50 | | | |
| 247 | 664+45 | S1,L1,L2 | 1 | 28.0' | 0.50 | L1,L2 | 89% | 83% |
| 248 | 664+22 | L4,S2 | 3 | 9.0' | 6.00 | | | |
| 249 | 664+02 | S1,L1,L2 | 1 | 26.0' | 0.50 | L1,L2 | 76% | 80% |
| 250 | 663+80 | S1,L1 | 1 | 17.0' | 0.35 | L1 | 83% | |
| 251 | 663+50 | S1,L1,L2,L3,L4,S2 | 1 | 49.0' | 0.50 | L1,L2 | 82% | 76% |
| 252 | 663+25 | L1,L2 | 1 | 15.0' | 0.50 | L1,L2 | 88% | 81% |
| 253 | 663+10 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 254 | 662+90 | S1,L1,L2 | 1 | 28.0' | 0.50 | L1,L2 | 91% | 80% |
| 255 | 662+85 | L4,S2 | 1 | 16.0' | 0.50 | | | |
| 256 | 662+03 | S1,L1,L2 | 1 | 26.0' | 0.35 | L1,L2 | 73% | 79% |
| 257 | 661+98 | L4,R1 | 1 | 24.0' | 0.50 | | | |
| 258 | 661+80 | S1 | 1 | 10.0' | 0.13 | | | |
| 259 | 661+42 | L4,R1 | 1 | 24.0' | 0.50 | | | |
| 260 | 661+25 | S1,L1,L2 | 1 | 25.0' | 0.25 | L1,L2 | 74% | 76% |
| 261 | 660+65 | L4,R1 | 1 | 17.0' | 0.25 | | | |
| 262 | 660+57 | L1,L2 | 1 | 16.0' | 0.50 | L1,L2 | 73% | 71% |
| 263 | 660+10 | S1 | 1 | 10.0' | 0.25 | | | |
| 264 | 660+10 | L1,L2 | 3 | 14.0' | 10.00 | L1,L2 | 73% | 67% |
| 265 | 659+80 | S1,L1,L2,L3,L4,R1 | 3 | 70.0' | 6.00 | L1,L2 | 61% | 56% |
| 266 | 659+75 | R1 | 3 | 12.0' | 1.00 | | | |
| 267 | 659+50 | S1 | 1 | 10.0' | 0.13 | | | |
| 268 | 659+00 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 269 | 658+30 | L4 | 1 | 12.0' | 0.50 | | | |
| 270 | 657+58 | L3,L4 | 1 | 16.0' | 0.50 | | | |
| 271 | 657+08 | L4 | 1 | 5.0' | 0.25 | | | |
| 272 | 656+70 | L4,S2 | 1 | 15.0' | 0.50 | | | |
| 273 | 656+65 | L1 | 1 | 12.0' | 0.25 | L1 | 64% | |
| 274 | 655+80 | S2 | 1 | 9.0' | 0.13 | | | |
| 275 | 654+50 | S1,L4 | 1 | 18.0' | 0.50 | | | |
| 276 | 654+50 | L3 | 3 | 12.0' | 4.00 | | | |
| 277 | 654+30 | S2 | 1 | 5.0' | 0.13 | | | |
| 278 | 653+63 | L4,S2 | 1 | 15.0' | 0.13 | | | |
| 279 | 653+50 | L3,L4,S2 | 1 | 35.0' | 0.50 | | | |
| 280 | 653+30 | L1 | 1 | 12.0' | 0.25 | L1 | 49% | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 281 | 653+00 | L3,L4,S2 | 1 | 16.0' | 0.35 | | | |
| 282 | 652+89 | L4,S2 | 1 | 6.0' | 0.13 | | | |
| 283 | 652+80 | S1 | 1 | 10.0' | 0.13 | | | |
| 284 | 652+50 | L3,L4,S2 | 1 | 32.0' | 0.50 | | | |
| 285 | 652+20 | S2 | 1 | 9.0' | 0.13 | | | |
| 286 | 652+00 | L3,L4 | 1 | 19.0' | 0.50 | | | |
| 287 | 651+60 | L4,S2 | 1 | 8.0' | 0.25 | | | |
| 288 | 651+40 | L4 | 1 | 4.0' | 0.25 | | | |
| 289 | 651+00 | L3,L4,S2 | 1 | 35.0' | 0.50 | | | |
| 290 | 650+60 | L4,S2 | 1 | 16.0' | 0.35 | | | |
| 291 | 650+20 | L4,S2 | 3 | 16.0' | 2.00 | | | |
| 292 | 649+70 | S1,L1,L2,L3,L4,S2 | 3 | 70.0' | 8.00 | L1,L2 | 84% | 61% |
| 293 | 648+75 | L4 | 1 | 6.0' | 0.50 | | | |
| 294 | 648+75 | S2 | 3 | 11.0' | 1.00 | | | |
| 295 | 648+00 | L4,S2 | 3 | 14.0' | 0.75 | | | |
| 296 | 647+90 | L2,L3,L4 | 1 | 28.0' | 0.50 | L2 | | 67% |
| 297 | 647+55 | S2 | 1 | 10.0' | 0.13 | | | |
| 298 | 647+40 | L4 | 1 | 4.0' | 0.50 | | | |
| 299 | 646+90 | L3,L4 | 1 | 24.0' | 0.35 | | | |
| 300 | 646+89 | L2 | 1 | 12.0' | 0.25 | L2 | | 59% |
| 301 | 646+35 | L4,R1 | 1 | 24.0' | 0.50 | | | |
| 302 | 645+95 | R1,S2 | 1 | 18.0' | 0.13 | | | |
| 303 | 645+63 | R1 | 1 | 12.0' | 0.35 | | | |
| 304 | 645+29 | L2 | 1 | 12.0' | 0.50 | L2 | | 64% |
| 305 | 645+27 | L3,L4 | 1 | 18.0' | 0.50 | | | |
| 306 | 644+78 | L3,L4,R1 | 1 | 36.0' | 0.50 | | | |
| 307 | 644+38 | R1 | 1 | 12.0' | 0.13 | | | |
| 308 | 644+27 | L1,L3,L4,R1 | 1 | 40.0' | 0.50 | L1 | 75% | |
| 309 | 644+27 | L2 | 3 | 12.0' | 12.00 | L2 | | 65% |
| 310 | 643+76 | L4 | 1 | 12.0' | 0.50 | | | |
| 311 | 643+25 | L3,L4,R1 | 1 | 34.0' | 0.50 | | | |
| 312 | 643+25 | L2 | 3 | 7.0' | 3.00 | L2 | | 64% |
| 313 | 643+85 | R1 | 1 | 8.0' | 0.13 | | | |
| 314 | 642+75 | L3,L4,R1 | 1 | 21.0' | 0.50 | | | |
| 315 | 642+25 | L2 | 3 | 12.0' | 14.00 | L2 | | 67% |
| 316 | 642+23 | L3,R1 | 1 | 24.0' | 0.50 | | | |
| 317 | 642+23 | L4 | 3 | 12.0' | 4.00 | | | |
| 318 | 641+70 | L2,L3,L4,R1 | 3 | 39.0' | 6.00 | L2 | | 68% |
| 319 | 641+65 | R1,S2 | 1 | 17.0' | 0.13 | | | |
| 320 | 641+30 | L2 | 1 | 5.0' | 0.50 | L2 | | 76% |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 321 | 641+25 | L2 | 1 | 5.0' | 0.25 | | | |
| 322 | 641+21 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 323 | 641+10 | R1,S2 | 1 | 12.0' | 0.35 | | | |
| 324 | 640+80 | L4,R1,S2 | 1 | 27.0' | 0.50 | | | |
| 325 | 640+55 | R1 | 1 | 9.0' | 0.35 | | | |
| 326 | 640+24 | L3 | 1 | 16.0' | 0.50 | | | |
| 327 | 640+24 | L2,L4 | 3 | 24.0' | 6.00 | L2 | | 69% |
| 328 | 640+20 | R1,S2 | 1 | 18.0' | 0.13 | | | |
| 329 | 640+13 | S1,L1,L2 | 1 | 20.0' | 0.50 | L1,L2 | 61% | 73% |
| 330 | 639+74 | L4 | 1 | 10.0' | 0.50 | | | |
| 331 | 639+72 | L1 | 1 | 4.0' | 0.50 | L1 | 57% | |
| 332 | 639+65 | R1 | 3 | 12.0' | 1.00 | | | |
| 333 | 639+43 | L2,L3,L4,R1 | 3 | 48.0' | 12.00 | | | |
| 334 | 639+40 | S1,L1,L2 | 1 | 17.0' | 0.35 | L1,L2 | 67% | 41% |
| 335 | 639+21 | L4,S2 | 1 | 16.0' | 0.50 | | | |
| 336 | 638+78 | L4,S2 | 1 | 22.0' | 0.50 | | | |
| 337 | 638+73 | L2,L4 | 1 | 13.0' | 0.50 | L2 | | 73% |
| 338 | 638+73 | L3 | 3 | 12.0' | 8.00 | | | |
| 339 | 638+70 | L1 | 1 | 12.0' | 0.35 | L1 | 69% | |
| 340 | 638+48 | S2 | 1 | 10.0' | 0.25 | | | |
| 341 | 638+23 | L1,L2 | 1 | 16.0' | 0.50 | L1,L2 | 65% | 78% |
| 342 | 638+23 | L3,L4 | 3 | 18.0' | 10.00 | | | |
| 343 | 637+90 | L4 | 1 | 12.0' | 0.50 | | | |
| 344 | 637+80 | L2 | 1 | 6.0' | 0.50 | L2 | | 64% |
| 345 | 637+70 | L1 | 1 | 12.0' | 0.50 | L1 | 63% | |
| 346 | 637+40 | L4,S2 | 1 | 17.0' | 0.50 | | | |
| 347 | 637+30 | L1,L2 | 1 | 16.0' | 0.35 | L1,L2 | 84% | 86% |
| 348 | 637+25 | L3,L4 | 1 | 17.0' | 0.50 | | | |
| 349 | 637+20 | L1 | 1 | 12.0' | 0.50 | L1 | 68% | |
| 350 | 636+90 | L4,S2 | 1 | 22.0' | 0.35 | | | |
| 351 | 636+88 | L1,L2 | 1 | 16.0' | 0.35 | L1,L2 | 68% | 82% |
| 352 | 636+75 | L1,L2 | 1 | 18.0' | 0.50 | L1,L2 | 65% | 70% |
| 353 | 636+65 | L1,L2 | 1 | 16.0' | 0.25 | L1,L2 | 80% | 84% |
| 354 | 636+50 | L4 | 1 | 14.0' | 0.50 | | | |
| 355 | 636+28 | L2,L4 | 1 | 16.0' | 0.50 | L2 | | 84% |
| 356 | 636+28 | L3 | 3 | 12.0' | 10.00 | | | |
| 357 | 636+24 | L1,L4,S2 | 1 | 30.0' | 0.35 | L1 | 77% | |
| 358 | 636+00 | L1 | 1 | 12.0' | 0.13 | L1 | 79% | |
| 359 | 635+80 | L1,L2 | 1 | 6.0' | 0.13 | L1 | 85% | |
| 360 | 635+75 | L2,L3,L4 | 1 | 24.0' | 0.50 | L2 | | 79% |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 361 | 635+65 | S1,L1,L4,S2 | 1 | 28.0' | 0.50 | L1 | 79% | |
| 362 | 635+35 | L1,L2 | 1 | 15.0' | 0.50 | L1,L2 | 79% | 83% |
| 363 | 635+30 | L2,L4,S2 | 1 | 27.0' | 0.13 | L2 | | 77% |
| 364 | 635+30 | L3 | 3 | 12.0' | 6.00 | | | |
| 365 | 635+23 | S1,L1,L2 | 1 | 21.0' | 0.50 | L1,L2 | 87% | 83% |
| 366 | 635+10 | L4,S2 | 1 | 11.0' | 0.50 | | | |
| 367 | 634+75 | L1,L2,L3,L4 | 1 | 40.0' | 0.50 | L1,L2 | 79% | 78% |
| 368 | 634+70 | L4,S2 | 1 | 18.0' | 0.50 | | | |
| 369 | 634+57 | L1,L2 | 1 | 18.0' | 0.50 | L1,L2 | 86% | 87% |
| 370 | 634+50 | L1,L2 | 1 | 18.0' | 0.50 | L1,L2 | 81% | 86% |
| 371 | 634+25 | L3,L4 | 1 | 19.0' | 0.35 | | | |
| 372 | 634+23 | L4,S2 | 1 | 12.0' | 0.25 | | | |
| 373 | 634+08 | L1 | 1 | 8.0' | 0.25 | L1 | 82% | |
| 374 | 633+90 | S2 | 1 | 16.0' | 0.13 | | | |
| 375 | 633+75 | L2,L3,L4 | 1 | 20.0' | 0.50 | L2 | | 83% |
| 376 | 633+65 | L4,S2 | 1 | 26.0' | 0.35 | | | |
| 377 | 633+60 | L1,L2 | 1 | 6.0' | 0.35 | L1,L2 | 78% | 83% |
| 378 | 633+30 | L1,L2 | 1 | 24.0' | 0.50 | L1,L2 | 86% | 81% |
| 379 | 633+25 | L4 | 1 | 7.0' | 0.50 | | | |
| 380 | 633+25 | L3 | 3 | 12.0' | 12.00 | | | |
| 381 | 633+05 | L1,L2 | 1 | 16.0' | 0.13 | L1,L2 | 85% | 86% |
| 382 | 632+91 | L4,S2 | 1 | 21.0' | 0.35 | | | |
| 383 | 632+80 | L1,L2,L3,L4,S2 | 1 | 49.0' | 0.50 | L1,L2 | 85% | 87% |
| 384 | 632+57 | S1,L1 | 1 | 16.0' | 0.50 | L1 | 80% | |
| 385 | 632+31 | L4,S2 | 1 | 19.0' | 0.25 | | | |
| 386 | 632+28 | L1,L2,L4 | 1 | 24.0' | 0.50 | L1,L2 | 84% | 81% |
| 387 | 632+18 | S1,L1 | 3 | 15.0' | 3.00 | L1 | 79% | |
| 388 | 631+88 | L4,S2 | 3 | 19.0' | 7.00 | | | |
| 389 | 631+75 | S1,L1 | 1 | 15.0' | 0.50 | L1 | 82% | |
| 390 | 631+75 | L2,L3,L4 | 3 | 28.0' | 6.00 | L2 | | 86% |
| 391 | 631+33 | S1,L1,L2 | 1 | 27.0' | 0.50 | L1 | 79% | |
| 392 | 631+30 | L4,S2 | 3 | 20.0' | 6.00 | | | |
| 393 | 631+25 | L2,L3,L4 | 3 | 22.0' | 8.00 | L2 | | 84% |
| 394 | 631+10 | L2 | 1 | 12.0' | 0.50 | L2 | | 81% |
| 395 | 631+05 | S1,L1 | 3 | 22.0' | 4.00 | | | |
| 396 | 630+88 | L4 | 1 | 7.0' | 0.35 | | | |
| 397 | 630+75 | L3,L4 | 1 | 17.0' | 0.50 | | | |
| 398 | 630+50 | S1,L1,L2 | 3 | 27.0' | 12.00 | L1,L2 | 84% | 85% |
| 399 | 630+40 | S2 | 1 | 7.0' | 0.50 | | | |
| 400 | 630+40 | L4 | 3 | 8.0' | 6.00 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 401 | 630+30 | L1,L2 | 1 | 14.0' | 0.50 | L1,L2 | 85% | 76% |
| 402 | 630+30 | L3,L4 | 3 | 16.0' | 8.00 | | | |
| 403 | 630+20 | S1,L1,L2 | 1 | 21.0' | 0.50 | L1,L2 | 83% | 82% |
| 404 | 629+75 | S1 | 1 | 6.0' | 0.25 | | | |
| 405 | 629+75 | L1,L2,L3,L4,S2 | 3 | 56.0' | 12.00 | L1,L2 | 83% | 71% |
| 406 | 629+50 | S1,L1,L2,L3,L4,S2 | 3 | 66.0' | 12.00 | L1,L2 | 63% | 47% |
| 407 | 629+40 | L4 | 3 | 5.0' | 16.00 | | | |
| 408 | 629+30 | L4,S2 | 1 | 8.0' | 0.50 | | | |
| 409 | 629+05 | L1,L2 | 1 | 14.0' | 0.50 | L1,L2 | 75% | 71% |
| 410 | 628+90 | S2 | 1 | 8.0' | 0.50 | | | |
| 411 | 628+90 | L4 | 3 | 5.0' | 12.00 | | | |
| 412 | 628+80 | S1,L1,L2 | 1 | 23.0' | 0.50 | L1 | 66% | |
| 413 | 628+76 | L2,L3,L4 | 3 | 24.0' | 8.00 | L2 | | 66% |
| 414 | 628+50 | L4 | 3 | 5.0' | 14.00 | | | |
| 415 | 628+25 | L1 | 1 | 3.0' | 0.50 | L1 | 69% | |
| 416 | 628+20 | L1,L2 | 1 | 14.0' | 0.35 | L2 | | 70% |
| 417 | 628+05 | L3,L4,S2 | 3 | 32.0' | 9.00 | | | |
| 418 | 627+78 | L3,L4 | 1 | 8.0' | 0.50 | | | |
| 419 | 627+60 | S1,L1 | 1 | 8.0' | 0.50 | L1 | 70% | |
| 420 | 627+55 | L4 | 3 | 8.0' | 12.00 | | | |
| 421 | 627+40 | L4,S2 | 1 | 20.0' | 0.35 | | | |
| 422 | 627+29 | S1,L2 | 1 | 11.0' | 0.50 | L2 | | 68% |
| 423 | 627+29 | L1,L3,L4 | 3 | 36.0' | 6.00 | L1 | 72% | |
| 424 | 626+95 | S1,L1 | 1 | 11.0' | 0.25 | L1 | 70% | |
| 425 | 626+82 | S2 | 1 | 8.0' | 0.25 | | | |
| 426 | 626+82 | L4 | 3 | 12.0' | 8.00 | | | |
| 427 | 626+80 | L2,L3 | 3 | 14.0' | 4.00 | L2 | | 77% |
| 428 | 626+30 | S1,L1,L2,L3,L4 | 1 | 39.0' | 0.50 | L1,L2 | 78% | 86% |
| 429 | 626+00 | L4,S2 | 1 | 16.0' | 0.25 | | | |
| 430 | 625+90 | S1,L1 | 1 | 18.0' | 0.50 | L1 | 73% | |
| 431 | 625+75 | L3,L4 | 1 | 19.0' | 0.50 | | | |
| 432 | 625+35 | L2,L3,L4 | 1 | 28.0' | 0.50 | L2 | | 83% |
| 433 | 625+28 | L1,L2 | 1 | 6.0' | 0.50 | L1,L2 | 59% | 80% |
| 434 | 625+10 | L1 | 1 | 8.0' | 0.35 | L1 | 73% | |
| 435 | 624+46 | L1,L2 | 1 | 16.0' | 0.50 | L1,L2 | 76% | 87% |
| 436 | 624+35 | L3,L4 | 1 | 17.0' | 0.50 | | | |
| 437 | 624+28 | L4 | 1 | 4.0' | 0.50 | | | |
| 438 | 623+90 | L1,L2 | 1 | 9.0' | 0.25 | L1,L2 | 77% | 84% |
| 439 | 623+80 | L2,L3,L4 | 1 | 28.0' | 0.50 | L2 | | 87% |
| 440 | 623+70 | L4 | 1 | 7.0' | 0.50 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 441 | 623+40 | L1,L2,L3,L4 | 1 | 31.0' | 0.50 | L2 | | 78% |
| 442 | 623+30 | L4 | 1 | 7.0' | 0.50 | | | |
| 443 | 623+25 | S1,L1 | 1 | 10.0' | 0.25 | L1 | 75% | |
| 444 | 622+90 | S1,L1,L2,L3,L4 | 1 | 58.0' | 0.50 | L1,L2 | 73% | 84% |
| 445 | 622+90 | S2 | 3 | 10.0' | 1.00 | | | |
| 446 | 622+60 | L4,S2 | 1 | 9.0' | 0.25 | | | |
| 447 | 622+35 | S1,L1 | 1 | 17.0' | 0.13 | L1 | 78% | |
| 448 | 622+25 | L4 | 1 | 7.0' | 0.25 | | | |
| 449 | 622+25 | L3 | 3 | 12.0' | 6.00 | | | |
| 450 | 622+20 | L1,L2 | 1 | 24.0' | 0.50 | L1,L2 | 73% | 84% |
| 451 | 622+15 | L4,S2 | 3 | 20.0' | 10.00 | | | |
| 452 | 622+00 | L1,L2 | 1 | 14.0' | 0.25 | L1,L2 | 71% | 82% |
| 453 | 621+65 | S1,L1 | 1 | 16.0' | 0.50 | L1 | 73% | |
| 454 | 621+38 | L2,L3,L4 | 3 | 29.0' | 10.00 | L2 | | 74% |
| 455 | 621+35 | S2 | 1 | 10.0' | 0.35 | | | |
| 456 | 621+10 | L4 | 1 | 12.0' | 0.35 | | | |
| 457 | 621+10 | S2 | 3 | 12.0' | 1.00 | | | |
| 458 | 620+90 | S1,L1,L4 | 1 | 17.0' | 0.50 | L1 | 78% | |
| 459 | 620+90 | L2,L3 | 3 | 24.0' | 6.00 | L2 | | 82% |
| 460 | 620+41 | S1,L1,L2 | 1 | 30.0' | 0.50 | L1 | 68% | |
| 461 | 620+40 | L2 | 3 | 5.0' | 6.00 | L2 | | 74% |
| 462 | 620+25 | L4 | 1 | 9.0' | 0.50 | | | |
| 463 | 620+15 | L3,L4 | 1 | 15.0' | 0.35 | | | |
| 464 | 620+00 | S1,L1,L2 | 1 | 25.0' | 0.13 | L1,L2 | 72% | 85% |
| 465 | 619+85 | L4,S2 | 1 | 17.0' | 0.25 | | | |
| 466 | 619+60 | S2 | 1 | 10.0' | 0.25 | | | |
| 467 | 619+60 | S1,L1,L2,L3,L4 | 3 | 58.0' | 10.00 | L1,L2 | 66% | 70% |
| 468 | 619+08 | L3,L4 | 1 | 15.0' | 0.50 | | | |
| 469 | 616+83 | L4 | 1 | 5.0' | 0.35 | | | |
| 470 | 616+83 | L2,L3 | 3 | 19.0' | 8.00 | L2 | | 82% |
| 471 | 616+50 | L2,L3 | 3 | 11.0' | 15.00 | L2 | | 94% |
| 472 | 616+40 | L1 | 1 | 6.0' | 0.25 | L1 | 43% | |
| 473 | 616+10 | L4,S2 | 1 | 7.0' | 0.25 | | | |
| 474 | 615+85 | S1,L1,L2,L3,L4,S2 | 3 | 61.0' | 9.00 | L1,L2 | 83% | 84% |
| 475 | 615+70 | S1,L1 | 1 | 13.0' | 0.50 | L1 | 82% | |
| 476 | 615+55 | S1,L1 | 1 | 15.0' | 0.25 | L1 | 80% | |
| 477 | 615+55 | L2 | 3 | 5.0' | 6.00 | L2 | | 85% |
| 478 | 615+10 | S1,L1,L2,L3,L4,S2 | 3 | 68.0' | 10.00 | L1,L2 | 80% | 71% |
| 479 | 614+20 | S1,L1,L2 | 1 | 24.0' | 0.50 | L1,L2 | 80% | 82% |
| 480 | 613+88 | S1,L3,L4 | 1 | 21.0' | 0.50 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|-------------------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 481 | 613+88 | L1,L2 | 3 | 24.0' | 3.00 | L1,L2 | 76% | 85% |
| 482 | 613+40 | L1,L2 | 3 | 16.0' | 1.00 | L1,L2 | 77% | 71% |
| 483 | 613+32 | L4,S2 | 3 | 15.0' | 4.00 | | | |
| 484 | 613+20 | S1,L1,L2 | 3 | 26.0' | 5.00 | L1,L2 | 80% | 87% |
| 485 | 612+90 | S1,L2 | 1 | 7.0' | 0.50 | L2 | | 82% |
| 486 | 612+90 | L1 | 3 | 12.0' | 1.00 | L1 | 75% | |
| 487 | 612+28 | S1,L1,L2,L3,L4,S2 | 3 | 62.0' | 8.00 | L1,L2 | 77% | 76% |
| 488 | 611+90 | S1,L1 | 1 | 22.0' | 0.50 | L1 | 82% | |
| 489 | 611+60 | L4,S2 | 1 | 19.0' | 0.50 | | | |
| 490 | 611+25 | L1 | 1 | 8.0' | 0.35 | L1 | 80% | |
| 491 | 611+25 | S1 | 3 | 12.0' | 2.00 | | | |
| 492 | 611+15 | L4,S2 | 1 | 22.0' | 0.50 | | | |
| 493 | 611+15 | L2,L3 | 3 | 24.0' | 8.00 | L2 | | 68% |
| 494 | 610+78 | S1,L1 | 1 | 9.0' | 0.50 | L1 | 79% | |
| 495 | 610+60 | L2 | 1 | 12.0' | 0.50 | L2 | | 80% |
| 496 | 610+45 | L3,L4 | 1 | 15.0' | 0.50 | | | |
| 497 | 610+30 | S1,L1 | 3 | 24.0' | 1.00 | L1 | 77% | |
| 498 | 610+18 | L3 | 3 | 12.0' | 6.00 | | | |
| 499 | 610+15 | S1,L1,L2,L4 | 3 | 46.0' | 8.00 | L1,L2 | 61% | 72% |
| 500 | 606+65 | L4 | 1 | 5.0' | 0.13 | | | |
| 501 | 609+60 | L3 | 1 | 12.0' | 0.35 | | | |
| 502 | 609+60 | L2 | 3 | 12.0' | 1.00 | L2 | | 84% |
| 503 | 609+40 | S1,L1 | 1 | 22.0' | 0.50 | L1 | 81% | |
| 504 | 609+10 | L2,L3,L4,S2 | 1 | 40.0' | 0.50 | L2 | | 79% |
| 505 | 609+00 | S1,L1 | 3 | 24.0' | 1.00 | L1 | 68% | |
| 506 | 608+63 | L3,L4,S2 | 1 | 29.0' | 0.50 | | | |
| 507 | 608+63 | S1,L1,L2 | 3 | 38.0' | 2.00 | L1 | 67% | |
| 508 | 608+25 | L4 | 1 | 4.0' | 0.25 | | | |
| 509 | 608+15 | S1,L1,L2 | 3 | 20.0' | 2.00 | L1 | 68% | |
| 510 | 608+00 | L3,L4 | 1 | 14.0' | 0.50 | | | |
| 511 | 607+55 | S1,L1,L2 | 3 | 28.0' | 1.00 | L1,L2 | 63% | 77% |
| 512 | 607+40 | L3,L4,S2 | 3 | 25.0' | 4.00 | | | |
| 513 | 607+20 | L3,L4 | 1 | 16.0' | 0.50 | | | |
| 514 | 607+15 | L1,L2 | 3 | 24.0' | 1.00 | L1 | 63% | |
| 515 | 606+65 | L1,L2 | 3 | 24.0' | 2.00 | L1,L2 | 75% | 79% |
| 516 | 606+60 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 517 | 606+15 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 518 | 605+80 | L1,L2,L3,L4 | 3 | 48.0' | 18.00 | L1,L2 | 65% | 78% |
| 519 | 605+70 | L3,L4 | 3 | 18.0' | 7.00 | | | |
| 520 | 605+65 | L1,L2 | 3 | 24.0' | 3.00 | L1,L2 | 68% | 84% |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------|------------------|--------------|-------------------|-------------------|-----|-----|
| | | | | | | | L1 | L2 |
| 521 | 604+70 | L1,L2 | 3 | 24.0' | 6.00 | L1,L2 | 58% | 79% |
| 522 | 604+65 | L3,L4 | 3 | 24.0' | 3.00 | | | |
| 523 | 604+25 | L1,L2 | 3 | 19.0' | 8.00 | L1,L2 | 60% | 76% |
| 524 | 603+60 | L3,L4 | 3 | 24.0' | 4.00 | | | |
| 525 | 603+80 | L1,L2 | 3 | 18.0' | 10.00 | L1,L2 | 70% | 83% |
| 526 | 603+15 | L2 | 3 | 10.0' | 1.00 | L2 | | 82% |
| 527 | 602+85 | L3,L4 | 1 | 18.0' | 0.50 | | | |
| 528 | 602+35 | L1,L2 | 3 | 19.0' | 10.00 | L1,L2 | 68% | 80% |
| 529 | 602+20 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 530 | 601+48 | L3,L4 | 1 | 15.0' | 0.50 | | | |
| 531 | 601+75 | L1,L2 | 3 | 19.0' | 5.00 | L1,L2 | 71% | 80% |
| 532 | 601+25 | L1,L2 | 3 | 19.0' | 1.00 | L1,L2 | 76% | 83% |
| 533 | 600+85 | L3,L4 | 3 | 24.0' | 1.00 | | | |
| 534 | 600+80 | L1,L2 | 3 | 17.0' | 9.00 | L1,L2 | 65% | 79% |
| 535 | 600+30 | L3,L4 | 1 | 15.0' | 0.35 | | | |
| 536 | 600+15 | L1,L2 | 3 | 17.0' | 2.00 | L1,L2 | 59% | 65% |
| 537 | 599+65 | L3,L4 | 1 | 22.0' | 0.25 | | | |
| 538 | 599+52 | L1,L2 | 3 | 14.0' | 9.00 | L1,L2 | 62% | 70% |
| 539 | 599+02 | S1,L4 | 1 | 14.0' | 0.50 | | | |
| 540 | 599+02 | L1,L2,L3 | 3 | 36.0' | 12.00 | L1,L2 | 58% | 69% |
| 541 | 598+35 | L3,L4 | 3 | 24.0' | 8.00 | | | |
| 542 | 598+30 | L1,L2 | 3 | 17.0' | 12.00 | L1,L2 | 55% | 76% |
| 543 | 597+45 | L2 | 3 | 12.0' | 10.00 | L2 | | 71% |
| 544 | 597+25 | L3 | 1 | 10.0' | 0.50 | | | |
| 545 | 597+25 | L4 | 3 | 10.0' | 8.00 | | | |
| 546 | 597+20 | L4 | 1 | 12.0' | 0.50 | | | |
| 547 | 597+20 | L2,L3 | 3 | 24.0' | 9.00 | L2 | | 57% |
| 548 | 596+78 | L3,L4 | 3 | 14.0' | 4.00 | | | |
| 549 | 596+70 | L2 | 3 | 12.0' | 14.00 | L2 | | 64% |
| 550 | 596+65 | L4 | 3 | 10.0' | 4.00 | | | |
| 551 | 596+55 | L3 | 3 | 9.0' | 6.00 | | | |
| 552 | 595+90 | L2 | 3 | 12.0' | 1.00 | L2 | | 66% |
| 553 | 595+85 | S1,L1 | 3 | 22.0' | 5.00 | L1 | 66% | |
| 554 | 595+70 | L2 | 3 | 8.0' | 6.00 | | | |
| 555 | 595+65 | L2,L3,L4 | 3 | 35.0' | 10.00 | L2 | | 67% |
| 556 | 595+43 | L3,L4 | 1 | 12.0' | 0.50 | | | |
| 557 | 595+30 | L2 | 3 | 12.0' | 2.00 | | | |
| 558 | 594+90 | S1,L3,L4 | 1 | 23.0' | 0.50 | | | |
| 559 | 595+60 | L3,L4 | 1 | 14.0' | 0.50 | | | |
| 560 | 594+15 | L3,L4 | 1 | 14.0' | 0.50 | | | |



Table C-1: Joint Condition Survey Results

| Joint No. | Station (Design Baseline) | Lanes | Joint/Crack Type | Length (ft.) | Crack Width (in.) | FWD Testing Lanes | LTE | |
|-----------|---------------------------|----------|------------------|--------------|-------------------|-------------------|-----|----|
| | | | | | | | L1 | L2 |
| 561 | 593+45 | L2,L3,L4 | 1 | 28.0' | 0.50 | | | |
| 562 | 592+90 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 563 | 592+30 | L3,L4 | 1 | 24.0' | 0.50 | | | |
| 564 | 591+60 | L3 | 1 | 12.0' | 0.50 | | | |
| 565 | 591+60 | L4 | 3 | 12.0' | 4.00 | | | |
| 566 | 590+85 | L3,L4 | 1 | 24.0' | 0.50 | | | |



Table C-2: Observed Pavement Distress

| Begin Station | End Station | Lane | Distress Description |
|----------------------|--------------------|-------------|---|
| 718+55 | 718+82 | L2 | Medium Severity Alligator Cracking |
| 718+82 | 718+82 | L2 | Pothole |
| 716+40 | 717+00 | L2 | Low Severity Alligator Cracking |
| 712+00 | 712+18 | L2 | Low Severity Alligator Cracking |
| 710+85 | 710+85 | L1 | Pothole |
| 710+92 | 710+92 | L1 | Pothole |
| 709+30 | 709+59 | L1 | Low Severity Alligator Cracking |
| 708+28 | 708+72 | L1 | Low Severity Alligator Cracking |
| 707+30 | 707+38 | L1 | Low Severity Alligator Cracking |
| 704+77 | 706+00 | L4 | Low Severity Alligator Cracking |
| 702+68 | 703+73 | L4 | Low Severity Alligator Cracking |
| 702+87 | 703+00 | L1 | Low Severity Alligator Cracking |
| 699+25 | 699+40 | S2 | Medium Severity Alligator Cracking |
| 695+13 | 695+92 | L4 | Low Severity Alligator Cracking |
| 690+48 | 690+48 | L3 | High Severity Alligator Cracking |
| 689+58 | 689+62 | L2 | Medium Severity Patch |
| 685+58 | 685+67 | L4 | High Severity Alligator Cracking |
| 684+63 | 684+70 | L4 | Medium Severity Alligator Cracking |
| 684+63 | 684+63 | L4 | Medium Severity Patch |
| 682+81 | 682+86 | L4 | High Severity Alligator Cracking and Depression |
| 681+79 | 682+00 | L1 | Low Severity Alligator Cracking |
| 679+40 | 680+80 | L4 | Low Severity Alligator Cracking |
| 674+25 | 674+38 | L4 | Low Severity Alligator Cracking |
| 650+40 | 650+43 | L3,L4 | Depression |
| 648+40 | 648+43 | L3,L4 | Depression |
| 647+90 | 647+93 | L3,L4 | Depression |
| 647+40 | 647+21 | L3,L4 | Depression |
| 640+50 | 640+89 | L4 | Low Severity Alligator Cracking |
| 639+80 | 640+24 | L4 | Low/Medium Severity Alligator Cracking |
| 634+75 | 634+77 | L3 | High Severity Alligator Cracking |
| 633+25 | 633+27 | L3 | High Severity Alligator Cracking |
| 625+25 | 625+27 | L4 | Medium Severity Alligator Cracking |



Table C-2: Observed Pavement Distress

| Begin Station | End Station | Lane | Distress Description |
|---------------|-------------|------|----------------------------------|
| 616+86 | 617+26 | L4 | Low Severity Alligator Cracking |
| 607+15 | 607+16 | L4 | High Severity Alligator Cracking |
| 602+30 | 606+50 | L4 | Low Severity Alligator Cracking |
| 599+15 | 599+29 | L1 | Low Severity Alligator Cracking |
| 599+05 | 599+30 | L2 | Low Severity Alligator Cracking |
| 598+80 | 599+05 | L1 | Low Severity Alligator Cracking |
| 598+50 | 598+70 | L1 | Low Severity Alligator Cracking |
| 598+30 | 599+02 | L2 | Low Severity Alligator Cracking |
| 598+33 | 598+38 | L4 | Low Severity Alligator Cracking |
| 596+60 | 597+06 | L2 | Low Severity Alligator Cracking |
| 595+00 | 595+27 | L2 | Low Severity Alligator Cracking |

GW Parkway Ramp

| Begin Station | End Station | Lane | Distress Description |
|---------------|-------------|------|---------------------------------|
| 692+25 | 692+25 | S3 | Low Severity Patch |
| 690+80 | 691+40 | S3 | Medium/High Severity Edge Crack |
| 688+24 | 688+34 | S4 | Medium Severity Edge Crack |
| 687+38 | 687+38 | R1 | Pothole |



PROJECT NEXT

APPENDIX C

Pavement Core Logs

Core ID: 19DTR-P02

Roadway: Dulles Toll Rd EB Ramp to I-495 SB/NB

Location Within Roadway: Inside Shoulder

Date: 7/2/2019

Cored By: SaLUT, Inc.

Logged By: Amanda Thomason

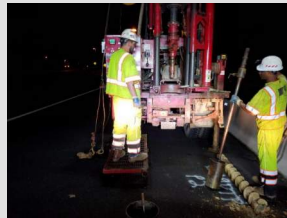
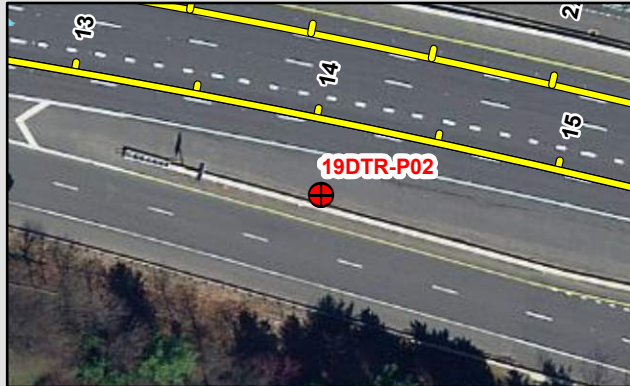
Soil Boring Complete?: Yes refer to Soil Boring Log 19DTR-P02

Station: 21+16

Offset: 60 RT

Latitude: 38.933498

Longitude: -77.218667



General Surface Condition: Good
Specific Surface Distress(es): Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

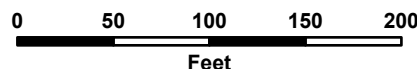


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.2 | 2.2 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.2 | 9.0 | 6.8 | Fair |
| Aggregate | 9.0 | 22.0 | 13.0 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19DTR-P06

Roadway: Dulless Access Rd EB Ramp to I-495 NB

Location Within Roadway: Inside Shoulder

Date: 7/3/2019

Cored By: SaLUT, Inc.

Logged By: Amanda Thomason

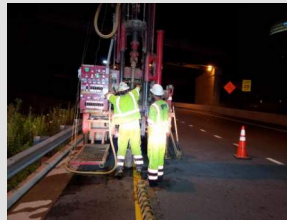
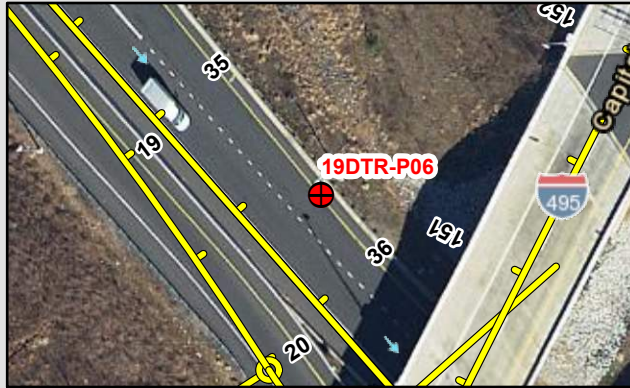
Soil Boring Complete?: Yes refer to Soil Boring Log 19DTR-P06

Station: 35+65

Offset: 32 LT

Latitude: 38.930191

Longitude: -77.212665



General Surface Condition: Good
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

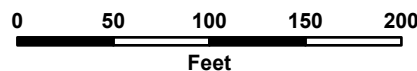


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 15.5 | 14.0 | Good |
| Aggregate | 15.5 | 30.0 | 14.5 | |
| Depth to Subgrade: 30.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19DTR-P07

Roadway: Dulles Toll Road EB

Location Within Roadway: Inside Shoulder

Date: 6/27/2019

Cored By: SaLUT, Inc.

Logged By: Amanda Thomason

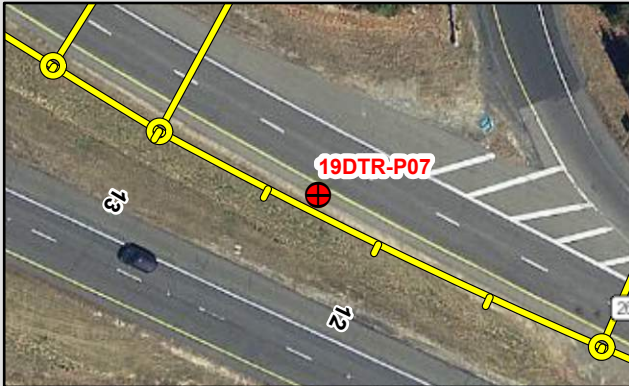
Soil Boring Complete?: Yes refer to Soil Boring Log 19DTR-P07

Station: 12+33

Offset: 9 RT

Latitude: 38.929495

Longitude: -77.204272



General Surface Condition: Fair
Specific Surface Distress(es):
 Transverse Crack

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

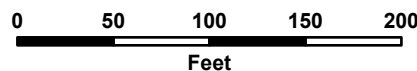


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 5.5 | 3.5 | Good |
| Aggregate | 5.5 | 12.0 | 6.5 | |
| Depth to Subgrade: 12.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19DTR-P09

Roadway: Dulless Access Rd EB Ramp to I-495 NB

Location Within Roadway: Travel Lane

Date: 7/15/2019

Cored By: SaLUT, Inc.

Logged By: Amanda Thomason

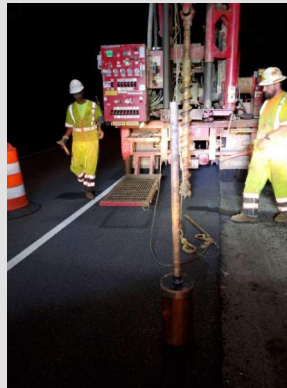
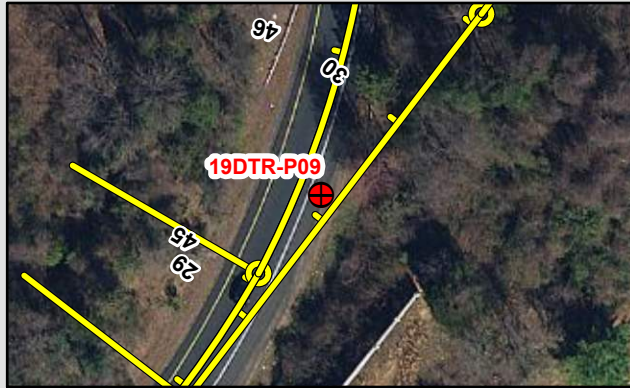
Soil Boring Complete?: Yes refer to Soil Boring Log 19DTR-P09

Station: 45+46

Offset: 8 RT

Latitude: 38.930248

Longitude: -77.209905



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

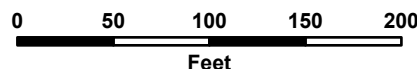


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 4.0 | 1.5 | Poor |
| Aggregate | 4.0 | 18.0 | 14.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-BR15

Roadway: I-495 SB to Ramp to GTP

Location Within Roadway: Outside Lane

Date: 6/18/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

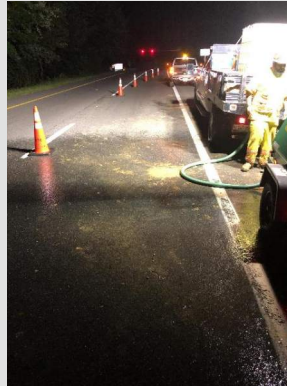
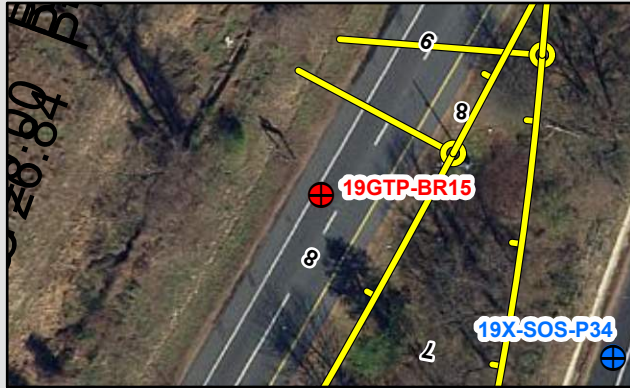
Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-BR15

Station: 08+28

Offset: 41 RT

Latitude: 38.955824

Longitude: -77.19404



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking, Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Changed to 19GTP-BR15

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

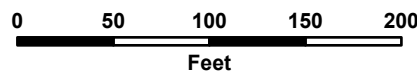


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 8.5 | 6.5 | Good |
| Aggregate | 8.5 | 12.5 | 4.0 | |
| Depth to Subgrade: 12.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P07 **Roadway:** I-495 NB Off Ramp to GTP

Date: 4/23/2019

Cored By: SaLUT, Inc.

Logged By: Russ Kanith

Location Within Roadway: Inside Lane

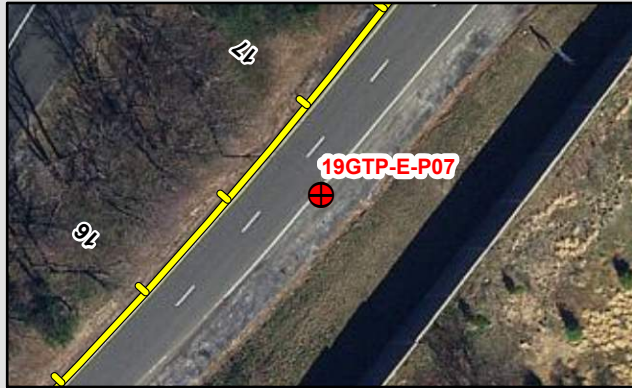
Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P07

Station: 16+78

Offset: 25 RT

Latitude: 38.953195

Longitude: -77.194071



General Surface Condition: Fair
Specific Surface Distress(es):
Alligator Cracking, Longitudinal Cracking, Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

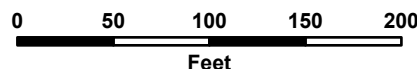


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Fair |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 11.0 | 8.0 | Fair |
| Aggregate | 11.0 | 14.0 | 3.0 | |
| Depth to Subgrade: 14.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P08 **Roadway:** I-495 NB Off Ramp to GTP

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Russ Kanith

Location Within Roadway: Inside Lane

Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P08

Station: 19+69

Offset: 29 RT

Latitude: 38.953848

Longitude: -77.193454



Photo Unavailable

General Surface Condition: Fair
Specific Surface Distress(es):
Transverse Cracking, Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

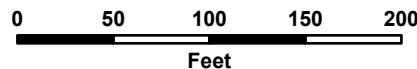


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 7.5 | 7.5 | Fair |
| | | | | |
| | | | | |
| | | | | |
| Aggregate | 7.5 | 11.5 | 4.0 | |
| Depth to Subgrade: 11.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P09

Roadway: GTP EB

Location Within Roadway: Inside Left Turn Lane

Date: 5/31/2019

Cored By: SaLUT, Inc.

Logged By: Andy Lewis

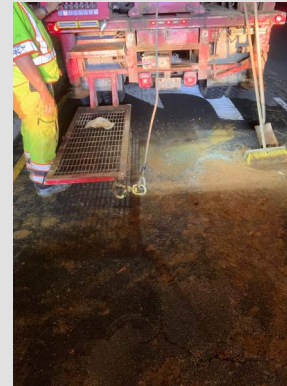
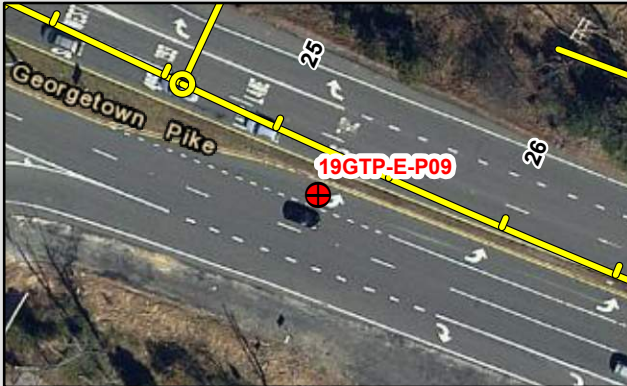
Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P09

Station: 25+25

Offset: 15 RT

Latitude: 38.954161

Longitude: -77.192656



General Surface Condition: Fair
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

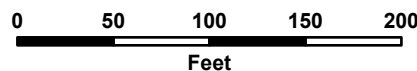


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.8 | 2.8 | Fair |
| Asphalt Concrete - Base Mix (BM) | 2.8 | 10.0 | 7.2 | Good |
| Aggregate | 10.0 | 19.0 | 9.0 | |
| Depth to Subgrade: 19.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P10

Roadway: GTP WB

Location Within Roadway: Inside Lane

Date: 6/6/2019

Cored By: SaLUT, Inc.

Logged By: Emily Munoz

Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P10

Station: 30+79

Offset: 15 LT

Latitude: 38.953715

Longitude: -77.190793

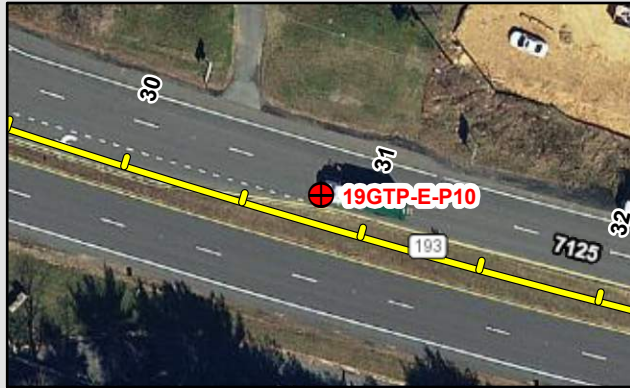


Photo Unavailable

General Surface Condition: Good
Specific Surface Distress(es):

Block Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

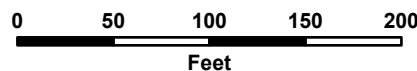


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 9.0 | 6.0 | Good |
| Aggregate | 9.0 | 24.0 | 15.0 | |
| Depth to Subgrade: 24.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P11

Roadway: GTP On Ramp to I-495 NB

Location Within Roadway: Inside Lane

Date: 4/29/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

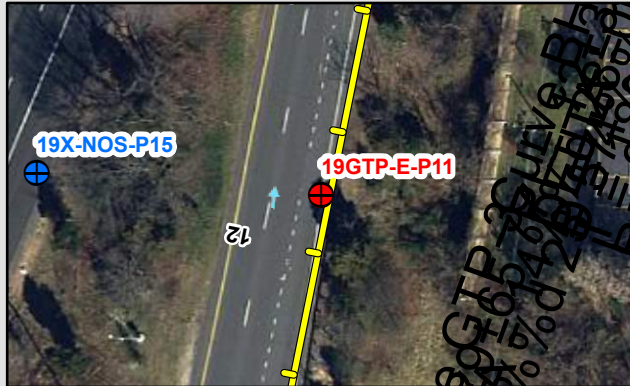
Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P11

Station: 12+26

Offset: 5 LT

Latitude: 38.954983

Longitude: -77.192967



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

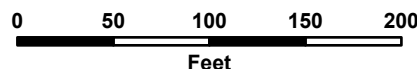


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Fair |
| | | | | |
| | | | | |
| | | | | |
| Aggregate | 3.0 | 12.0 | 9.0 | |
| Depth to Subgrade: 12.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P12 **Roadway:** Balls Hill Rd NB

Date: 6/7/2019

Cored By: SaLUT, Inc.

Logged By: Andy Lewis

Location Within Roadway: Right Turn Lane

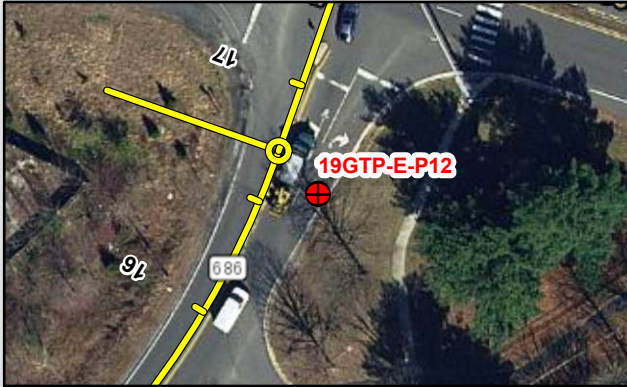
Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P12

Station: 16+64

Offset: 19 RT

Latitude: 38.953687

Longitude: -77.192087



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

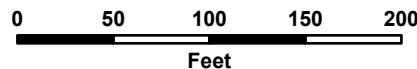


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 5.0 | 5.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 5.0 | 10.0 | 5.0 | Good |
| Aggregate | 10.0 | 18.0 | 8.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-E-P13

Roadway: Balls Hill Rd SB

Location Within Roadway: Right Turn Lane

Date: 6/7/2019

Cored By: SaLUT, Inc.

Logged By: Andy Lewis

Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-E-P13

Station: 18+97

Offset: 17 LT

Latitude: 38.954326

Longitude: -77.191932



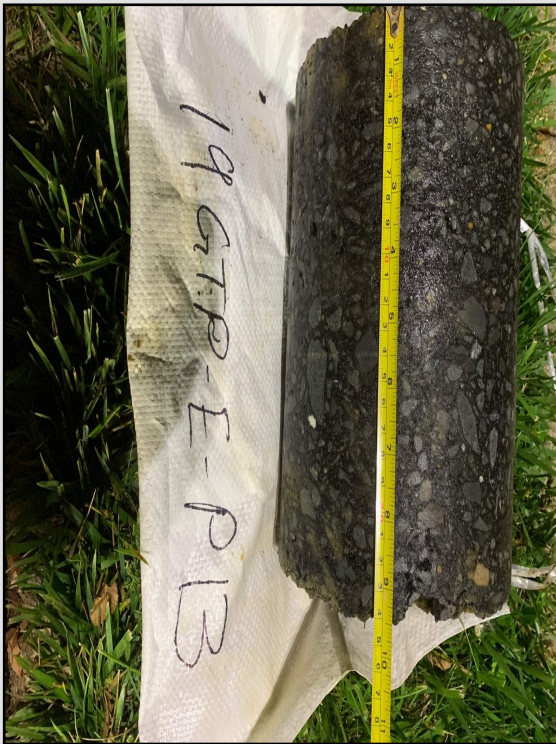
Photo Unavailable



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

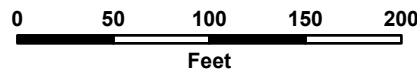


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.8 | 3.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.8 | 9.5 | 5.7 | Good |
| Aggregate | 9.5 | 27.5 | 18.0 | |
| Depth to Subgrade: 27.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-W-P04 **Roadway:** GTP EB

Date: 5/31/2019 **Cored By:** SaLUT, Inc.

Station: 17+04 **Offset:** 25 RT

Logged By: Andy Lewis

Latitude: 38.955086

Location Within Roadway: Inside Lane

Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-W-P04

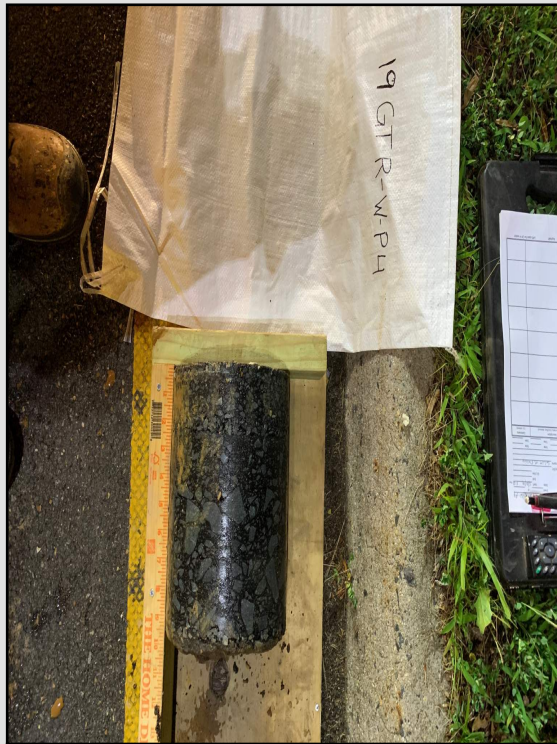
Longitude: -77.195286



General Surface Condition: Good
Specific Surface Distress(es):
None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

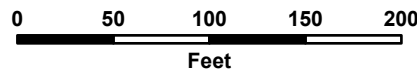


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.5 | 3.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.5 | 10.0 | 6.5 | Good |
| Aggregate | 10.0 | 19.0 | 9.0 | |
| Depth to Subgrade: 19.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GTP-W-P06 **Roadway:** GTP On Ramp to I-495 SB

Location Within Roadway: Merge Lane

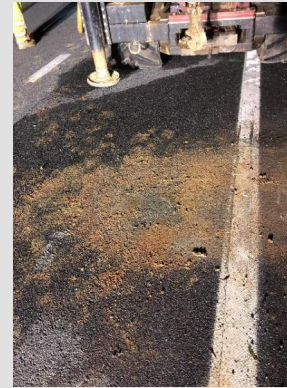
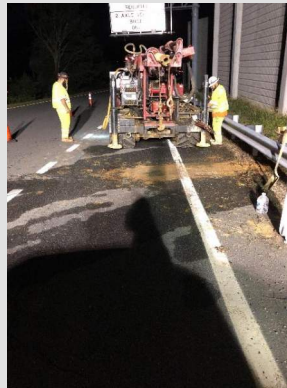
Date: 6/11/2019 **Cored By:** Connelly & Associates **Logged By:** Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19GTP-W-P06

Station: 18+98 **Offset:** 4 LT

Latitude: 38.954243

Longitude: -77.194953



General Surface Condition: Fair
Specific Surface Distress(es):
Transverse Cracking, Alligator Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

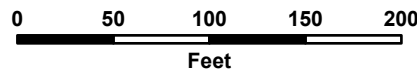


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|-------------------------------------|-------------|-----|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.8 | 1.8 | Fair |
| Asphalt Concrete - Base Mix (BM) | 1.8 | 4.0 | 2.2 | Fair |
| Aggregate | 4.0 | 6.0 | 2.0 | |
| Depth to Subgrade: 6.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P03

Roadway: I-495 SB On Ramp to GWP

Location Within Roadway: Travel Lane

Date: 6/20/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

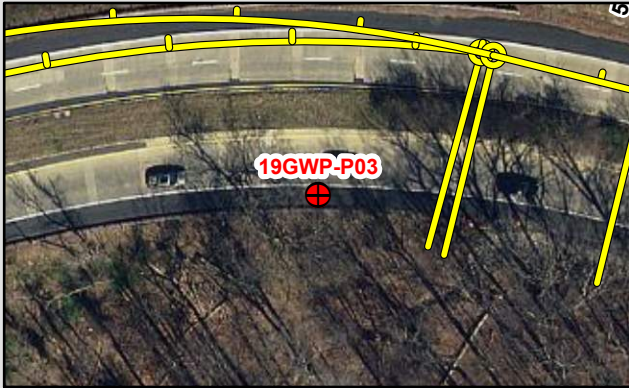
Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P03

Station: 29+11

Offset: 59 RT

Latitude: 38.964177

Longitude: -77.185639



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

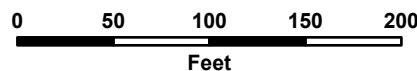


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|-------------------------------------|-------------|-----|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 5.0 | 3.5 | Good |
| Aggregate | 5.0 | 8.0 | 3.0 | |
| Depth to Subgrade: 8.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P04

Roadway: GWP On Ramp to I-495 SB

Location Within Roadway: Inside Travel Lane

Date: 6/5/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P04

Station: 29+77

Offset: 39 RT

Latitude: 38.964149

Longitude: -77.184706



General Surface Condition: Fair
Specific Surface Distress(es): None

Core Diameter (in.): 8.0

Additional Notes:

Surface patches visible in the vicinity of boring.

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

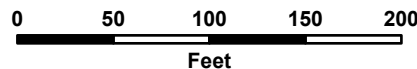


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|-------------------------------------|-------------|-----|-----------------|-----------|
| | FROM | TO | | |
| | | | | |
| | | | | |
| | | | | |
| Concrete | 0.0 | 8.5 | 8.5 | Fair |
| | | | | |
| | | | | |
| Depth to Subgrade: 8.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P05

Roadway: GWP WB

Location Within Roadway: Outside Lane

Date: 6/3/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P05

Station: 24+07

Offset: 98 LT

Latitude: 38.963435

Longitude: -77.181776



General Surface Condition: Fair
Specific Surface Distress(es):
 Potholes, Transverse Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

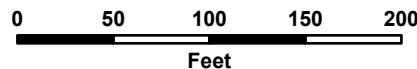


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|-------------------------------------|-------------|-----|-----------------|-----------|
| | FROM | TO | | |
| | | | | |
| | | | | |
| | | | | |
| Concrete | 0.0 | 9.0 | 9.0 | Fair |
| | | | | |
| | | | | |
| Depth to Subgrade: 9.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P06

Roadway: I-495 NB On Ramp to GWP

Location Within Roadway: Travel Lane

Date: 6/27/2019

Cored By: Connelly & Associates **Logged By:** Amanda Thomason

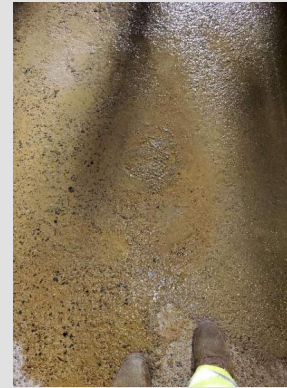
Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P06

Station: 20+59

Offset: 19 LT

Latitude: 38.963087

Longitude: -77.182979



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

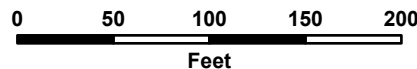


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|-------------------------------------|-------------|-----|-----------------|-----------|
| | FROM | TO | | |
| | | | | |
| | | | | |
| | | | | |
| Concrete | 0.0 | 9.5 | 9.5 | Fair |
| | | | | |
| | | | | |
| Depth to Subgrade: 9.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P07

Roadway: GWP On Ramp to I-495 SB

Location Within Roadway: Inside Travel Lane

Date: 6/5/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

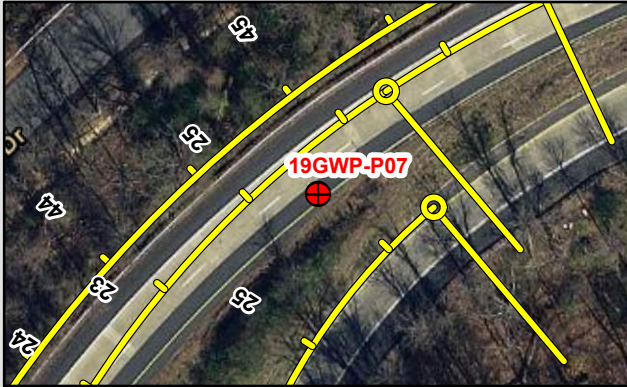
Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P07

Station: 25+24

Offset: 14 RT

Latitude: 38.963974

Longitude: -77.186866



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Core taken in asphalt patched area. Patch appears to extend approximately 200 ft east and west of boring location.

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

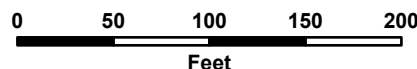


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Fair |
| Asphalt Concrete - Intermediate Mix (IM) | 2.5 | 9.0 | 6.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 9.0 | 16.5 | 7.5 | Good |
| Concrete | 16.5 | 23.5 | 7.0 | Poor |
| | | | | |
| Aggregate | 23.5 | 31.5 | 8.0 | |
| Depth to Subgrade: 31.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P08

Roadway: GWP On Ramp to I-495 SB

Location Within Roadway: Outside Shoulder

Date: 6/7/2019

Cored By: Connelly & Associates **Logged By:** Kohlтан Heiter

Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P08

Station: 36+49

Offset: 19 RT

Latitude: 38.962

Longitude: -77.188144



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

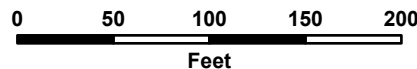


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Aggregate | 6.0 | 12.0 | 6.0 | |
| Depth to Subgrade: 12.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19GWP-P09

Roadway: GWP EB On Ramp to I-495 NB

Location Within Roadway: Outside Shoulder

Date: 6/23/2019

Cored By: Connelly & Associates **Logged By:** Amanda Thomason

Soil Boring Complete?: Yes refer to Soil Boring Log 19GWP-P09

Station: 43+21

Offset: 64 RT

Latitude: 38.963688

Longitude: -77.180322



General Surface Condition: Good
Specific Surface Distress(es):

Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

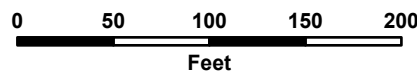


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Poor |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 5.0 | 3.0 | |
| Asphalt Concrete - Base Mix (BM) | 5.0 | 8.0 | 3.0 | Poor |
| | | | | |
| | | | | |
| Aggregate | 8.0 | 18.0 | 10.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19LOD-W-P14

Roadway: Live Oak Dr WB

Location Within Roadway: Travel Lane

Date: 7/12/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

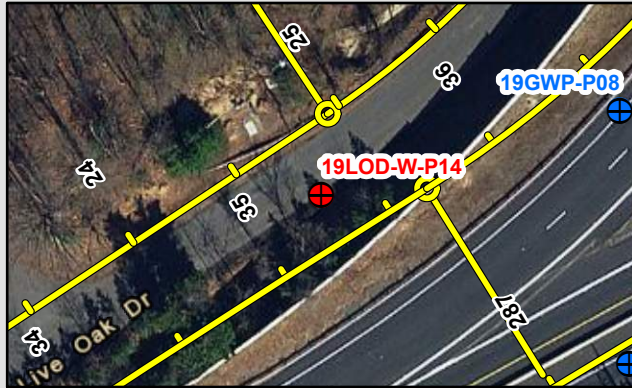
Soil Boring Complete?: Yes refer to Soil Boring Log 19LOD-W-P14

Station: 24+75

Offset: 23 LT

Latitude: 38.961906

Longitude: -77.18857



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

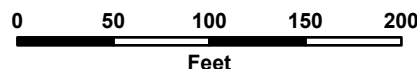


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 3.5 | 2.0 | Good |
| Aggregate | 3.5 | 13.5 | 10.0 | |
| Depth to Subgrade: 13.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19LOD-W-P15

Roadway: Live Oak Dr WB

Location Within Roadway: Travel Lane

Date: 7/12/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

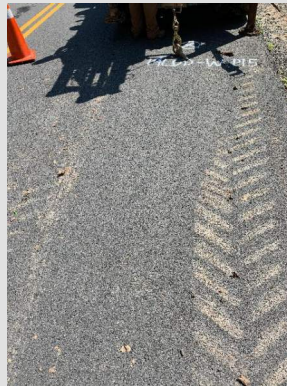
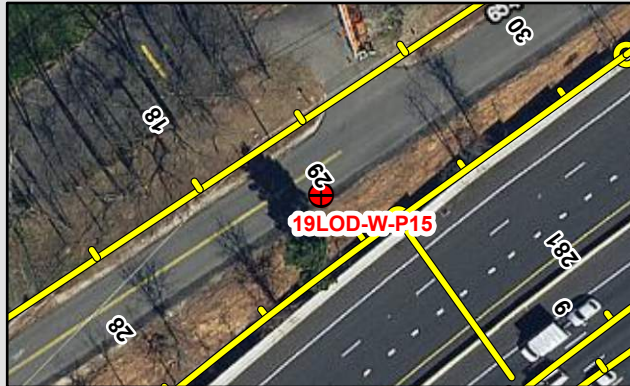
Soil Boring Complete?: Yes refer to Soil Boring Log 19LOD-W-P15

Station: 18+41

Offset: 26 RT

Latitude: 38.960937

Longitude: -77.190423



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

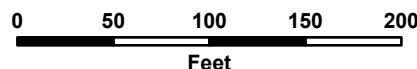


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Aggregate | 6.0 | 18.0 | 12.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19ODD-E-P02 **Roadway:** Old Dominion Drive WB

Date: 5/16/2019

Cored By: SaLUT, Inc.

Logged By: Nathan Peterson

Location Within Roadway: Travel Lane

Soil Boring Complete?: Yes refer to Soil Boring Log 19ODD-E-P02

Station: 28+64

Offset: 29 RT

Latitude: 38.94492

Longitude: -77.200459

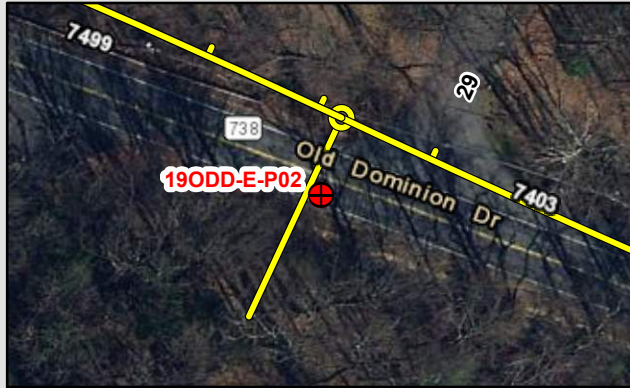


Photo Unavailable



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

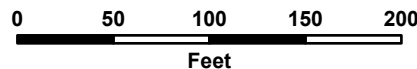


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 5.3 | 5.3 | Good |
| Asphalt Concrete - Base Mix (BM) | 5.3 | 11.0 | 5.7 | Good |
| Aggregate | 11.0 | 18.0 | 7.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19ODD-W-P01 **Roadway:** Old Dominion Drive WB

Date: 5/15/2019

Cored By: SaLUT, Inc.

Logged By: Nathan Peterson

Location Within Roadway: Travel Lane

Soil Boring Complete?: Yes refer to Soil Boring Log 19ODD-W-P01

Station: 16+35

Offset: 31 RT

Latitude: 38.946028

Longitude: -77.204492

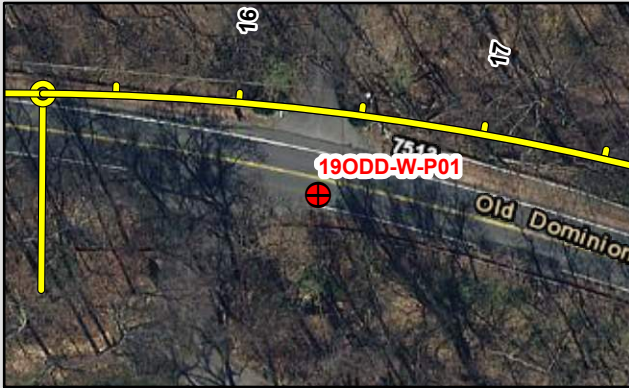


Photo Unavailable



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

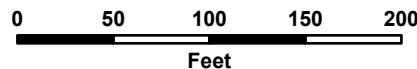


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.5 | 3.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.5 | 12.0 | 8.5 | Good |
| Aggregate | 12.0 | 26.5 | 14.5 | |
| Depth to Subgrade: 26.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NIS-PC01 **Roadway:** I-495 NB HOV

Location Within Roadway: Inside Shoulder

Date: 5/9/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

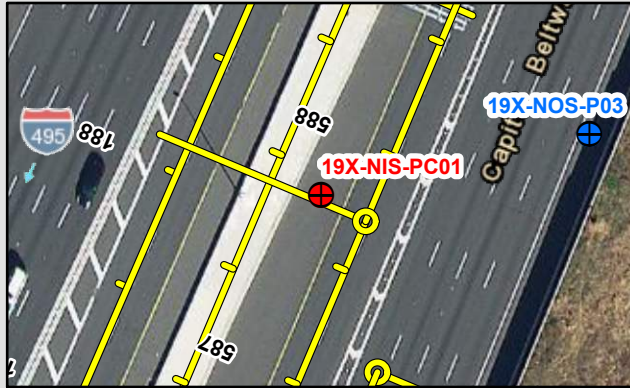
Soil Boring Complete?: No

Station: 587+77

Offset: 22 LT

Latitude: 38.939105

Longitude: -77.206315



General Surface Condition: Fair
Specific Surface Distress(es):
 Alligator Cracking, Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

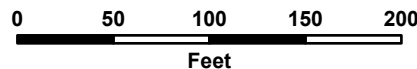


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 10.0 | 7.5 | Good |
| Aggregate | 10.0 | 29.0 | 19.0 | |
| Depth to Subgrade: 29.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NIS-PC02

Roadway: I-495 NB

Location Within Roadway: Inside Shoulder

Date: 5/8/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

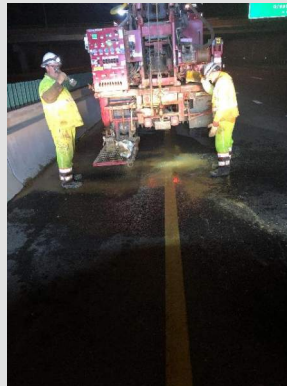
Soil Boring Complete?: No

Station: 611+67

Offset: 26 LT

Latitude: 38.945101

Longitude: -77.202895



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

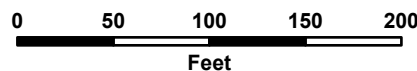


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 5.5 | 5.5 | Good |
| | | | | |
| Concrete | 5.5 | 14.5 | 9.0 | Good |
| Cement Treated Aggregate | 14.5 | 21.0 | 6.5 | Good |
| Aggregate | 21.0 | 25.0 | 4.0 | |
| Depth to Subgrade: 25.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NIS-PC04

Roadway: I-495 NB

Location Within Roadway: Inside Shoulder

Date: 5/9/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

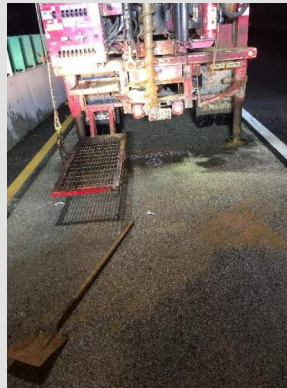
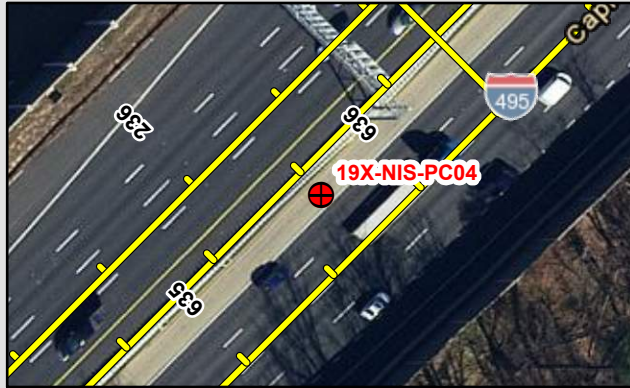
Soil Boring Complete?: No

Station: 635+71

Offset: 29 LT

Latitude: 38.95039

Longitude: -77.197894



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

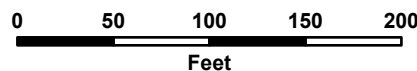


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Good |
| | | | | |
| | | | | |
| Concrete | 4.5 | 15.0 | 10.5 | Good |
| Cement Treated Aggregate | 15.0 | 21.5 | 6.5 | Good |
| Aggregate | 21.5 | 24.0 | 2.5 | |
| Depth to Subgrade: 24.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NIS-PC06

Roadway: I-495 NB

Location Within Roadway: Inside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

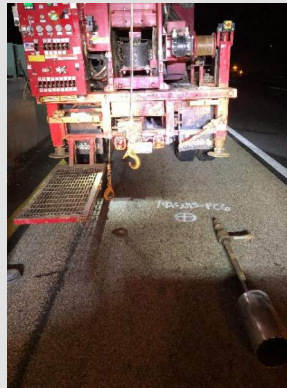
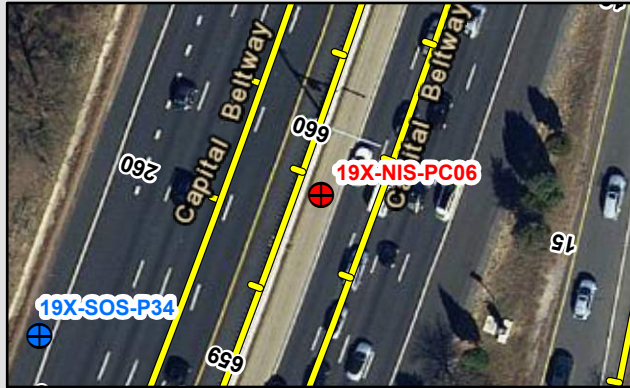
Soil Boring Complete?: No

Station: 659+80

Offset: 24 LT

Latitude: 38.955799

Longitude: -77.193222



General Surface Condition: Good
Specific Surface Distress(es):

None

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Gravel and Grout

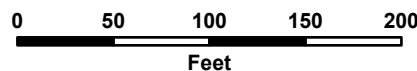


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Good |
| | | | | |
| Concrete | 4.5 | 12.0 | 7.5 | Good |
| | | | | |
| Aggregate | 12.0 | 22.0 | 10.0 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NIS-PC07

Roadway: I-495 NB

Location Within Roadway: Inside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

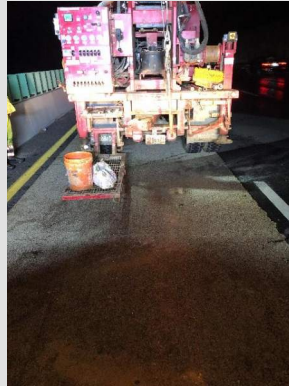
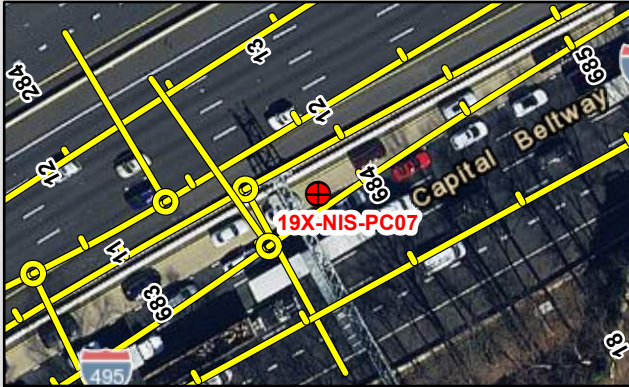
Soil Boring Complete?: No

Station: 683+80

Offset: 46 LT

Latitude: 38.961217

Longitude: -77.188778



General Surface Condition: Fair
Specific Surface Distress(es):
 Depressions, Longitudinal Cracking, Rutting

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

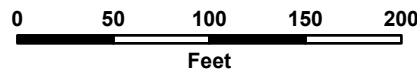


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 15.5 | 14 | Good |
| Concrete | 15.5 | 24.5 | 9.0 | Good |
| Cement Treated Aggregate | 24.5 | 29.5 | 5.0 | Good |
| Depth to Subgrade: 29.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC03 **Roadway:** I-495 NB
Date: 5/10/2019 **Cored By:** SaLUT, Inc.
Station: 621+69 **Offset:** 27 RT

Logged By: Jacob Moorman
Latitude: 38.947433

Location Within Roadway: Outside Lane
Soil Boring Complete?: No
Longitude: -77.201034



General Surface Condition: Good
Specific Surface Distress(es):
 None
Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

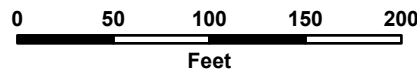


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.0 | 16.0 | 12.0 | Good |
| | | | | |
| | | | | |
| | | | | |
| Depth to Subgrade: 16.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC05 **Roadway:** I-495 NB
Date: 5/10/2019 **Cored By:** SaLUT, Inc.
Station: 650+96 **Offset:** 27 RT

Logged By: Jacob Moorman
Latitude: 38.953548

Location Within Roadway: Outside Lane
Soil Boring Complete?: No
Longitude: -77.194385



General Surface Condition: Good
Specific Surface Distress(es):
 None
Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

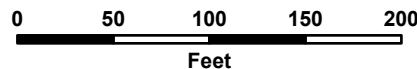


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 9.3 | 6.3 | Good |
| Concrete | 9.3 | 18.6 | 9.3 | Good |
| Depth to Subgrade: 18.6 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet

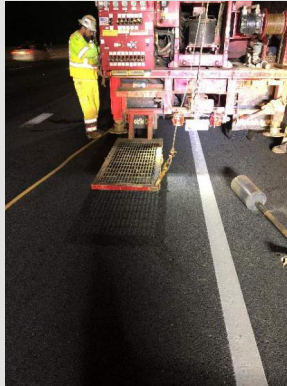


495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC08 **Roadway:** I-495 NB
Date: 4/30/2019 **Cored By:** SaLUT, Inc.
Station: 687+20 **Offset:** 0 RT

Logged By: Lance Martin
Latitude: 38.961515

Location Within Roadway: Outside Lane
Soil Boring Complete?: No
Longitude: -77.187625



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

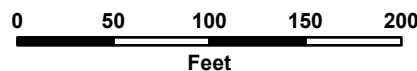


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 4.0 | 7.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 7.0 | 17.5 | 10.5 | Good |
| | | | | |
| | | | | |
| | | | | |
| Depth to Subgrade: 17.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet

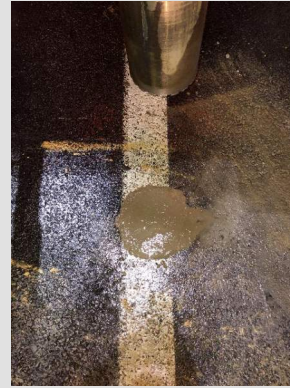
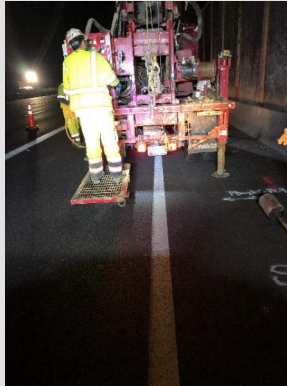


495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC09 **Roadway:** I-495 NB
Date: 5/1/2019 **Cored By:** SaLUT, Inc.
Station: 692+55 **Offset:** 10 RT

Logged By: Lance Martin
Latitude: 38.962218

Location Within Roadway: Outside Lane
Soil Boring Complete?: No
Longitude: -77.185973



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

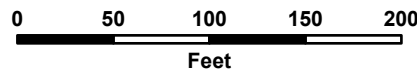


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 7.0 | 5.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 7.0 | 16.0 | 9.0 | Good |
| | | | | |
| | | | | |
| | | | | |
| Depth to Subgrade: 16.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet

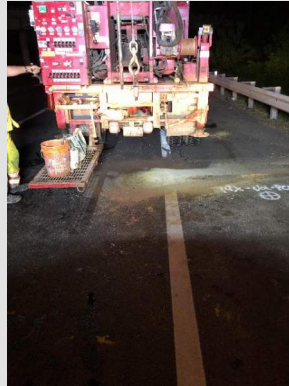


495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC10 **Roadway:** I-495 NB
Date: 4/30/2019 **Cored By:** SaLUT, Inc.
Station: 700+52 **Offset:** 39 RT

Logged By: Jacob Moorman
Latitude: 38.963302

Location Within Roadway: Outside Lane
Soil Boring Complete?: No
Longitude: -77.183533



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

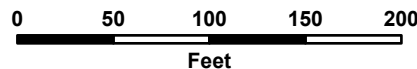


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 5.3 | 5.3 | Good |
| Asphalt Concrete - Base Mix (BM) | 5.3 | 14.0 | 8.7 | Good |
| Concrete | 14.0 | 22.0 | 8.0 | Good |
| Cement Treated Aggregate | 22.0 | 28.5 | 6.5 | Good |
| Depth to Subgrade: 28.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOL-PC11 **Roadway:** I-495 NB

Location Within Roadway: Outside Lane

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: No

Station: 46+18

Offset: 248 RT

Latitude: 38.964599

Longitude: -77.18136



General Surface Condition: Good
Specific Surface Distress(es):
None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

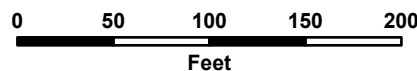


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 4.0 | 6.5 | 2.5 | Good |
| | | | | |
| Concrete | 6.5 | 15.3 | 8.8 | Good |
| | | | | |
| | | | | |
| Depth to Subgrade: 15.3 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P01

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/16/2019

Cored By: SaLUT, Inc.

Logged By: Joe Wallen

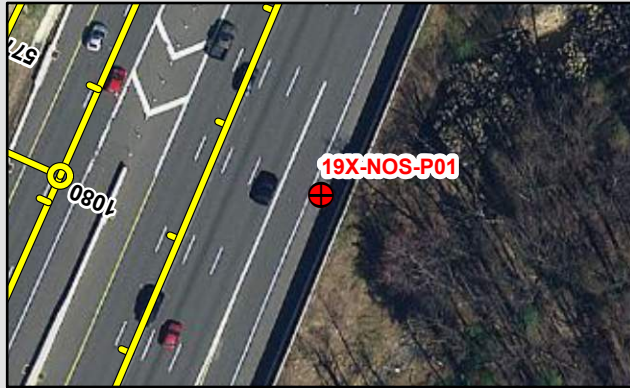
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P01

Station: 1080+41

Offset: 45 RT

Latitude: 38.936267

Longitude: -77.207453



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

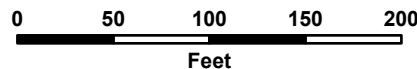


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|---------------------------------------|-------------|-------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.8 | 1.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.8 | 7.8 | 6.0 | Good |
| Concrete | 7.8 | 17.8 | 10.0 | Good |
| Cement Treated Aggregate | 17.8 | 22.8 | 5.0 | Good |
| Aggregate | 22.8 | 25.75 | 3.0 | |
| Depth to Subgrade: 25.75 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P02

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/17/2019

Cored By: SaLUT, Inc.

Logged By: Harsh Patel

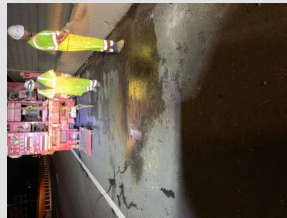
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P02

Station: 1086+11

Offset: 48 RT

Latitude: 38.937712

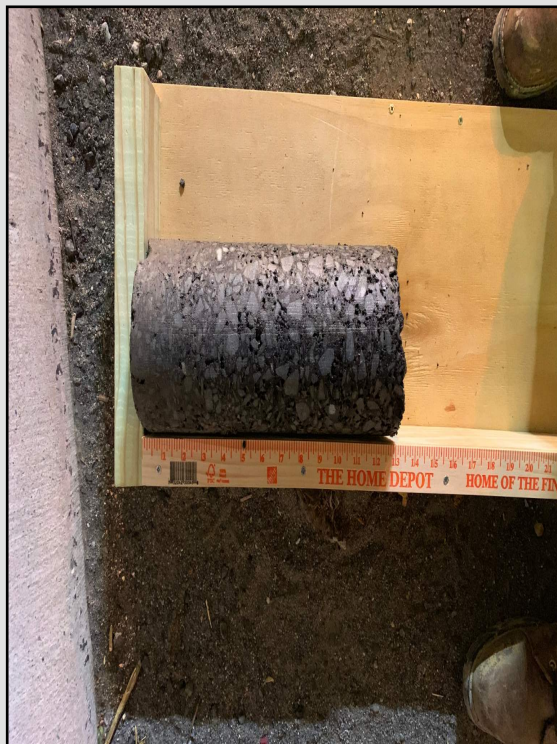
Longitude: -77.206681



General Surface Condition: Good
Specific Surface Distress(es): Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

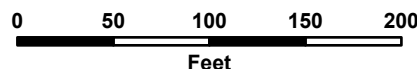


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.5 | 7.0 | 4.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 7.0 | 13.0 | 6.0 | Good |
| | | | | |
| | | | | |
| Aggregate | 13.0 | 20.0 | 7.0 | |
| Depth to Subgrade: 20.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P03

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/18/2019

Cored By: SaLUT, Inc.

Logged By: Joe Wallen

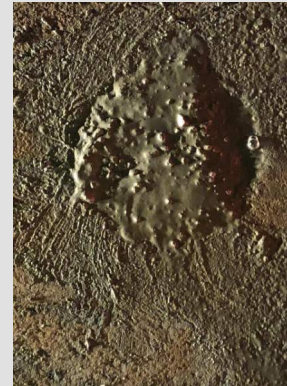
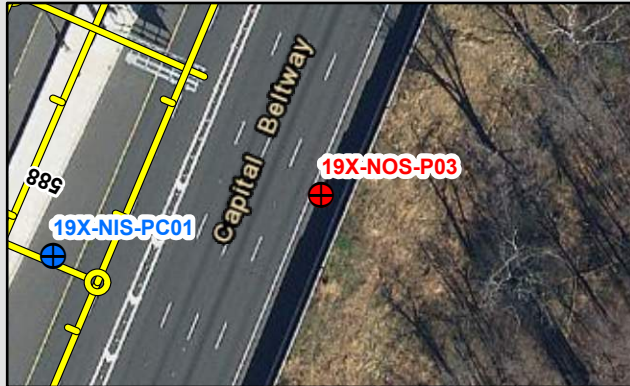
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P03

Station: 588+42

Offset: 68 RT

Latitude: 38.939173

Longitude: -77.205932



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0

Additional Notes:

Lower break in asphalt mechanical to remove core

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

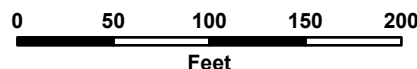


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 4.5 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.5 | 19.8 | 15.3 | Good |
| | | | | |
| | | | | |
| Aggregate | 19.8 | 24.3 | 4.5 | |
| Depth to Subgrade: 24.25 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P04

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Russ Kanith

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P04

Station: 594+48

Offset: 63 RT

Latitude: 38.940707

Longitude: -77.205111



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

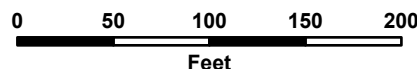


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 3.0 | 14.5 | 11.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 14.5 | 19.5 | 5.0 | Good |
| | | | | |
| | | | | |
| Aggregate | 19.5 | 25.5 | 6.0 | |
| Depth to Subgrade: 25.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P05

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/25/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

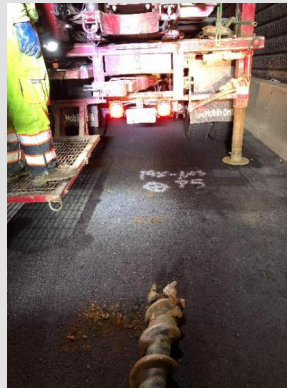
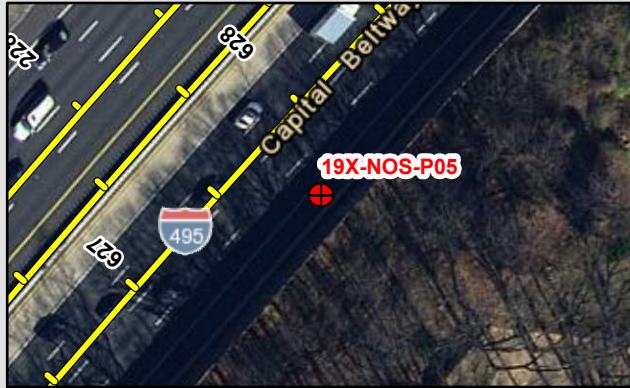
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P05

Station: 627+80

Offset: 29 RT

Latitude: 38.948735

Longitude: -77.199699



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

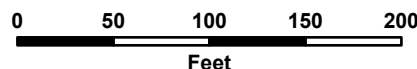


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 17.0 | 15.5 | Good |
| Aggregate | 17.0 | 24.0 | 7.0 | |
| Depth to Subgrade: 24.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P06

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/23/19

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P06

Station: 606+42

Offset: 39 RT

Latitude: 38.943721

Longitude: -77.203471



Photo Unavailable

Photo Unavailable

General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel and Grout

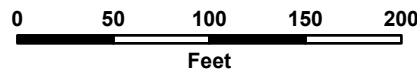


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 19.5 | 18.0 | Good |
| Aggregate | 19.5 | 48.0 | 28.5 | |
| Depth to Subgrade: 48.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P07

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P07

Station: 612+62

Offset: 39 RT

Latitude: 38.945261

Longitude: -77.202547



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

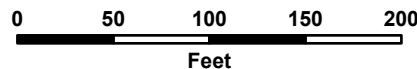


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 9.5 | 8.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 9.5 | 14.0 | 4.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 14.0 | 48.0 | 34.0 | |
| Depth to Subgrade: 48.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P08

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P08

Station: 621+72

Offset: 33 RT

Latitude: 38.947431

Longitude: -77.20101



General Surface Condition: Fair
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

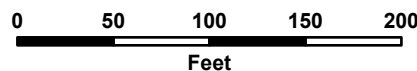


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 17.0 | 15.5 | Good |
| Aggregate | 17.0 | 24.0 | 7.0 | |
| Depth to Subgrade: 24.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P09

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P09

Station: 600+43

Offset: 54 RT

Latitude: 38.942209

Longitude: -77.204294



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

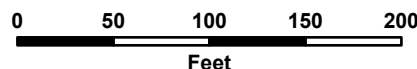


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.5 | 6.0 | 3.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 6.0 | 18.0 | 12 | Good |
| | | | | |
| | | | | |
| Aggregate | 18.0 | 48.0 | 30.0 | |
| Depth to Subgrade: 48.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P10

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/25/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

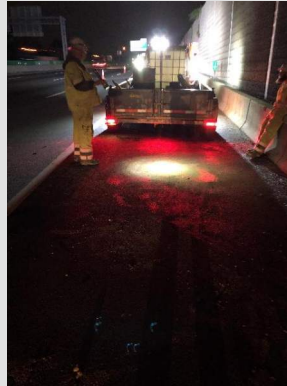
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P10

Station: 633+86

Offset: 29 RT

Latitude: 38.949917

Longitude: -77.198208



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

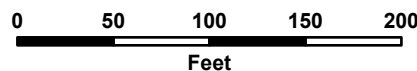


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.5 | 5.0 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 5.0 | 17.5 | 12.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 17.5 | 36.0 | 18.5 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P11

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/25/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P11

Station: 639+94

Offset: 46 RT

Latitude: 38.951085

Longitude: -77.196673



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

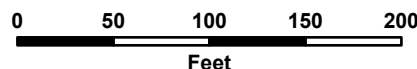


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.0 | 1.0 | Good |
| | | | | |
| Asphalt Concrete - Base Mix (BM) | 1.0 | 12.5 | 11.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 12.5 | 36.0 | 23.5 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P12

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/25/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P12

Station: 645+72

Offset: 37 RT

Latitude: 38.952327

Longitude: -77.195385



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

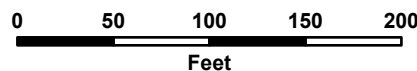


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 14.0 | 12.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 17.0 | 3.0 | Good |
| | | | | |
| | | | | |
| Aggregate | 17.0 | 26.4 | 9.4 | |
| Depth to Subgrade: 26.4 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P13

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/28/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P13

Station: 651+14

Offset: 56 RT

Latitude: 38.953551

Longitude: -77.194266



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

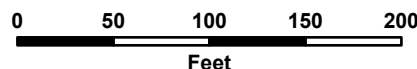


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 21.5 | 20.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 21.5 | 33.0 | 11.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 33.0 | 42.0 | 9.0 | |
| Depth to Subgrade: 42.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P14

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/29/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P14

Station: 650+98

Offset: 39 RT

Latitude: 38.953536

Longitude: -77.194348



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

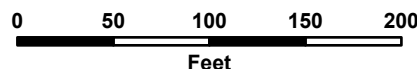


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 13.0 | 11.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 13.0 | 22.0 | 9.0 | Good |
| | | | | |
| | | | | |
| Aggregate | 22.0 | 48.0 | 26.0 | |
| Depth to Subgrade: 48.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P15

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/25/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

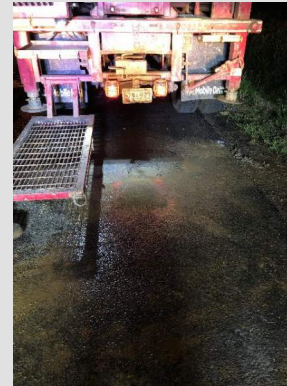
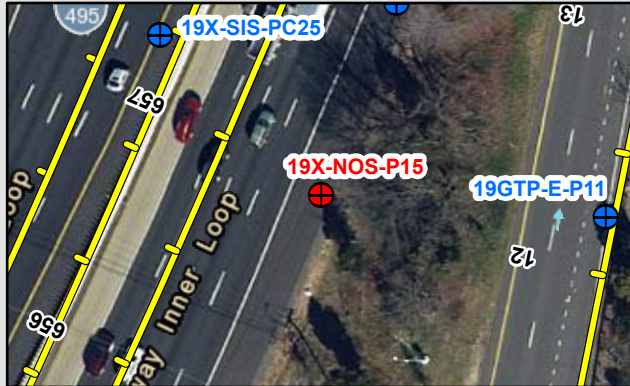
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P15

Station: 656+97

Offset: 43 RT

Latitude: 38.955007

Longitude: -77.193373



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

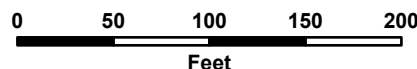


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 16.5 | 15.0 | Good |
| Aggregate | 16.5 | 30.0 | 13.5 | |
| Depth to Subgrade: 30.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P16

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/24/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

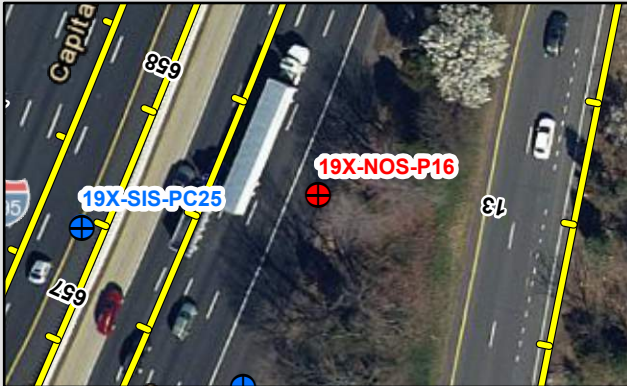
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P16

Station: 657+79

Offset: 41 RT

Latitude: 38.95522

Longitude: -77.193266



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0

Additional Notes:

Log for 19X-NOS-P16

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

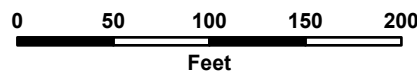


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 27.0 | 25.5 | Good |
| Aggregate | 27.0 | 36.0 | 9.0 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P17

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/29/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

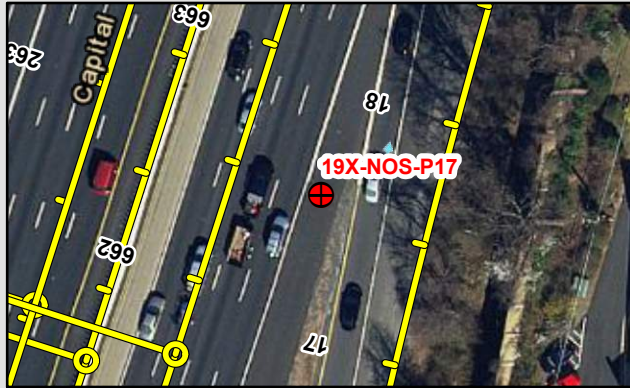
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P17

Station: 662+51

Offset: 35 RT

Latitude: 38.956451

Longitude: -77.19272



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

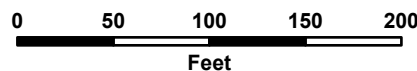


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 6.0 | 6.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 6.0 | 16.0 | 10.0 | Good |
| Concrete | 16.0 | 27.5 | 11.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 27.5 | 43.2 | 15.7 | |
| Depth to Subgrade: 43.2 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P18

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/30/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

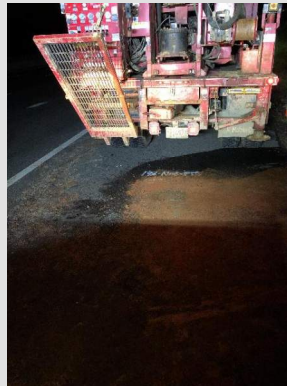
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P18

Station: 668+54

Offset: 48 RT

Latitude: 38.958014

Longitude: -77.192025



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

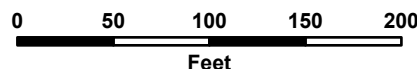


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 11.5 | 11.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 11.5 | 17.5 | 6.0 | Good |
| Aggregate | 17.5 | 36.0 | 18.5 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P19

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/30/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

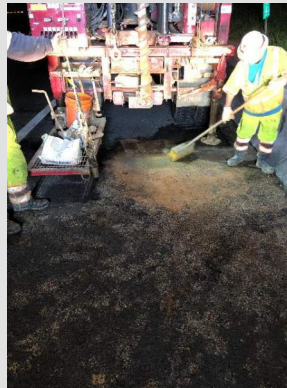
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P19

Station: 674+83

Offset: 32 RT

Latitude: 38.959511

Longitude: -77.191039



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

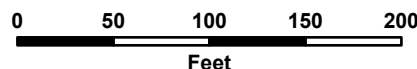


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.8 | 1.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.8 | 16.0 | 14.2 | Good |
| Aggregate | 16.0 | 36.0 | 20.0 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P20

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/30/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

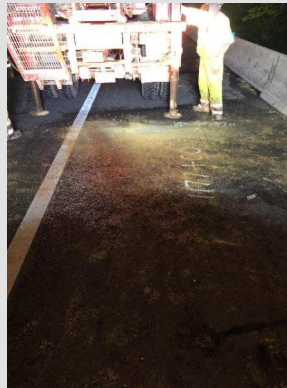
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P20

Station: 681+07

Offset: 22 RT

Latitude: 38.960676

Longitude: -77.189485



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

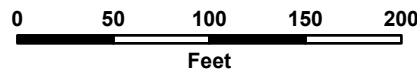


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 1.5 | 12.1 | 10.6 | Good |
| Asphalt Concrete - Base Mix (BM) | 12.1 | 17.8 | 5.7 | Good |
| | | | | |
| | | | | |
| Aggregate | 17.8 | 36.0 | 18.3 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P21

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 4/30/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

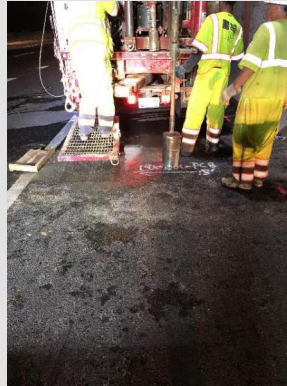
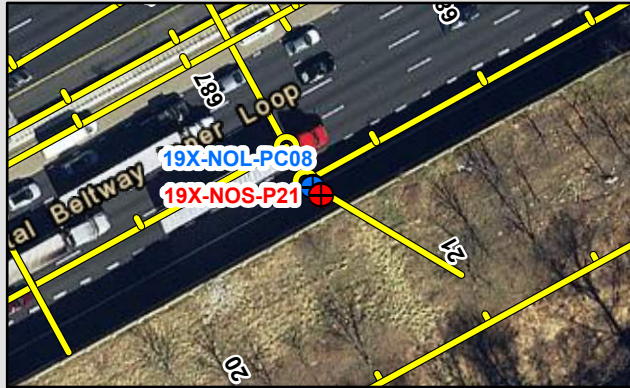
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P21

Station: 687+21

Offset: 5 RT

Latitude: 38.961506

Longitude: -77.187613



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

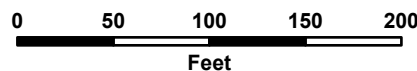


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 17.5 | 15.5 | Good |
| Aggregate | 17.5 | 27.5 | 10.0 | |
| Depth to Subgrade: 27.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P22

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

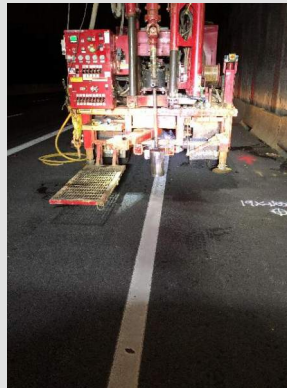
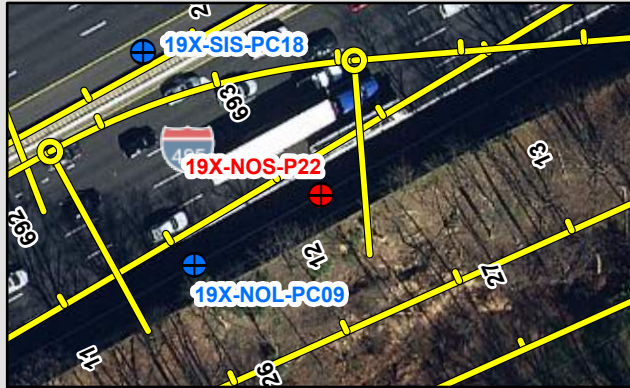
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P22

Station: 693+13

Offset: 12 LT

Latitude: 38.962296

Longitude: -77.185792



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

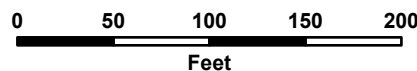


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2 | 2 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 5.5 | 3.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 5.5 | 17.0 | 11.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 17.0 | 27.0 | 10.0 | |
| Depth to Subgrade: 27.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P23

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Lance Martin

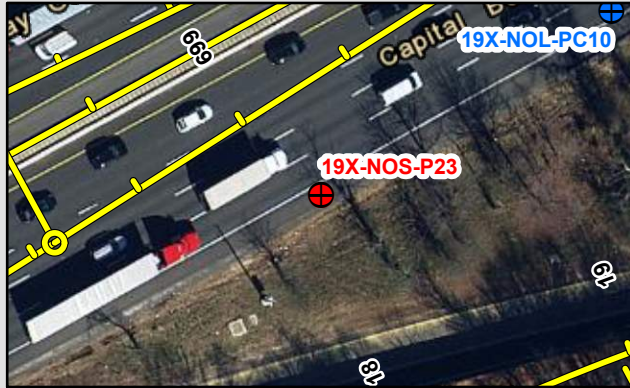
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P23

Station: 699+13

Offset: 39 RT

Latitude: 38.963098

Longitude: -77.183947



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

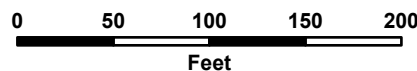


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.5 | 17.0 | 12.5 | Good |
| Aggregate | 17.0 | 27.0 | 10.0 | |
| Depth to Subgrade: 27.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet

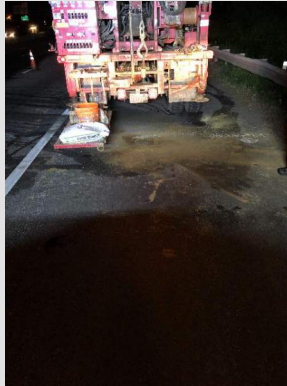


495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P24 **Roadway:** I-495 NB
Date: 4/30/2019 **Cored By:** SaLUT, Inc.
Station: 705+11 **Offset:** 53 RT

Logged By: Jacob Moorman
Latitude: 38.963991

Location Within Roadway: Outside Shoulder
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P24
Longitude: -77.182155



General Surface Condition: Good
Specific Surface Distress(es): None
Core Diameter (in.): 8.0
Additional Notes:
Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

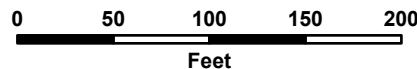


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 7.0 | 5.0 | Good |
| Concrete | 7.0 | 17.0 | 10.0 | Good |
| Cement Treated Aggregate | 17.0 | 22.5 | 5.5 | Good |
| Aggregate | 22.5 | 36.0 | 13.5 | |
| Depth to Subgrade: 36.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P25

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

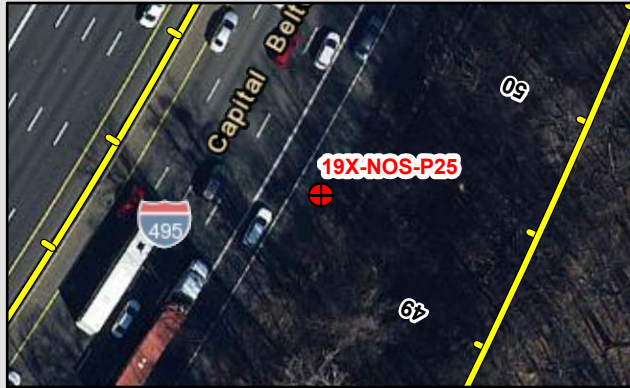
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P25

Station: 49+30

Offset: 89 LT

Latitude: 38.965499

Longitude: -77.180419



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

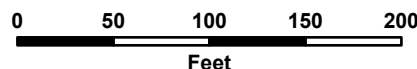


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 4.0 | 8.5 | 4.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 8.5 | 11 | 2.5 | Good |
| | | | | |
| | | | | |
| Aggregate | 11.0 | 23.5 | 12.5 | |
| Depth to Subgrade: 23.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-NOS-P26

Roadway: I-495 NB

Location Within Roadway: Outside Shoulder

Date: 5/1/2019

Cored By: SaLUT, Inc.

Logged By: Jacob Moorman

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-NOS-P26

Station: 55+00

Offset: 63 RT

Latitude: 38.966914

Longitude: -77.179722



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

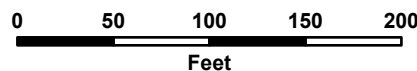


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 4.5 | 2.5 | Good |
| | | | | |
| | | | | |
| | | | | |
| Aggregate | 4.5 | 24.0 | 19.5 | |
| Depth to Subgrade: 24.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC13

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/22/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

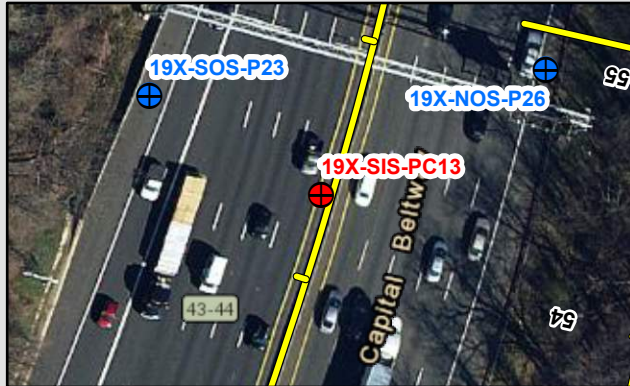
Soil Boring Complete?: No

Station: 54+30

Offset: 141 RT

Latitude: 38.966775

Longitude: -77.180042



General Surface Condition: Good
Specific Surface Distress(es):

None

Core Diameter (in.): 4.0

Additional Notes:

Backfill: Gravel and Grout

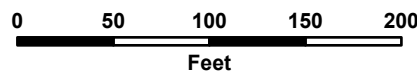


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 13.0 | 10.0 | Good |
| Aggregate | 13.0 | 27.8 | 14.8 | |
| Depth to Subgrade: 27.8 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC15

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/23/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

Soil Boring Complete?: No

Station: 305+99

Offset: 5 RT

Latitude: 38.964121

Longitude: -77.182338



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.):
Additional Notes:

Backfill: Gravel and Grout

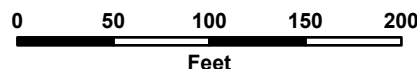


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 9.0 | 9.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 9.0 | 12.3 | 3.3 | Good |
| Aggregate | 12.3 | 28.3 | 16.0 | |
| Depth to Subgrade: 28.3 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC18

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/23/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

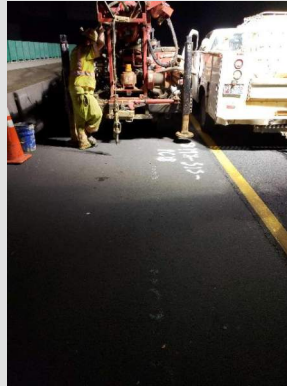
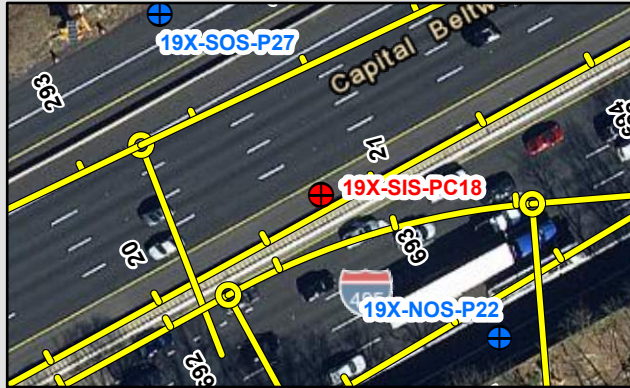
Soil Boring Complete?: No

Station: 293+84

Offset: 47 LT

Latitude: 38.962455

Longitude: -77.186046



General Surface Condition: Good
Specific Surface Distress(es):

Longitudinal Cracking

Core Diameter (in.): 4.0

Additional Notes:

Backfill: Gravel and Grout

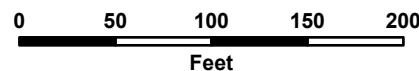


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.5 | 3.5 | Good |
| | | | | |
| | | | | |
| Concrete | 3.5 | 12.0 | 8.5 | Good |
| Cement Treated Aggregate | 12.0 | 16.0 | 4.0 | Poor |
| | | | | |
| Depth to Subgrade: 16.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC20

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/23/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

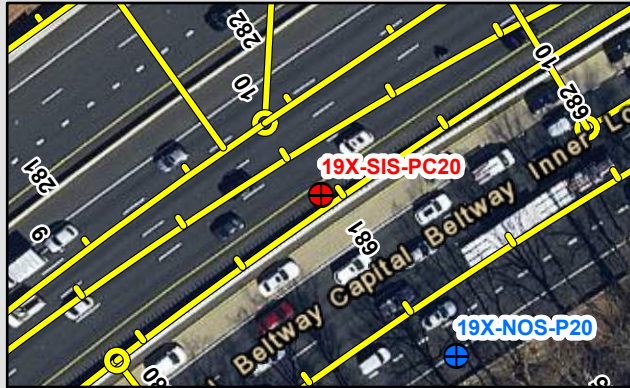
Soil Boring Complete?: No

Station: 281+91

Offset: 34 LT

Latitude: 38.960855

Longitude: -77.189678



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

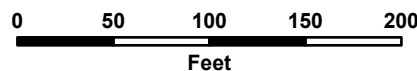


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 6.5 | 6.5 | Good |
| | | | | |
| Concrete | 6.5 | 17.0 | 10.5 | Good |
| Cement Treated Aggregate | 17.0 | 22.0 | 5.0 | Poor |
| | | | | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC23

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/28/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

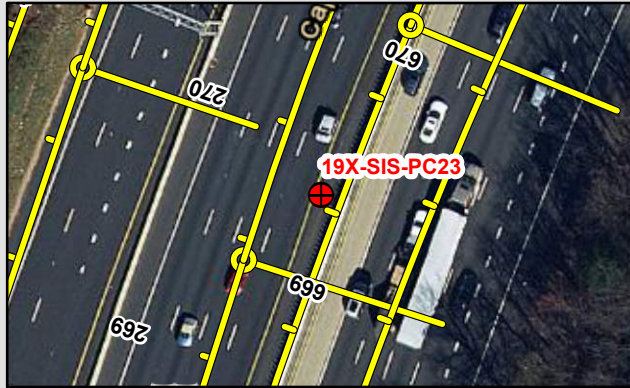
Soil Boring Complete?: No

Station: 269+80

Offset: 20 LT

Latitude: 38.958323

Longitude: -77.192227



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

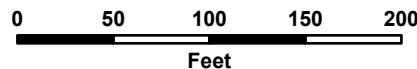


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Concrete | 6.0 | 14.5 | 8.5 | Good |
| Cement Treated Aggregate | 14.5 | 20.5 | 6.0 | Fair |
| Depth to Subgrade: 20.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC25

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/29/2019

Cored By: Connelly & Associates

Logged By: Jacob Moorman

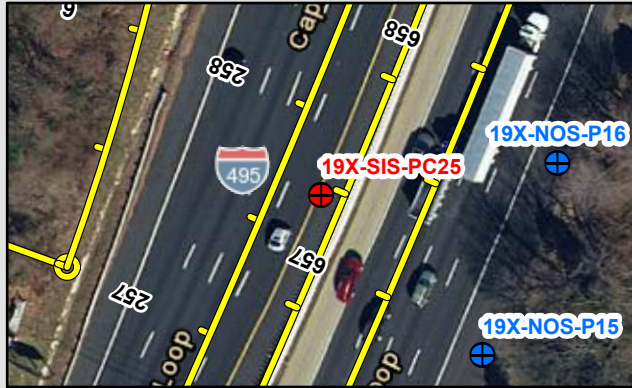
Soil Boring Complete?: No

Station: 257+72

Offset: 17 LT

Latitude: 38.955184

Longitude: -77.193603



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

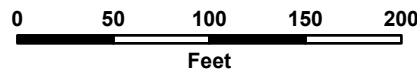


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 9.0 | 7.0 | Good |
| Concrete | 9.0 | 18.0 | 9.0 | Good |
| Cement Treated Aggregate | 18.0 | 22.0 | 4.0 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC28

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 5/29/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

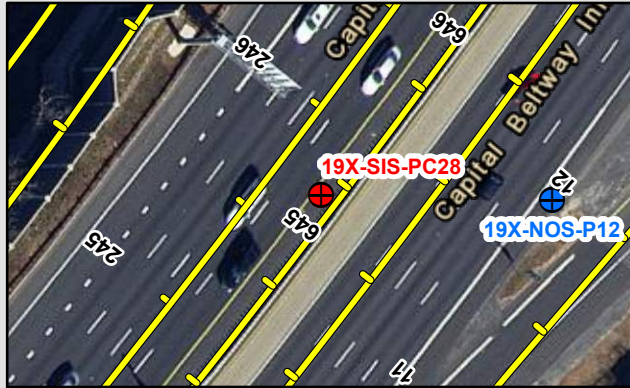
Soil Boring Complete?: No

Station: 245+74

Offset: 19 LT

Latitude: 38.952333

Longitude: -77.195714



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

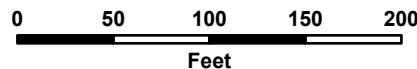


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 10.0 | 8.0 | Good |
| Concrete | 10.0 | 18.5 | 8.5 | Good |
| Cement Treated Aggregate | 18.5 | 25.0 | 6.5 | Good |
| Depth to Subgrade: 25.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC30

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 6/11/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

Soil Boring Complete?: No

Station: 233+89

Offset: 19 LT

Latitude: 38.949944

Longitude: -77.198549



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

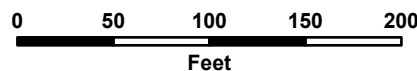


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 6.3 | 3.3 | Good |
| Concrete | 6.3 | 14.0 | 7.7 | Good |
| Aggregate | 14.0 | 17.0 | 3.0 | |
| Depth to Subgrade: 17.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC33

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 6/11/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

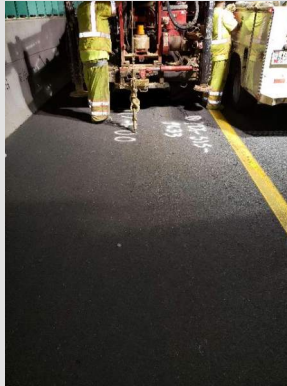
Soil Boring Complete?: No

Station: 221+78

Offset: 20 LT

Latitude: 38.947439

Longitude: -77.201317



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

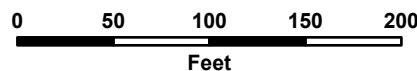


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 6.3 | 3.8 | Good |
| Concrete | 6.3 | 14.6 | 8.3 | Good |
| Cement Treated Aggregate | 14.6 | 19.6 | 5.0 | Good |
| Depth to Subgrade: 19.6 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC35

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 6/11/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

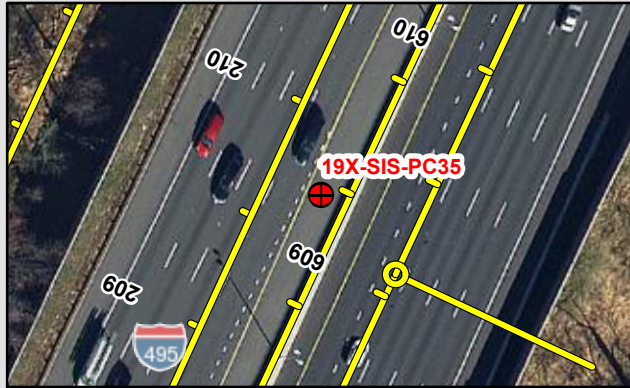
Soil Boring Complete?: No

Station: 209+72

Offset: 20 LT

Latitude: 38.944529

Longitude: -77.203305



General Surface Condition: Good
Specific Surface Distress(es):
 None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

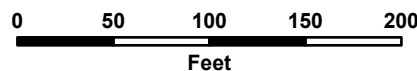


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.8 | 1.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.8 | 6.5 | 4.7 | Good |
| Concrete | 6.5 | 16.3 | 9.8 | Good |
| Cement Treated Aggregate | 16.3 | 21.0 | 4.7 | Fair |
| Depth to Subgrade: 21.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SIS-PC38

Roadway: I-495 SB

Location Within Roadway: Inside Shoulder

Date: 6/11/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

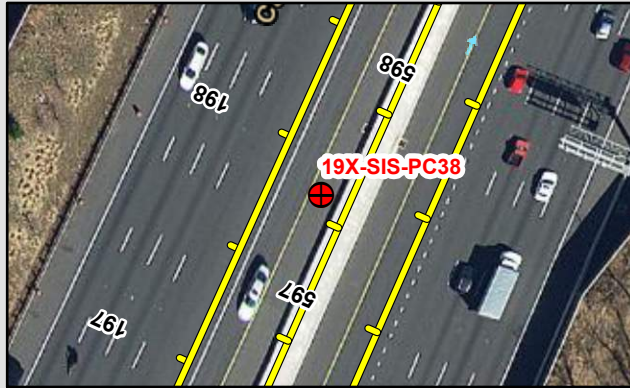
Soil Boring Complete?: No

Station: 197+86

Offset: 19 LT

Latitude: 38.94157

Longitude: -77.20504



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

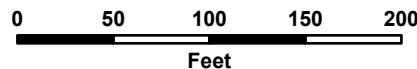


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.8 | 1.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.8 | 10.8 | 9.0 | Good |
| Concrete | 10.8 | 23.1 | 12.3 | Good |
| Depth to Subgrade: 23.1 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC12 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 4/17/2019 **Cored By:** Connelly & Associates **Logged By:** Russ Kanith

Soil Boring Complete?: No

Station: 56+17 **Offset:** 189 LT

Latitude: 38.967287

Longitude: -77.180085



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

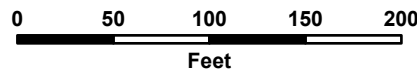


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.9 | 1.9 | Fair |
| Asphalt Concrete - Base Mix (BM) | 1.9 | 17.5 | 15.6 | Fair |
| Aggregate | 17.5 | 19.5 | 2.0 | |
| Depth to Subgrade: 19.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC14 **Roadway:** I-495 SB Auxiliary

Location Within Roadway: Outside Lane

Date: 4/18/2019

Cored By: Connelly & Associates **Logged By:** Russ Kanith

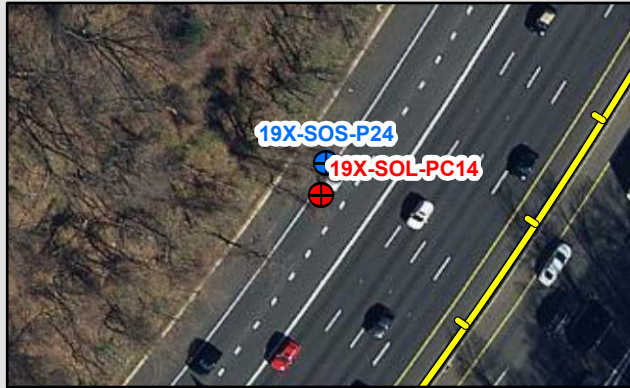
Soil Boring Complete?: No

Station: 47+90

Offset: 266 LT

Latitude: 38.965357

Longitude: -77.181204



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

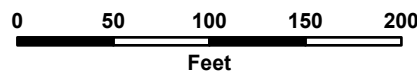


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 6.0 | 6.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 6.0 | 14.5 | 8.5 | Good |
| Aggregate | 14.5 | 22.5 | 8.0 | |
| Depth to Subgrade: 22.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC16 **Roadway:** I-495 SB Auxiliary

Location Within Roadway: Outside Lane

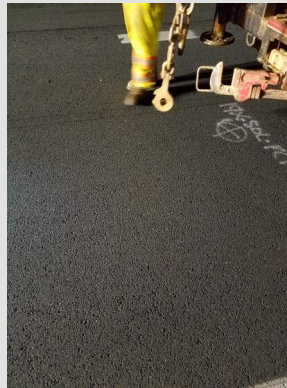
Date: 5/31/2019 **Cored By:** Connelly & Associates **Logged By:** Mark Tilashalski

Soil Boring Complete?: No

Station: 10+80 **Offset:** 19 LT

Latitude: 38.963955

Longitude: -77.183271



General Surface Condition: Good
Specific Surface Distress(es):

None

Core Diameter (in.): 4.0

Additional Notes:

Cement Treated Aggregate broke apart during coring, unable to photograph.

Backfill: Gravel and Grout

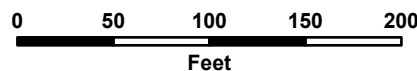


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 13.5 | 11.5 | Good |
| Cement Treated Aggregate | 13.5 | 31.5 | 18.0 | Good |
| Depth to Subgrade: 31.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC17 **Roadway:** I-495 SB On Ramp to GWP

Location Within Roadway: Outside Shoulder

Date: 6/21/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

Soil Boring Complete?: No

Station: 295+22

Offset: 64 LT

Latitude: 38.962891

Longitude: -77.185772



General Surface Condition: Good
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

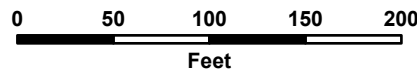


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Cement Treated Aggregate | 6.0 | 18.0 | 12.0 | Poor |
| | | | | |
| | | | | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC19 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

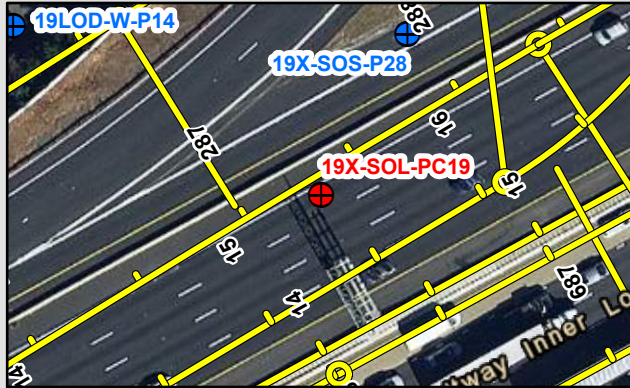
Date: 5/31/2019 **Cored By:** Connelly & Associates **Logged By:** Mark Tilashalski

Soil Boring Complete?: No

Station: 287+32 **Offset:** 5 LT

Latitude: 38.961719

Longitude: -77.188131



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

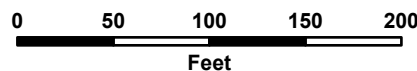


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.8 | 3.8 | Fair |
| Asphalt Concrete - Base Mix (BM) | 3.8 | 15.3 | 11.5 | Good |
| Cement Treated Aggregate | 15.3 | 21.3 | 6.0 | Fair |
| | | | | |
| | | | | |
| Depth to Subgrade: 21.3 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC21 **Roadway:** I-495 SB Auxiliary

Location Within Roadway: Outside Lane

Date: 5/6/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

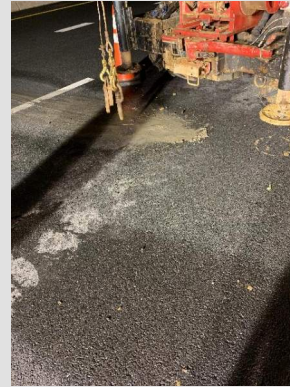
Soil Boring Complete?: No

Station: 279+36

Offset: 65 LT

Latitude: 38.960638

Longitude: -77.190603



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking, Transverse Cracking

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

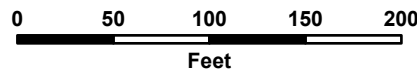


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 6.0 | 4.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 6.0 | 8.5 | 2.5 | Fair |
| Cement Treated Aggregate | 8.5 | 14.5 | 6.0 | Fair |
| Aggregate | 14.5 | 17.5 | 3.0 | |
| Depth to Subgrade: 17.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC22 **Roadway:** I-495 SB Auxiliary

Location Within Roadway: Outside Lane

Date: 5/7/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

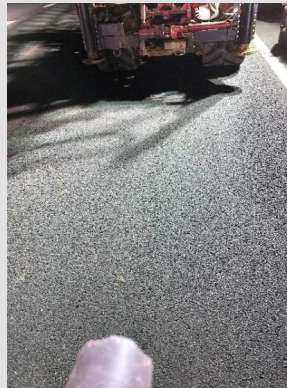
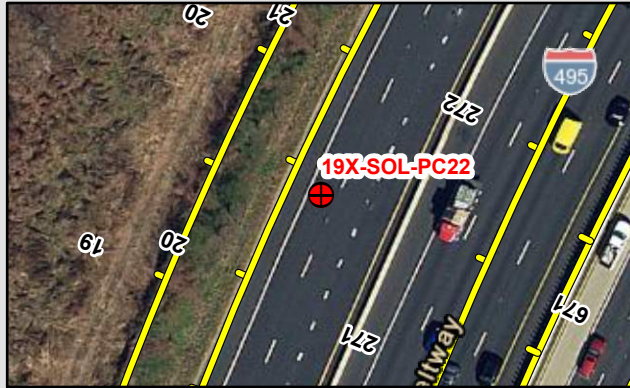
Soil Boring Complete?: No

Station: 271+49

Offset: 74 LT

Latitude: 38.958858

Longitude: -77.192313



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

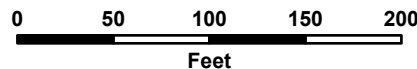


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 4.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.5 | 13.0 | 8.5 | Fair |
| Cement Treated Aggregate | 13.0 | 19.5 | 6.5 | Fair |
| Aggregate | 19.5 | 25.5 | 6.0 | |
| Depth to Subgrade: 25.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC24 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 6/13/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

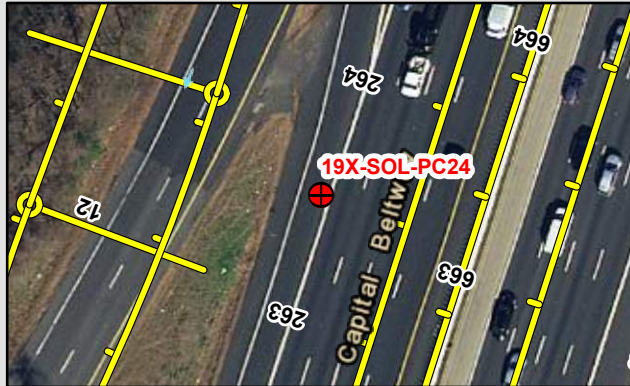
Soil Boring Complete?: No

Station: 263+54

Offset: 39 LT

Latitude: 38.956739

Longitude: -77.193097



General Surface Condition: Good
Specific Surface Distress(es):
None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

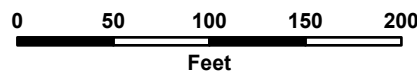


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 6.0 | 3.0 | Good |
| Aggregate | 6.0 | 16.0 | 10.0 | |
| Depth to Subgrade: 16.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC26 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 6/14/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

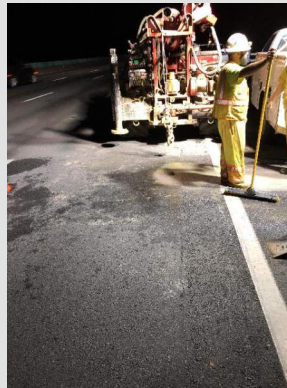
Soil Boring Complete?: No

Station: 254+55

Offset: 30 LT

Latitude: 38.954451

Longitude: -77.194222



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

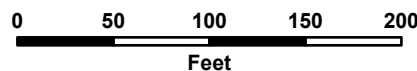


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 6.0 | 3.5 | Good |
| Concrete | 6.0 | 16.0 | 10.0 | Good |
| Cement Treated Aggregate | 16.0 | 21.0 | 5.0 | Good |
| Depth to Subgrade: 21.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC27 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 6/16/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

Soil Boring Complete?: No

Station: 247+54

Offset: 26 LT

Latitude: 38.952806

Longitude: -77.195467



General Surface Condition: Good
Specific Surface Distress(es):
None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

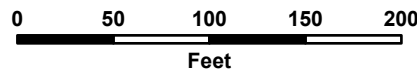


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 6.0 | 3.5 | Good |
| Concrete | 6.0 | 16.0 | 10.0 | Good |
| Cement Treated Aggregate | 16.0 | 18.0 | 2.0 | Fair |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC29 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

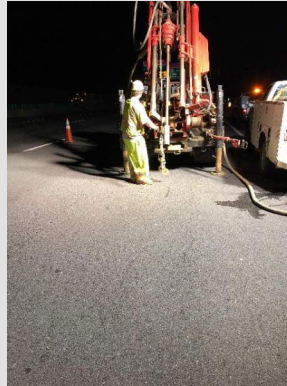
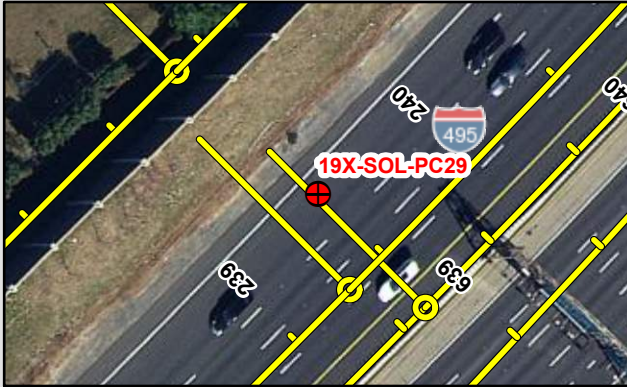
Date: 5/15/2019 **Cored By:** Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: No

Station: 239+50 **Offset:** 39 LT

Latitude: 38.951148

Longitude: -77.197301



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

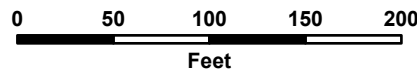


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Good |
| | | | | |
| Concrete | 4.5 | 14.0 | 9.5 | Good |
| Cement Treated Aggregate | 14.0 | 17.5 | 3.5 | Poor |
| Aggregate | 17.5 | 28.5 | 11.0 | |
| Depth to Subgrade: 28.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC31 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 5/15/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: No

Station: 231+40

Offset: 30 LT

Latitude: 38.949557

Longitude: -77.199291



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking, Transverse Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Gravel and Grout

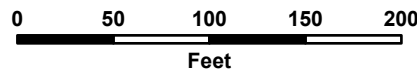


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.8 | 2.8 | Fair |
| | | | | |
| Concrete | 2.8 | 12.8 | 10.0 | |
| | | | | |
| Aggregate | 12.8 | 18.5 | 5.7 | |
| Depth to Subgrade: 18.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC32 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

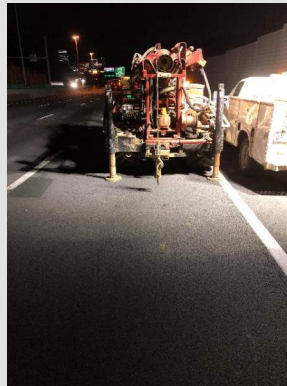
Date: 5/16/2019 **Cored By:** Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: No

Station: 223+47 **Offset:** 30 LT

Latitude: 38.947898

Longitude: -77.20112



General Surface Condition: Fair
Specific Surface Distress(es):

Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Gravel and Grout

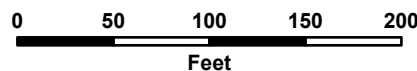


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| | | | | |
| Concrete | 3.0 | 12.0 | 9.0 | Good |
| Cement Treated Aggregate | 12.0 | 18.0 | 6.0 | Fair |
| | | | | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC34 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 5/22/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

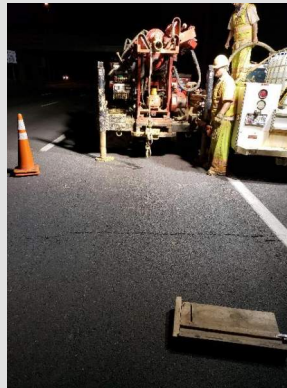
Soil Boring Complete?: No

Station: 215+41

Offset: 29 LT

Latitude: 38.945996

Longitude: -77.202593



General Surface Condition: Fair
Specific Surface Distress(es):
 Transverse Cracking, Longitudinal Cracking

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

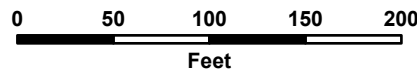


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 1.5 | 1.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 1.5 | 4.0 | 2.5 | Good |
| Concrete | 4.0 | 12.8 | 8.8 | Good |
| Cement Treated Aggregate | 12.8 | 16.6 | 3.8 | Poor |
| Depth to Subgrade: 16.6 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC36 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 5/9/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

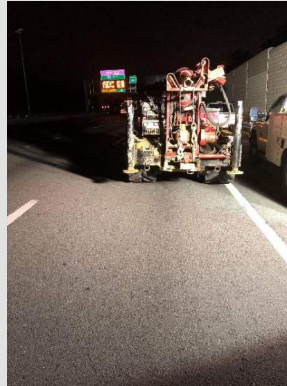
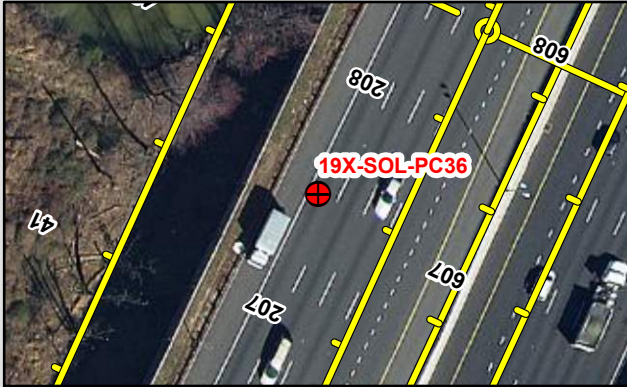
Soil Boring Complete?: No

Station: 207+54

Offset: 37 LT

Latitude: 38.944052

Longitude: -77.203807



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

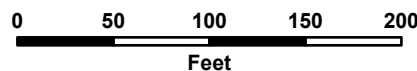


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.0 | 7.8 | 3.8 | Good |
| Concrete | 7.8 | 15.3 | 7.5 | Good |
| Cement Treated Aggregate | 15.3 | 18.1 | 2.8 | Poor |
| Aggregate | 18.1 | 21.0 | 2.9 | |
| Depth to Subgrade: 21.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC37 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

Date: 5/10/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

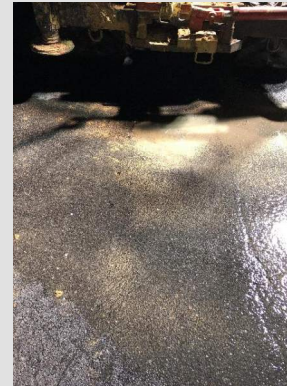
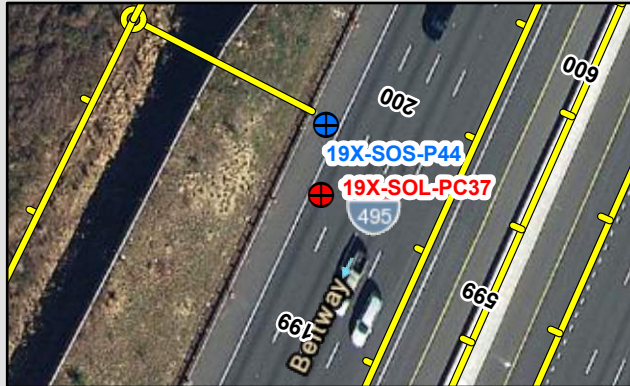
Soil Boring Complete?: No

Station: 199+56

Offset: 50 LT

Latitude: 38.942073

Longitude: -77.205015



General Surface Condition: Fair
Specific Surface Distress(es):

Longitudinal Cracking

Core Diameter (in.): 4.0

Additional Notes:

Backfill: Gravel and Grout

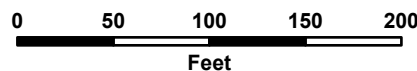


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 5.0 | 5.0 | Fair |
| Asphalt Concrete - Base Mix (BM) | 5.0 | 7.3 | 2.3 | Good |
| Concrete | 7.3 | 14.1 | 6.8 | Good |
| Cement Treated Aggregate | 14.1 | 19.6 | 5.5 | Poor |
| Aggregate | 19.6 | 29.0 | 9.4 | |
| Depth to Subgrade: 29.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOL-PC39 **Roadway:** I-495 SB

Location Within Roadway: Outside Lane

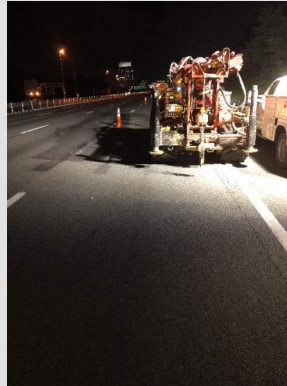
Date: 5/14/2019 **Cored By:** Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: No

Station: 192+43 **Offset:** 61 LT

Latitude: 38.940302

Longitude: -77.206085



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Gravel and Grout

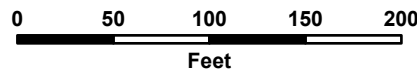


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.8 | 4.8 | Fair |
| Asphalt Concrete - Base Mix (BM) | 4.8 | 8.3 | 3.5 | Fair |
| Concrete | 8.3 | 16.1 | 7.8 | Good |
| Cement Treated Aggregate | 16.1 | 20.1 | 4.0 | Poor |
| Aggregate | 20.1 | 22.0 | 1.9 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P23

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 4/17/2019

Cored By: Connelly & Associates **Logged By:** Russ Kanith

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P23

Station: 54+54

Offset: 218 LT

Latitude: 38.966885

Longitude: -77.180287



General Surface Condition: Fair
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

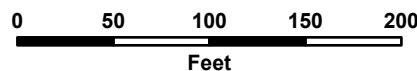


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.5 | 9.0 | 4.5 | Good |
| Aggregate | 9.0 | 32.4 | 23.4 | |
| Depth to Subgrade: 32.4 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P24

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 4/18/2019

Cored By: Connelly & Associates **Logged By:** Russ Kanith

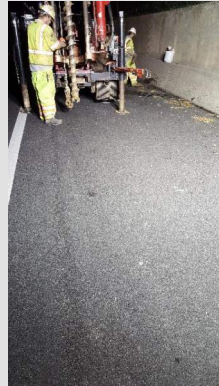
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P24

Station: 47+98

Offset: 270 LT

Latitude: 38.965393

Longitude: -77.181197



General Surface Condition: Fair
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

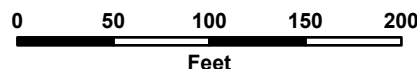


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 7.0 | 5.0 | Good |
| Aggregate | 7.0 | 20.0 | 13.0 | |
| Depth to Subgrade: 20.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P25

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 6/21/2019

Cored By: Connelly & Associates **Logged By:** Mark Tilashalski

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P25

Station: 305+83

Offset: 90 LT

Latitude: 38.964301

Longitude: -77.182586

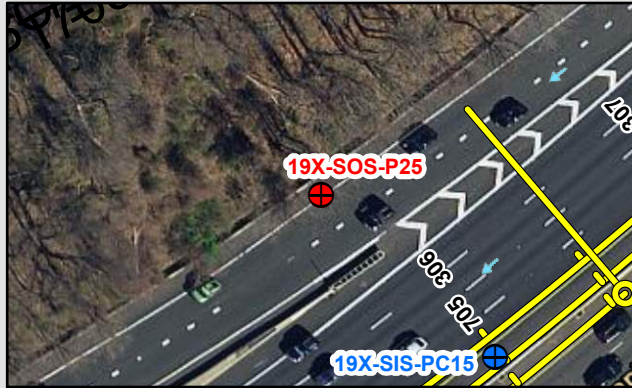


Photo Unavailable



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

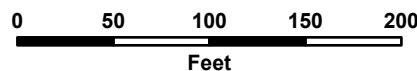


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.0 | 6.5 | 3.5 | Good |
| Aggregate | 6.5 | 18.5 | 12.0 | |
| Depth to Subgrade: 18.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P26

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 6/21/2019

Cored By: Connelly & Associates **Logged By:** Mark Tilashalski

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P26

Station: 299+35

Offset: 91 LT

Latitude: 38.96344

Longitude: -77.184502



Photo Unavailable



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

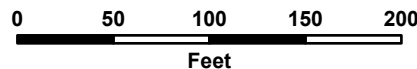


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Aggregate | 6.0 | 22.0 | 16.0 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P27

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 6/21/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

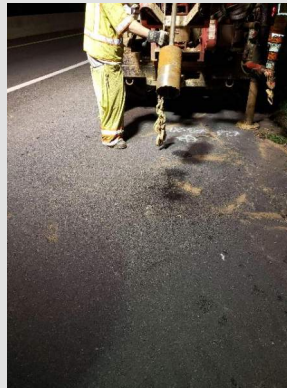
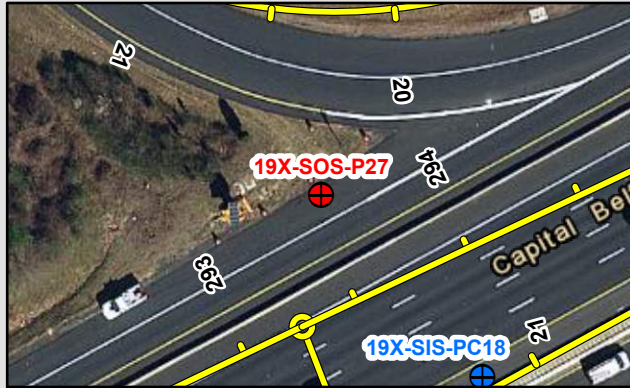
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P27

Station: 293+56

Offset: 48 LT

Latitude: 38.962656

Longitude: -77.186276



General Surface Condition: Good
Specific Surface Distress(es): Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

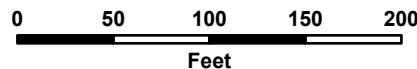


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 6.3 | 6.3 | Good |
| Asphalt Concrete - Base Mix (BM) | 6.3 | 9.0 | 2.7 | Good |
| Aggregate | 9.0 | 15.0 | 6.0 | |
| Depth to Subgrade: 15.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P28

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 6/20/2019

Cored By: Connelly & Associates **Logged By:** Austin Morgan

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P28

Station: 287+95

Offset: 33 LT

Latitude: 38.961897

Longitude: -77.188008



Photo Unavailable

General Surface Condition: Good
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

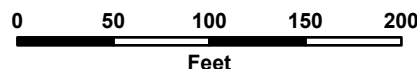


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.8 | 3.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 3.8 | 10.0 | 6.2 | Good |
| Aggregate | 10.0 | 22.0 | 12.0 | |
| Depth to Subgrade: 22.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P29

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 5/5/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

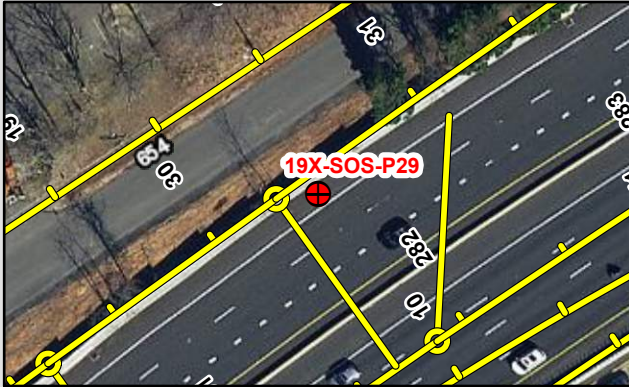
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P29

Station: 281+82

Offset: 79 LT

Latitude: 38.961098

Longitude: -77.189928



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

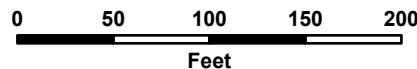


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 6.0 | 4.0 | Good |
| Aggregate | 6.0 | 18.0 | 12.0 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P30

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 5/6/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

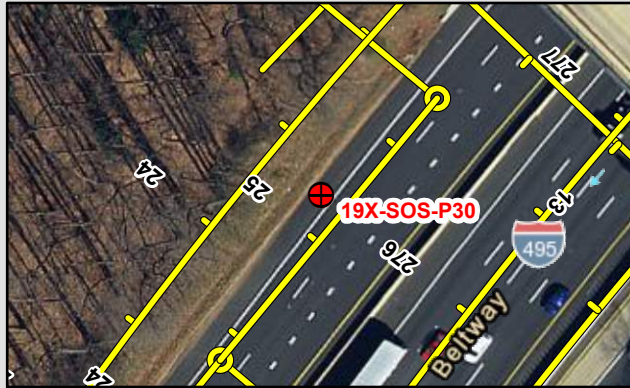
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P30

Station: 276+03

Offset: 78 LT

Latitude: 38.959971

Longitude: -77.191469



General Surface Condition: Good
Specific Surface Distress(es):
 Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

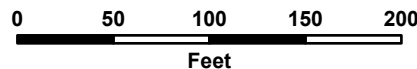


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 3.5 | 1.5 | Good |
| Aggregate | 3.5 | 15.5 | 12.0 | |
| Depth to Subgrade: 15.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P31

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 5/7/2019

Cored By: Connelly & Associates **Logged By:** Harsh Patel

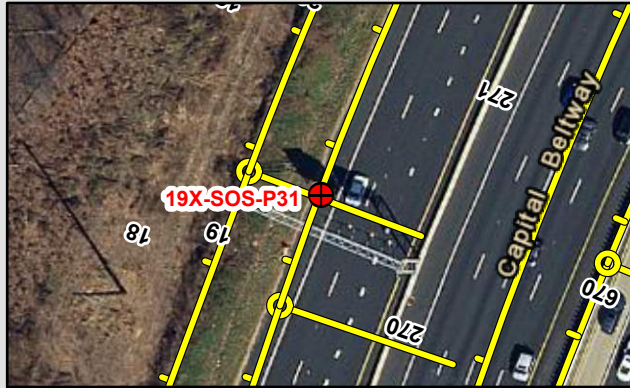
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P31

Station: 270+42

Offset: 88 LT

Latitude: 38.958587

Longitude: -77.192508



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 4.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

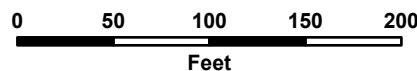


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.0 | 5.5 | 3.5 | Good |
| Aggregate | 5.5 | 17.5 | 12.0 | |
| Depth to Subgrade: 17.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P32

Roadway: I-495 SB Auxiliary

Location Within Roadway: Outside Shoulder

Date: 6/20/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

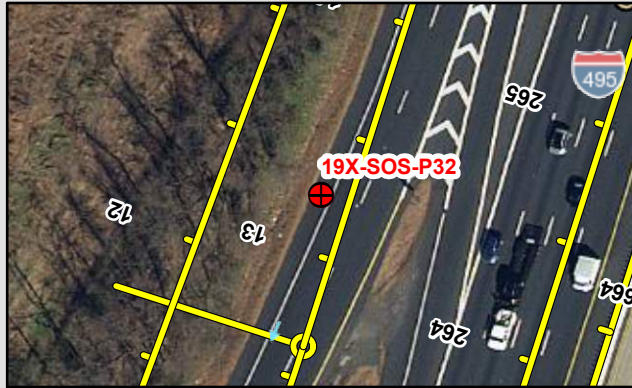
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P32

Station: 264+41

Offset: 103 LT

Latitude: 38.95702

Longitude: -77.19322



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

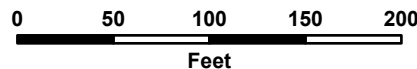


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.0 | 8.5 | 4.5 | Good |
| Aggregate | 8.5 | 20.5 | 12.0 | |
| Depth to Subgrade: 20.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P34

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 6/13/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

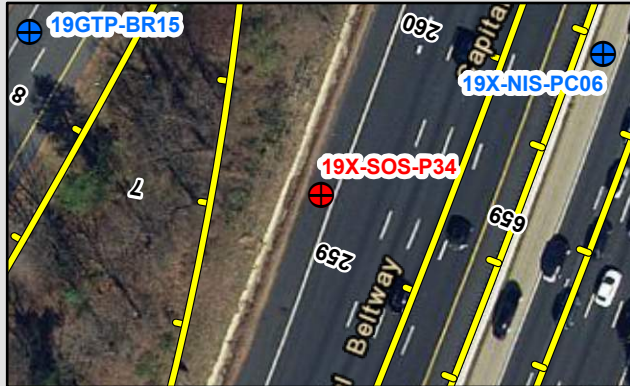
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P34

Station: 259+25

Offset: 51 LT

Latitude: 38.955643

Longitude: -77.193624



General Surface Condition: Fair
Specific Surface Distress(es):
 Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

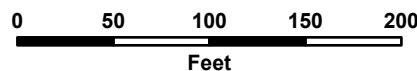


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.5 | 2.5 | Good |
| Asphalt Concrete - Base Mix (BM) | 2.5 | 7.5 | 5.0 | Good |
| Aggregate | 7.5 | 18.0 | 10.5 | |
| Depth to Subgrade: 18.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P35

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 6/14/2019

Cored By: Connelly & Associates **Logged By:** Jacob Moorman

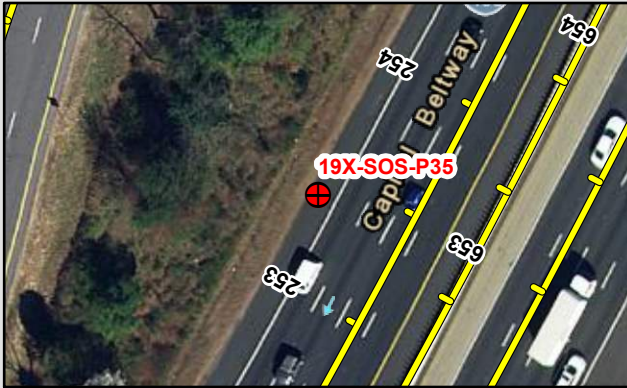
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P35

Station: 253+41

Offset: 41 LT

Latitude: 38.954189

Longitude: -77.194439



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking, Transverse Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

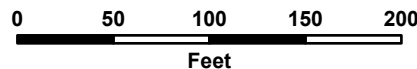


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| | | | | |
| | | | | |
| Concrete | 3.0 | 7.0 | 4.0 | Poor |
| | | | | |
| Aggregate | 7.0 | 17.0 | 10.0 | |
| Depth to Subgrade: 17.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P37

Roadway: 193 EB Ramp to I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/14/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

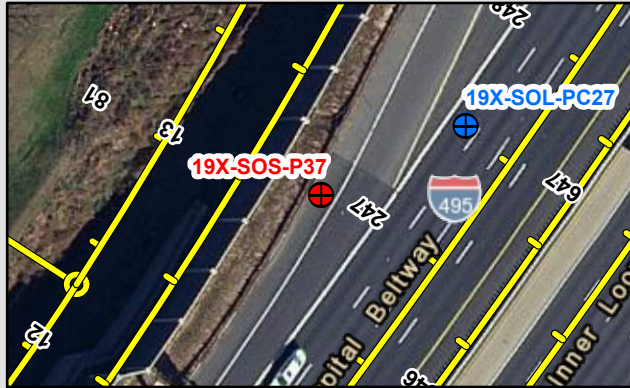
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P37

Station: 246+97

Offset: 57 LT

Latitude: 38.952729

Longitude: -77.195673



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

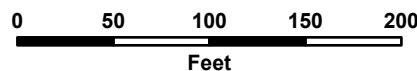


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.0 | 4.0 | Good |
| Asphalt Concrete - Base Mix (BM) | 4.0 | 11.3 | 7.3 | Good |
| Aggregate | 11.3 | 19.3 | 8.0 | |
| Depth to Subgrade: 19.3 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P38

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/15/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

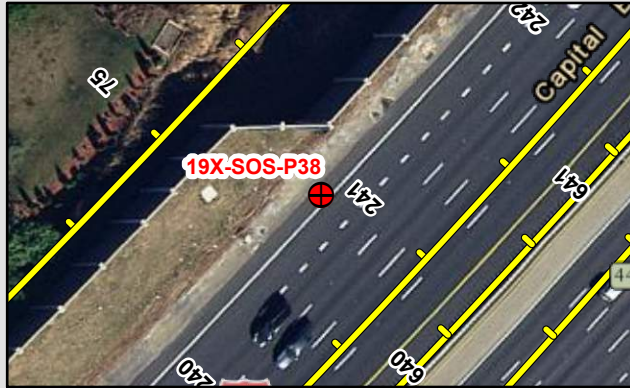
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P38

Station: 240+92

Offset: 51 LT

Latitude: 38.951449

Longitude: -77.196992



General Surface Condition: Fair
Specific Surface Distress(es):

Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

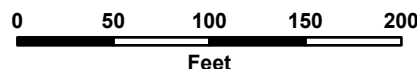


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.3 | 2.3 | Fair |
| Asphalt Concrete - Base Mix (BM) | 2.3 | 3.5 | 1.2 | Fair |
| Concrete | 3.5 | 12.0 | 8.5 | Good |
| Aggregate | 12.0 | 23.0 | 11.0 | |
| Depth to Subgrade: 23.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P39

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/15/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

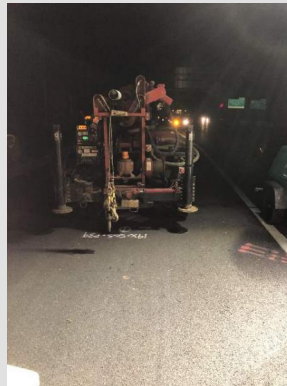
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P39

Station: 234+67

Offset: 43 LT

Latitude: 38.950218

Longitude: -77.19851



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

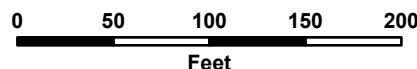


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 3.0 | 3.0 | Good |
| | | | | |
| | | | | |
| Concrete | 3.0 | 11.8 | 8.8 | Good |
| Cement Treated Aggregate | 11.8 | 17.6 | 5.7 | Good |
| | | | | |
| Depth to Subgrade: 17.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P40

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/15/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P40

Station: 228+75

Offset: 39 LT

Latitude: 38.949046

Longitude: -77.199962



General Surface Condition: Fair
Specific Surface Distress(es):

Transverse Cracking

Core Diameter (in.): 8.0

Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

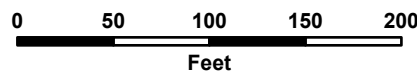


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.8 | 4.8 | Good |
| | | | | |
| | | | | |
| Concrete | 4.8 | 11.8 | 7.0 | Good |
| Cement Treated Aggregate | 11.8 | 16.8 | 5.0 | Fair |
| | | | | |
| Depth to Subgrade: 16.8 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P41

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/16/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

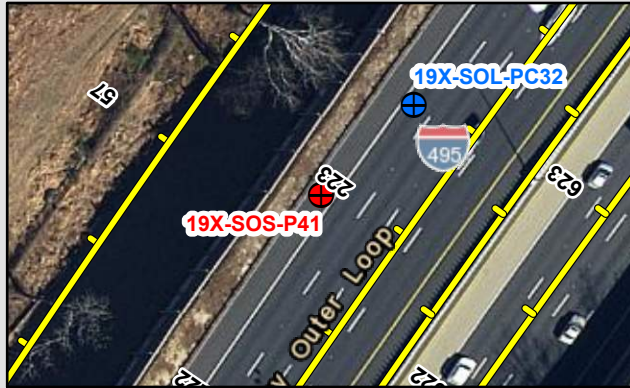
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P41

Station: 222+96

Offset: 39 LT

Latitude: 38.947798

Longitude: -77.201252



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

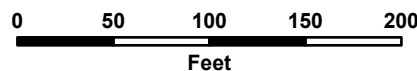


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--------------------------------------|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 6.0 | 6.0 | Good |
| | | | | |
| Concrete | 6.0 | 12.5 | 6.5 | Good |
| Cement Treated Aggregate | 12.5 | 19.0 | 6.5 | Fair |
| Depth to Subgrade: 19.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P42

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/8/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P42

Station: 211+95

Offset: 40 LT

Latitude: 38.945155

Longitude: -77.203162



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

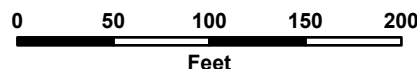


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 4.5 | 4.5 | Fair |
| Asphalt Concrete - Intermediate Mix (IM) | 4.5 | 8.8 | 4.3 | Good |
| Asphalt Concrete - Base Mix (BM) | 8.8 | 22.0 | 13.2 | Fair |
| | | | | |
| | | | | |
| Aggregate | 22.0 | 34.0 | 12.0 | |
| Depth to Subgrade: 34.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P43

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/9/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P43

Station: 205+89

Offset: 50 LT

Latitude: 38.943653

Longitude: -77.204091



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

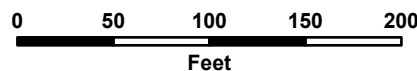


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 10.7 | 8.7 | Good |
| Asphalt Concrete - Base Mix (BM) | 10.7 | 18.5 | 7.8 | Good |
| | | | | |
| | | | | |
| Aggregate | 18.5 | 34.5 | 16.0 | |
| Depth to Subgrade: 34.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P44

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/10/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

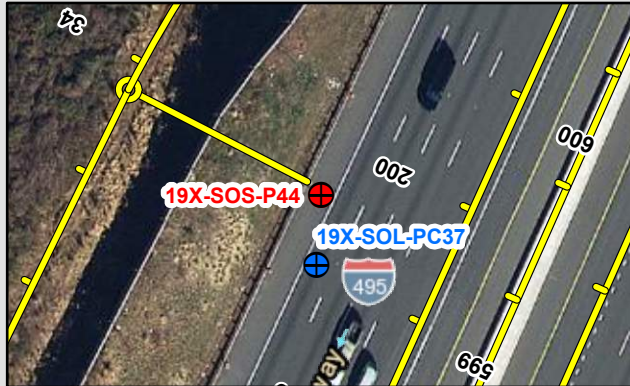
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P44

Station: 199+83

Offset: 60 LT

Latitude: 38.942151

Longitude: -77.205008



General Surface Condition: Good
Specific Surface Distress(es): None

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

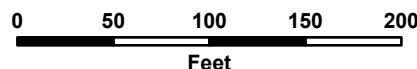


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.0 | 2.0 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.0 | 10.8 | 8.8 | Good |
| Asphalt Concrete - Base Mix (BM) | 10.8 | 19.0 | 8.2 | Fair |
| | | | | |
| | | | | |
| Aggregate | 19.0 | 43.0 | 24.0 | |
| Depth to Subgrade: 43.0 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT

Core ID: 19X-SOS-P45

Roadway: I-495 SB

Location Within Roadway: Outside Shoulder

Date: 5/14/2019

Cored By: Connelly & Associates **Logged By:** Lance Martin

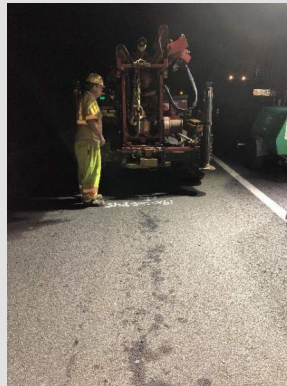
Soil Boring Complete?: Yes refer to Soil Boring Log 19X-SOS-P45

Station: 194+03

Offset: 67 LT

Latitude: 38.940709

Longitude: -77.205872



General Surface Condition: Fair
Specific Surface Distress(es):
Longitudinal Cracking

Core Diameter (in.): 8.0
Additional Notes:

Backfill: Compacted Cuttings, Spider Plug, Gravel, and Grout

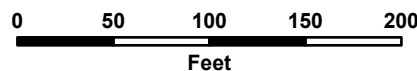


| Material Description | Depth (in.) | | Thickness (in.) | Condition |
|--|-------------|------|-----------------|-----------|
| | FROM | TO | | |
| Asphalt Concrete - Surface Mix (SM) | 0.0 | 2.3 | 2.3 | Good |
| Asphalt Concrete - Intermediate Mix (IM) | 2.3 | 11.5 | 9.2 | Good |
| Asphalt Concrete - Base Mix (BM) | 11.5 | 19.5 | 8.0 | Fair |
| | | | | |
| | | | | |
| Aggregate | 19.5 | 30.5 | 11.0 | |
| Depth to Subgrade: 30.5 (in.) | | | | |



Transurban

Map Scale: 1 Inch = 100 Feet



495 Express Lanes - Project NEXT



PROJECT NEXT

APPENDIX C

GPR Evaluation Report by INFRASENSE



Ground Penetrating Radar (GPR) Pavement Structure Evaluation of Interstate- 495 in Fairfax County, Virginia

Final Report

Submitted to

HDR, Inc

4470 Cox Road, Suite 200

Glen Allen, VA

by

Infrasense

21G Olympia Ave

Woburn, MA 01801

October 17, 2019

1. Introduction

The objective of this project was to utilize ground penetrating radar (GPR) to measure the thickness of the Asphalt Concrete (AC) and Portland Cement Concrete (PCC) pavement layers along a 3-mile section of I-495 in Fairfax County, Virginia. The project section consists of 5 mainline lanes and 2 shoulders in each direction of travel between the Dulles Toll Road Interchange and the American Legion Bridge. Additional data were collected along the express lanes and a prescribed ramp lane. The following sections describe the data collection procedures, analysis methods, and resulting deliverables.

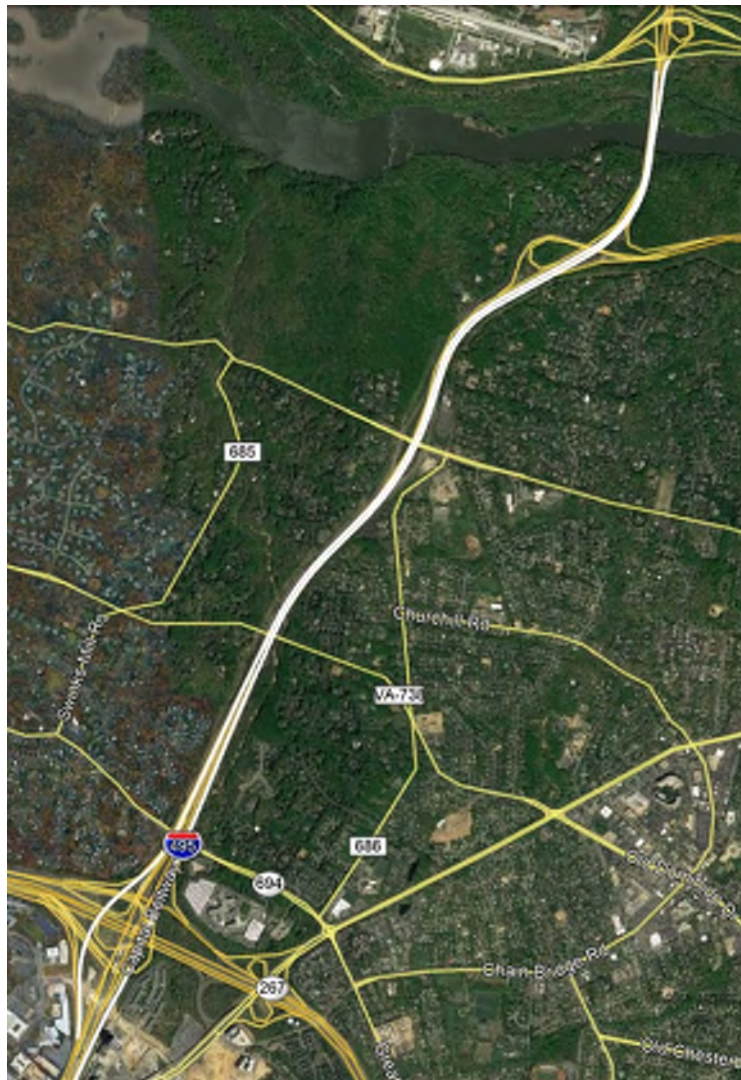


Figure 1 – Project Section

2. Data Collection

The GPR data collection was carried out on September 16-17, 2019 at normal driving speed using a single 1-GHz horn antenna system, manufactured by GSSI, Inc. of Nashua, NH (see Figure 2). The vehicle is equipped with an electronic distance-measuring instrument (DMI) mounted to the rear wheel, providing synchronous distance data as the GPR data was collected; and a Trimble GPS unit, providing high resolution, differentially corrected geo-spatial information. The data collection and recording are controlled by the SIR-30 GPR system operated from within the survey vehicle. The data were collected at a rate of one scan per unit of distance (foot). Using the setup shown in Figure 2, data were collected along the centerline of the travel lanes.

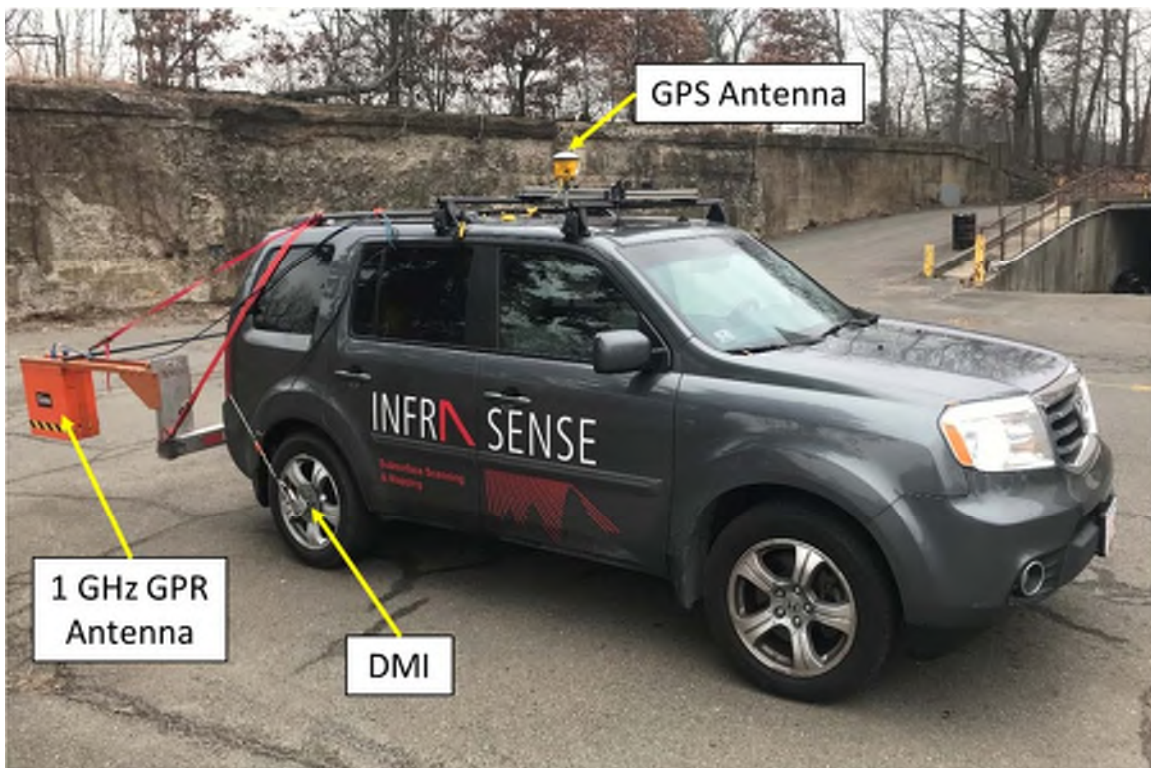


Figure 2 - Infrasense GPR Equipment Setup

3. Data Analysis and Results

The GPR data, when displayed in a gray scale "B-scan", reveals the pavement cross-section including the individual pavement layers. Figure 3 shows a representative sample of the data and identifies the layers detected and reported for the project section. Figure 4 shows the same sample data, but with individual asphalt layer "picked" by the GPR analyst. The software carries out the dielectric and thickness calculations on this picked data.

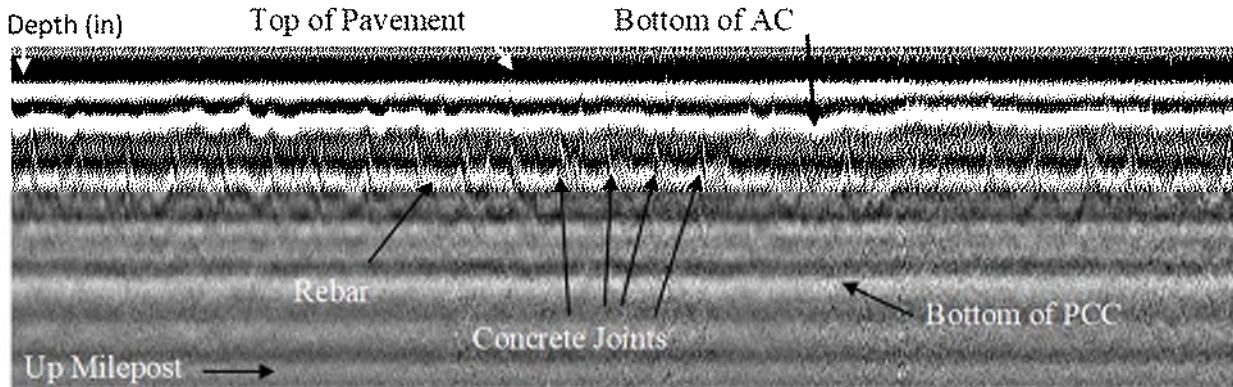


Figure 3 - Sample GPR Data Showing Pavement Layers

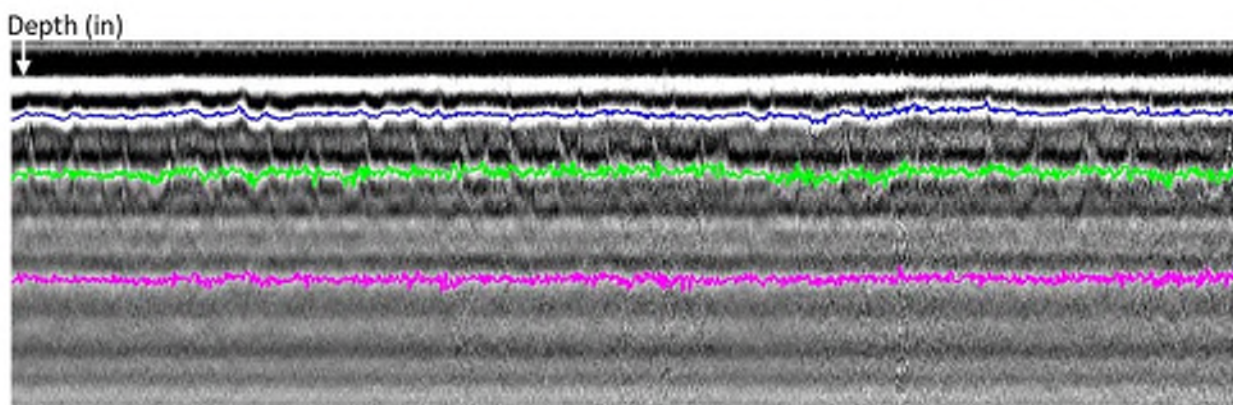


Figure 4 - Sample GPR Data Showing Pavement Layers "Picked" By Analyst

The pavement layer thicknesses were calculated and reported at 5-foot increments along the centerline of each surveyed lane and shoulder. The reported values represent the average of individual readings calculated over an interval of ± 5 -feet on either side of the reported location. The GPR data was accurately tied to the project stationing using the integrated GPS coordinates and KMZ file provided by HDR.

The GPR results were calibrated using select core data at 51 locations. Core locations not corresponding to the alignment (>4 -ft offset) of GPR profiles were not used in the calibration. The calibrated GPR results were found to be within 8.8% of the core thicknesses. Thickness variations are likely a result of discrepancies between the core extraction and GPR measurement locations.

The resulting AC and PCC layer thickness values with corresponding linear referencing and GPS coordinates for all prescribed lanes have been submitted as tabular Excel files (see Attachment A). In addition, pavement structure profile plots have been provided as Attachment B. These are also included within the "Graphs" tab of the Excel files. Additional information on the principles of GPR for pavement thickness measurements are provided as Attachment C.

ATTACHMENT A

TABULAR PAVEMENT THICKNESS RESULTS

transmitted electronically as

"I-495 NB_GPR Pavement Thickness_Final_v2.xlsx"

"I-495 SB_GPR Pavement Thickness_Final_v2.xlsx"

"#1 SB Geo Wash Memorial Pkwy_Final_v2.xlsx"

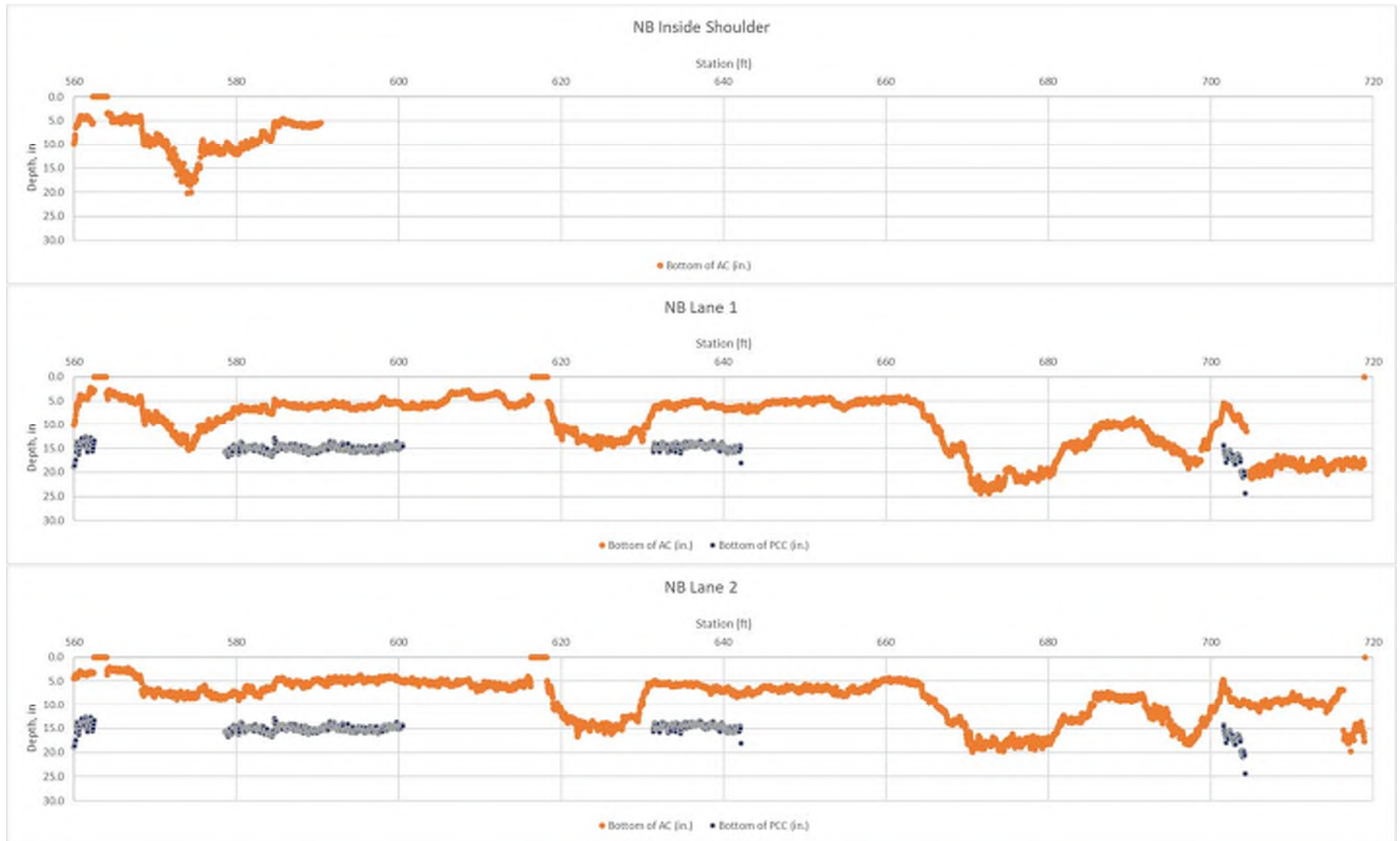
"#2 SB Express Lanes_Final_v2.xlsx"

"#3 NB Express Lanes_Final_v2.xlsx"

ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



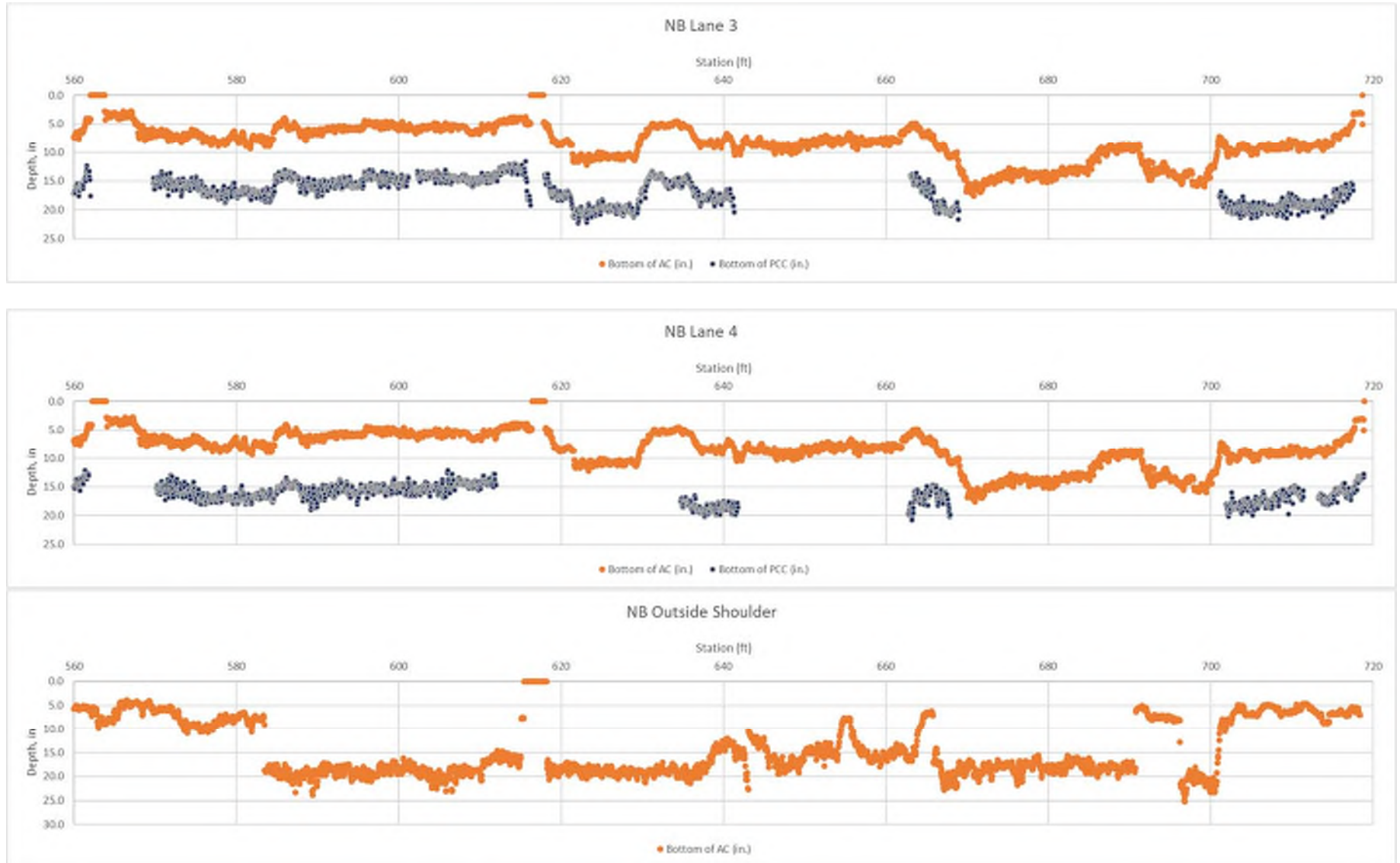
Northbound Pavement Structure Profiles



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



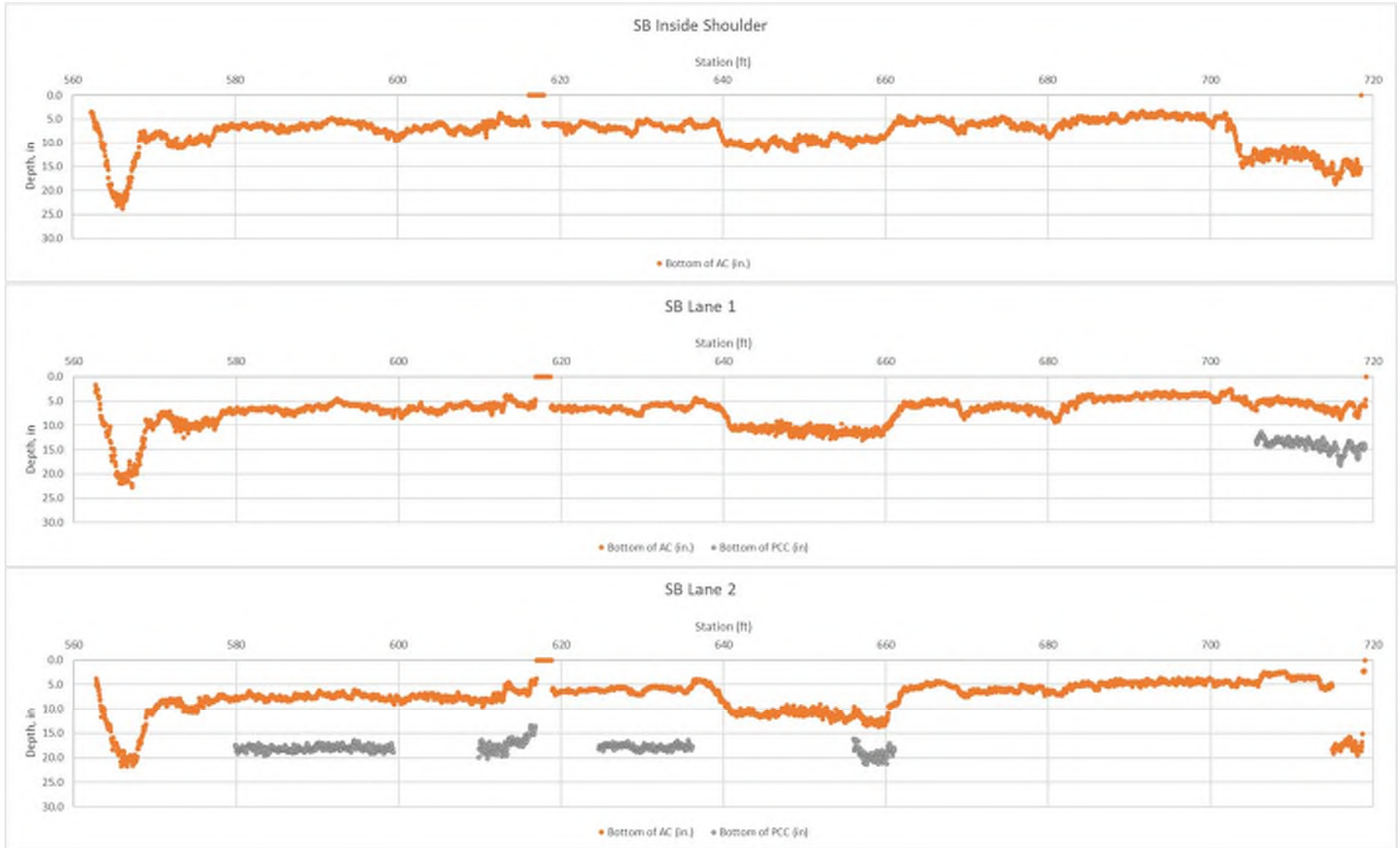
Northbound Pavement Structure Profiles (cont.)



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



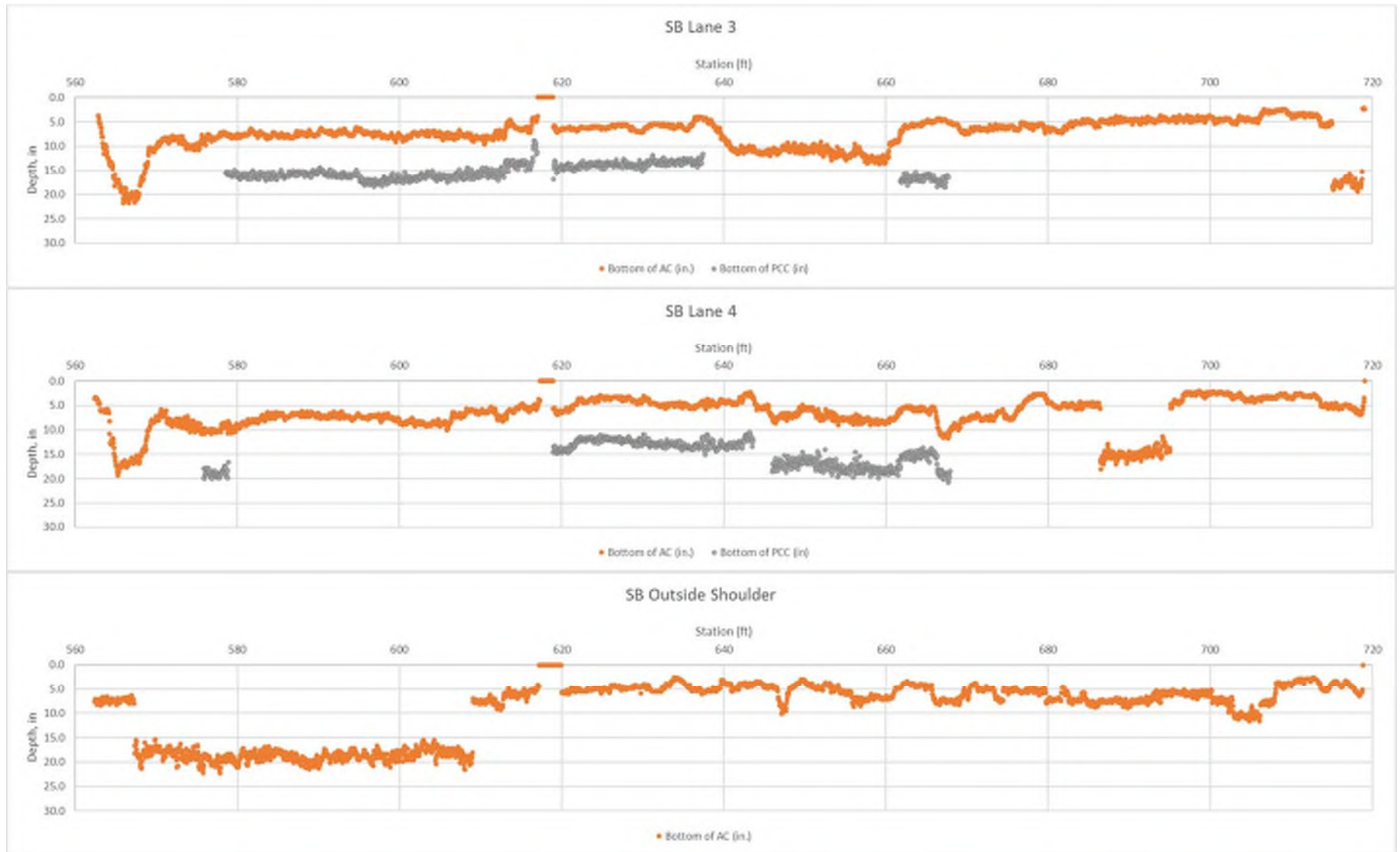
Southbound Pavement Structure Profiles



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



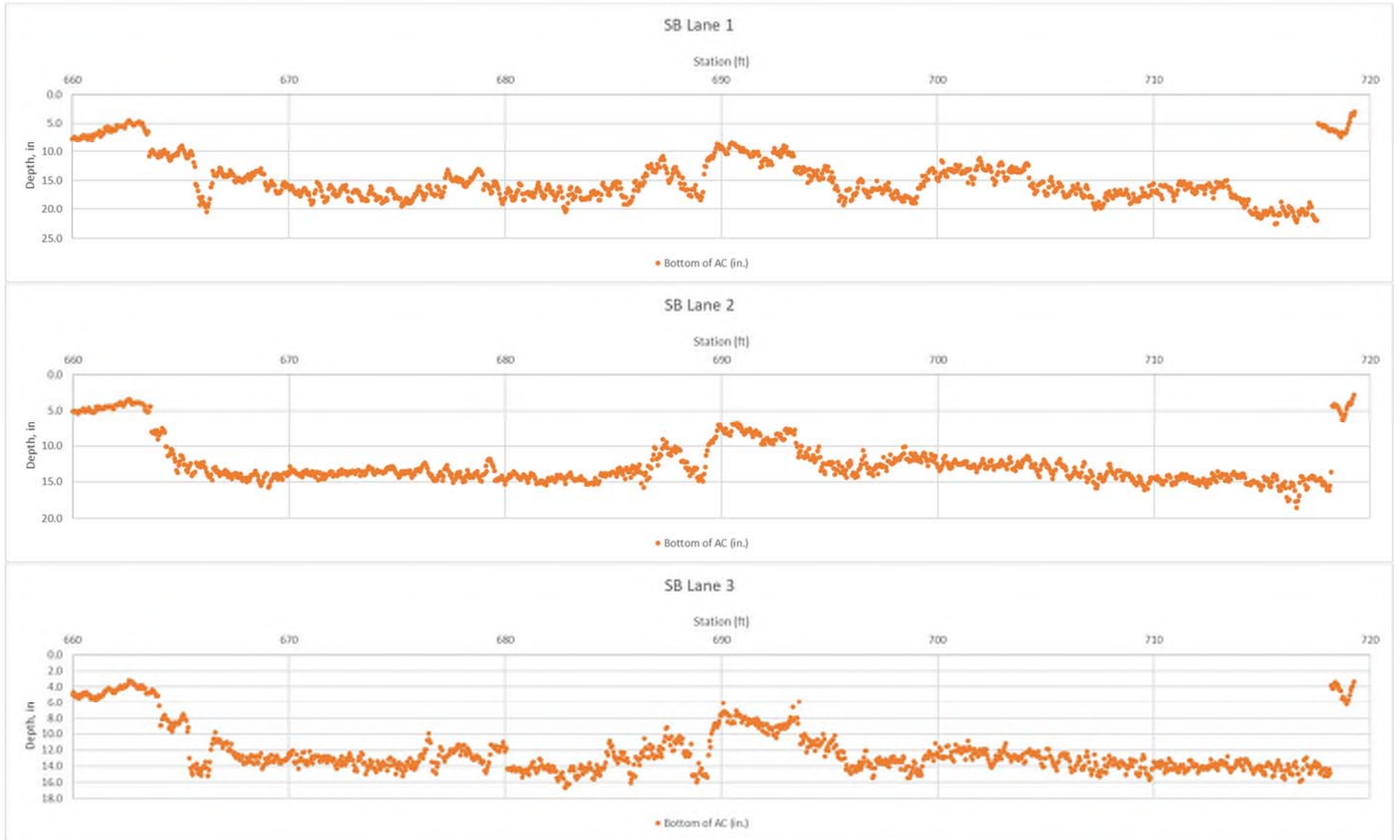
Southbound Pavement Structure Profiles (cont.)



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



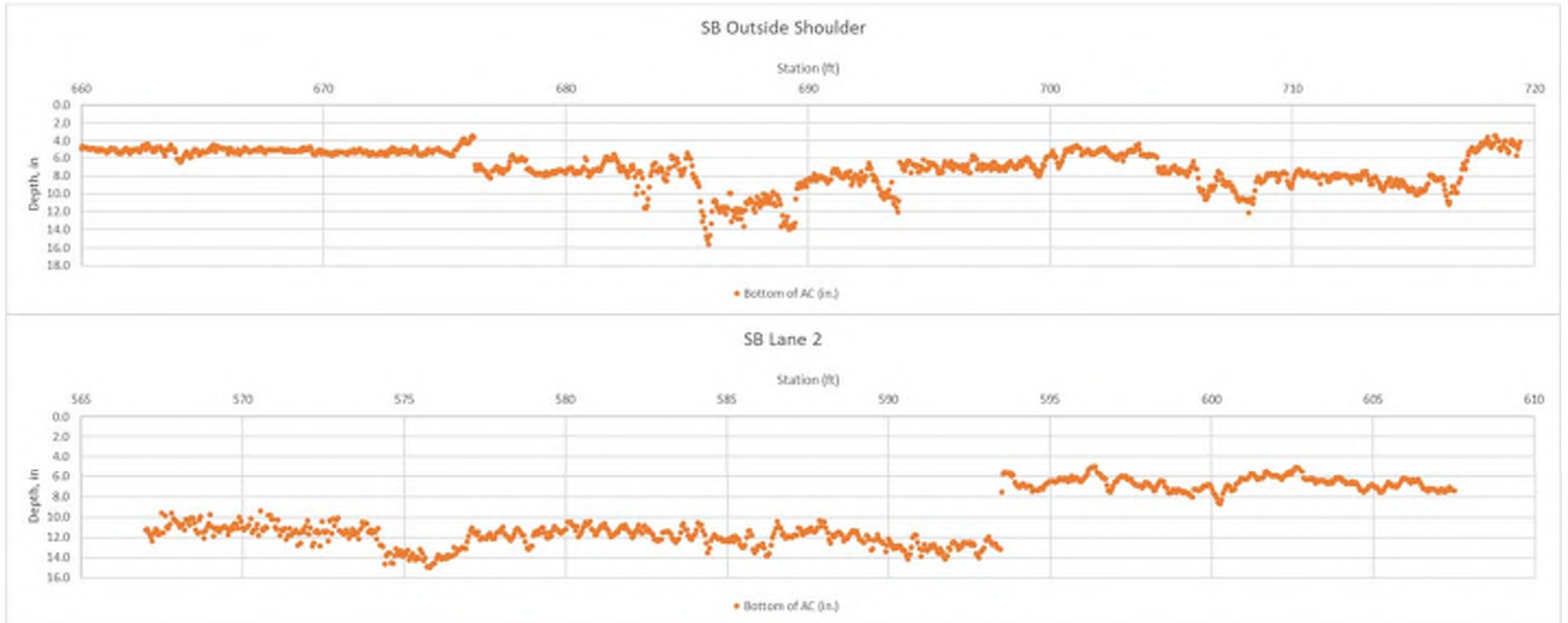
Southbound Geo Wash Memorial Pkwy



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



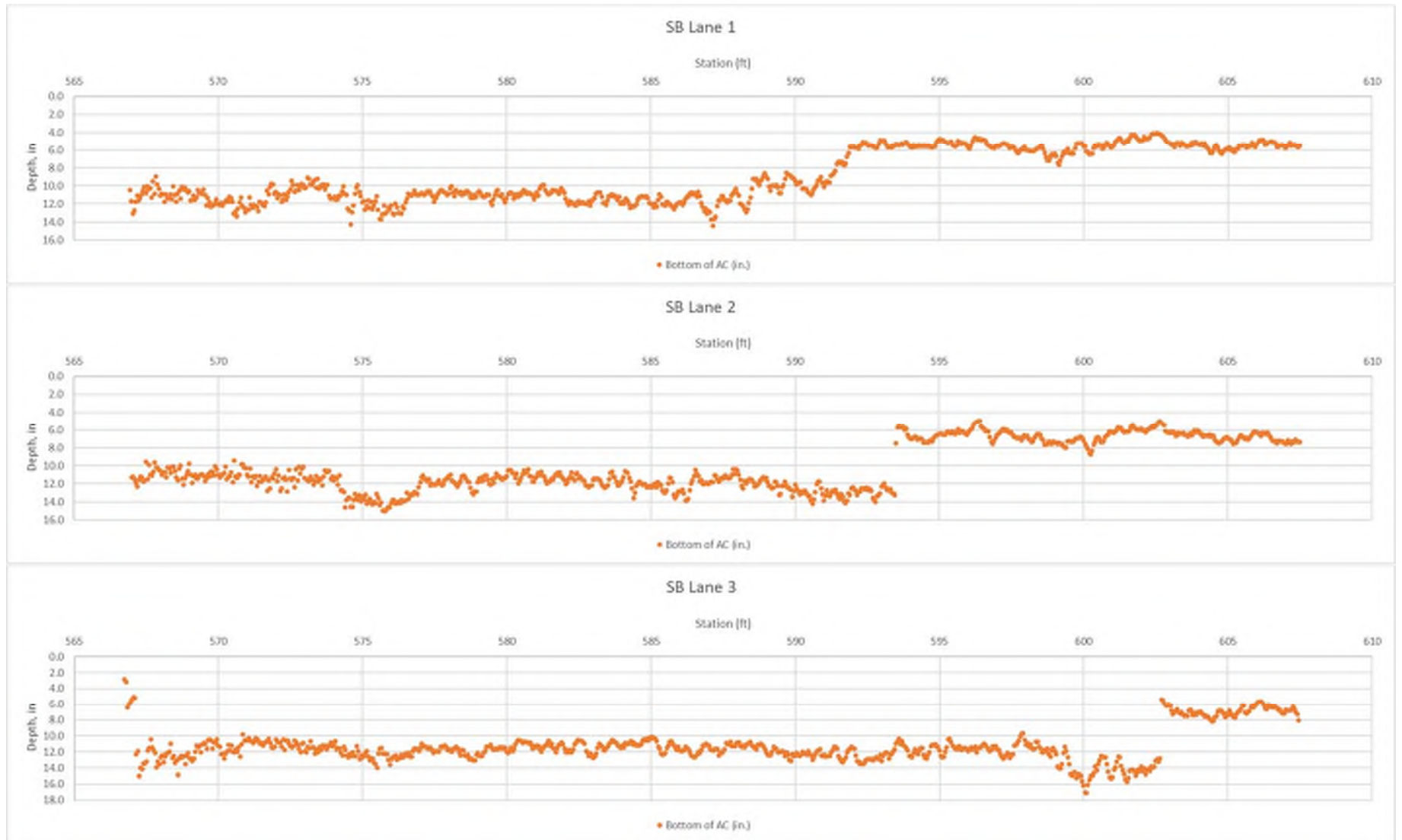
Southbound Geo Wash Memorial Pkwy (cont.)



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



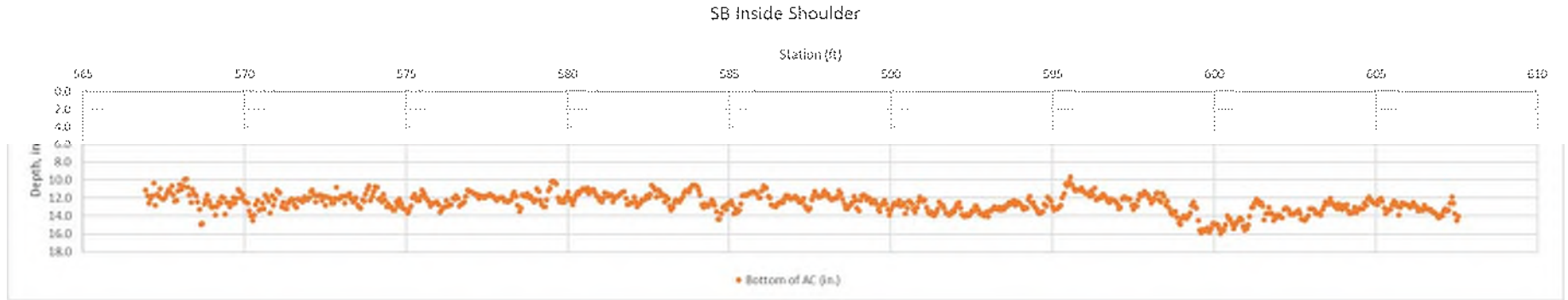
Southbound Express Lanes



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



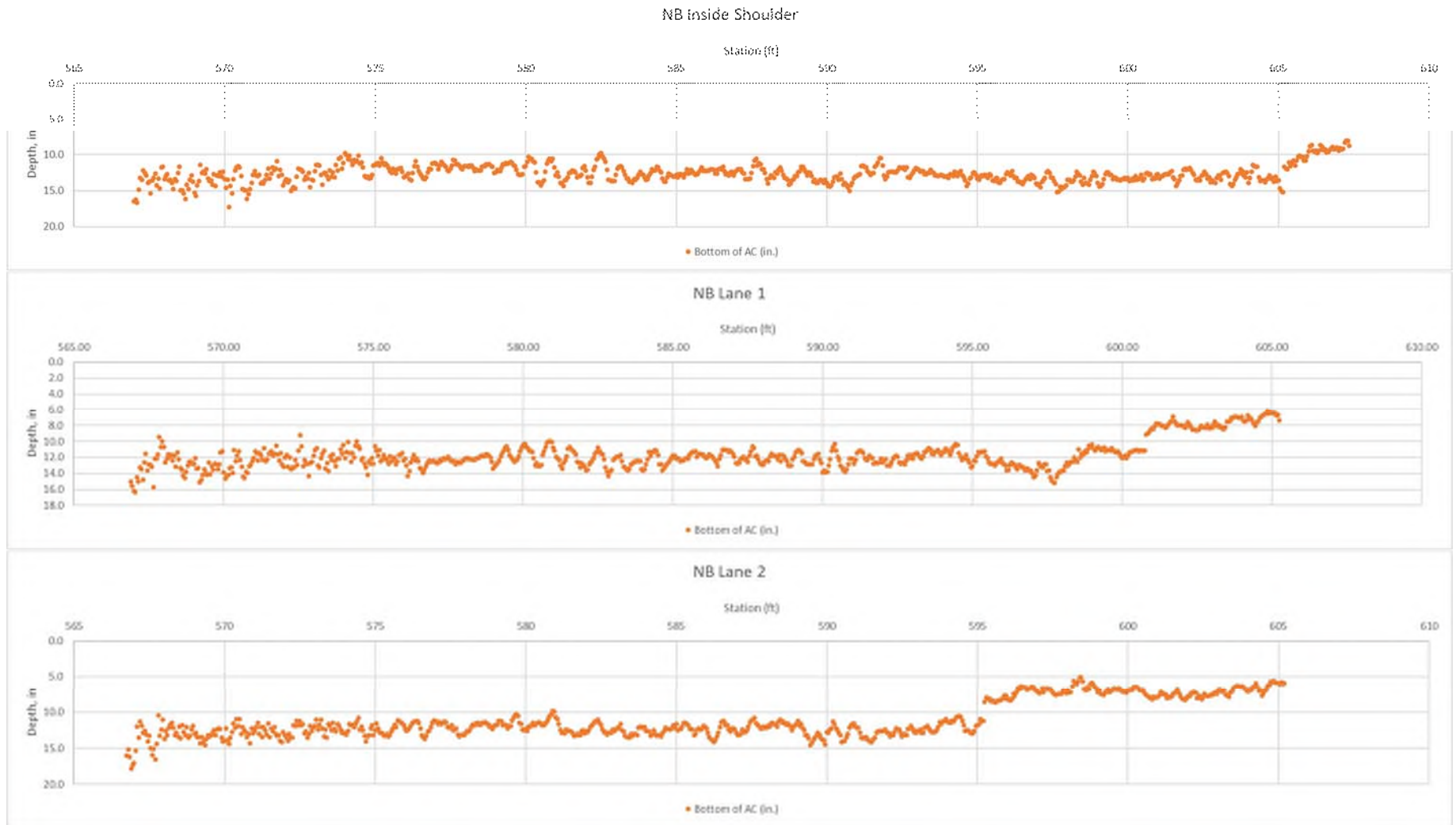
Southbound Express Lanes (cont.)



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



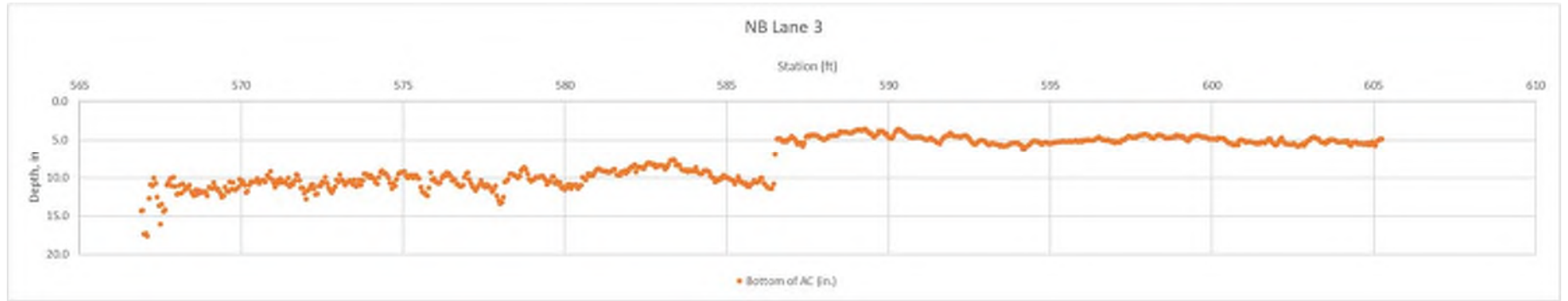
Northbound Express Lanes



ATTACHMENT B PAVEMENT STRUCTURE PROFILE PLOTS



Northbound Express Lanes (cont.)



Attachment C

Principles of GPR for Pavement Evaluation

Ground penetrating radar operates by transmitting short pulses of electromagnetic energy into the pavement using an antenna attached to a survey vehicle. These pulses are reflected back to the antenna with an arrival time and amplitude that is related to the location and nature of dielectric discontinuities in the material (air/asphalt or asphalt/concrete, reinforcing steel, etc.). The reflected energy is captured and may be displayed on an oscilloscope to form a series of pulses that are referred to as the radar waveform. The waveform contains a record of the properties and thicknesses of the layers within the pavement (Figure C1).

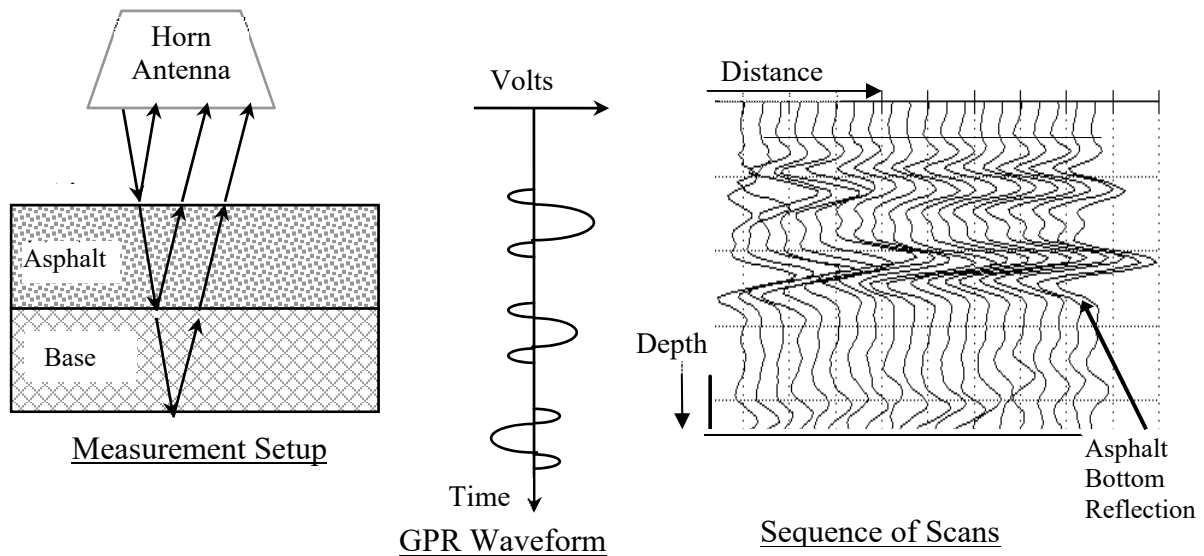


Figure C1 – Structure of the GPR Signal for Pavements

The sequence of scans shown on the right of Figure C1 is frequently coded in color or gray scale to produce the "b" scan representation, examples of which have been shown in the body of the report. The b-scan provides the equivalent of a cross sectional view of the pavement, with the individual pavement layers showing up as colored horizontal bands. The white and black bands indicate stronger reflections and occur when the dielectric contrast is greater. The grey regions indicate weaker reflections and occur when there is little dielectric contrast.

Layer thickness is calculated from the arrival time of the reflection from the top and bottom of each layer as follows:

$$\text{Thickness (in.)} = (5.9 t) / \sqrt{\epsilon_a} \quad (1)$$

where time (t) is measured in nanoseconds and ϵ_a is the relative dielectric permittivity or “dielectric constant” of the pavement layer (Roddis, et. al., 1992).

Computation of the dielectric constant of the surface layer can be made by measuring the ratio of

the radar reflection from the pavement surface to the radar amplitude incident on the pavement. The incident amplitude on the pavement is determined by measuring the reflection from a metal plate on the pavement surface, since the metal plate reflects 100% of the incident energy. Using this data, one obtains the asphalt dielectric constant, ϵ_a as follows:

$$\epsilon_a = [(A_{pl} + A)/(A_{pl} - A)]^2 \quad (2)$$

where A = amplitude of reflection from asphalt, and A_{pl} = amplitude of reflection from metal plate (negative of incident amplitude) (Roddis, et. al., 1992). Table C1 shows typical dielectric constants and associated GPR velocities for pavement materials. Note that the range of dielectric constant for asphalt is large, due to the variations in density and aggregate composition.

Table C1 – GPR Velocities and Dielectric Constants for Pavement Materials

| VELOCITY | | | DIELECTRIC CONSTANT | NOTES |
|----------|-------|---------|------------------------|---------------------------|
| METRIC | | ENGLISH | | |
| M/NS | CM/NS | IN/NS | | |
| 0.90 | 9.0 | 3.54 | 11.00 | ↑ typical for PCC ↓ |
| 0.100 | 10.0 | 3.94 | 9.00 | |
| 0.105 | 10.5 | 4.13 | 8.16 | |
| 0.110 | 11.0 | 4.33 | 7.44 | |
| 0.115 | 11.5 | 4.53 | 6.81 | |
| 0.120 | 12.0 | 4.72 | 6.25 | |
| 0.125 | 12.5 | 4.92 | 5.76 | |
| 0.130 | 13.0 | 5.12 | 5.33 | |
| 0.135 | 13.5 | 5.31 | 4.94 | |
| 0.140 | 14.0 | 5.51 | 4.59 | |
| 0.145 | 14.5 | 5.71 | 4.28 | ↓ typical for AC |
| 0.150 | 15.0 | 5.90 | 4.00 | |
| 0.155 | 15.5 | 6.10 | 3.75 | |

A similar calculation can be made for the dielectric constant of the base material. Changes in base moisture content have a strong effect on the base dielectric constant, and thus the base dielectric constant can be used as an indicator of high moisture content.

The calculations described above are automated in Infrasense’s *winDecar*® data analysis software program for computing pavement layer thickness and changes in pavement layer properties. The analytical techniques described above serve as the basis for data analysis carried out during this project, as described in Section 3 of the report.

References

- ASTM D 4748–98, “Standard Test Method for Determining the Thickness of Bound Pavement Layers Using Short-Pulse Radar.” Annual Book of ASTM Standards, American Society for Testing and Materials (March 1998).
- Maser, K.R., Scullion, T., “Influence of Asphalt Layering and Surface Treatments on Asphalt and Base Layer Thickness Computations Using Radar.” Texas DOTPD Report TX-92-1923-1, Austin, TX (1992b).
- Roddis, W.M., Kim, Maser, K.R., and Gisi, A.J., “Radar Pavement Thickness Evaluations for Varying Base Conditions,” Transportation Research Record No. 1355, TRB National Research Council, pp. 90-98, 1992.



PROJECT NEXT

APPENDIX C

Pavement Joint Evaluation Report by PTS



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October 15, 2019

Mr. Jesse Darden, P.E.
4880 Sadler Road, Suite 100
Glen Allen, VA 23060-6164

Re: I-495 NEXT
Pavement Joint Evaluation
Final Report

Dear Mr. Darden:

This letter report has been prepared by PTS for HDR Engineering, Inc. (HDR) for the pavement joint evaluation of approximately 2.4 miles of existing I-495 southbound in Fairfax County, Virginia as part of the I-495 Northeast Extension project. The project begins at the southern abutment of the American Legion Memorial Bridge at approximately Station 1215+00 over the Potomac River and extends to the south to Station 1088+00. In general, there are typically four (4) travel lanes and two shoulders that make up the project alignment.

PROJECT TASKS

TASK 1: PAVEMENT JOINT CONDITION SURVEY

PTS conducted a pavement joint condition survey of the project pavements which included both the existing mainline travel lanes and existing shoulders. While the primary purpose of the condition survey was to locate and record the condition of reflective cracking exhibited in the asphalt concrete above existing joints in the underlying concrete pavement, other encountered pavement distress that would warrant separate repair during resurfacing was also recorded.

The condition survey was performed at night under traffic control utilizing a light plant on April 23rd through April 29th, 2019. The field team consisted of two representatives from PTS. One PTS representative ran a measuring wheel to track the field station location of each joint recorded. The field baseline established along the roadway by HDR in 100-foot Stations was utilized and the measuring wheel was reset at each Station. The second PTS representative maintained a field log of the recorded information. This log included the joint number, station location, joint repair type (provided by TU from a previous project on I-395), and joint / crack width visible in the field. The joint repair type criteria used for classifying the observed transverse joint reflection cracks is summarized in Table 1.

Table 1
Joint Assessment / Repair Criteria

| Repair Type | Criteria |
|--------------------|--|
| Type 1 | Observed pavement distress includes a single reflective crack over a joint having a width of ½" or less. |
| Type 3 | Observed pavement distress includes a primary reflective crack over a joint surrounded by additional cracking. |
| Type 4 | Previous utility crossing patch or previous pavement repair over an existing joint. |

In order to track the lane location of recorded distress, the shoulders and lanes were numbered from the inside of the roadway to the outside. The following designations presented in Table 2 were utilized for the mainline roadway:

Table 2
Lane / Shoulder Designations

| Designation | Location |
|--------------------|---------------------|
| Shoulder 1 | Inside Shoulder |
| Lane 1 | Inside Lane |
| Lane 2 | Left Interior Lane |
| Lane 3 | Right Interior Lane |
| Lane 4 | Outside Lane |
| Shoulder 2 | Outside Shoulder |

Due to the width of the roadway, the condition survey had to be performed in three passes under traffic control. The first pass was conducted by closing the inside shoulder and the inside two lanes. The second pass was conducted by closing the outside shoulder and outside two lanes. The third pass was performed on the pass-through ramp at the GW Parkway intersection by closing one lane and shoulder. It should be noted that lane/shoulder designations in this area were Ramp 1 and Ramp 2 for the two travel lanes and Shoulder 3 and Shoulder 4 for the two shoulders to prevent confusion with the mainline shoulders.

TASK 2: NON-DESTRUCTIVE TESTING (NDT) OF PAVEMENT JOINTS

PTS conducted the NDT at night under traffic control with a light plant on April 30th through May 2nd, 2019 with our Dynatest Model 8000 Falling Weight Deflectometer (FWD). The field crew consisted of two PTS technicians. One of the technicians served as the FWD operator and the second worked to locate the joints for testing, record the appropriate Station, and assist the operator for correctly positioning the FWD at each joint. The testing was performed in each of the two inside travel lanes (Lanes 1 and 2).

The collection of FWD data for joint-load transfer efficiency necessitates that 12-inch diameter load plate of the FWD is located immediately adjacent to the transverse joint being tested. This provides that the center of the load plate and first deflection sensor (D1) are located 6 inches from the joint. This also provides that the sensor located at 12 inches (D3) is positioned 6 inches from the joint as well.

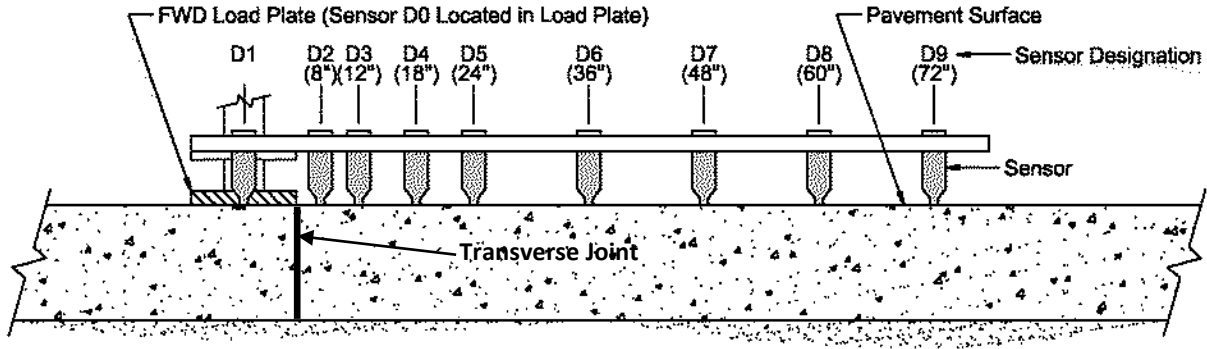


Figure 1 – FWD Load Plate and Sensor Configuration

At each NDT test location, a seating drop followed by three recorded load applications were applied to the pavement surface. For each load application, the corresponding pavement deflections were measured and automatically recorded in the FWD’s on-board computer. PTS reviewed and reduced the raw data collected during the NDT testing. The raw data was reviewed for any anomalies recorded during testing.

TASK 3: LOAD TRANSFER EFFICIENCY ANALYSIS

The collected FWD data has been analyzed to assess the load transfer efficiency at each tested transverse joint. A total of 205 joints were tested in Lane 1 and 200 joints tested in Lane 2. The load transfer analyses were performed utilizing the AASHTO methodology which is a ratio of deflection in the adjacent loaded and unloaded slabs at each test location. AASHTO indicates that this method applies to jointed concrete pavement with or without asphalt concrete overlays. The Joint Load Transfer Efficiency is defined as follows:

- Joint-Load Transfer Efficiency (LTE) = $d_u / d_l \times 100$ where,
 - d_u = Deflection (D3) at the joint of the unloaded slab and,
 - d_l = Deflection (D1) at the joint of the loaded slab

TASK 4: SUMMARY LETTER REPORT

PTS has prepared this report to summarize the findings of the pavement joint condition survey and joint-load-transfer efficiency. This report includes the following:

- Joint Condition Survey Results
- Joint-Load-Transfer Efficiency for Lanes 1 and 2
- Summary of Other Observed Pavement Distress

RESULTS

Pavement Joint Condition Survey

As mentioned previously, the pavement joint condition survey was conducted utilizing the criteria presented in Table 1. The results are presented in “Attachment 1 – Joint Condition Survey Results” and summarized in Table 3.

Table 3
Summary of Joint Condition Survey

| Joint/Crack Type | Number of Locations | Percent |
|------------------|---------------------|-------------|
| Type 1 | 399 | 70% |
| Type 3 | 167 | 30% |
| Type 4 | 0 | 0% |
| Total | 566 | 100% |

It should be noted that the number of locations is based on Station location utilizing the field marked baseline. The results presented in Attachment 1 include the Station location, joint/crack type, crack width, crack length, and lane/shoulder designations included at each location. Attachment 4 includes some photographs of typical Type 1 and Type 3 cracking.

Joint Load Transfer Efficiency

The results of the joint load transfer efficiency (LTE) are included in Attachment 1 and the detailed data and results are presented in “Attachment 2 – Joint Load Transfer Efficiency Results”. A summary of the LTE by Joint/Crack Type for the 405 joints tested in Lanes 1 and 2 are presented in Table 4.

Table 4
Summary of LTE in Lanes 1 and 2

| LTE | Percentage (Number) of Tested Joints | | |
|---------------------|--------------------------------------|------------|-------------|
| | Type 1 | Type 3 | Total |
| Acceptable (≥70%) | 71.6% (202) | 56.9% (70) | 67.2% (272) |
| Fair (>50% to <70%) | 26.2% (74) | 39.0% (48) | 30.1% (122) |
| Poor (≤ 50%) | 2.1% (6) | 4.1% (5) | 2.7% (11) |

Additional Observed Pavement Distress

During the scoping phase of the project, HDR asked that any pavement distress, other than the Type 1, 3, or 4 joints, that may warrant repair be noted by PTS during the pavement joint condition survey. Other distresses observed during the survey were noted to include alligator cracking, potholes, small patches, depressions, edge cracking. There were 43 areas noted on the mainline and another 4 locations on the parallel GW Parkway Ramp. It should be noted that most of these other distresses appeared to be associated with longitudinal joints or asphalt concrete paving lane deterioration, especially the alligator cracking which is typically associated with full-depth asphalt pavement and not a composite pavement section. Cracking at longitudinal joints or paving lanes that had started to ravel or spread gave the appearance of alligator cracking. Patching appeared to be primarily small and placed to covered potholes or other distress occurring at longitudinal or transverse joints. Some typical photographs of these distresses are included in Attachment 4.

RECOMMENDATIONS

It is our understanding that the existing southbound lanes of I-495 are planned to be rehabilitated by performing Type 1, 3, and 4 repairs prior to resurfacing and the resurfacing would likely consist of milling and replacing 2 inches of asphalt concrete.

We reviewed the results of both the pavement joint condition survey and LTE analyses in attempt to determine if there was any correlation between the joint/crack type and LTE for use in developing the recommended repair program. The observed crack widths ranged widely from 1/8th-inch to 20 inches. A summary of crack widths and associated average LTE is presented in Table 5.

Table 5
Crack Width and Average LTE

| Crack Width (in.) | Average LTE |
|--------------------------|--------------------|
| ≤0.5 | 74% |
| 0.5 to 2 | 73% |
| 2 to 4 | 76% |
| 4 to 6 | 73% |
| 6 to 8 | 72% |
| 8 to 10 | 72% |
| 10 to 12 | 68% |
| >12 | 67% |

The average LTE for the ranged of crack widths in Table 5 is generally around 72% with only 2 to 5 points in variation. Therefore, there is little to no correlation between crack width and LTE. It should also be noted that of the eleven (11) joints tested that exhibited poor LTE (<50%), six (6) were Type 1 and five (5) were Type 3 which further substantiates no correlation between crack width and LTE.

This could be due to joints being raveled or open at the top just under the asphalt concrete, but have intact load transfer devices. However, joints that have sufficient load transfer, but are exhibiting excessive cracking are still a long-term issue. Therefore, we recommend that the joints exhibiting some of the worst cracking be considered for the full-depth Type 4 repair along with the eleven (11) joints in Lanes 1 and 2 that resulting in LTE < 50%. Table 6 includes a summary of the number of joints/cracks greater than or equal to 6 to 12 inches.

Table 6
Crack Width Comparison

| Crack Width (in.) | Number Greater Than or To |
|--------------------------|----------------------------------|
| 6 | 109 |
| 8 | 76 |
| 10 | 49 |
| 12 | 28 |

If you have any questions, comments, or would like to discuss, please call me at your convenience.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. L. Dodson, III".

Robert L. Dodson, III, P.E.

Vice President

Attachment 1 – Joint Condition Survey Results

Attachment 2 – Joint Load Transfer Efficiency Results

Attachment 3 – Summary of Other Observed Pavement Distress

Attachment 4 – Photographs of Typical Conditions

Attachment 1
Joint Condition Survey Results

REFER TO TABLE C-1 IN APPENDIX C

Attachment 2
Joint Load Transfer Efficiency Results

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1091+30 | 3 | 9,633 | 5.99 | 4.46 | 4.03 | 3.76 | 3.33 | 2.82 | 2.41 | 1.89 | 1.55 | 67% |
| Lane 1 | 1091+54 | 3 | 9,601 | 5.01 | 3.50 | 3.30 | 2.87 | 2.57 | 2.23 | 1.89 | 1.55 | 1.31 | 66% |
| Lane 2 | 1091+58 | 3 | 9,664 | 5.94 | 4.40 | 3.95 | 3.65 | 3.35 | 2.81 | 2.45 | 1.97 | 1.60 | 66% |
| Lane 2 | 1091+58 | 3 | 9,660 | 5.57 | 3.44 | 3.04 | 2.83 | 2.57 | 2.24 | 1.93 | 1.57 | 1.26 | 55% |
| Lane 2 | 1092+35 | 3 | 9,691 | 5.69 | 4.88 | 3.62 | 2.70 | 2.51 | 2.02 | 1.71 | 1.49 | 1.28 | 64% |
| Lane 2 | 1092+83 | 3 | 9,672 | 5.92 | 3.93 | 3.39 | 3.15 | 2.87 | 2.42 | 2.06 | 1.63 | 1.37 | 57% |
| Lane 2 | 1093+16 | 3 | 9,760 | 4.04 | 3.28 | 2.85 | 2.65 | 2.37 | 1.97 | 1.66 | 1.39 | 1.07 | 71% |
| Lane 1 | 1093+95 | 3 | 9,609 | 3.98 | 2.43 | 2.17 | 1.96 | 1.83 | 1.60 | 1.48 | 1.15 | 1.12 | 55% |
| Lane 2 | 1093+95 | 3 | 9,771 | 3.19 | 2.51 | 2.44 | 2.01 | 1.70 | 1.42 | 1.23 | 1.11 | 0.85 | 76% |
| Lane 1 | 1094+71 | 3 | 9,548 | 4.02 | 2.58 | 2.34 | 1.98 | 1.89 | 1.52 | 1.63 | 1.40 | 1.19 | 58% |
| Lane 2 | 1094+71 | 3 | 9,803 | 3.98 | 3.17 | 2.74 | 2.48 | 2.24 | 2.07 | 1.61 | 1.39 | 1.11 | 69% |
| Lane 1 | 1095+21 | 3 | 9,521 | 4.16 | 2.86 | 2.56 | 2.34 | 2.13 | 1.93 | 1.65 | 1.37 | 1.16 | 62% |
| Lane 2 | 1095+21 | 3 | 9,728 | 3.20 | 2.37 | 2.23 | 2.07 | 1.90 | 1.64 | 1.43 | 1.18 | 1.00 | 70% |
| Lane 1 | 1095+80 | 3 | 9,617 | 4.62 | 3.15 | 2.74 | 2.41 | 2.24 | 1.92 | 1.67 | 1.39 | 1.31 | 59% |
| Lane 2 | 1095+80 | 3 | 9,664 | 4.76 | 3.63 | 3.10 | 2.44 | 2.22 | 1.90 | 1.65 | 1.41 | 1.07 | 65% |
| Lane 1 | 1096+52 | 3 | 9,604 | 6.23 | 4.53 | 4.03 | 3.81 | 3.45 | 2.87 | 2.57 | 1.94 | 1.80 | 65% |
| Lane 2 | 1096+52 | 3 | 9,823 | 4.58 | 3.98 | 3.61 | 3.39 | 3.02 | 2.69 | 2.33 | 1.91 | 1.56 | 79% |
| Lane 1 | 1097+23 | 3 | 9,612 | 4.86 | 3.79 | 3.67 | 3.37 | 3.09 | 2.70 | 2.38 | 1.86 | 1.74 | 76% |
| Lane 2 | 1097+23 | 3 | 9,768 | 4.17 | 3.58 | 3.46 | 3.25 | 3.01 | 2.61 | 2.25 | 1.95 | 1.67 | 83% |
| Lane 1 | 1097+41 | 3 | 9,604 | 5.61 | 4.44 | 3.99 | 3.75 | 3.43 | 2.86 | 2.39 | 1.91 | 1.70 | 71% |
| Lane 2 | 1097+41 | 3 | 9,803 | 5.10 | 4.38 | 4.06 | 3.70 | 3.33 | 2.73 | 2.25 | 1.91 | 1.54 | 80% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1098+00 | 3 | 9,636 | 6.48 | 4.98 | 4.43 | 4.00 | 3.58 | 2.86 | 2.52 | 1.94 | 1.78 | 68% |
| Lane 2 | 1098+00 | 3 | 9,826 | 4.54 | 4.02 | 3.65 | 3.30 | 3.06 | 2.61 | 2.37 | 1.86 | 1.62 | 80% |
| Lane 2 | 1098+78 | 3 | 9,795 | 3.63 | 3.08 | 2.98 | 2.79 | 2.59 | 2.29 | 1.99 | 1.67 | 1.43 | 82% |
| Lane 1 | 1099+02 | 3 | 9,585 | 6.28 | 4.92 | 4.41 | 3.94 | 3.69 | 3.25 | 2.93 | 2.31 | 1.80 | 70% |
| Lane 2 | 1099+02 | 3 | 9,787 | 4.87 | 4.35 | 4.02 | 3.57 | 3.38 | 2.91 | 2.69 | 2.20 | 1.83 | 83% |
| Lane 1 | 1099+87 | 3 | 9,585 | 6.53 | 4.47 | 3.89 | 3.65 | 3.53 | 2.98 | 2.59 | 2.10 | 1.93 | 60% |
| Lane 2 | 1099+87 | 3 | 9,771 | 5.74 | 4.99 | 4.39 | 4.02 | 3.76 | 3.19 | 2.80 | 2.30 | 1.94 | 76% |
| Lane 1 | 1100+33 | 3 | 9,601 | 7.03 | 4.72 | 4.10 | 3.83 | 3.48 | 3.06 | 2.81 | 2.09 | 1.96 | 58% |
| Lane 2 | 1100+33 | 3 | 9,776 | 7.70 | 6.90 | 6.10 | 4.80 | 4.22 | 3.62 | 3.21 | 2.71 | 2.36 | 79% |
| Lane 1 | 1101+30 | 3 | 9,620 | 5.56 | 4.32 | 3.76 | 3.39 | 3.07 | 2.69 | 2.27 | 1.82 | 1.46 | 68% |
| Lane 2 | 1101+30 | 3 | 9,850 | 6.31 | 5.81 | 5.31 | 4.52 | 4.06 | 3.54 | 3.03 | 2.52 | 2.15 | 84% |
| Lane 1 | 1101+50 | 3 | 9,617 | 6.48 | 5.45 | 4.18 | 3.55 | 3.21 | 2.82 | 2.48 | 2.04 | 1.64 | 65% |
| Lane 2 | 1101+50 | 3 | 9,791 | 7.72 | 6.67 | 6.02 | 5.42 | 4.94 | 4.36 | 3.98 | 2.99 | 2.59 | 78% |
| Lane 1 | 1102+35 | 3 | 9,612 | 5.79 | 4.71 | 4.35 | 3.94 | 3.69 | 3.17 | 2.76 | 2.22 | 1.71 | 75% |
| Lane 2 | 1102+35 | 3 | 9,863 | 4.23 | 3.48 | 3.34 | 3.04 | 2.83 | 2.41 | 2.27 | 1.72 | 1.64 | 79% |
| Lane 2 | 1102+35 | 3 | 9,807 | 5.45 | 4.85 | 3.95 | 3.51 | 3.23 | 2.77 | 2.37 | 2.04 | 1.59 | 72% |
| Lane 1 | 1102+76 | 3 | 9,644 | 5.37 | 3.99 | 3.39 | 3.07 | 2.85 | 2.37 | 2.22 | 1.76 | 1.72 | 63% |
| Lane 1 | 1103+25 | 3 | 9,667 | 6.10 | 4.07 | 3.86 | 3.59 | 3.28 | 2.83 | 2.39 | 1.99 | 1.58 | 63% |
| Lane 2 | 1103+25 | 3 | 9,803 | 5.02 | 4.54 | 3.87 | 3.62 | 3.25 | 2.83 | 2.45 | 2.09 | 1.70 | 77% |
| Lane 1 | 1103+76 | 3 | 9,640 | 5.33 | 4.09 | 3.63 | 3.44 | 3.19 | 2.71 | 2.32 | 1.98 | 1.61 | 68% |
| Lane 1 | 1104+28 | 3 | 9,656 | 5.86 | 4.13 | 3.94 | 3.69 | 3.38 | 2.90 | 2.50 | 2.02 | 1.63 | 67% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1104+69 | 3 | 9,839 | 4.07 | 3.00 | 2.76 | 2.65 | 2.52 | 2.23 | 2.03 | 1.74 | 1.52 | 68% |
| Lane 2 | 1104+77 | 1 | 9,839 | 4.34 | 3.71 | 3.41 | 3.15 | 2.93 | 2.49 | 2.18 | 1.86 | 1.59 | 79% |
| Lane 1 | 1105+09 | 1 | 9,760 | 3.16 | 2.50 | 2.56 | 2.36 | 2.23 | 1.95 | 1.73 | 1.58 | 1.33 | 81% |
| Lane 2 | 1105+26 | 3 | 9,783 | 3.99 | 3.58 | 3.37 | 3.00 | 2.78 | 2.57 | 2.27 | 1.76 | 1.62 | 84% |
| Lane 1 | 1105+75 | 3 | 9,771 | 4.18 | 2.80 | 2.57 | 2.43 | 2.27 | 1.97 | 1.81 | 1.54 | 1.38 | 61% |
| Lane 2 | 1105+75 | 3 | 9,755 | 4.40 | 3.53 | 3.17 | 2.93 | 2.63 | 2.36 | 2.08 | 1.78 | 1.44 | 72% |
| Lane 1 | 1106+01 | 3 | 9,842 | 3.22 | 2.58 | 2.48 | 2.38 | 2.25 | 2.02 | 1.83 | 1.59 | 1.38 | 77% |
| Lane 2 | 1106+29 | 1 | 9,799 | 4.27 | 3.46 | 3.40 | 2.99 | 2.76 | 2.41 | 2.10 | 1.73 | 1.41 | 80% |
| Lane 1 | 1106+54 | 1 | 9,810 | 3.07 | 2.59 | 2.43 | 2.32 | 2.11 | 1.88 | 1.73 | 1.49 | 1.16 | 79% |
| Lane 2 | 1106+78 | 3 | 9,799 | 4.83 | 3.72 | 3.30 | 3.04 | 2.79 | 2.41 | 2.07 | 1.76 | 1.50 | 68% |
| Lane 1 | 1106+89 | 1 | 9,842 | 3.33 | 2.74 | 2.65 | 2.41 | 2.26 | 2.00 | 1.75 | 1.52 | 1.34 | 80% |
| Lane 1 | 1107+58 | 1 | 9,795 | 3.39 | 2.82 | 2.79 | 2.71 | 2.45 | 2.18 | 1.99 | 1.79 | 1.50 | 82% |
| Lane 1 | 1107+94 | 3 | 9,807 | 4.26 | 3.36 | 3.26 | 3.00 | 2.81 | 2.56 | 2.31 | 2.21 | 1.80 | 77% |
| Lane 2 | 1107+94 | 3 | 9,771 | 4.46 | 3.48 | 3.37 | 3.16 | 2.97 | 2.57 | 2.24 | 1.87 | 1.61 | 76% |
| Lane 1 | 1108+57 | 3 | 9,823 | 3.77 | 2.94 | 2.84 | 2.68 | 2.53 | 2.35 | 2.31 | 1.74 | 1.54 | 75% |
| Lane 2 | 1108+57 | 1 | 9,776 | 4.45 | 3.81 | 3.67 | 3.46 | 3.37 | 3.06 | 2.80 | 2.17 | 2.06 | 82% |
| Lane 1 | 1108+85 | 3 | 9,787 | 3.26 | 2.61 | 2.61 | 2.38 | 2.23 | 1.98 | 1.84 | 1.60 | 1.36 | 80% |
| Lane 2 | 1108+85 | 3 | 9,791 | 4.63 | 4.07 | 4.04 | 3.87 | 3.58 | 3.33 | 2.92 | 2.55 | 1.95 | 87% |
| Lane 1 | 1108+98 | 3 | 9,795 | 3.85 | 2.83 | 2.96 | 2.75 | 2.56 | 2.24 | 2.14 | 1.96 | 1.81 | 77% |
| Lane 2 | 1108+98 | 3 | 9,807 | 3.95 | 2.91 | 2.79 | 2.65 | 2.52 | 2.01 | 1.86 | 1.63 | 1.23 | 71% |
| Lane 1 | 1109+54 | 3 | 9,934 | 4.09 | 3.30 | 3.09 | 2.91 | 2.67 | 2.39 | 2.09 | 1.81 | 1.53 | 76% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1109+54 | 3 | 9,826 | 4.73 | 4.22 | 4.03 | 3.47 | 3.21 | 2.63 | 2.22 | 1.83 | 1.49 | 85% |
| Lane 1 | 1109+85 | 1 | 9,950 | 3.92 | 3.25 | 3.13 | 2.88 | 2.69 | 2.48 | 2.31 | 2.01 | 1.87 | 80% |
| Lane 2 | 1109+85 | 1 | 9,803 | 5.64 | 4.93 | 4.63 | 4.25 | 3.98 | 3.54 | 3.15 | 2.66 | 2.24 | 82% |
| Lane 1 | 1110+75 | 3 | 9,866 | 5.41 | 4.42 | 4.33 | 3.89 | 3.46 | 3.15 | 2.71 | 2.27 | 2.13 | 80% |
| Lane 2 | 1110+75 | 3 | 9,667 | 6.40 | 5.63 | 4.55 | 4.17 | 3.82 | 3.55 | 3.11 | 2.49 | 2.19 | 71% |
| Lane 1 | 1111+24 | 1 | 9,993 | 5.39 | 4.60 | 4.32 | 4.01 | 3.74 | 3.25 | 2.93 | 2.50 | 2.11 | 80% |
| Lane 2 | 1111+24 | 3 | 9,755 | 7.09 | 6.47 | 6.06 | 5.58 | 5.19 | 4.54 | 3.97 | 3.31 | 2.85 | 85% |
| Lane 1 | 1111+39 | 1 | 10,014 | 5.30 | 4.57 | 4.34 | 4.08 | 3.84 | 3.40 | 3.06 | 2.61 | 2.29 | 82% |
| Lane 1 | 1111+53 | 3 | 10,049 | 5.50 | 4.57 | 4.56 | 4.08 | 3.65 | 3.10 | 2.89 | 2.46 | 1.81 | 83% |
| Lane 2 | 1111+53 | 3 | 9,874 | 5.41 | 4.79 | 4.56 | 4.38 | 4.21 | 3.45 | 3.10 | 2.60 | 2.15 | 84% |
| Lane 1 | 1112+14 | 1 | 10,061 | 7.04 | 3.29 | 3.01 | 2.65 | 2.59 | 2.25 | 1.99 | 1.81 | 1.41 | 43% |
| Lane 2 | 1112+20 | 3 | 9,855 | 5.63 | 5.42 | 5.31 | 4.71 | 4.39 | 3.77 | 3.30 | 2.79 | 2.38 | 94% |
| Lane 2 | 1112+53 | 3 | 9,675 | 11.06 | 10.03 | 9.02 | 7.94 | 7.17 | 5.96 | 5.06 | 4.00 | 2.90 | 82% |
| Lane 1 | 1115+32 | 3 | 9,791 | 5.79 | 4.89 | 3.82 | 3.24 | 2.92 | 2.52 | 2.18 | 1.89 | 8.61 | 66% |
| Lane 2 | 1115+32 | 3 | 9,755 | 7.35 | 5.74 | 5.13 | 4.68 | 4.15 | 3.56 | 3.11 | 2.69 | 3.64 | 70% |
| Lane 1 | 1115+71 | 1 | 9,858 | 4.94 | 4.31 | 3.57 | 2.72 | 2.47 | 2.15 | 1.99 | 1.68 | 9.28 | 72% |
| Lane 2 | 1115+71 | 1 | 9,807 | 4.22 | 3.58 | 3.58 | 3.24 | 2.91 | 2.55 | 2.35 | 1.90 | 1.46 | 85% |
| Lane 2 | 1116+17 | 3 | 9,803 | 5.00 | 3.94 | 3.71 | 3.47 | 3.12 | 2.69 | 2.28 | 2.00 | 0.93 | 74% |
| Lane 1 | 1116+18 | 1 | 9,839 | 4.44 | 3.33 | 3.04 | 2.84 | 2.65 | 2.24 | 1.89 | 1.67 | 0.78 | 68% |
| Lane 1 | 1116+68 | 1 | 9,882 | 3.71 | 3.10 | 2.90 | 2.28 | 2.13 | 1.88 | 1.56 | 1.29 | 11.07 | 78% |
| Lane 2 | 1116+68 | 3 | 9,842 | 4.33 | 3.93 | 3.56 | 3.26 | 2.96 | 2.66 | 2.33 | 2.03 | 6.61 | 82% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1117+15 | 3 | 9,882 | 4.15 | 3.13 | 3.09 | 2.74 | 2.49 | 2.26 | 1.94 | 1.56 | 1.15 | 74% |
| Lane 1 | 1117+37 | 1 | 9,826 | 2.98 | 2.35 | 2.19 | 2.09 | 1.85 | 1.68 | 1.62 | 1.36 | 9.16 | 73% |
| Lane 1 | 1117+73 | 1 | 9,874 | 3.17 | 2.39 | 2.24 | 2.02 | 1.86 | 1.57 | 1.56 | 1.28 | 8.78 | 71% |
| Lane 2 | 1117+73 | 1 | 9,823 | 4.61 | 3.93 | 3.80 | 3.45 | 3.22 | 2.66 | 2.34 | 1.92 | 0.00 | 82% |
| Lane 1 | 1117+91 | 1 | 9,922 | 3.01 | 2.33 | 2.20 | 2.02 | 1.86 | 1.59 | 1.46 | 1.20 | 0.63 | 73% |
| Lane 2 | 1117+91 | 1 | 9,906 | 3.74 | 3.15 | 3.14 | 2.83 | 2.56 | 2.27 | 1.96 | 1.63 | 1.04 | 84% |
| Lane 1 | 1118+16 | 1 | 9,879 | 2.55 | 2.14 | 2.00 | 1.92 | 1.82 | 1.61 | 1.45 | 1.24 | 1.09 | 78% |
| Lane 1 | 1118+65 | 1 | 9,934 | 3.51 | 2.77 | 2.56 | 2.33 | 2.13 | 1.87 | 1.69 | 1.37 | 0.77 | 73% |
| Lane 2 | 1118+65 | 1 | 9,906 | 4.40 | 3.85 | 3.69 | 3.31 | 3.04 | 2.70 | 2.30 | 1.92 | 9.20 | 84% |
| Lane 1 | 1118+96 | 1 | 9,850 | 2.83 | 2.10 | 2.11 | 1.94 | 1.82 | 1.74 | 1.48 | 1.31 | 8.08 | 75% |
| Lane 2 | 1119+14 | 1 | 9,842 | 4.53 | 3.69 | 3.53 | 3.30 | 3.05 | 2.72 | 2.42 | 2.09 | 5.70 | 78% |
| Lane 2 | 1119+63 | 1 | 9,882 | 4.55 | 4.01 | 3.96 | 3.55 | 3.28 | 2.97 | 2.41 | 1.98 | 1.45 | 87% |
| Lane 1 | 1119+73 | 1 | 9,866 | 2.81 | 2.41 | 2.15 | 1.96 | 1.86 | 1.89 | 1.64 | 1.48 | 1.38 | 77% |
| Lane 2 | 1119+73 | 1 | 9,879 | 4.36 | 3.78 | 3.67 | 3.43 | 3.17 | 2.81 | 2.49 | 2.17 | 1.44 | 84% |
| Lane 1 | 1120+22 | 1 | 9,866 | 3.27 | 2.65 | 2.47 | 2.35 | 2.05 | 1.83 | 1.69 | 1.45 | 9.00 | 76% |
| Lane 2 | 1120+22 | 1 | 9,903 | 3.91 | 3.33 | 3.39 | 3.07 | 2.97 | 2.58 | 2.30 | 1.92 | 7.12 | 87% |
| Lane 1 | 1120+85 | 1 | 9,934 | 2.10 | 1.60 | 1.53 | 1.35 | 1.26 | 1.15 | 1.11 | 0.87 | 0.92 | 73% |
| Lane 1 | 1121+08 | 1 | 9,953 | 2.19 | 1.38 | 1.29 | 1.21 | 1.07 | 0.96 | 0.87 | 0.75 | 1.30 | 59% |
| Lane 2 | 1121+08 | 1 | 9,911 | 3.87 | 3.20 | 3.09 | 2.86 | 2.68 | 2.51 | 2.04 | 1.44 | 1.28 | 80% |
| Lane 2 | 1121+12 | 1 | 9,942 | 4.07 | 3.52 | 3.37 | 2.89 | 2.59 | 2.22 | 1.80 | 1.41 | 0.76 | 83% |
| Lane 1 | 1121+68 | 1 | 9,898 | 2.52 | 1.96 | 1.83 | 1.63 | 1.50 | 1.33 | 1.16 | 0.95 | 0.52 | 73% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1122+11 | 1 | 9,863 | 3.58 | 3.04 | 2.80 | 2.58 | 2.40 | 2.02 | 1.82 | 1.46 | 1.19 | 78% |
| Lane 2 | 1122+11 | 1 | 9,961 | 4.53 | 4.00 | 3.88 | 3.58 | 3.14 | 2.73 | 2.30 | 1.89 | 1.55 | 86% |
| Lane 2 | 1122+60 | 3 | 9,906 | 4.11 | 3.57 | 3.17 | 2.77 | 2.49 | 2.13 | 1.84 | 1.58 | 5.81 | 77% |
| Lane 1 | 1122+75 | 1 | 9,879 | 3.17 | 2.26 | 2.23 | 2.07 | 1.91 | 1.60 | 1.36 | 1.13 | 0.44 | 70% |
| Lane 1 | 1123+09 | 3 | 9,874 | 3.39 | 2.63 | 2.45 | 2.28 | 2.03 | 1.75 | 1.44 | 1.19 | 12.84 | 72% |
| Lane 2 | 1123+09 | 1 | 9,906 | 4.98 | 3.59 | 3.38 | 3.05 | 2.66 | 2.37 | 1.83 | 1.46 | 8.41 | 68% |
| Lane 1 | 1123+37 | 1 | 9,919 | 2.33 | 1.80 | 1.62 | 1.49 | 1.37 | 1.23 | 1.03 | 0.90 | 0.75 | 70% |
| Lane 2 | 1123+96 | 1 | 9,950 | 3.89 | 3.06 | 2.71 | 2.32 | 2.04 | 1.75 | 1.39 | 1.03 | 0.45 | 70% |
| Lane 1 | 1124+00 | 1 | 9,922 | 2.01 | 1.54 | 1.39 | 1.27 | 1.10 | 0.99 | 0.79 | 0.52 | 8.87 | 69% |
| Lane 2 | 1124+58 | 3 | 9,930 | 5.86 | 4.46 | 3.87 | 3.28 | 2.95 | 2.45 | 2.06 | 1.59 | 1.20 | 66% |
| Lane 1 | 1124+64 | 1 | 9,882 | 3.35 | 2.61 | 2.21 | 2.02 | 1.78 | 1.47 | 1.26 | 1.07 | 0.84 | 66% |
| Lane 1 | 1125+05 | 1 | 9,887 | 3.03 | 2.53 | 2.28 | 2.15 | 1.93 | 1.68 | 1.53 | 1.31 | 12.18 | 75% |
| Lane 2 | 1125+05 | 1 | 9,834 | 5.60 | 4.29 | 3.99 | 3.43 | 3.02 | 2.58 | 2.22 | 1.77 | 5.72 | 71% |
| Lane 1 | 1125+31 | 3 | 9,850 | 5.15 | 3.76 | 3.22 | 2.80 | 2.50 | 2.09 | 1.78 | 1.48 | 11.28 | 63% |
| Lane 2 | 1125+31 | 3 | 9,803 | 11.02 | 8.02 | 5.18 | 4.44 | 3.89 | 3.28 | 2.80 | 2.17 | 1.70 | 47% |
| Lane 1 | 1125+56 | 3 | 9,914 | 4.42 | 4.32 | 3.67 | 2.61 | 2.33 | 2.13 | 1.76 | 1.41 | 0.63 | 83% |
| Lane 2 | 1125+56 | 3 | 9,839 | 7.76 | 5.90 | 5.51 | 4.91 | 4.34 | 3.66 | 2.93 | 2.40 | 17.06 | 71% |
| Lane 1 | 1125+94 | 1 | 9,842 | 4.07 | 3.59 | 3.37 | 3.04 | 2.83 | 2.45 | 2.15 | 1.82 | 11.05 | 83% |
| Lane 2 | 1125+94 | 1 | 9,938 | 6.26 | 5.41 | 5.13 | 4.69 | 4.30 | 3.88 | 3.50 | 2.90 | 5.44 | 82% |
| Lane 1 | 1126+07 | 1 | 9,879 | 3.52 | 2.98 | 2.98 | 2.84 | 2.68 | 2.42 | 2.16 | 1.80 | 10.40 | 85% |
| Lane 1 | 1126+07 | 1 | 9,874 | 3.50 | 2.99 | 2.93 | 2.83 | 2.62 | 2.39 | 2.29 | 1.79 | 9.64 | 84% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1126+07 | 1 | 9,953 | 7.68 | 6.33 | 5.82 | 5.23 | 4.69 | 4.11 | 3.61 | 3.08 | 4.11 | 76% |
| Lane 1 | 1126+29 | 3 | 9,895 | 4.16 | 3.95 | 3.48 | 3.31 | 3.00 | 2.57 | 2.31 | 1.96 | 1.20 | 84% |
| Lane 1 | 1126+29 | 3 | 9,823 | 5.37 | 5.37 | 4.48 | 4.07 | 3.59 | 3.06 | 2.59 | 2.07 | 10.85 | 83% |
| Lane 2 | 1126+29 | 3 | 9,969 | 6.80 | 6.07 | 5.78 | 5.22 | 4.94 | 4.41 | 3.52 | 3.03 | 2.61 | 85% |
| Lane 2 | 1126+83 | 1 | 9,871 | 8.44 | 7.10 | 6.81 | 6.17 | 5.61 | 4.93 | 4.02 | 3.23 | 6.50 | 81% |
| Lane 2 | 1127+06 | 3 | 10,001 | 6.16 | 5.61 | 5.20 | 4.68 | 4.22 | 3.67 | 3.13 | 2.41 | 2.57 | 84% |
| Lane 1 | 1127+12 | 1 | 9,855 | 3.96 | 3.34 | 3.12 | 3.11 | 2.54 | 2.29 | 1.97 | 1.67 | 1.07 | 79% |
| Lane 1 | 1127+55 | 1 | 9,799 | 4.13 | 3.47 | 3.38 | 3.13 | 2.90 | 2.57 | 2.25 | 1.84 | 1.69 | 82% |
| Lane 2 | 1127+55 | 3 | 9,977 | 6.21 | 5.91 | 5.33 | 4.59 | 4.24 | 3.52 | 2.97 | 2.48 | 5.50 | 86% |
| Lane 1 | 1127+95 | 3 | 9,871 | 3.64 | 2.93 | 2.88 | 2.70 | 2.46 | 2.24 | 1.96 | 1.71 | 1.21 | 79% |
| Lane 1 | 1128+07 | 1 | 9,874 | 3.36 | 2.81 | 2.81 | 2.63 | 2.41 | 2.29 | 2.00 | 1.60 | 1.22 | 84% |
| Lane 2 | 1128+07 | 1 | 10,022 | 5.99 | 5.34 | 4.84 | 4.33 | 3.91 | 3.22 | 2.79 | 2.31 | 2.24 | 81% |
| Lane 1 | 1128+35 | 1 | 9,831 | 3.55 | 3.16 | 2.85 | 2.74 | 2.46 | 2.10 | 1.87 | 1.72 | 1.18 | 80% |
| Lane 1 | 1128+57 | 1 | 9,858 | 2.94 | 2.57 | 2.50 | 2.34 | 2.15 | 1.90 | 1.69 | 1.42 | 1.17 | 85% |
| Lane 2 | 1128+57 | 1 | 9,969 | 4.39 | 3.88 | 3.83 | 3.50 | 3.18 | 2.93 | 2.39 | 2.10 | 4.93 | 87% |
| Lane 1 | 1128+86 | 1 | 9,842 | 3.22 | 2.76 | 2.74 | 2.54 | 2.30 | 2.01 | 1.86 | 1.51 | 1.02 | 85% |
| Lane 2 | 1128+86 | 1 | 10,030 | 4.07 | 3.39 | 3.50 | 3.26 | 2.98 | 2.58 | 2.31 | 1.96 | 1.40 | 86% |
| Lane 1 | 1129+07 | 1 | 9,863 | 3.92 | 3.47 | 3.38 | 3.07 | 2.80 | 2.48 | 2.21 | 1.83 | 8.93 | 86% |
| Lane 2 | 1129+07 | 1 | 10,057 | 4.36 | 3.76 | 3.54 | 3.25 | 2.97 | 2.45 | 2.20 | 1.90 | 0.87 | 81% |
| Lane 1 | 1129+38 | 1 | 9,882 | 3.45 | 2.70 | 2.69 | 2.52 | 2.35 | 2.15 | 1.94 | 1.61 | 1.42 | 78% |
| Lane 2 | 1129+38 | 1 | 10,054 | 3.55 | 3.09 | 2.94 | 2.63 | 2.49 | 2.25 | 1.94 | 1.57 | 2.89 | 83% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1129+55 | 1 | 10,173 | 4.01 | 3.47 | 3.34 | 3.02 | 2.85 | 2.39 | 2.01 | 1.62 | 8.09 | 83% |
| Lane 1 | 1129+86 | 1 | 9,831 | 3.07 | 2.56 | 2.51 | 2.35 | 2.15 | 1.94 | 1.87 | 1.53 | 1.74 | 82% |
| Lane 1 | 1130+14 | 1 | 9,882 | 3.57 | 3.24 | 2.90 | 2.66 | 2.44 | 2.21 | 1.85 | 1.56 | 1.14 | 81% |
| Lane 2 | 1130+14 | 1 | 10,184 | 5.15 | 4.53 | 4.42 | 3.95 | 3.56 | 3.16 | 2.81 | 2.30 | 6.33 | 86% |
| Lane 1 | 1130+31 | 1 | 9,866 | 4.41 | 3.90 | 3.80 | 3.35 | 3.09 | 2.74 | 2.38 | 2.01 | 1.59 | 86% |
| Lane 2 | 1130+31 | 1 | 10,208 | 4.31 | 3.67 | 3.75 | 3.40 | 3.13 | 2.70 | 2.47 | 1.96 | 6.66 | 87% |
| Lane 1 | 1130+56 | 1 | 9,847 | 5.50 | 4.59 | 4.35 | 4.00 | 3.65 | 3.13 | 2.74 | 2.21 | 1.89 | 79% |
| Lane 2 | 1130+56 | 1 | 10,220 | 5.34 | 4.42 | 4.15 | 3.80 | 3.31 | 2.82 | 2.43 | 2.00 | 9.09 | 78% |
| Lane 1 | 1130+99 | 1 | 9,855 | 3.43 | 3.14 | 2.98 | 2.74 | 2.50 | 2.25 | 2.03 | 1.72 | 1.24 | 87% |
| Lane 2 | 1130+99 | 1 | 10,340 | 5.34 | 4.37 | 4.41 | 3.98 | 3.72 | 3.29 | 2.84 | 2.22 | 1.35 | 83% |
| Lane 2 | 1131+08 | 1 | 9,648 | 5.02 | 4.24 | 3.89 | 3.70 | 3.19 | 2.79 | 2.29 | 2.09 | 1.86 | 77% |
| Lane 1 | 1131+15 | 1 | 9,850 | 3.60 | 3.01 | 2.84 | 2.55 | 2.45 | 2.31 | 2.01 | 1.77 | 1.57 | 79% |
| Lane 2 | 1131+15 | 1 | 9,625 | 4.38 | 3.69 | 3.63 | 3.49 | 3.21 | 2.72 | 2.48 | 1.97 | 2.71 | 83% |
| Lane 1 | 1131+44 | 1 | 9,855 | 4.06 | 3.60 | 3.19 | 2.93 | 2.60 | 2.31 | 1.93 | 1.55 | 1.02 | 79% |
| Lane 2 | 1131+56 | 1 | 9,688 | 3.77 | 3.07 | 2.97 | 2.67 | 2.49 | 2.06 | 1.98 | 1.52 | 1.22 | 79% |
| Lane 1 | 1131+61 | 1 | 9,871 | 3.17 | 2.72 | 2.69 | 2.43 | 2.33 | 2.10 | 1.87 | 1.59 | 1.28 | 85% |
| Lane 1 | 1131+78 | 1 | 9,866 | 3.31 | 2.73 | 2.61 | 2.38 | 2.17 | 1.92 | 1.72 | 1.37 | 0.91 | 79% |
| Lane 1 | 1132+01 | 1 | 9,863 | 4.10 | 3.45 | 3.17 | 2.87 | 2.54 | 2.04 | 1.75 | 1.35 | 0.84 | 77% |
| Lane 2 | 1132+06 | 1 | 9,680 | 3.44 | 2.98 | 2.88 | 2.63 | 2.28 | 1.84 | 1.55 | 1.09 | 6.67 | 84% |
| Lane 1 | 1132+39 | 1 | 9,847 | 3.18 | 2.73 | 2.55 | 2.37 | 2.05 | 1.62 | 1.44 | 1.17 | 0.37 | 80% |
| Lane 2 | 1132+39 | 1 | 9,664 | 3.89 | 3.23 | 3.28 | 3.07 | 2.77 | 2.34 | 2.07 | 1.71 | 1.48 | 84% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1132+55 | 1 | 9,953 | 3.49 | 2.57 | 2.27 | 2.01 | 1.79 | 1.51 | 1.28 | 0.84 | 0.68 | 65% |
| Lane 2 | 1132+55 | 1 | 9,648 | 4.33 | 3.07 | 3.01 | 2.64 | 2.30 | 1.82 | 1.50 | 1.11 | 0.57 | 70% |
| Lane 1 | 1132+68 | 1 | 9,906 | 4.42 | 3.33 | 3.02 | 2.61 | 2.22 | 1.70 | 1.34 | 0.94 | 0.54 | 68% |
| Lane 2 | 1132+68 | 1 | 9,696 | 3.31 | 2.72 | 2.73 | 2.42 | 2.11 | 1.69 | 1.34 | 1.02 | 0.45 | 82% |
| Lane 1 | 1132+95 | 1 | 9,926 | 3.31 | 2.69 | 2.26 | 2.00 | 1.72 | 1.37 | 1.09 | 0.74 | 0.43 | 68% |
| Lane 1 | 1133+15 | 1 | 9,930 | 2.58 | 2.35 | 2.17 | 1.57 | 1.38 | 1.13 | 0.85 | 0.70 | 0.23 | 84% |
| Lane 2 | 1133+15 | 1 | 9,675 | 3.49 | 3.04 | 2.99 | 2.77 | 2.52 | 2.12 | 1.68 | 1.36 | 0.56 | 86% |
| Lane 1 | 1133+50 | 1 | 9,887 | 3.66 | 2.54 | 2.32 | 2.11 | 1.73 | 1.35 | 1.03 | 0.98 | 0.25 | 63% |
| Lane 2 | 1133+57 | 1 | 9,628 | 5.07 | 3.44 | 3.22 | 2.76 | 2.43 | 1.89 | 1.51 | 1.16 | 0.20 | 64% |
| Lane 1 | 1133+97 | 1 | 9,922 | 3.22 | 2.43 | 2.09 | 1.81 | 1.50 | 1.15 | 0.96 | 0.70 | 0.40 | 65% |
| Lane 2 | 1133+97 | 1 | 9,728 | 3.64 | 3.18 | 2.84 | 2.55 | 2.27 | 1.87 | 1.51 | 1.08 | 0.76 | 78% |
| Lane 1 | 1134+45 | 1 | 9,958 | 4.04 | 2.99 | 2.78 | 2.43 | 2.10 | 1.59 | 1.32 | 0.96 | 0.69 | 69% |
| Lane 2 | 1134+47 | 1 | 9,723 | 3.43 | 3.06 | 2.52 | 2.17 | 1.89 | 1.50 | 1.15 | 0.86 | 0.25 | 73% |
| Lane 1 | 1135+20 | 1 | 9,966 | 4.93 | 4.47 | 3.29 | 2.83 | 2.54 | 2.04 | 1.69 | 1.27 | 0.90 | 67% |
| Lane 2 | 1135+20 | 1 | 9,553 | 11.20 | 6.51 | 4.56 | 3.63 | 2.86 | 1.83 | 1.33 | 0.92 | 0.64 | 41% |
| Lane 1 | 1135+46 | 1 | 9,974 | 4.07 | 2.65 | 2.31 | 2.02 | 1.83 | 1.40 | 1.19 | 0.92 | 0.72 | 57% |
| Lane 1 | 1135+91 | 1 | 9,974 | 4.83 | 3.24 | 2.93 | 2.68 | 2.39 | 2.09 | 1.85 | 1.45 | 1.34 | 61% |
| Lane 2 | 1135+91 | 1 | 9,672 | 4.23 | 3.06 | 3.09 | 2.74 | 2.48 | 2.17 | 1.91 | 1.48 | 0.91 | 73% |
| Lane 2 | 1135+99 | 3 | 9,636 | 5.63 | 4.15 | 3.86 | 3.48 | 3.03 | 2.62 | 2.11 | 1.68 | 1.17 | 69% |
| Lane 2 | 1137+07 | 1 | 9,683 | 3.70 | 2.80 | 2.80 | 2.53 | 2.25 | 2.26 | 1.74 | 1.44 | 1.24 | 76% |
| Lane 2 | 1137+50 | 3 | 9,696 | 4.59 | 3.61 | 3.14 | 2.82 | 2.48 | 2.25 | 2.08 | 1.66 | 1.46 | 68% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1138+01 | 3 | 9,644 | 4.14 | 2.94 | 2.78 | 2.65 | 2.32 | 2.29 | 1.94 | 1.57 | 1.39 | 67% |
| Lane 2 | 1139+01 | 3 | 9,656 | 4.55 | 3.35 | 2.93 | 2.65 | 2.37 | 2.04 | 1.84 | 1.51 | 1.09 | 64% |
| Lane 1 | 1140+03 | 1 | 9,977 | 2.80 | 2.23 | 2.10 | 1.85 | 1.80 | 1.62 | 1.49 | 1.20 | 0.99 | 75% |
| Lane 2 | 1140+03 | 3 | 9,660 | 3.85 | 2.62 | 2.52 | 2.43 | 2.09 | 1.81 | 1.76 | 1.50 | 1.24 | 65% |
| Lane 2 | 1141+06 | 1 | 9,640 | 3.77 | 2.69 | 2.41 | 2.17 | 2.06 | 1.77 | 1.69 | 1.42 | 1.27 | 64% |
| Lane 2 | 1142+62 | 1 | 9,672 | 2.49 | 1.69 | 1.46 | 1.19 | 1.13 | 0.96 | 0.84 | 0.60 | 0.53 | 59% |
| Lane 2 | 1143+64 | 1 | 9,704 | 3.41 | 2.51 | 2.27 | 2.07 | 1.89 | 1.73 | 1.70 | 1.30 | 1.07 | 67% |
| Lane 1 | 1145+42 | 3 | 9,946 | 2.87 | 2.51 | 2.42 | 2.20 | 2.04 | 1.70 | 1.52 | 1.33 | 1.05 | 84% |
| Lane 2 | 1145+42 | 3 | 9,604 | 5.03 | 3.39 | 3.07 | 2.61 | 2.32 | 2.06 | 1.96 | 1.58 | 1.38 | 61% |
| Lane 1 | 1149+02 | 1 | 9,911 | 1.98 | 1.14 | 0.98 | 0.89 | 0.80 | 0.72 | 0.58 | 0.53 | 0.46 | 49% |
| Lane 1 | 1152+30 | 1 | 9,911 | 2.46 | 1.73 | 1.58 | 1.43 | 1.36 | 1.17 | 1.13 | 1.01 | 0.90 | 64% |
| Lane 1 | 1155+49 | 3 | 9,803 | 4.07 | 2.90 | 2.47 | 2.23 | 2.04 | 1.72 | 1.48 | 1.30 | 1.11 | 61% |
| Lane 2 | 1155+49 | 3 | 9,604 | 5.12 | 4.67 | 2.89 | 2.48 | 2.18 | 1.81 | 1.62 | 1.31 | 1.09 | 56% |
| Lane 1 | 1155+73 | 3 | 9,783 | 3.44 | 2.87 | 2.52 | 2.26 | 2.09 | 1.94 | 1.92 | 1.32 | 1.36 | 73% |
| Lane 2 | 1155+73 | 3 | 9,636 | 3.31 | 2.40 | 2.21 | 1.95 | 1.83 | 1.61 | 1.55 | 1.22 | 0.96 | 67% |
| Lane 1 | 1156+14 | 1 | 9,823 | 3.01 | 2.49 | 2.20 | 2.09 | 1.80 | 1.74 | 1.60 | 1.19 | 1.28 | 73% |
| Lane 2 | 1156+14 | 1 | 9,715 | 2.80 | 2.25 | 1.99 | 1.84 | 1.69 | 1.54 | 1.42 | 1.18 | 1.05 | 71% |
| Lane 1 | 1156+85 | 1 | 9,898 | 2.14 | 1.72 | 1.58 | 1.44 | 1.31 | 1.16 | 1.16 | 0.83 | 0.79 | 74% |
| Lane 2 | 1156+85 | 1 | 9,728 | 2.66 | 2.12 | 2.01 | 1.77 | 1.47 | 1.35 | 1.24 | 1.01 | 0.79 | 76% |
| Lane 1 | 1157+68 | 1 | 9,871 | 3.43 | 2.75 | 2.52 | 2.23 | 1.96 | 1.62 | 1.48 | 1.13 | 0.88 | 73% |
| Lane 2 | 1157+68 | 1 | 9,648 | 3.28 | 2.59 | 2.58 | 2.28 | 2.06 | 1.72 | 1.52 | 1.24 | 0.91 | 79% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1158+56 | 1 | 9,871 | 5.96 | 5.61 | 5.41 | 4.20 | 3.71 | 3.03 | 2.56 | 2.05 | 1.67 | 91% |
| Lane 2 | 1158+56 | 1 | 9,593 | 5.27 | 4.56 | 4.19 | 3.87 | 3.50 | 3.14 | 2.94 | 2.22 | 1.98 | 80% |
| Lane 1 | 1158+89 | 1 | 9,871 | 3.65 | 3.25 | 3.22 | 2.93 | 2.72 | 2.35 | 2.14 | 1.95 | 1.48 | 88% |
| Lane 2 | 1158+89 | 1 | 9,617 | 4.01 | 3.48 | 3.25 | 2.91 | 2.67 | 2.34 | 2.07 | 1.64 | 1.44 | 81% |
| Lane 1 | 1159+20 | 1 | 9,879 | 2.91 | 2.71 | 2.40 | 2.29 | 2.04 | 1.80 | 1.64 | 1.35 | 1.12 | 82% |
| Lane 2 | 1159+20 | 1 | 9,617 | 4.41 | 3.58 | 3.36 | 3.06 | 2.76 | 2.39 | 2.16 | 1.70 | 1.26 | 76% |
| Lane 1 | 1159+46 | 1 | 9,950 | 2.52 | 2.16 | 2.08 | 1.94 | 1.84 | 1.63 | 1.47 | 1.27 | 1.05 | 83% |
| Lane 1 | 1159+68 | 1 | 9,898 | 3.27 | 2.72 | 2.50 | 2.28 | 2.13 | 1.84 | 1.59 | 1.34 | 1.11 | 76% |
| Lane 2 | 1159+68 | 1 | 9,636 | 3.90 | 3.22 | 3.13 | 2.82 | 2.57 | 2.37 | 2.01 | 1.61 | 1.22 | 80% |
| Lane 1 | 1160+11 | 1 | 9,810 | 3.75 | 3.54 | 3.32 | 3.05 | 2.75 | 2.36 | 2.16 | 1.80 | 1.58 | 89% |
| Lane 2 | 1160+11 | 1 | 9,656 | 4.19 | 3.43 | 3.46 | 3.27 | 3.00 | 2.73 | 2.35 | 1.78 | 1.82 | 83% |
| Lane 1 | 1160+54 | 1 | 9,874 | 2.82 | 2.51 | 2.25 | 2.09 | 1.89 | 1.59 | 1.46 | 1.17 | 1.06 | 80% |
| Lane 2 | 1160+54 | 1 | 9,648 | 4.05 | 3.70 | 3.63 | 3.27 | 3.11 | 2.70 | 2.50 | 2.06 | 1.62 | 90% |
| Lane 1 | 1160+94 | 1 | 9,911 | 3.72 | 3.35 | 3.15 | 2.92 | 2.78 | 2.44 | 2.25 | 1.84 | 1.57 | 85% |
| Lane 2 | 1160+94 | 1 | 9,620 | 3.17 | 2.67 | 2.57 | 2.39 | 2.18 | 1.88 | 1.81 | 1.28 | 1.26 | 81% |
| Lane 1 | 1161+69 | 1 | 9,895 | 2.97 | 2.70 | 2.50 | 2.34 | 2.14 | 1.92 | 1.66 | 1.33 | 1.26 | 84% |
| Lane 2 | 1161+69 | 1 | 9,601 | 3.27 | 2.76 | 2.71 | 2.63 | 2.36 | 2.23 | 2.05 | 1.56 | 1.44 | 83% |
| Lane 1 | 1161+92 | 1 | 9,871 | 2.62 | 2.20 | 2.10 | 1.98 | 1.82 | 1.62 | 1.52 | 1.22 | 1.09 | 80% |
| Lane 2 | 1161+92 | 1 | 9,588 | 3.77 | 3.22 | 3.17 | 2.92 | 2.71 | 2.31 | 1.93 | 1.63 | 1.41 | 84% |
| Lane 1 | 1162+21 | 1 | 9,882 | 2.99 | 2.44 | 2.24 | 2.07 | 1.86 | 1.72 | 1.46 | 1.20 | 1.01 | 75% |
| Lane 2 | 1162+21 | 1 | 9,636 | 2.91 | 2.44 | 2.36 | 2.20 | 2.03 | 1.76 | 1.53 | 1.23 | 1.05 | 81% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1162+55 | 1 | 9,612 | 3.76 | 3.62 | 3.37 | 3.24 | 2.94 | 2.57 | 2.13 | 1.50 | 1.20 | 90% |
| Lane 1 | 1162+58 | 3 | 9,866 | 3.39 | 2.99 | 2.66 | 2.41 | 2.16 | 1.90 | 1.73 | 1.42 | 1.18 | 78% |
| Lane 1 | 1163+25 | 1 | 9,895 | 3.23 | 2.60 | 2.26 | 2.02 | 1.88 | 1.64 | 1.46 | 1.24 | 1.06 | 70% |
| Lane 2 | 1163+25 | 1 | 9,633 | 3.51 | 2.74 | 2.65 | 2.48 | 2.28 | 1.96 | 1.67 | 1.40 | 1.10 | 75% |
| Lane 1 | 1163+46 | 1 | 9,914 | 2.41 | 2.04 | 1.97 | 1.78 | 1.70 | 1.50 | 1.35 | 1.12 | 1.01 | 82% |
| Lane 2 | 1163+46 | 1 | 9,617 | 3.81 | 3.15 | 3.00 | 2.74 | 2.51 | 2.11 | 1.61 | 1.47 | 1.27 | 79% |
| Lane 1 | 1163+61 | 1 | 9,890 | 3.13 | 2.69 | 2.44 | 2.15 | 2.00 | 1.81 | 1.64 | 1.36 | 1.22 | 78% |
| Lane 2 | 1163+61 | 1 | 9,569 | 4.74 | 3.92 | 3.89 | 3.59 | 3.38 | 2.93 | 2.52 | 2.05 | 1.72 | 82% |
| Lane 1 | 1163+84 | 1 | 9,882 | 3.24 | 2.56 | 2.20 | 2.02 | 1.85 | 1.54 | 1.39 | 1.11 | 0.92 | 68% |
| Lane 2 | 1163+84 | 1 | 9,569 | 4.15 | 3.28 | 3.19 | 2.93 | 2.72 | 2.45 | 2.11 | 1.82 | 1.39 | 77% |
| Lane 1 | 1164+10 | 1 | 9,866 | 4.00 | 3.31 | 2.89 | 2.67 | 2.38 | 2.00 | 1.67 | 1.31 | 1.03 | 72% |
| Lane 2 | 1164+10 | 3 | 9,553 | 3.99 | 3.12 | 2.92 | 2.69 | 2.43 | 2.10 | 1.78 | 1.48 | 1.28 | 73% |
| Lane 1 | 1164+42 | 1 | 9,874 | 3.05 | 2.52 | 2.27 | 2.06 | 1.82 | 1.52 | 1.24 | 0.91 | 0.71 | 74% |
| Lane 2 | 1164+42 | 1 | 9,545 | 3.83 | 3.17 | 2.95 | 2.69 | 2.46 | 2.11 | 1.88 | 1.56 | 1.33 | 77% |
| Lane 1 | 1164+63 | 1 | 9,855 | 3.01 | 2.40 | 2.19 | 1.74 | 1.51 | 1.26 | 1.06 | 0.72 | 0.52 | 73% |
| Lane 2 | 1164+63 | 1 | 9,569 | 3.93 | 3.28 | 2.97 | 2.73 | 2.61 | 2.25 | 2.07 | 1.58 | 1.47 | 76% |
| Lane 1 | 1165+18 | 3 | 9,823 | 4.60 | 2.83 | 2.39 | 1.93 | 1.78 | 1.56 | 1.64 | 1.07 | 1.06 | 52% |
| Lane 2 | 1165+18 | 3 | 9,445 | 4.26 | 3.54 | 2.86 | 2.40 | 2.19 | 1.92 | 1.57 | 1.09 | 1.17 | 67% |
| Lane 1 | 1165+55 | 1 | 9,882 | 3.68 | 2.98 | 2.82 | 2.40 | 2.06 | 1.81 | 1.68 | 1.23 | 0.93 | 77% |
| Lane 2 | 1165+55 | 1 | 9,580 | 3.30 | 2.27 | 2.15 | 1.90 | 1.68 | 1.68 | 1.45 | 1.01 | 0.77 | 65% |
| Lane 1 | 1165+89 | 1 | 9,818 | 3.66 | 2.51 | 2.05 | 1.80 | 1.63 | 1.46 | 1.33 | 0.93 | 0.81 | 56% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1165+89 | 1 | 9,493 | 3.96 | 2.75 | 2.59 | 2.15 | 2.03 | 2.01 | 1.66 | 1.24 | 1.00 | 65% |
| Lane 1 | 1166+14 | 1 | 9,839 | 3.62 | 2.57 | 2.32 | 2.06 | 1.83 | 1.59 | 1.48 | 0.94 | 0.94 | 64% |
| Lane 2 | 1166+14 | 1 | 9,556 | 3.33 | 2.49 | 2.19 | 2.00 | 1.81 | 1.65 | 1.31 | 1.02 | 0.91 | 66% |
| Lane 2 | 1166+38 | 1 | 9,537 | 3.04 | 2.04 | 1.91 | 1.77 | 1.55 | 1.47 | 1.23 | 0.85 | 0.63 | 63% |
| Lane 1 | 1166+81 | 1 | 9,874 | 2.84 | 2.07 | 1.94 | 1.87 | 1.63 | 1.56 | 1.39 | 1.16 | 0.82 | 68% |
| Lane 2 | 1166+81 | 1 | 9,604 | 3.23 | 2.42 | 2.25 | 2.07 | 1.85 | 1.64 | 1.35 | 0.92 | 0.88 | 70% |
| Lane 1 | 1167+39 | 1 | 9,815 | 3.69 | 2.34 | 1.97 | 1.78 | 1.66 | 1.42 | 1.28 | 1.02 | 0.76 | 53% |
| Lane 2 | 1167+39 | 1 | 9,569 | 3.56 | 2.60 | 2.30 | 1.97 | 1.76 | 1.52 | 1.31 | 1.02 | 0.78 | 65% |
| Lane 1 | 1167+73 | 1 | 9,768 | 3.04 | 2.21 | 1.98 | 1.83 | 1.66 | 1.44 | 1.28 | 1.07 | 0.87 | 65% |
| Lane 1 | 1167+89 | 1 | 9,779 | 2.78 | 1.85 | 1.73 | 1.58 | 1.49 | 1.50 | 1.31 | 0.92 | 0.76 | 62% |
| Lane 2 | 1167+89 | 1 | 9,580 | 3.62 | 2.73 | 2.46 | 2.14 | 1.96 | 1.71 | 1.54 | 1.16 | 0.95 | 68% |
| Lane 1 | 1167+97 | 1 | 9,747 | 3.06 | 1.92 | 1.77 | 1.59 | 1.44 | 1.28 | 1.33 | 0.97 | 0.80 | 58% |
| Lane 1 | 1168+38 | 1 | 9,787 | 2.91 | 1.98 | 1.90 | 1.73 | 1.61 | 1.50 | 1.35 | 1.00 | 0.87 | 65% |
| Lane 1 | 1168+68 | 1 | 9,763 | 2.93 | 2.10 | 1.99 | 1.78 | 1.67 | 1.43 | 1.35 | 1.13 | 1.00 | 68% |
| Lane 2 | 1168+68 | 1 | 9,561 | 3.30 | 2.43 | 2.38 | 2.19 | 1.87 | 1.74 | 1.48 | 1.26 | 0.78 | 72% |
| Lane 1 | 1168+87 | 1 | 9,826 | 3.41 | 2.43 | 2.29 | 2.25 | 1.85 | 1.79 | 1.57 | 1.26 | 1.17 | 67% |
| Lane 2 | 1168+87 | 1 | 9,609 | 2.96 | 2.09 | 1.87 | 1.67 | 1.49 | 1.39 | 1.11 | 0.78 | 0.60 | 63% |
| Lane 1 | 1169+08 | 1 | 9,739 | 3.88 | 3.21 | 3.00 | 2.80 | 2.62 | 2.45 | 2.20 | 1.88 | 1.72 | 77% |
| Lane 1 | 1169+37 | 3 | 9,807 | 2.70 | 1.93 | 1.84 | 1.70 | 1.57 | 1.47 | 1.36 | 1.26 | 1.06 | 68% |
| Lane 2 | 1169+37 | 3 | 9,521 | 4.30 | 3.23 | 3.22 | 2.70 | 2.54 | 2.55 | 2.33 | 1.90 | 1.78 | 75% |
| Lane 1 | 1169+47 | 1 | 9,787 | 2.87 | 1.96 | 1.81 | 1.64 | 1.39 | 1.23 | 1.08 | 0.90 | 0.64 | 63% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1169+47 | 1 | 9,545 | 3.97 | 2.98 | 2.78 | 2.58 | 2.38 | 2.11 | 1.94 | 1.42 | 1.26 | 70% |
| Lane 1 | 1169+78 | 1 | 9,823 | 2.65 | 1.66 | 1.49 | 1.33 | 1.22 | 1.02 | 0.87 | 0.57 | 0.48 | 56% |
| Lane 2 | 1169+78 | 1 | 9,625 | 2.93 | 2.06 | 1.88 | 1.77 | 1.54 | 1.31 | 1.07 | 0.73 | 0.65 | 64% |
| Lane 1 | 1170+10 | 1 | 9,826 | 3.25 | 2.39 | 2.16 | 2.02 | 1.90 | 1.76 | 1.56 | 1.22 | 1.04 | 66% |
| Lane 2 | 1170+10 | 1 | 9,556 | 3.24 | 2.65 | 2.44 | 2.33 | 1.96 | 1.85 | 1.69 | 1.54 | 1.40 | 75% |
| Lane 1 | 1170+45 | 1 | 9,847 | 2.62 | 1.92 | 1.80 | 1.57 | 1.45 | 1.35 | 1.28 | 0.90 | 0.74 | 69% |
| Lane 2 | 1170+45 | 1 | 9,580 | 3.60 | 2.50 | 2.27 | 2.06 | 1.89 | 1.72 | 1.42 | 1.07 | 0.74 | 63% |
| Lane 1 | 1170+82 | 1 | 9,895 | 2.64 | 2.07 | 1.91 | 1.73 | 1.55 | 1.49 | 1.22 | 0.83 | 0.77 | 72% |
| Lane 2 | 1170+82 | 1 | 9,569 | 2.86 | 2.06 | 1.80 | 1.65 | 1.43 | 1.26 | 1.02 | 0.80 | 0.64 | 63% |
| Lane 1 | 1170+97 | 1 | 9,799 | 3.07 | 2.41 | 2.29 | 2.12 | 1.95 | 1.83 | 1.67 | 1.25 | 1.17 | 75% |
| Lane 1 | 1171+64 | 1 | 9,911 | 2.99 | 2.12 | 2.02 | 1.84 | 1.74 | 1.67 | 1.53 | 1.11 | 1.07 | 68% |
| Lane 2 | 1171+64 | 1 | 9,585 | 4.69 | 3.81 | 3.53 | 3.24 | 3.03 | 2.63 | 2.52 | 1.94 | 1.85 | 75% |
| Lane 1 | 1172+04 | 1 | 9,858 | 3.18 | 2.35 | 2.13 | 2.02 | 1.83 | 1.60 | 1.53 | 1.23 | 0.96 | 67% |
| Lane 1 | 1172+66 | 1 | 9,887 | 3.31 | 2.87 | 2.44 | 2.19 | 2.05 | 1.91 | 1.74 | 1.53 | 1.23 | 74% |
| Lane 2 | 1173+15 | 1 | 9,509 | 4.65 | 3.87 | 3.69 | 3.15 | 2.90 | 2.68 | 2.36 | 1.94 | 1.59 | 79% |
| Lane 1 | 1173+39 | 1 | 9,799 | 3.94 | 2.56 | 2.21 | 1.99 | 1.78 | 1.59 | 1.41 | 0.95 | 1.06 | 56% |
| Lane 2 | 1173+39 | 1 | 9,493 | 4.37 | 3.59 | 3.45 | 3.05 | 2.75 | 2.57 | 2.48 | 1.72 | 1.15 | 79% |
| Lane 2 | 1173+64 | 1 | 9,509 | 4.75 | 3.87 | 3.68 | 3.37 | 3.17 | 2.86 | 2.50 | 2.01 | 1.85 | 77% |
| Lane 1 | 1174+10 | 1 | 9,934 | 4.54 | 3.41 | 3.14 | 2.76 | 2.57 | 2.39 | 2.07 | 1.65 | 1.35 | 69% |
| Lane 2 | 1174+14 | 1 | 9,521 | 6.05 | 4.24 | 4.05 | 3.81 | 3.30 | 2.83 | 2.63 | 1.98 | 1.71 | 67% |
| Lane 1 | 1174+92 | 3 | 9,831 | 5.53 | 3.88 | 3.55 | 3.36 | 2.89 | 2.59 | 2.37 | 1.70 | 1.48 | 64% |

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Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1174+92 | 3 | 9,239 | 10.26 | 10.01 | 8.62 | 5.18 | 4.52 | 4.00 | 3.73 | 3.00 | 2.65 | 84% |
| Lane 2 | 1174+92 | 3 | 9,532 | 6.74 | 5.03 | 4.56 | 4.06 | 3.59 | 3.25 | 2.93 | 2.39 | 1.88 | 68% |
| Lane 1 | 1175+05 | 3 | 9,752 | 8.22 | 4.62 | 4.01 | 3.52 | 3.37 | 2.74 | 2.50 | 2.12 | 1.78 | 49% |
| Lane 2 | 1175+05 | 3 | 9,299 | 10.07 | 9.82 | 8.36 | 4.91 | 4.24 | 3.82 | 3.56 | 2.83 | 2.35 | 83% |
| Lane 1 | 1175+30 | 1 | 9,847 | 4.19 | 3.35 | 3.16 | 2.65 | 2.43 | 2.22 | 1.97 | 1.54 | 1.35 | 75% |
| Lane 2 | 1175+30 | 1 | 9,545 | 5.67 | 3.75 | 3.56 | 3.24 | 3.00 | 2.69 | 2.29 | 2.04 | 1.60 | 63% |
| Lane 1 | 1175+96 | 1 | 9,914 | 3.71 | 2.77 | 2.30 | 2.15 | 1.85 | 1.68 | 1.58 | 1.17 | 0.95 | 62% |
| Lane 2 | 1175+96 | 1 | 9,553 | 4.60 | 3.51 | 3.21 | 2.98 | 2.81 | 2.63 | 2.46 | 1.79 | 1.53 | 70% |
| Lane 1 | 1176+35 | 1 | 9,847 | 4.16 | 2.88 | 2.47 | 2.22 | 2.09 | 1.80 | 1.64 | 1.31 | 1.03 | 59% |
| Lane 1 | 1176+67 | 1 | 9,938 | 3.11 | 1.84 | 1.45 | 1.33 | 1.15 | 1.04 | 0.82 | 0.60 | 0.54 | 47% |
| Lane 2 | 1176+67 | 1 | 9,545 | 4.68 | 3.28 | 3.09 | 2.71 | 2.47 | 2.04 | 1.98 | 1.13 | 0.96 | 66% |
| Lane 1 | 1177+25 | 1 | 9,961 | 3.74 | 3.32 | 2.85 | 2.52 | 2.19 | 1.87 | 1.59 | 1.14 | 0.85 | 76% |
| Lane 2 | 1177+25 | 1 | 9,580 | 4.31 | 3.43 | 3.09 | 2.84 | 2.57 | 2.21 | 1.97 | 1.32 | 1.04 | 72% |
| Lane 1 | 1178+01 | 1 | 9,874 | 4.28 | 3.55 | 3.25 | 2.71 | 2.42 | 2.06 | 1.80 | 1.24 | 1.29 | 76% |
| Lane 2 | 1178+01 | 1 | 9,509 | 3.61 | 2.59 | 2.54 | 2.27 | 2.07 | 1.89 | 1.57 | 1.31 | 0.91 | 70% |
| Lane 1 | 1178+24 | 1 | 9,898 | 5.31 | 3.56 | 3.22 | 2.94 | 2.69 | 2.26 | 2.04 | 1.50 | 1.24 | 61% |
| Lane 2 | 1178+24 | 1 | 9,469 | 5.03 | 3.19 | 2.65 | 2.51 | 2.39 | 2.01 | 1.84 | 1.43 | 1.46 | 53% |
| Lane 1 | 1178+52 | 1 | 9,914 | 4.76 | 4.00 | 3.89 | 3.48 | 3.15 | 2.74 | 2.40 | 1.90 | 1.66 | 82% |
| Lane 2 | 1178+52 | 1 | 9,596 | 6.87 | 3.77 | 3.28 | 3.07 | 2.92 | 2.50 | 2.37 | 1.98 | 1.58 | 48% |
| Lane 1 | 1179+22 | 3 | 9,953 | 5.48 | 4.70 | 4.54 | 3.76 | 3.32 | 2.71 | 2.34 | 1.63 | 1.42 | 83% |
| Lane 2 | 1179+22 | 3 | 9,532 | 6.13 | 4.62 | 4.07 | 3.70 | 3.37 | 2.70 | 2.33 | 1.85 | 1.41 | 66% |

I-495 NEXT

Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1179+74 | 3 | 9,942 | 4.26 | 3.78 | 3.63 | 2.98 | 2.46 | 1.89 | 1.56 | 1.05 | 0.96 | 85% |
| Lane 2 | 1179+74 | 3 | 9,604 | 3.90 | 3.24 | 2.82 | 2.53 | 2.22 | 1.74 | 1.37 | 1.07 | 0.84 | 72% |
| Lane 1 | 1180+10 | 3 | 9,807 | 7.85 | 5.13 | 4.67 | 4.13 | 3.66 | 2.86 | 2.31 | 1.59 | 1.24 | 59% |
| Lane 2 | 1180+10 | 3 | 9,617 | 5.29 | 4.49 | 3.94 | 3.56 | 3.22 | 2.63 | 2.27 | 1.62 | 1.44 | 74% |
| Lane 1 | 1180+41 | 1 | 9,903 | 4.06 | 3.82 | 2.95 | 2.63 | 2.28 | 1.75 | 1.41 | 0.94 | 0.63 | 73% |
| Lane 1 | 1181+15 | 3 | 9,850 | 10.57 | 5.65 | 5.22 | 4.58 | 3.83 | 2.99 | 2.26 | 1.62 | 1.02 | 49% |
| Lane 2 | 1181+17 | 3 | 9,525 | 15.88 | 8.05 | 4.32 | 3.77 | 3.32 | 2.52 | 2.11 | 1.35 | 1.16 | 27% |
| Lane 1 | 1181+25 | 1 | 9,930 | 6.67 | 3.46 | 3.22 | 2.97 | 2.75 | 2.27 | 1.97 | 1.39 | 1.05 | 48% |
| Lane 2 | 1181+27 | 3 | 9,625 | 7.16 | 4.31 | 3.56 | 2.94 | 2.46 | 1.72 | 1.25 | 0.87 | 0.62 | 50% |
| Lane 1 | 1181+91 | 1 | 9,961 | 6.58 | 6.46 | 4.85 | 4.39 | 3.94 | 3.36 | 2.85 | 2.17 | 1.98 | 74% |
| Lane 1 | 1182+13 | 1 | 9,882 | 6.25 | 5.05 | 4.56 | 4.12 | 3.70 | 3.09 | 2.62 | 2.06 | 1.67 | 73% |
| Lane 2 | 1182+13 | 3 | 9,588 | 6.28 | 6.10 | 4.65 | 4.18 | 3.78 | 3.20 | 2.78 | 2.14 | 1.53 | 74% |
| Lane 2 | 1182+62 | 3 | 9,612 | 5.42 | 4.05 | 3.87 | 3.52 | 3.18 | 2.87 | 2.48 | 1.72 | 1.70 | 71% |
| Lane 1 | 1182+79 | 1 | 9,895 | 5.37 | 5.20 | 4.78 | 4.39 | 3.93 | 3.19 | 2.62 | 2.11 | 1.61 | 89% |
| Lane 1 | 1182+99 | 1 | 9,898 | 4.94 | 4.68 | 4.79 | 4.24 | 3.78 | 3.17 | 2.72 | 2.26 | 1.81 | 97% |
| Lane 1 | 1183+17 | 1 | 9,887 | 6.17 | 5.11 | 4.38 | 4.03 | 3.58 | 2.96 | 2.52 | 2.02 | 1.62 | 71% |
| Lane 2 | 1183+17 | 3 | 9,652 | 4.69 | 4.25 | 3.83 | 3.45 | 3.12 | 2.76 | 2.28 | 1.70 | 1.92 | 82% |
| Lane 1 | 1183+53 | 1 | 9,914 | 6.26 | 4.93 | 4.39 | 4.07 | 3.65 | 2.80 | 2.49 | 1.85 | 1.59 | 70% |
| Lane 1 | 1183+93 | 1 | 9,950 | 4.66 | 4.32 | 3.79 | 3.48 | 3.06 | 2.51 | 2.17 | 1.67 | 1.41 | 81% |
| Lane 2 | 1183+93 | 3 | 9,617 | 4.68 | 3.95 | 3.65 | 3.25 | 2.97 | 2.52 | 2.21 | 1.63 | 1.46 | 78% |
| Lane 1 | 1184+14 | 1 | 9,998 | 4.60 | 3.86 | 3.44 | 3.24 | 2.91 | 2.38 | 2.05 | 1.66 | 1.30 | 75% |

I-495 NEXT

Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1184+43 | 1 | 10,017 | 4.58 | 3.53 | 3.30 | 3.04 | 2.72 | 2.25 | 1.97 | 1.62 | 1.30 | 72% |
| Lane 2 | 1184+43 | 1 | 9,640 | 4.62 | 3.67 | 3.50 | 3.19 | 2.95 | 2.55 | 2.26 | 1.91 | 1.69 | 76% |
| Lane 1 | 1184+61 | 1 | 9,977 | 4.35 | 3.59 | 3.54 | 3.35 | 3.00 | 2.48 | 2.16 | 1.74 | 1.35 | 81% |
| Lane 1 | 1185+37 | 1 | 10,054 | 4.90 | 4.46 | 4.22 | 3.61 | 3.14 | 2.60 | 2.27 | 1.75 | 1.46 | 86% |
| Lane 2 | 1185+43 | 1 | 9,644 | 6.78 | 4.48 | 4.12 | 3.75 | 3.30 | 2.89 | 2.46 | 1.81 | 1.46 | 61% |
| Lane 1 | 1185+73 | 1 | 10,101 | 4.91 | 4.23 | 3.93 | 3.62 | 3.30 | 2.83 | 2.42 | 1.96 | 1.54 | 80% |
| Lane 2 | 1185+92 | 1 | 9,644 | 5.93 | 4.93 | 4.82 | 4.24 | 3.81 | 3.19 | 2.74 | 1.94 | 1.95 | 81% |
| Lane 1 | 1186+06 | 1 | 9,990 | 5.57 | 4.30 | 3.73 | 3.47 | 3.15 | 2.67 | 2.19 | 1.80 | 1.41 | 67% |
| Lane 2 | 1186+42 | 1 | 9,715 | 4.96 | 3.46 | 3.19 | 2.93 | 2.70 | 2.33 | 1.98 | 1.56 | 1.40 | 64% |
| Lane 1 | 1186+53 | 1 | 10,069 | 5.57 | 3.95 | 3.38 | 3.06 | 2.87 | 2.37 | 2.13 | 1.69 | 1.42 | 61% |
| Lane 2 | 1186+93 | 1 | 9,660 | 4.84 | 3.01 | 2.66 | 2.44 | 2.24 | 1.94 | 1.82 | 1.37 | 1.28 | 55% |
| Lane 1 | 1187+12 | 1 | 10,057 | 4.30 | 3.81 | 3.56 | 3.20 | 2.98 | 2.41 | 2.15 | 1.71 | 1.43 | 83% |
| Lane 1 | 1187+47 | 1 | 10,104 | 4.39 | 4.04 | 3.72 | 3.35 | 3.00 | 2.45 | 2.16 | 1.73 | 1.40 | 85% |
| Lane 2 | 1187+57 | 1 | 9,664 | 6.09 | 3.65 | 3.08 | 2.90 | 2.68 | 2.22 | 1.96 | 1.66 | 1.31 | 51% |
| Lane 1 | 1187+88 | 1 | 10,057 | 4.81 | 4.55 | 4.02 | 3.68 | 3.28 | 2.64 | 2.24 | 1.72 | 1.31 | 84% |
| Lane 2 | 1187+93 | 1 | 9,667 | 5.85 | 3.47 | 3.01 | 2.76 | 2.53 | 2.27 | 2.11 | 1.62 | 1.57 | 51% |
| Lane 2 | 1188+44 | 3 | 9,680 | 5.68 | 3.75 | 3.42 | 3.13 | 2.93 | 2.78 | 2.52 | 2.10 | 2.32 | 60% |
| Lane 1 | 1188+50 | 3 | 9,926 | 11.75 | 8.39 | 6.29 | 5.43 | 4.63 | 3.59 | 2.86 | 2.08 | 1.62 | 54% |
| Lane 1 | 1189+03 | 1 | 10,120 | 5.03 | 4.61 | 4.01 | 3.57 | 3.14 | 2.52 | 2.19 | 1.65 | 1.34 | 80% |
| Lane 1 | 1189+43 | 1 | 10,152 | 3.96 | 3.45 | 3.12 | 2.81 | 2.46 | 2.09 | 4.51 | 2.54 | 0.00 | 79% |
| Lane 2 | 1189+43 | 1 | 9,617 | 7.72 | 6.34 | 5.95 | 5.52 | 5.11 | 4.28 | 3.70 | 2.83 | 2.30 | 77% |

I-495 NEXT

Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1189+92 | 1 | 10,081 | 3.87 | 3.13 | 2.80 | 2.58 | 2.19 | 1.85 | 1.50 | 1.15 | 0.81 | 72% |
| Lane 2 | 1189+92 | 1 | 9,675 | 5.93 | 3.61 | 3.08 | 2.86 | 2.67 | 2.23 | 1.94 | 1.49 | 1.20 | 52% |
| Lane 2 | 1190+41 | 1 | 9,715 | 3.79 | 2.87 | 2.56 | 2.30 | 2.19 | 1.90 | 1.70 | 1.45 | 1.04 | 68% |
| Lane 1 | 1190+64 | 3 | 10,136 | 5.30 | 4.50 | 4.02 | 3.43 | 2.93 | 2.29 | 1.86 | 1.39 | 1.01 | 76% |
| Lane 2 | 1190+64 | 1 | 9,752 | 3.57 | 2.76 | 2.59 | 2.40 | 2.22 | 1.94 | 1.61 | 1.28 | 1.01 | 73% |
| Lane 1 | 1191+03 | 1 | 10,133 | 3.52 | 3.02 | 2.82 | 2.52 | 2.22 | 1.85 | 1.68 | 1.33 | 1.13 | 80% |
| Lane 1 | 1191+23 | 1 | 10,192 | 3.69 | 2.96 | 2.94 | 2.61 | 2.43 | 2.06 | 1.80 | 1.43 | 1.11 | 80% |
| Lane 2 | 1191+42 | 1 | 9,715 | 5.09 | 3.91 | 3.60 | 3.28 | 2.99 | 2.50 | 2.10 | 1.68 | 1.47 | 71% |
| Lane 1 | 1191+46 | 1 | 10,236 | 4.67 | 3.66 | 3.41 | 3.21 | 2.85 | 2.38 | 2.12 | 1.68 | 1.37 | 73% |
| Lane 1 | 1192+11 | 1 | 10,152 | 4.15 | 3.54 | 3.30 | 3.05 | 2.86 | 2.43 | 2.26 | 1.86 | 1.75 | 80% |
| Lane 1 | 1192+43 | 1 | 10,189 | 4.66 | 4.12 | 3.60 | 3.22 | 2.87 | 2.30 | 1.90 | 1.53 | 1.11 | 77% |
| Lane 2 | 1192+43 | 1 | 9,736 | 4.13 | 3.52 | 3.26 | 2.93 | 2.72 | 2.27 | 2.03 | 1.64 | 1.33 | 79% |
| Lane 1 | 1193+17 | 1 | 10,216 | 3.70 | 2.98 | 2.75 | 2.54 | 2.37 | 2.03 | 1.85 | 1.46 | 1.28 | 74% |
| Lane 1 | 1193+70 | 1 | 10,165 | 3.45 | 3.72 | 2.94 | 2.66 | 2.44 | 2.09 | 1.83 | 1.47 | 1.33 | 85% |
| Lane 1 | 1193+70 | 1 | 10,204 | 3.54 | 2.98 | 2.87 | 2.63 | 2.43 | 2.15 | 1.95 | 1.44 | 1.45 | 81% |
| Lane 1 | 1193+90 | 1 | 10,287 | 4.23 | 3.35 | 3.21 | 2.82 | 2.56 | 2.13 | 1.91 | 1.61 | 1.31 | 76% |
| Lane 2 | 1193+90 | 1 | 9,736 | 4.01 | 3.43 | 3.21 | 2.93 | 2.67 | 2.26 | 1.95 | 1.58 | 1.22 | 80% |
| Lane 1 | 1194+54 | 1 | 10,311 | 4.83 | 4.18 | 3.96 | 3.59 | 3.27 | 2.76 | 2.47 | 2.00 | 1.56 | 82% |
| Lane 2 | 1194+54 | 1 | 9,760 | 4.28 | 3.31 | 3.00 | 2.77 | 2.65 | 2.30 | 2.09 | 1.74 | 1.62 | 70% |
| Lane 1 | 1195+44 | 3 | 10,279 | 5.96 | 5.02 | 4.66 | 4.22 | 3.81 | 3.24 | 2.76 | 2.11 | 1.84 | 78% |
| Lane 2 | 1195+44 | 3 | 9,728 | 5.09 | 3.91 | 3.31 | 3.04 | 2.75 | 2.41 | 2.21 | 1.61 | 1.46 | 65% |

I-495 NEXT

Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 1 | 1196+13 | 1 | 10,475 | 3.07 | 2.54 | 2.24 | 2.00 | 1.78 | 1.44 | 1.19 | 0.88 | 0.71 | 73% |
| Lane 1 | 1196+51 | 1 | 10,470 | 4.15 | 3.17 | 2.81 | 2.58 | 2.31 | 1.87 | 1.57 | 1.23 | 0.94 | 68% |
| Lane 2 | 1196+91 | 1 | 9,667 | 3.36 | 2.63 | 2.42 | 2.12 | 1.93 | 1.64 | 1.43 | 1.07 | 0.91 | 72% |
| Lane 1 | 1197+02 | 1 | 10,390 | 3.57 | 3.03 | 2.59 | 2.33 | 2.07 | 1.81 | 1.59 | 1.21 | 1.06 | 73% |
| Lane 1 | 1197+44 | 1 | 10,546 | 4.28 | 4.08 | 3.41 | 3.05 | 2.77 | 2.35 | 2.21 | 1.55 | 1.22 | 80% |
| Lane 2 | 1197+44 | 3 | 9,652 | 4.35 | 3.14 | 2.94 | 2.67 | 2.35 | 1.93 | 1.54 | 1.10 | 0.78 | 68% |
| Lane 1 | 1199+37 | 1 | 10,594 | 3.65 | 2.63 | 2.42 | 2.14 | 1.85 | 1.28 | 1.01 | 0.65 | 0.39 | 66% |
| Lane 2 | 1199+37 | 1 | 9,763 | 2.68 | 1.85 | 1.66 | 1.50 | 1.31 | 0.94 | 0.60 | 0.51 | 0.26 | 62% |
| Lane 1 | 1200+02 | 1 | 10,872 | 4.19 | 3.05 | 2.62 | 2.12 | 1.83 | 1.37 | 1.14 | 0.96 | 0.53 | 63% |
| Lane 2 | 1200+41 | 1 | 9,652 | 3.45 | 2.76 | 2.38 | 2.07 | 1.87 | 1.53 | 1.14 | 0.75 | 0.57 | 69% |
| Lane 1 | 1200+84 | 1 | 11,002 | 4.10 | 3.01 | 2.77 | 2.40 | 2.15 | 1.59 | 1.22 | 0.81 | 0.61 | 68% |
| Lane 2 | 1201+44 | 1 | 9,683 | 3.25 | 2.63 | 2.23 | 1.93 | 1.73 | 1.27 | 0.93 | 0.58 | 0.44 | 69% |
| Lane 2 | 1201+96 | 1 | 9,739 | 2.38 | 2.01 | 1.63 | 1.37 | 1.16 | 0.80 | 0.58 | 0.37 | 0.24 | 68% |
| Lane 2 | 1202+51 | 1 | 9,768 | 2.60 | 2.28 | 2.02 | 1.74 | 1.52 | 1.12 | 0.96 | 0.69 | 0.42 | 78% |
| Lane 2 | 1202+91 | 1 | 9,752 | 2.30 | 1.98 | 1.71 | 1.48 | 1.27 | 1.11 | 0.78 | 0.54 | 0.52 | 74% |
| Lane 2 | 1203+68 | 1 | 9,768 | 2.52 | 2.36 | 2.00 | 1.76 | 1.55 | 1.19 | 0.91 | 0.64 | 0.33 | 79% |
| Lane 2 | 1204+02 | 1 | 9,783 | 3.03 | 2.57 | 2.44 | 2.07 | 1.84 | 1.41 | 1.11 | 0.85 | 0.69 | 81% |
| Lane 2 | 1205+05 | 1 | 9,731 | 3.95 | 3.33 | 3.06 | 2.76 | 2.50 | 2.08 | 1.70 | 1.33 | 1.05 | 77% |
| Lane 2 | 1205+57 | 1 | 9,736 | 3.27 | 2.84 | 2.55 | 2.33 | 2.22 | 1.93 | 1.61 | 1.15 | 0.89 | 78% |
| Lane 2 | 1205+76 | 1 | 9,731 | 4.13 | 3.55 | 3.38 | 3.11 | 2.79 | 2.30 | 1.88 | 1.40 | 1.19 | 82% |
| Lane 2 | 1206+06 | 1 | 9,744 | 3.01 | 2.46 | 2.33 | 2.00 | 1.80 | 1.51 | 1.26 | 0.92 | 0.82 | 77% |

I-495 NEXT

Joint Load Transfer Efficiency Results

| Lane | Station | Crack Type | Load (lbs.) | Deflections (mils) | | | | | | | | | Joint Load Transfer Efficiency |
|--------|---------|------------|-------------|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|--------------------------------|
| | | | | D1 (0") | D2 (8") | D3 (12") | D4 (18") | D5 (24") | D6 (36") | D7 (48") | D8 (60") | D9 (72") | |
| Lane 2 | 1206+51 | 1 | 9,779 | 2.87 | 2.38 | 2.26 | 2.03 | 1.84 | 1.43 | 1.24 | 0.86 | 0.75 | 79% |
| Lane 2 | 1207+05 | 1 | 9,699 | 3.94 | 3.43 | 3.24 | 3.04 | 2.91 | 2.56 | 2.37 | 1.65 | 1.38 | 82% |
| Lane 2 | 1207+34 | 1 | 9,787 | 3.28 | 2.94 | 2.86 | 2.53 | 2.35 | 1.88 | 1.68 | 1.35 | 0.96 | 87% |
| Lane 2 | 1207+78 | 1 | 9,863 | 4.20 | 3.46 | 3.19 | 2.89 | 2.59 | 2.27 | 1.83 | 1.41 | 1.02 | 76% |
| Lane 2 | 1211+23 | 1 | 9,787 | 3.35 | 2.39 | 1.89 | 1.55 | 1.38 | 1.09 | 0.73 | 0.76 | 0.19 | 56% |
| Lane 2 | 1212+75 | 1 | 9,847 | 5.85 | 4.20 | 3.85 | 3.31 | 2.92 | 2.43 | 2.00 | 1.44 | 1.26 | 66% |

Attachment 3
Summary of Other Observed Pavement Distress

REFER TO TABLE C-2 IN APPENDIX C

Attachment 4
Photographs of Typical Conditions



Photo 1 – Typical Type 1 Joint/Crack

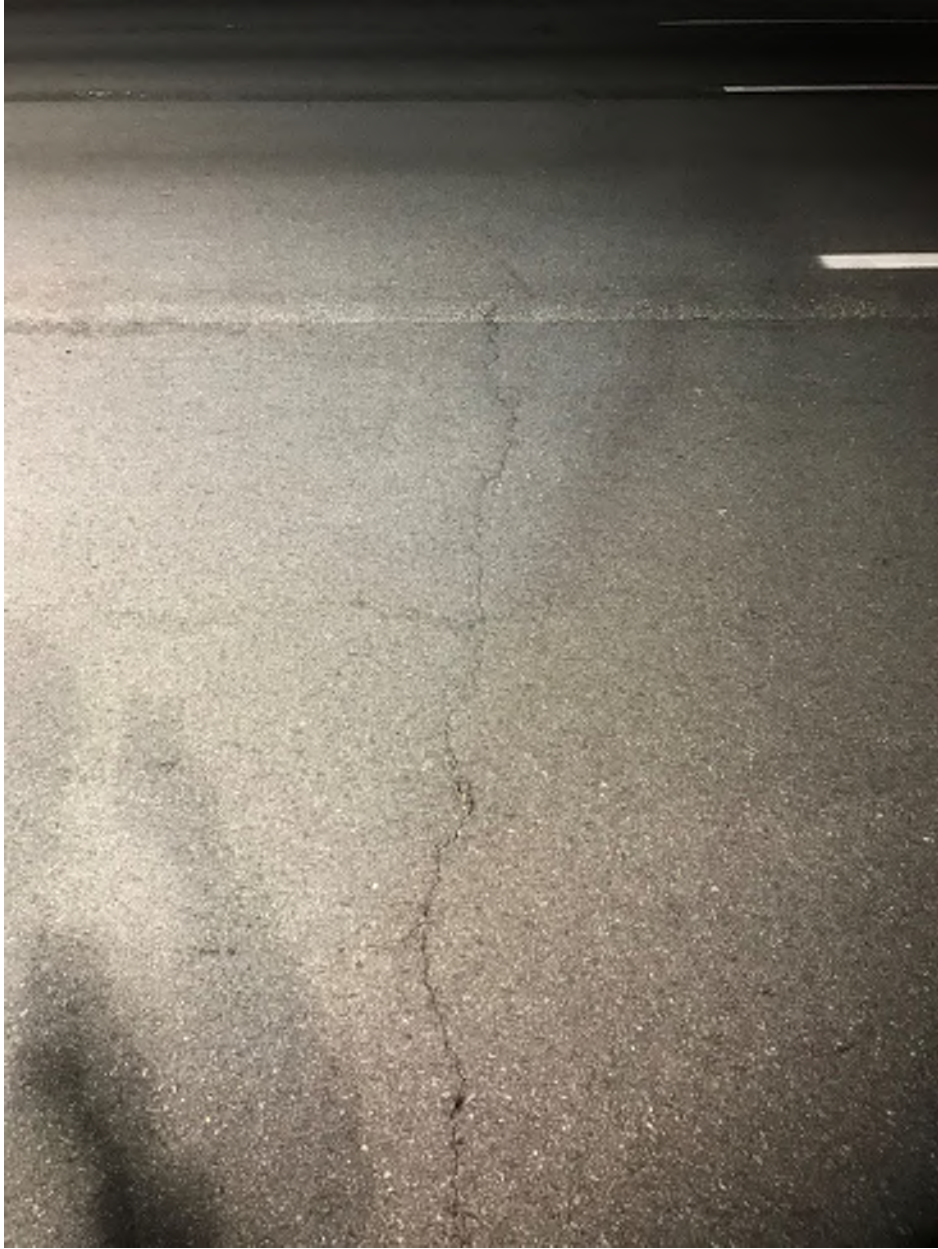


Photo 2 – Typical Type 1 Joint/Crack



Photo 3 – Typical Type 3 Joint/Crack

(Note Small Pothole)



Photo 4 – Typical Type 3 Joint/Crack
(Note presence of patching)



Photo 5 – Typical Longitudinal Cracking noted as Alligator Cracking due to appearance and location in wheel path. Likely caused by underlying longitudinal joint



PROJECT NEXT

APPENDIX D

LABORATORY TESTING DATA

Moisture Content Results
Atterberg Limits Test Results
Grain Size Analysis Results
Standard Proctor Moisture Density Results
CBR Test Reports
Corrosion Results
Resistivity Results
Resilient Modulus
Direct Shear Results
Consolidation Results
Rock Unconfined Compression Results

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-BR20 | 0.0 - 1.5 | | | | | | | | 12.5 |
| 19GWP-BR20 | 2.0 - 4.0 | | | | | | | | 19.5 |
| 19GWP-BR20 | 4.0 - 6.0 | | | | | | | | 12.7 |
| 19GWP-BR20 | 6.0 - 8.0 | 32 | 26 | 6 | 96 | 45 | SM | A-4 | 14.9 |
| 19GWP-BR20 | 8.0 - 10.0 | | | | | | | | 16.6 |
| 19GWP-BR20 | 13.0 - 15.0 | | | | | | | | 16.7 |
| 19GWP-BR20 | 18.0 - 20.0 | | | | | | | | 17.5 |
| 19GWP-BR20 | 23.0 - 25.0 | | | | | | | | 20.7 |
| 19GWP-BR20 | 28.0 - 30.0 | | | | | | | | 23.4 |
| 19GWP-BR20 | 33.0 - 35.0 | | | | | | | | 24.1 |
| 19GWP-BR20 | 38.0 - 40.0 | | | | | | | | 21.1 |
| 19GWP-BR20 | 43.0 - 45.0 | | | | | | | | 25.8 |
| 19GWP-BR20 | 48.0 - 50.0 | | | | | | | | 22.6 |
| 19GWP-BR20 | 53.0 - 55.0 | 27 | 22 | 5 | 72 | 19 | SM | A-1-b | 4.0 |
| 19GWP-BR20 | 58.0 - 60.0 | 36 | 25 | 11 | 99 | 56 | ML | A-6 | 19.0 |
| 19GWP-BR20 | 63.0 - 64.3 | | | | | | | | 15.5 |
| 19GWP-BR20 | 68.0 - 68.9 | | | | | | | | 15.5 |
| 19GWP-BR20 | 73.0 - 73.5 | | | | | | | | 13.5 |
| 19GWP-BR21 | 1.8 - 2.0 | | | | | | | | 12.4 |
| 19GWP-BR21 | 2.0 - 4.0 | | | | | | | | 15.1 |
| 19GWP-BR21 | 4.0 - 6.0 | | | | | | | | 14.3 |
| 19GWP-BR21 | 6.0 - 8.0 | | | | | | | | 25.6 |
| 19GWP-BR21 | 10.0 - 12.0 | | | | | | | | 20.0 |
| 19GWP-BR21 | 13.0 - 15.0 | 34 | 24 | 10 | 95 | 52 | ML | A-4 | 17.7 |
| 19GWP-BR21 | 18.0 - 20.0 | | | | | | | | 14.9 |
| 19GWP-BR21 | 23.0 - 25.0 | | | | | | | | 18.3 |
| 19GWP-BR21 | 30.0 - 32.0 | | | | | | | | 15.3 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/4/19

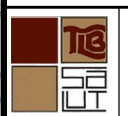


Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-BR21 | 33.0 - 35.0 | | | | | | | | 19.6 |
| 19GWP-BR21 | 38.0 - 40.0 | | | | | | | | 21.4 |
| 19GWP-BR21 | 43.0 - 45.0 | | | | | | | | 20.8 |
| 19GWP-BR21 | 48.0 - 50.0 | 36 | 28 | 8 | 91 | 46 | SM | A-4 | 20.4 |
| 19GWP-BR21 | 53.0 - 55.0 | | | | | | | | 20.7 |
| 19GWP-BR21 | 58.0 - 60.0 | | | | | | | | 14.6 |
| 19GWP-BR21 | 63.0 - 63.3 | | | | | | | | 14.4 |
| 19GWP-BR21 | 68.0 - 68.3 | | | | | | | | 13.2 |
| 19GWP-BR21 | 73.0 - 73.2 | | | | | | | | 20.7 |
| 19GWP-BR22 | 0.0 - 2.0 | | | | | | | | 21.7 |
| 19GWP-BR22 | 2.0 - 4.0 | 46 | 37 | 9 | 100 | 72 | ML | A-5 | 23.5 |
| 19GWP-BR22 | 4.0 - 6.0 | | | | | | | | 33.4 |
| 19GWP-BR22 | 6.0 - 8.0 | | | | | | | | 18.0 |
| 19GWP-BR22 | 8.0 - 10.0 | | | | | | | | 20.2 |
| 19GWP-BR22 | 13.0 - 15.0 | | | | | | | | 17.8 |
| 19GWP-BR22 | 18.0 - 20.0 | 32 | 27 | 5 | 99 | 47 | SM | A-4 | 15.4 |
| 19GWP-BR22 | 23.0 - 23.9 | | | | | | | | 18.7 |
| 19GWP-BR22 | 26.5 - 26.7 | | | | | | | | 10.7 |
| 19GWP-BR22 | 28.0 - 28.8 | | | | | | | | 12.8 |
| 19GWP-BR22 | 33.0 - 33.9 | 29 | 23 | 6 | 93 | 41 | SM | A-4 | 13.4 |
| 19GWP-BR22 | 38.0 - 38.8 | | | | | | | | 11.9 |
| 19GWP-BR22 | 43.0 - 43.5 | | | | | | | | 12.9 |
| 19GWP-BR22 | 48.0 - 48.3 | | | | | | | | 18.4 |
| 19GWP-BR23 | 3.0 - 5.0 | | | | | | | | 15.4 |
| 19GWP-BR23 | 5.0 - 7.0 | | | | | | | | 16.1 |
| 19GWP-BR23 | 7.0 - 9.0 | | | | | | | | 14.2 |
| 19GWP-BR23 | 9.0 - 11.0 | | | | | | | | 18.3 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/4/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-BR23 | 11.0 - 13.0 | | | | | | | | 18.0 |
| 19GWP-BR23 | 13.0 - 15.0 | 40 | 29 | 11 | 97 | 55 | ML | A-6 | 25.4 |
| 19GWP-BR23 | 18.0 - 20.0 | | | | | | | | 13.2 |
| 19GWP-BR23 | 23.0 - 25.0 | 43 | 39 | 4 | 100 | 50 | SM | A-5 | 23.4 |
| 19GWP-BR23 | 28.0 - 29.9 | | | | | | | | 15.7 |
| 19GWP-BR23 | 33.0 - 33.8 | | | | | | | | 5.4 |
| 19GWP-BR23 | 38.0 - 38.1 | | | | | | | | 11.6 |
| 19LOD-BR15 | 0.0 - 2.0 | | | | | | | | 17.8 |
| 19LOD-BR15 | 2.0 - 4.0 | | | | | | | | 27.5 |
| 19LOD-BR15 | 4.0 - 6.0 | 45 | 27 | 18 | | 74 | ML | A-7-6 | 24.3 |
| 19LOD-BR15 | 6.0 - 8.0 | | | | | | | | 23.5 |
| 19LOD-BR15 | 8.0 - 10.0 | | | | | | | | 36.6 |
| 19LOD-BR15 | 13.0 - 15.0 | 58 | 47 | 11 | 100 | 84 | MH | A-7-5 | 44.7 |
| 19LOD-BR15 | 18.0 - 20.0 | | | | | | | | 52.3 |
| 19LOD-BR15 | 23.0 - 25.0 | | | | | | | | 42.4 |
| 19LOD-BR15 | 28.0 - 30.0 | 45 | 37 | 8 | | 76 | ML | A-5 | 44.2 |
| 19LOD-BR15 | 33.0 - 34.0 | | | | | | | | 16.2 |
| 19LOD-BR15 | 38.0 - 39.0 | | | | | | | | 12.9 |
| 19LOD-BR15 | 43.0 - 44.3 | | | | | | | | 22.2 |
| 19LOD-BR15 | 48.0 - 48.1 | | | | | | | | 7.2 |
| 19LOD-BR16 | 0.0 - 2.0 | | | | | | | | 20.4 |
| 19LOD-BR16 | 2.0 - 4.0 | | | | | | | | 4.8 |
| 19LOD-BR16 | 4.0 - 6.0 | | | | | | | | 15.6 |
| 19LOD-BR16 | 6.0 - 8.0 | | | | | | | | 12.3 |
| 19LOD-BR16 | 8.0 - 10.0 | | | | | | | | 12.7 |
| 19LOD-BR16 | 13.0 - 15.0 | 39 | 26 | 13 | 96 | 53 | ML | A-6 | 20.5 |
| 19LOD-BR16 | 18.0 - 20.0 | | | | | | | | 11.8 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/4/19

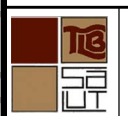


Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19LOD-BR16 | 23.0 - 25.0 | | | | | | | | 11.2 |
| 19LOD-BR16 | 28.0 - 30.0 | 29 | 22 | 7 | | 58 | CL-ML | A-4 | 23.6 |
| 19LOD-BR16 | 33.0 - 35.0 | | | | | | | | 14.6 |
| 19LOD-BR16 | 38.0 - 40.0 | | | | | | | | 23.7 |
| 19LOD-BR16 | 43.0 - 45.0 | | | | | | | | 18.6 |
| 19LOD-BR16 | 48.0 - 50.0 | | | | | | | | 31.0 |
| 19LOD-BR16 | 53.0 - 54.8 | 39 | 29 | 10 | | 61 | ML | A-4 | 18.4 |
| 19LOD-BR16 | 58.0 - 58.3 | | | | | | | | 11.6 |
| 19LOD-BR16 | 63.0 - 63.8 | | | | | | | | 13.5 |
| 19LOD-BR16 | 68.0 - 68.3 | | | | | | | | 10.3 |
| 19ODD-BR07 | 2.0 - 4.0 | 40 | 27 | 13 | | 67 | ML | A-6 | 21.8 |
| 19ODD-BR07 | 4.0 - 6.0 | | | | | | | | 22.7 |
| 19ODD-BR07 | 6.0 - 8.0 | | | | | | | | 23.8 |
| 19ODD-BR07 | 8.0 - 10.0 | | | | | | | | 21.6 |
| 19ODD-BR07 | 10.0 - 12.0 | | | | | | | | 22.3 |
| 19ODD-BR07 | 13.0 - 15.0 | | | | | | | | 20.9 |
| 19ODD-BR07 | 18.0 - 20.0 | | | | | | | | 16.2 |
| 19ODD-BR07 | 23.0 - 25.0 | | | | | | | | 31.4 |
| 19ODD-BR07 | 29.0 - 30.0 | | | | | | | | 27.7 |
| 19ODD-BR07 | 33.0 - 35.0 | 34 | 22 | 12 | | 75 | CL | A-6 | 23.7 |
| 19ODD-BR07 | 38.0 - 40.0 | | | | 65 | 16 | | | 12.2 |
| 19ODD-BR07 | 43.0 - 45.0 | | | | | | | | 25.8 |
| 19ODD-BR07 | 48.0 - 50.0 | | | | | | | | 19.3 |
| 19ODD-BR07 | 53.0 - 55.0 | 34 | 28 | 6 | 100 | 82 | ML | A-4 | 13.1 |
| 19ODD-BR07 | 58.0 - 58.9 | | | | | | | | 13.5 |
| 19ODD-BR07 | 63.0 - 63.9 | | | | | | | | 15.3 |
| 19ODD-BR07 | 68.0 - 68.9 | | | | | | | | 25.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/4/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19ODD-BR08A | 2.0 - 4.0 | | | | | | | | 18.1 |
| 19ODD-BR08A | 4.0 - 6.0 | 39 | 27 | 12 | 98 | 64 | ML | A-6 | 22.8 |
| 19ODD-BR08A | 6.0 - 8.0 | | | | | | | | 23.4 |
| 19ODD-BR08A | 8.0 - 10.0 | | | | | | | | 24.5 |
| 19ODD-BR08A | 10.0 - 12.0 | | | | | | | | 22.4 |
| 19ODD-BR08A | 13.0 - 15.0 | | | | | | | | 22.8 |
| 19ODD-BR08A | 18.0 - 20.0 | | | | | | | | 24.8 |
| 19ODD-BR08A | 23.0 - 25.0 | 40 | 26 | 14 | | 66 | ML | A-6 | 21.8 |
| 19ODD-BR08A | 28.0 - 30.0 | | | | | | | | 17.9 |
| 19ODD-BR08A | 33.0 - 35.0 | | | | | | | | 31.5 |
| 19ODD-BR08A | 38.0 - 40.0 | | | | | | | | 14.0 |
| 19ODD-BR08A | 43.0 - 45.0 | | | | | | | | 11.9 |
| 19ODD-BR08A | 48.0 - 49.5 | | | | | | | | 11.7 |
| 19ODD-BR08A | 53.0 - 54.9 | | | | | | | | 19.6 |
| 19ODD-BR08A | 58.0 - 59.4 | 34 | 28 | 6 | 96 | 49 | SM | A-4 | 16.7 |
| 19ODD-BR08A | 63.0 - 63.8 | | | | | | | | 13.3 |
| 19ODD-BR08A | 68.0 - 68.9 | | | | | | | | 13.7 |
| 19X-BR09 | 2.0 - 4.0 | | | | 70 | 20 | | | 9.5 |
| 19X-BR09 | 4.0 - 6.0 | 41 | 30 | 11 | | | | | 28.3 |
| 19X-BR09 | 6.0 - 8.0 | | | | | | | | 30.3 |
| 19X-BR09 | 8.0 - 10.0 | 46 | 34 | 12 | 100 | 83 | ML | A-7-5 | 32.7 |
| 19X-BR09 | 10.0 - 12.0 | | | | | | | | 35.5 |
| 19X-BR09 | 13.0 - 15.0 | | | | | | | | 16.4 |
| 19X-BR09 | 18.0 - 19.3 | | | | | | | | 16.6 |
| 19X-BR10 | 2.0 - 4.0 | | | | | | | | 32.8 |
| 19X-BR10 | 4.0 - 6.0 | 45 | 35 | 10 | 97 | 55 | ML | A-5 | 27.4 |
| 19X-BR10 | 6.0 - 8.0 | | | | | | | | 23.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/4/19



Summary of Laboratory Results

I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|----------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-BR10 | 8.0 - 10.0 | | | | | | | | 21.7 |
| 19X-BR10 | 13.0 - 15.0 | | | | | | | | 19.4 |
| 19X-BR10 | 18.0 - 20.0 | 38 | 24 | 14 | | 85 | CL | A-6 | 31.0 |
| 19X-BR10 | 23.0 - 25.0 | | | | | | | | 27.1 |
| 19X-BR10 | 28.0 - 29.9 | | | | | | | | 16.7 |
| 19X-BR10 | 33.0 - 34.3 | | | | | | | | 11.0 |
| 19X-BR10 | 38.0 - 39.0 | 31 | 26 | 5 | 100 | 51 | ML | A-4 | 14.6 |
| 19X-BR10 | 43.0 - 43.3 | | | | | | | | 16.8 |
| 19X-BR10 | 48.0 - 49.9 | | | | | | | | 18.4 |
| 19X-BR10 | 53.0 - 53.3 | | | | | | | | 12.7 |
| 19X-BR10 | 58.0 - 58.2 | | | | | | | | 7.5 |

T:\B Lab Summary - Basic - Next 495 Express Lanes Assignment 2.gpj - PROJECT.GDT 10/4/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19DTR-RW05 | 8.0 - 10.0 | | | | | | | | 19.3 |
| 19DTR-RW05 | 13.0 - 15.0 | | | | | | | | 13.1 |
| 19DTR-RW05 | 18.0 - 20.0 | 38 | 30 | 8 | 91 | 73 | ML | A-4 | 32.8 |
| 19DTR-RW05 | 23.0 - 25.0 | | | | | | | | 27.7 |
| 19DTR-RW05 | 28.0 - 30.0 | | | | | | | | 26.7 |
| 19DTR-RW05 | 33.0 - 33.4 | 33 | 27 | 6 | 98 | 46 | SM | A-4 | 5.2 |
| 19DTR-RW05 | 38.0 - 38.3 | | | | | | | | 1.4 |
| 19DTR-RW05 | 41.5 - 41.6 | | | | | | | | 0.4 |
| 19DTR-RW07 | 2.0 - 4.0 | | | | | | | | 21.6 |
| 19DTR-RW07 | 4.0 - 6.0 | 37 | 33 | 4 | 81 | 36 | SM | A-4 | 10.9 |
| 19DTR-RW07 | 6.0 - 7.4 | | | | | | | | 6.5 |
| 19DTR-RW07 | 8.0 - 10.0 | | | | | | | | 6.7 |
| 19DTR-RW07 | 10.0 - 12.0 | | | | | | | | 21.6 |
| 19DTR-RW07 | 15.0 - 16.8 | | | | | | | | 11.8 |
| 19DTR-RW07 | 20.0 - 20.9 | | | | 95 | 37 | | | 6.5 |
| 19DTR-RW07 | 25.0 - 25.4 | | | | | | | | 5.8 |
| 19DTR-RW07 | 30.0 - 30.8 | | | | | | | | 6.2 |
| 19DTR-RW07 | 35.0 - 35.2 | | | | | | | | 5.2 |
| 19DTR-RW07 | 40.0 - 40.1 | | | | | | | | 5.0 |
| 19DTR-RW07 | 45.0 - 45.1 | | | | | | | | 4.6 |
| 19DTR-RW07 | 50.0 - 50.2 | | | | | | | | 4.8 |
| 19GTP-E-P07 | 1.5 - 3.5 | | | | | | | | 21.8 |
| 19GTP-E-P07 | 3.5 - 5.5 | 43 | 33 | 10 | | 69 | ML | A-5 | 19.0 |
| 19GTP-E-P07 | 5.5 - 7.5 | | | | | | | | 12.6 |
| 19GTP-E-P08 | 1.0 - 2.5 | | | | 73 | 30 | | | 6.4 |
| 19GTP-E-P08 | 3.0 - 5.0 | | | | | | | | 17.7 |
| 19GTP-E-P08 | 5.0 - 7.0 | | | | | | | | 23.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT - 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GTP-E-P11 | 1.0 - 3.0 | | | | | | | | 5.1 |
| 19GTP-E-P11 | 3.0 - 4.5 | 35 | 24 | 11 | 94 | 50 | CL | A-6 | 14.6 |
| 19GTP-E-P11 | 5.0 - 7.0 | | | | | | | | 19.1 |
| 19GTP-E-P11 | 7.0 - 9.0 | | | | | | | | 21.2 |
| 19GWP-P01 | 0.0 - 2.0 | | | | | | | | 18.3 |
| 19GWP-P01 | 2.0 - 4.0 | | | | | | | | 18.8 |
| 19GWP-P01 | 4.0 - 6.0 | 33 | 28 | 5 | 88 | 38 | SM | A-4 | 9.3 |
| 19GWP-P02 | 0.0 - 2.0 | | | | | | | | 21.0 |
| 19GWP-P02 | 2.0 - 4.0 | 35 | 24 | 11 | 97 | 40 | SC | A-6 | 10.6 |
| 19GWP-P02 | 4.0 - 6.0 | | | | | | | | 10.7 |
| 19GWP-RW05 | 0.0 - 2.0 | | | | | | | | 11.5 |
| 19GWP-RW05 | 2.0 - 4.0 | 32 | 25 | 7 | 82 | 39 | SM | A-4 | 15.5 |
| 19GWP-RW05 | 4.0 - 6.0 | | | | | | | | 18.0 |
| 19GWP-RW05 | 6.0 - 8.0 | | | | | | | | 20.5 |
| 19GWP-RW05 | 8.0 - 10.0 | | | | | | | | 24.0 |
| 19GWP-RW05 | 13.0 - 15.0 | | | | | | | | 17.8 |
| 19GWP-RW05 | 18.0 - 20.0 | | | | | | | | 20.3 |
| 19GWP-RW05 | 23.0 - 25.0 | | | | | | | | 19.8 |
| 19GWP-RW05 | 28.0 - 30.0 | | | | | | | | 26.0 |
| 19GWP-RW05 | 33.0 - 35.0 | | | | | | | | 25.1 |
| 19GWP-RW05 | 38.0 - 40.0 | | | | | | | | 25.2 |
| 19GWP-RW05 | 43.0 - 45.0 | 38 | 34 | 4 | 100 | 75 | ML | A-4 | 30.0 |
| 19GWP-RW05 | 48.0 - 50.0 | | | | | | | | 22.5 |
| 19GWP-RW05 | 53.0 - 54.3 | | | | | | | | 23.3 |
| 19GWP-RW09 | 2.0 - 4.0 | | | | | | | | 16.1 |
| 19GWP-RW09 | 4.0 - 6.0 | | | | | | | | 17.8 |
| 19GWP-RW09 | 6.0 - 8.0 | | | | | | | | 16.4 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-RW09 | 8.0 - 10.0 | | | | | | | | 14.4 |
| 19GWP-RW09 | 10.0 - 12.0 | | | | | | | | 19.5 |
| 19GWP-RW09 | 13.0 - 15.0 | 33 | 27 | 6 | 92 | 44 | SM | A-4 | 16.3 |
| 19GWP-RW09 | 18.0 - 20.0 | | | | | | | | 16.7 |
| 19GWP-RW09 | 23.0 - 25.0 | | | | | | | | 16.9 |
| 19GWP-RW09 | 28.0 - 30.0 | | | | | | | | 17.7 |
| 19GWP-RW09 | 33.0 - 35.0 | | | | | | | | 20.6 |
| 19GWP-RW09 | 38.0 - 40.0 | | | | | | | | 15.8 |
| 19GWP-RW09 | 43.0 - 45.0 | | | | | | | | 14.8 |
| 19GWP-RW09 | 48.0 - 50.0 | 32 | 28 | 4 | 99 | 53 | ML | A-4 | 17.7 |
| 19GWP-RW10 | 2.0 - 4.0 | | | | | | | | 4.0 |
| 19GWP-RW10 | 4.0 - 6.0 | 29 | 21 | 8 | 100 | 55 | CL | A-4 | 6.9 |
| 19GWP-RW10 | 6.0 - 8.0 | | | | | | | | 7.3 |
| 19GWP-RW10 | 8.0 - 10.0 | | | | | | | | 10.2 |
| 19GWP-RW10 | 13.0 - 15.0 | | | | | | | | 10.8 |
| 19GWP-RW10 | 18.0 - 20.0 | | | | | | | | 12.2 |
| 19GWP-RW10 | 23.5 - 24.8 | | | | | | | | 8.3 |
| 19GWP-RW10 | 28.0 - 28.8 | | | | | | | | 9.4 |
| 19GWP-RW10 | 33.0 - 33.9 | 31 | 25 | 6 | 100 | 49 | SM | A-4 | 9.8 |
| 19GWP-RW10 | 38.0 - 38.2 | | | | | | | | 6.1 |
| 19GWP-RW10 | 43.0 - 43.1 | | | | | | | | 5.0 |
| 19GWP-RW11 | 2.0 - 4.0 | | | | | | | | 8.8 |
| 19GWP-RW11 | 4.0 - 6.0 | | | | | | | | 15.0 |
| 19GWP-RW11 | 6.0 - 8.0 | | | | | | | | 14.7 |
| 19GWP-RW11 | 8.0 - 10.0 | | | | | | | | 12.3 |
| 19GWP-RW11 | 13.0 - 15.0 | 35 | 28 | 7 | 91 | 43 | SM | A-4 | 17.3 |
| 19GWP-RW11 | 18.0 - 20.0 | | | | | | | | 18.2 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-RW11 | 23.5 - 25.0 | | | | | | | | 14.2 |
| 19GWP-RW11 | 28.0 - 30.0 | | | | | | | | 22.9 |
| 19GWP-RW11 | 33.0 - 35.0 | | | | | | | | 8.3 |
| 19GWP-RW11 | 38.0 - 38.8 | | | | | | | | 6.7 |
| 19GWP-RW11 | 43.0 - 43.8 | | | | | | | | 8.6 |
| 19GWP-RW11 | 48.0 - 48.5 | 28 | 23 | 5 | 100 | 43 | SM | A-4 | 12.4 |
| 19GWP-RW11 | 50.0 - 50.5 | | | | | | | | 11.9 |
| 19GWP-RW12 | 0.0 - 2.0 | 32 | 28 | 4 | 94 | 34 | SM | A-2-4 | 9.6 |
| 19GWP-RW12 | 2.0 - 2.8 | | | | | | | | 4.3 |
| 19GWP-RW12 | 4.0 - 5.3 | | | | | | | | 5.4 |
| 19GWP-RW12 | 6.0 - 6.3 | | | | | | | | 5.4 |
| 19GWP-RW12 | 8.0 - 8.4 | | | | | | | | 6.0 |
| 19GWP-RW12 | 13.0 - 15.0 | 29 | 24 | 5 | 100 | 58 | ML | A-4 | 10.3 |
| 19GWP-RW12 | 18.0 - 18.9 | | | | | | | | 8.7 |
| 19GWP-RW12 | 23.0 - 24.0 | 29 | 22 | 7 | 94 | 34 | SC-SM | A-2-4 | 11.9 |
| 19GWP-RW12 | 28.0 - 28.5 | | | | | | | | 6.3 |
| 19GWP-RW13 | 0.0 - 2.0 | | | | | | | | 16.6 |
| 19GWP-RW13 | 2.0 - 4.0 | | | | | | | | 18.9 |
| 19GWP-RW13 | 4.0 - 6.0 | 28 | 23 | 5 | 99 | 60 | ML | A-4 | 16.3 |
| 19GWP-RW13 | 6.0 - 8.0 | | | | | | | | 14.7 |
| 19GWP-RW13 | 8.0 - 10.0 | | | | | | | | 14.1 |
| 19GWP-RW13 | 13.0 - 15.0 | | | | | | | | 18.5 |
| 19GWP-RW13 | 18.0 - 20.0 | | | | | | | | 11.2 |
| 19GWP-RW13 | 23.0 - 24.4 | 32 | 28 | 4 | 100 | 58 | ML | A-4 | 12.5 |
| 19GWP-RW13 | 28.0 - 28.8 | | | | | | | | 10.5 |
| 19GWP-RW13 | 33.0 - 33.7 | | | | | | | | 10.3 |
| 19GWP-RW13 | 38.0 - 38.3 | | | | | | | | 6.5 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19GWP-RW13 | 43.0 - 43.3 | | | | | | | | 11.8 |
| 19GWP-RW13 | 48.0 - 48.3 | | | | | | | | 10.1 |
| 19GWP-RW13 | 53.0 - 53.8 | 31 | 25 | 6 | 100 | 57 | ML | A-4 | 15.5 |
| 19GWP-RW14 | 0.0 - 2.0 | | | | | | | | 11.7 |
| 19GWP-RW14 | 2.0 - 4.0 | | | | | | | | 10.3 |
| 19GWP-RW14 | 4.0 - 6.0 | | | | | | | | 8.9 |
| 19GWP-RW14 | 6.0 - 8.0 | | | | | | | | 9.4 |
| 19GWP-RW14 | 8.0 - 9.9 | | | | | | | | 7.2 |
| 19GWP-RW14 | 13.0 - 15.0 | 34 | 25 | 9 | | 59 | ML | A-4 | 10.3 |
| 19GWP-RW14 | 18.0 - 19.8 | | | | | | | | 16.3 |
| 19GWP-RW14 | 23.0 - 24.8 | | | | | | | | 17.4 |
| 19GWP-RW14 | 28.0 - 29.2 | | | | | | | | 10.6 |
| 19GWP-RW14 | 33.0 - 33.9 | | | | | | | | 11.4 |
| 19GWP-RW15 | 0.0 - 2.0 | | | | | | | | 12.5 |
| 19GWP-RW15 | 2.0 - 4.0 | | | | | | | | 14.0 |
| 19GWP-RW15 | 4.0 - 5.7 | 34 | 28 | 6 | 98 | 30 | SM | A-2-4 | 15.1 |
| 19GWP-RW15 | 6.0 - 8.0 | | | | | | | | 13.7 |
| 19GWP-RW15 | 8.0 - 10.0 | | | | | | | | 16.1 |
| 19GWP-RW15 | 13.0 - 13.9 | | | | | | | | 9.3 |
| 19GWP-RW15 | 18.0 - 18.9 | | | | | | | | 8.7 |
| 19GWP-RW15 | 23.0 - 24.0 | | | | | | | | 8.3 |
| 19GWP-RW15 | 28.0 - 29.3 | 37 | 28 | 9 | 100 | 38 | SM | A-4 | 12.2 |
| 19GWP-RW15 | 33.0 - 33.4 | | | | | | | | 12.8 |
| 19GWP-RW15 | 38.0 - 38.4 | | | | | | | | 13.0 |
| 19LOD-W-P14 | 1.5 - 3.5 | | | | | | | | 15.9 |
| 19LOD-W-P14 | 3.5 - 5.5 | 37 | 27 | 10 | 95 | 51 | ML | A-4 | 15.2 |
| 19LOD-W-P14 | 5.5 - 7.5 | | | | | | | | 14.5 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19LOD-W-P15 | 1.5 - 5.0 | | | | | | | | 19.3 |
| 19LOD-W-P15 | 3.5 - 9.0 | 37 | 28 | 9 | | 53 | ML | A-4 | 12.0 |
| 19LOD-W-P15 | 5.5 - 13.0 | | | | | | | | 13.1 |
| 19ODD-E-P02 | 2.0 - 4.0 | 41 | 27 | 14 | | 62 | ML | A-7-6 | 18.0 |
| 19ODD-E-P02 | 4.0 - 6.0 | | | | | | | | 17.3 |
| 19ODD-E-P02 | 6.0 - 8.0 | 39 | 31 | 8 | | 84 | ML | A-4 | 16.8 |
| 19ODD-W-P01 | 2.0 - 4.0 | | | | | | | | 19.5 |
| 19ODD-W-P01 | 4.0 - 6.0 | | | | | | | | 21.0 |
| 19ODD-W-P01 | 6.0 - 8.0 | | | | | | | | 15.9 |
| 19SWM-05 | 0.0 - 2.0 | | | | | | | | 13.6 |
| 19SWM-05 | 2.0 - 4.0 | | | | | | | | 23.2 |
| 19SWM-05 | 4.0 - 6.0 | 47 | 26 | 21 | 100 | 78 | CL | A-7-6 | 30.2 |
| 19SWM-05 | 6.0 - 8.0 | 25 | 21 | 4 | 98 | 33 | SC-SM | A-2-4 | 18.7 |
| 19SWM-05 | 8.0 - 10.0 | | | | | | | | 12.1 |
| 19SWM-05 | 13.0 - 15.0 | | | | | | | | 20.5 |
| 19SWM-05 | 18.0 - 19.4 | | | | | | | | 19.2 |
| 19SWM-05 | 20.0 - 25.0 | | | | | | | | 25.3 |
| 19SWM-05 | 23.0 - 23.3 | | | | | | | | 18.7 |
| 19SWM-11 | 0.0 - 2.0 | | | | | | | | 17.6 |
| 19SWM-11 | 2.0 - 4.0 | 48 | 26 | 22 | 99 | 74 | CL | A-7-6 | 26.6 |
| 19SWM-11 | 4.0 - 6.0 | | | | | | | | 15.2 |
| 19SWM-11 | 6.0 - 8.0 | | | | | | | | 8.2 |
| 19SWM-11 | 8.0 - 10.0 | | | | | | | | 22.4 |
| 19SWM-11 | 13.0 - 15.0 | | | | | | | | 7.9 |
| 19SWM-11 | 15.0 - 20.0 | | | | | | | | 1.1 |
| 19SWM-11 | 18.0 - 20.0 | | | | | | | | 32.4 |
| 19SWM-11 | 23.0 - 25.0 | | | | | | | | 38.8 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|----------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19SWM-12 | 0.0 - 2.0 | | | | | | | | 29.3 |
| 19SWM-12 | 2.0 - 4.0 | | | | | | | | 24.1 |
| 19SWM-12 | 4.0 - 6.0 | | | | | | | | 30.1 |
| 19SWM-12 | 5.0 - 10.0 | | | | 95 | 58 | | | 1.3 |
| 19SWM-12 | 6.0 - 8.0 | 40 | 29 | 11 | 94 | 47 | SM | A-6 | 19.4 |
| 19SWM-12 | 8.0 - 10.0 | | | | | | | | 36.4 |
| 19SWM-12 | 13.0 - 15.0 | | | | | | | | 29.7 |
| 19SWM-12 | 18.0 - 20.0 | 39 | 33 | 6 | 100 | 73 | ML | A-4 | 30.4 |
| 19SWM-12 | 23.0 - 25.0 | | | | | | | | 26.7 |
| 19SWM-13 | 0.0 - 2.0 | | | | | | | | 20.9 |
| 19SWM-13 | 2.0 - 4.0 | 39 | 21 | 18 | 100 | 71 | CL | A-6 | 21.9 |
| 19SWM-13 | 4.0 - 6.0 | | | | | | | | 16.1 |
| 19SWM-13 | 6.0 - 8.0 | | | | | | | | 15.4 |
| 19SWM-13 | 6.0 - 10.0 | | | | | | | | 18.3 |
| 19SWM-13 | 8.0 - 10.0 | | | | | | | | 18.7 |
| 19SWM-13 | 13.0 - 15.0 | | | | | | | | 17.8 |
| 19SWM-13 | 18.0 - 20.0 | | | | | | | | 10.3 |
| 19SWM-13 | 23.0 - 25.0 | 34 | 28 | 6 | 100 | 70 | ML | A-4 | 8.4 |
| 19SWM-14 | 0.0 - 2.0 | 47 | 24 | 23 | 97 | 67 | CL | A-7-6 | 24.7 |
| 19SWM-14 | 2.0 - 4.0 | | | | | | | | 16.1 |
| 19SWM-14 | 4.0 - 6.0 | | | | | | | | 13.8 |
| 19SWM-14 | 6.0 - 8.0 | | | | | | | | 12.8 |
| 19SWM-14 | 8.0 - 10.0 | | | | | | | | 23.3 |
| 19SWM-14 | 10.0 - 15.0 | | | | | | | | 22.5 |
| 19SWM-14 | 13.0 - 15.0 | | | | | | | | 19.1 |
| 19SWM-14 | 18.0 - 19.7 | | | | | | | | 10.5 |
| 19SWM-14 | 23.0 - 23.8 | | | | | | | | 5.3 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-NOS-P01 | 2.3 - 4.3 | | | | | | | | 13.5 |
| 19X-NOS-P01 | 4.3 - 6.3 | | | | | | | | 17.8 |
| 19X-NOS-P01 | 6.3 - 8.3 | | | | | | | | 24.9 |
| 19X-NOS-P02 | 2.0 - 4.0 | 18 | 14 | 4 | 71 | 14 | SC-SM | A-1-a | 4.6 |
| 19X-NOS-P02 | 4.0 - 6.0 | | | | | | | | 23.3 |
| 19X-NOS-P02 | 6.0 - 8.0 | | | | | | | | 21.9 |
| 19X-NOS-P03 | 5.0 - 7.0 | 34 | 27 | 7 | 92 | 40 | SM | A-4 | 15.9 |
| 19X-NOS-P03 | 7.0 - 9.0 | | | | | | | | 17.8 |
| 19X-NOS-P03 | 9.0 - 11.0 | | | | | | | | 21.7 |
| 19X-NOS-P04 | 2.2 - 4.0 | | | | | | | | 30.8 |
| 19X-NOS-P04 | 4.0 - 6.0 | 35 | 25 | 10 | 82 | 39 | SM | A-4 | 17.1 |
| 19X-NOS-P04 | 6.0 - 8.0 | | | | | | | | 20.6 |
| 19X-NOS-P05 | 2.0 - 3.5 | | | | | | | | 3.9 |
| 19X-NOS-P05 | 3.5 - 5.5 | 38 | 28 | 10 | 97 | 56 | ML | A-4 | 11.2 |
| 19X-NOS-P05 | 5.5 - 7.5 | | | | | | | | 14.1 |
| 19X-NOS-P06 | 4.0 - 6.0 | | | | | | | | 20.1 |
| 19X-NOS-P06 | 6.0 - 8.0 | | | | | | | | 19.3 |
| 19X-NOS-P06 | 8.0 - 10.0 | | | | | | | | 24.1 |
| 19X-NOS-P07 | 2.0 - 4.0 | | | | | | | | 1.3 |
| 19X-NOS-P07 | 4.0 - 6.0 | | | | | | | | 21.0 |
| 19X-NOS-P07 | 6.0 - 8.0 | | | | | | | | 32.5 |
| 19X-NOS-P08 | 1.5 - 3.5 | | | | | | | | 4.2 |
| 19X-NOS-P08 | 3.5 - 5.5 | | | | | | | | 25.4 |
| 19X-NOS-P08 | 5.5 - 7.5 | | | | | | | | 22.0 |
| 19X-NOS-P09 | 4.0 - 6.0 | | | | 89 | 34 | | | 13.3 |
| 19X-NOS-P09 | 6.0 - 8.0 | | | | | | | | 24.2 |
| 19X-NOS-P09 | 8.0 - 10.0 | | | | | | | | 23.7 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT - 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-NOS-P10 | 3.0 - 5.0 | | | | | | | | 22.5 |
| 19X-NOS-P10 | 5.0 - 7.0 | | | | | | | | 19.2 |
| 19X-NOS-P10 | 7.0 - 9.0 | | | | | | | | 16.3 |
| 19X-NOS-P11 | 3.0 - 5.0 | | | | | | | | 12.9 |
| 19X-NOS-P11 | 5.0 - 7.0 | | | | | | | | 27.5 |
| 19X-NOS-P11 | 7.0 - 9.0 | | | | | | | | 14.1 |
| 19X-NOS-P12 | 1.5 - 1.7 | | | | | | | | 10.9 |
| 19X-NOS-P12 | 3.5 - 5.5 | | | | | | | | 21.7 |
| 19X-NOS-P12 | 5.5 - 7.5 | | | | | | | | 18.6 |
| 19X-NOS-P13 | 3.5 - 5.5 | | | | | | | | 20.5 |
| 19X-NOS-P13 | 5.5 - 7.5 | | | | | | | | 10.9 |
| 19X-NOS-P13 | 7.5 - 9.5 | | | | | | | | 11.7 |
| 19X-NOS-P14 | 4.0 - 6.0 | 56 | 44 | 12 | 100 | 49 | SM | A-7-5 | 37.5 |
| 19X-NOS-P14 | 6.0 - 8.0 | | | | | | | | 36.6 |
| 19X-NOS-P14 | 8.0 - 10.0 | | | | | | | | 39.8 |
| 19X-NOS-P15 | 1.5 - 1.9 | | | | | | | | 3.7 |
| 19X-NOS-P15 | 3.5 - 5.5 | | | | | | | | 6.5 |
| 19X-NOS-P15 | 5.5 - 7.5 | 53 | 33 | 20 | 98 | 69 | MH | A-7-5 | 32.1 |
| 19X-NOS-P16 | 3.0 - 5.0 | | | | | | | | 29.6 |
| 19X-NOS-P16 | 5.0 - 7.0 | | | | | | | | 27.9 |
| 19X-NOS-P16 | 7.0 - 9.0 | | | | | | | | 24.9 |
| 19X-NOS-P17 | 3.6 - 5.6 | | | | | | | | 2.3 |
| 19X-NOS-P17 | 5.6 - 7.6 | | | | | | | | 19.2 |
| 19X-NOS-P17 | 7.6 - 9.6 | 36 | 26 | 10 | 100 | 60 | ML | A-4 | 24.6 |
| 19X-NOS-P17 | 9.6 - 11.6 | | | | | | | | 18.6 |
| 19X-NOS-P17 | 11.6 - 13.6 | | | | | | | | 21.3 |
| 19X-NOS-P18 | 3.0 - 5.0 | | | | | | | | 17.9 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19

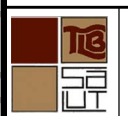


Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-NOS-P18 | 5.0 - 7.0 | | | | | | | | 20.0 |
| 19X-NOS-P18 | 7.0 - 9.0 | | | | | | | | 15.0 |
| 19X-NOS-P19 | 3.0 - 5.0 | | | | | | | | 12.6 |
| 19X-NOS-P19 | 5.0 - 7.0 | | | | | | | | 10.7 |
| 19X-NOS-P19 | 7.0 - 9.0 | | | | | | | | 20.4 |
| 19X-NOS-P20 | 3.0 - 5.0 | | | | | | | | 18.2 |
| 19X-NOS-P20 | 5.0 - 7.0 | | | | | | | | 18.5 |
| 19X-NOS-P20 | 7.0 - 9.0 | | | | | | | | 38.6 |
| 19X-NOS-P21 | 2.5 - 4.5 | 35 | 23 | 12 | 96 | 57 | CL | A-6 | 12.4 |
| 19X-NOS-P21 | 4.5 - 6.5 | | | | | | | | 15.3 |
| 19X-NOS-P21 | 6.5 - 8.5 | | | | | | | | 15.6 |
| 19X-NOS-P22 | 2.5 - 4.5 | | | | | | | | 16.7 |
| 19X-NOS-P22 | 4.5 - 6.5 | | | | | | | | 19.2 |
| 19X-NOS-P22 | 6.5 - 8.5 | | | | | | | | 19.4 |
| 19X-NOS-P23 | 2.5 - 4.5 | | | | | | | | 16.7 |
| 19X-NOS-P23 | 4.5 - 6.5 | 38 | 23 | 15 | 99 | 69 | CL | A-6 | 15.1 |
| 19X-NOS-P23 | 6.5 - 8.5 | | | | | | | | 14.4 |
| 19X-NOS-P24 | 3.0 - 5.0 | | | | | | | | 12.2 |
| 19X-NOS-P24 | 5.0 - 7.0 | | | | | | | | 9.5 |
| 19X-NOS-P24 | 7.0 - 9.0 | | | | | | | | 12.2 |
| 19X-NOS-P25 | 2.0 - 4.0 | 36 | 28 | 8 | 100 | 67 | ML | A-4 | 13.9 |
| 19X-NOS-P25 | 4.0 - 6.0 | | | | | | | | 11.5 |
| 19X-NOS-P25 | 6.0 - 7.3 | | | | | | | | 10.1 |
| 19X-NOS-P26 | 2.0 - 4.0 | | | | | | | | 8.0 |
| 19X-NOS-P26 | 4.0 - 6.0 | | | | | | | | 7.7 |
| 19X-NOS-P26 | 6.0 - 7.9 | | | | | | | | 10.0 |
| 19X-N-RW02 | 2.3 - 4.3 | 40 | 29 | 11 | 87 | 44 | SM | A-6 | 19.1 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW02 | 4.3 - 6.3 | | | | | | | | 24.2 |
| 19X-N-RW02 | 6.3 - 8.3 | | | | | | | | 17.6 |
| 19X-N-RW02 | 8.3 - 10.3 | | | | | | | | 20.7 |
| 19X-N-RW02 | 13.0 - 15.0 | | | | | | | | 17.4 |
| 19X-N-RW02 | 18.0 - 20.0 | | | | | | | | 26.4 |
| 19X-N-RW02 | 23.0 - 25.0 | 30 | 23 | 7 | 74 | 20 | SM | A-2-4 | 10.8 |
| 19X-N-RW02 | 28.0 - 30.0 | | | | | | | | 29.5 |
| 19X-N-RW02 | 33.0 - 35.0 | | | | | | | | 28.5 |
| 19X-N-RW02 | 38.0 - 40.0 | | | | | | | | 22.4 |
| 19X-N-RW02 | 43.0 - 43.5 | 32 | 26 | 6 | 99 | 41 | SM | A-4 | 17.8 |
| 19X-N-RW02 | 48.0 - 48.2 | | | | | | | | 18.7 |
| 19X-N-RW03 | 2.0 - 4.0 | | | | | | | | 12.3 |
| 19X-N-RW03 | 4.0 - 6.0 | | | | | | | | 19.5 |
| 19X-N-RW03 | 6.0 - 8.0 | 36 | 26 | 10 | 96 | 59 | ML | A-4 | 21.7 |
| 19X-N-RW03 | 8.0 - 10.0 | | | | | | | | 21.8 |
| 19X-N-RW03 | 13.0 - 15.0 | | | | | | | | 19.4 |
| 19X-N-RW03 | 18.0 - 20.0 | 52 | 22 | 30 | | 84 | CH | A-7-6 | 26.2 |
| 19X-N-RW03 | 23.0 - 25.0 | | | | | | | | 20.2 |
| 19X-N-RW03 | 28.0 - 29.4 | 32 | 25 | 7 | 100 | 59 | ML | A-4 | 8.2 |
| 19X-N-RW03 | 33.0 - 33.4 | | | | | | | | 7.3 |
| 19X-N-RW03 | 38.0 - 38.4 | | | | | | | | 7.0 |
| 19X-N-RW03 | 43.0 - 43.1 | | | | | | | | 12.8 |
| 19X-N-RW04 | 3.0 - 5.0 | | | | | | | | 15.2 |
| 19X-N-RW04 | 5.0 - 7.0 | | | | | | | | 13.1 |
| 19X-N-RW04 | 7.0 - 9.0 | | | | | | | | 21.3 |
| 19X-N-RW04 | 9.0 - 11.0 | | | | | | | | 26.3 |
| 19X-N-RW04 | 13.0 - 15.0 | 43 | 22 | 21 | | 70 | CL | A-7-6 | 25.9 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW04 | 18.0 - 20.0 | | | | | | | | 19.3 |
| 19X-N-RW04 | 23.0 - 25.0 | 38 | 28 | 10 | 72 | 29 | SM | A-2-4 | 13.6 |
| 19X-N-RW04 | 28.0 - 28.4 | | | | | | | | 16.8 |
| 19X-N-RW04 | 33.0 - 33.5 | | | | | | | | 19.4 |
| 19X-N-RW04 | 38.0 - 38.3 | | | | | | | | 15.9 |
| 19X-N-RW05 | 2.0 - 4.0 | | | | | | | | 15.7 |
| 19X-N-RW05 | 4.0 - 6.0 | 33 | 26 | 7 | 85 | 45 | SM | A-4 | 20.1 |
| 19X-N-RW05 | 6.0 - 8.0 | | | | | | | | 19.3 |
| 19X-N-RW05 | 8.0 - 10.0 | | | | | | | | 16.2 |
| 19X-N-RW05 | 13.0 - 15.0 | | | | | | | | 31.1 |
| 19X-N-RW05 | 18.0 - 20.0 | | | | | | | | 9.7 |
| 19X-N-RW05 | 23.0 - 25.0 | | | | | | | | 27.8 |
| 19X-N-RW05 | 28.0 - 30.0 | | | | | | | | 19.3 |
| 19X-N-RW05 | 33.0 - 34.8 | 31 | 26 | 5 | | 34 | SM | A-2-4 | 8.6 |
| 19X-N-RW05 | 38.0 - 38.6 | | | | | | | | 17.6 |
| 19X-N-RW05 | 43.0 - 43.9 | | | | | | | | 17.8 |
| 19X-N-RW05 | 48.0 - 48.3 | | | | | | | | 13.4 |
| 19X-N-RW06 | 0.0 - 2.0 | | | | | | | | 24.6 |
| 19X-N-RW06 | 2.0 - 4.0 | 38 | 23 | 15 | | 84 | CL | A-6 | 31.7 |
| 19X-N-RW06 | 4.0 - 6.0 | | | | | | | | 23.2 |
| 19X-N-RW06 | 6.0 - 8.0 | | | | | | | | 9.3 |
| 19X-N-RW06 | 8.0 - 10.0 | | | | | | | | 16.9 |
| 19X-N-RW06 | 13.0 - 15.0 | | | | | | | | 18.5 |
| 19X-N-RW06 | 18.0 - 18.8 | | | | | | | | 11.2 |
| 19X-N-RW06 | 23.0 - 23.3 | | | | | | | | 15.2 |
| 19X-N-RW06 | 28.0 - 28.2 | | | | | | | | 14.4 |
| 19X-N-RW06 | 33.0 - 33.3 | | | | | | | | 15.4 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW07 | 0.0 - 2.0 | | | | | | | | 31.8 |
| 19X-N-RW07 | 2.0 - 4.0 | | | | | | | | 27.6 |
| 19X-N-RW07 | 4.0 - 6.0 | 40 | 21 | 19 | 93 | 42 | SC | A-6 | 26.4 |
| 19X-N-RW07 | 6.0 - 8.0 | | | | | | | | 10.9 |
| 19X-N-RW07 | 8.0 - 10.0 | | | | | | | | 12.2 |
| 19X-N-RW07 | 13.0 - 14.5 | | | | | | | | 9.8 |
| 19X-N-RW07 | 18.0 - 19.4 | 36 | 30 | 6 | | 67 | ML | A-4 | 17.7 |
| 19X-N-RW07 | 23.0 - 24.5 | | | | | | | | 19.0 |
| 19X-N-RW07 | 28.0 - 28.4 | | | | | | | | 18.2 |
| 19X-N-RW07 | 33.0 - 33.5 | | | | | | | | 17.0 |
| 19X-N-RW07 | 38.0 - 38.2 | | | | | | | | 20.9 |
| 19X-N-RW08 | 0.0 - 2.0 | | | | | | | | 12.1 |
| 19X-N-RW08 | 2.0 - 4.0 | 45 | 32 | 13 | | 62 | ML | A-7-5 | 23.5 |
| 19X-N-RW08 | 4.0 - 6.0 | | | | | | | | 28.6 |
| 19X-N-RW08 | 6.0 - 8.0 | 48 | 25 | 23 | | 86 | CL | A-7-6 | 34.2 |
| 19X-N-RW08 | 8.0 - 10.0 | | | | | | | | 15.0 |
| 19X-N-RW08 | 13.0 - 15.0 | 37 | 32 | 5 | 100 | 70 | ML | A-4 | 33.6 |
| 19X-N-RW08 | 18.0 - 20.0 | | | | | | | | 18.4 |
| 19X-N-RW08 | 23.0 - 24.3 | 30 | 26 | 4 | 99 | 60 | ML | A-4 | 13.3 |
| 19X-N-RW08 | 28.0 - 30.0 | | | | | | | | 8.5 |
| 19X-N-RW08 | 33.0 - 33.3 | | | | | | | | 11.5 |
| 19X-N-RW08 | 37.0 - 37.2 | | | | | | | | 19.0 |
| 19X-N-RW13 | 0.0 - 2.0 | 41 | 29 | 12 | 96 | 64 | ML | A-7-6 | 19.8 |
| 19X-N-RW13 | 2.0 - 4.0 | | | | | | | | 31.4 |
| 19X-N-RW13 | 4.0 - 6.0 | | | | | | | | 13.6 |
| 19X-N-RW13 | 6.0 - 8.0 | | | | | | | | 22.8 |
| 19X-N-RW13 | 8.0 - 10.0 | | | | | | | | 24.9 |

T1B LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results

I-495 NEXT Express Lanes

Fairfax County, Virginia
 Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW13 | 13.0 - 15.0 | | | | | | | | 27.5 |
| 19X-N-RW13 | 18.0 - 20.0 | | | | | | | | 22.4 |
| 19X-N-RW13 | 23.0 - 25.0 | | | | | | | | 30.2 |
| 19X-N-RW13 | 28.0 - 30.0 | | | | | | | | 21.7 |
| 19X-N-RW13 | 33.0 - 35.0 | | | | | | | | 34.3 |
| 19X-N-RW13 | 38.0 - 40.0 | | | | | | | | 23.4 |
| 19X-N-RW13 | 43.0 - 45.0 | 36 | 30 | 6 | 99 | 56 | ML | A-4 | 21.9 |
| 19X-N-RW13 | 48.0 - 49.3 | | | | | | | | 19.7 |
| 19X-N-RW14 | 1.0 - 3.0 | | | | | | | | 15.7 |
| 19X-N-RW14 | 3.0 - 5.0 | | | | | | | | 12.3 |
| 19X-N-RW14 | 5.0 - 7.0 | | | | | | | | 15.7 |
| 19X-N-RW14 | 7.0 - 9.0 | | | | | | | | 15.1 |
| 19X-N-RW14 | 9.0 - 11.0 | | | | | | | | 11.6 |
| 19X-N-RW14 | 13.0 - 15.0 | | | | | | | | 18.4 |
| 19X-N-RW14 | 18.0 - 20.0 | | | | | | | | 20.1 |
| 19X-N-RW14 | 23.0 - 25.0 | 38 | 31 | 7 | 96 | 43 | SM | A-4 | 17.7 |
| 19X-N-RW14 | 28.0 - 30.0 | | | | | | | | 32.1 |
| 19X-N-RW14 | 33.0 - 33.5 | | | | | | | | 17.6 |
| 19X-N-RW14 | 38.0 - 39.8 | | | | | | | | 21.1 |
| 19X-N-RW14 | 43.0 - 44.4 | | | | | | | | 17.0 |
| 19X-N-RW14 | 48.0 - 50.0 | | | | | | | | 22.1 |
| 19X-N-RW15 | 0.0 - 2.0 | | | | | | | | 5.7 |
| 19X-N-RW15 | 2.0 - 4.0 | 39 | 27 | 12 | 94 | 60 | ML | A-6 | 18.6 |
| 19X-N-RW15 | 4.0 - 6.0 | | | | | | | | 22.5 |
| 19X-N-RW15 | 6.0 - 8.0 | | | | | | | | 18.2 |
| 19X-N-RW15 | 8.0 - 10.0 | | | | | | | | 22.0 |
| 19X-N-RW15 | 13.0 - 15.0 | | | | | | | | 22.8 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW15 | 18.0 - 20.0 | | | | | | | | 35.1 |
| 19X-N-RW15 | 23.0 - 25.0 | | | | | | | | 22.8 |
| 19X-N-RW15 | 28.0 - 30.0 | | | | | | | | 15.7 |
| 19X-N-RW15 | 33.0 - 35.0 | | | | | | | | 17.2 |
| 19X-N-RW15 | 38.0 - 40.0 | 37 | 29 | 8 | 99 | 58 | ML | A-4 | 19.1 |
| 19X-N-RW15 | 43.0 - 44.3 | | | | | | | | 21.4 |
| 19X-N-RW15 | 48.0 - 48.3 | | | | | | | | 6.6 |
| 19X-N-RW15 | 50.0 - 50.9 | | | | | | | | 7.5 |
| 19X-N-RW16 | 2.0 - 3.0 | | | | | | | | 12.3 |
| 19X-N-RW16 | 4.0 - 6.0 | | | | | | | | 38.4 |
| 19X-N-RW16 | 6.0 - 8.0 | | | | | | | | 38.3 |
| 19X-N-RW16 | 8.0 - 10.0 | | | | | | | | 39.8 |
| 19X-N-RW16 | 13.0 - 15.0 | 51 | 39 | 12 | 100 | 70 | MH | A-7-5 | 36.3 |
| 19X-N-RW16 | 18.0 - 20.0 | | | | | | | | 10.6 |
| 19X-N-RW16 | 23.0 - 25.0 | | | | | | | | 19.8 |
| 19X-N-RW16 | 28.0 - 29.4 | | | | | | | | 11.4 |
| 19X-N-RW16 | 33.0 - 33.9 | | | | | | | | 9.2 |
| 19X-N-RW16 | 38.0 - 38.8 | | | | | | | | 8.1 |
| 19X-N-RW16 | 43.0 - 43.8 | | | | | | | | 9.0 |
| 19X-N-RW16 | 48.0 - 50.0 | 37 | 27 | 10 | 99 | 52 | ML | A-4 | 11.2 |
| 19X-N-RW16 | 50.0 - 51.3 | | | | | | | | 14.2 |
| 19X-N-RW18 | 0.0 - 2.0 | | | | | | | | 20.2 |
| 19X-N-RW18 | 2.0 - 4.0 | | | | | | | | 25.3 |
| 19X-N-RW18 | 4.0 - 6.0 | 39 | 25 | 14 | 96 | 51 | CL | A-6 | 22.5 |
| 19X-N-RW18 | 6.0 - 8.0 | | | | | | | | 26.0 |
| 19X-N-RW18 | 18.0 - 20.0 | | | | | | | | 14.6 |
| 19X-N-RW18 | 23.0 - 25.0 | | | | | | | | 24.2 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW18 | 28.0 - 30.0 | 40 | 30 | 10 | 98 | 47 | SM | A-4 | 14.0 |
| 19X-N-RW18 | 33.0 - 35.0 | | | | | | | | 16.9 |
| 19X-N-RW18 | 38.0 - 40.0 | | | | | | | | 17.9 |
| 19X-N-RW18 | 43.0 - 44.3 | | | | | | | | 16.4 |
| 19X-N-RW18 | 48.0 - 50.0 | | | | | | | | 26.5 |
| 19X-N-RW20 | 0.0 - 2.0 | | | | | | | | 19.2 |
| 19X-N-RW20 | 2.0 - 4.0 | 38 | 27 | 11 | 98 | 74 | ML | A-6 | 21.3 |
| 19X-N-RW20 | 4.0 - 4.9 | | | | | | | | 21.2 |
| 19X-N-RW20 | 6.0 - 8.0 | | | | | | | | 13.0 |
| 19X-N-RW20 | 8.0 - 10.0 | | | | | | | | 13.4 |
| 19X-N-RW20 | 13.0 - 15.0 | 44 | 35 | 9 | 100 | 73 | ML | A-5 | 20.2 |
| 19X-N-RW20 | 18.0 - 20.0 | | | | | | | | 13.6 |
| 19X-N-RW20 | 23.0 - 24.4 | | | | | | | | 10.3 |
| 19X-N-RW20 | 28.0 - 29.9 | | | | | | | | 10.7 |
| 19X-N-RW20 | 33.0 - 35.0 | | | | | | | | 12.4 |
| 19X-N-RW20 | 38.0 - 38.5 | | | | | | | | 13.0 |
| 19X-N-RW20 | 43.0 - 45.0 | | | | | | | | 29.2 |
| 19X-N-RW20 | 48.0 - 48.2 | | | | | | | | 15.9 |
| 19X-N-RW21 | 0.0 - 2.0 | | | | | | | | 35.7 |
| 19X-N-RW21 | 2.0 - 4.0 | | | | | | | | 18.3 |
| 19X-N-RW21 | 4.0 - 6.0 | 30 | 25 | 5 | 100 | 52 | ML | A-4 | 15.2 |
| 19X-N-RW21 | 6.0 - 8.0 | | | | | | | | 16.4 |
| 19X-N-RW21 | 8.0 - 10.0 | | | | | | | | 15.1 |
| 19X-N-RW21 | 13.0 - 13.9 | | | | | | | | 25.6 |
| 19X-N-RW21 | 18.0 - 20.0 | | | | | | | | 17.5 |
| 19X-N-RW21 | 23.0 - 23.8 | | | | | | | | 14.2 |
| 19X-N-RW21 | 28.0 - 28.3 | | | | | | | | 19.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-N-RW21 | 33.0 - 33.3 | | | | | | | | 5.3 |
| 19X-N-RW21 | 38.0 - 39.5 | 33 | 23 | 10 | 97 | 40 | SC | A-4 | 15.9 |
| 19X-N-RW21 | 43.0 - 43.1 | | | | | | | | 28.2 |
| 19X-N-RW21 | 48.0 - 48.1 | | | | | | | | 14.1 |
| 19X-N-RW22 | 0.0 - 2.0 | 29 | 21 | 8 | 96 | 62 | CL | A-4 | 14.9 |
| 19X-N-RW22 | 2.0 - 4.0 | | | | | | | | 23.3 |
| 19X-N-RW22 | 4.0 - 6.0 | | | | | | | | 13.4 |
| 19X-N-RW22 | 6.0 - 8.0 | | | | | | | | 14.2 |
| 19X-N-RW22 | 8.0 - 10.0 | | | | | | | | 12.1 |
| 19X-N-RW22 | 13.0 - 15.0 | | | | | | | | 9.1 |
| 19X-N-RW22 | 18.0 - 20.0 | 31 | 25 | 6 | 98 | 49 | SM | A-4 | 19.4 |
| 19X-N-RW22 | 23.0 - 23.5 | | | | | | | | 13.8 |
| 19X-N-RW22 | 28.0 - 28.4 | | | | | | | | 17.9 |
| 19X-N-RW22 | 33.0 - 34.4 | | | | | | | | 12.8 |
| 19X-N-RW22 | 38.0 - 38.2 | | | | | | | | 12.8 |
| 19X-N-RW22 | 43.0 - 43.1 | | | | | | | | 6.3 |
| 19X-N-RW22 | 48.0 - 48.2 | | | | | | | | 13.6 |
| 19X-SOS-P23 | 0.7 - 2.7 | | | | | | | | 5.6 |
| 19X-SOS-P23 | 2.7 - 4.7 | | | | | | | | 15.1 |
| 19X-SOS-P23 | 4.7 - 6.7 | | | | | | | | 19.0 |
| 19X-SOS-P23 | 6.7 - 8.7 | | | | | | | | 20.5 |
| 19X-SOS-P24 | 1.8 - 3.4 | | | | | | | | 4.8 |
| 19X-SOS-P24 | 2.6 - 4.6 | | | | | | | | 5.4 |
| 19X-SOS-P24 | 4.6 - 4.8 | | | | | | | | 4.1 |
| 19X-SOS-P24 | 6.6 - 6.8 | | | | | | | | 4.3 |
| 19X-SOS-P29 | 1.5 - 3.5 | 34 | 24 | 10 | 92 | 50 | ML | A-4 | 15.9 |
| 19X-SOS-P29 | 3.5 - 5.5 | | | | | | | | 18.5 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT - 10/9/19



Summary of Laboratory Results

I-495 NEXT Express Lanes

Fairfax County, Virginia
 Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-SOS-P29 | 5.5 - 7.5 | | | | | | | | 14.6 |
| 19X-SOS-P30 | 1.3 - 3.3 | | | | 49 | 6 | | | 1.9 |
| 19X-SOS-P30 | 3.3 - 5.3 | | | | | | | | 2.6 |
| 19X-SOS-P30 | 5.3 - 7.3 | | | | | | | | 6.2 |
| 19X-SOS-P31 | 1.5 - 3.5 | | | | | | | | 16.2 |
| 19X-SOS-P31 | 3.5 - 5.5 | | | | | | | | 19.4 |
| 19X-SOS-P31 | 5.5 - 7.5 | | | | | | | | 19.5 |
| 19X-SOS-P33 | 0.0 - 2.0 | | | | | | | | 16.3 |
| 19X-SOS-P33 | 2.0 - 4.0 | 43 | 31 | 12 | 98 | 66 | ML | A-7-5 | 21.6 |
| 19X-SOS-P33 | 4.0 - 6.0 | | | | | | | | 22.9 |
| 19X-SOS-P33 | 6.0 - 8.0 | | | | | | | | 29.1 |
| 19X-SOS-P33 | 8.0 - 10.0 | | | | | | | | 24.9 |
| 19X-SOS-P33 | 13.0 - 15.0 | | | | | | | | 23.1 |
| 19X-SOS-P37 | 2.0 - 4.0 | | | | | | | | 20.4 |
| 19X-SOS-P37 | 4.0 - 6.0 | 40 | 25 | 15 | 99 | 72 | CL | A-6 | 20.6 |
| 19X-SOS-P37 | 6.0 - 8.0 | | | | | | | | 24.5 |
| 19X-SOS-P38 | 2.0 - 4.0 | | | | | | | | 4.8 |
| 19X-SOS-P38 | 4.0 - 6.0 | | | | | | | | 7.3 |
| 19X-SOS-P38 | 6.0 - 8.0 | | | | | | | | 12.1 |
| 19X-SOS-P39 | 1.5 - 3.5 | 40 | 27 | 13 | 93 | 63 | ML | A-6 | 23.2 |
| 19X-SOS-P39 | 3.5 - 5.5 | | | | | | | | 28.4 |
| 19X-SOS-P39 | 5.5 - 7.5 | | | | | | | | 17.1 |
| 19X-SOS-P40 | 2.0 - 3.5 | | | | | | | | 13.1 |
| 19X-SOS-P40 | 3.5 - 4.8 | | | | | | | | 6.6 |
| 19X-SOS-P40 | 5.5 - 6.3 | | | | | | | | 9.0 |
| 19X-SOS-P42 | 2.8 - 4.8 | 42 | 30 | 12 | 90 | 51 | ML | A-7-5 | 18.3 |
| 19X-SOS-P42 | 4.8 - 6.8 | | | | | | | | 21.1 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT - 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-SOS-P42 | 6.8 - 8.8 | | | | | | | | 22.3 |
| 19X-SOS-P43 | 3.0 - 5.0 | | | | | | | | 19.5 |
| 19X-SOS-P43 | 5.0 - 7.0 | | | | | | | | 21.2 |
| 19X-SOS-P43 | 7.0 - 9.0 | | | | | | | | 23.9 |
| 19X-SOS-P44 | 4.0 - 6.0 | | | | | | | | 13.1 |
| 19X-SOS-P44 | 6.0 - 8.0 | | | | | | | | 11.2 |
| 19X-SOS-P44 | 8.0 - 8.4 | | | | | | | | 8.0 |
| 19X-SOS-P45 | 2.5 - 4.5 | | | | | | | | 25.6 |
| 19X-SOS-P45 | 4.5 - 6.5 | 40 | 34 | 6 | 99 | 72 | ML | A-4 | 27.8 |
| 19X-SOS-P45 | 6.5 - 8.5 | | | | | | | | 32.8 |
| 19X-S-RW25 | 0.0 - 2.0 | 45 | 25 | 20 | | 68 | CL | A-7-6 | 19.4 |
| 19X-S-RW25 | 2.0 - 4.0 | | | | | | | | 13.6 |
| 19X-S-RW25 | 4.0 - 6.0 | | | | | | | | 13.9 |
| 19X-S-RW25 | 6.0 - 8.0 | 34 | 27 | 7 | 99 | 58 | ML | A-4 | 13.1 |
| 19X-S-RW25 | 8.0 - 10.0 | | | | | | | | 9.3 |
| 19X-S-RW25 | 13.0 - 14.4 | | | | | | | | 8.9 |
| 19X-S-RW25 | 18.0 - 20.0 | | | | | | | | 6.9 |
| 19X-S-RW25 | 23.0 - 24.5 | 35 | 28 | 7 | 100 | 63 | ML | A-4 | 4.8 |
| 19X-S-RW25 | 28.0 - 28.5 | | | | | | | | 6.7 |
| 19X-S-RW25 | 33.0 - 34.0 | | | | | | | | 6.2 |
| 19X-S-RW25 | 38.0 - 38.1 | | | | | | | | 7.4 |
| 19X-S-RW25 | 40.5 - 41.0 | | | | | | | | 7.8 |
| 19X-S-RW26 | 0.0 - 2.0 | | | | | | | | 18.9 |
| 19X-S-RW26 | 2.0 - 4.0 | 31 | 22 | 9 | 87 | 40 | SC | A-4 | 14.8 |
| 19X-S-RW26 | 4.0 - 6.0 | | | | | | | | 19.2 |
| 19X-S-RW26 | 7.0 - 8.0 | | | | 94 | 53 | | | 19.2 |
| 19X-S-RW26 | 8.0 - 10.0 | | | | | | | | 20.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-S-RW26 | 13.0 - 15.0 | | | | | | | | 12.5 |
| 19X-S-RW26 | 18.0 - 18.8 | | | | | | | | 18.9 |
| 19X-S-RW26 | 23.0 - 25.0 | | | | | | | | 13.1 |
| 19X-S-RW26 | 28.0 - 30.0 | | | | | | | | 21.3 |
| 19X-S-RW26 | 33.0 - 35.0 | 35 | 30 | 5 | 100 | 50 | ML | A-4 | 21.0 |
| 19X-S-RW26 | 38.0 - 39.9 | | | | | | | | 16.9 |
| 19X-S-RW26 | 43.0 - 45.0 | | | | | | | | 15.9 |
| 19X-S-RW26 | 48.0 - 50.0 | | | | | | | | 13.5 |
| 19X-S-RW27 | 0.0 - 2.0 | | | | | | | | 23.6 |
| 19X-S-RW27 | 2.0 - 4.0 | | | | | | | | 18.7 |
| 19X-S-RW27 | 4.0 - 6.0 | 39 | 29 | 10 | 96 | 57 | ML | A-4 | 18.3 |
| 19X-S-RW27 | 6.0 - 8.0 | | | | | | | | 17.9 |
| 19X-S-RW27 | 8.0 - 10.0 | | | | | | | | 19.1 |
| 19X-S-RW27 | 13.0 - 15.0 | | | | | | | | 21.4 |
| 19X-S-RW27 | 18.0 - 20.0 | | | | | | | | 22.6 |
| 19X-S-RW27 | 23.0 - 25.0 | | | | | | | | 19.7 |
| 19X-S-RW27 | 28.0 - 30.0 | | | | | | | | 14.7 |
| 19X-S-RW27 | 33.0 - 35.0 | | | | | | | | 16.1 |
| 19X-S-RW27 | 38.0 - 40.0 | | | | | | | | 15.3 |
| 19X-S-RW27 | 43.0 - 45.0 | | | | | | | | 17.6 |
| 19X-S-RW27 | 48.0 - 49.8 | 32 | 25 | 7 | 100 | 59 | ML | A-4 | 10.9 |
| 19X-S-RW28 | 0.0 - 2.0 | | | | | | | | 28.5 |
| 19X-S-RW28 | 2.0 - 4.0 | | | | | | | | 19.1 |
| 19X-S-RW28 | 4.0 - 6.0 | | | | | | | | 22.8 |
| 19X-S-RW28 | 6.0 - 8.0 | 52 | 30 | 22 | | 81 | MH | A-7-5 | 27.3 |
| 19X-S-RW28 | 8.0 - 10.0 | | | | | | | | 17.6 |
| 19X-S-RW28 | 13.0 - 15.0 | | | | | | | | 19.6 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-S-RW28 | 18.0 - 20.0 | | | | | | | | 18.4 |
| 19X-S-RW28 | 23.0 - 25.0 | | | | | | | | 13.1 |
| 19X-S-RW28 | 28.0 - 30.0 | | | | | | | | 26.5 |
| 19X-S-RW28 | 33.0 - 35.0 | | | | | | | | 17.4 |
| 19X-S-RW28 | 38.0 - 39.4 | 36 | 29 | 7 | 100 | 56 | ML | A-4 | 12.5 |
| 19X-S-RW28 | 43.0 - 44.4 | | | | | | | | 12.7 |
| 19X-S-RW28 | 48.0 - 50.0 | | | | | | | | 16.0 |
| 19X-S-RW29 | 0.0 - 2.0 | | | | | | | | 13.8 |
| 19X-S-RW29 | 2.0 - 4.0 | | | | | | | | 17.8 |
| 19X-S-RW29 | 4.0 - 6.0 | | | | | | | | 21.4 |
| 19X-S-RW29 | 6.0 - 8.0 | | | | | | | | 18.3 |
| 19X-S-RW29 | 8.0 - 10.0 | 33 | 26 | 7 | 97 | 52 | ML | A-4 | 18.1 |
| 19X-S-RW29 | 14.5 - 15.0 | | | | | | | | 17.1 |
| 19X-S-RW29 | 18.0 - 20.0 | | | | | | | | 18.9 |
| 19X-S-RW29 | 23.0 - 25.0 | | | | | | | | 23.0 |
| 19X-S-RW29 | 28.0 - 30.0 | | | | | | | | 20.1 |
| 19X-S-RW29 | 33.0 - 35.0 | | | | | | | | 26.3 |
| 19X-S-RW29 | 38.0 - 40.0 | | | | | | | | 30.0 |
| 19X-S-RW29 | 43.0 - 45.0 | | | | | | | | 34.8 |
| 19X-S-RW29 | 48.0 - 50.0 | 40 | 31 | 9 | 100 | 64 | ML | A-4 | 24.7 |
| 19X-S-RW30 | 0.0 - 2.0 | | | | | | | | 4.7 |
| 19X-S-RW30 | 2.0 - 4.0 | 39 | 32 | 7 | 100 | 48 | SM | A-4 | 16.9 |
| 19X-S-RW30 | 4.0 - 6.0 | | | | | | | | 8.2 |
| 19X-S-RW30 | 6.0 - 8.0 | | | | | | | | 15.8 |
| 19X-S-RW30 | 8.0 - 10.0 | | | | | | | | 20.9 |
| 19X-S-RW30 | 13.0 - 13.8 | | | | | | | | 7.0 |
| 19X-S-RW30 | 18.0 - 19.4 | 40 | 31 | 9 | 96 | 33 | SM | A-2-4 | 13.7 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ PROJECT.GDT 10/9/19

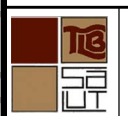


Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-S-RW30 | 23.0 - 25.0 | | | | | | | | 18.5 |
| 19X-S-RW30 | 28.0 - 30.0 | | | | | | | | 12.5 |
| 19X-S-RW30 | 33.0 - 33.9 | | | | | | | | 12.0 |
| 19X-S-RW30 | 38.0 - 38.9 | | | | | | | | 12.6 |
| 19X-S-RW31 | 1.0 - 3.0 | | | | | | | | 24.0 |
| 19X-S-RW31 | 3.0 - 5.0 | | | | | | | | 29.4 |
| 19X-S-RW31 | 5.0 - 7.0 | | | | | | | | 21.9 |
| 19X-S-RW31 | 7.0 - 9.0 | 46 | 33 | 13 | 98 | 65 | ML | A-7-5 | 22.7 |
| 19X-S-RW31 | 9.0 - 11.0 | | | | | | | | 12.4 |
| 19X-S-RW31 | 13.0 - 15.0 | | | | | | | | 17.2 |
| 19X-S-RW31 | 18.0 - 20.0 | | | | | | | | 19.6 |
| 19X-S-RW31 | 23.0 - 25.0 | 48 | 36 | 12 | 100 | 71 | ML | A-7-5 | 30.3 |
| 19X-S-RW31 | 28.0 - 30.0 | | | | | | | | 18.3 |
| 19X-S-RW31 | 33.0 - 35.0 | 44 | 33 | 11 | | 64 | ML | A-7-5 | 25.8 |
| 19X-S-RW31 | 38.0 - 39.4 | | | | | | | | 11.3 |
| 19X-S-RW31 | 43.0 - 43.2 | | | | | | | | 16.1 |
| 19X-S-RW36 | 3.0 - 5.0 | | | | | | | | 5.1 |
| 19X-S-RW36 | 5.0 - 7.0 | | | | | | | | 14.0 |
| 19X-S-RW36 | 7.5 - 9.0 | | | | | | | | 20.7 |
| 19X-S-RW36 | 9.0 - 11.0 | 39 | 26 | 13 | 98 | 56 | ML | A-6 | 22.1 |
| 19X-S-RW36 | 13.0 - 15.0 | 37 | 22 | 15 | 100 | 89 | CL | A-6 | 32.6 |
| 19X-S-RW36 | 19.0 - 20.0 | | | | | | | | 13.2 |
| 19X-S-RW36 | 23.0 - 25.0 | | | | | | | | 10.7 |
| 19X-S-RW36 | 28.0 - 29.3 | | | | | | | | 7.4 |
| 19X-S-RW36 | 33.0 - 33.2 | | | | | | | | 17.1 |
| 19X-S-RW37 | 3.0 - 5.0 | | | | | | | | 6.1 |
| 19X-S-RW37 | 5.0 - 7.0 | | | | | | | | 11.0 |

TLB LAB SUMMARY - BASIC - NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) |
|------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|
| 19X-S-RW37 | 7.0 - 9.0 | | | | | | | | 10.4 |
| 19X-S-RW37 | 9.0 - 11.0 | | | | | | | | 24.2 |
| 19X-S-RW37 | 13.0 - 15.0 | | | | | | | | 19.2 |
| 19X-S-RW37 | 18.0 - 20.0 | 42 | 34 | 8 | 94 | 61 | ML | A-5 | 23.3 |
| 19X-S-RW37 | 23.0 - 23.6 | | | | | | | | 8.2 |

T:\B Lab Summary - Basic - Next 495 Express Lanes Assignment 2.gpj - PROJECT.GDT 10/9/19



Summary of Laboratory Results
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

| Boring | Depth (ft) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | % < #4 Sieve | % < #200 Sieve | Classification | AASHTO | Water Content (%) | Dry Density (pcf) | Optimum Water Content (%) |
|-------------|-------------|------------------|-------------------|----------------------|--------------|----------------|----------------|--------|-------------------|-------------------|---------------------------|
| 19DTR-P08 | 3.0 - 6.0 | 31 | 24 | 7 | 86 | 31 | SM | A-2-4 | 10.6 | 124.0 | 10.4 |
| 19DTR-P08 | 3.0 - 6.0 | | | | | | | | | *128.8 | *9.3 |
| 19SWM-05 | 15.0 - 20.0 | 30 | 20 | 10 | 100 | 48 | SC | A-4 | 29.0 | 118.9 | 11.0 |
| 19SWM-11 | 20.0 - 25.0 | 46 | 28 | 18 | 100 | 69 | ML | A-7-6 | 18.8 | 109.0 | 14.9 |
| 19SWM-12 | 0.0 - 5.0 | 46 | 25 | 21 | 92 | 72 | CL | A-7-6 | 16.4 | 104.7 | 18.9 |
| 19SWM-13 | 11.0 - 15.0 | 34 | 22 | 12 | 100 | 62 | CL | A-6 | 17.0 | 112.5 | 14.5 |
| 19SWM-14 | 6.0 - 10.0 | 37 | 26 | 11 | 100 | 71 | ML | A-6 | 17.4 | 108.8 | 14.6 |
| 19X-SOS-P33 | 5.0 - 10.0 | 48 | 27 | 21 | 98 | 67 | CL | A-7-6 | 25.1 | 108.3 | 14.2 |

*Oversize Correction

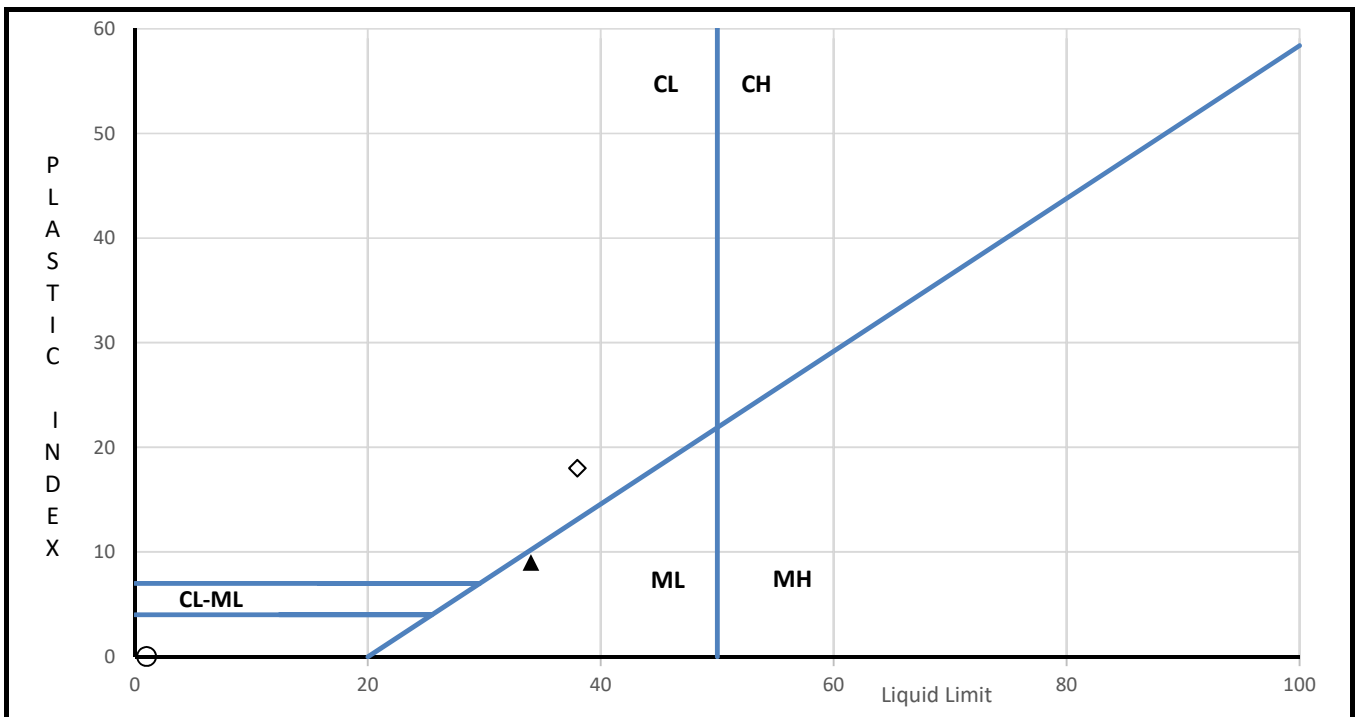
TLB LAB SUMMARY - BASIC - PROC. NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ - PROJECT.GDT - 10/4/19



Summary of Laboratory Results

I-495 NEXT Express Lanes

Fairfax County, Virginia
 Project Number: 19-0012



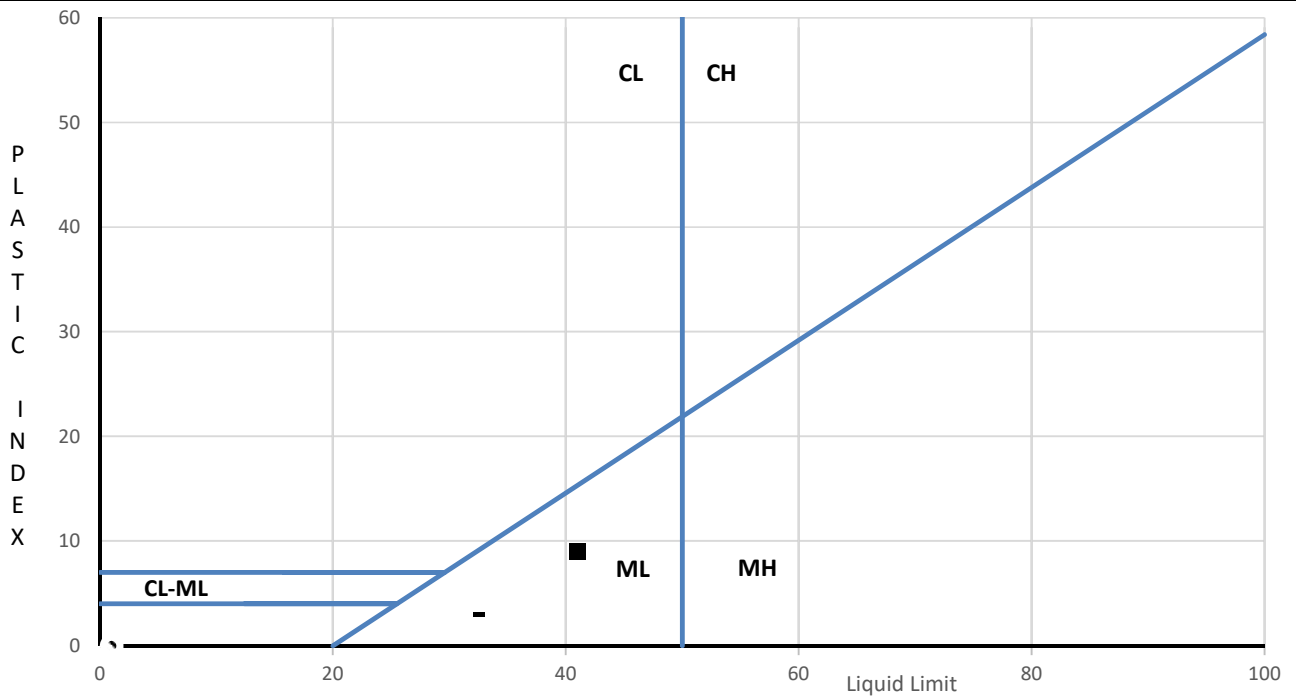
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19DTR-BR03, S-1 | 2-4 | 24.5 | | | | | | |
| 19DTR-BR03, S-2 | 4-6 | 24.8 | | | | | | |
| ▲ 19DTR-BR03, S-3 | 6-8 | 26.0 | 34 | 25 | 9 | 52.6 | ML | Sandy silt [A-4] |
| 19DTR-BR03, S-4 | 8-10 | 25.6 | | | | | | |
| 19DTR-BR03, S-5 | 10-12 | 29.6 | | | | | | |
| 19DTR-BR03, S-6 | 13-15 | 32.8 | | | | | | |
| 19DTR-BR03, S-7 | 18-20 | 28.3 | | | | | | |
| ◇ 19DTR-BR03, S-8 | 23-25 | 25.4 | 38 | 20 | 18 | 56.2 | CL | Sandy lean clay [A-6] |
| 19DTR-BR03, S-9 | 28-30 | 30.4 | | | | | | |
| 19DTR-BR03, S-10 | 33-35 | 19.9 | | | | | | |
| 19DTR-BR03, S-11 | 38-40 | 9.8 | | | | | | |
| 19DTR-BR03, S-12 | 43-45 | 14.1 | | | | | | |
| 19DTR-BR03, S-13 | 48-48.9 | 12.8 | | | | | | |
| ○ 19DTR-BR03, S-14 | 53-53.8 | 10.4 | NP | NP | NP | 12.5 | SM | Silty sand with gravel [A-2] |
| 19DTR-BR03, S-15 | 58-58.4 | 12.3 | | | | | | |
| 19DTR-BR03, S-16 | 63-65 | 9.4 | | | | | | |
| 19DTR-BR03, S-17 | 68-68.2 | 10.0 | | | | | | |
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INDEX TEST RESULTS



*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date: 9/7/2019

| | | | |
|----------------|---------------------------------|------------------|----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



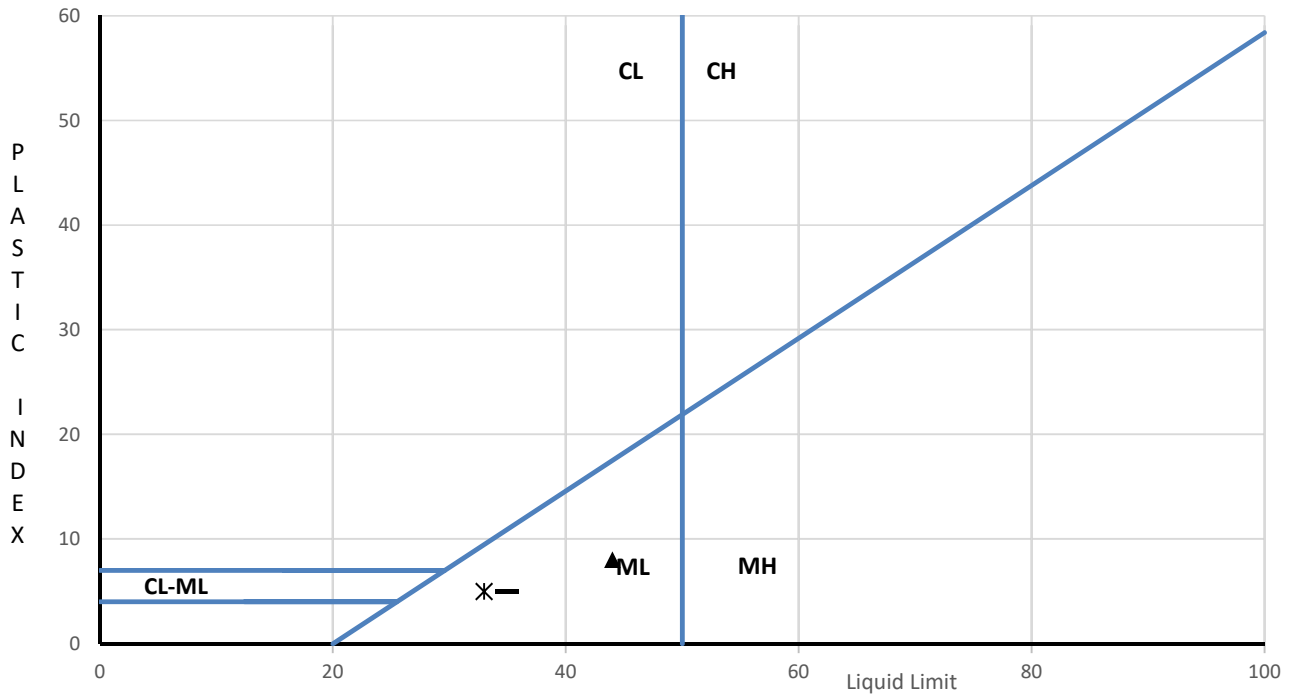
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|-------------------|------|----|----|----|-------|----------------|------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| ■ | 19DTR-BR04a, S-1 | 23.0 | 41 | 32 | 9 | 58.1 | ML | Sandy silt [A-5] |
| | 19DTR-BR04a, S-2 | 18.9 | | | | | | |
| | 19DTR-BR04a, S-3 | 20.7 | | | | | | |
| | 19DTR-BR04a, S-4 | 22.9 | | | | | | |
| — | 19DTR-BR04a, S-5 | 22.7 | 32 | 29 | 3 | 49.3 | SM | Silty sand [A-4] |
| | 19DTR-BR04a, S-6 | 19.0 | | | | | | |
| | 19DTR-BR04a, S-7 | 32.7 | | | | | | |
| ◇ | 19DTR-BR04a, S-8 | 8.3 | NP | NP | NP | 28.9 | SM | Silty sand with gravel [A-2] |
| | 19DTR-BR04a, S-9 | 4.5 | | | | | | |
| | 19DTR-BR04a, S-10 | 7.2 | | | | | | |
| | 19DTR-BR04a, S-11 | 6.2 | | | | | | |
| \ | 19DTR-BR04a, S-12 | 7.0 | NP | NP | NP | 43.9 | SM | Silty sand [A-4/A-5] |
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| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



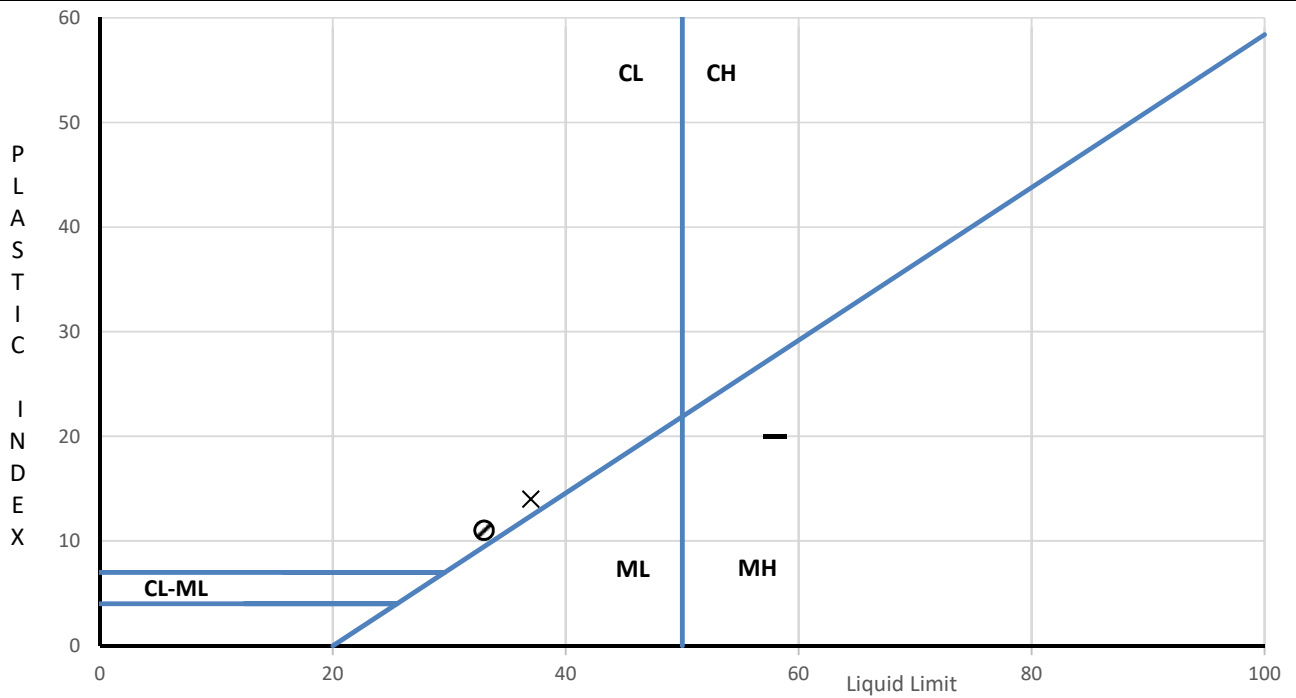
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19DTR-BR06, S-1 | 2-4 | 20.3 | | | | | | |
| 19DTR-BR06, S-2 | 4-6 | 25.9 | | | | | | |
| ▲ 19DTR-BR06, S-3 | 6-8 | 24.1 | 44 | 36 | 8 | 61.8 | ML | Sandy silt [A-5] |
| 19DTR-BR06, S-4 | 8-10 | 24.2 | | | | | | |
| 19DTR-BR06, S-5 | 13-15 | 20.5 | | | | | | |
| — 19DTR-BR06, S-6 | 18-19.9 | 14.1 | 35 | 30 | 5 | 50.7 | ML | Sandy silt [A-4] |
| 19DTR-BR06, S-7 | 23-25 | 22.4 | | | | | | |
| 19DTR-BR06, S-8 | 28-30 | 22.4 | | | | | | |
| 19DTR-BR06, S-9 | 33-34.8 | 19.9 | | | | | | |
| 19DTR-BR06, S-10 | 38-39.4 | 18.0 | | | | | | |
| * 19DTR-BR06, S-11 | 43-43.9 | 14.0 | 33 | 28 | 5 | 59.5 | ML | Sandy silt [A-4] |
| 19DTR-BR06, S-12 | 48-49.3 | 13.7 | | | | | | |
| 19DTR-BR06, S-13 | 53-53.8 | 10.9 | | | | | | |
| 19DTR-BR06, S-14 | 58-58.9 | 21.6 | | | | | | |
| 19DTR-BR06, S-15 | 63-63.4 | 14.6 | | | | | | |
| 19DTR-BR06, S-16 | 68-68.4 | 18.4 | | | | | | |
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| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



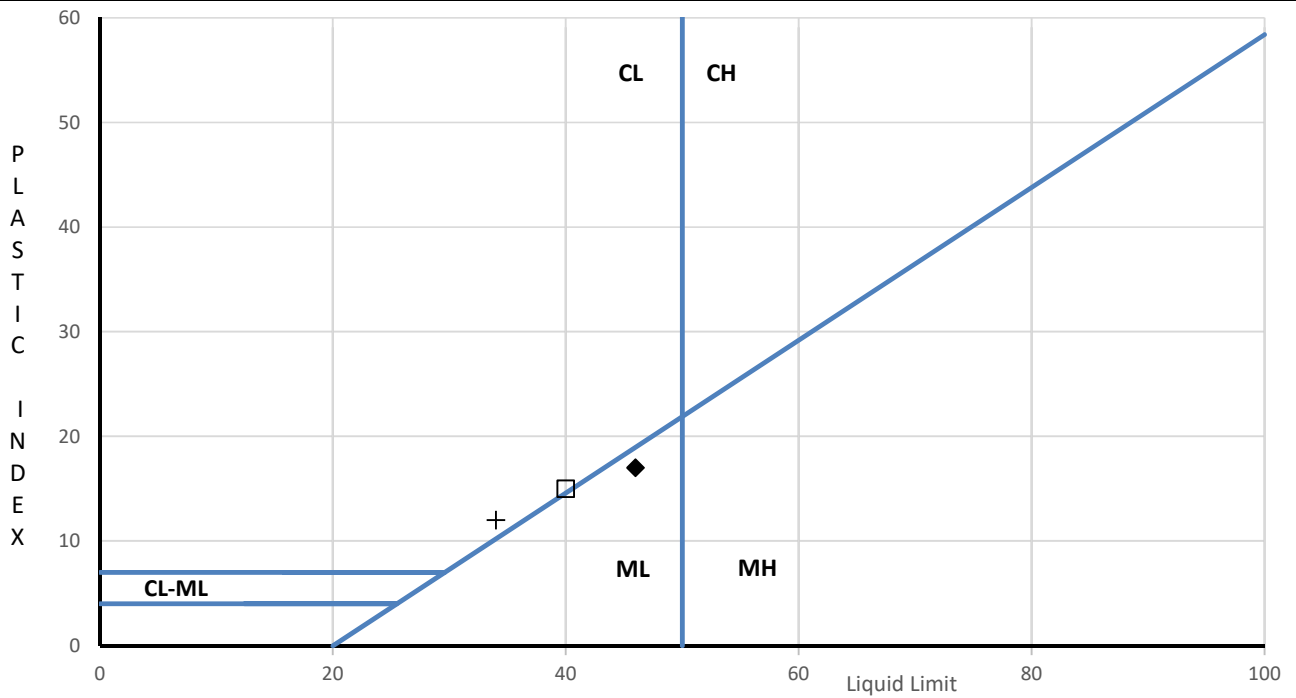
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|--------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GTP-BR13, S-1 | 2-4 | 24.4 | | | | | | |
| 19GTP-BR13, S-2 | 4-6 | 24.4 | | | | | | |
| 19GTP-BR13, S-3 | 6-8 | 33.8 | | | | | | |
| 19GTP-BR13, S-4 | 8-10 | 30.3 | | | | | | |
| 19GTP-BR13, S-5 | 10-12 | 31.6 | | | | | | |
| 19GTP-BR13, S-6 | 13-15 | 29.3 | 58 | 38 | 20 | 71.5 | MH | Elastic silt with sand [A-7-5] |
| 19GTP-BR13, S-7 | 18-20 | 13.8 | | | | | | |
| 19GTP-BR13, S-8 | 23-25 | 18.9 | | | | | | |
| 19GTP-BR13, S-9 | 28-30 | 12.8 | | | | | | |
| 19GTP-BR13, S-10 | 33-35 | 11.8 | 37 | 23 | 14 | 57.1 | CL | Sandy lean clay [A-6] |
| 19GTP-BR13, S-11 | 38-38.5 | 14.6 | | | | | | |
| 19GTP-BR13, S-12 | 43-43.3 | 12.8 | | | | | | |
| 19GTP-BR13, S-13 | 48-48.3 | 20.2 | | | | | | |
| 19GTP-BR13, S-14 | 49-49.3 | 16.8 | | | | | | |
| 19GTP-BR13, S-15 | 53-53.4 | 14.5 | | | | | | |
| 19GTP-BR13, S-16 | 58-58.8 | 14.5 | | | | | | |
| 19GTP-BR13, S-17 | 63-63.8 | 11.4 | 33 | 22 | 11 | 42.9 | SC | Clayey sand [A-6] |
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| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



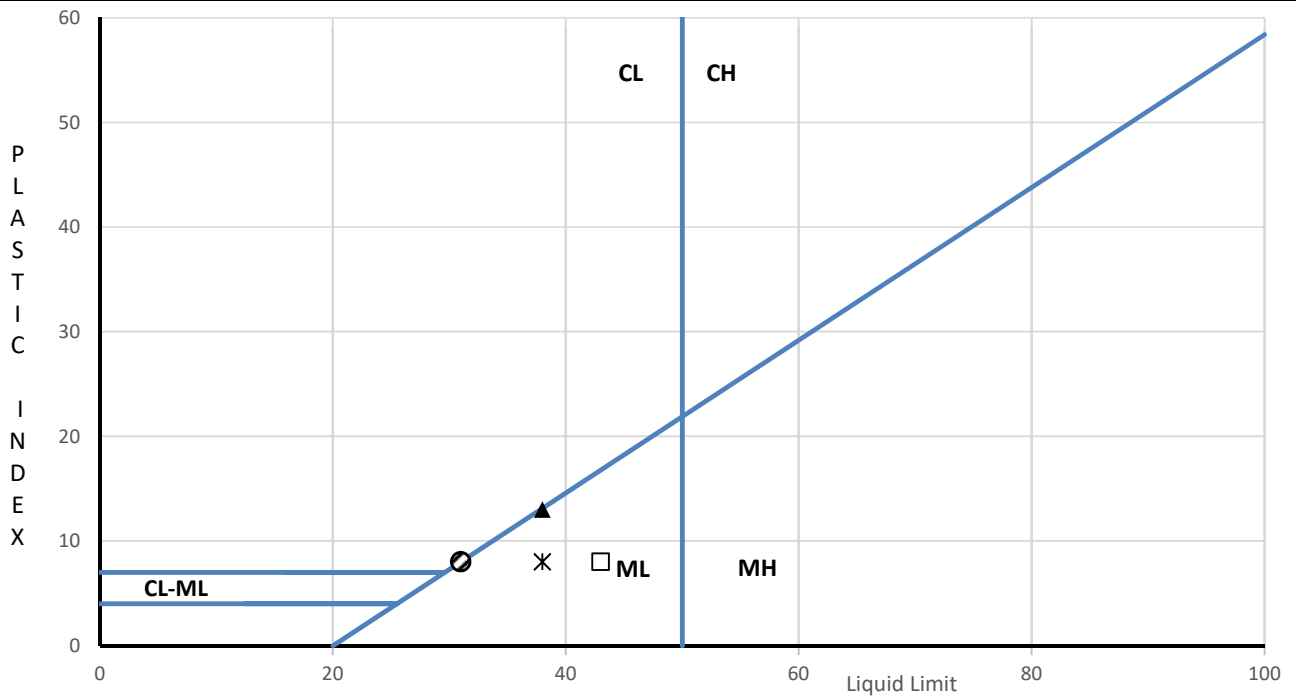
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|-----------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GTP-BR14, S-1 | 2-4 | 10.1 | | | | | | |
| ◆ 19GTP-BR14, S-2 | 4-6 | 22.4 | 46 | 29 | 17 | 53.5 | ML | Sandy silt [A-7-6] |
| 19GTP-BR14, S-3 | 6-8 | 19.3 | | | | | | |
| 19GTP-BR14, S-4 | 8-10 | 15.1 | | | | | | |
| 19GTP-BR14, S-5 | 10-12 | 17.8 | | | | | | |
| 19GTP-BR14, S-6 | 13-15 | 11.8 | | | | | | |
| □ 19GTP-BR14, S-7 | 18-20 | 15.3 | 40 | 25 | 15 | 61.1 | CL | Sandy lean clay [A-6] |
| 19GTP-BR14, S-8 | 23-25 | 15.0 | | | | | | |
| 19GTP-BR14, S-9 | 28-30 | 12.2 | | | | | | |
| 19GTP-BR14, S-10 | 33-35 | 23.8 | | | | | | |
| 19GTP-BR14, S-11 | 38-40 | 35.7 | | | | | | |
| 19GTP-BR14, S-12 | 43-44 | 15.2 | | | | | | |
| 19GTP-BR14, S-13 | 48-48.3 | 12.6 | | | | | | |
| 19GTP-BR14, S-14 | 53-55 | 15.8 | | | | | | |
| + 19GTP-BR14, S-15 | 58-58.4 | 19.6 | 34 | 22 | 12 | 46.7 | SC | Clayey sand [A-6] |
| 19GTP-BR14, S-16 | 63-63.1 | 8.6 | | | | | | |
| 19GTP-BR14, S-17 | 68-68.2 | 6.7 | | | | | | |
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|----------------|---------------------------------|------------------|----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



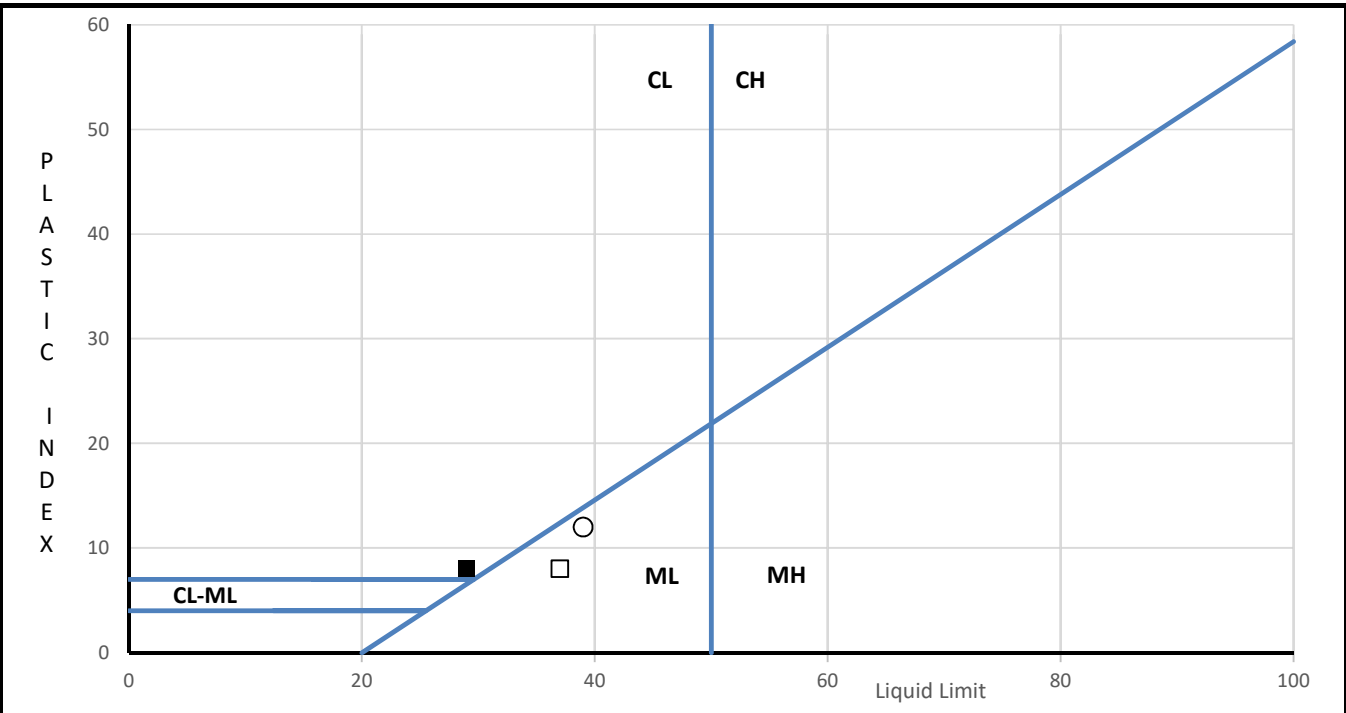
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|---------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GTP-BR15, S-1 | 1-3 | 25.2 | | | | | | |
| 19GTP-BR15, S-2 | 3-5 | 17.9 | | | | | | |
| ▲ 19GTP-BR15, S-3 | 5-7 | 20.8 | 38 | 25 | 13 | 63.8 | CL | Sandy lean clay [A-6] |
| 19GTP-BR15, S-4 | 7-9 | 23.8 | | | | | | |
| 19GTP-BR15, S-5 | 9-11 | 29.4 | | | | | | |
| 19GTP-BR15, S-6 | 13-15 | 37.7 | | | | | | |
| □ 19GTP-BR15, S-7 | 18-20 | 37.1 | 43 | 35 | 8 | 71.0 | ML | Silt with sand [A-5] |
| 19GTP-BR15, S-8 | 23-25 | 33.2 | | | | | | |
| 19GTP-BR15, S-9 | 28-30 | 25.2 | | | | | | |
| 19GTP-BR15, S-10 | 33-35 | 14.3 | | | | | | |
| * 19GTP-BR15, S-11 | 38-39.3 | 26.2 | 38 | 30 | 8 | 70.8 | ML | Silt with sand [A-4] |
| 19GTP-BR15, S-12 | 43-45 | 23.1 | | | | | | |
| 19GTP-BR15, S-13 | 48-50 | 22.2 | | | | | | |
| 19GTP-BR15, S-14 | 53-54.4 | 21.1 | | | | | | |
| 19GTP-BR15, S-15 | 58-58.8 | 19.9 | | | | | | |
| 19GTP-BR15, S-16 | 63-63.4 | 20.2 | | | | | | |
| ⊙ 19GTP-BR15, S-17 | 68-69.3 | 14.8 | 31 | 23 | 8 | 32.5 | SC | Clayey sand with gravel [A-2-4] |
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 References: VTM-7, VTM-25
 Report Date: 9/7/2019

| | | | |
|----------------|-----------|---------------------------------|----------|
| Project Name | | I-495 Between McLean and Dulles | |
| Project Number | | 1243-19-025 | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>Will D KL</i> | 9/7/2019 |



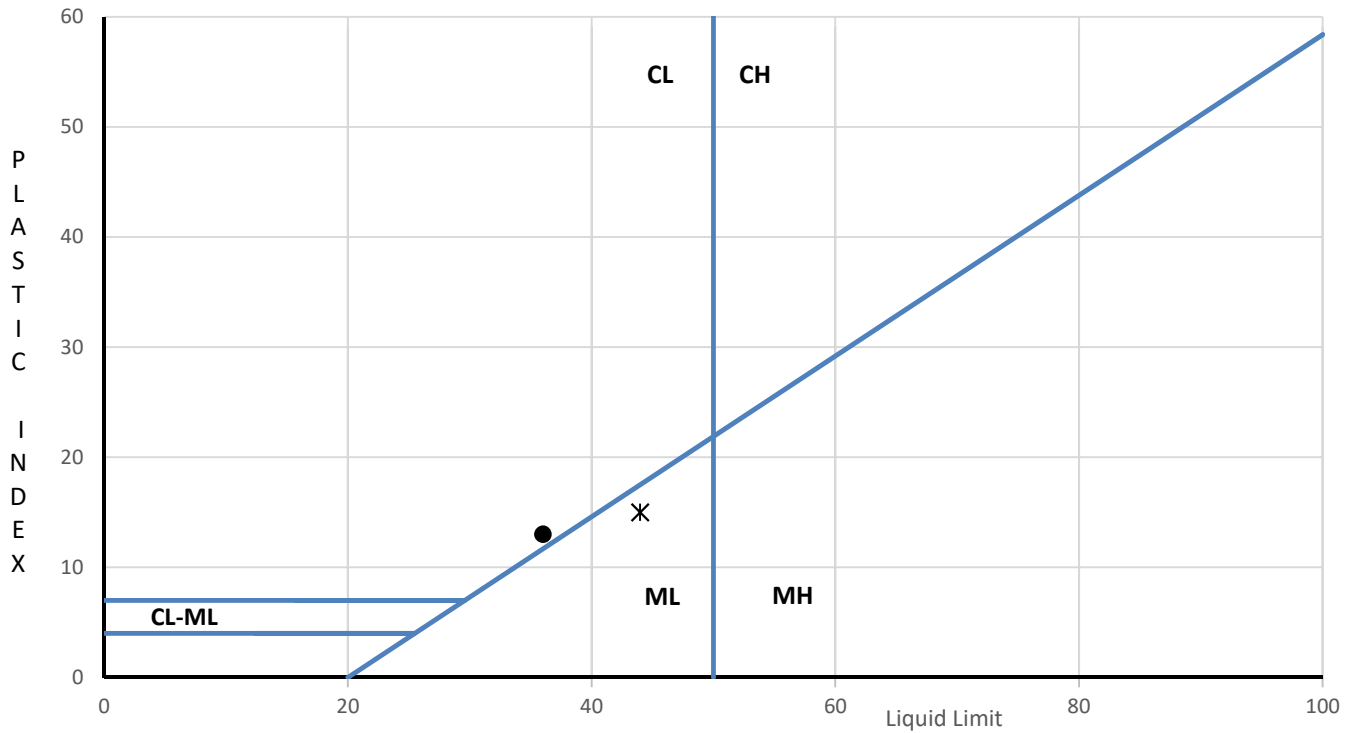
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | | |
|-------------------------|------------------|---------|------|----|----|-------|----------------|------------------|---------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description | |
| ■ | 19GTP-BR16, S-1 | 0-2 | 16.9 | 29 | 21 | 8 | 30.8 | SC | Clayey sand with gravel [A-2-4] |
| | 19GTP-BR16, S-2 | 2-4 | 19.0 | | | | | | |
| | 19GTP-BR16, S-3 | 4-6 | 19.1 | | | | | | |
| | 19GTP-BR16, S-4 | 6-8 | 17.2 | | | | | | |
| | 19GTP-BR16, S-5 | 8-10 | 23.4 | | | | | | |
| | 19GTP-BR16, S-6 | 13-15 | 19.0 | | | | | | |
| □ | 19GTP-BR16, S-7 | 18-20 | 20.7 | 37 | 29 | 8 | 55.8 | ML | Sandy silt [A-4] |
| | 19GTP-BR16, S-8 | 23-25 | 13.1 | | | | | | |
| | 19GTP-BR16, S-9 | 28-30 | 21.1 | | | | | | |
| | 19GTP-BR16, S-10 | 33-35 | 18.8 | | | | | | |
| | 19GTP-BR16, S-11 | 38-40 | 21.3 | | | | | | |
| | 19GTP-BR16, S-12 | 43-43.8 | 13.2 | | | | | | |
| | 19GTP-BR16, S-13 | 48-48.3 | 9.5 | | | | | | |
| ○ | 19GTP-BR16, S-14 | 53-54.3 | 14.8 | 39 | 27 | 12 | 47.1 | SM | Silty sand [A-6] |
| | 19GTP-BR16, S-15 | 58-58.8 | 16.7 | | | | | | |
| | 19GTP-BR16, S-16 | 63-63.2 | 11.6 | | | | | | |
| | 19GTP-BR16, S-17 | 68-68.2 | 9.0 | | | | | | |
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| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>H. Randy Davis</i> | 10/8/2019 |

*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date: 10/8/2019



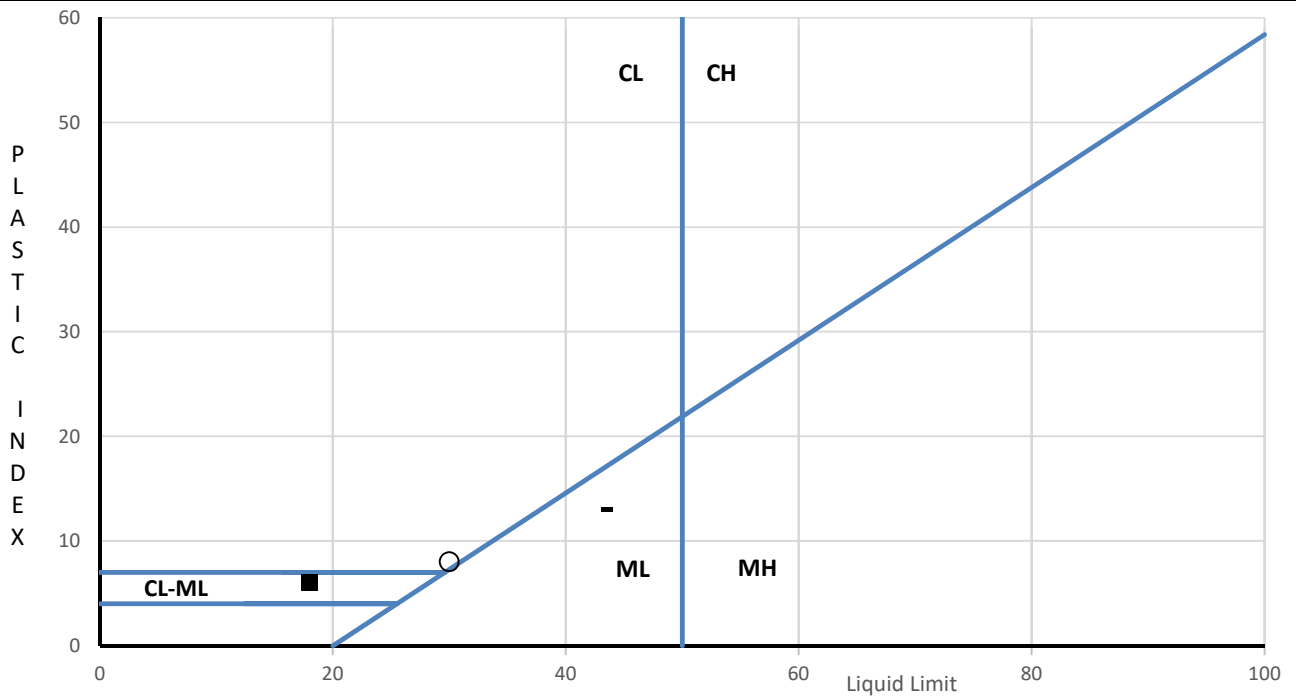
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|--------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GTP-E-P09, S-1 | 4-6 | 21.1 | | | | | | |
| 19GTP-E-P09, S-2 | 6-8 | 23.9 | | | | | | |
| 19GTP-E-P09, S-3 | 8-10 | 25.6 | | | | | | |
| ● 19GTP-E-P10, S-1 | 2-4 | 21.1 | 36 | 23 | 13 | 39.0 | SC | Clayey Sand with Gravel [A-6] |
| 19GTP-E-P10, S-2 | 4-6 | 22.8 | | | | | | |
| 19GTP-E-P10, S-3 | 6-8 | 26.7 | | | | | | |
| 19GTP-E-P12, S-1 | 2-4 | 25.6 | | | | | | |
| 19GTP-E-P12, S-2 | 4-6 | 22.8 | | | | | | |
| 19GTP-E-P12, S-3 | 6-8 | 22.9 | | | | | | |
| 19GTP-E-P13, S-1 | 2.3-4.3 | 26.0 | | | | | | |
| * 19GTP-E-P13, S-2 | 4.3-6.3 | 22.1 | 44 | 29 | 15 | 39.0 | SM | Silty Sand with Gravel [A-7-6] |
| 19GTP-E-P13, S-3 | 6.3-8.3 | 24.8 | | | | | | |
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| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Derek Baker | 9/5/2019 | N. Randy Rainwater | 9/17/2019 |

*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/8/2019



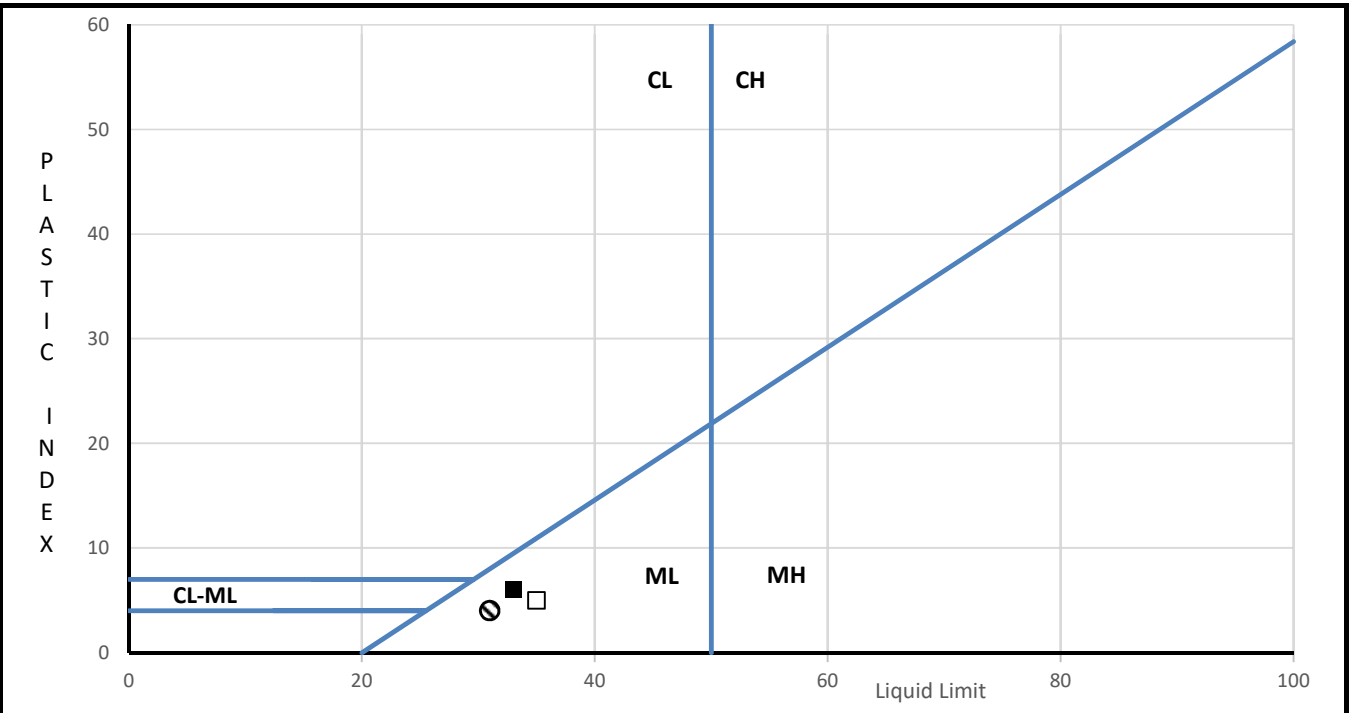
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | | |
|-------------------------|------------------|---------|------|----|----|-------|----------------|------------------|---|
| ID | Depth (ft) | | | | | | Symbol | Soil Description | |
| ■ | 19GWP-BR18, S-1 | 0-2 | 2.9 | 18 | 12 | 6 | 10.1 | SP-SC | Poorly graded sand with silty clay and gravel [A-1-a] |
| | 19GWP-BR18, S-2 | 2-4 | 15.6 | | | | | | |
| | 19GWP-BR18, S-3 | 4-6 | 11.9 | | | | | | |
| | 19GWP-BR18, S-4 | 6-8 | 11.0 | | | | | | |
| — | 19GWP-BR18, S-5 | 8-10 | 16.3 | 43 | 30 | 13 | 36.8 | SM | Silty sand [A-7-5] |
| | 19GWP-BR18, S-6 | 13-15 | 15.4 | | | | | | |
| | 19GWP-BR18, S-7 | 18-20 | 12.4 | | | | | | |
| | 19GWP-BR18, S-8 | 23-25 | 17.6 | | | | | | |
| | 19GWP-BR18, S-9 | 28-29.3 | 33.9 | | | | | | |
| | 19GWP-BR18, S-10 | 30-32 | 23.0 | | | | | | |
| | 19GWP-BR18, S-11 | 38-40 | 6.3 | | | | | | |
| | 19GWP-BR18, S-12 | 43-45 | 18.7 | | | | | | |
| | 19GWP-BR18, S-13 | 48-50 | 14.1 | | | | | | |
| ○ | 19GWP-BR18, S-14 | 53-55 | 15.0 | 30 | 22 | 8 | 37.1 | SC | Clayey sand [A-4] |
| | 19GWP-BR18, S-15 | 58-60 | 11.8 | | | | | | |
| | 19GWP-BR18, S-16 | 63-65 | 12.8 | | | | | | |
| | 19GWP-BR18, S-17 | 68-70 | 12.0 | | | | | | |
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| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | N. Randy Rainwater | 10/21/2019 |



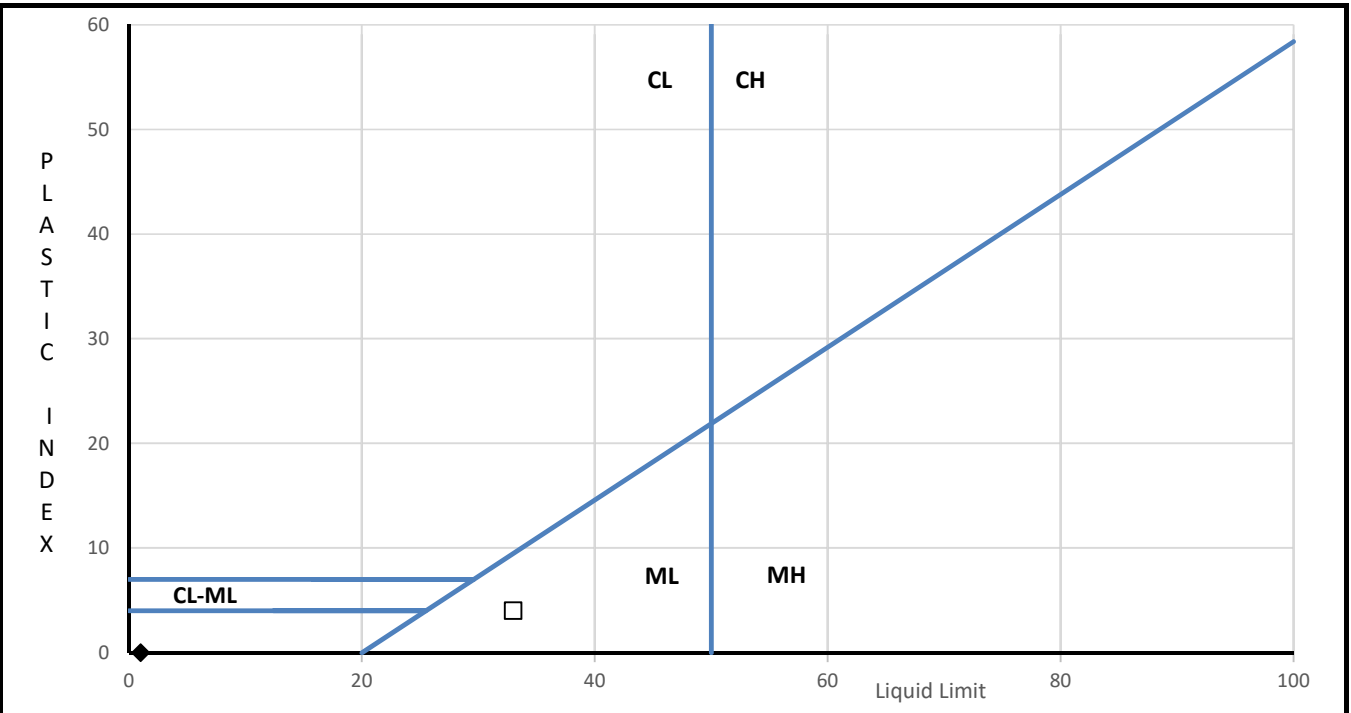
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------------|---------|------|----|----|-------|----------------|------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| ■ | 19GWP-BR19, S-1 | 2-4 | 22.1 | 33 | 27 | 6 | 42.4 | SM Silty sand [A-4] |
| | 19GWP-BR19, S-2 | 4-6 | 27.0 | | | | | |
| | 19GWP-BR19, S-3 | 6-8 | 19.1 | | | | | |
| | 19GWP-BR19, S-4 | 9-10 | 16.2 | | | | | |
| | 19GWP-BR19, S-5 | 13-15 | 14.1 | | | | | |
| | 19GWP-BR19, S-6 | 18-20 | 17.1 | | | | | |
| □ | 19GWP-BR19, S-7 | 23-25 | 14.4 | 35 | 30 | 5 | 38.9 | SM Silty sand [A-4] |
| | 19GWP-BR19, S-8 | 28-30 | 9.7 | | | | | |
| | 19GWP-BR19, S-9 | 33-35 | 11.5 | | | | | |
| | 19GWP-BR19, S-10 | 38-39.8 | 16.8 | | | | | |
| | 19GWP-BR19, S-11 | 43-44.8 | 8.1 | | | | | |
| | 19GWP-BR19, S-12 | 48-48.8 | 20.0 | | | | | |
| | 19GWP-BR19, S-13 | 53-53.4 | 11.1 | | | | | |
| | 19GWP-BR19, S-14 | 58-58.3 | 16.6 | | | | | |
| | 19GWP-BR19, S-15 | 63-63.3 | 8.9 | | | | | |
| ⊗ | 19GWP-BR19, S-16 | 68-68.8 | 9.6 | 31 | 27 | 4 | 41.3 | SM Silty sand [A-4] |
| | 19GWP-BR19, S-17 | 70-70.2 | 7.6 | | | | | |
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| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 8/23/2019 | <i>A. Randy Hamilton</i> | 10/8/2019 |



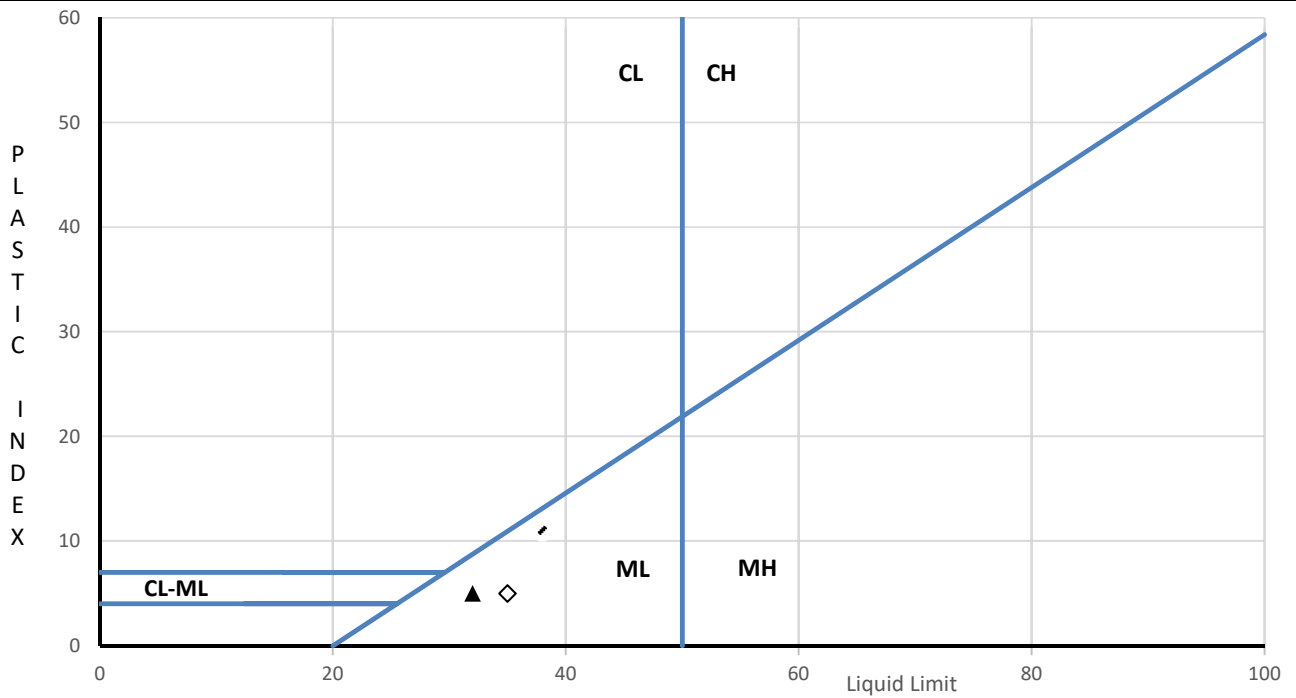
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|-------------------------|------------|------|----|----|----|-------|----------------|------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GWP-RW02, S-1 | 2-4 | 12.0 | | | | | | |
| ◆ 19GWP-RW02, S-2 | 4-6 | 10.7 | NP | NP | NP | 26.0 | SM | Silty Sand with Gravel [A-2] |
| 19GWP-RW02, S-3 | 6-8 | 12.3 | | | | | | |
| 19GWP-RW02, S-4 | 8-10 | 12.6 | | | | | | |
| 19GWP-RW02, S-5 | 13-15 | 15.6 | | | | | | |
| 19GWP-RW02, S-6 | 18-20 | 25.3 | | | | | | |
| □ 19GWP-RW02, S-7 | 23-25 | 16.7 | 33 | 29 | 4 | 44.5 | SM | Silty Sand [A-4] |
| 19GWP-RW02, S-8 | 28-30 | 15.9 | | | | | | |
| 19GWP-RW02, S-9 | 33-33.4 | 11.4 | | | | | | |
| 19GWP-RW02, S-10 | 38-38.4 | 11.1 | | | | | | |
| 19GWP-RW02, S-11 | 43-43.3 | 24.0 | | | | | | |
| 19GWP-RW02, S-12 | 48-48.3 | 15.7 | | | | | | |
| 19GWP-RW02, S-13 | 50-50.2 | 18.2 | | | | | | |
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| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 9/13/2019 |



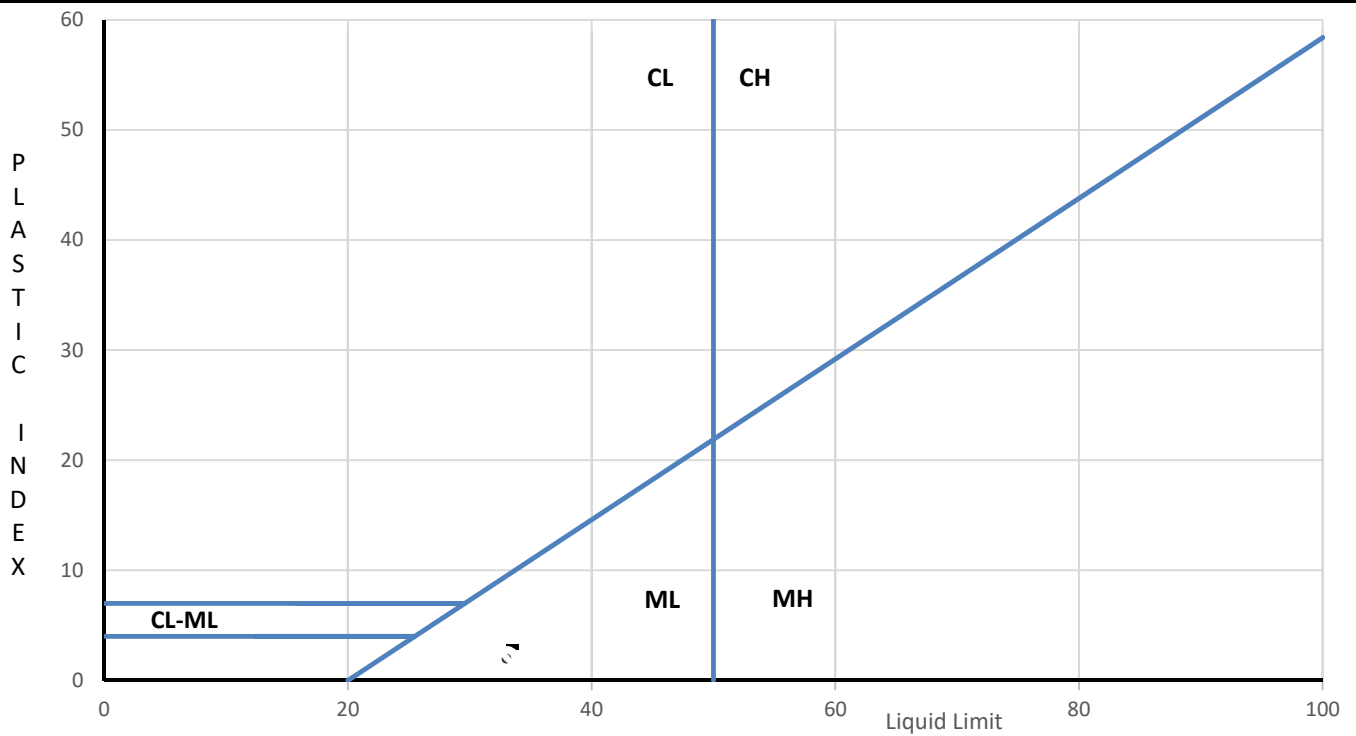
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GWP-RW03, S-1 | 1-3 | 19.1 | | | | | | |
| 19GWP-RW03, S-2 | 3-5 | 17.5 | | | | | | |
| ▲ 19GWP-RW03, S-3 | 5-7 | 13.5 | 32 | 27 | 5 | 39.1 | SM | Silty Sand [A-4] |
| 19GWP-RW03, S-4 | 7-9 | 17.1 | | | | | | |
| 19GWP-RW03, S-5 | 9-11 | 14.7 | | | | | | |
| 19GWP-RW03, S-6 | 13-15 | 20.8 | | | | | | |
| 19GWP-RW03, S-7 | 18-20 | 18.0 | | | | | | |
| ◇ 19GWP-RW03, S-8 | 23-25 | 20.5 | 35 | 30 | 5 | 50.2 | ML | Sandy Silt [A-4] |
| 19GWP-RW03, S-9 | 28-30 | 22.7 | | | | | | |
| 19GWP-RW03, S-10 | 33-35 | 21.2 | | | | | | |
| 19GWP-RW03, S-11 | 38-40 | 18.1 | | | | | | |
| 19GWP-RW03, S-12 | 43-45 | 5.7 | | | | | | |
| / 19GWP-RW03, S-13 | 48-50 | 25.6 | 38 | 27 | 11 | 50.7 | ML | Sandy Silt [A-6] |
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| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 10/21/2019 |



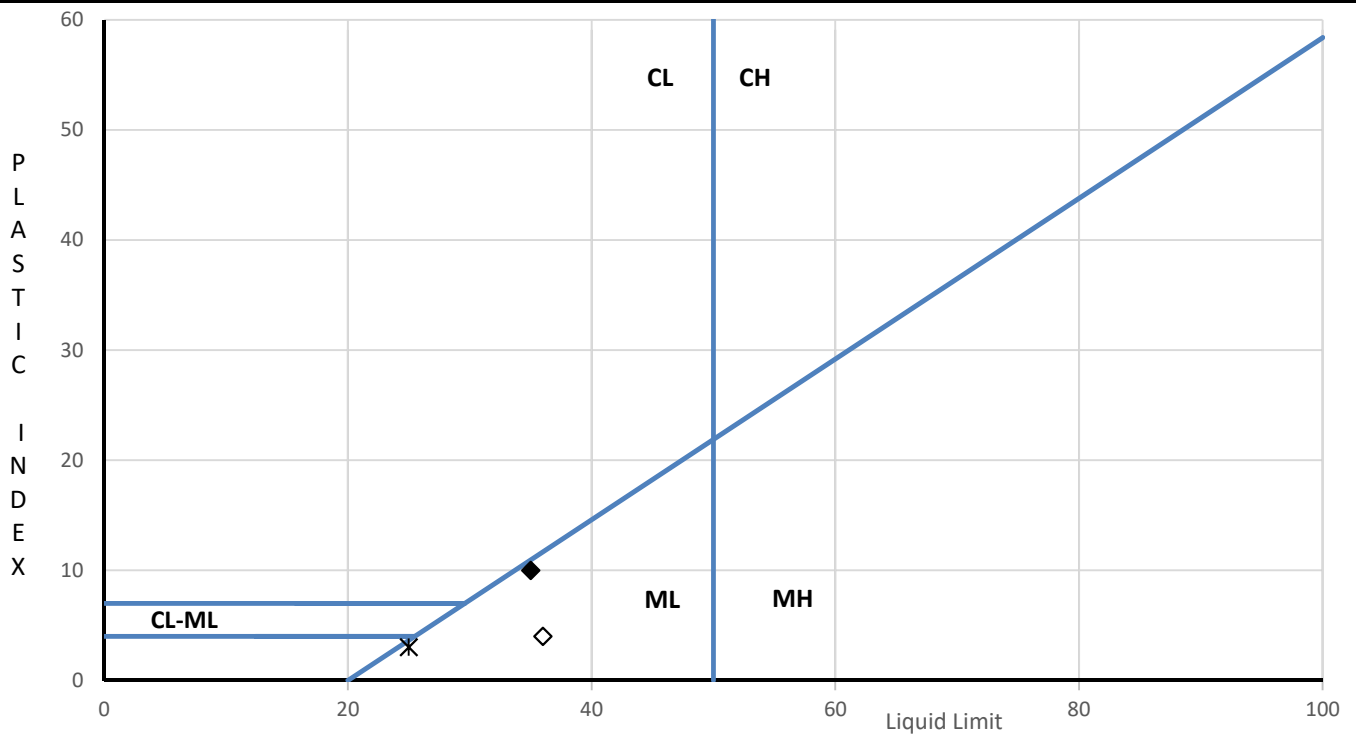
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|---------------------------|------------|------|----|----|----|-------|----------------|------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GWP-RW04, S-1 | 0.7-2.5 | 10.1 | | | | | | |
| 19GWP-RW04, S-2 | 2.5-4.5 | 18.1 | | | | | | |
| 19GWP-RW04, S-3 | 4.5-6.5 | 14.3 | | | | | | |
| 19GWP-RW04, S-4 | 6.5-8.5 | 18.5 | | | | | | |
| — 19GWP-RW04, S-5 | 8.5-10.5 | 15.7 | 33 | 30 | 3 | 48.1 | SM | Silty Sand [A-4] |
| 19GWP-RW04, S-6 | 13-15 | 16.3 | | | | | | |
| 19GWP-RW04, S-7 | 18-20 | 22.3 | | | | | | |
| 19GWP-RW04, S-8 | 23-25 | 15.2 | | | | | | |
| 19GWP-RW04, S-9 | 28-30 | 16.6 | | | | | | |
| 19GWP-RW04, S-10 | 33-35 | 13.8 | | | | | | |
| 19GWP-RW04, S-11 | 38-40 | 15.7 | | | | | | |
| \ 19GWP-RW04, S-12 | 43-45 | 14.3 | 33 | 31 | 2 | 65.5 | ML | Sandy Silt [A-4] |
| 19GWP-RW04, S-13 | 48-48.9 | 13.1 | | | | | | |
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| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 10/21/2019 |



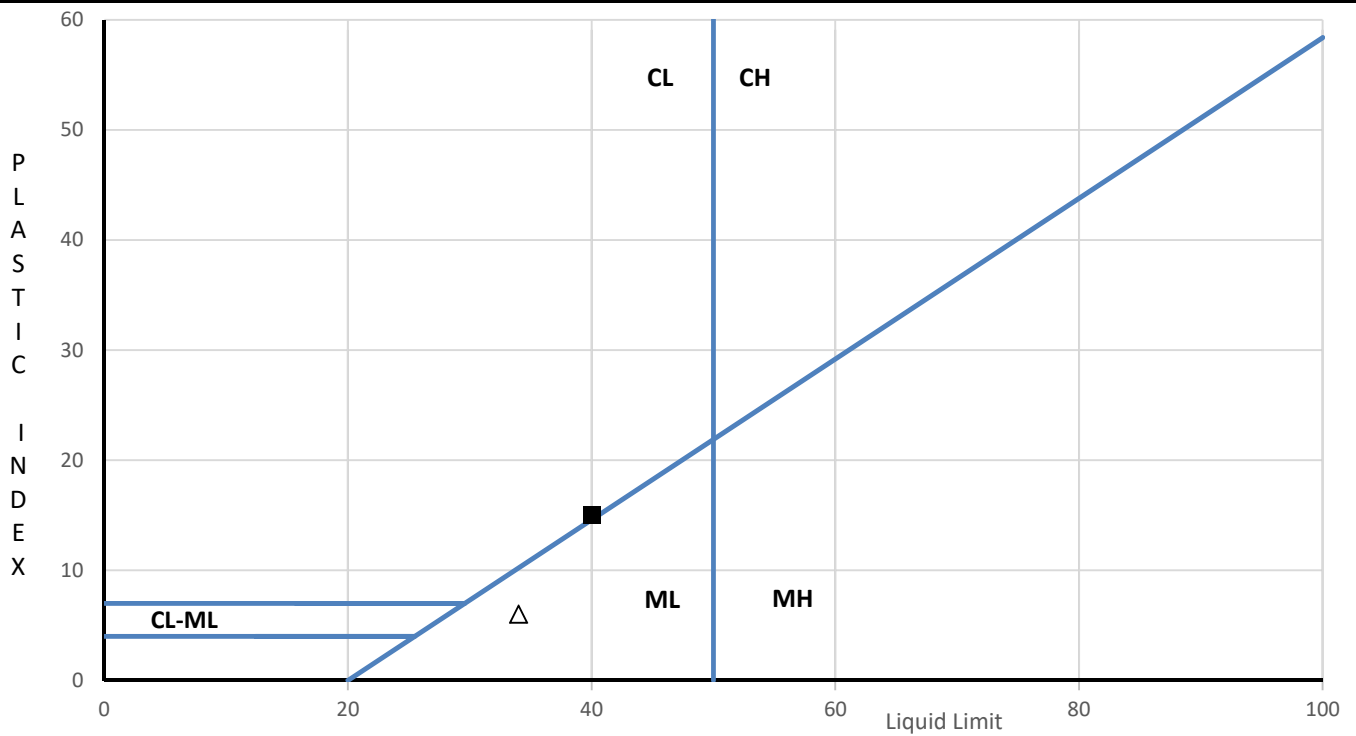
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| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19GWP-RW06, S-1 | 2-4 | 9.8 | | | | | | |
| ◆ 19GWP-RW06, S-2 | 4-6 | 11.1 | 35 | 25 | 10 | 42.0 | SM | Silty Sand [A-4] |
| 19GWP-RW06, S-3 | 6-8 | 9.6 | | | | | | |
| 19GWP-RW06, S-4 | 8-9.9 | 8.3 | | | | | | |
| 19GWP-RW06, S-5 | 13-15 | 10.2 | | | | | | |
| 19GWP-RW06, S-6 | 18-19.9 | 9.6 | | | | | | |
| 19GWP-RW06, S-7 | 23-24.4 | 8.1 | | | | | | |
| ◇ 19GWP-RW06, S-8 | 28-30 | 16.7 | 36 | 32 | 4 | 57.7 | ML | Sandy Silt [A-4] |
| 19GWP-RW06, S-9 | 33-35 | 18.4 | | | | | | |
| 19GWP-RW06, S-10 | 38-40 | 11.6 | | | | | | |
| * 19GWP-RW06, S-11 | 43-43.3 | 11.5 | 25 | 22 | 3 | 33.4 | SM | Silty Sand with Gravel [A-2-4] |
| 19GWP-RW06, S-12 | 44-44.1 | 14.3 | | | | | | |
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| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson & Derek Baker | 9/13/2019 | N. Randy Rainwater | 10/21/2019 |



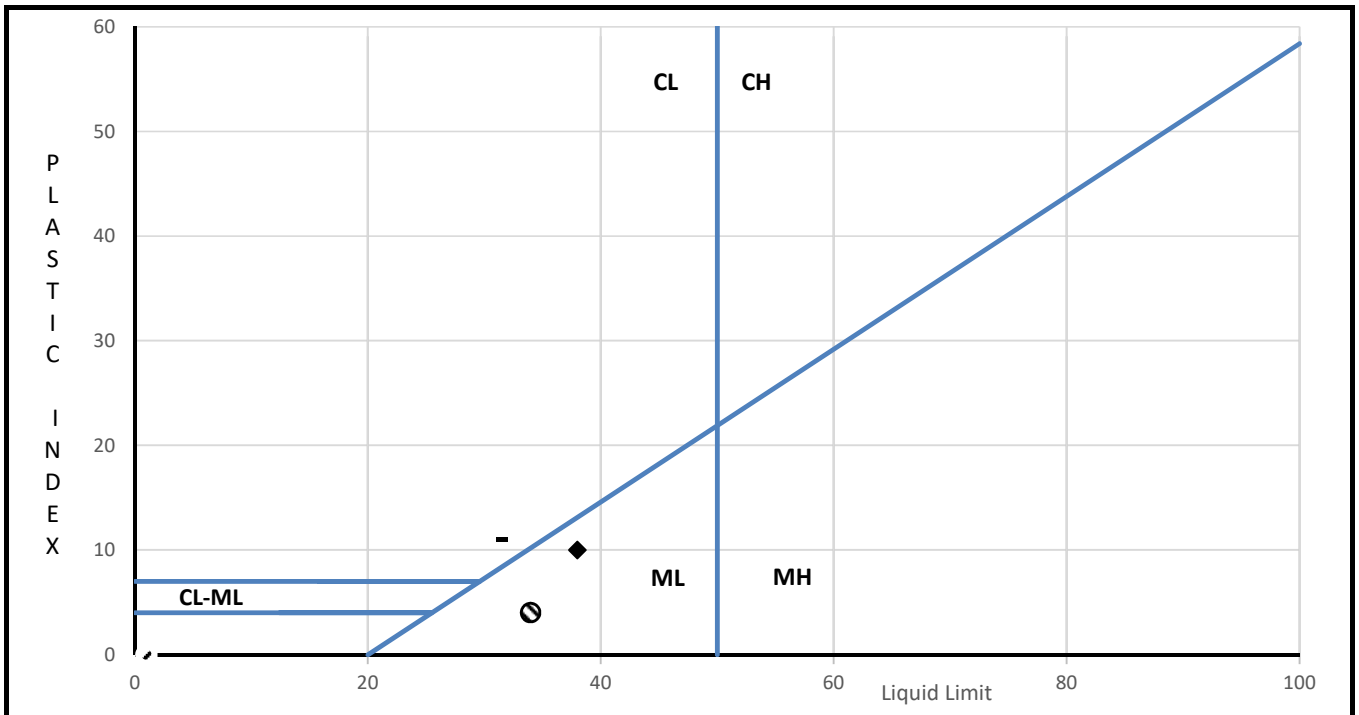
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|-------------------------|------------------|---------|------|----|----|-------|----------------|------------------|---------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description | |
| ■ | 19GWP-RW08, S-1 | 1-3 | 19.7 | 40 | 25 | 15 | 73.8 | CL | Lean Clay with Sand [A-6] |
| | 19GWP-RW08, S-2 | 3-5 | 13.2 | | | | | | |
| | 19GWP-RW08, S-3 | 5-7 | 12.6 | | | | | | |
| | 19GWP-RW08, S-4 | 7-9 | 12.9 | | | | | | |
| | 19GWP-RW08, S-5 | 9-11 | 13.6 | | | | | | |
| | 19GWP-RW08, S-6 | 14-16 | 14.9 | | | | | | |
| | 19GWP-RW08, S-7 | 19-21 | 12.3 | | | | | | |
| | 19GWP-RW08, S-8 | 24-24.4 | 9.9 | | | | | | |
| △ | 19GWP-RW08, S-9 | 29-30.4 | 22.5 | 34 | 28 | 6 | 60.9 | ML | Sandy Silt [A-4] |
| | 19GWP-RW08, S-10 | 34-34.9 | 15.9 | | | | | | |
| | 19GWP-RW08, S-11 | 39-39.3 | 20.2 | | | | | | |
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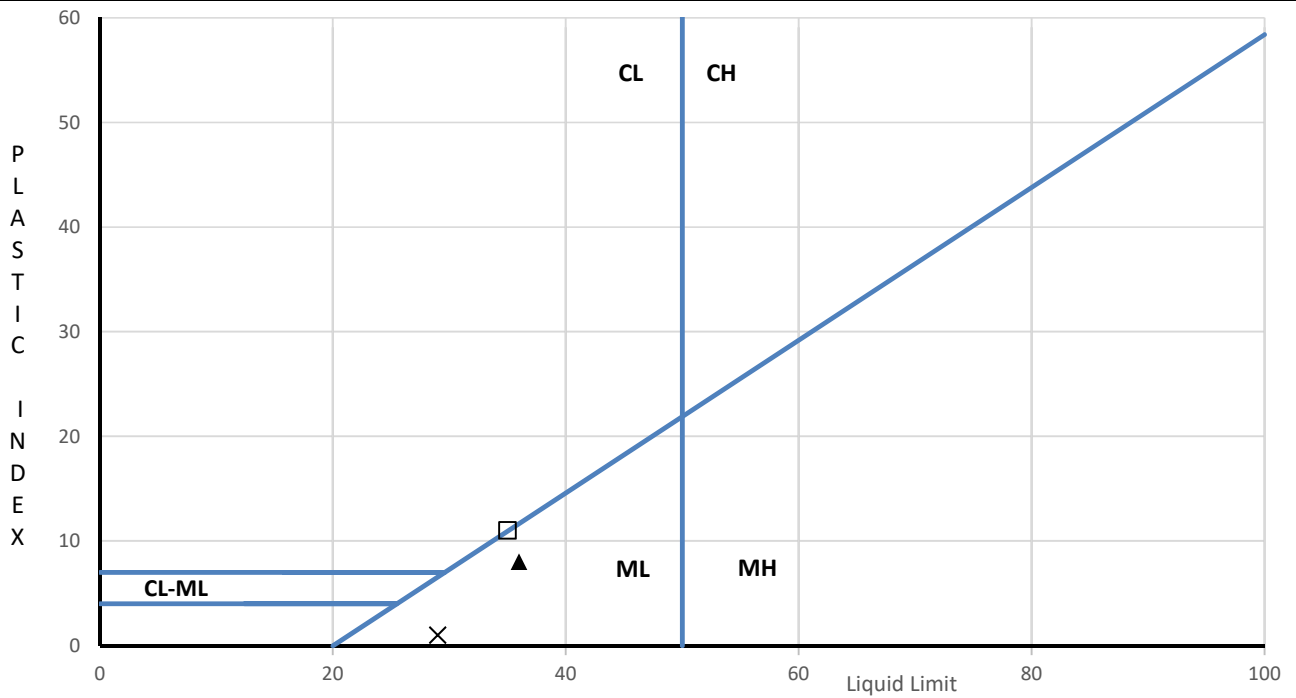
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| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-BR11, S-1 | 2-4 | 15.1 | | | | | | |
| ◆ 19X-BR11, S-2 | 4-6 | 23.5 | 38 | 28 | 10 | 54.3 | ML | Sandy silt [A-4] |
| 19X-BR11, S-3 | 6-8 | 23.0 | | | | | | |
| 19X-BR11, S-4 | 8-10 | 24.8 | | | | | | |
| — 19X-BR11, S-5 | 13-15 | 22.6 | 31 | 20 | 11 | 53.9 | CL | |
| 19X-BR11, S-6 | 18-20 | 20.0 | | | | | | |
| 19X-BR11, S-7 | 23-25 | 8.8 | | | | | | |
| 19X-BR11, S-8 | 28-30 | 9.5 | | | | | | |
| 19X-BR11, S-9 | 33-33.8 | 6.9 | | | | | | |
| 19X-BR11, S-10 | 38-40 | 8.4 | | | | | | |
| 19X-BR11, S-11 | 43-43.2 | 15.1 | | | | | | |
| 19X-BR11, S-12 | 48-48.3 | 15.4 | | | | | | |
| / 19X-BR11, S-13 | 53-53.8 | 10.0 | NP | NP | NP | 36.9 | SM | Silty sand [A-4/A-5] |
| 19X-BR11, S-14 | 58-58.8 | 20.7 | | | | | | |
| 19X-BR11, S-15 | 63-63.3 | 14.5 | | | | | | |
| ⊙ 19X-BR11, S-16 | 68-68.4 | 21.3 | 34 | 30 | 4 | 30.5 | SM* | |
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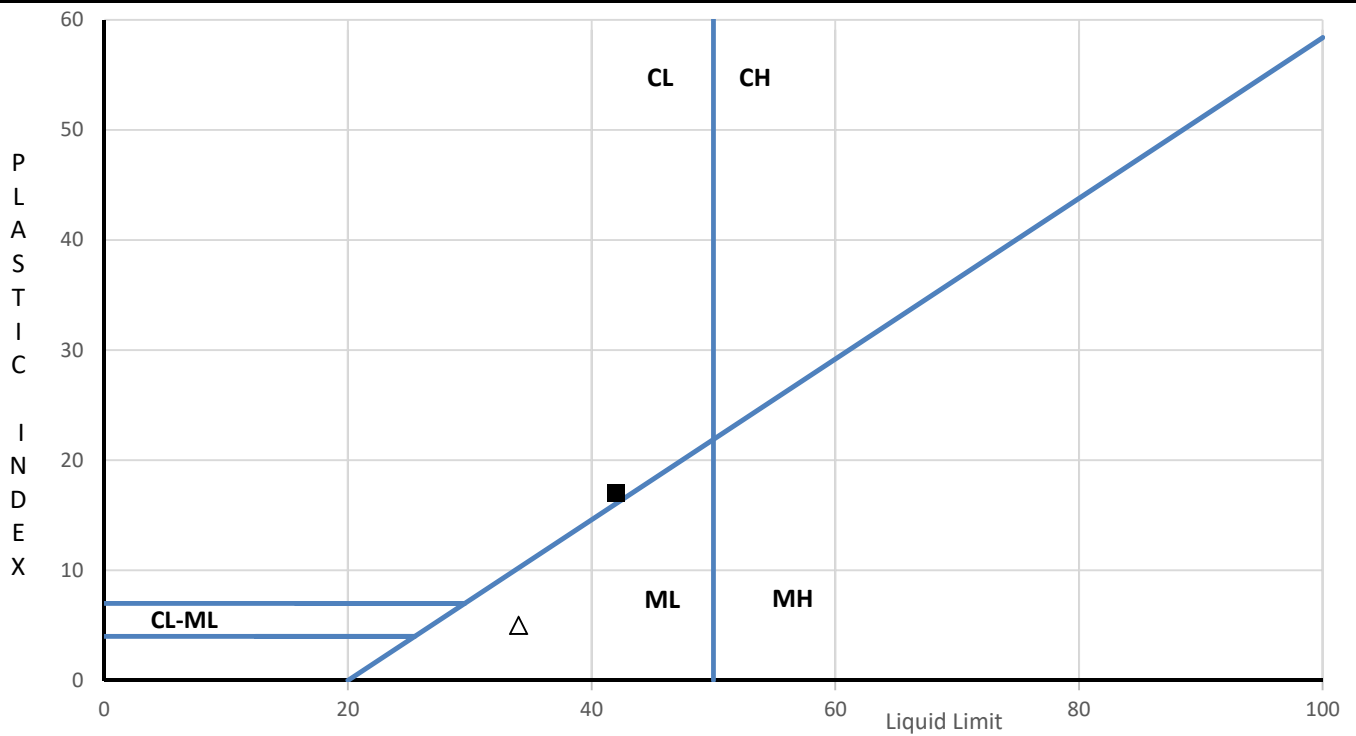
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| 19X-BR12, S-1 | 2.1-4.1 | 20.9 | | | | | | |
| 19X-BR12, S-2 | 4.1-6.1 | 20.5 | | | | | | |
| ▲ 19X-BR12, S-3 | 6.1-8.1 | 19.7 | 36 | 28 | 8 | 53.7 | ML | Sandy silt [A-4] |
| 19X-BR12, S-4 | 8.1-10.1 | 27.3 | | | | | | |
| 19X-BR12, S-5 | 13.5-15.1 | 24.1 | | | | | | |
| 19X-BR12, S-6 | 18.1-20.1 | 25.8 | | | | | | |
| ◻ 19X-BR12, S-7 | 23.1-25.1 | 27.0 | 35 | 24 | 11 | 79.3 | CL | Lean clay with sand [A-6] |
| 19X-BR12, S-8 | 29.1-30.1 | 10.0 | | | | 9.8 | | |
| 19X-BR12, S-9 | 34.1-35.1 | 14.3 | | | | | | |
| × 19X-BR12, S-11 | 43.1-44 | 12.1 | 29 | 28 | 1 | 69.2 | ML | Sandy silt [A-4] |
| 19X-BR12, S-12 | 48.1-48.5 | 14.0 | | | | | | |
| 19X-BR12, S-13 | 53-53.1 | 9.5 | | | | | | |
| 19X-BR12, S-14 | 58.1-58.5 | 10.9 | | | | | | |
| 19X-BR12, S-15 | 63.1-63.4 | 12.8 | | | | | | |
| 19X-BR12, S-16 | 68.1-68.3 | 17.9 | | | | | | |
| 19X-BR12, S-17 | 70.1-70.4 | 15.8 | | | | | | |
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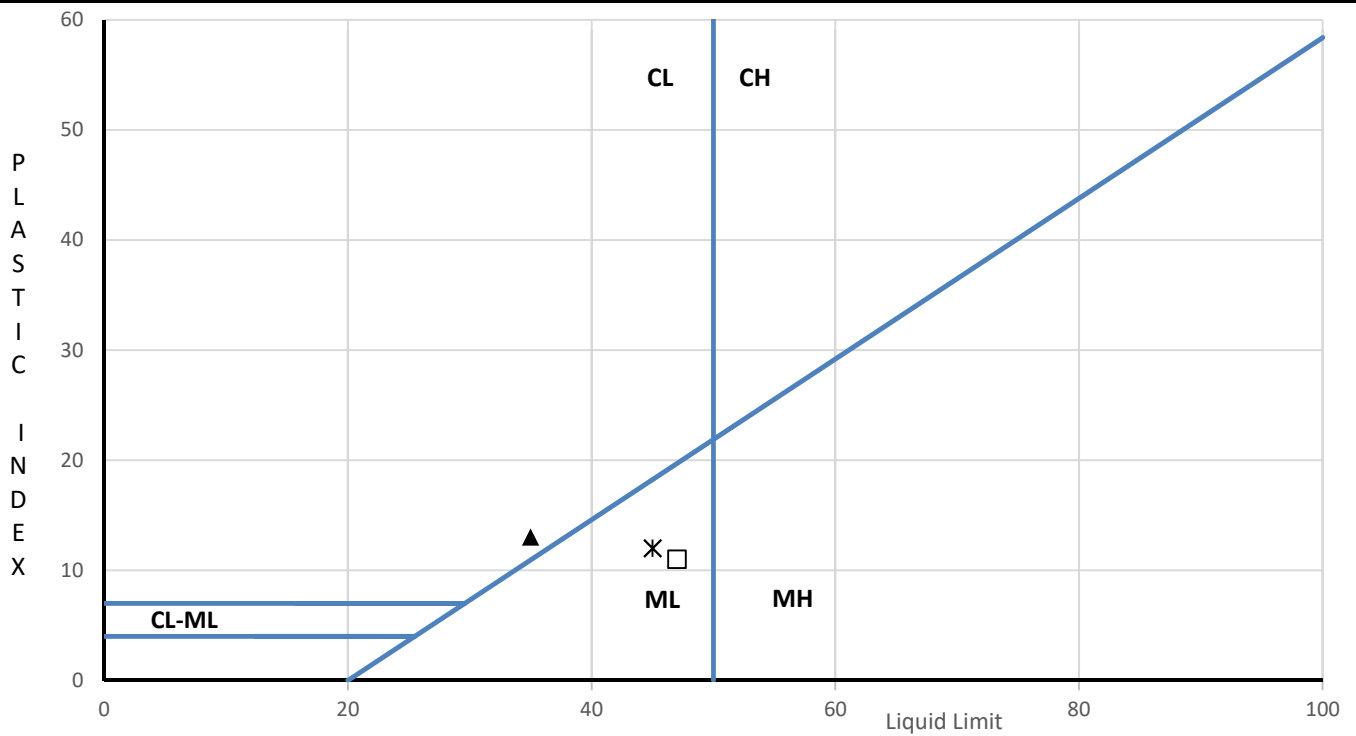
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| ID | Depth (ft) | | | | | | Symbol | Soil Description | |
| ■ | 19S-N-RW10, S-1 | 0-2 | 16.6 | 42 | 25 | 17 | 75.0 | CL | Lean Clay with Sand [A-7-6] |
| | 19S-N-RW10, S-2 | 2-4 | 11.5 | | | | | | |
| | 19S-N-RW10, S-3 | 4-6 | 22.6 | | | | | | |
| | 19S-N-RW10, S-4 | 6-8 | 20.1 | | | | | | |
| | 19S-N-RW10, S-5 | 8-10 | 12.9 | | | | | | |
| | 19S-N-RW10, S-6 | 13-14 | 8.8 | | | | | | |
| | 19S-N-RW10, S-7 | 18-19.5 | 10.5 | | | | | | |
| | 19S-N-RW10, S-8 | 23-23.9 | 9.6 | | | | | | |
| △ | 19S-N-RW10, S-9 | 25-26.4 | 9.0 | 34 | 29 | 5 | 40.9 | SM | Silty Sand [A-4] |
| | 19S-N-RW10, S-10 | 33-33.8 | 9.5 | | | | | | |
| | 19S-N-RW10, S-11 | 38-38.4 | 7.1 | | | | | | |
| | 19S-N-RW10, S-12 | 43-43.5 | 9.7 | | | | | | |
| | 19S-N-RW10, S-13 | 48-48.8 | 11.6 | | | | | | |
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INDEX TEST RESULTS



*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/8/2019

| | | | |
|----------------|---------------------------------|--------------------|-----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 9/13/2019 |



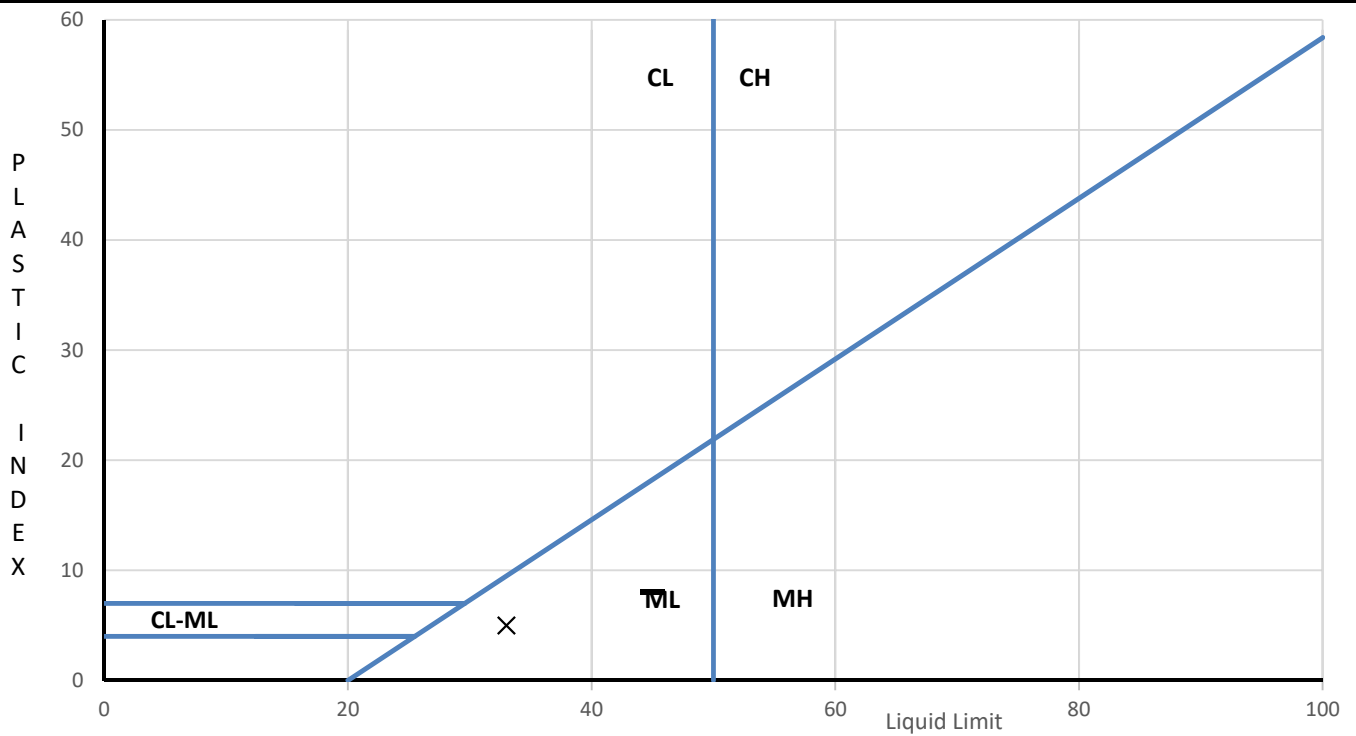
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-N-RW11, S-1 | 0-2 | 19.1 | | | | | | |
| 19X-N-RW11, S-2 | 2-4 | 16.9 | | | | | | |
| ▲ 19X-N-RW11, S-3 | 4-6 | 15.2 | 35 | 22 | 13 | 66.1 | CL | Sandy Lean Clay [A-6] |
| 19X-N-RW11, S-4 | 6-8 | 25.1 | | | | | | |
| 19X-N-RW11, S-5 | 8-10 | 20.1 | | | | | | |
| 19X-N-RW11, S-6 | 13-15 | 27.5 | | | | | | |
| □ 19X-N-RW11, S-7 | 18-20 | 28.3 | 47 | 36 | 11 | 64.6 | ML | Sandy Silt [A-7-5] |
| 19X-N-RW11, S-8 | 23-25 | 31.4 | | | | | | |
| 19X-N-RW11, S-9 | 28-30 | 31.5 | | | | | | |
| 19X-N-RW11, S-10 | 33-35 | 18.9 | | | | | | |
| * 19X-N-RW11, S-11 | 38-39.5 | 30.4 | 45 | 33 | 12 | 77.3 | ML | Silt with Sand [A-7-5] |
| 19X-N-RW11, S-12 | 43-44.8 | 29.5 | | | | | | |
| 19X-N-RW11, S-13 | 48-48.8 | 22.3 | | | | | | |
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INDEX TEST RESULTS



| | | | |
|----------------|---------------------------------|--------------------|-----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 9/13/2019 |

*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/8/2019



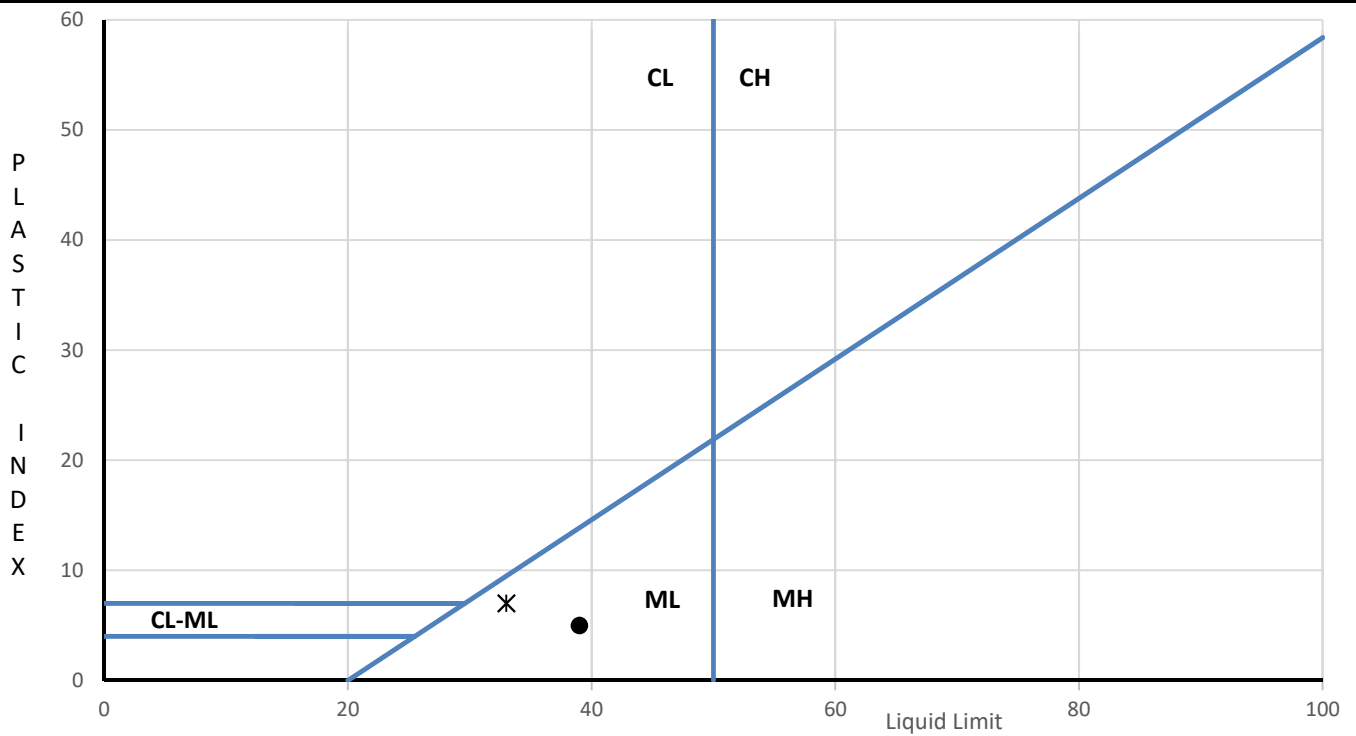
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-N-RW12, S-1 | 0-2 | 4.7 | | | | 15.0 | | |
| 19X-N-RW12, S-2 | 2-4 | 16.5 | | | | | | |
| 19X-N-RW12, S-3 | 4-6 | 18.1 | | | | | | |
| 19X-N-RW12, S-4 | 6-8 | 19.3 | | | | | | |
| 19X-N-RW12, S-5 | 8-10 | 16.9 | | | | | | |
| 19X-N-RW12, S-6 | 13-15 | 15.6 | 45 | 37 | 8 | 46.8 | SM | Silty Sand [A-5] |
| 19X-N-RW12, S-7 | 18-20 | 13.9 | | | | | | |
| 19X-N-RW12, S-8 | 23-24.3 | 9.3 | | | | | | |
| 19X-N-RW12, S-9 | 28-29 | 8.4 | | | | | | |
| X 19X-N-RW12, S-10 | 33-34.5 | 6.5 | 33 | 28 | 5 | 38.3 | SM | Silty Sand [A-4] |
| 19X-N-RW12, S-11 | 38-38.9 | 8.2 | | | | | | |
| 19X-N-RW12, S-12 | 43-44.3 | 9.6 | | | | | | |
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INDEX TEST RESULTS



| | | | |
|----------------|---------------------------------|--------------------|------------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 10/21/2019 |

*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/22/2019



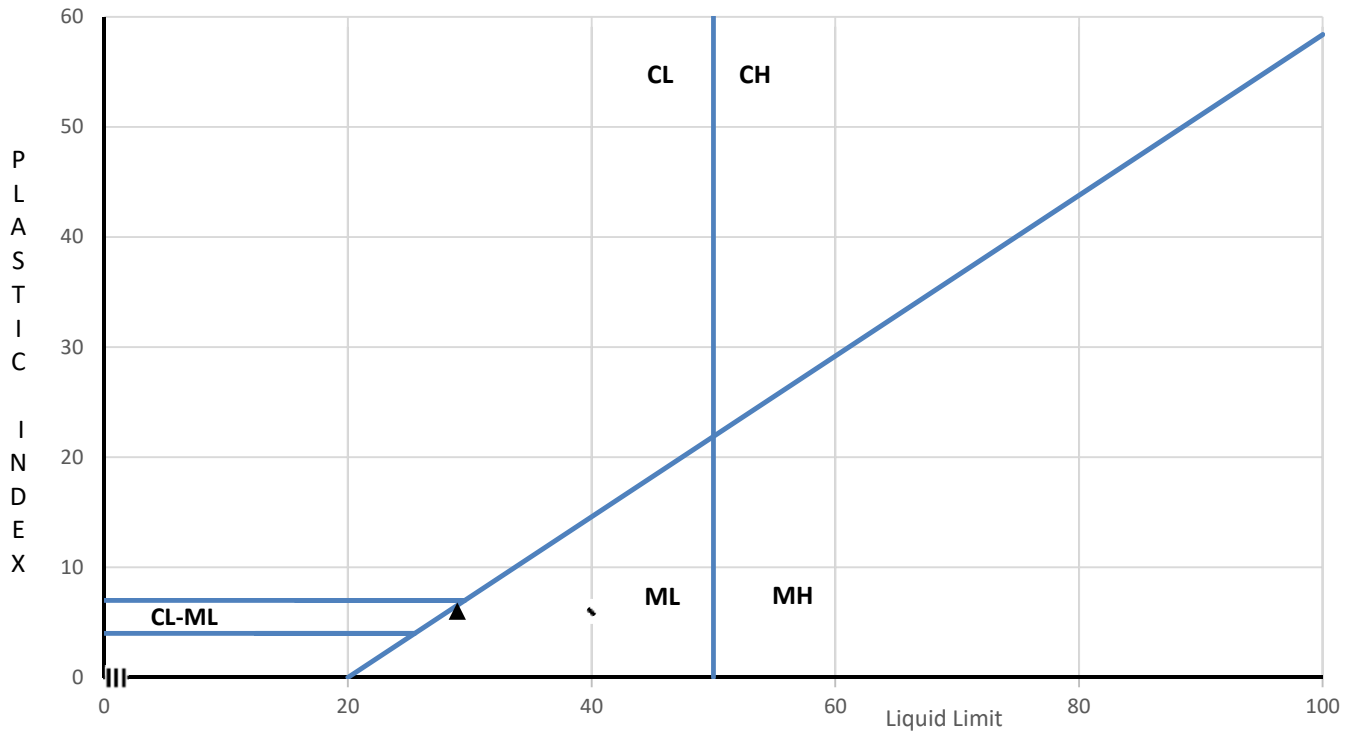
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-N-RW17, S-1 | 2-4 | 17.0 | | | | | | |
| 19X-N-RW17, S-2 | 4-6 | 19.5 | | | | | | |
| 19X-N-RW17, S-3 | 6-8 | 19.0 | | | | | | |
| ● 19X-N-RW17, S-4 | 8-10 | 24.0 | 39 | 34 | 5 | 55.6 | ML | Sandy Silt [A-4] |
| 19X-N-RW17, S-5 | 10-12 | 22.0 | | | | | | |
| 19X-N-RW17, S-6 | 13-15 | 19.3 | | | | | | |
| 19X-N-RW17, S-7 | 18-20 | 23.1 | | | | | | |
| 19X-N-RW17, S-8 | 23-23 | 24.3 | | | | | | |
| 19X-N-RW17, S-9 | 28-28 | 20.4 | | | | | | |
| 19X-N-RW17, S-10 | 33-33 | 22.5 | | | | | | |
| * 19X-N-RW17, S-11 | 38-38 | 18.0 | 33 | 26 | 7 | 44.3 | SM | Silty Sand [A-4] |
| 19X-N-RW17, S-12 | 43-43 | 18.8 | | | | | | |
| 19X-N-RW17, S-13 | 48-48 | 16.2 | | | | | | |
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INDEX TEST RESULTS



| | | | |
|----------------|---------------------------------|--------------------|-----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 9/13/2019 |

*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/8/2019



| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|------------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-SOS-P25, S-1 | 2-4 | 7.1 | | | | | | |
| 19X-SOS-P25, S-2 | 4-6 | 8.7 | | | | 14.7 | | |
| ▲ 19X-SOS-P26, S-1 | 2-4 | 13.9 | 29 | 23 | 6 | 39.3 | SM | Silty Sand with Gravel [A-4] |
| 19X-SOS-P26, S-2 | 4-6 | 12.5 | | | | | | |
| 19X-SOS-P27, S-1 | 1.5-3.5 | 16.2 | | | | | | |
| 19X-SOS-P27, S-2 | 3.5-5.5 | 17.6 | | | | | | |
| 19X-SOS-P27, S-3 | 5.5-7.5 | 14.9 | | | | | | |
| 19X-SOS-P28, S-1 | 2-4 | 16.1 | | | | | | |
| 19X-SOS-P28, S-2 | 4-6 | 16.5 | | | | | | |
| 19X-SOS-P28, S-3 | 6-8 | 15.0 | | | | | | |
| 19X-SOS-P32, S-1 | 3-5 | 17.7 | | | | | | |
| \ 19X-SOS-P32, S-2 | 5-7 | 18.7 | 40 | 34 | 6 | 66.6 | ML | Sandy Silt [A-4] |
| 19X-SOS-P32, S-3 | 7-9 | 19.2 | | | | | | |
| 19X-SOS-P34, S-1 | 1.5-3.5 | 18.4 | | | | | | |
| 19X-SOS-P34, S-2 | 3.5-5.5 | 19.9 | | | | | | |
| 19X-SOS-P34, S-3 | 5.5-7.5 | 22.2 | | | | | | |
| 19X-SOS-P35, S-1 | 1.5-3.5 | 2.2 | | | | | | |
| II 19X-SOS-P35, S-2 | 3.5-5.5 | 23.0 | NP | NP | NP | 43.3 | SM | Silty Sand [A-4/A-5] |
| 19X-SOS-P35, S-3 | 5.5-7.5 | 21.5 | | | | | | |

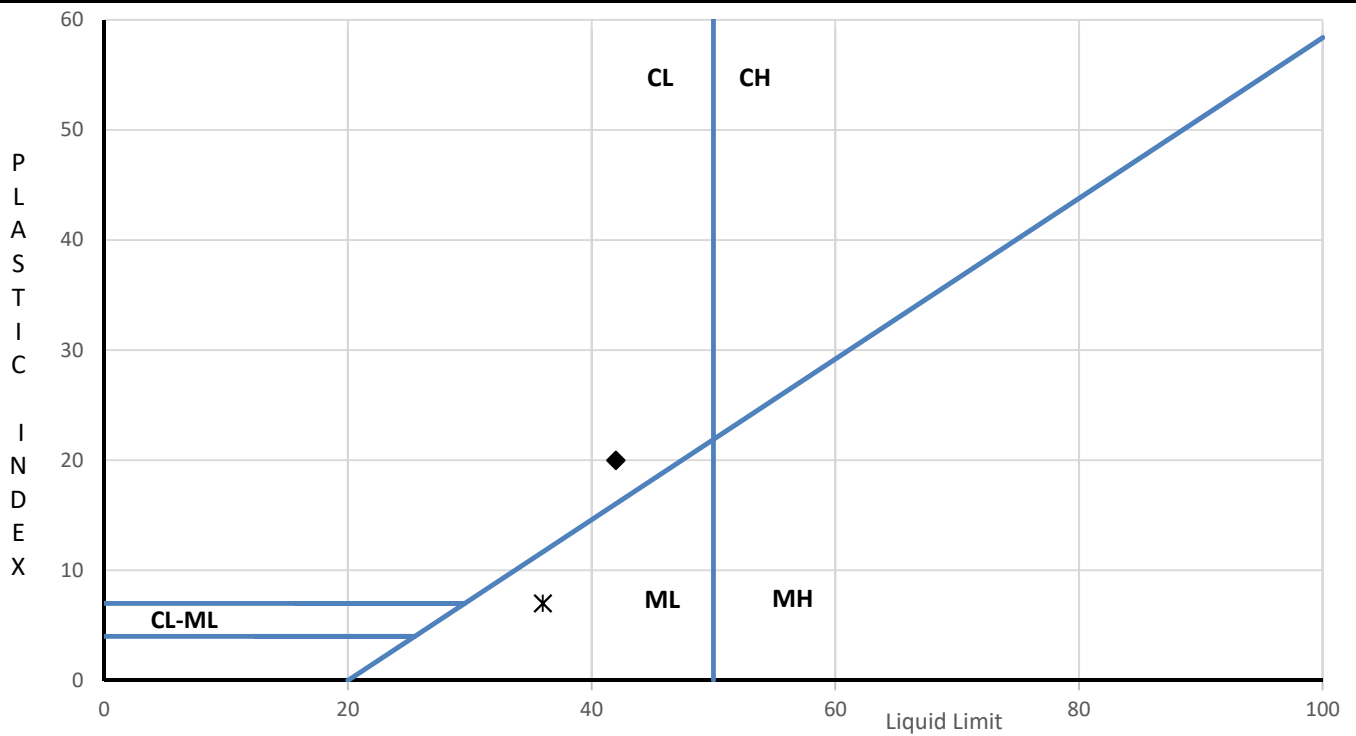
INDEX TEST RESULTS



*Symbol based on minus No. 40 portion only

References: VTM-7, VTM-25
Report Date 10/22/2019

| | | | |
|----------------|---------------------------------|--------------------|------------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 10/21/2019 |



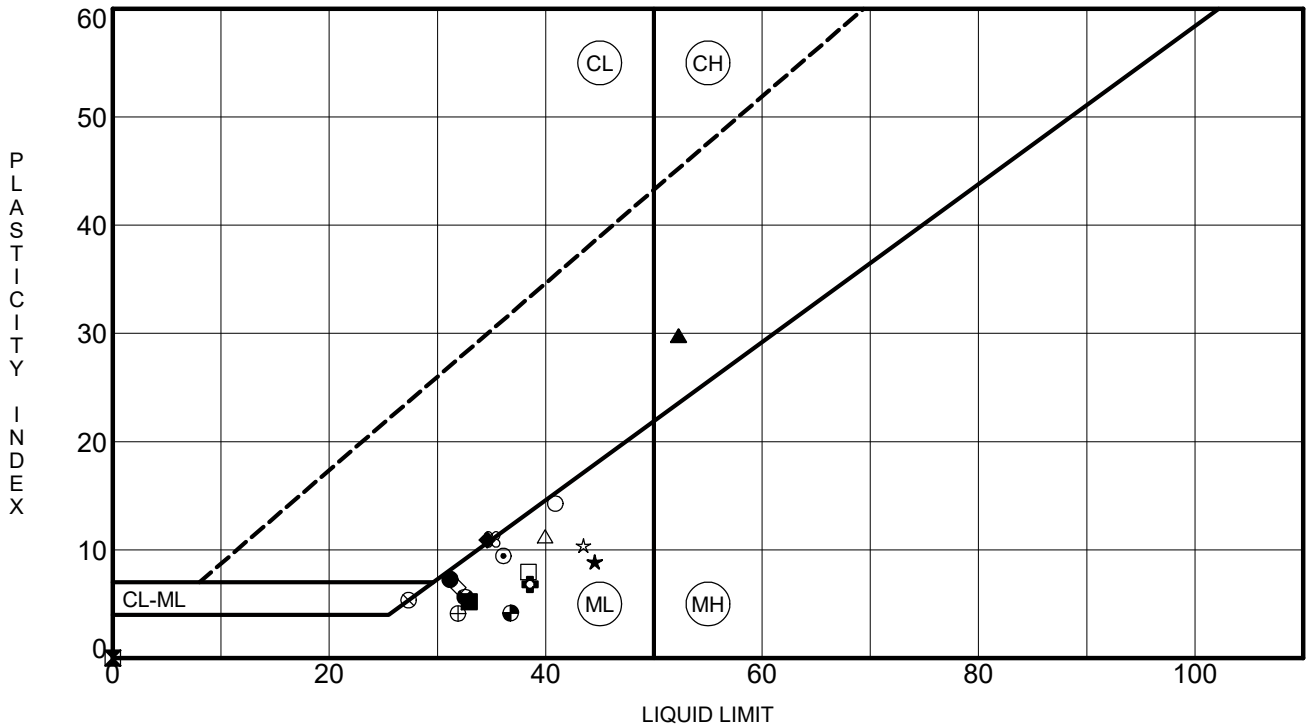
| Specimen Identification | | MC | LL | PL | PI | Fines | Classification | |
|-------------------------|------------|------|----|----|----|-------|----------------|-------------------------|
| ID | Depth (ft) | | | | | | Symbol | Soil Description |
| 19X-S-RW34, S-1 | 0-2 | 15.9 | | | | | | |
| ◆ 19X-S-RW34, S-2 | 2-4 | 18.0 | 42 | 22 | 20 | 57.1 | CL | Sandy Lean Clay [A-7-6] |
| 19X-S-RW34, S-3 | 4-6 | 8.7 | | | | | | |
| 19X-S-RW34, S-4 | 6-8 | 8.5 | | | | | | |
| 19X-S-RW34, S-5 | 8-10 | 7.0 | | | | | | |
| 19X-S-RW34, S-6 | 13-15 | 7.8 | | | | | | |
| 19X-S-RW34, S-7 | 18-20 | 11.2 | | | | | | |
| 19X-S-RW34, S-8 | 23-25 | 10.9 | | | | | | |
| 19X-S-RW34, S-9 | 28-30 | 14.9 | | | | | | |
| 19X-S-RW34, S-10 | 33-33.9 | 7.4 | | | | | | |
| * 19X-S-RW34, S-11 | 38-38.8 | 10.3 | 36 | 29 | 7 | 56.8 | ML | Sandy Silt [A-4] |
| 19X-S-RW34, S-12 | 43-43.4 | 6.2 | | | | | | |
| 19X-S-RW34, S-13 | 48-48.9 | 10.0 | | | | | | |
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INDEX TEST RESULTS



*Symbol based on minus No. 40 portion only
 References: VTM-7, VTM-25
 Report Date 10/8/2019

| | | | |
|----------------|---------------------------------|--------------------|-----------|
| Project Name | I-495 Between McLean and Dulles | | |
| Project Number | 1243-19-025 | | |
| Tested by | Date | Approved by | Date |
| Jimmy Hanson | 9/13/2019 | N. Randy Rainwater | 9/13/2019 |



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|---------------|-------------|----|----|----|-------|----------------------------|--------|
| ● 19DTR-P08 | 3.0 - 6.0 | 31 | 24 | 7 | 31 | SILTY SAND(SM) | A-2-4 |
| ☒ 19DTR-P09 | 3.5 - 5.5 | NP | NP | NP | 37 | SILTY SAND(SM) | A-4 |
| ▲ 19DTR-RW01 | 8.0 - 10.0 | 52 | 22 | 30 | 77 | FAT CLAY with SAND(CH) | A-7-6 |
| ★ 19DTR-RW01 | 38.0 - 40.0 | 45 | 36 | 9 | 86 | SILT(ML) | A-5 |
| ⊙ 19DTR-RW02 | 18.0 - 20.0 | 36 | 27 | 9 | 58 | SANDY SILT(ML) | A-4 |
| ⊕ 19DTR-RW02 | 43.0 - 45.0 | 39 | 32 | 7 | 72 | SILT with SAND(ML) | A-4 |
| ○ 19DTR-RW03 | 2.0 - 4.0 | 41 | 27 | 14 | 64 | SANDY SILT(ML) | A-7-6 |
| △ 19DTR-RW03 | 13.0 - 15.0 | 40 | 29 | 11 | 67 | SANDY SILT(ML) | A-6 |
| ⊗ 19DTR-RW03 | 38.0 - 38.8 | 27 | 22 | 5 | 56 | SANDY SILT(ML) | A-4 |
| ⊕ 19DTR-RW05 | 4.0 - 6.0 | 32 | 28 | 4 | 36 | SILTY SAND with GRAVEL(SM) | A-4 |
| □ 19DTR-RW05 | 18.0 - 20.0 | 38 | 30 | 8 | 73 | SILT with SAND(ML) | A-4 |
| ⊕ 19DTR-RW05 | 33.0 - 33.4 | 33 | 27 | 6 | 46 | SILTY SAND(SM) | A-4 |
| ⊕ 19DTR-RW07 | 4.0 - 6.0 | 37 | 33 | 4 | 36 | SILTY SAND with GRAVEL(SM) | A-4 |
| ☆ 19GTP-E-P07 | 3.5 - 5.5 | 43 | 33 | 10 | 69 | SANDY SILT(ML) | A-5 |
| ⊗ 19GTP-E-P11 | 3.0 - 4.5 | 35 | 24 | 11 | 50 | SANDY LEAN CLAY(CL) | A-6 |
| ■ 19GWP-P01 | 4.0 - 6.0 | 33 | 28 | 5 | 38 | SILTY SAND(SM) | A-4 |
| ◆ 19GWP-P02 | 2.0 - 4.0 | 35 | 24 | 11 | 40 | CLAYEY SAND(SC) | A-6 |
| ◇ 19GWP-RW05 | 2.0 - 4.0 | 32 | 25 | 7 | 39 | SILTY SAND with GRAVEL(SM) | A-4 |

Test Method: VTM-7

Tested By: SM

Date: 9/7/2019

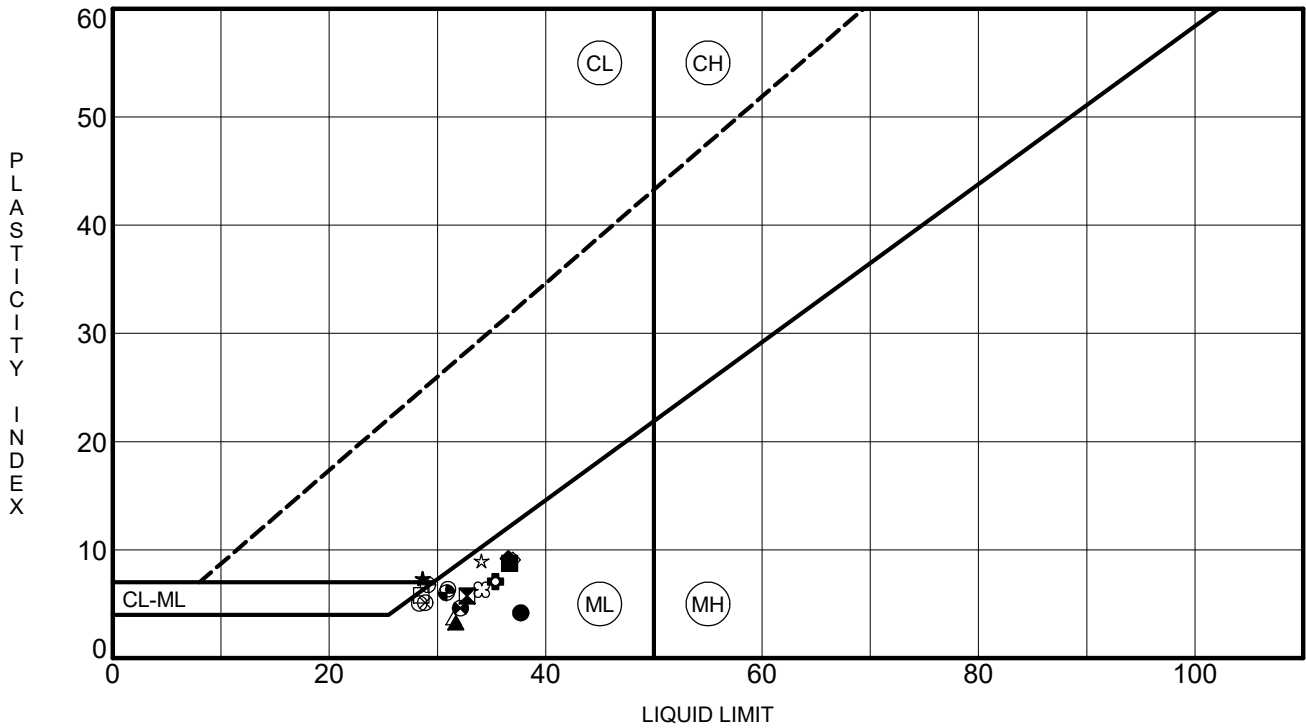


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|--------|------------------------|----|----|----|-------|---------------------------|--------|
| ● | 19GWP-RW05 43.0 - 45.0 | 38 | 34 | 4 | 75 | SILT with SAND(ML) | A-4 |
| ☒ | 19GWP-RW09 13.0 - 15.0 | 33 | 27 | 6 | 44 | SILTY SAND(SM) | A-4 |
| ▲ | 19GWP-RW09 48.0 - 50.0 | 32 | 28 | 4 | 53 | SANDY SILT(ML) | A-4 |
| ★ | 19GWP-RW10 4.0 - 6.0 | 29 | 21 | 8 | 55 | SANDY LEAN CLAY(CL) | A-4 |
| ⊙ | 19GWP-RW10 33.0 - 33.9 | 31 | 25 | 6 | 49 | SILTY SAND(SM) | A-4 |
| ⊕ | 19GWP-RW11 13.0 - 15.0 | 35 | 28 | 7 | 43 | SILTY SAND(SM) | A-4 |
| ○ | 19GWP-RW11 48.0 - 48.5 | 28 | 23 | 5 | 43 | SILTY SAND(SM) | A-4 |
| △ | 19GWP-RW12 0.0 - 2.0 | 32 | 28 | 4 | 34 | SILTY SAND(SM) | A-2-4 |
| ⊗ | 19GWP-RW12 13.0 - 15.0 | 29 | 24 | 5 | 58 | SANDY SILT(ML) | A-4 |
| ⊕ | 19GWP-RW12 23.0 - 24.0 | 29 | 22 | 7 | 34 | SILTY, CLAYEY SAND(SC-SM) | A-2-4 |
| □ | 19GWP-RW13 4.0 - 6.0 | 28 | 23 | 5 | 60 | SANDY SILT(ML) | A-4 |
| ⊕ | 19GWP-RW13 23.0 - 24.4 | 32 | 28 | 4 | 58 | SANDY SILT(ML) | A-4 |
| ⊕ | 19GWP-RW13 53.0 - 53.8 | 31 | 25 | 6 | 57 | SANDY SILT(ML) | A-4 |
| ☆ | 19GWP-RW14 13.0 - 15.0 | 34 | 25 | 9 | 59 | SANDY SILT(ML) | A-4 |
| ⊗ | 19GWP-RW15 4.0 - 5.7 | 34 | 28 | 6 | 30 | SILTY SAND(SM) | A-2-4 |
| ■ | 19GWP-RW15 28.0 - 29.3 | 37 | 28 | 9 | 38 | SILTY SAND(SM) | A-4 |
| ◆ | 19LOD-W-P14 3.5 - 5.5 | 37 | 27 | 10 | 51 | SANDY SILT(ML) | A-4 |
| ◇ | 19LOD-W-P15 3.5 - 5.5 | 37 | 28 | 9 | 53 | SANDY SILT(ML) | A-4 |

Test Method: VTM-7

Tested By: SM Date: 9/9/2019

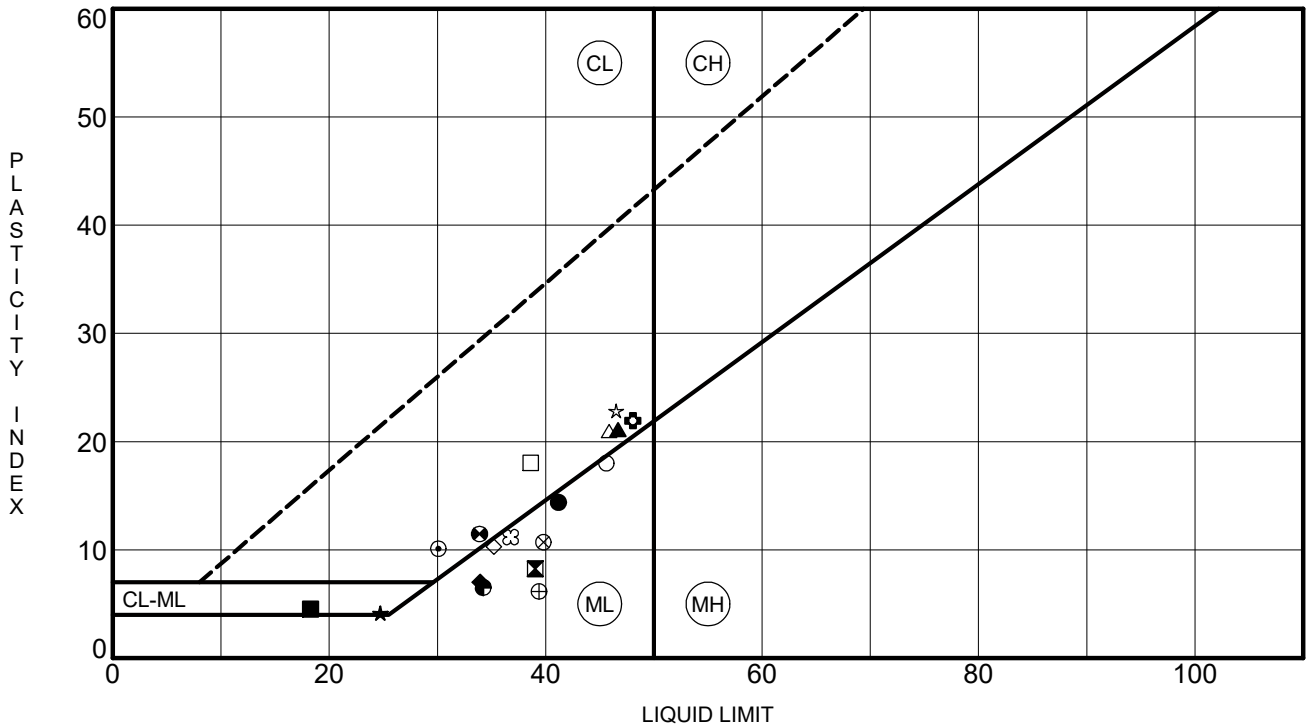


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO | |
|--------|-------------|-------------|----|----|-------|----------------|---------------------------------------|-------|
| ● | 19ODD-E-P02 | 2.0 - 4.0 | 41 | 27 | 14 | 62 | SANDY SILT(ML) | A-7-6 |
| ⊗ | 19ODD-E-P02 | 6.0 - 8.0 | 39 | 31 | 8 | 84 | SILT with SAND(ML) | A-4 |
| ▲ | 19SWM-05 | 4.0 - 6.0 | 47 | 26 | 21 | 78 | LEAN CLAY with SAND(CL) | A-7-6 |
| ★ | 19SWM-05 | 6.0 - 8.0 | 25 | 21 | 4 | 33 | SILTY, CLAYEY SAND(SC-SM) | A-2-4 |
| ⊙ | 19SWM-05 | 15.0 - 20.0 | 30 | 20 | 10 | 48 | CLAYEY SAND(SC) | A-4 |
| ⊕ | 19SWM-11 | 2.0 - 4.0 | 48 | 26 | 22 | 74 | LEAN CLAY with SAND(CL) | A-7-6 |
| ○ | 19SWM-11 | 20.0 - 25.0 | 46 | 28 | 18 | 69 | SANDY SILT(ML) | A-7-6 |
| △ | 19SWM-12 | 0.0 - 5.0 | 46 | 25 | 21 | 72 | LEAN CLAY with SAND(CL) | A-7-6 |
| ⊗ | 19SWM-12 | 6.0 - 8.0 | 40 | 29 | 11 | 47 | SILTY SAND(SM) | A-6 |
| ⊕ | 19SWM-12 | 18.0 - 20.0 | 39 | 33 | 6 | 73 | SILT with SAND(ML) | A-4 |
| □ | 19SWM-13 | 2.0 - 4.0 | 39 | 21 | 18 | 71 | LEAN CLAY with SAND(CL) | A-6 |
| ⊕ | 19SWM-13 | 11.0 - 15.0 | 34 | 22 | 12 | 62 | SANDY LEAN CLAY(CL) | A-6 |
| ⊕ | 19SWM-13 | 23.0 - 25.0 | 34 | 28 | 6 | 70 | SANDY SILT(ML) | A-4 |
| ★ | 19SWM-14 | 0.0 - 2.0 | 47 | 24 | 23 | 67 | SANDY LEAN CLAY(CL) | A-7-6 |
| ⊗ | 19SWM-14 | 6.0 - 10.0 | 37 | 26 | 11 | 71 | SILT with SAND(ML) | A-6 |
| ■ | 19X-NOS-P02 | 2.0 - 4.0 | 18 | 14 | 4 | 14 | SILTY, CLAYEY SAND with GRAVEL(SC-SM) | A-1-a |
| ◆ | 19X-NOS-P03 | 5.0 - 7.0 | 34 | 27 | 7 | 40 | SILTY SAND(SM) | A-4 |
| ◇ | 19X-NOS-P04 | 4.0 - 6.0 | 35 | 25 | 10 | 39 | SILTY SAND with GRAVEL(SM) | A-4 |

Test Method: VTM-7

Tested By: SM

Date: 9/22/2019

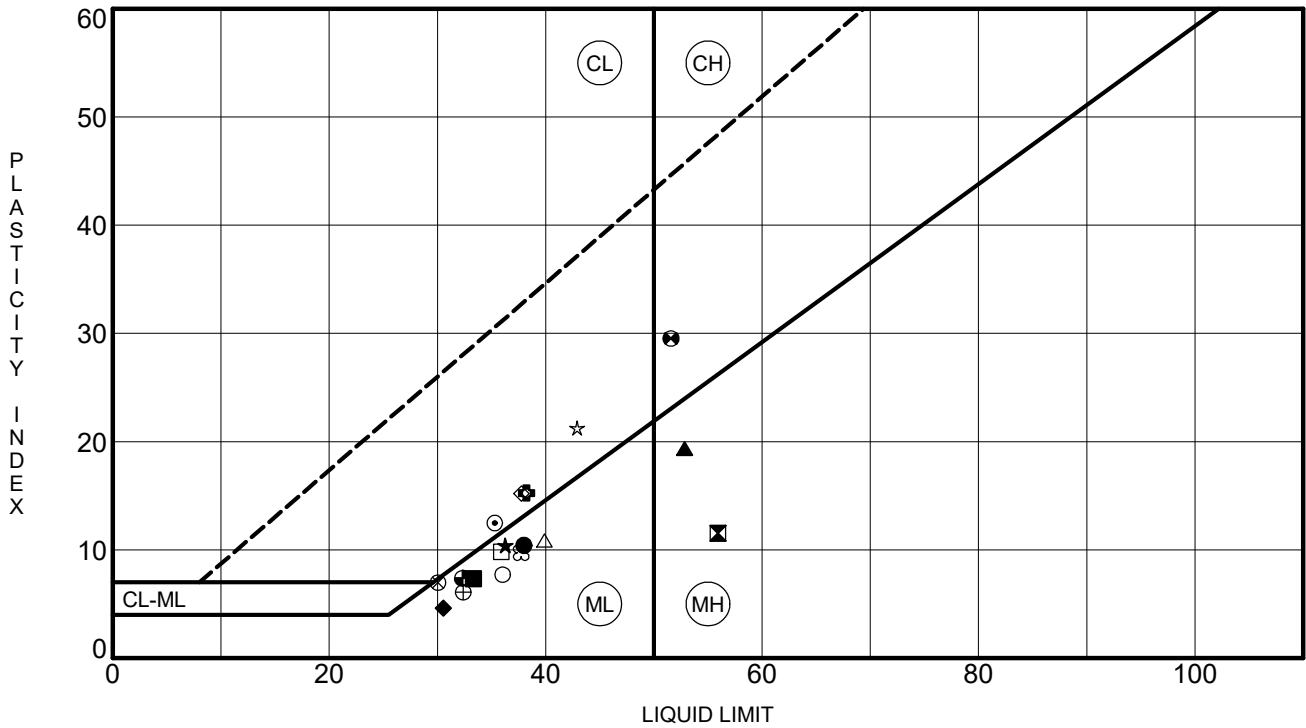


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|---------------|-------------|----|----|----|-------|----------------------------|--------|
| ● 19X-NOS-P05 | 3.5 - 5.5 | 38 | 28 | 10 | 56 | SANDY SILT(ML) | A-4 |
| ⊠ 19X-NOS-P14 | 4.0 - 6.0 | 56 | 44 | 12 | 49 | SILTY SAND(SM) | A-7-5 |
| ▲ 19X-NOS-P15 | 5.5 - 7.5 | 53 | 33 | 20 | 69 | SANDY ELASTIC SILT(MH) | A-7-5 |
| ★ 19X-NOS-P17 | 7.6 - 9.6 | 36 | 26 | 10 | 60 | SANDY SILT(ML) | A-4 |
| ⊙ 19X-NOS-P21 | 2.5 - 4.5 | 35 | 23 | 12 | 57 | SANDY LEAN CLAY(CL) | A-6 |
| ⊕ 19X-NOS-P23 | 4.5 - 6.5 | 38 | 23 | 15 | 69 | SANDY LEAN CLAY(CL) | A-6 |
| ○ 19X-NOS-P25 | 2.0 - 4.0 | 36 | 28 | 8 | 67 | SANDY SILT(ML) | A-4 |
| △ 19X-N-RW02 | 2.3 - 4.3 | 40 | 29 | 11 | 44 | SILTY SAND(SM) | A-6 |
| ⊗ 19X-N-RW02 | 23.0 - 25.0 | 30 | 23 | 7 | 20 | SILTY SAND with GRAVEL(SM) | A-2-4 |
| ⊕ 19X-N-RW02 | 43.0 - 43.5 | 32 | 26 | 6 | 41 | SILTY SAND(SM) | A-4 |
| □ 19X-N-RW03 | 6.0 - 8.0 | 36 | 26 | 10 | 59 | SANDY SILT(ML) | A-4 |
| ⊕ 19X-N-RW03 | 18.0 - 20.0 | 52 | 22 | 30 | 84 | FAT CLAY with SAND(CH) | A-7-6 |
| ⊕ 19X-N-RW03 | 28.0 - 29.4 | 32 | 25 | 7 | 59 | SANDY SILT(ML) | A-4 |
| ☆ 19X-N-RW04 | 13.0 - 15.0 | 43 | 22 | 21 | 70 | SANDY LEAN CLAY(CL) | A-7-6 |
| ⊗ 19X-N-RW04 | 23.0 - 25.0 | 38 | 28 | 10 | 29 | SILTY SAND with GRAVEL(SM) | A-2-4 |
| ■ 19X-N-RW05 | 4.0 - 6.0 | 33 | 26 | 7 | 45 | SILTY SAND(SM) | A-4 |
| ◆ 19X-N-RW05 | 33.0 - 34.8 | 31 | 26 | 5 | 34 | SILTY SAND(SM) | A-2-4 |
| ◇ 19X-N-RW06 | 2.0 - 4.0 | 38 | 23 | 15 | 84 | LEAN CLAY with SAND(CL) | A-6 |

Test Method: VTM-7

Tested By: SM

Date: 9/22/2019

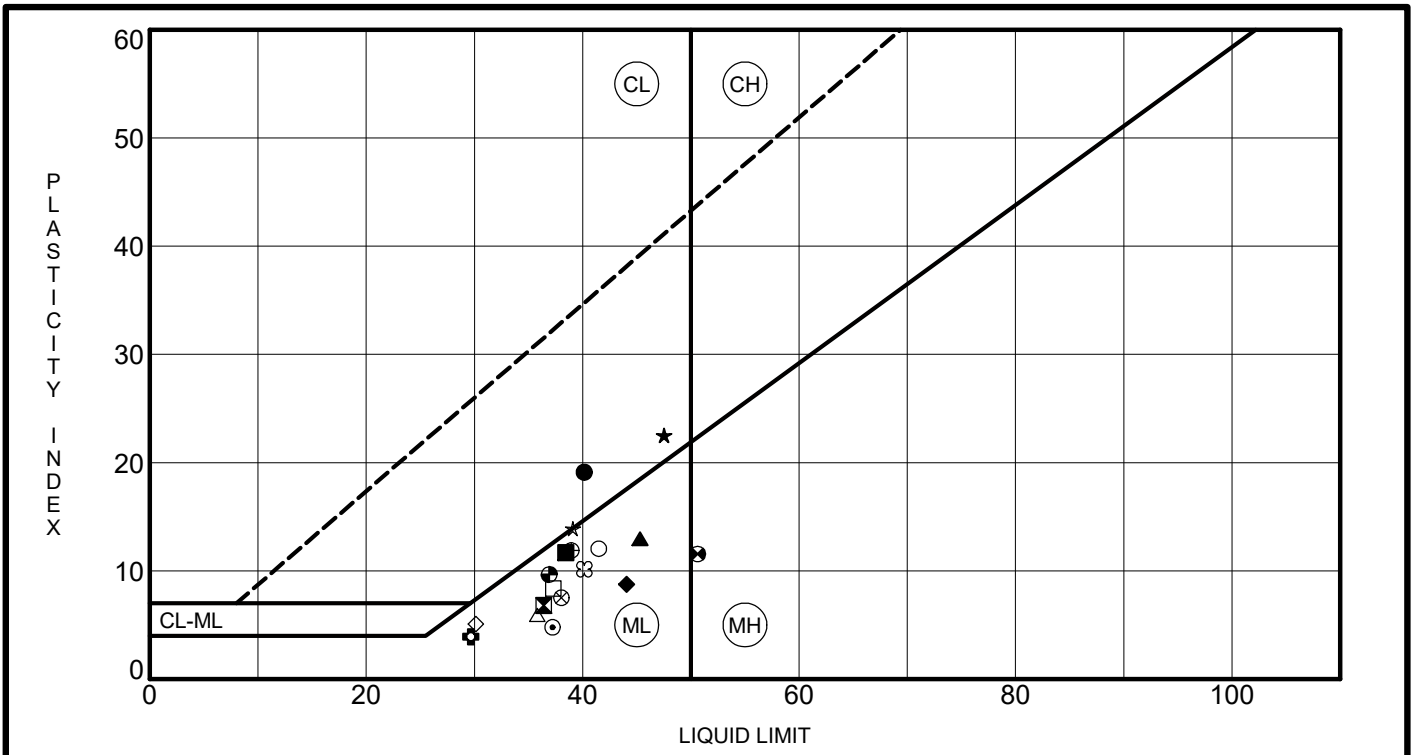


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|--------------|-------------|----|----|----|-------|------------------------|--------|
| ● 19X-N-RW07 | 4.0 - 6.0 | 40 | 21 | 19 | 42 | CLAYEY SAND(SC) | A-6 |
| ⊠ 19X-N-RW07 | 18.0 - 19.4 | 36 | 30 | 6 | 67 | SANDY SILT(ML) | A-4 |
| ▲ 19X-N-RW08 | 2.0 - 4.0 | 45 | 32 | 13 | 62 | SANDY SILT(ML) | A-7-5 |
| ★ 19X-N-RW08 | 6.0 - 8.0 | 48 | 25 | 23 | 86 | LEAN CLAY(CL) | A-7-6 |
| ⊙ 19X-N-RW08 | 13.0 - 15.0 | 37 | 32 | 5 | 70 | SILT with SAND(ML) | A-4 |
| ⊕ 19X-N-RW08 | 23.0 - 24.3 | 30 | 26 | 4 | 60 | SANDY SILT(ML) | A-4 |
| ○ 19X-N-RW13 | 0.0 - 2.0 | 41 | 29 | 12 | 64 | SANDY SILT(ML) | A-7-6 |
| △ 19X-N-RW13 | 43.0 - 45.0 | 36 | 30 | 6 | 56 | SANDY SILT(ML) | A-4 |
| ⊗ 19X-N-RW14 | 23.0 - 25.0 | 38 | 31 | 7 | 43 | SILTY SAND(SM) | A-4 |
| ⊕ 19X-N-RW15 | 2.0 - 4.0 | 39 | 27 | 12 | 60 | SANDY SILT(ML) | A-6 |
| □ 19X-N-RW15 | 38.0 - 40.0 | 37 | 29 | 8 | 58 | SANDY SILT(ML) | A-4 |
| ⊕ 19X-N-RW16 | 13.0 - 15.0 | 51 | 39 | 12 | 70 | SANDY ELASTIC SILT(MH) | A-7-5 |
| ⊕ 19X-N-RW16 | 48.0 - 50.0 | 37 | 27 | 10 | 52 | SANDY SILT(ML) | A-4 |
| ☆ 19X-N-RW18 | 4.0 - 6.0 | 39 | 25 | 14 | 51 | SANDY LEAN CLAY(CL) | A-6 |
| ⊗ 19X-N-RW18 | 28.0 - 30.0 | 40 | 30 | 10 | 47 | SILTY SAND(SM) | A-4 |
| ■ 19X-N-RW20 | 2.0 - 4.0 | 38 | 27 | 11 | 74 | SILT with SAND(ML) | A-6 |
| ◆ 19X-N-RW20 | 13.0 - 15.0 | 44 | 35 | 9 | 73 | SILT with SAND(ML) | A-5 |
| ◇ 19X-N-RW21 | 4.0 - 6.0 | 30 | 25 | 5 | 52 | SANDY SILT(ML) | A-4 |

Test Method: VTM-7

Tested By: SM

Date: 9/22/2019

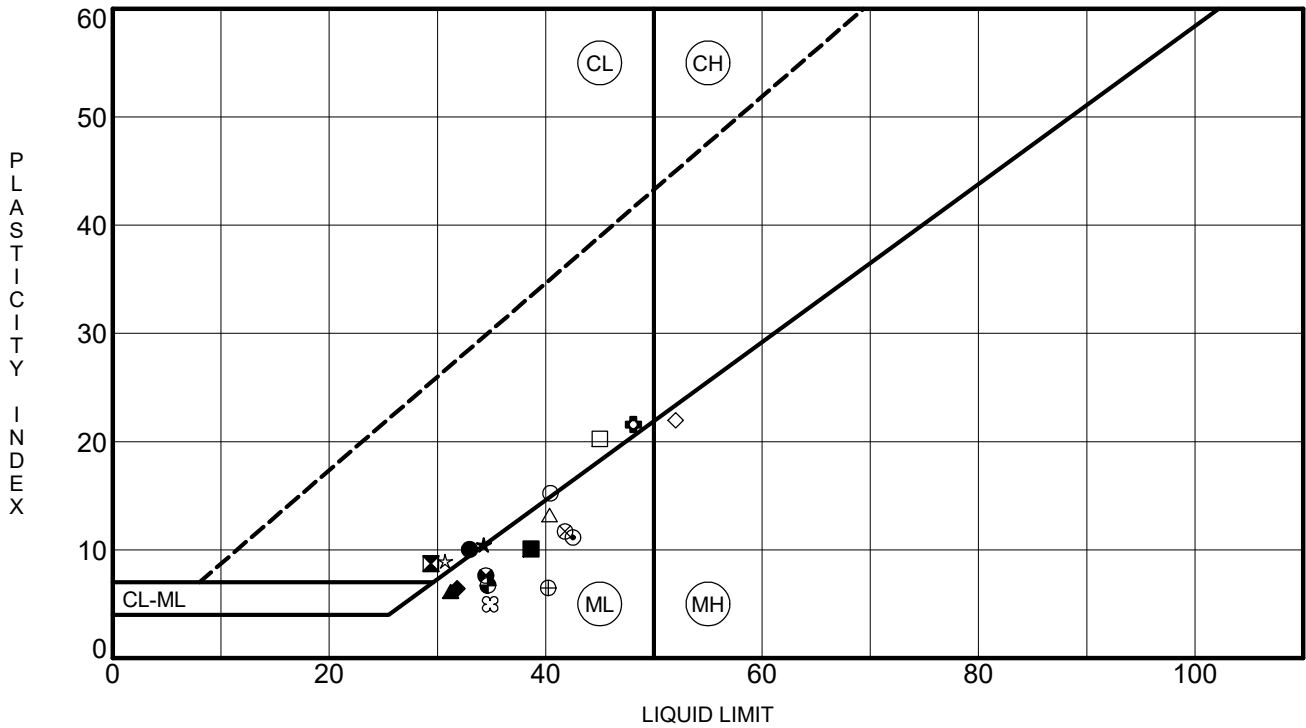


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|---------------|-------------|----|----|----|-------|----------------------------|--------|
| ● 19X-N-RW21 | 38.0 - 39.5 | 33 | 23 | 10 | 40 | CLAYEY SAND(SC) | A-4 |
| ⊠ 19X-N-RW22 | 0.0 - 2.0 | 29 | 21 | 8 | 62 | SANDY LEAN CLAY(CL) | A-4 |
| ▲ 19X-N-RW22 | 18.0 - 20.0 | 31 | 25 | 6 | 49 | SILTY SAND(SM) | A-4 |
| ★ 19X-SOS-P29 | 1.5 - 3.5 | 34 | 24 | 10 | 50 | SANDY SILT(ML) | A-4 |
| ⊙ 19X-SOS-P33 | 2.0 - 4.0 | 43 | 31 | 12 | 66 | SANDY SILT(ML) | A-7-5 |
| ⊕ 19X-SOS-P33 | 5.0 - 10.0 | 48 | 27 | 21 | 67 | SANDY LEAN CLAY(CL) | A-7-6 |
| ○ 19X-SOS-P37 | 4.0 - 6.0 | 40 | 25 | 15 | 72 | LEAN CLAY with SAND(CL) | A-6 |
| △ 19X-SOS-P39 | 1.5 - 3.5 | 40 | 27 | 13 | 63 | SANDY SILT(ML) | A-6 |
| ⊗ 19X-SOS-P42 | 2.8 - 4.8 | 42 | 30 | 12 | 51 | SANDY SILT(ML) | A-7-5 |
| ⊕ 19X-SOS-P45 | 4.5 - 6.5 | 40 | 34 | 6 | 72 | SILT with SAND(ML) | A-4 |
| □ 19X-S-RW25 | 0.0 - 2.0 | 45 | 25 | 20 | 68 | SANDY LEAN CLAY(CL) | A-7-6 |
| ⊕ 19X-S-RW25 | 6.0 - 8.0 | 34 | 27 | 7 | 58 | SANDY SILT(ML) | A-4 |
| ⊕ 19X-S-RW25 | 23.0 - 24.5 | 35 | 28 | 7 | 63 | SANDY SILT(ML) | A-4 |
| ★ 19X-S-RW26 | 2.0 - 4.0 | 31 | 22 | 9 | 40 | CLAYEY SAND(SC) | A-4 |
| ⊗ 19X-S-RW26 | 33.0 - 35.0 | 35 | 30 | 5 | 50 | SANDY SILT(ML) | A-4 |
| ■ 19X-S-RW27 | 4.0 - 6.0 | 39 | 29 | 10 | 57 | SANDY SILT(ML) | A-4 |
| ◆ 19X-S-RW27 | 48.0 - 49.8 | 32 | 25 | 7 | 59 | SANDY SILT(ML) | A-4 |
| ◇ 19X-S-RW28 | 6.0 - 8.0 | 52 | 30 | 22 | 81 | ELASTIC SILT with SAND(MH) | A-7-5 |

Test Method: VTM-7

Tested By: SM

Date: 9/22/2019

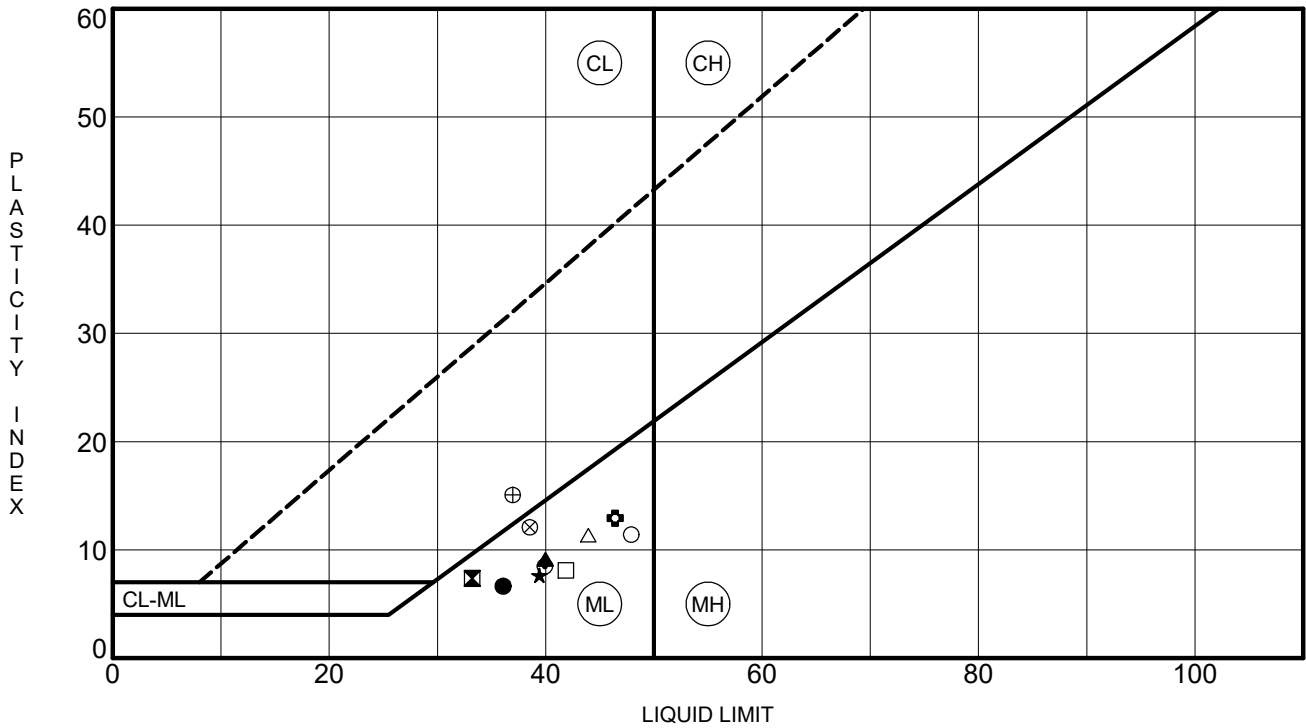


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|--------------|-------------|----|----|----|-------|--------------------|--------|
| ● 19X-S-RW28 | 38.0 - 39.4 | 36 | 29 | 7 | 56 | SANDY SILT(ML) | A-4 |
| ⊠ 19X-S-RW29 | 8.0 - 10.0 | 33 | 26 | 7 | 52 | SANDY SILT(ML) | A-4 |
| ▲ 19X-S-RW29 | 48.0 - 50.0 | 40 | 31 | 9 | 64 | SANDY SILT(ML) | A-4 |
| ★ 19X-S-RW30 | 2.0 - 4.0 | 39 | 32 | 7 | 48 | SILTY SAND(SM) | A-4 |
| ⊙ 19X-S-RW30 | 18.0 - 19.4 | 40 | 31 | 9 | 33 | SILTY SAND(SM) | A-2-4 |
| ⊕ 19X-S-RW31 | 7.0 - 9.0 | 46 | 33 | 13 | 65 | SANDY SILT(ML) | A-7-5 |
| ○ 19X-S-RW31 | 23.0 - 25.0 | 48 | 36 | 12 | 71 | SILT with SAND(ML) | A-7-5 |
| △ 19X-S-RW31 | 33.0 - 35.0 | 44 | 33 | 11 | 64 | SANDY SILT(ML) | A-7-5 |
| ⊗ 19X-S-RW36 | 9.0 - 11.0 | 39 | 26 | 13 | 56 | SANDY SILT(ML) | A-6 |
| ⊕ 19X-S-RW36 | 13.0 - 15.0 | 37 | 22 | 15 | 89 | LEAN CLAY(CL) | A-6 |
| □ 19X-S-RW37 | 18.0 - 20.0 | 42 | 34 | 8 | 61 | SANDY SILT(ML) | A-5 |
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Test Method: VTM-7

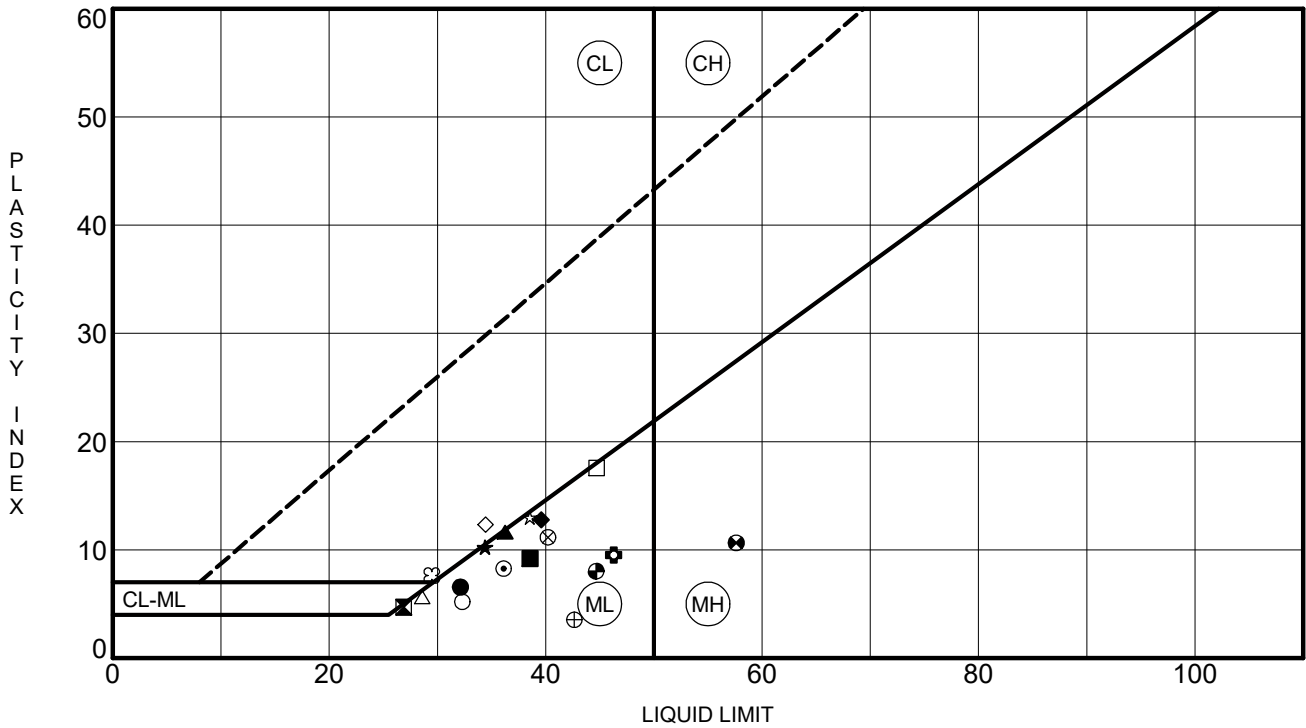
Tested By: SM Date: 9/21/2019



ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes
 Location: Fairfax County, Virginia
 Project Number: 19-0012

T&E-ATTERBERG LIMITS NEXT 495 EXPRESS LANES ASSIGNMENT 2/GPJ T&E2019.GDT 10/4/19



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|--------------|-------------|----|----|----|-------|----------------------------|--------|
| ● 19GWP-BR20 | 6.0 - 8.0 | 32 | 26 | 6 | 45 | SILTY SAND(SM) | A-4 |
| ⊠ 19GWP-BR20 | 53.0 - 55.0 | 27 | 22 | 5 | 19 | SILTY SAND with GRAVEL(SM) | A-1-b |
| ▲ 19GWP-BR20 | 58.0 - 60.0 | 36 | 25 | 11 | 56 | SANDY SILT(ML) | A-6 |
| ★ 19GWP-BR21 | 13.0 - 15.0 | 34 | 24 | 10 | 52 | SANDY SILT(ML) | A-4 |
| ⊙ 19GWP-BR21 | 48.0 - 50.0 | 36 | 28 | 8 | 46 | SILTY SAND(SM) | A-4 |
| ⊕ 19GWP-BR22 | 2.0 - 4.0 | 46 | 37 | 9 | 72 | SILT with SAND(ML) | A-5 |
| ○ 19GWP-BR22 | 18.0 - 20.0 | 32 | 27 | 5 | 47 | SILTY SAND(SM) | A-4 |
| △ 19GWP-BR22 | 33.0 - 33.9 | 29 | 23 | 6 | 41 | SILTY SAND(SM) | A-4 |
| ⊗ 19GWP-BR23 | 13.0 - 15.0 | 40 | 29 | 11 | 55 | SANDY SILT(ML) | A-6 |
| ⊕ 19GWP-BR23 | 23.0 - 25.0 | 43 | 39 | 4 | 50 | SILTY SAND(SM) | A-5 |
| □ 19LOD-BR15 | 4.0 - 6.0 | 45 | 27 | 18 | 74 | SILT with SAND(ML) | A-7-6 |
| ⊕ 19LOD-BR15 | 13.0 - 15.0 | 58 | 47 | 11 | 84 | ELASTIC SILT with SAND(MH) | A-7-5 |
| ⊕ 19LOD-BR15 | 28.0 - 30.0 | 45 | 37 | 8 | 76 | SILT with SAND(ML) | A-5 |
| ☆ 19LOD-BR16 | 13.0 - 15.0 | 39 | 26 | 13 | 53 | SANDY SILT(ML) | A-6 |
| ⊗ 19LOD-BR16 | 28.0 - 30.0 | 29 | 22 | 7 | 58 | SANDY SILTY CLAY(CL-ML) | A-4 |
| ■ 19LOD-BR16 | 53.0 - 54.8 | 39 | 29 | 10 | 61 | SANDY SILT(ML) | A-4 |
| ◆ 19ODD-BR07 | 2.0 - 4.0 | 40 | 27 | 13 | 67 | SANDY SILT(ML) | A-6 |
| ◇ 19ODD-BR07 | 33.0 - 35.0 | 34 | 22 | 12 | 75 | LEAN CLAY with SAND(CL) | A-6 |

Test Method: VTM-7

Tested By: SM

Date: 8/14/2019

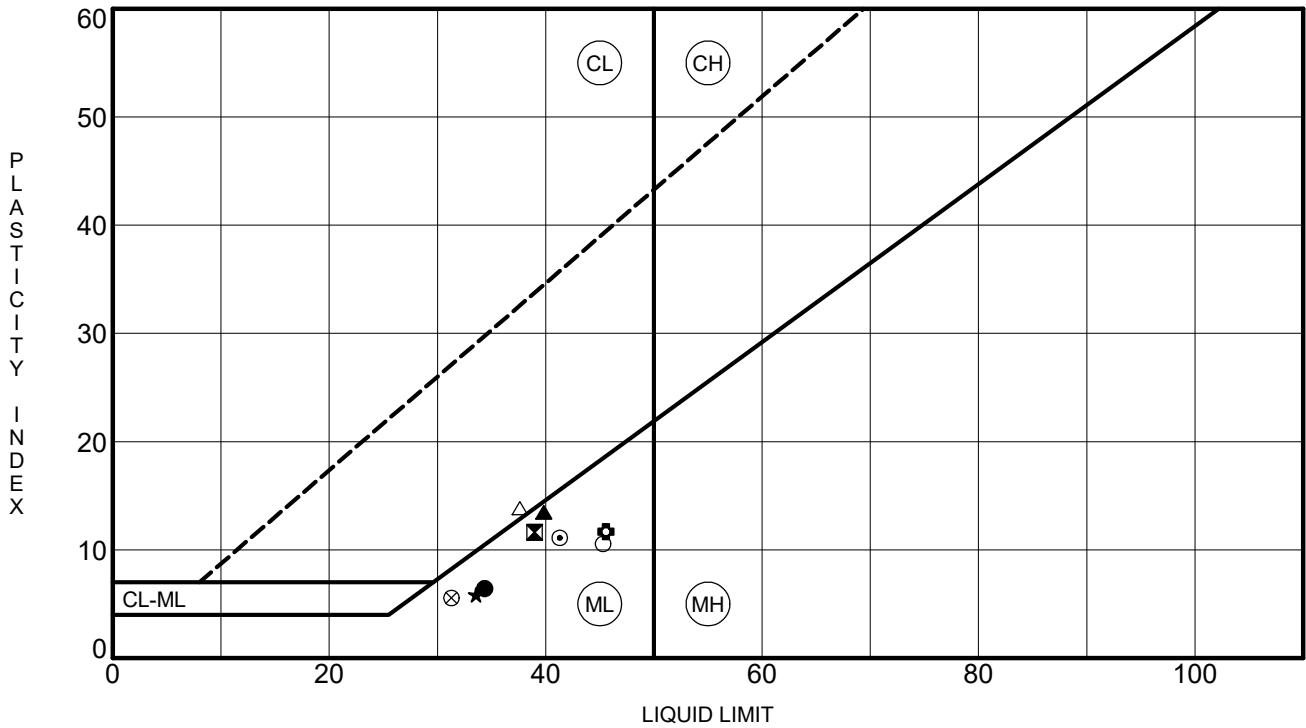


ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



| Boring | Depth | LL | PL | PI | Fines | Classification | AASHTO |
|--------------------------|-------------|----|----|----|----------------|--------------------|--------|
| ● 19ODD-BR07 | 53.0 - 55.0 | 34 | 28 | 6 | 82 | SILT with SAND(ML) | A-4 |
| ⊠ 19ODD-BR08A | 4.0 - 6.0 | 39 | 27 | 12 | 64 | SANDY SILT(ML) | A-6 |
| ▲ 19ODD-BR08A23.0 - 25.0 | 40 | 26 | 14 | 66 | SANDY SILT(ML) | A-6 | |
| ★ 19ODD-BR08A58.0 - 59.4 | 34 | 28 | 6 | 49 | SILTY SAND(SM) | A-4 | |
| ⊙ 19X-BR09 | 4.0 - 6.0 | 41 | 30 | 11 | | | |
| ⊕ 19X-BR09 | 8.0 - 10.0 | 46 | 34 | 12 | 83 | SILT with SAND(ML) | A-7-5 |
| ○ 19X-BR10 | 4.0 - 6.0 | 45 | 35 | 10 | 55 | SANDY SILT(ML) | A-5 |
| △ 19X-BR10 | 18.0 - 20.0 | 38 | 24 | 14 | 85 | LEAN CLAY(CL) | A-6 |
| ⊗ 19X-BR10 | 38.0 - 39.0 | 31 | 26 | 5 | 51 | SANDY SILT(ML) | A-4 |
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Test Method: VTM-7

Tested By: SM Date: 8/16/2019



ATTERBERG LIMITS' RESULTS

Project: I-495 NEXT Express Lanes
 Location: Fairfax County, Virginia
 Project Number: 19-0012

T&E-ATTERBERG LIMITS NEXT 495 EXPRESS LANES ASSIGNMENT 2/GPJ T&E2019.GDT 10/4/19

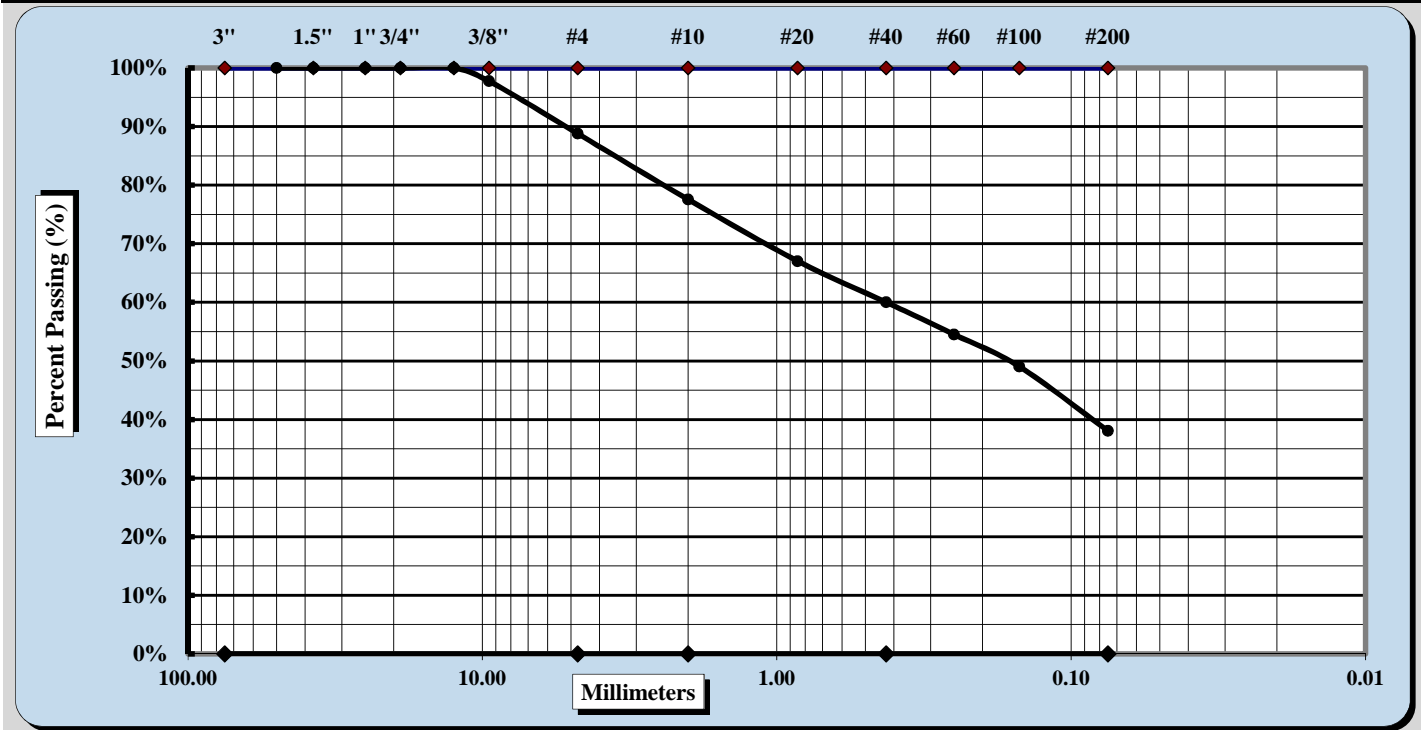


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR01 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 11.3% | Fine Sand | 21.9% |
| Gravel | 11.2% | Medium Sand | 17.5% | Silt & Clay | 38.1% |
| Liquid Limit | 37 | Plastic Limit | 30 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

| | | | |
|---|--|--|--------------------------|
| <u>Jimmy Hanson</u> Technical Responsibility | | <u>Geotechnical Lab Supervisor</u> Position | <u>8/23/2019</u> Date |
|---|--|--|--------------------------|

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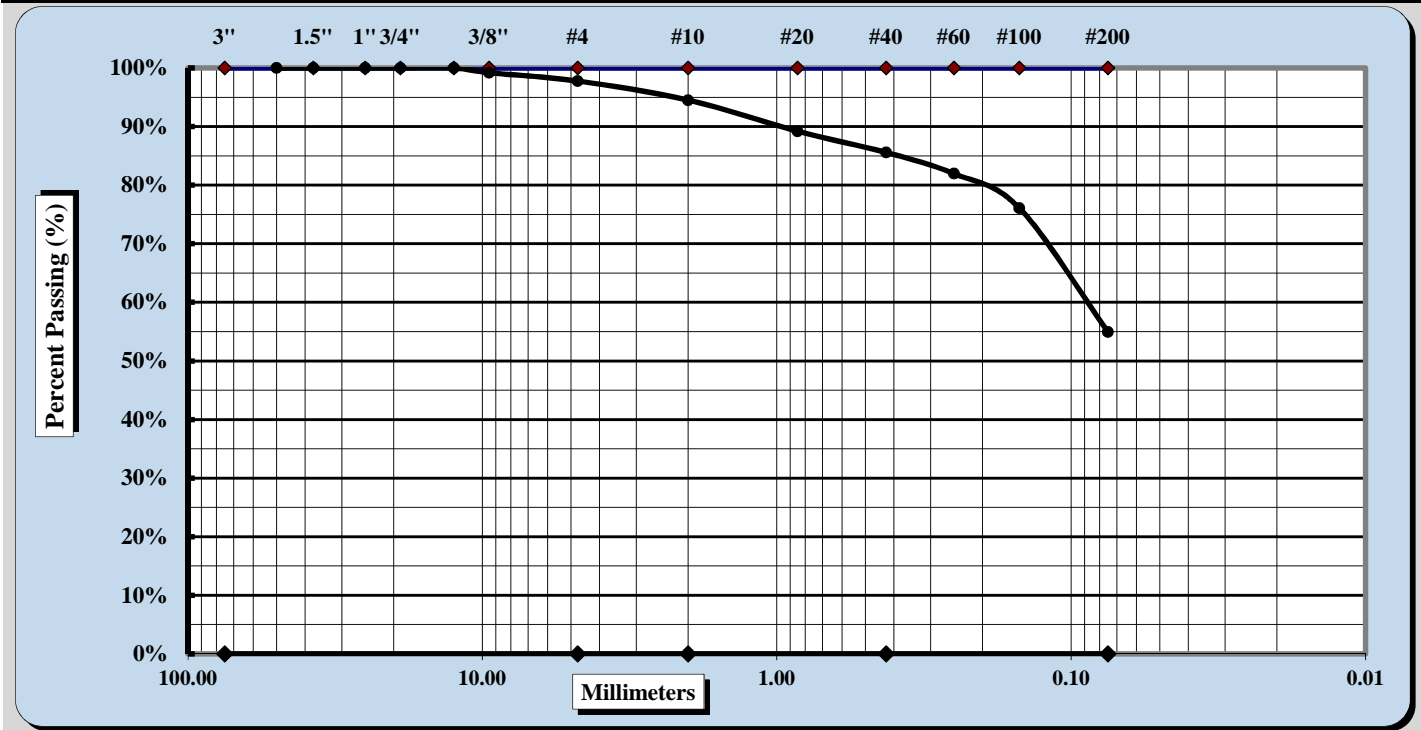


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR01 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-24.5 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 3.3% | Fine Sand | 30.6% |
| Gravel | 2.2% | Medium Sand | 8.9% | Silt & Clay | 55.0% |
| Liquid Limit | 34 | Plastic Limit | 29 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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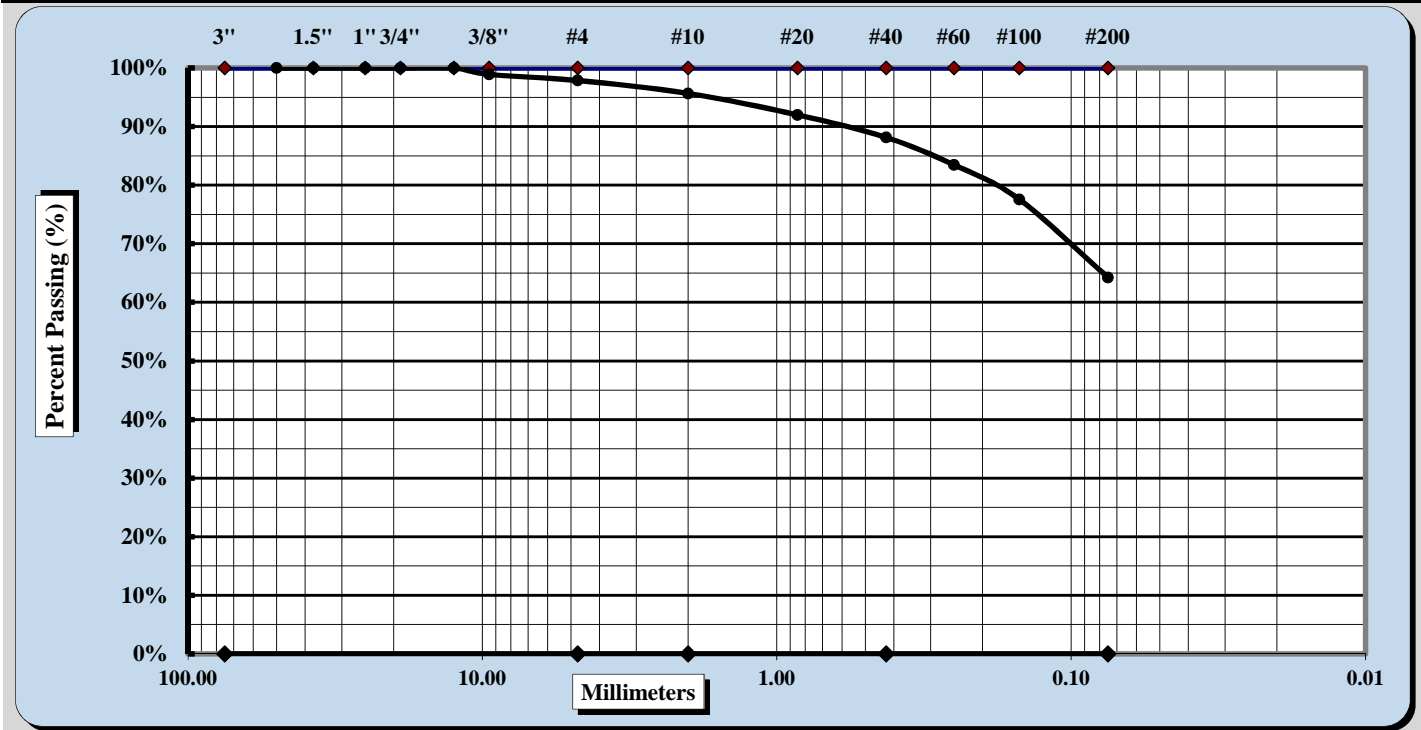


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR02 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 5-7 ft |

Sample Description: SANDY SILT (ML) A-7-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 2.2% | Fine Sand | 23.9% |
| Gravel | 2.1% | Medium Sand | 7.5% | Silt & Clay | 64.2% |
| Liquid Limit | 42 | Plastic Limit | 30 | Plastic Index | 12 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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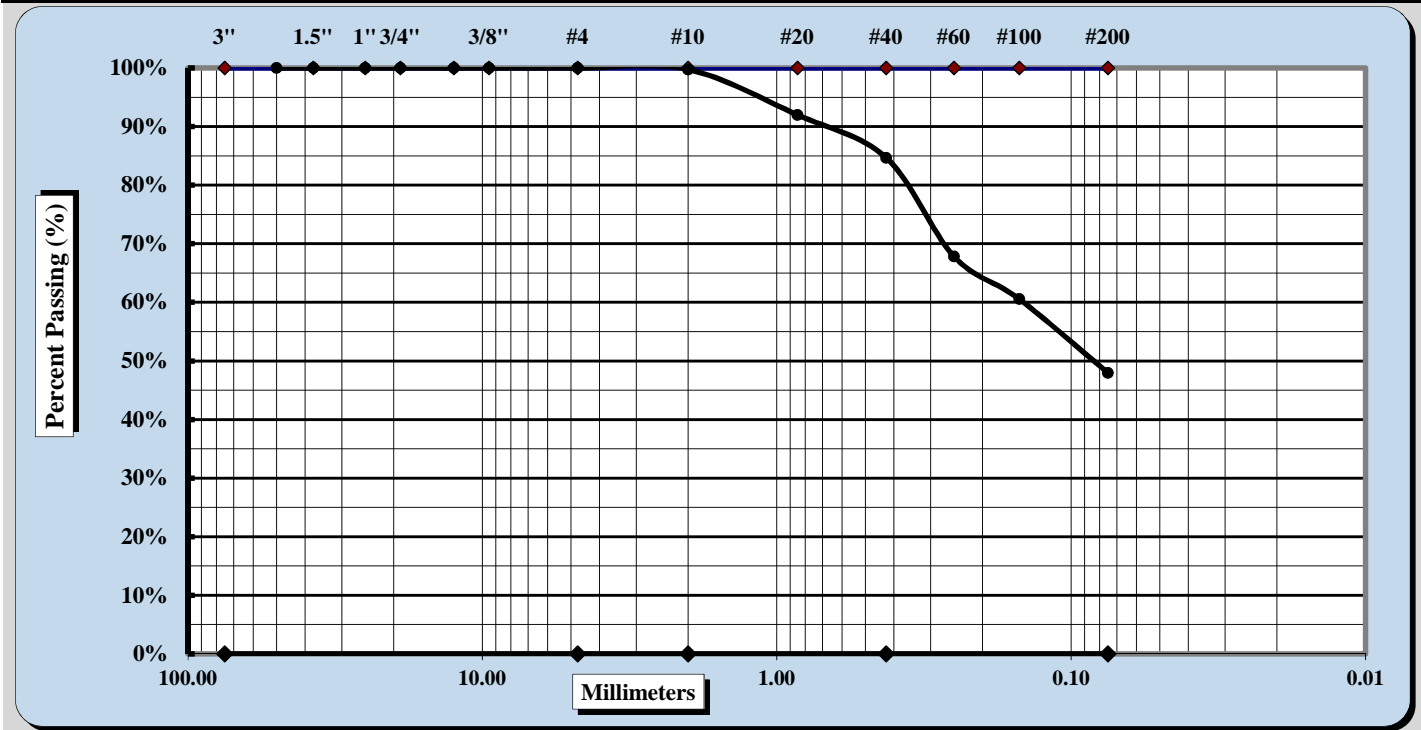


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR02 | Sample#: | S-9 |
| Log#: | 601 | Depth: | 28-30 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.3% | Fine Sand | 36.7% |
| Gravel | 0.0% | Medium Sand | 15.1% | Silt & Clay | 48.0% |
| Liquid Limit | 37 | Plastic Limit | 30 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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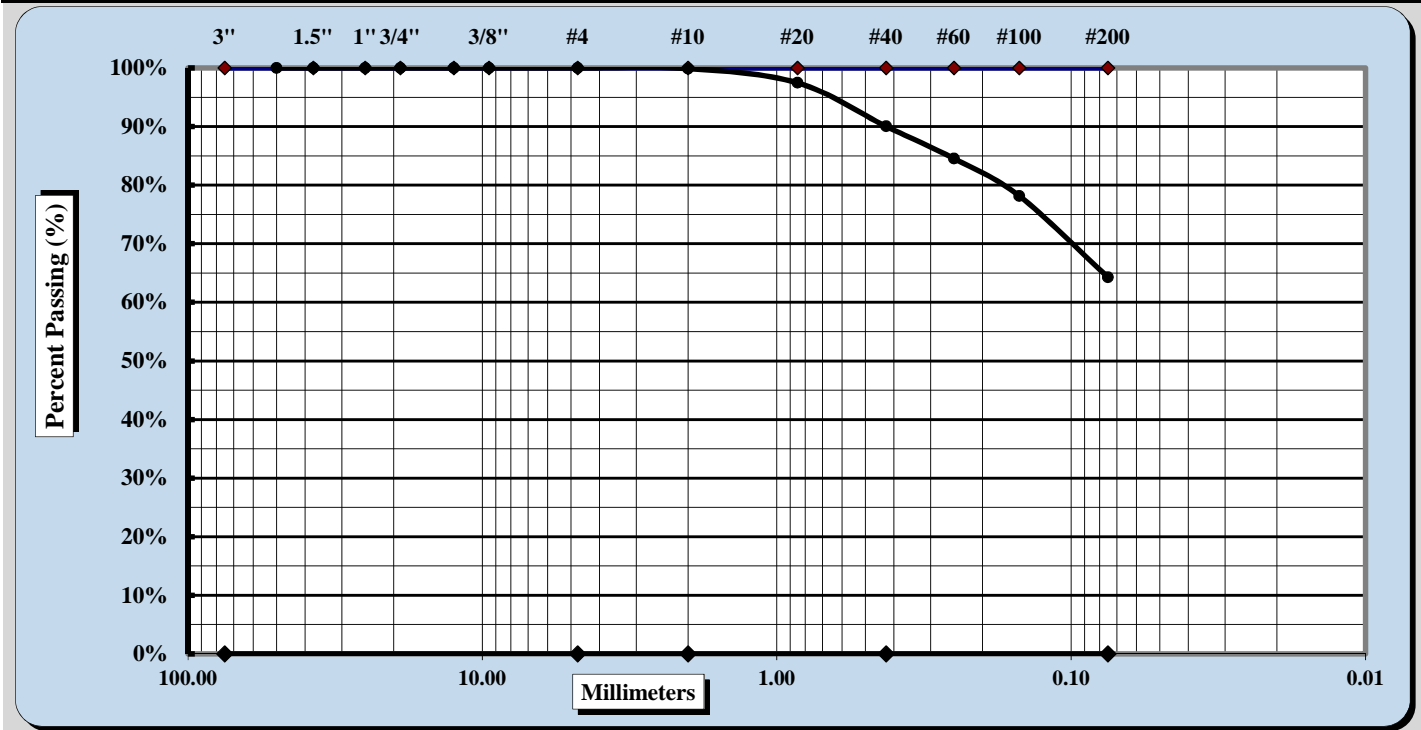


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR02 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 38-40 ft |

Sample Description: SANDY SILT (ML) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.1% | Fine Sand | 25.8% |
| Gravel | 0.0% | Medium Sand | 9.9% | Silt & Clay | 64.3% |
| Liquid Limit | 36 | Plastic Limit | 25 | Plastic Index | 11 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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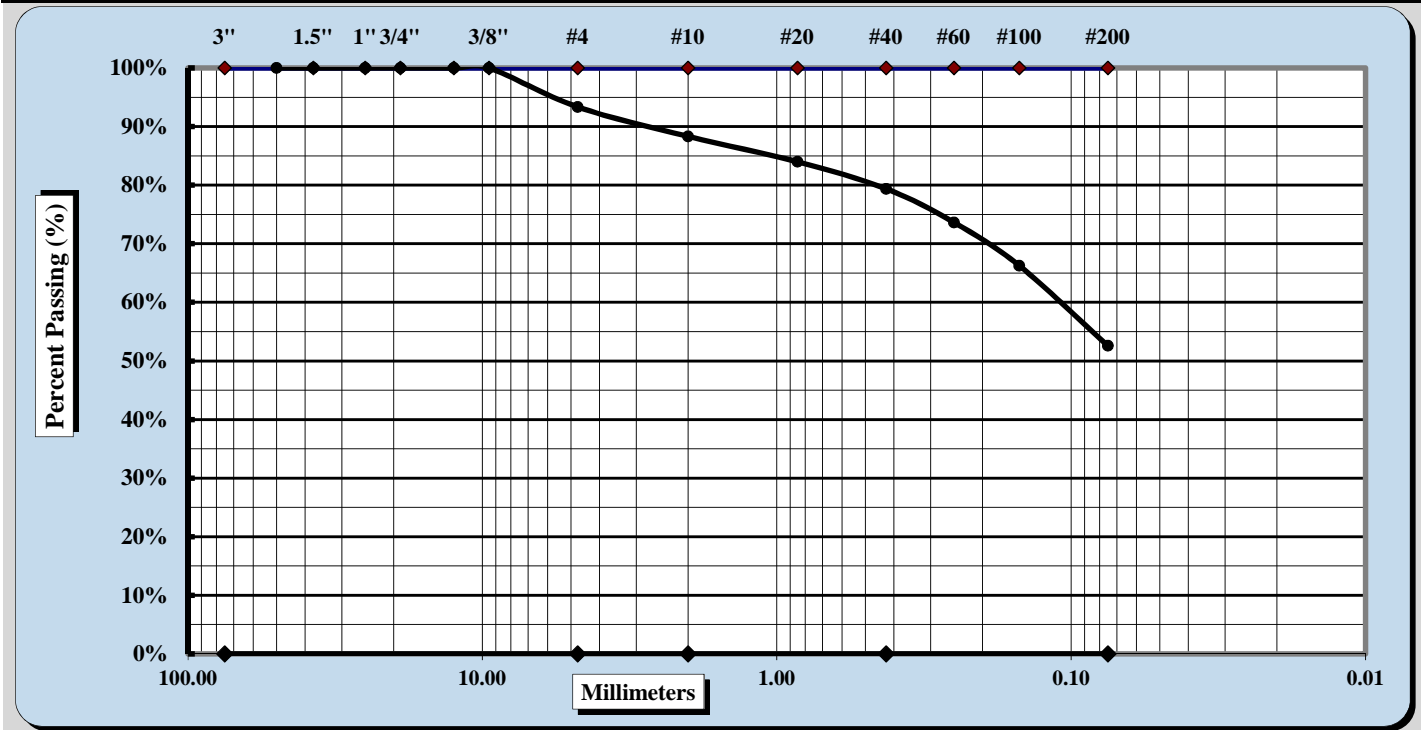


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR03 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 6-8 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 5.0% | Fine Sand | 26.8% |
| Gravel | 6.6% | Medium Sand | 9.0% | Silt & Clay | 52.6% |
| Liquid Limit | 34 | Plastic Limit | 25 | Plastic Index | 9 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Jimmy Hanson
Signature

Geotechnical Lab Supervisor
Position

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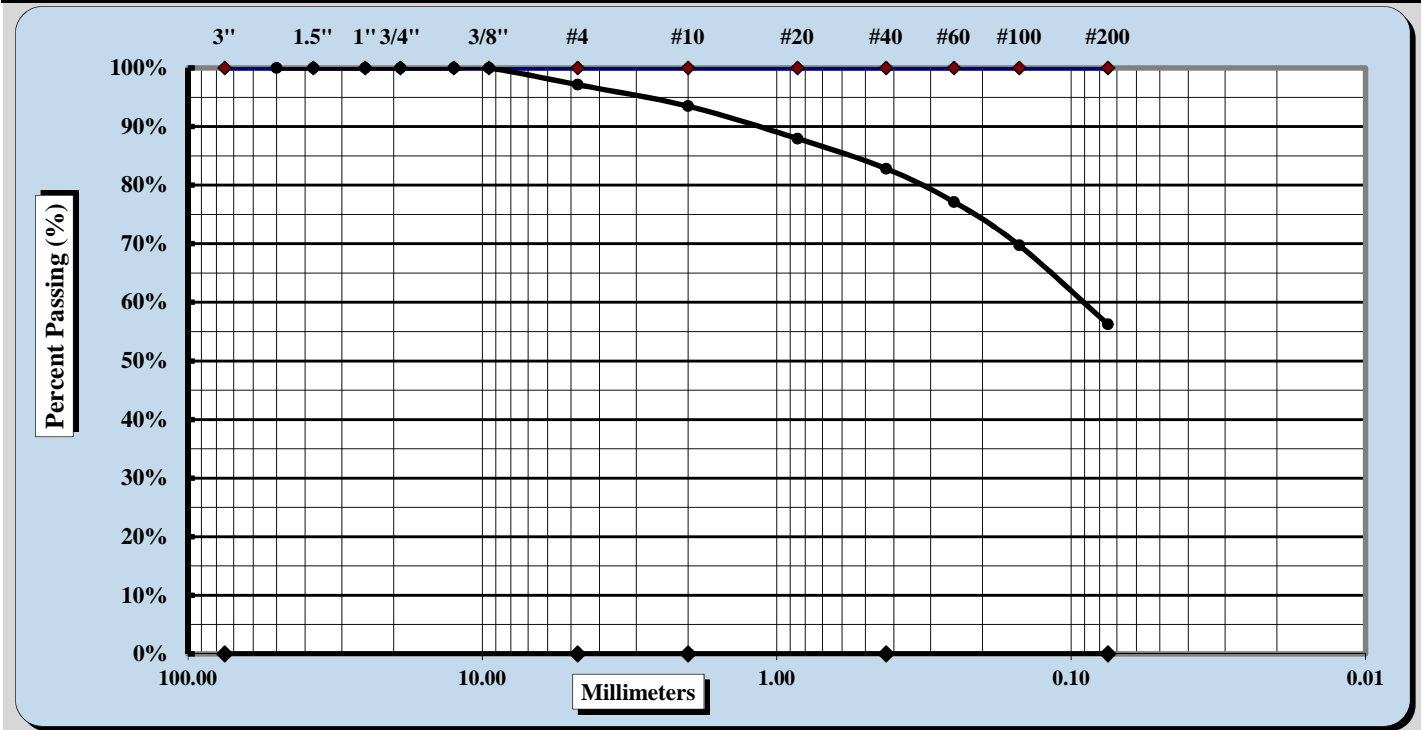


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| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR03 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: **SANDY LEAN CLAY (CL)** **A-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 3.7% | Fine Sand | 26.6% |
| Gravel | 2.8% | Medium Sand | 10.7% | Silt & Clay | 56.2% |
| Liquid Limit | 38 | Plastic Limit | 20 | Plastic Index | 18 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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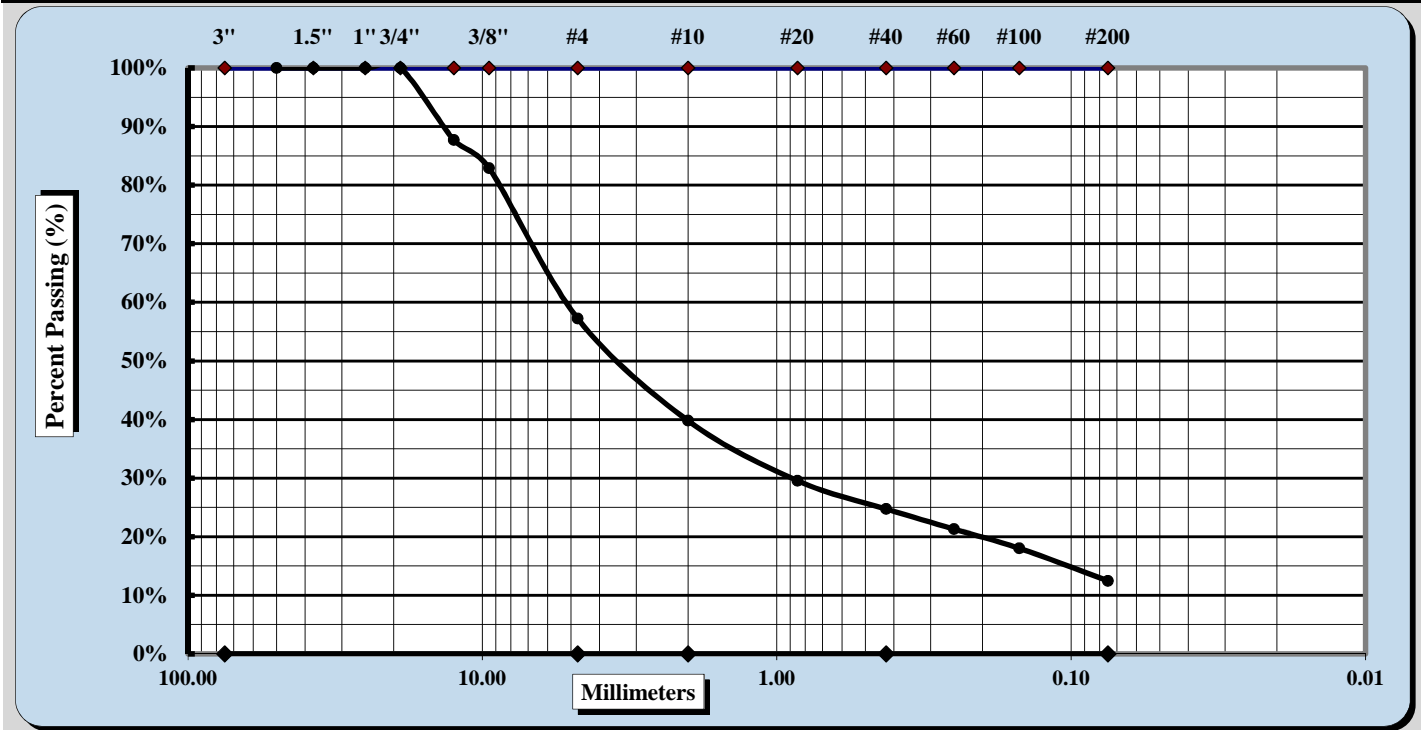


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR03 | Sample#: | S-14 |
| Log#: | 601 | Depth: | 53-53.8 ft |

Sample Description: SILTY SAND WITH GRAVEL (SM) A-2



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 17.5% | Fine Sand | 12.2% |
| Gravel | 42.7% | Medium Sand | 15.1% | Silt & Clay | 12.5% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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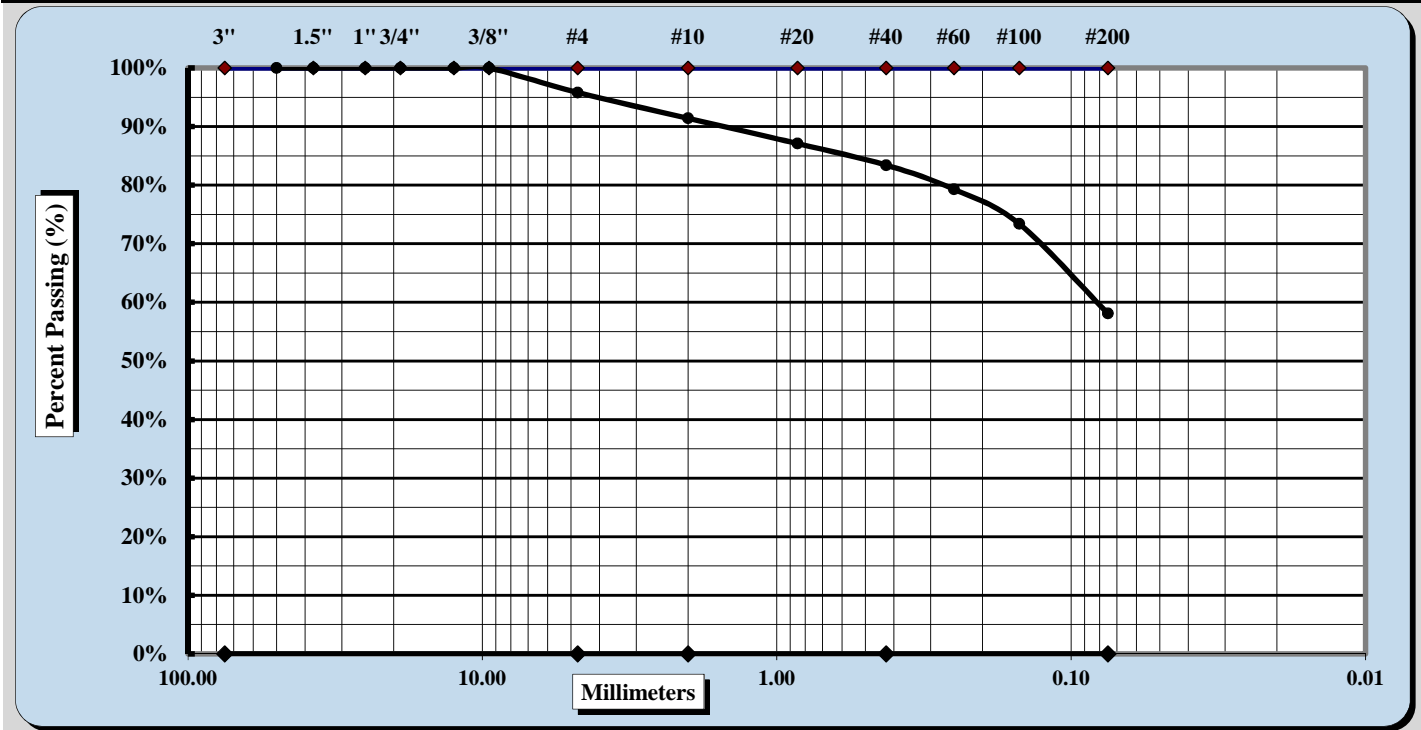


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| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR04a | Sample#: | S-1 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: SANDY SILT (ML) A-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.4% | Fine Sand | 25.3% |
| Gravel | 4.2% | Medium Sand | 8.0% | Silt & Clay | 58.1% |
| Liquid Limit | 41 | Plastic Limit | 32 | Plastic Index | 9 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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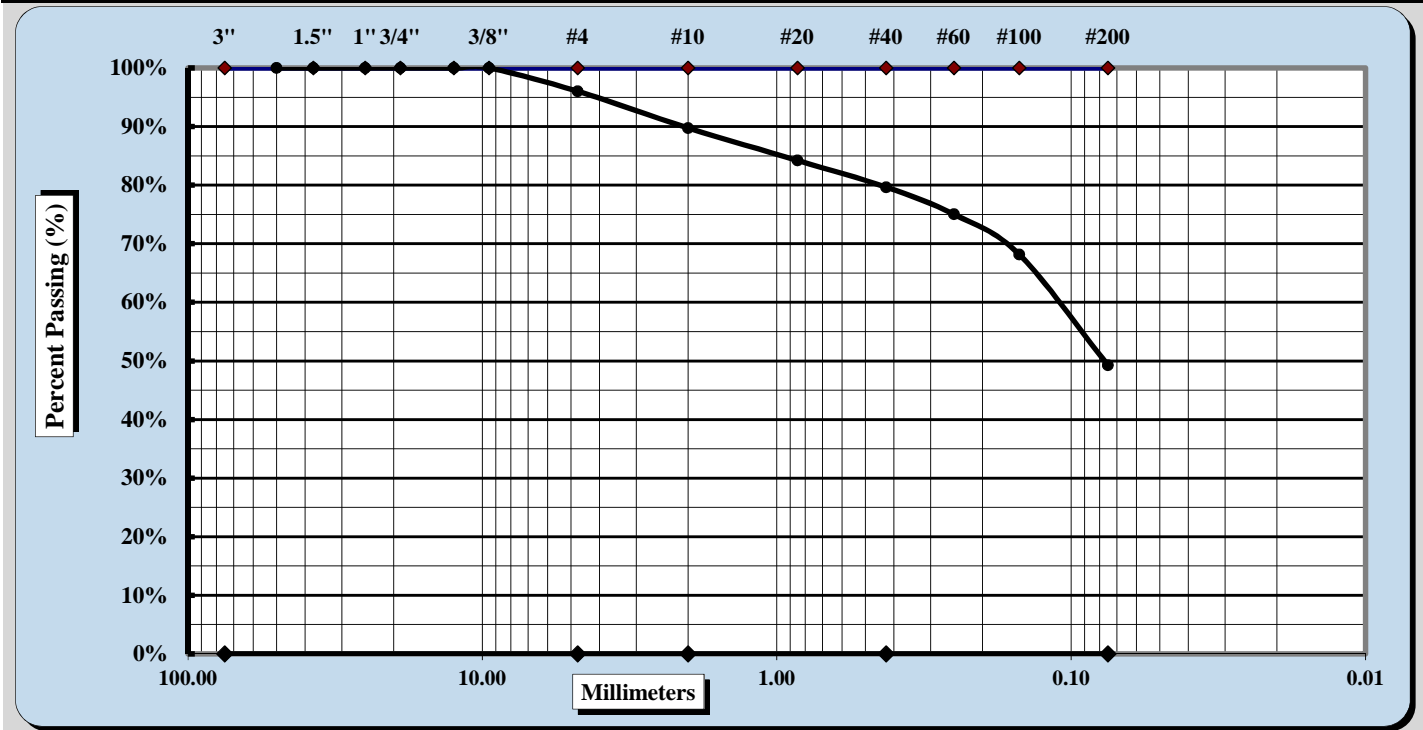


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR04a | Sample#: | S-5 |
| Log#: | 601 | Depth: | 10-12 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 6.3% | Fine Sand | 30.4% |
| Gravel | 4.0% | Medium Sand | 10.1% | Silt & Clay | 49.3% |
| Liquid Limit | 32 | Plastic Limit | 29 | Plastic Index | 3 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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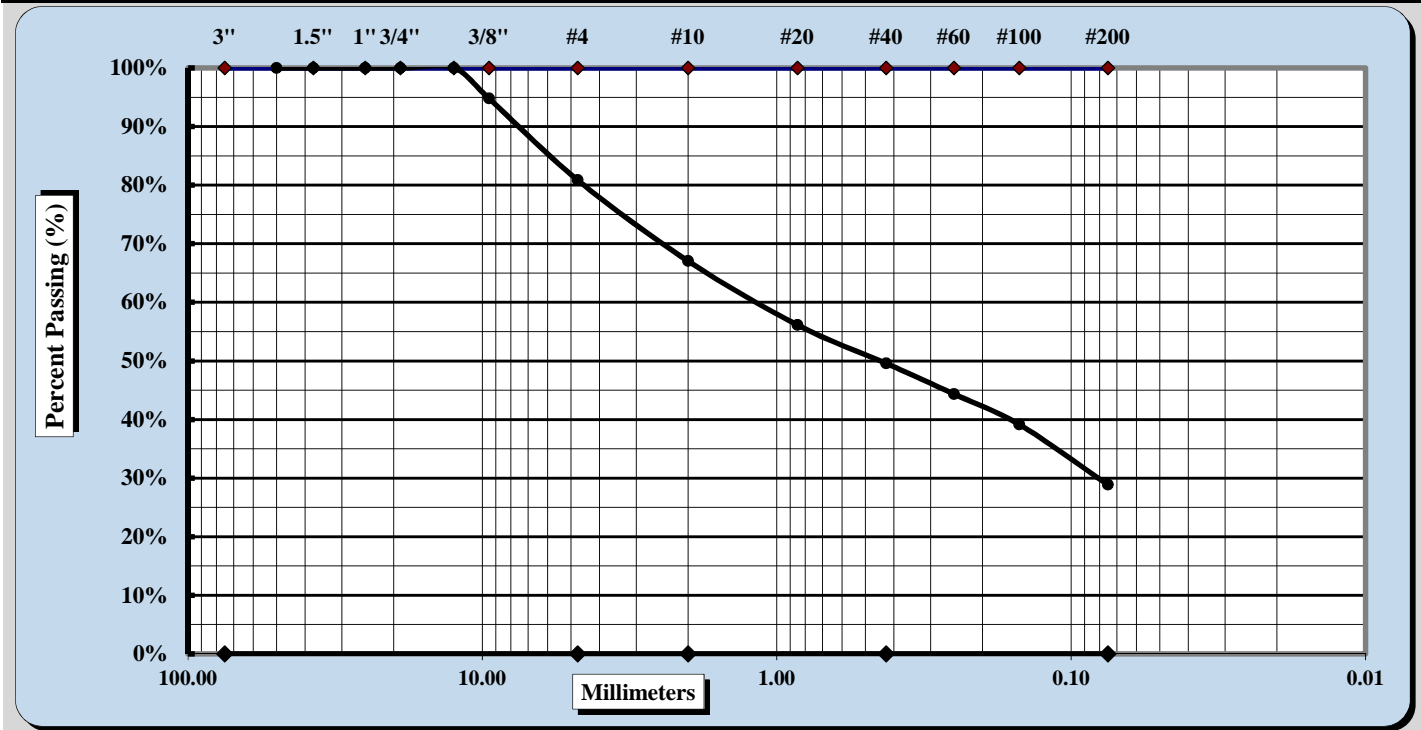


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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR04a | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-24.7 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-2**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 13.8% | Fine Sand | 20.7% |
| Gravel | 19.1% | Medium Sand | 17.5% | Silt & Clay | 28.9% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

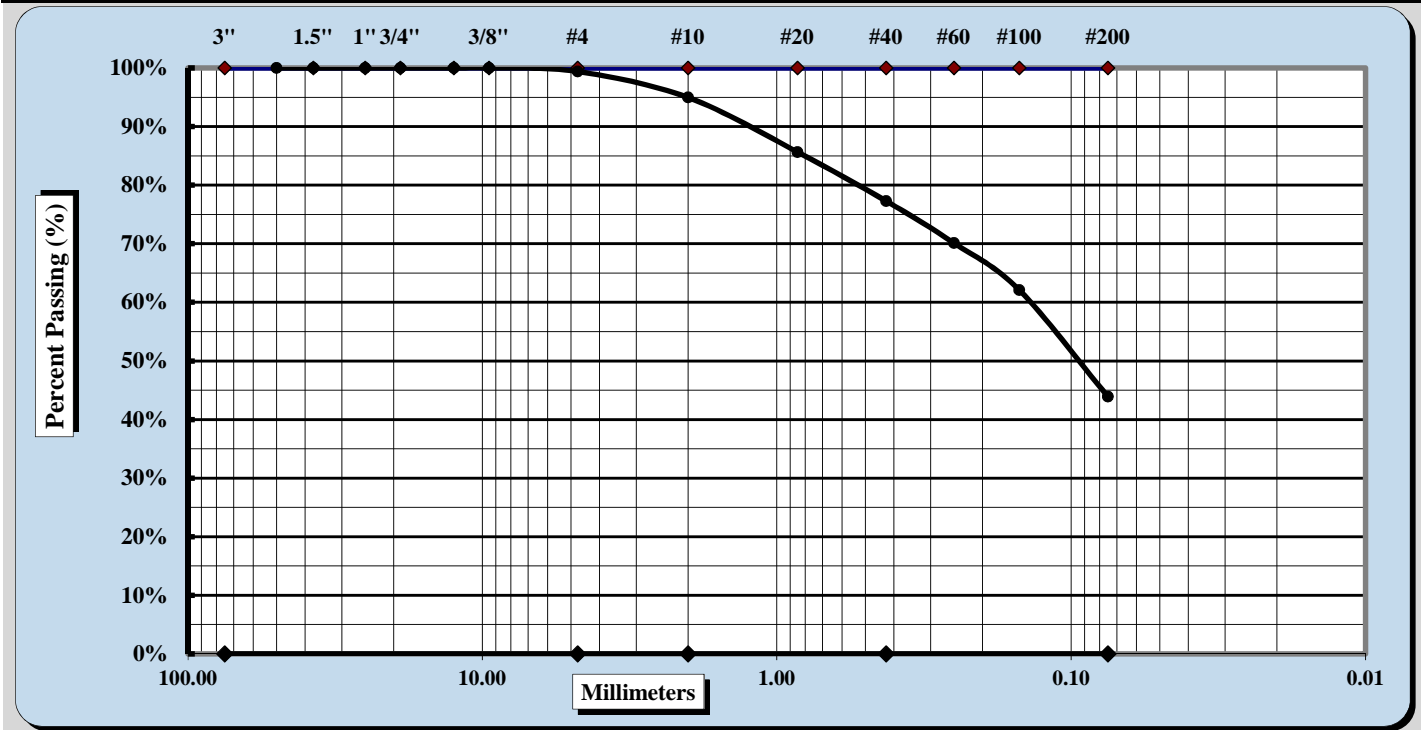
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|---------------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR04a | Sample#: | S-12 |
| Log#: | 601 | Depth: | 43-43.9 ft |
| Sample Description: | SILTY SAND (SM) | | A-4/A-5 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.4% | Fine Sand | 33.4% |
| Gravel | 0.6% | Medium Sand | 17.7% | Silt & Clay | 43.9% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

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Position

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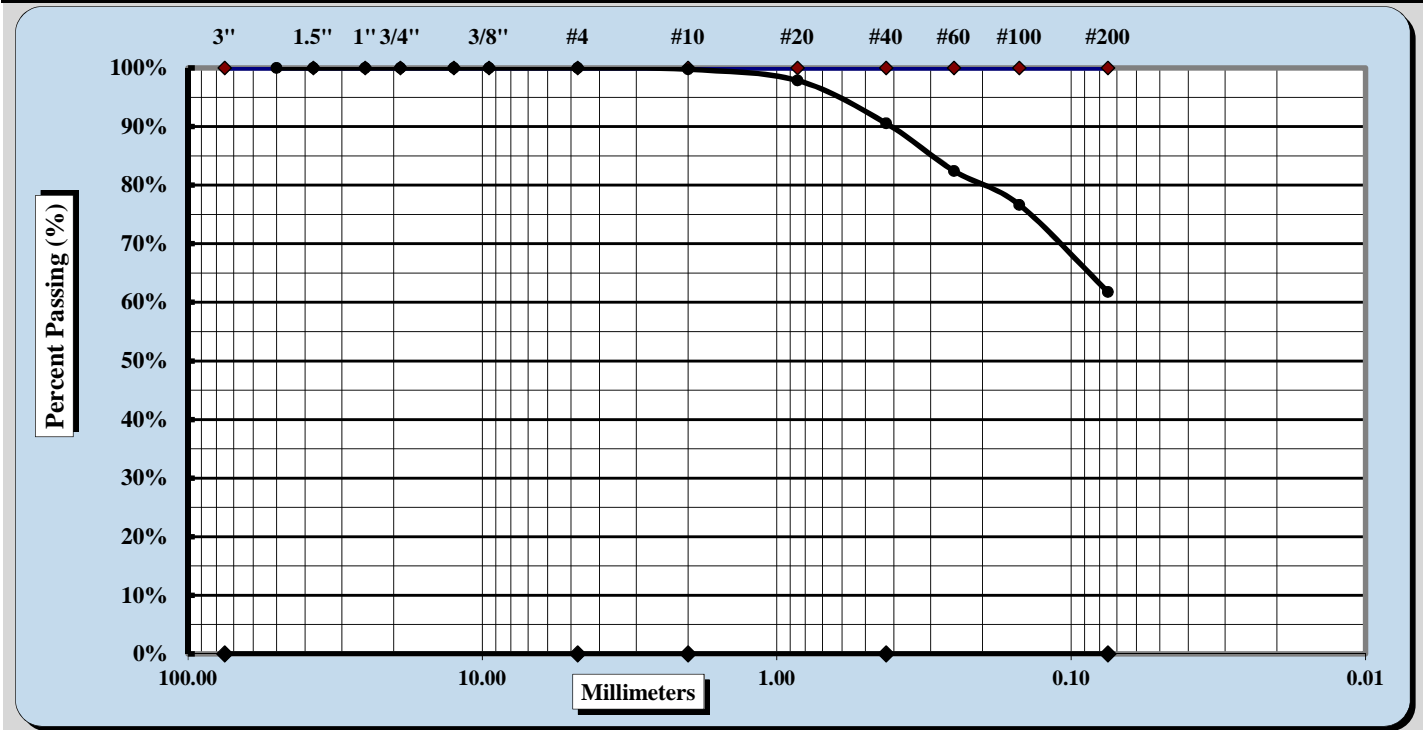


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR06 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 6-8 ft |

Sample Description: SANDY SILT (ML) A-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.2% | Fine Sand | 28.8% |
| Gravel | 0.0% | Medium Sand | 9.2% | Silt & Clay | 61.8% |
| Liquid Limit | 44 | Plastic Limit | 36 | Plastic Index | 8 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Jimmy Hanson
Signature

Geotechnical Lab Supervisor
Position

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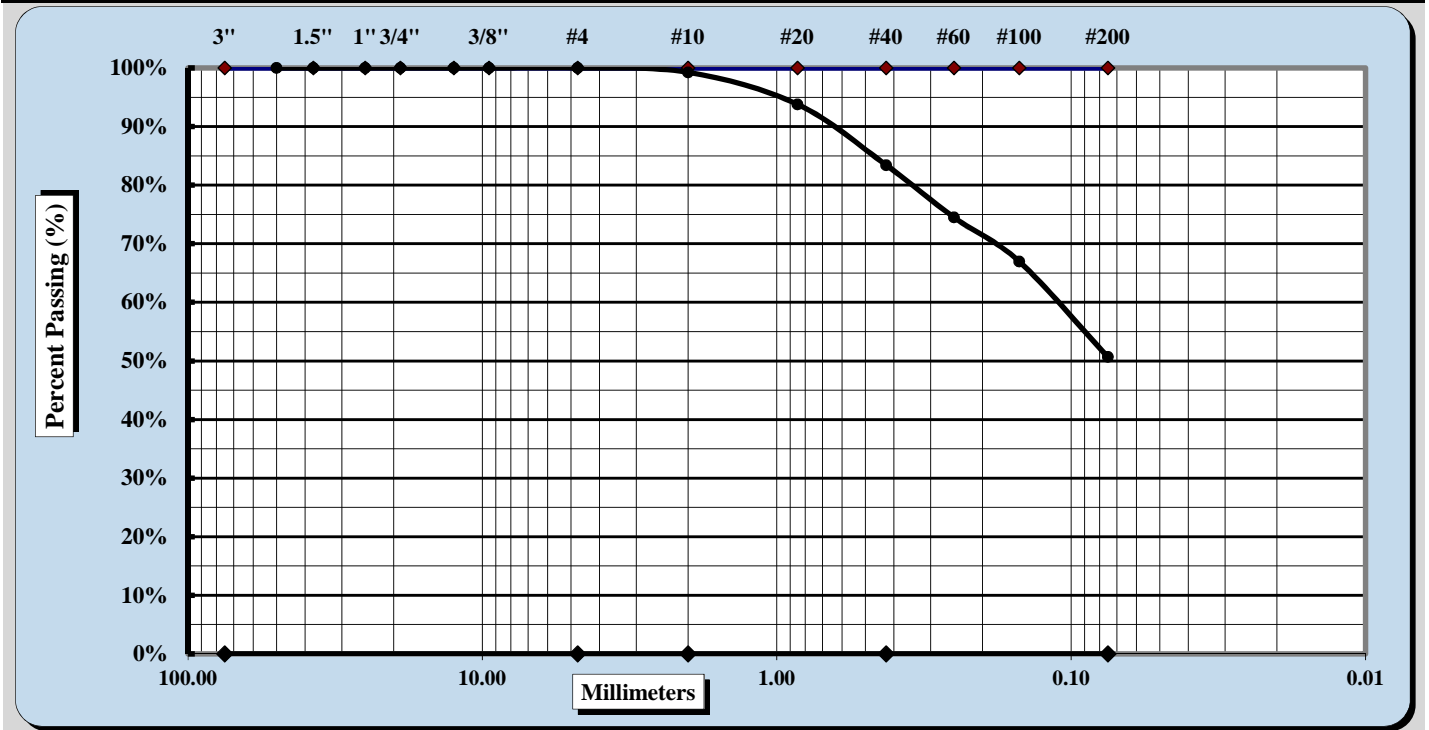


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|-----------------|---------------------------------|---------------|-------------------|
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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR06 | Sample#: | S-6 |
| Log#: | 601 | Depth: | 18-19.9 ft |

Sample Description: SANDY SILT (ML) A-4



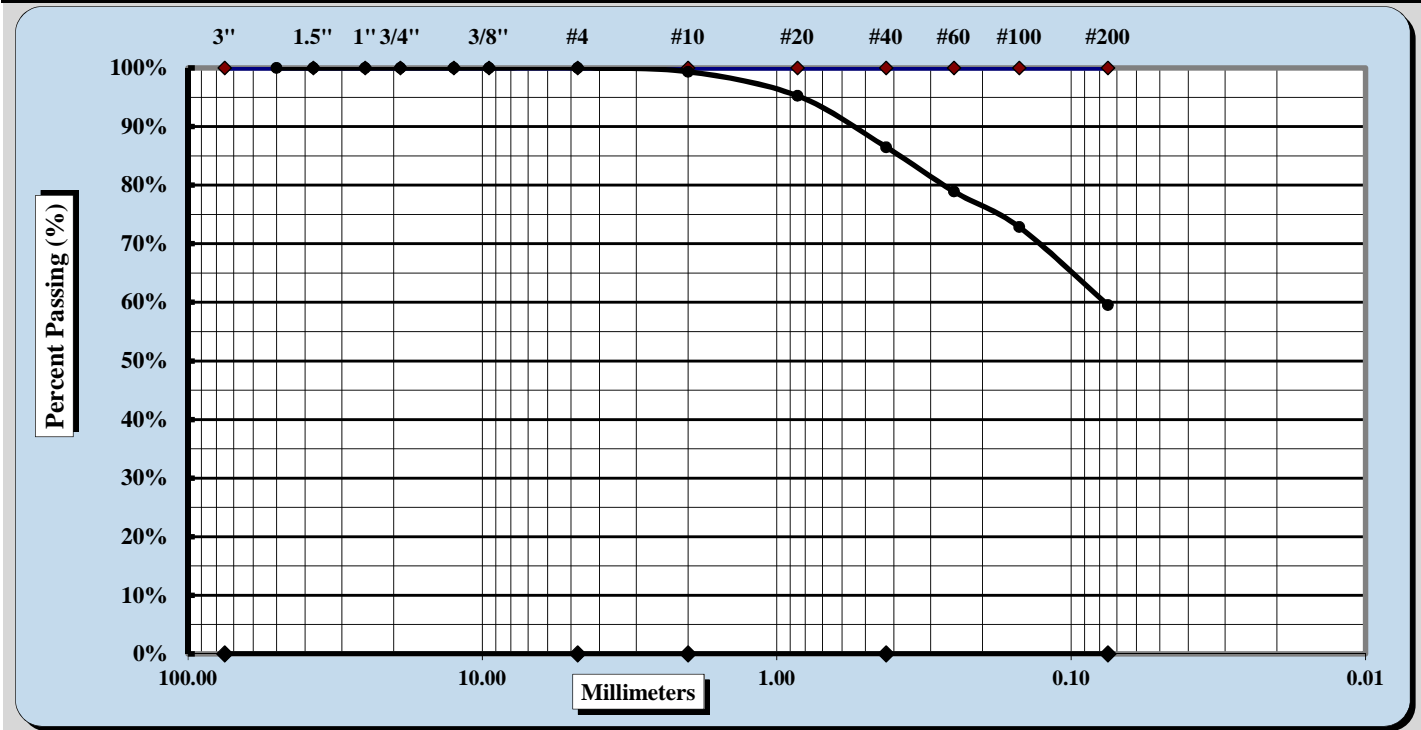


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-BR06 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 43-43.9 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.6% | Fine Sand | 26.9% |
| Gravel | 0.0% | Medium Sand | 12.9% | Silt & Clay | 59.5% |
| Liquid Limit | 33 | Plastic Limit | 28 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

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Position

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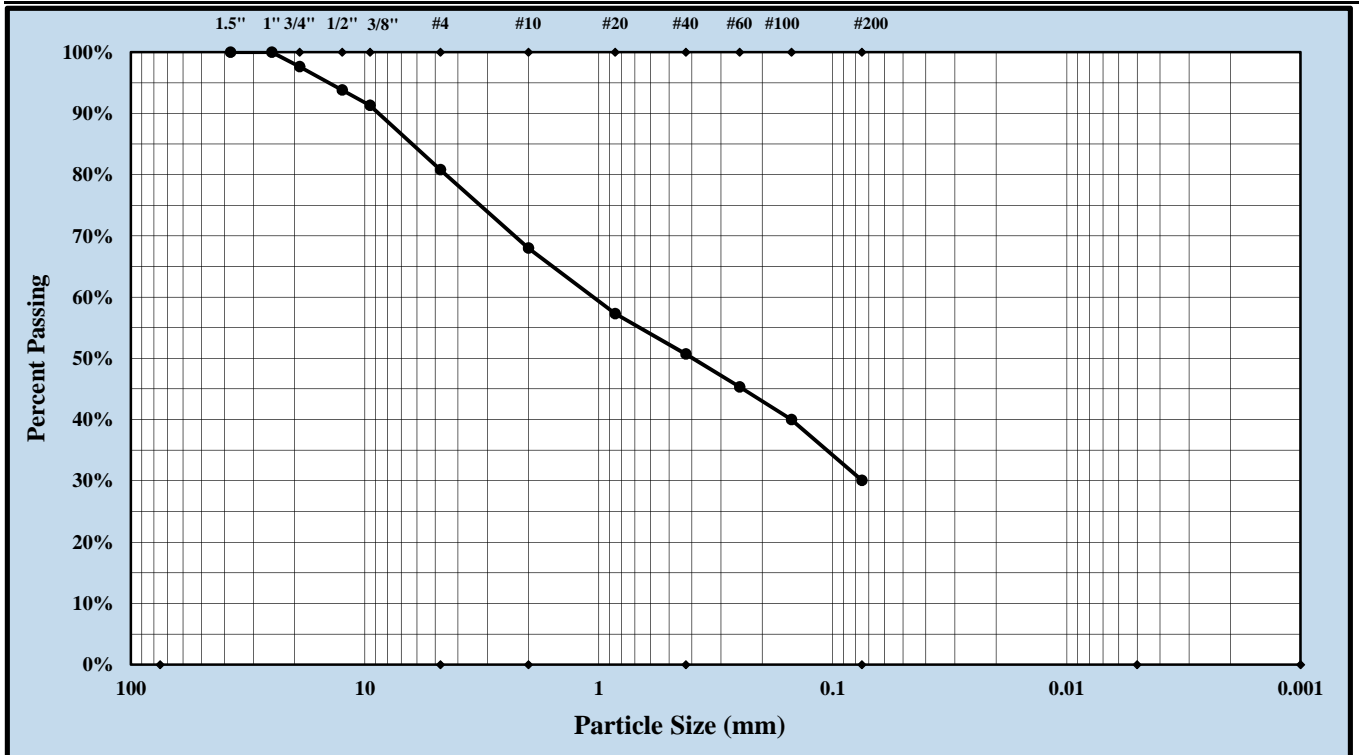
PARTICLE SIZE ANALYSIS OF SOIL



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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | July 17-21, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19DTR-P07 | Log #: | 43-2927 |
| | | | Depth: 1 - 3 ft |

Sample Description: **SILTY SAND with GRAVEL (SM) / A-2-4**



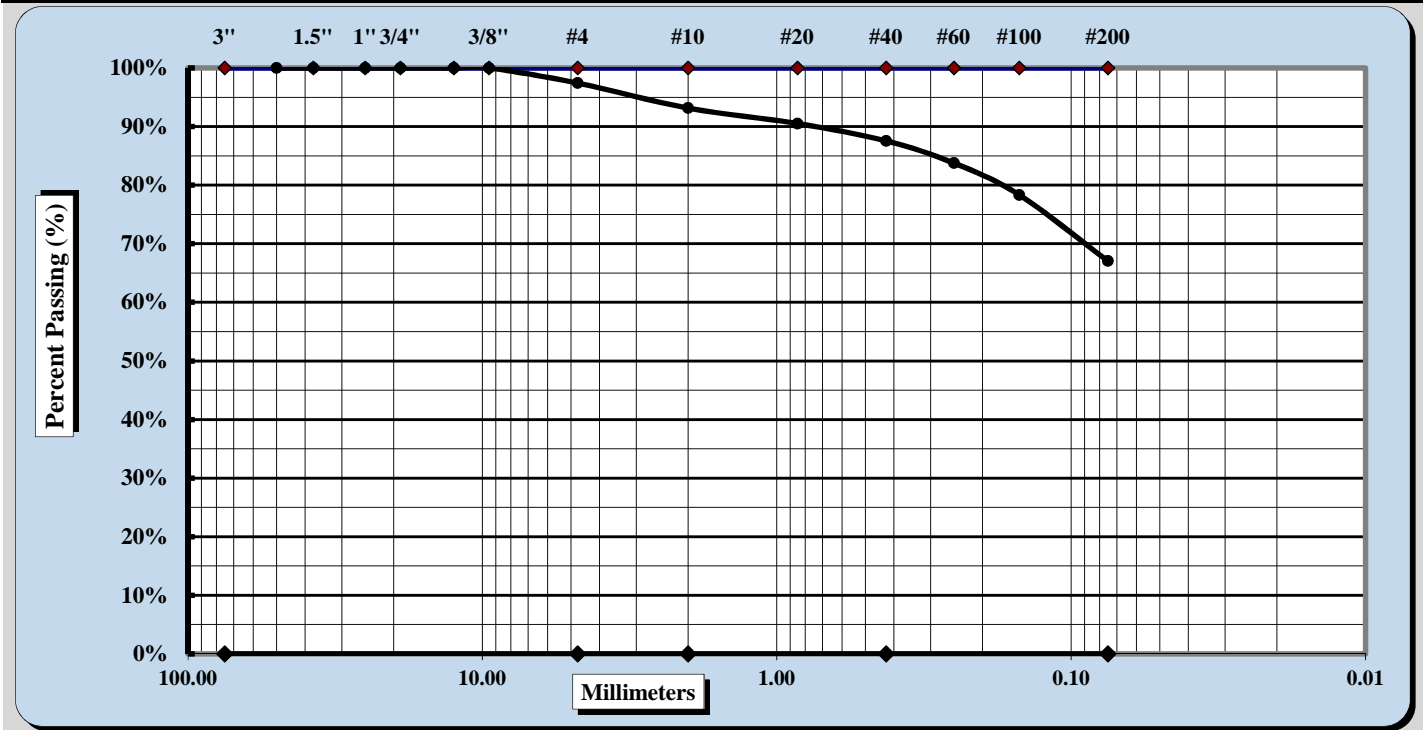


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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-RW04 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: SANDY SILT (ML) A-7-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|------------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.3% | Fine Sand | 20.5% |
| Gravel | 2.6% | Medium Sand | 5.6% | Silt & Clay | 67.0% |
| Liquid Limit | 44 | Plastic Limit | 30 | Plastic Index | 14 |
| | | | | Moisture Content | 23.7% |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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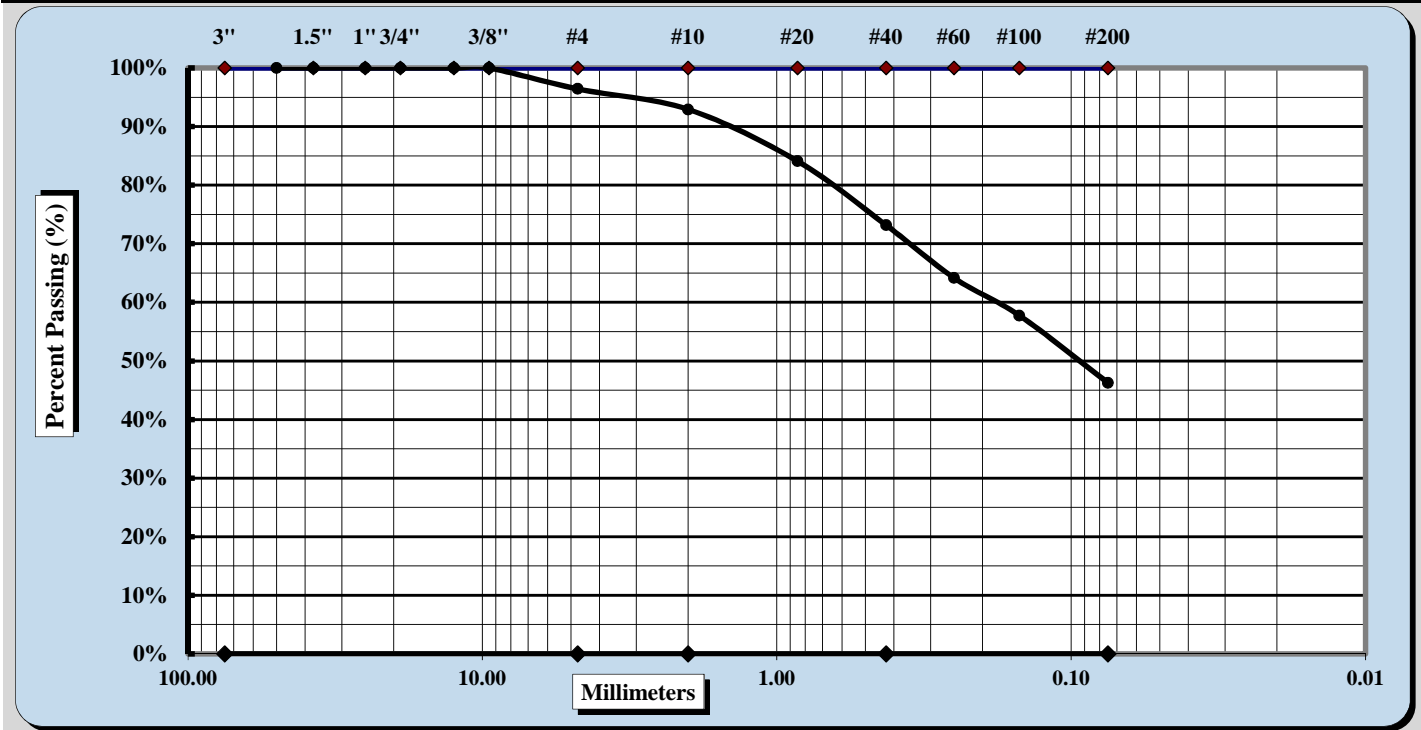


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-RW04 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 20-20.8 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|------------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 3.5% | Fine Sand | 26.9% |
| Gravel | 3.6% | Medium Sand | 19.8% | Silt & Clay | 46.3% |
| Liquid Limit | 29 | Plastic Limit | 26 | Plastic Index | 3 |
| | | | | Moisture Content | 10.6% |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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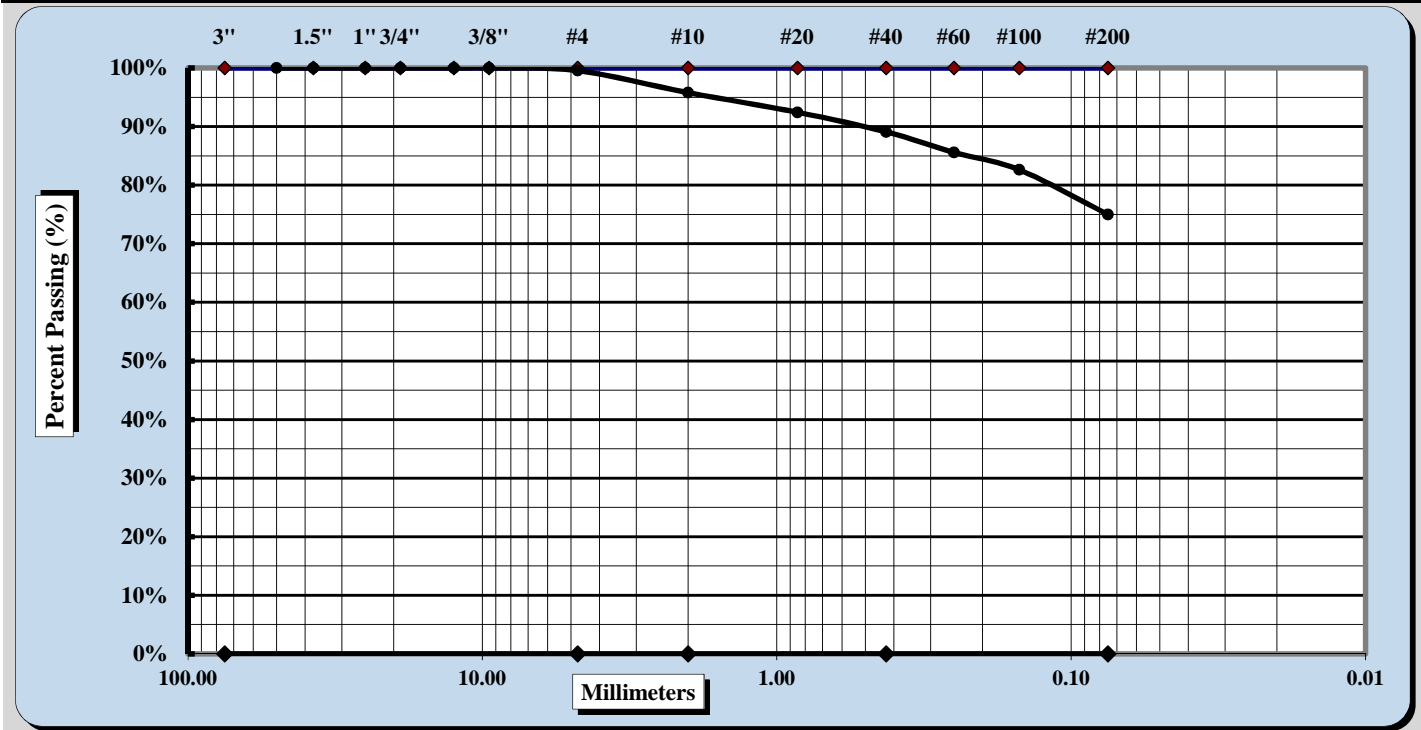


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-RW06 | Sample#: | S-4 |
| Log#: | 601 | Depth: | 8-10 ft |

Sample Description: **SILT WITH SAND (ML)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 3.8% | Fine Sand | 14.1% |
| Gravel | 0.4% | Medium Sand | 6.7% | Silt & Clay | 75.0% |
| Liquid Limit | 39 | Plastic Limit | 32 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

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Geotechnical Lab Supervisor
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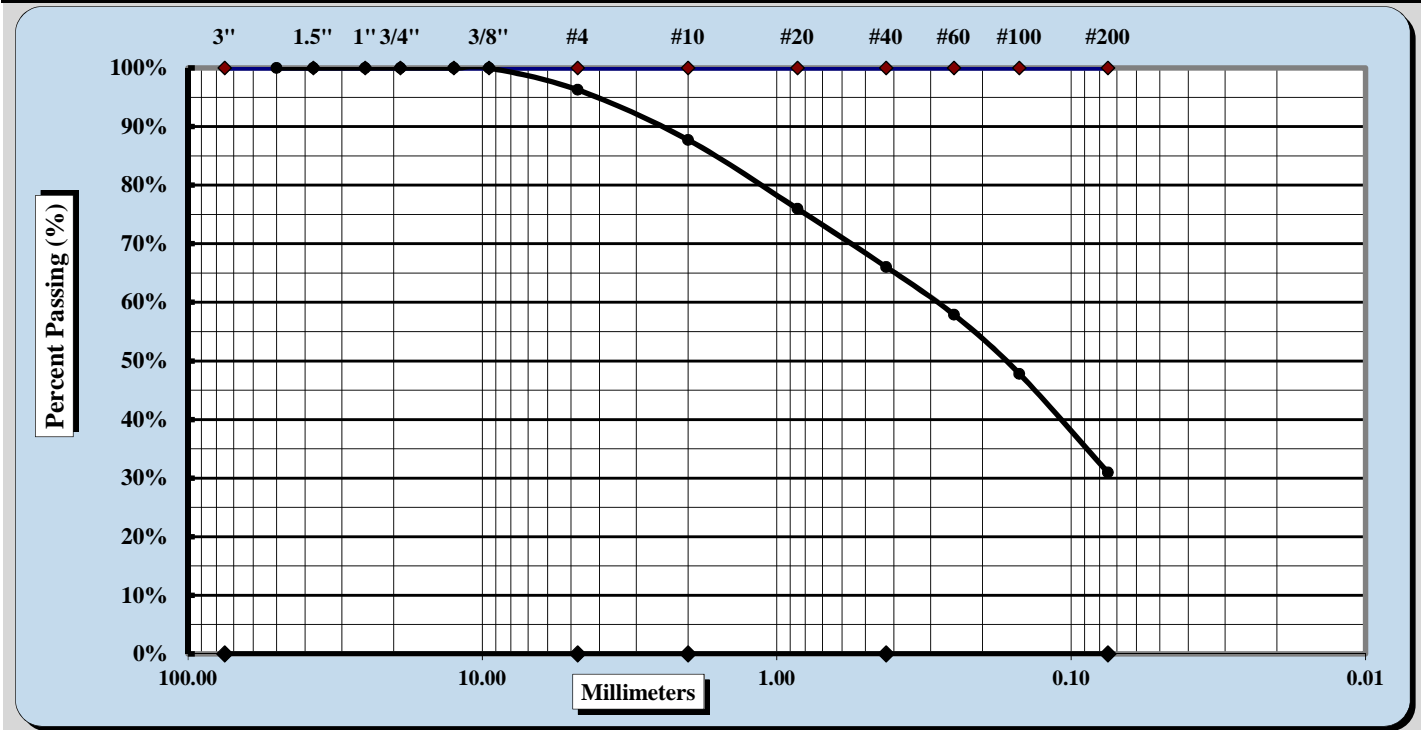


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19DTR-RW06 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: **SILTY SAND (SM)** **A-2**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 8.5% | Fine Sand | 35.1% |
| Gravel | 3.7% | Medium Sand | 21.7% | Silt & Clay | 31.0% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
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Geotechnical Lab Supervisor
Position

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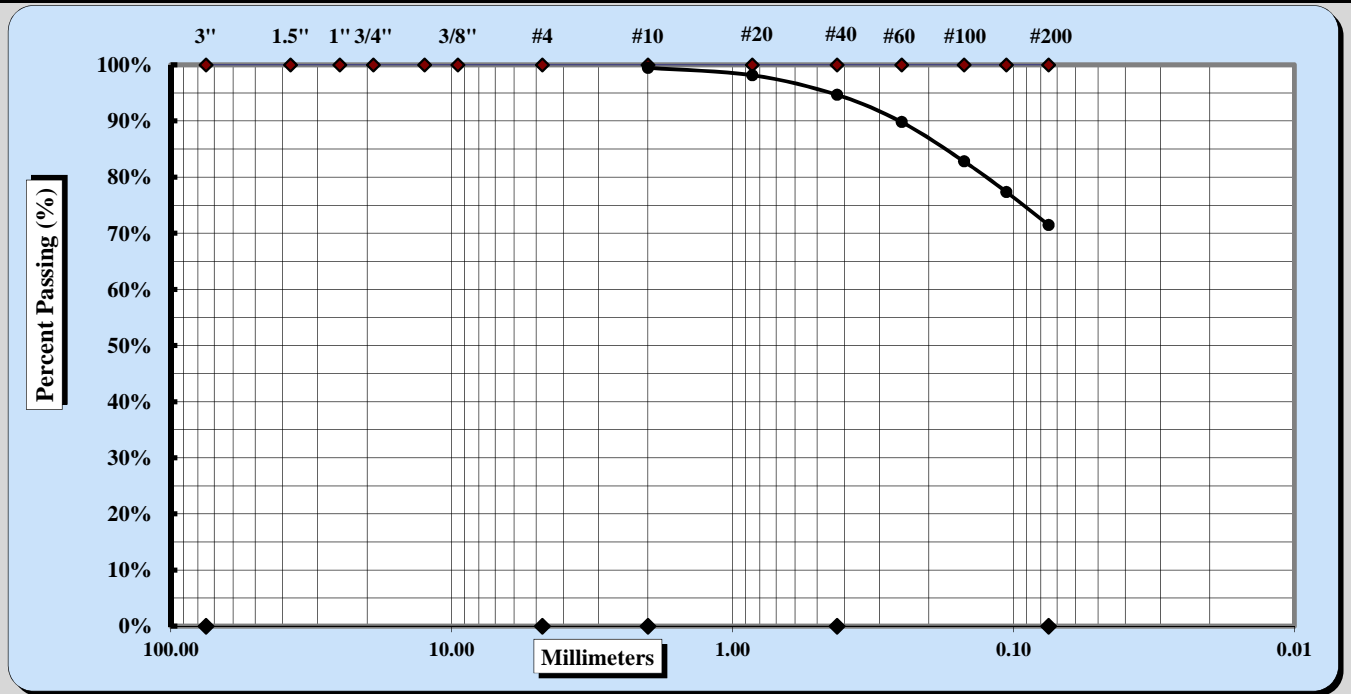
Sieve Analysis of Soils

Quality Assurance

AASHTO T88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR13 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-6 | Depth: 13 - 15 ft |
| Sample Description: ELASTIC SILT WITH SAND (MH) | | A-7-5 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-----|---------------|----|---------------|-----|
| Maximum Particle Size | #10 | Coarse Sand | 1% | Fine Sand | 23% |
| Gravel | 0% | Medium Sand | 5% | Silt & Clay | 71% |
| Liquid Limit | 58 | Plastic Limit | 38 | Plastic Index | 20 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

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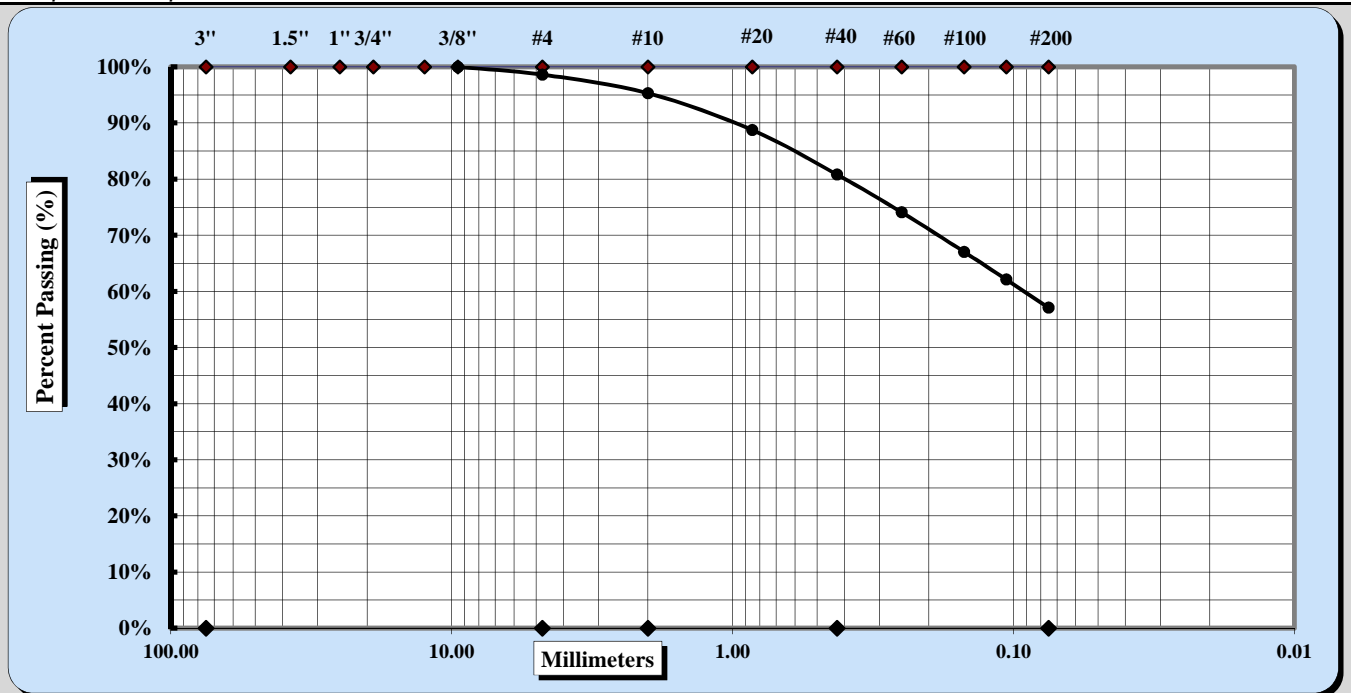
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|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR13 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-10 | Depth: 33 - 35 ft |
| Sample Description: SANDY LEAN CLAY (CL) | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 3/8" | Coarse Sand | 3% | Fine Sand | 24% |
| Gravel | 1% | Medium Sand | 14% | Silt & Clay | 57% |
| Liquid Limit | 37 | Plastic Limit | 23 | Plastic Index | 14 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

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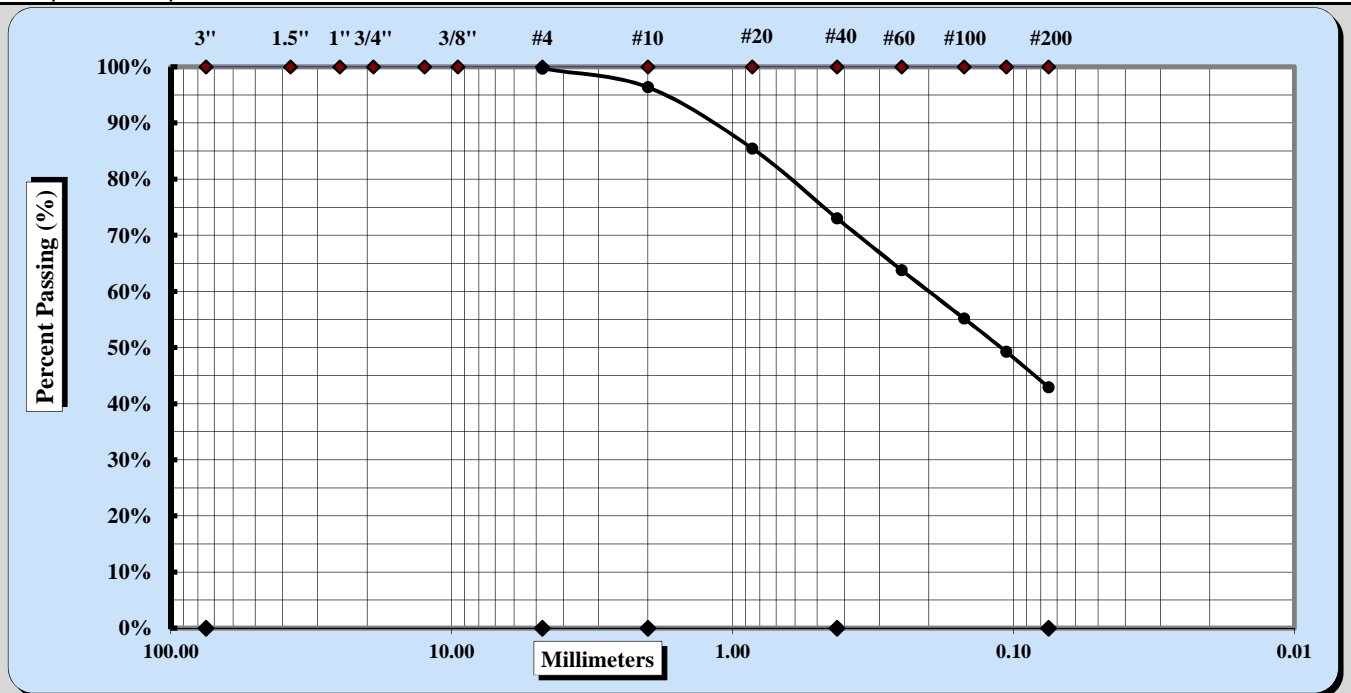
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| | | |
|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR13 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-17 | Depth: 63 - 63.8 ft |
| Sample Description: CLAYEY SAND (SC) | A-6 | |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|----|---------------|-----|---------------|-----|
| Maximum Particle Size | #4 | Coarse Sand | 3% | Fine Sand | 30% |
| Gravel | 0% | Medium Sand | 23% | Silt & Clay | 43% |
| Liquid Limit | 33 | Plastic Limit | 22 | Plastic Index | 11 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

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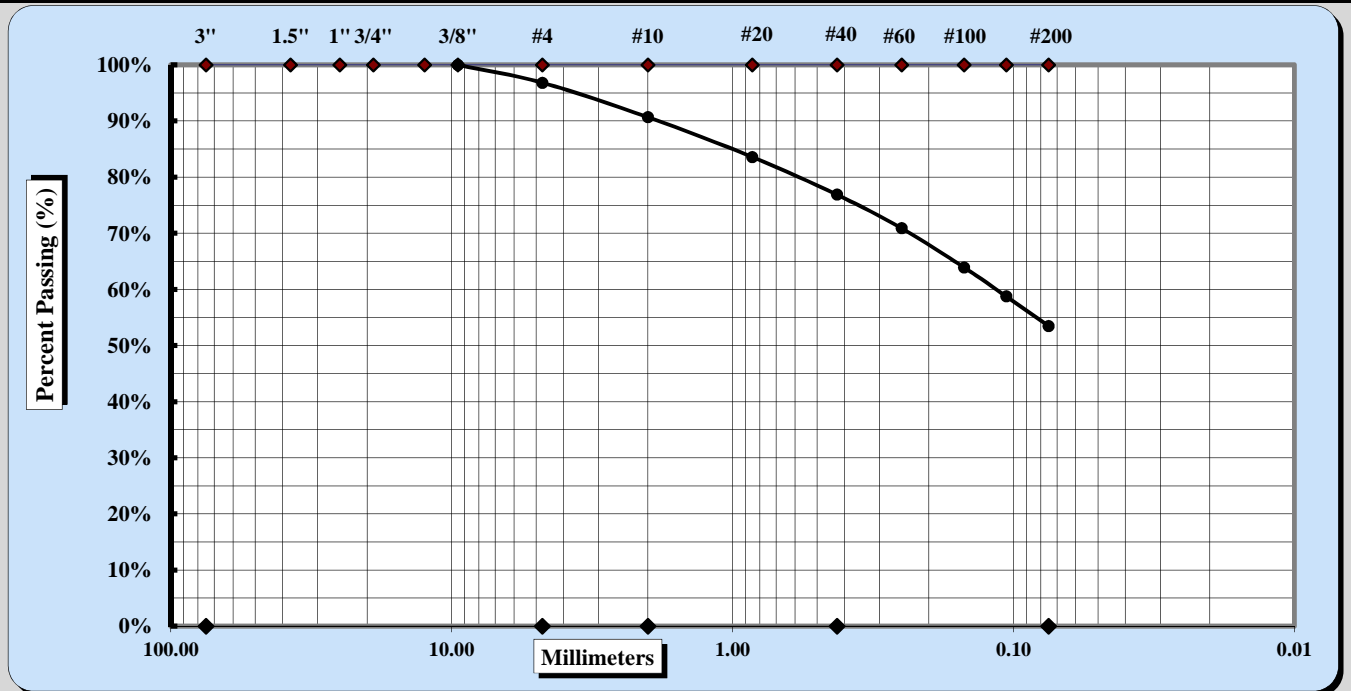
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| | | |
|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR14 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-2 | Depth: 4 - 6 ft |
| Sample Description: SANDY SILT (ML) | A-7-6 | |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 3/8" | Coarse Sand | 6% | Fine Sand | 23% |
| Gravel | 3% | Medium Sand | 14% | Silt & Clay | 53% |
| Liquid Limit | 46 | Plastic Limit | 29 | Plastic Index | 17 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

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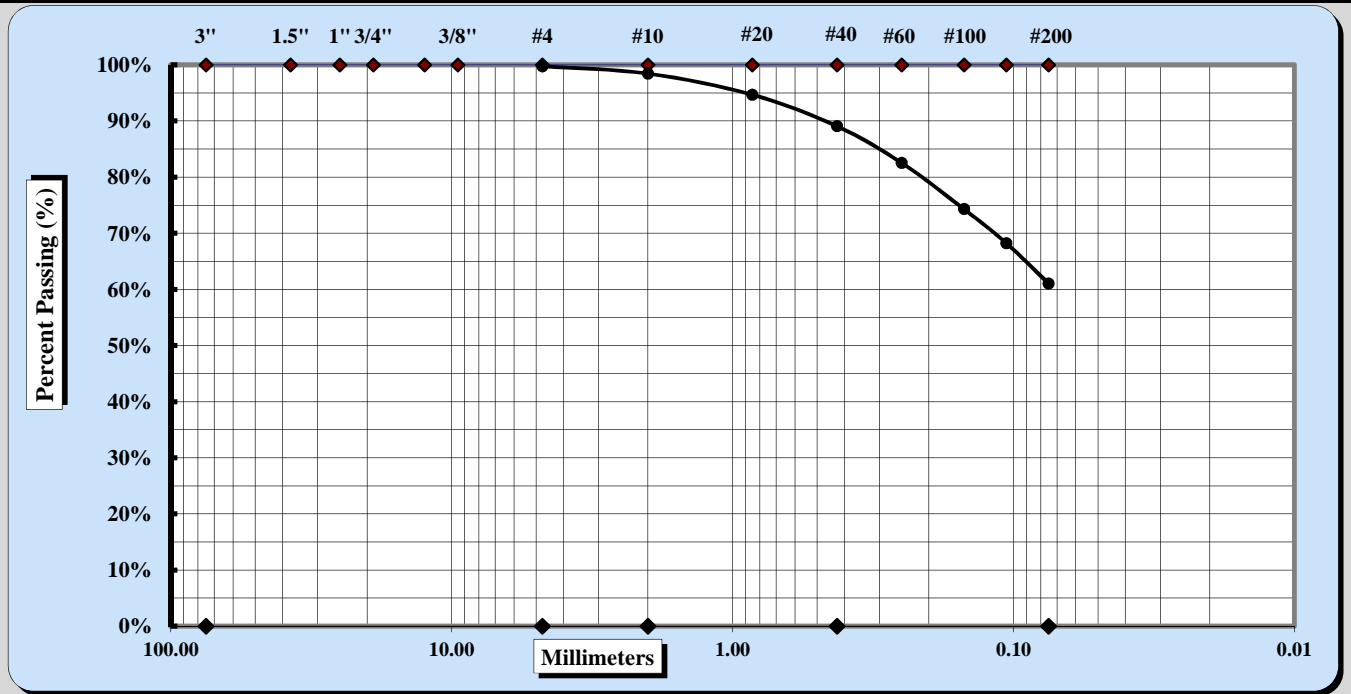
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|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR14 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-7 | Depth: 18 - 20 ft |
| Sample Description: SANDY LEAN CLAY (CL) | A-6 | |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|----|---------------|----|---------------|-----|
| Maximum Particle Size | #4 | Coarse Sand | 1% | Fine Sand | 28% |
| Gravel | 0% | Medium Sand | 9% | Silt & Clay | 61% |
| Liquid Limit | 40 | Plastic Limit | 25 | Plastic Index | 15 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

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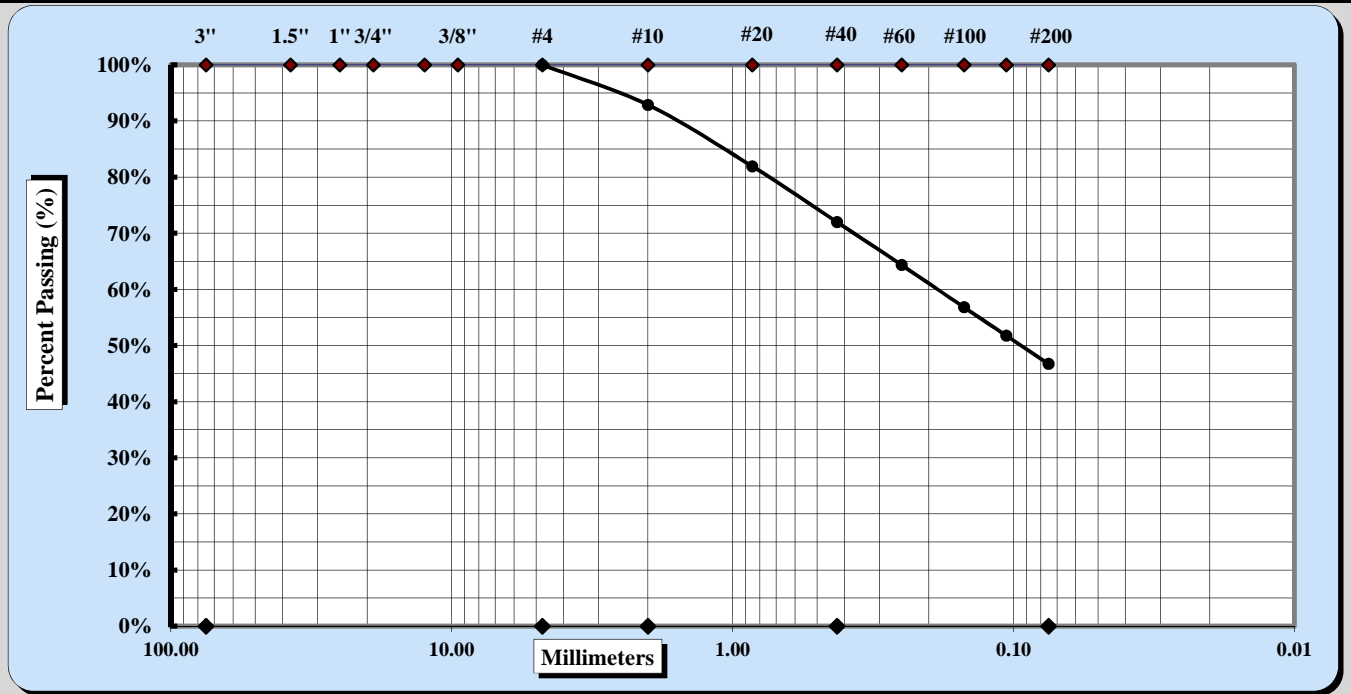
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|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR14 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-15 | Depth: 58 - 58.4 ft |
| Sample Description: CLAYEY SAND (SC) | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|----|---------------|-----|---------------|-----|
| Maximum Particle Size | #4 | Coarse Sand | 7% | Fine Sand | 25% |
| Gravel | 0% | Medium Sand | 21% | Silt & Clay | 47% |
| Liquid Limit | 34 | Plastic Limit | 22 | Plastic Index | 12 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

| | | | |
|-------------------------------|-----------|---------------------------|-----------------|
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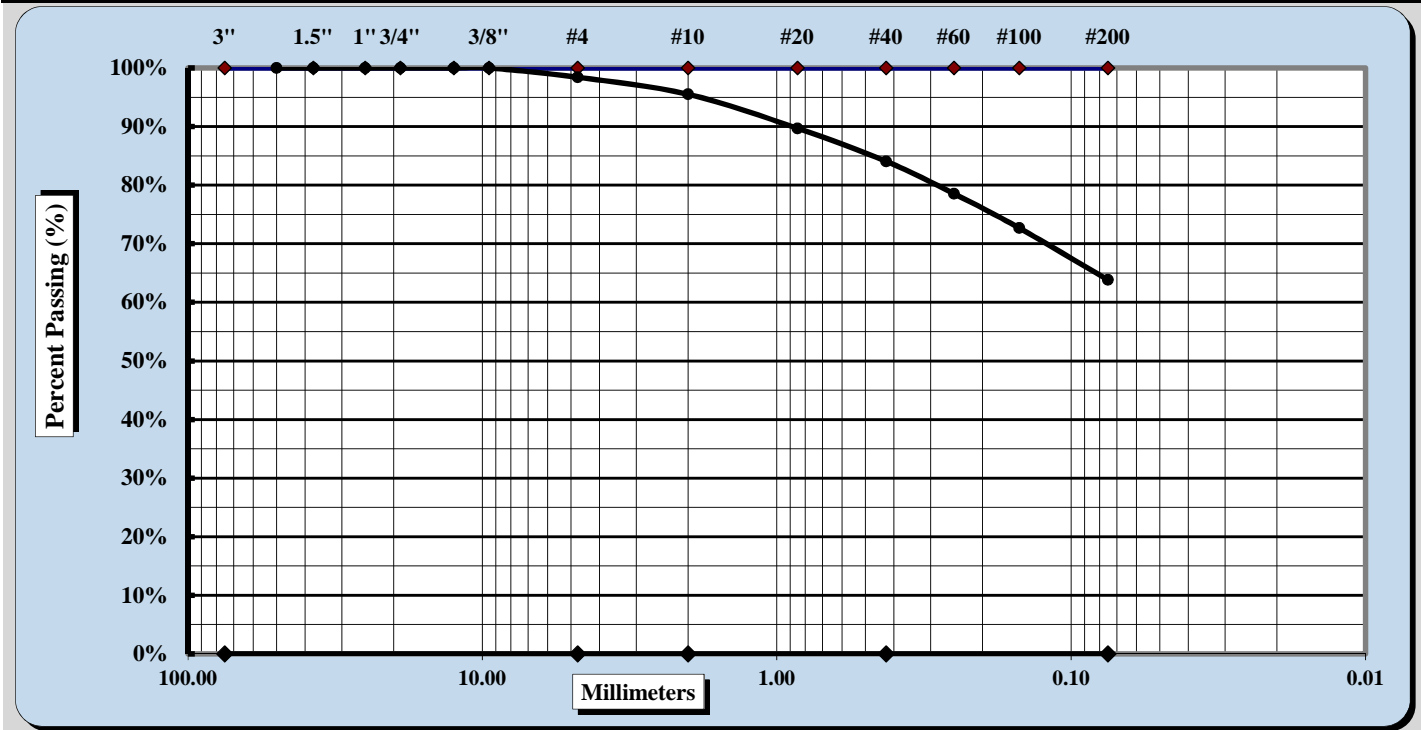


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR15 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 5-7 ft |

Sample Description: **SANDY LEAN CLAY (CL)** **A-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.9% | Fine Sand | 20.2% |
| Gravel | 1.6% | Medium Sand | 11.4% | Silt & Clay | 63.8% |
| Liquid Limit | 38 | Plastic Limit | 25 | Plastic Index | 13 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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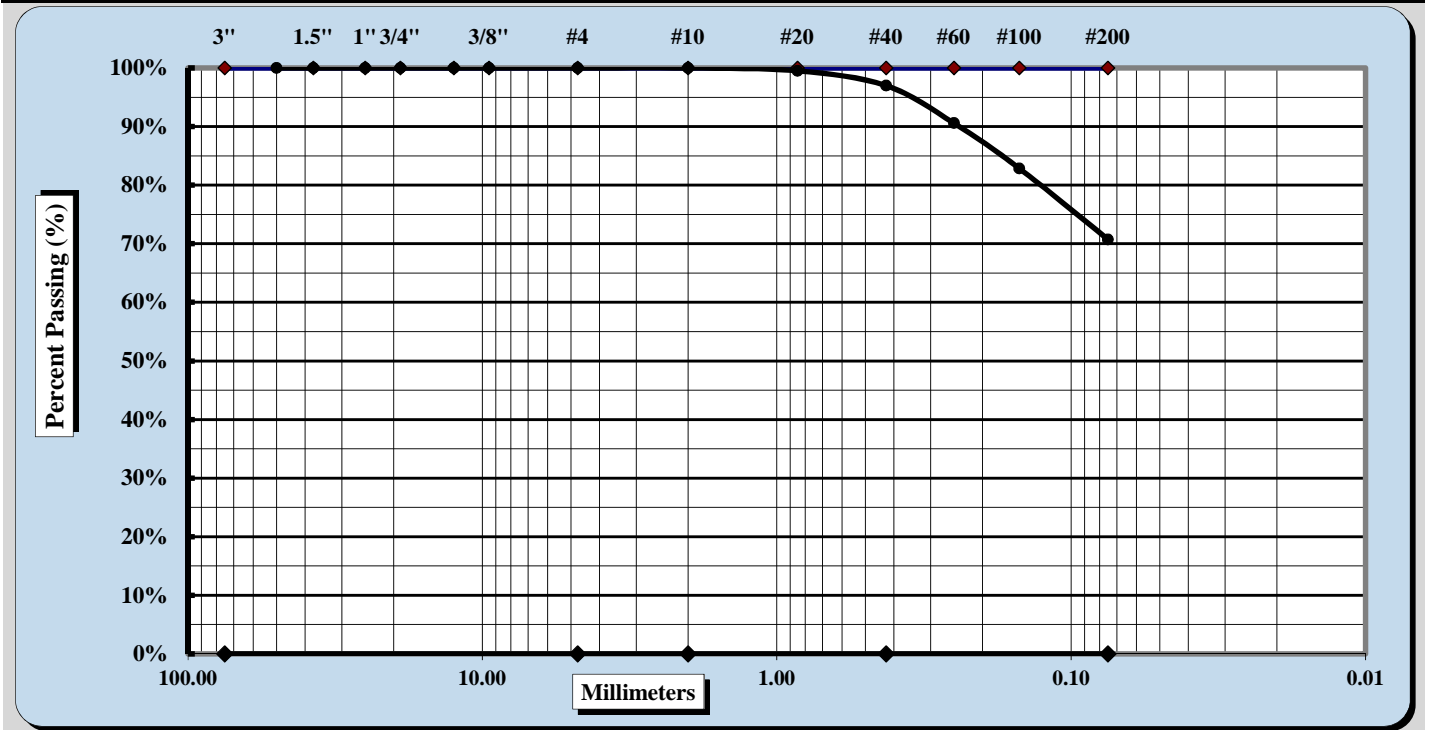


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR15 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 38-39.3 ft |

Sample Description: **SILT WITH SAND (ML)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #20 | Coarse Sand | 0.0% | Fine Sand | 26.2% |
| Gravel | 0.0% | Medium Sand | 3.0% | Silt & Clay | 70.8% |
| Liquid Limit | 38 | Plastic Limit | 30 | Plastic Index | 8 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

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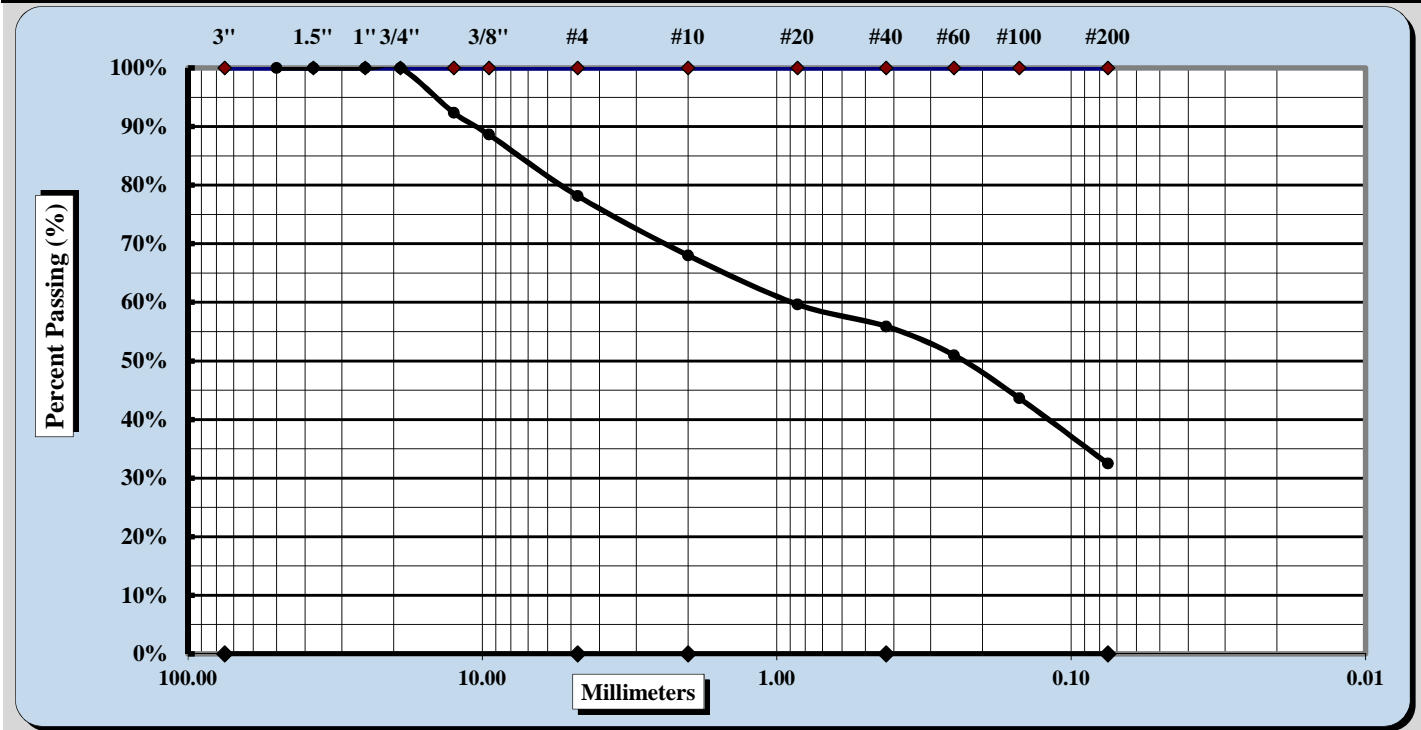


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR15 | Sample#: | S-17 |
| Log#: | 601 | Depth: | 68-69.3 ft |

Sample Description: **CLAYEY SAND WITH GRAVEL (SC)** **A-2-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 10.2% | Fine Sand | 23.4% |
| Gravel | 21.8% | Medium Sand | 12.1% | Silt & Clay | 32.5% |
| Liquid Limit | 31 | Plastic Limit | 23 | Plastic Index | 8 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

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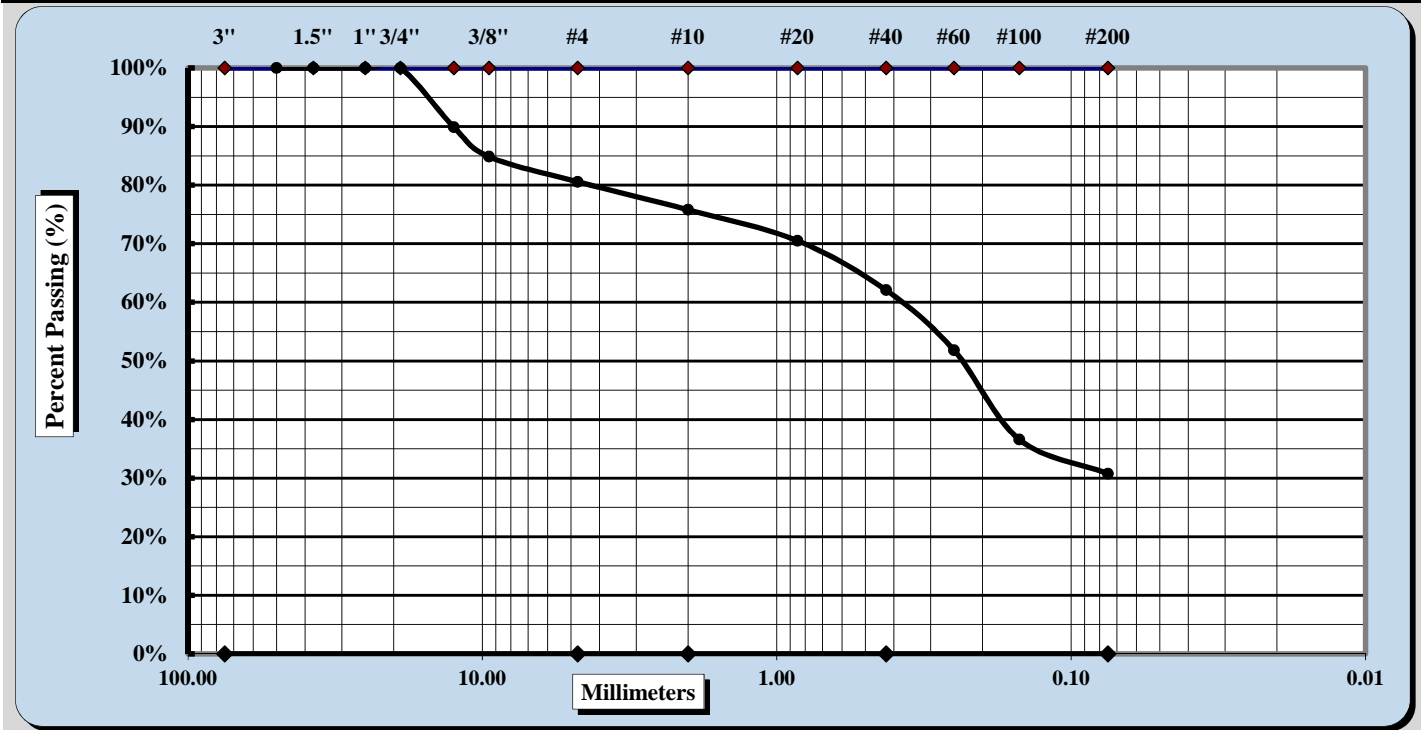


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR16 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 0-2 ft |

Sample Description: **CLAYEY SAND WITH GRAVEL (SC)** **A-2-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 4.8% | Fine Sand | 31.3% |
| Gravel | 19.4% | Medium Sand | 13.7% | Silt & Clay | 30.8% |
| Liquid Limit | 29 | Plastic Limit | 21 | Plastic Index | 8 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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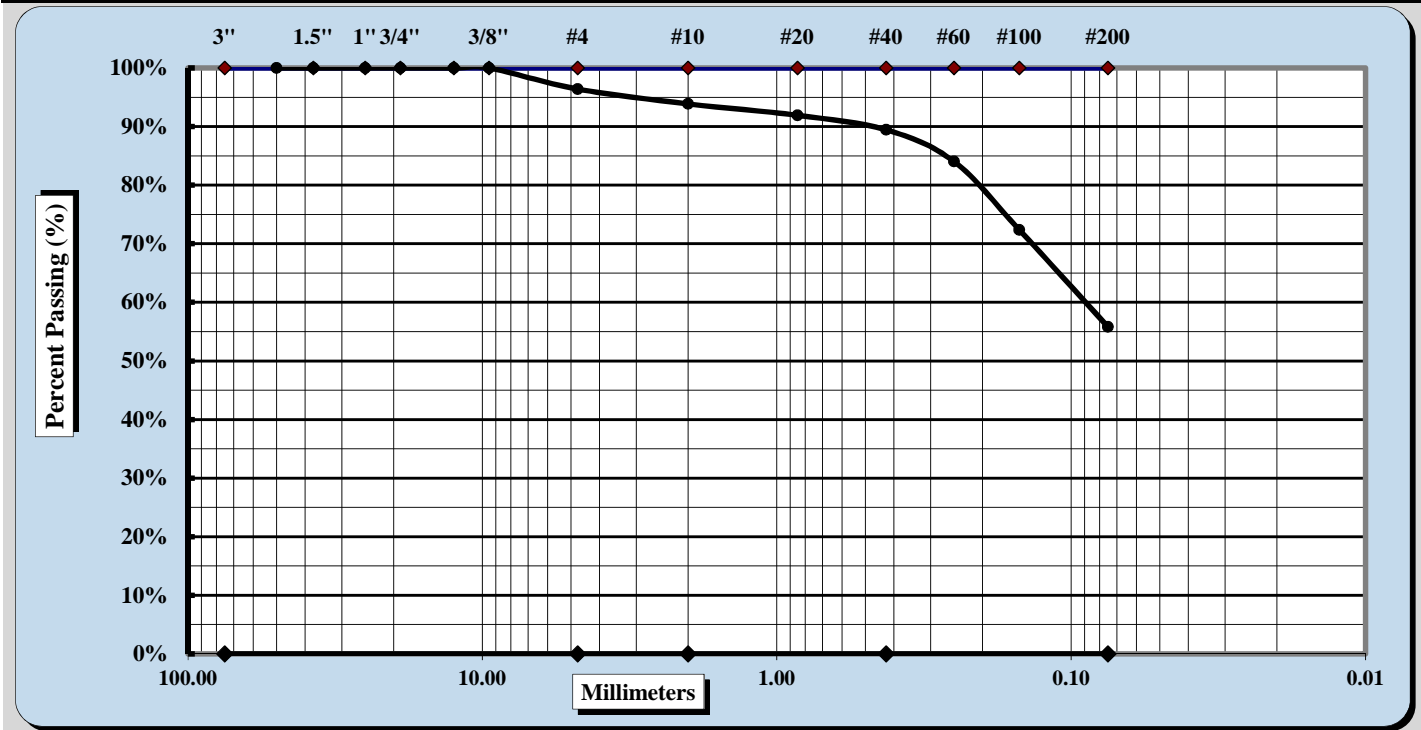


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR16 | Sample#: | S-7 |
| Log#: | 601 | Depth: | 18-20 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.5% | Fine Sand | 33.6% |
| Gravel | 3.6% | Medium Sand | 4.4% | Silt & Clay | 55.8% |
| Liquid Limit | 37 | Plastic Limit | 29 | Plastic Index | 8 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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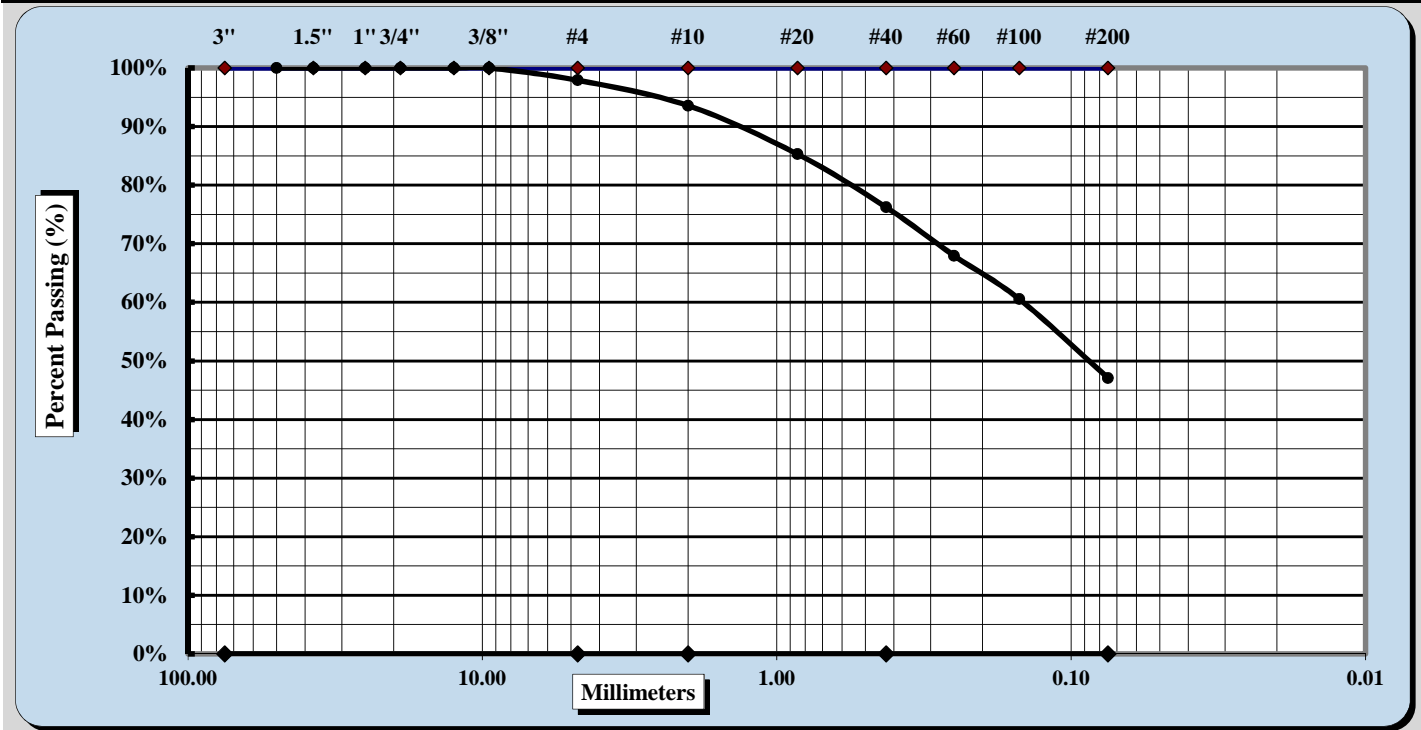


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-BR16 | Sample#: | S-14 |
| Log#: | 601 | Depth: | 53-54.3 ft |

Sample Description: **SILTY SAND (SM)** **A-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.3% | Fine Sand | 29.1% |
| Gravel | 2.1% | Medium Sand | 17.3% | Silt & Clay | 47.1% |
| Liquid Limit | 39 | Plastic Limit | 27 | Plastic Index | 12 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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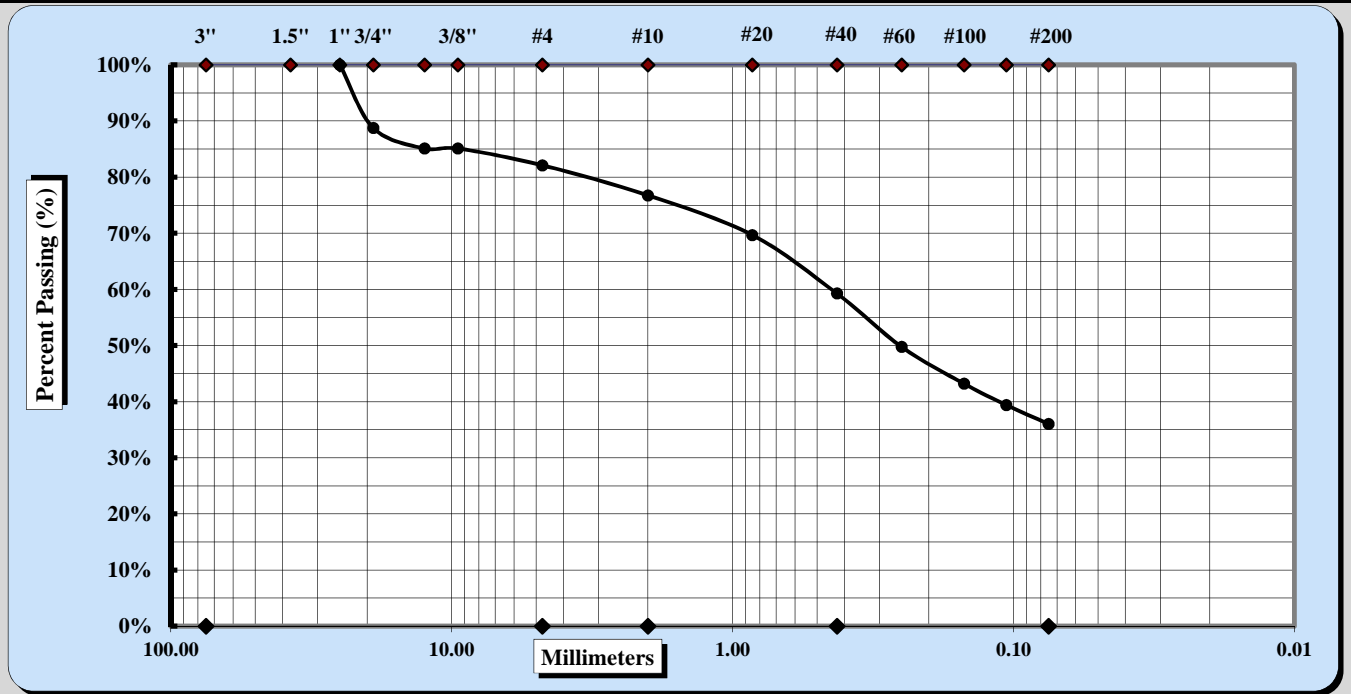
Sieve Analysis of Soils

Quality Assurance

AASHTO T88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR17 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-1 | Depth: 0.8 - 2.8 ft |
| Sample Description: CLAYEY SAND WITH GRAVEL (SC) | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 1.0" | Coarse Sand | 5% | Fine Sand | 23% |
| Gravel | 18% | Medium Sand | 17% | Silt & Clay | 36% |
| Liquid Limit | 35 | Plastic Limit | 23 | Plastic Index | 12 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

9/7/2019
Date

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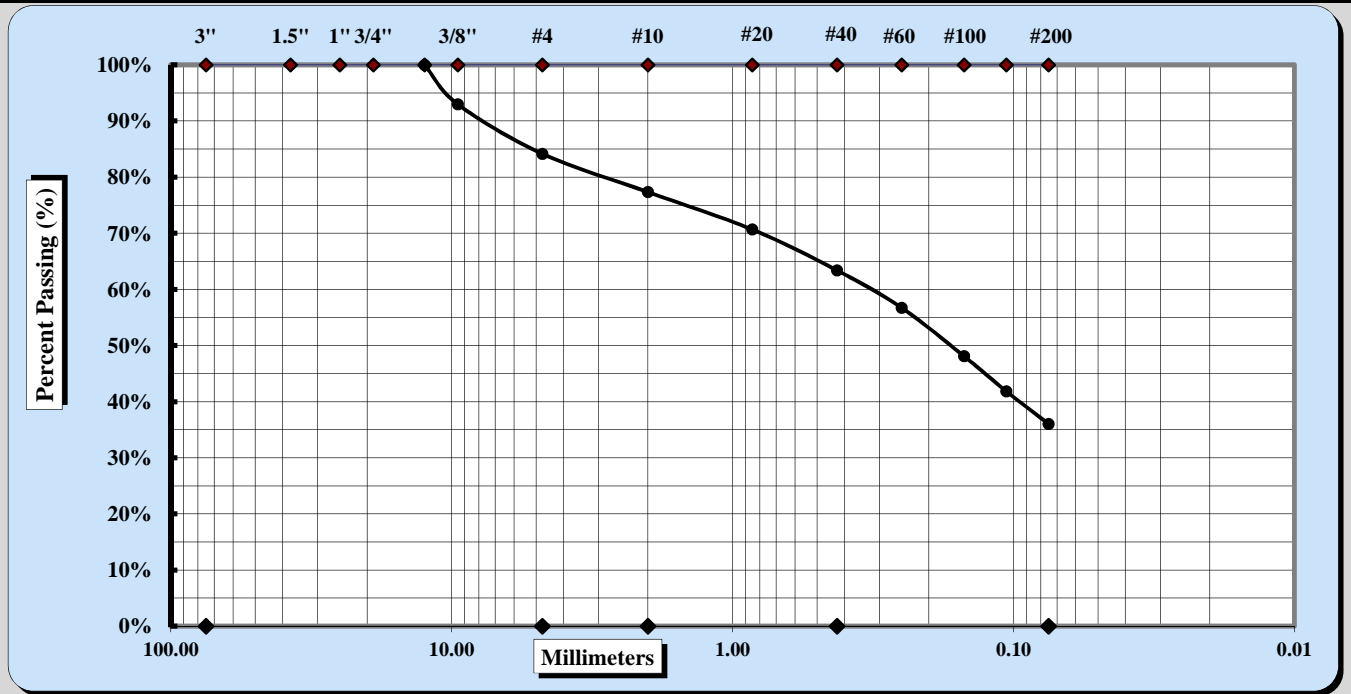
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| | | |
|---|---------------|-----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR17 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-7 | Depth: 18.8 - 20.8 ft |
| Sample Description: CLAYEY SAND WITH GRAVEL (SC) | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 1/2" | Coarse Sand | 7% | Fine Sand | 27% |
| Gravel | 16% | Medium Sand | 14% | Silt & Clay | 36% |
| Liquid Limit | 34 | Plastic Limit | 23 | Plastic Index | 11 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

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Date

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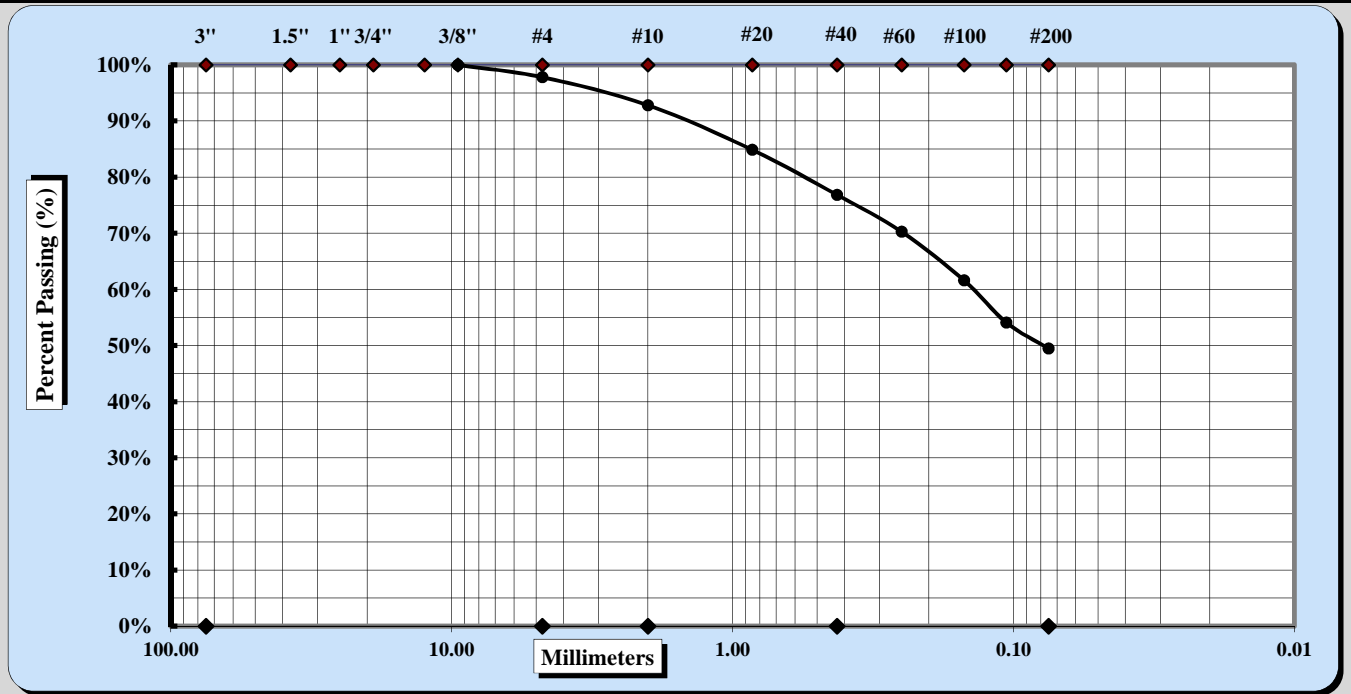
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|--|---------------|-----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-BR17 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-10 | Depth: 38.8 - 34.6 ft |
| Sample Description: SILTY, CLAYEY SAND (SC-SM) | | A-4 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 3/8" | Coarse Sand | 5% | Fine Sand | 27% |
| Gravel | 2% | Medium Sand | 16% | Silt & Clay | 49% |
| Liquid Limit | 28 | Plastic Limit | 22 | Plastic Index | 6 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

9/7/2019
Date

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Sieve Analysis of Soils

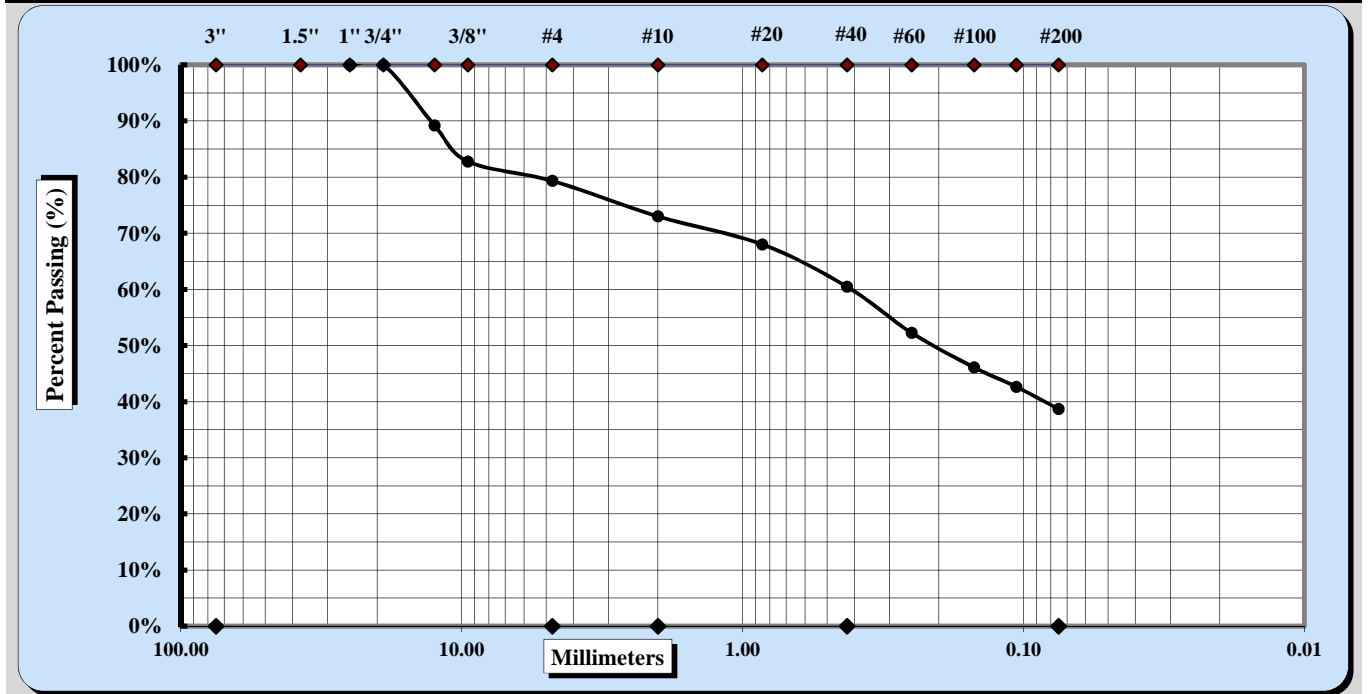


Quality Assurance

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| | | |
|---|---------------|-------------|
| Project #: 1243-19-025 | Report Date: | 9/17/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 9/13/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-E-P10 | Type: | Split Spoon |
| Sample Log No.: 43-2944 | Sample: | S-1 |
| | Depth: | 2 - 4 ft |
| Sample Description: CLAYEY SAND WITH GRAVEL (SC), Brown | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 3/4" | Coarse Sand | 6% | Fine Sand | 22% |
| Gravel | 21% | Medium Sand | 13% | Silt & Clay | 39% |
| Liquid Limit | 36 | Plastic Limit | 23 | Plastic Index | 13 |

| | | | | | |
|---|-------------------------------------|-------------|--------------------------|---------------------|-------------------------------------|
| Coarse Sand | 6% | Medium Sand | 13% | Fine Sand | 22% |
| Description of Sand & Gravel Particles: | | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**
 Sand and gravel sizes and fractions are per ASTM D2487.

| | | | |
|---|---------------|-----------------------------|-------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | Senior Engineer Position | 9/17/2019 Date |
|---|---------------|-----------------------------|-------------------|

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Sieve Analysis of Soils

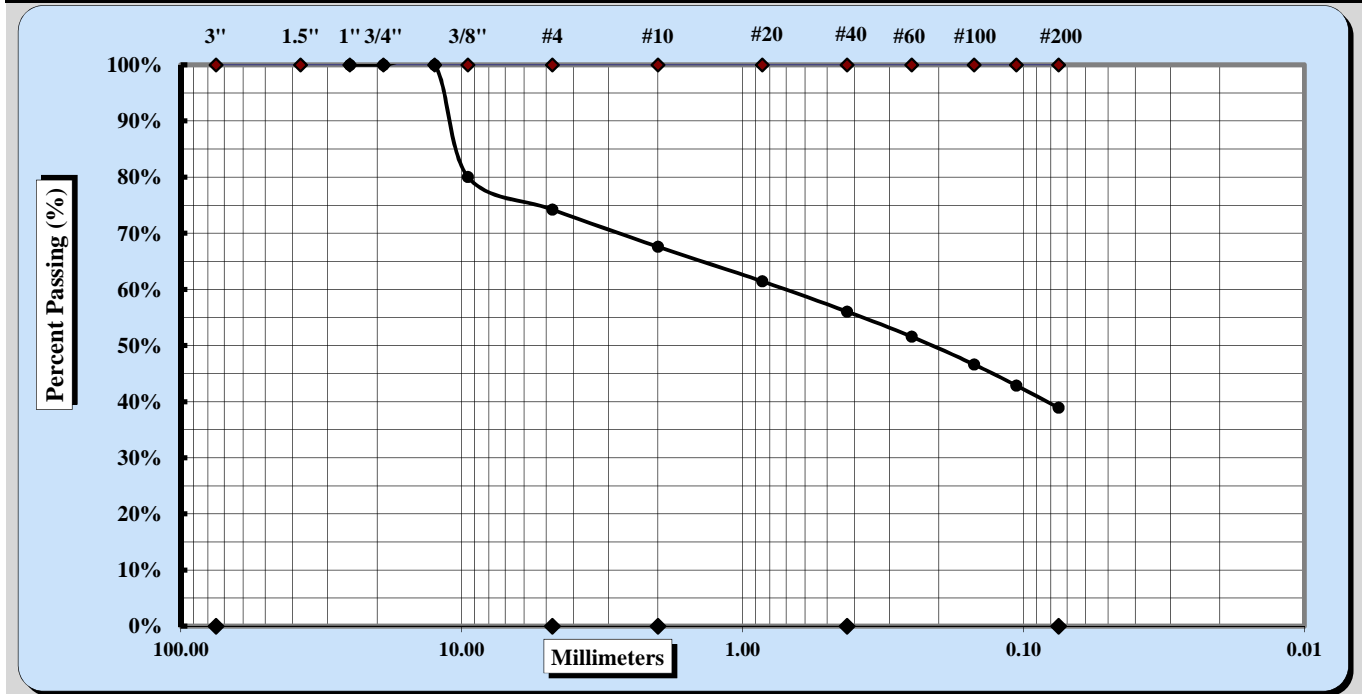


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|--|---------------|--------------|
| Project #: 1243-19-025 | Report Date: | 9/17/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 9/13/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GTP-E-P13 | Type: | Split Spoon |
| Sample Log No.: 43-2944 | Sample: | S-2 |
| | Depth: | 4.3 - 6.3 ft |
| Sample Description: SILTY SAND WITH GRAVEL (SM), Brown | | A-7-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 1/2" | Coarse Sand | 7% | Fine Sand | 17% |
| Gravel | 26% | Medium Sand | 12% | Silt & Clay | 39% |
| Liquid Limit | 44 | Plastic Limit | 29 | Plastic Index | 15 |

| | | | | | |
|---|-------------------------------------|-------------|-------------------------------------|---------------------|--------------------------|
| Coarse Sand | 7% | Medium Sand | 12% | Fine Sand | 17% |
| Description of Sand & Gravel Particles: | | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487.

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

9/17/2019
Date

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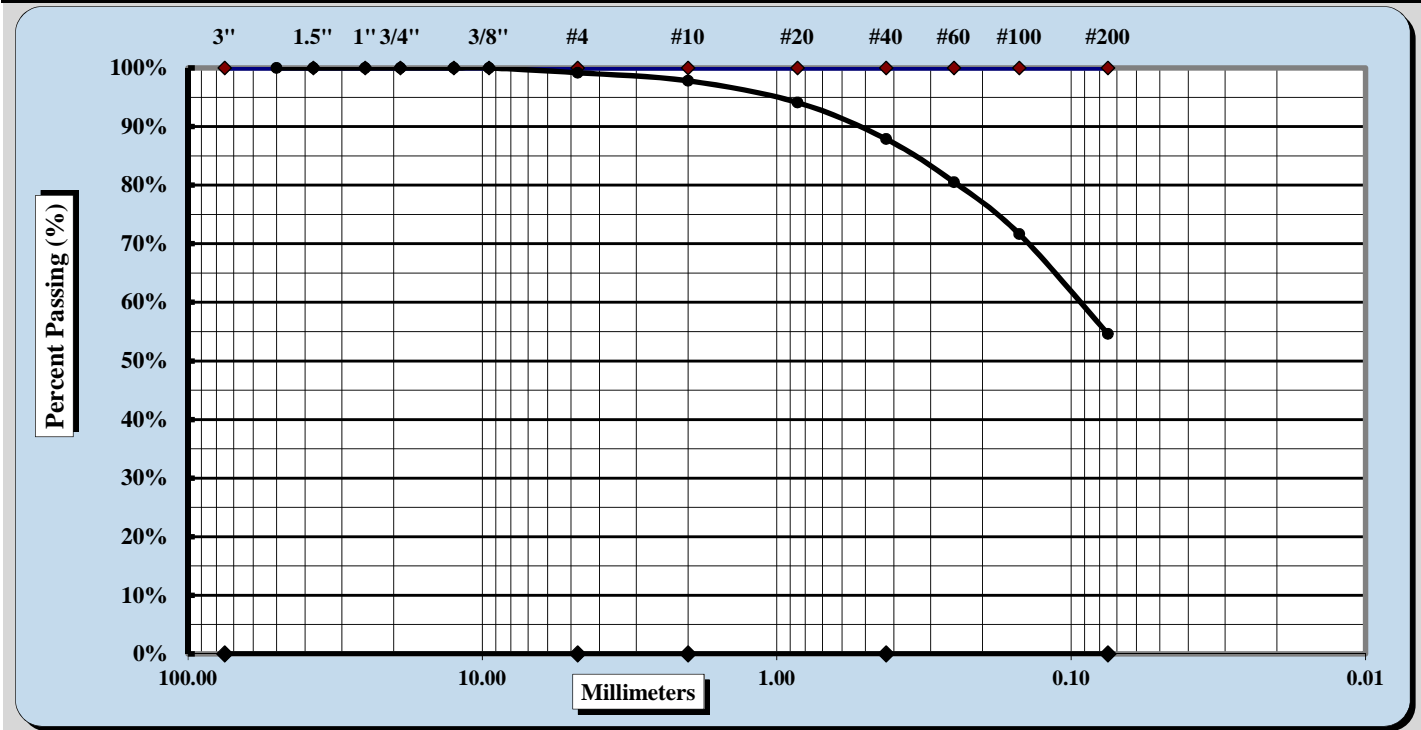


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-W-P04 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: SANDY ELASTIC SILT (MH) A-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 1.4% | Fine Sand | 33.2% |
| Gravel | 0.8% | Medium Sand | 9.9% | Silt & Clay | 54.6% |
| Liquid Limit | 51 | Plastic Limit | 46 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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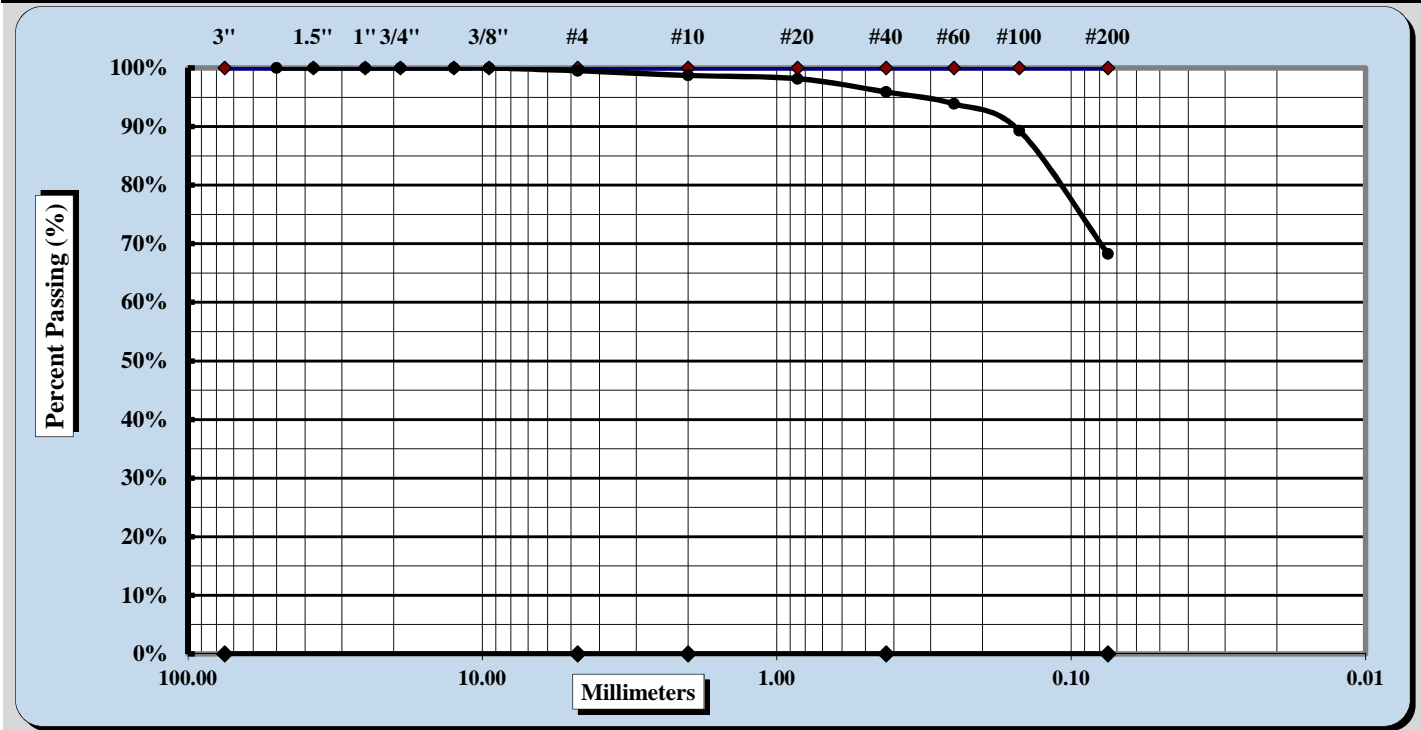


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GTP-W-P06 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 2.6-7.2 ft |

Sample Description: SANDY SILT (ML) A-7-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 0.8% | Fine Sand | 27.6% |
| Gravel | 0.5% | Medium Sand | 2.8% | Silt & Clay | 68.3% |
| Liquid Limit | 42 | Plastic Limit | 29 | Plastic Index | 13 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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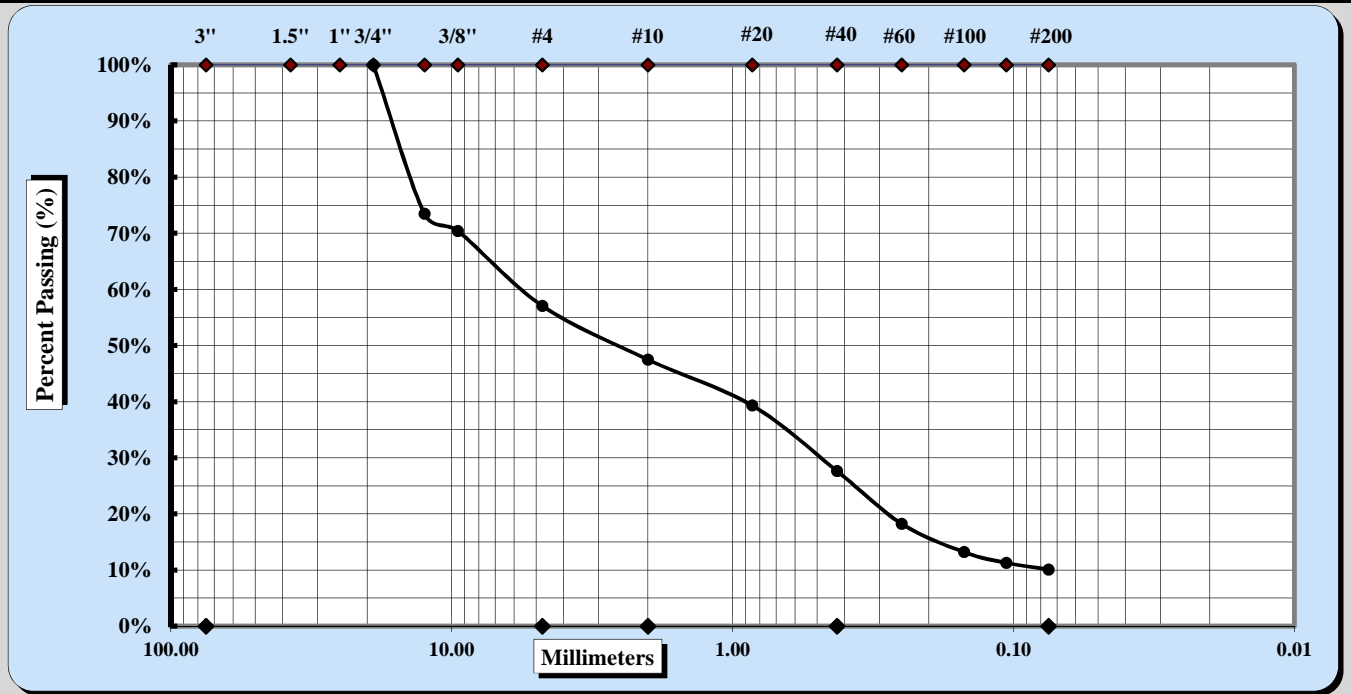
Sieve Analysis of Soils

Quality Assurance

AASHTO T88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|--|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-BR18 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-1 | Depth: 0 - 2 ft |
| Sample Description: POORLY GRADED SAND WITH SILTY CLAY AND GRAVEL (SP-SC) | | A-1-a |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|------------------|-----|---------------|-----|
| Maximum Particle Size | 3/4" | Coarse Sand | 10% | Fine Sand | 18% |
| Gravel | 43% | Medium Sand | 20% | Silt & Clay | 10% |
| Liquid Limit | 18 | Plastic Limit | 12 | Plastic Index | 6 |
| Cc = 0.6 | | Cu = 82.9 | | | |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

[Signature]
Signature

Staff Professional
Position

9/7/2019
Date

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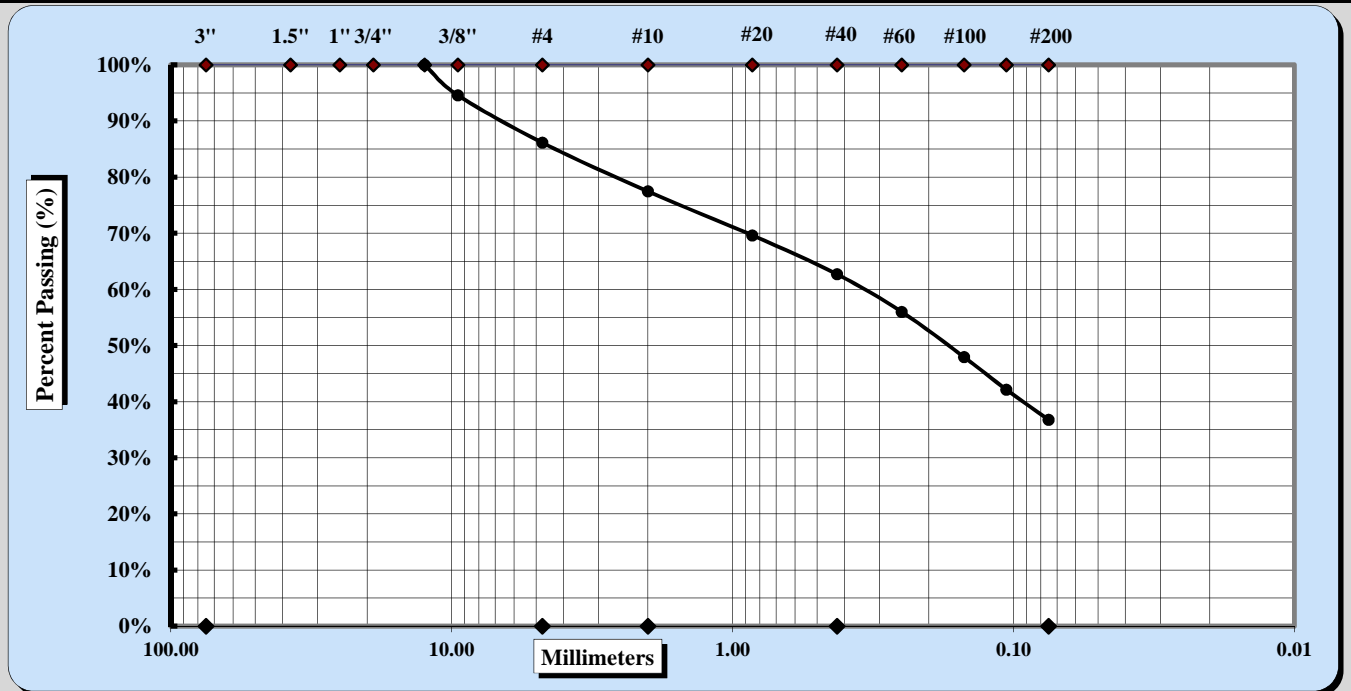
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| | | |
|---|---------------|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-BR18 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-5 | Depth: 8 - 10 ft |
| Sample Description: SILTY SAND (SM) | | A-7-5 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 1/2" | Coarse Sand | 9% | Fine Sand | 26% |
| Gravel | 14% | Medium Sand | 15% | Silt & Clay | 37% |
| Liquid Limit | 43 | Plastic Limit | 30 | Plastic Index | 13 |

| | | | | | |
|---|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

Michael D. Kelso, E.I.
Technical Responsibility

Michael D. Kelso
Signature

Staff Professional
Position

9/7/2019
Date

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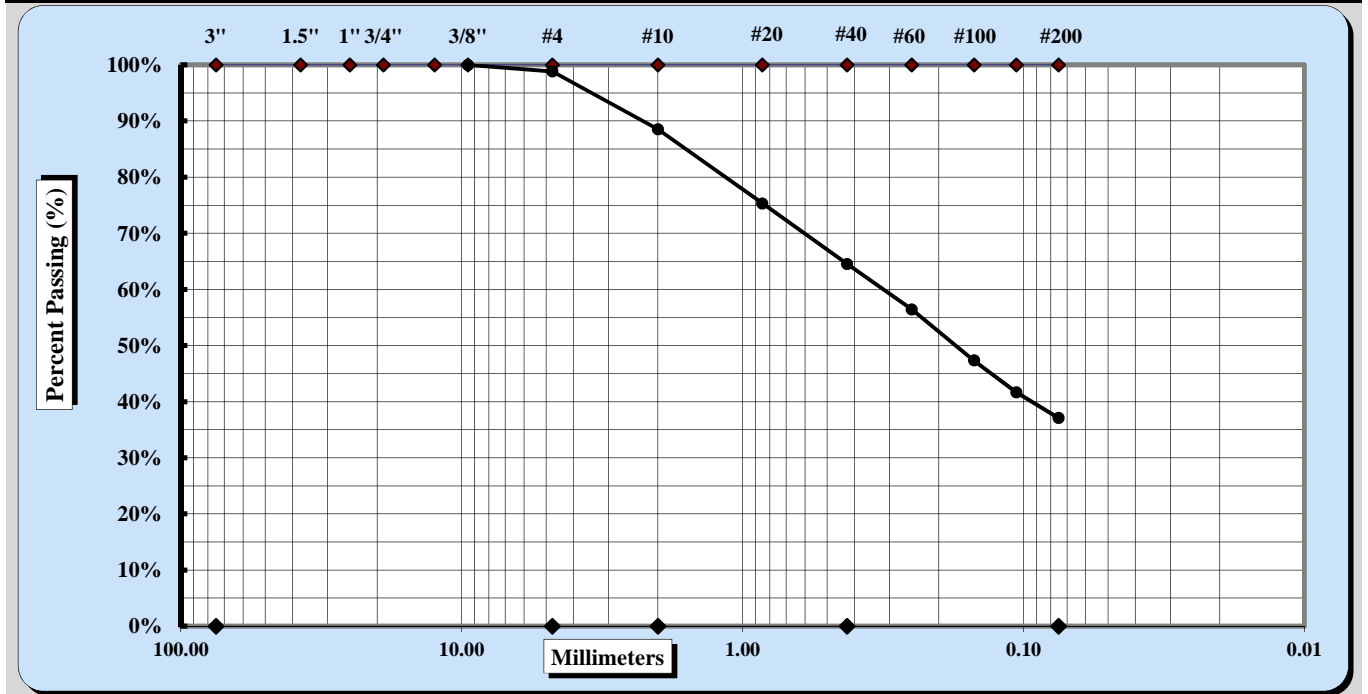
Sieve Analysis of Soils

Quality Assurance

AASHTO T88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|--|----------------------|
| Project #: 1243-19-025 | Report Date: | 9/7/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 8/19/2019 |
| Client Name: HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-BR18 | Type: Bag | Sample Date: Various |
| Sample Log No.: 43-2944 | Sample: S-14 | Depth: 53 - 55 ft |
| Sample Description: CLAYEY SAND (SC) | A-4 | |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 3/8" | Coarse Sand | 10% | Fine Sand | 27% |
| Gravel | 1% | Medium Sand | 24% | Silt & Clay | 37% |
| Liquid Limit | 30 | Plastic Limit | 22 | Plastic Index | 8 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

10/21/2019
Date

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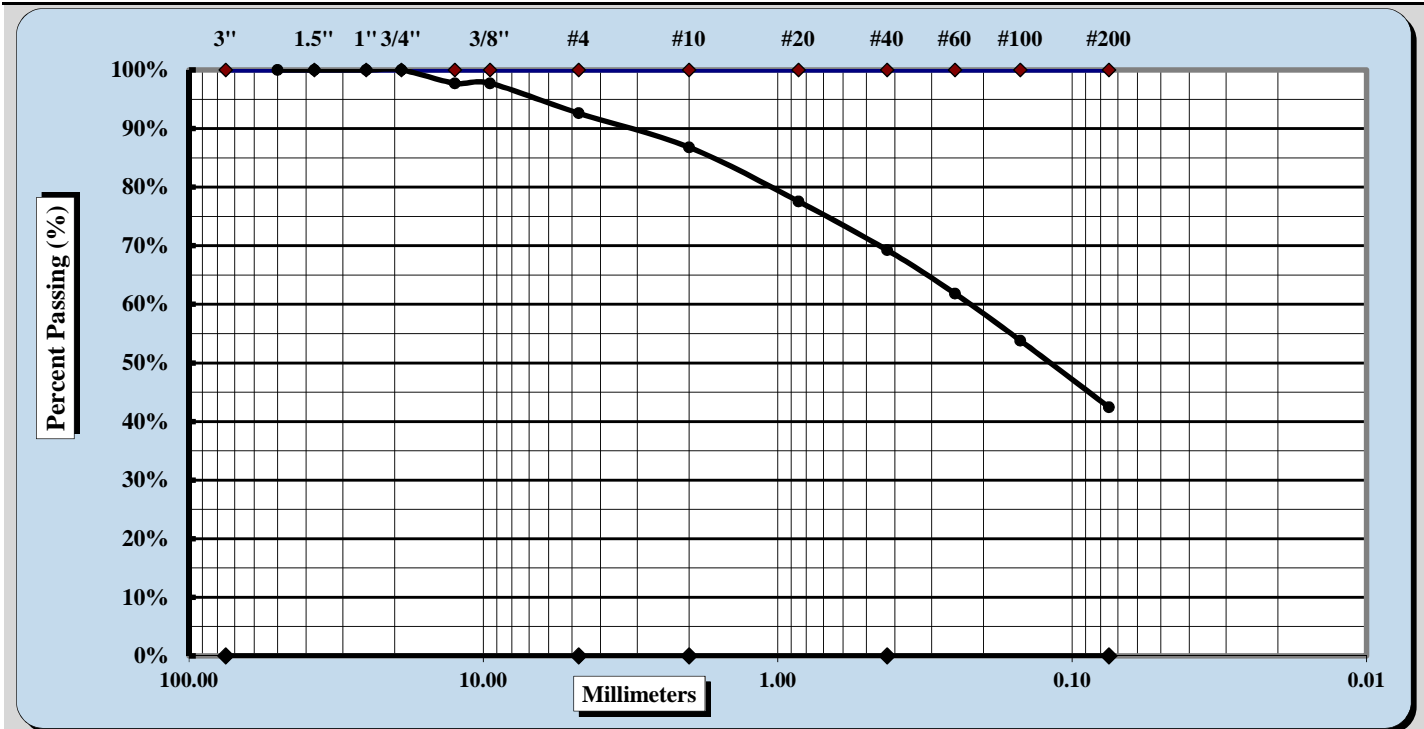


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-BR19 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 5.8% | Fine Sand | 26.8% |
| Gravel | 7.4% | Medium Sand | 17.6% | Silt & Clay | 42.4% |
| Liquid Limit | 33 | Plastic Limit | 27 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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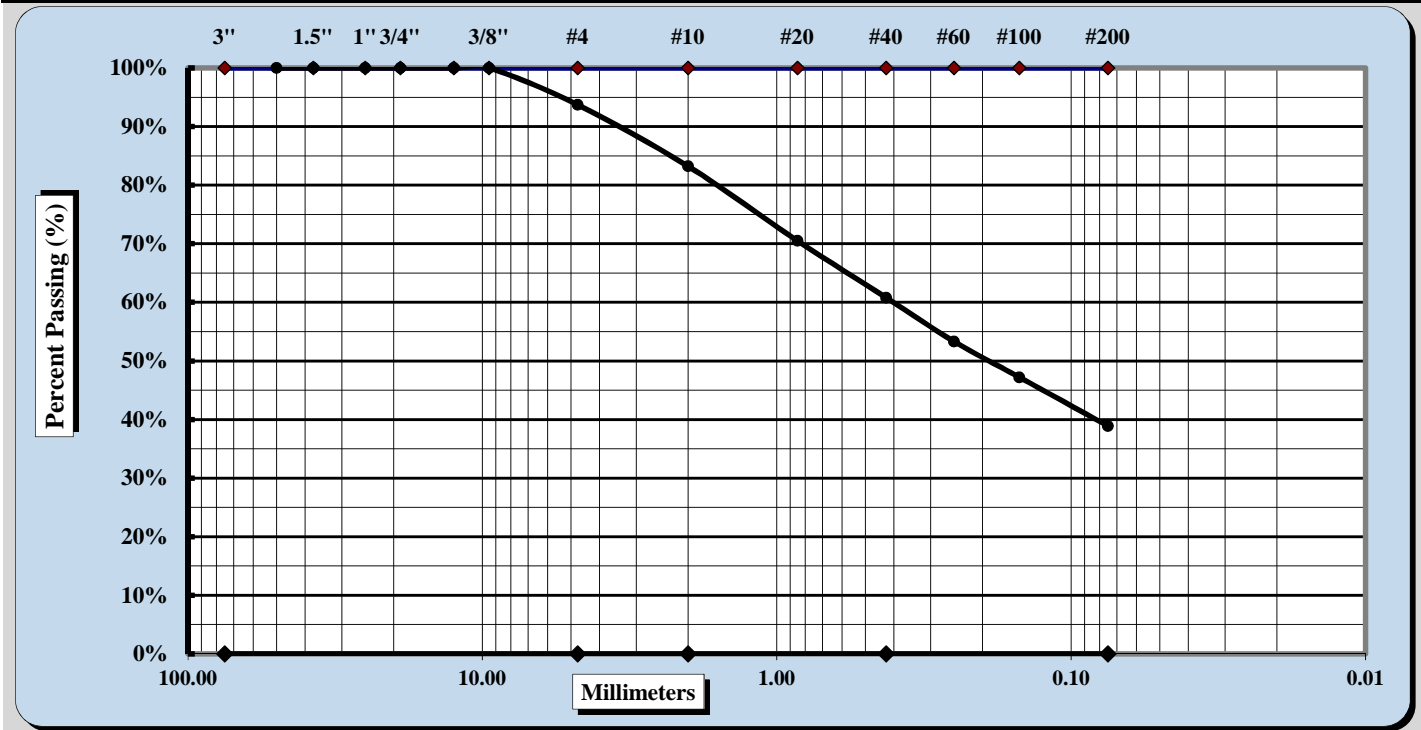


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-BR19 | Sample#: | S-7 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 10.5% | Fine Sand | 21.9% |
| Gravel | 6.3% | Medium Sand | 22.4% | Silt & Clay | 38.9% |
| Liquid Limit | 35 | Plastic Limit | 30 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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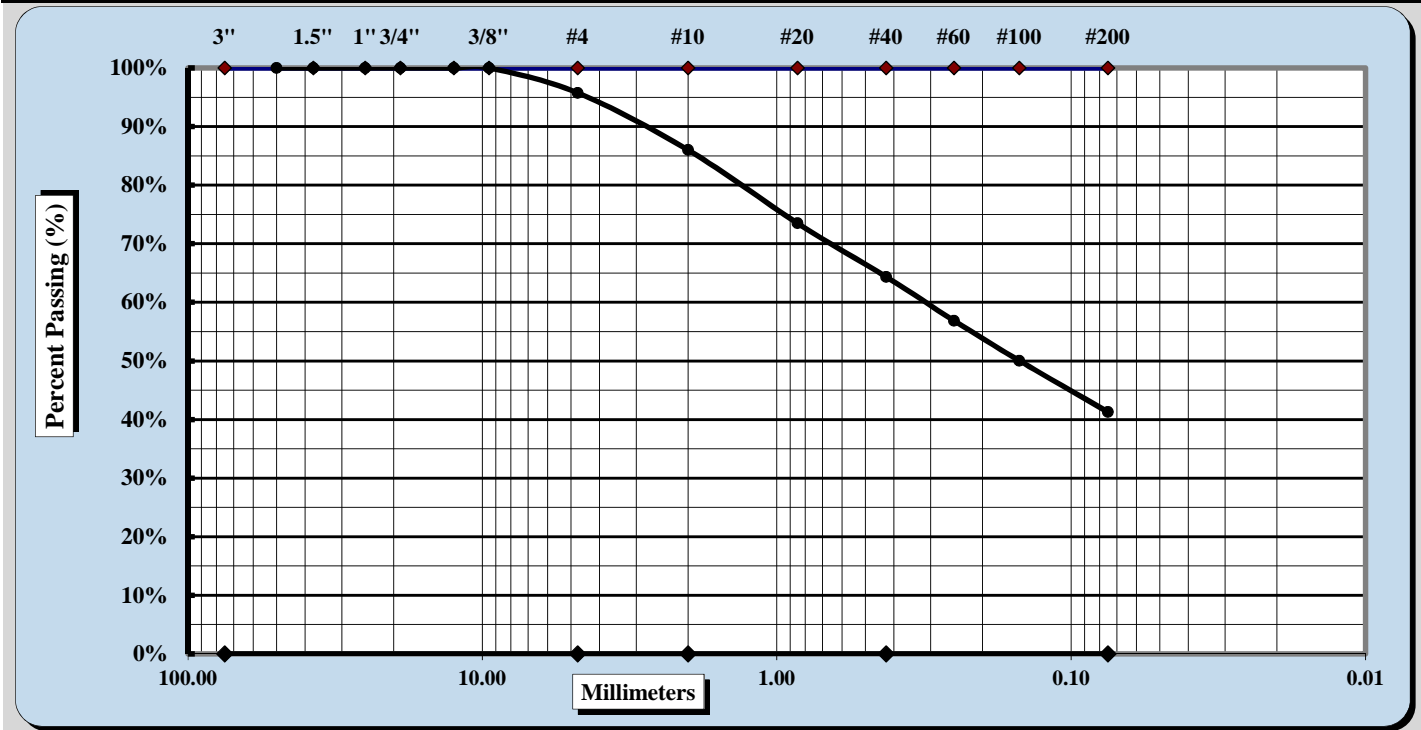


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-BR19 | Sample#: | S-16 |
| Log#: | 601 | Depth: | 68-68.8 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 9.7% | Fine Sand | 23.1% |
| Gravel | 4.2% | Medium Sand | 21.7% | Silt & Clay | 41.3% |
| Liquid Limit | 31 | Plastic Limit | 27 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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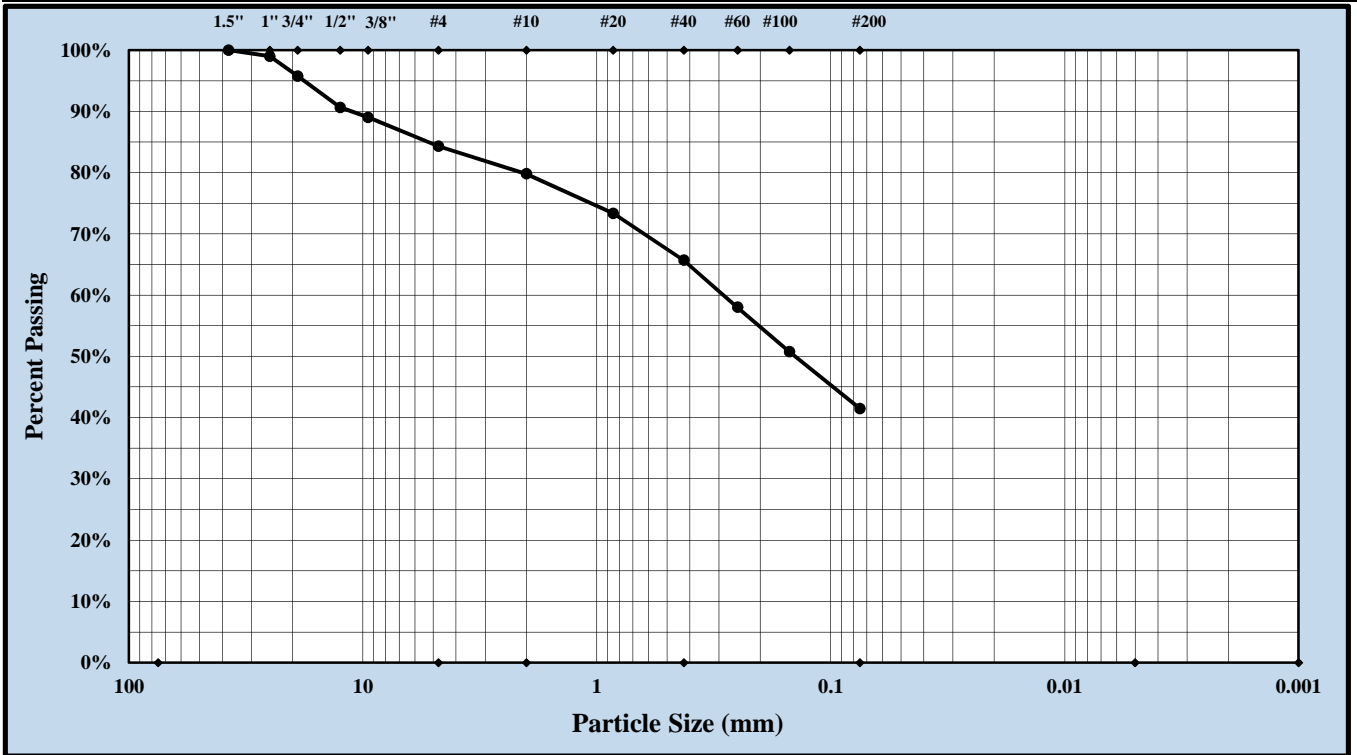
PARTICLE SIZE ANALYSIS OF SOIL



AASHTO T 88

| | | | |
|---|---------------------------------|---------------|------------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Report Date: | 7/25/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | July 17-21, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19GWP-P03 | Log #: | 43-2927 |
| | | | Depth: 1 - 7 ft |

Sample Description: **CLAYEY SAND WITH GRAVEL (SC) / A-6**



| | | | |
|-------------|---------------------------------|---------------|----------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

Maximum Particle Size: 3/4" Gravel: 15.7%
 Silt & Clay (% Passing #200): 41.5% Total Sand: 42.8%

Liquid Limit: 34 Plastic Limit: 23 Plastic Index: 11
 Coarse Sand: 4.5% Medium Sand: 14.1% Fine Sand: 24.2%

Description of Sand and Gravel Rounded Angular Hard & Durable Soft Weathered & Friable

Note: Sand and gravel sizes and fractions are per ASTM D2487

References / Comments / Deviations: Virginia Test Method - 25

| | | | |
|---|---------------|-----------------------------|-------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | Senior Engineer Position | 7/25/2019 Date |
|---|---------------|-----------------------------|-------------------|

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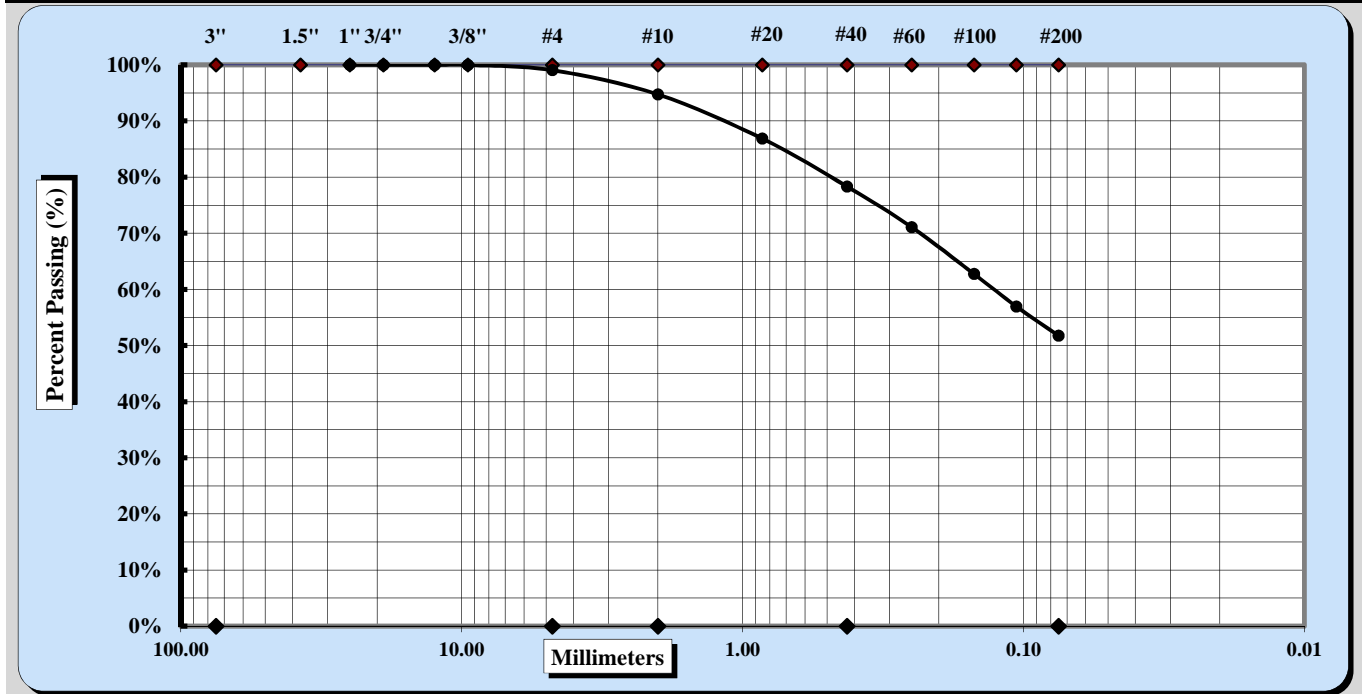
Sieve Analysis of Soils

Quality Assurance

ASTM D6913 Method A

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|---------------|--------------|
| Project #: 1243-19-025 | Report Date: | 9/17/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 9/13/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-P04 | Type: | Split Spoon |
| Sample Log No.: 43-2944 | Sample: | S-1 |
| | Depth: | 0.7 - 2.7 ft |
| Sample Description: SANDY LEAN CLAY (CL), Brown | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|----|---------------|-----|---------------|-----|
| Maximum Particle Size | #4 | Coarse Sand | 4% | Fine Sand | 27% |
| Gravel | 1% | Medium Sand | 16% | Silt & Clay | 52% |
| Liquid Limit | 35 | Plastic Limit | 22 | Plastic Index | 13 |

| | | | | | |
|---|-------------------------------------|-------------|-------------------------------------|---------------------|--------------------------|
| Coarse Sand | 4% | Medium Sand | 16% | Fine Sand | 27% |
| Description of Sand & Gravel Particles: | | Rounded | <input checked="" type="checkbox"/> | Angular | <input type="checkbox"/> |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487.

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/17/2019
 Date

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Sieve Analysis of Soils

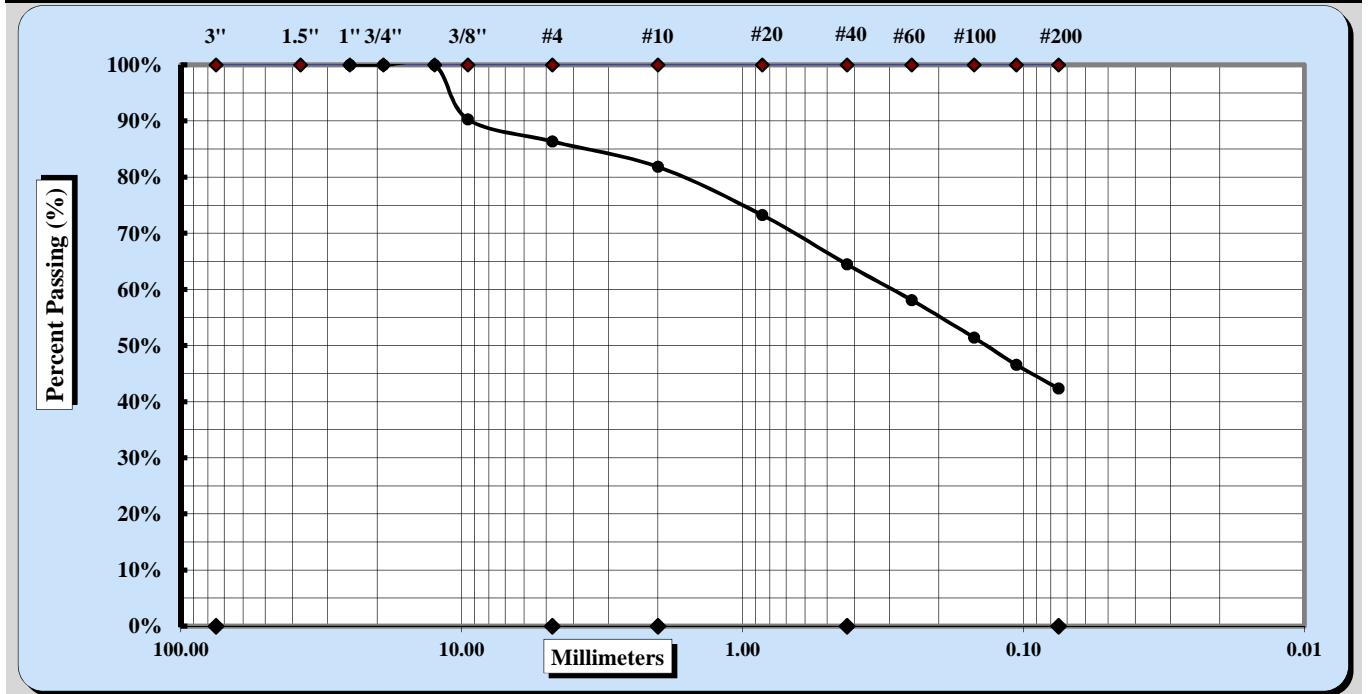


Quality Assurance

AASHTO T 88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|---------------|--------------|
| Project #: 1243-19-025 | Report Date: | 9/17/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 9/13/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-P05 | Type: | Split Spoon |
| Sample Log No.: 43-2944 | Sample: | S-2 |
| | Depth: | 2.8 - 4.8 ft |
| Sample Description: CLAYEY SAND (SC), Brown | | A-6 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-----|---------------|-----|
| Maximum Particle Size | 1/2" | Coarse Sand | 5% | Fine Sand | 22% |
| Gravel | 14% | Medium Sand | 17% | Silt & Clay | 42% |
| Liquid Limit | 38 | Plastic Limit | 24 | Plastic Index | 14 |

| | | | | | |
|---|-------------------------------------|-------------|-------------------------------------|---------------------|-------------------------------------|
| Coarse Sand | 5% | Medium Sand | 17% | Fine Sand | 22% |
| Description of Sand & Gravel Particles: | | Rounded | <input checked="" type="checkbox"/> | Angular | <input checked="" type="checkbox"/> |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487.

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

9/17/2019
Date

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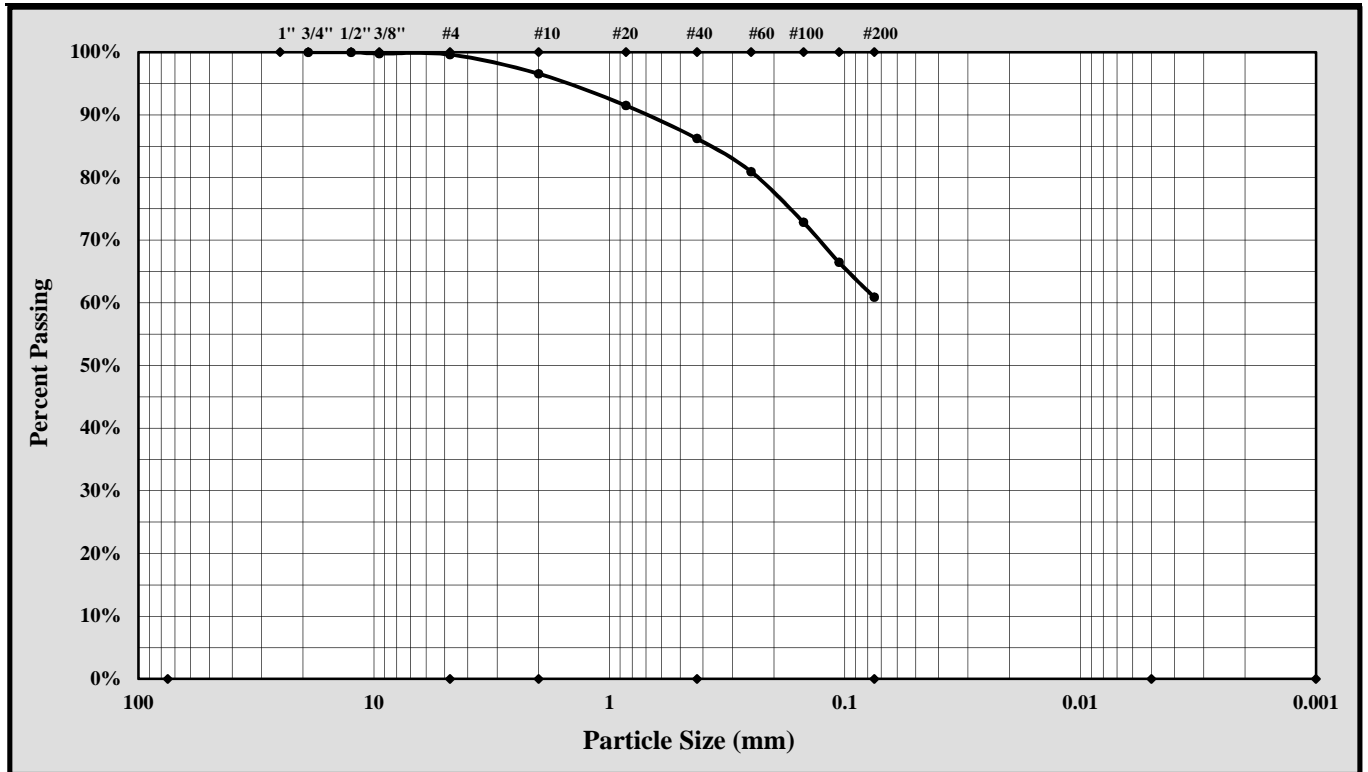
PARTICLE SIZE ANALYSIS OF SOIL



AASHTO T 88

S&ME, Inc., 1413 Topside Road, Louisville, TN 37777

| | | | |
|---------------------|---------------------------------|---------------|--------------|
| S&ME Project #: | 1243-19-025 | Report Date: | 8/2/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | 7/19/2019 |
| Client Name: | HDR Engineering, Inc. | | |
| Address: | Glen Allen, VA | | |
| Sample ID: | 19GWP-P07 | | |
| Sample Log No.: | 43-2927 | Depth: | 2.5 - 6.5 ft |
| Sample Description: | SANDY LEAN CLAY (CL) / A-6 | | |



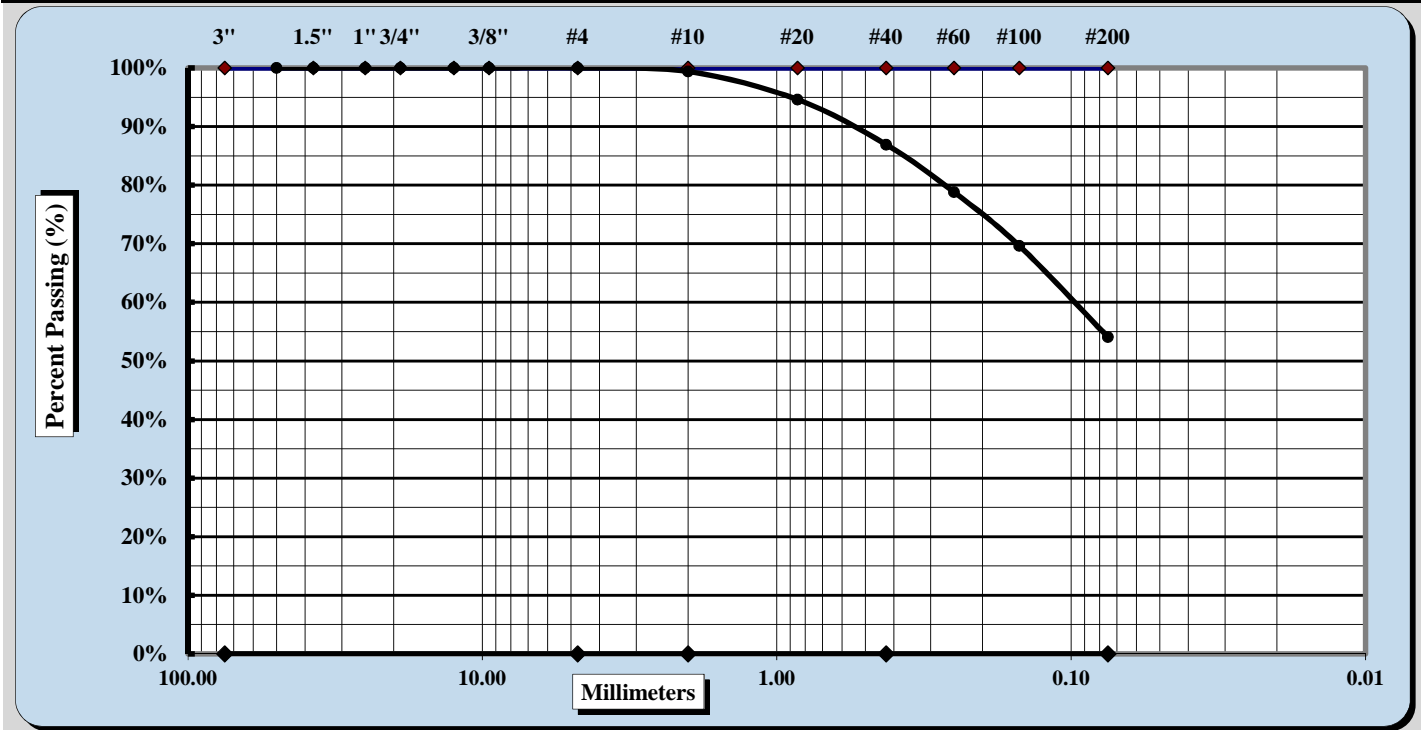


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-P09 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 3.5-5.5 ft |

Sample Description: SANDY SILT (ML) A-4/A-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 0.6% | Fine Sand | 32.8% |
| Gravel | 0.0% | Medium Sand | 12.5% | Silt & Clay | 54.1% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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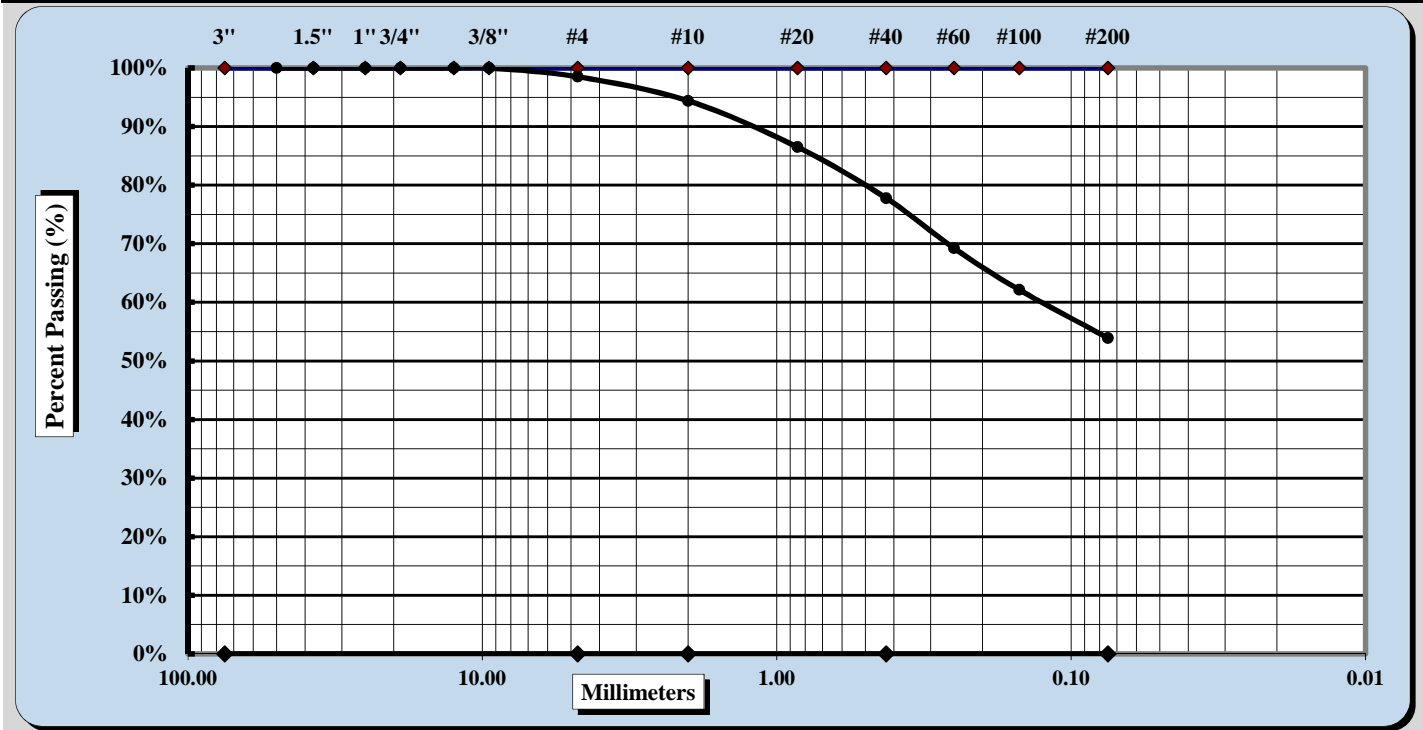


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW01 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.1% | Fine Sand | 23.9% |
| Gravel | 1.5% | Medium Sand | 16.6% | Silt & Clay | 53.9% |
| Liquid Limit | 36 | Plastic Limit | 30 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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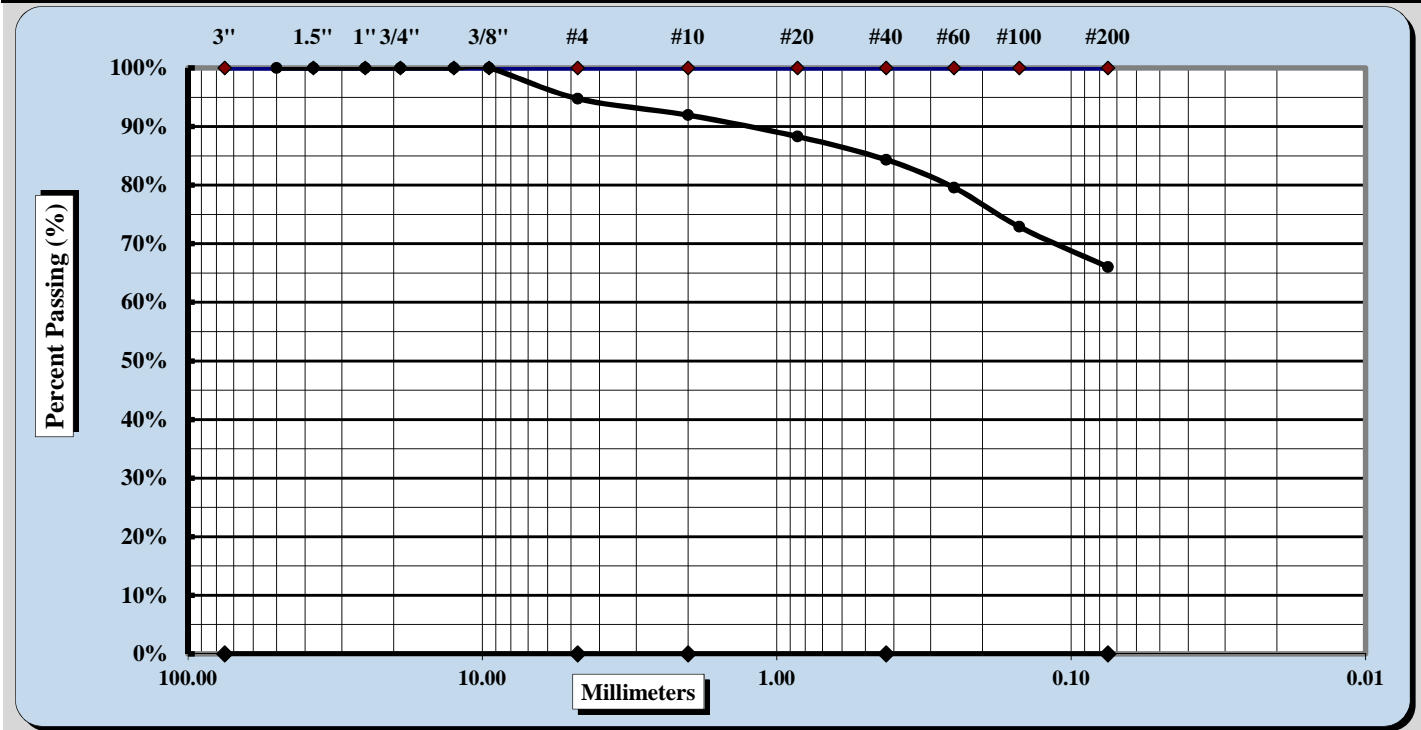


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW01 | Sample#: | S-4 |
| Log#: | 601 | Depth: | 8-10 ft |

Sample Description: SANDY LEAN CLAY (CL) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.8% | Fine Sand | 18.3% |
| Gravel | 5.2% | Medium Sand | 7.6% | Silt & Clay | 66.0% |
| Liquid Limit | 35 | Plastic Limit | 21 | Plastic Index | 14 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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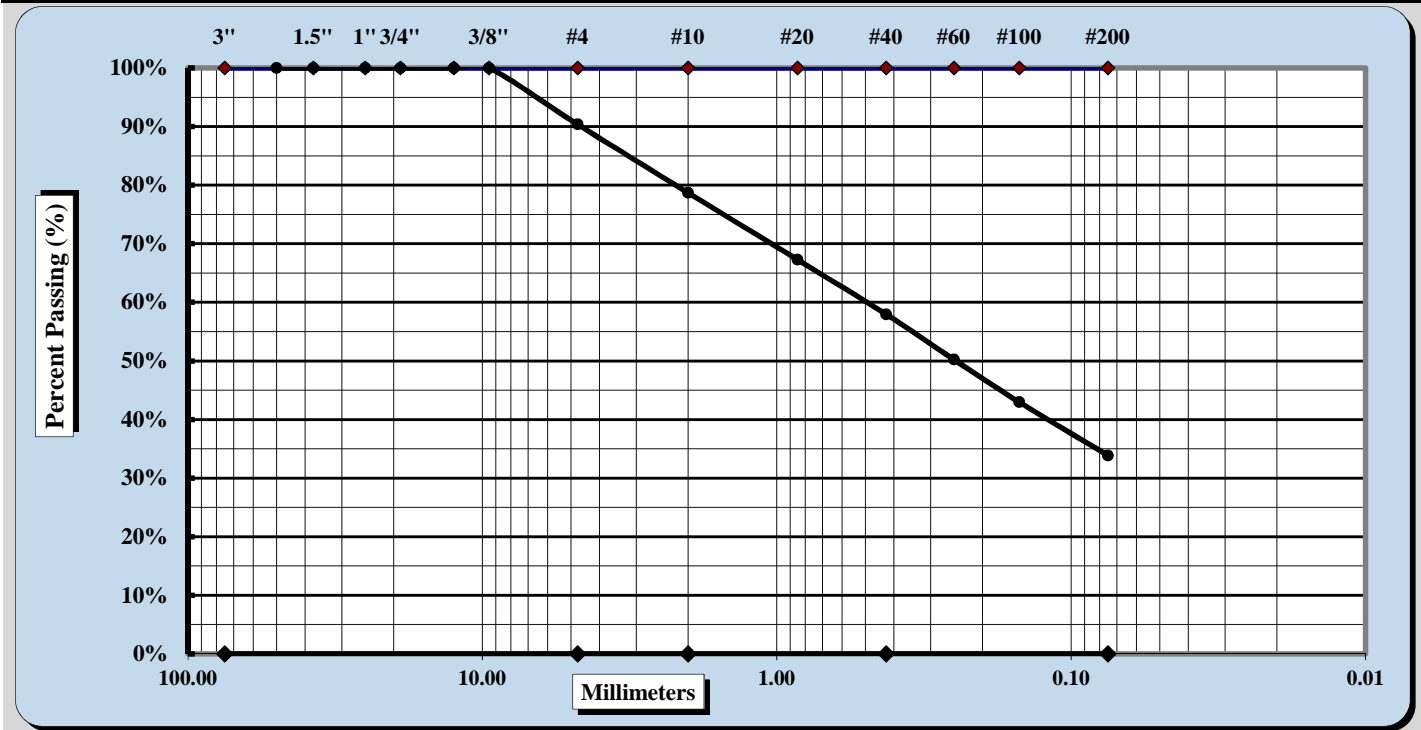


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW01 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 28-29.3 ft |

Sample Description: **SILTY SAND (SM)** **A-2-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 11.7% | Fine Sand | 24.1% |
| Gravel | 9.6% | Medium Sand | 20.7% | Silt & Clay | 33.9% |
| Liquid Limit | 30 | Plastic Limit | 28 | Plastic Index | 2 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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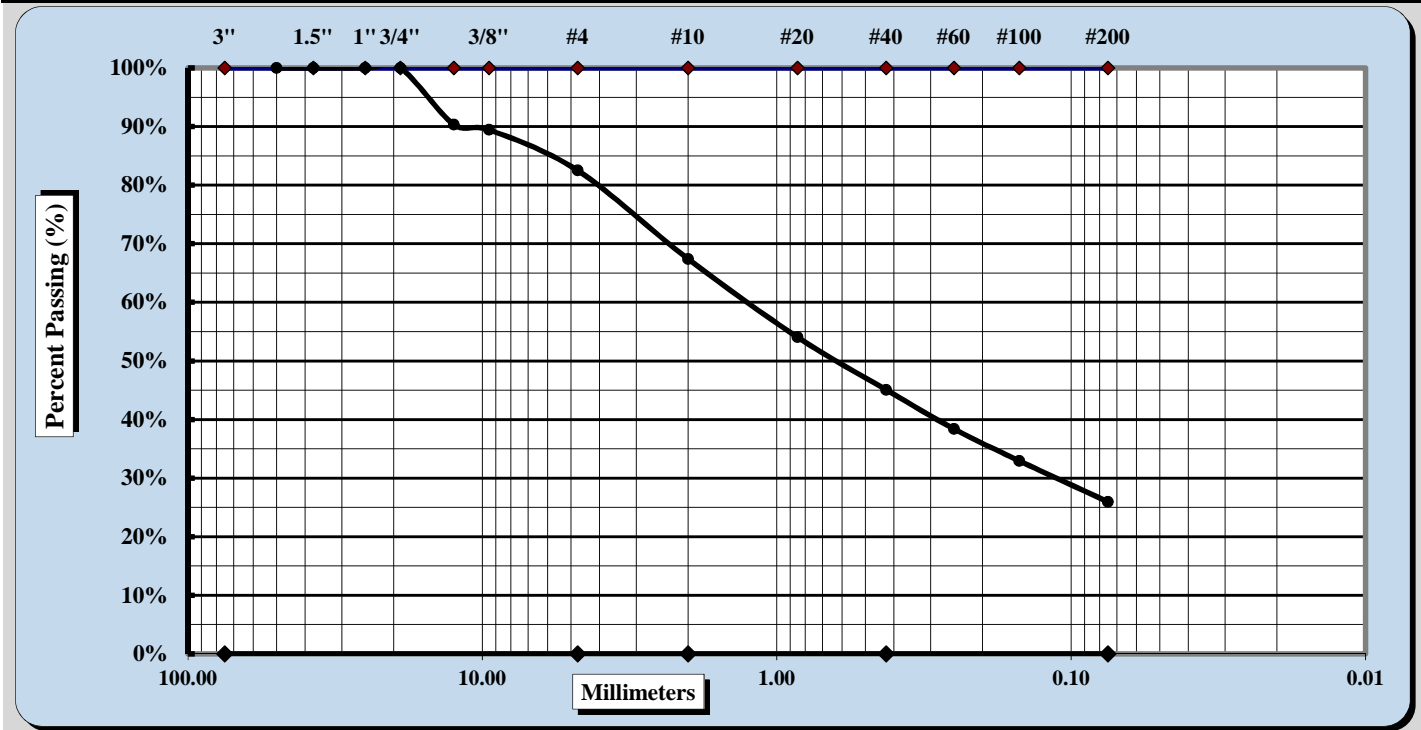


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW02 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-2**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 15.1% | Fine Sand | 19.1% |
| Gravel | 17.5% | Medium Sand | 22.3% | Silt & Clay | 26.0% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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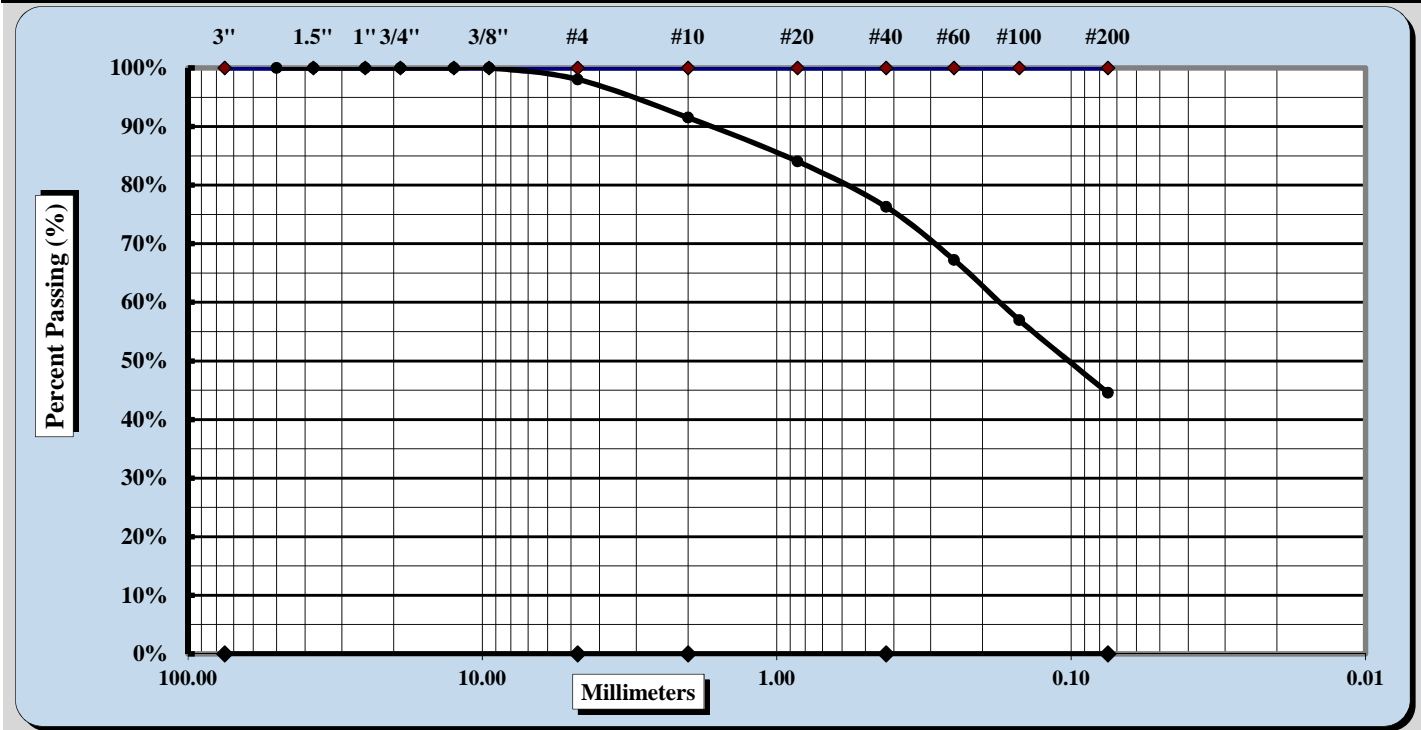


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW02 | Sample#: | S-7 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 6.5% | Fine Sand | 31.7% |
| Gravel | 1.9% | Medium Sand | 15.2% | Silt & Clay | 44.5% |
| Liquid Limit | 33 | Plastic Limit | 29 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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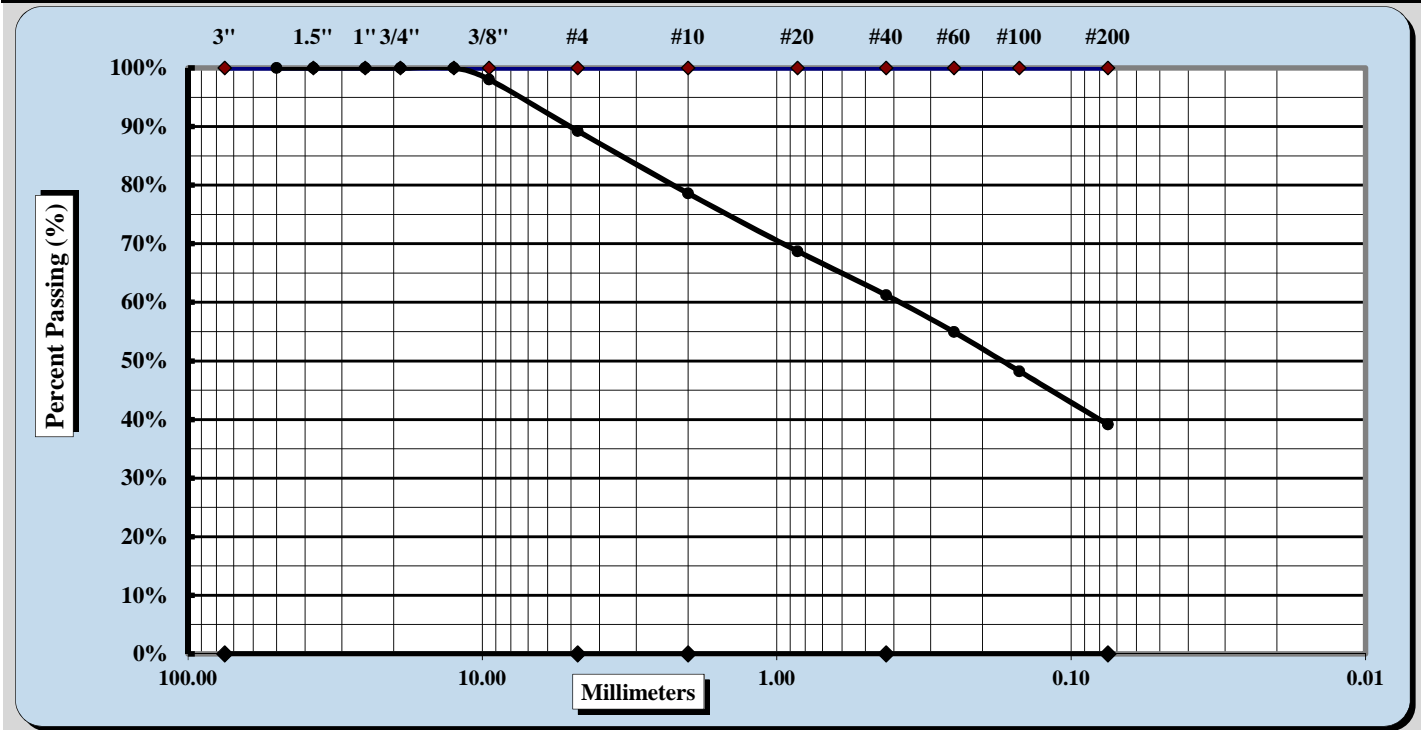


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW03 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 5-7 ft |

Sample Description: **SILTY SAND (SM) / A-4** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 10.7% | Fine Sand | 22.1% |
| Gravel | 10.7% | Medium Sand | 17.4% | Silt & Clay | 39.1% |
| Liquid Limit | 32 | Plastic Limit | 27 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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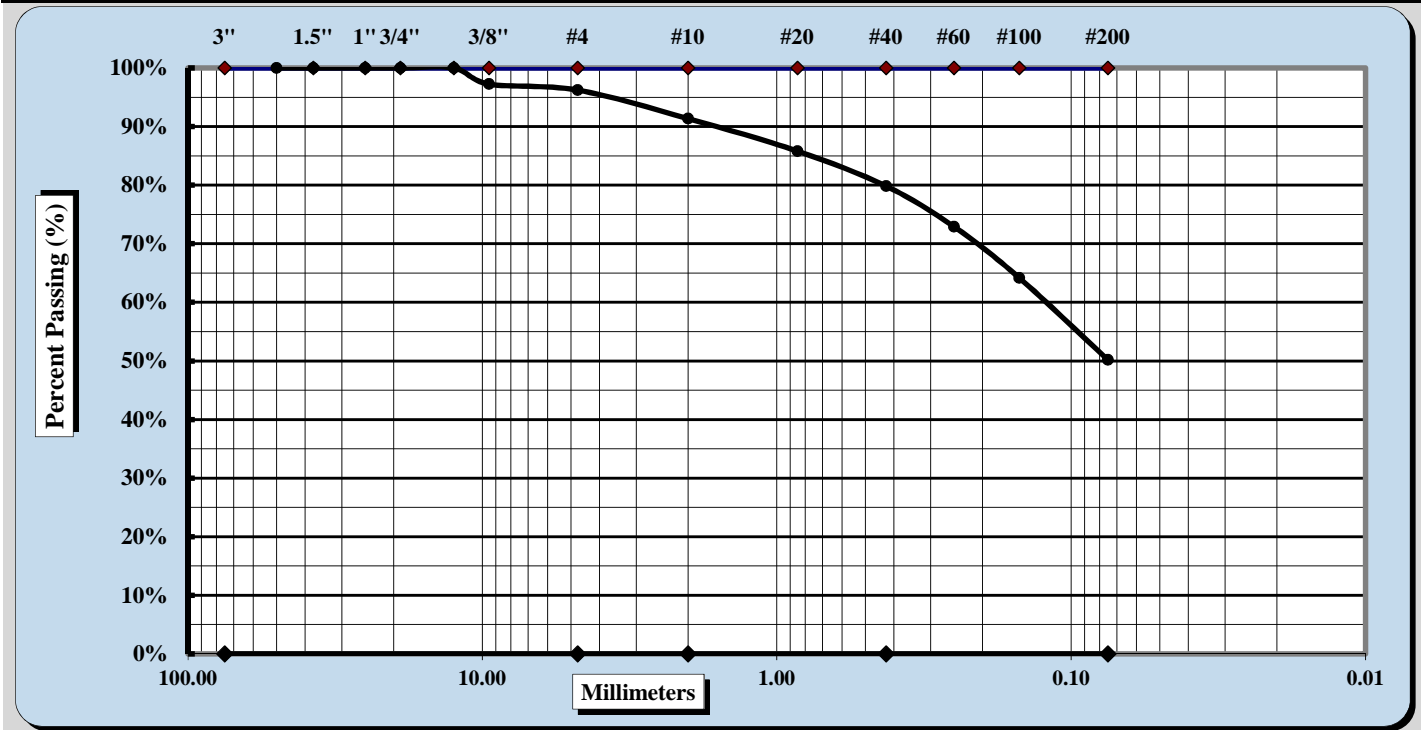


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW03 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 4.9% | Fine Sand | 29.7% |
| Gravel | 3.8% | Medium Sand | 11.5% | Silt & Clay | 50.2% |
| Liquid Limit | 35 | Plastic Limit | 30 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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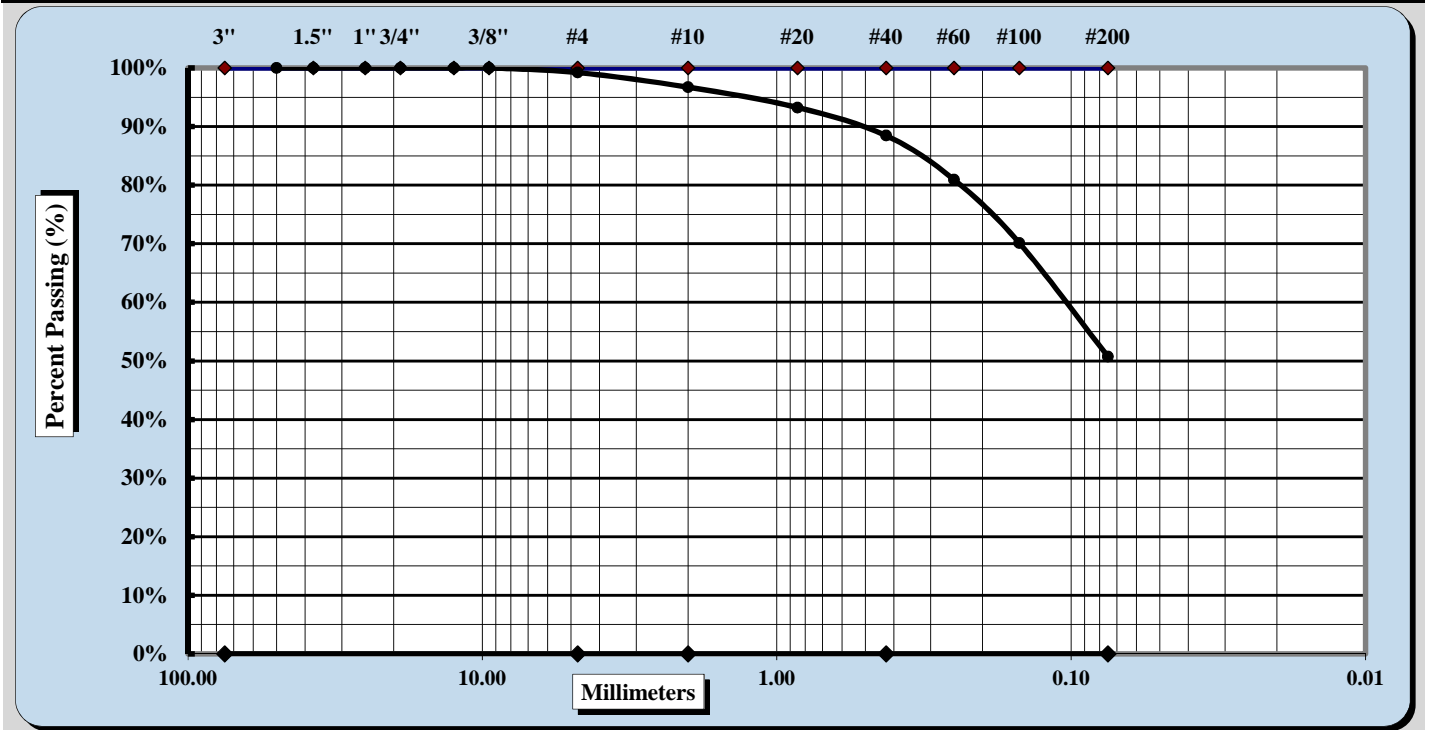


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW03 | Sample#: | S-13 |
| Log#: | 601 | Depth: | 48-50 ft |

Sample Description: SANDY SILT (ML) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.5% | Fine Sand | 37.7% |
| Gravel | 0.8% | Medium Sand | 8.3% | Silt & Clay | 50.7% |
| Liquid Limit | 38 | Plastic Limit | 27 | Plastic Index | 11 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|--|--------------------------|
| <u>Jimmy Hanson</u> Technical Responsibility | Signature | <u>Geotechnical Lab Supervisor</u> Position | <u>8/23/2019</u> Date |
|---|---------------|--|--------------------------|

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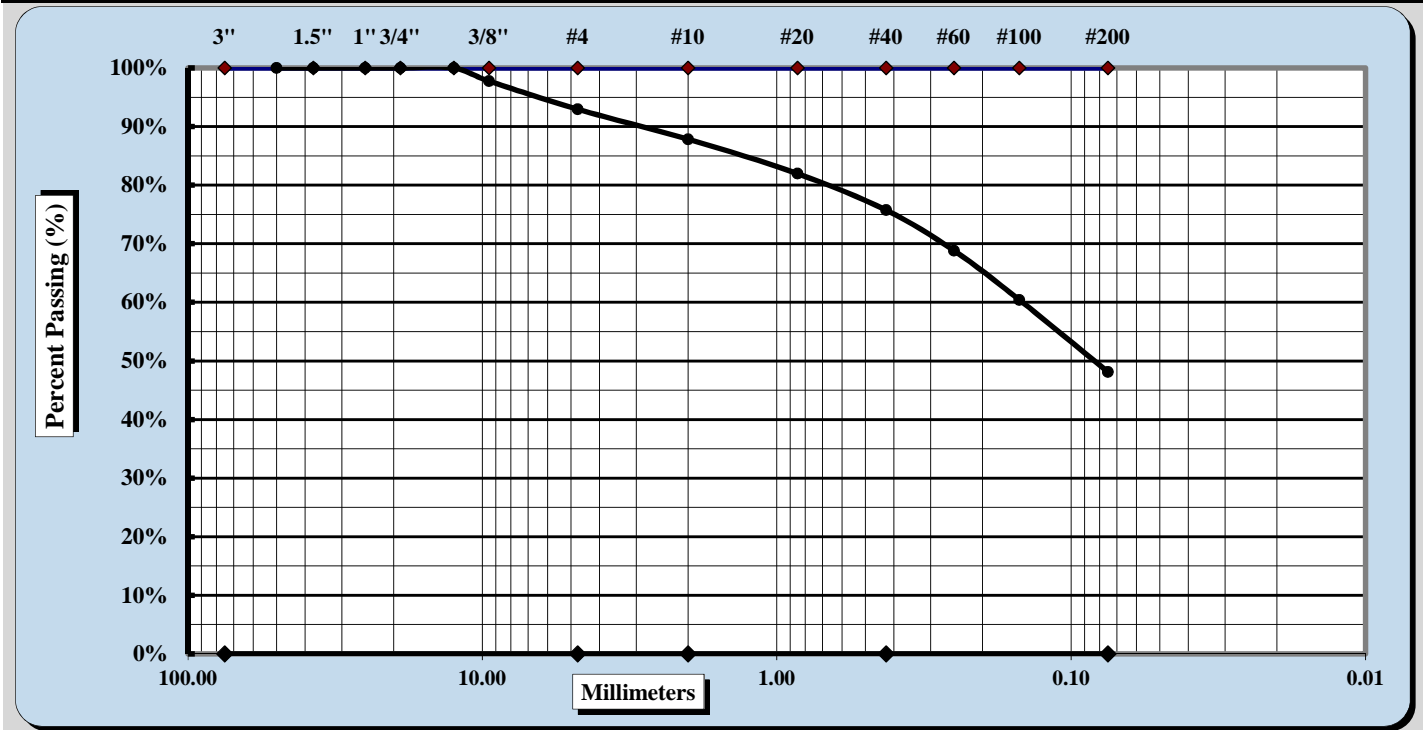


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW04 | Sample#: | S-5 |
| Log#: | 601 | Depth: | 8.5-10.5 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 5.1% | Fine Sand | 27.6% |
| Gravel | 7.0% | Medium Sand | 12.1% | Silt & Clay | 48.1% |
| Liquid Limit | 33 | Plastic Limit | 30 | Plastic Index | 3 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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Sieve Analysis of Soils

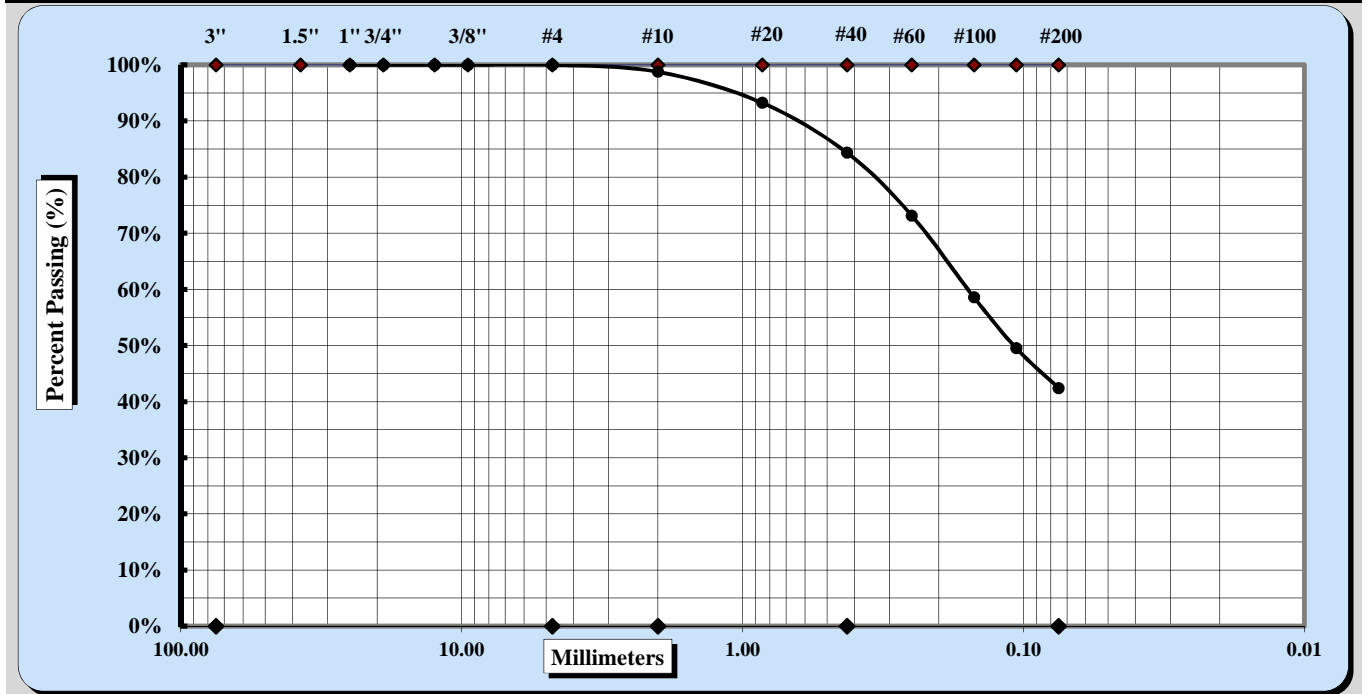


Quality Assurance

AASHTO T 88

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | |
|---|---------------|-------------|
| Project #: 1243-19-025 | Report Date: | 9/17/2019 |
| Project Name: I-495 Between McLean and Dulles | Test Date(s): | 9/13/2019 |
| Client Name: HDR Engineering Inc. | | |
| Client Address: Glen Allen, Virginia | | |
| Sample ID: 19GWP-RW06 | Type: | Split Spoon |
| Sample Log No.: 43-2944 | Sample: | S-2 |
| | Depth: | 4 - 6 ft |
| Sample Description: SILTY SAND (SM), Brown | | A-4 |



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-----|---------------|-----|---------------|-----|
| Maximum Particle Size | #10 | Coarse Sand | 1% | Fine Sand | 42% |
| Gravel | 0% | Medium Sand | 14% | Silt & Clay | 42% |
| Liquid Limit | 35 | Plastic Limit | 25 | Plastic Index | 10 |

| | | | | | |
|---|-------------------------------------|-------------|--------------------------|---------------------|-------------------------------------|
| Coarse Sand | 1% | Medium Sand | 14% | Fine Sand | 42% |
| Description of Sand & Gravel Particles: | | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and gravel sizes and fractions are per ASTM D2487.

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

9/17/2019
Date

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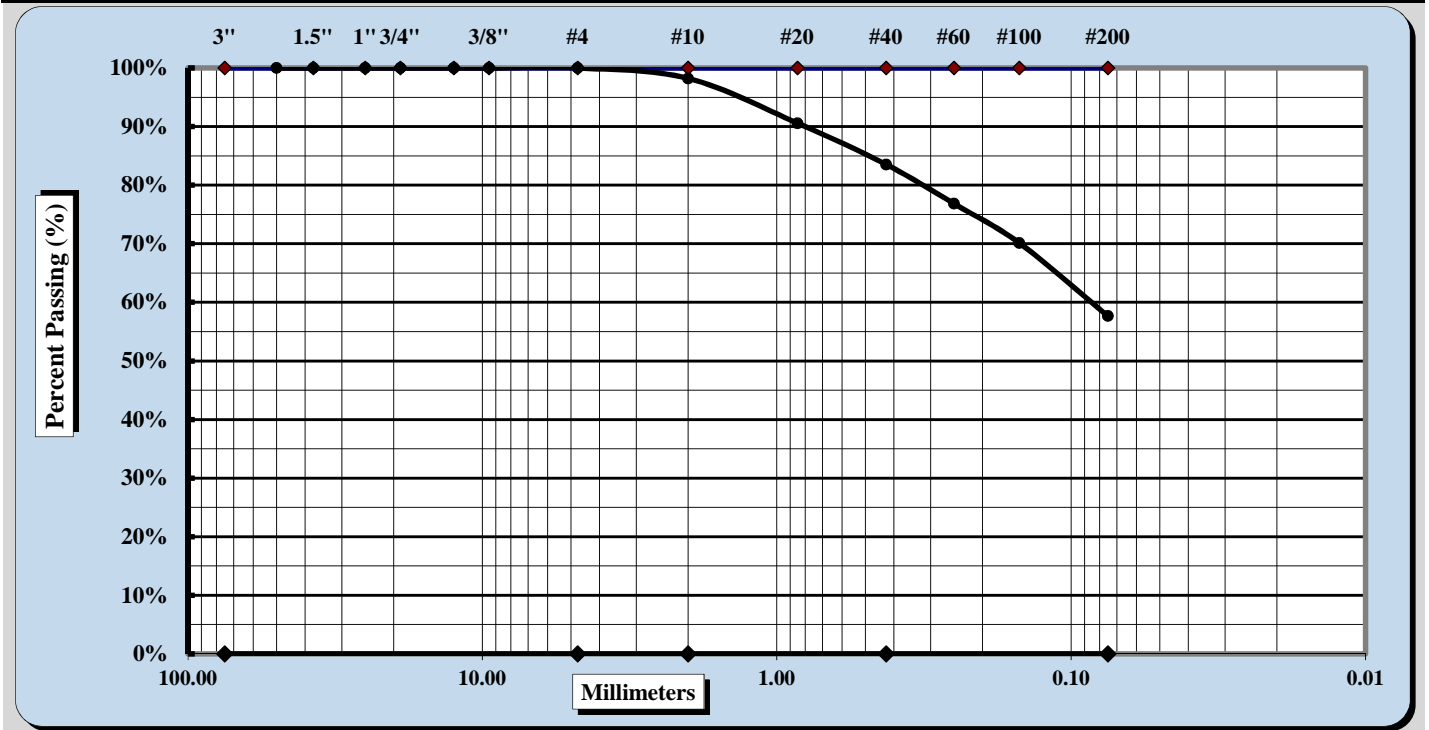


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW06 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 28-30 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 1.8% | Fine Sand | 25.9% |
| Gravel | 0.0% | Medium Sand | 14.7% | Silt & Clay | 57.7% |
| Liquid Limit | 36 | Plastic Limit | 32 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|------------------------------------|---------------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | <u>Senior Engineer</u> Position | <u>10/21/2019</u> Date |
|---|---------------|------------------------------------|---------------------------|

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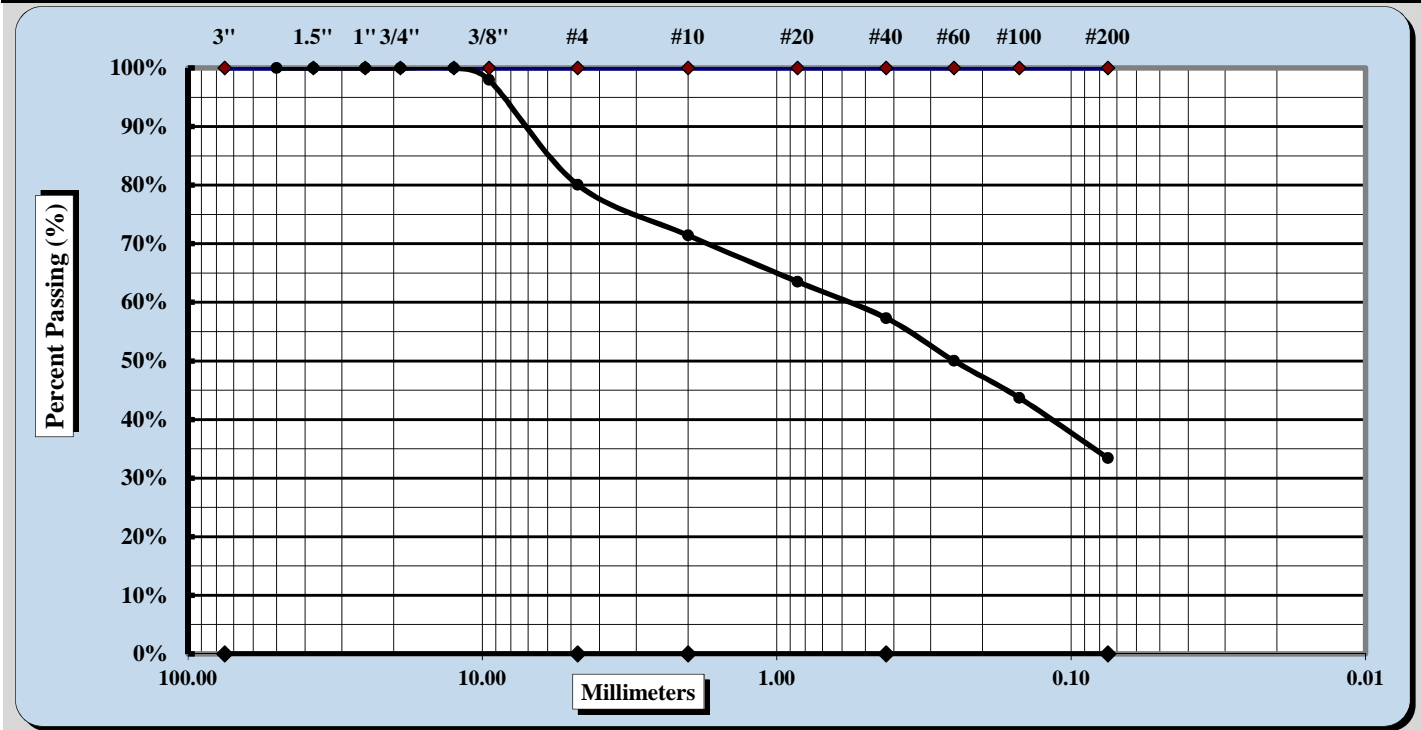


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW06 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 43-43.3 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-2-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 8.6% | Fine Sand | 23.9% |
| Gravel | 19.9% | Medium Sand | 14.1% | Silt & Clay | 33.4% |
| Liquid Limit | 25 | Plastic Limit | 22 | Plastic Index | 3 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|------------------------------------|---------------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | <u>Senior Engineer</u> Position | <u>10/21/2019</u> Date |
|---|---------------|------------------------------------|---------------------------|

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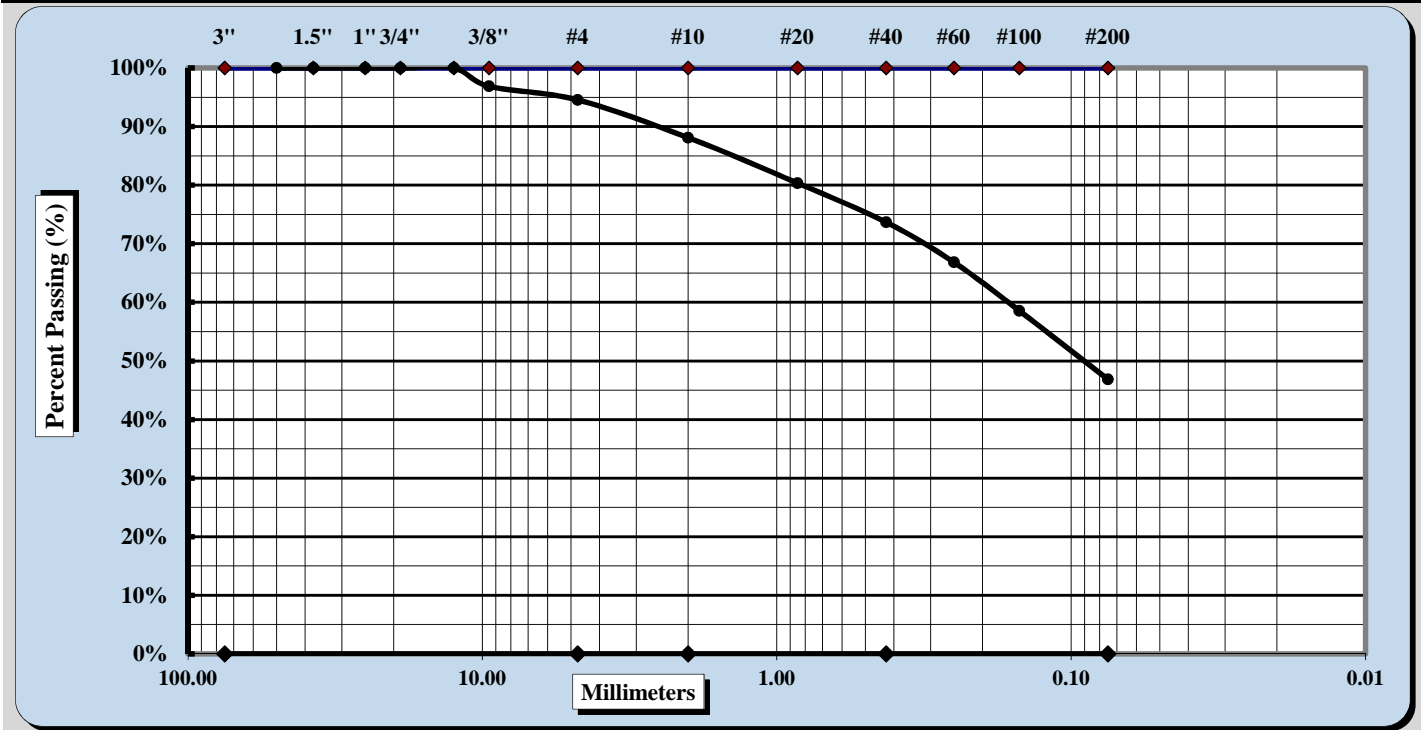


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW07 | Sample#: | S-6 |
| Log#: | 601 | Depth: | 18-20 ft |

Sample Description: SILTY SAND (SM) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 6.5% | Fine Sand | 26.8% |
| Gravel | 5.4% | Medium Sand | 14.4% | Silt & Clay | 46.9% |
| Liquid Limit | 35 | Plastic Limit | 28 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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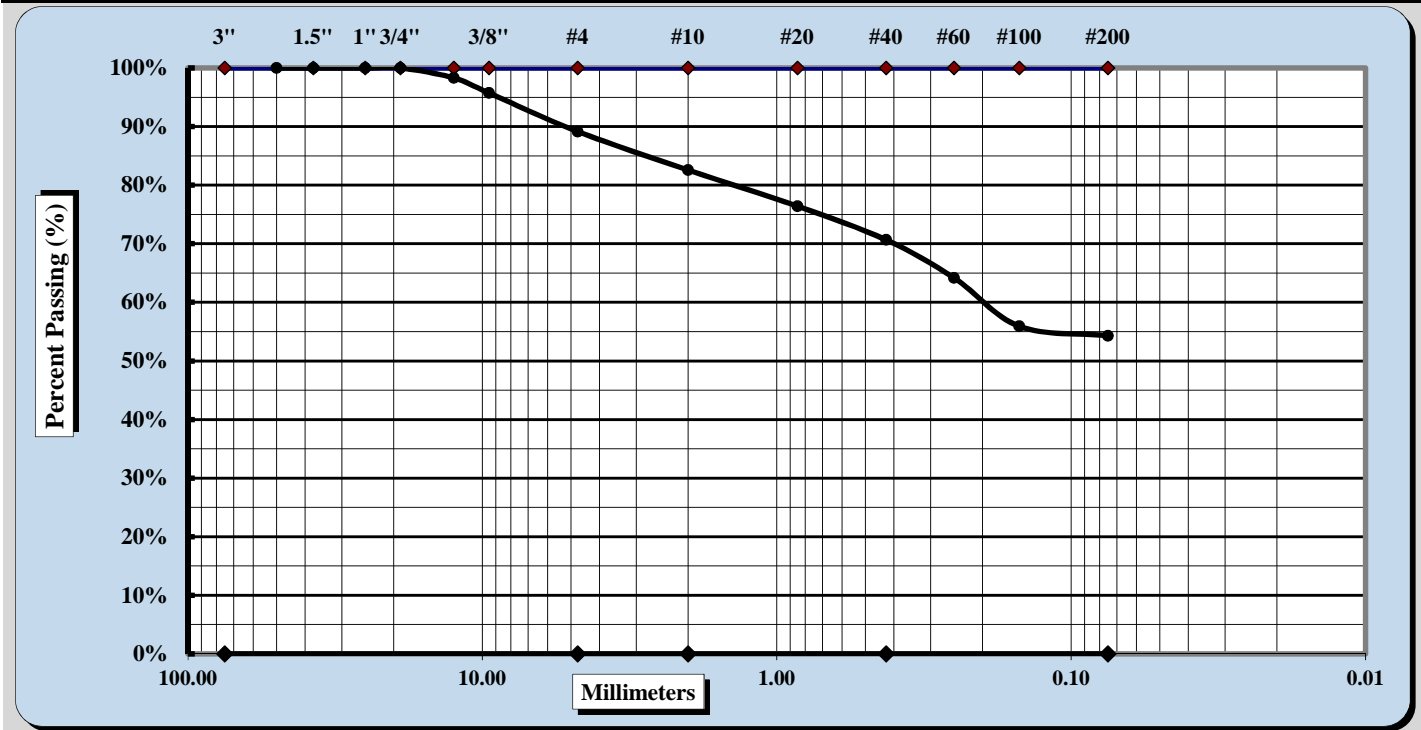


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW07 | Sample#: | S-9 |
| Log#: | 601 | Depth: | 33-35 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 6.6% | Fine Sand | 16.4% |
| Gravel | 10.8% | Medium Sand | 11.9% | Silt & Clay | 54.3% |
| Liquid Limit | 32 | Plastic Limit | 28 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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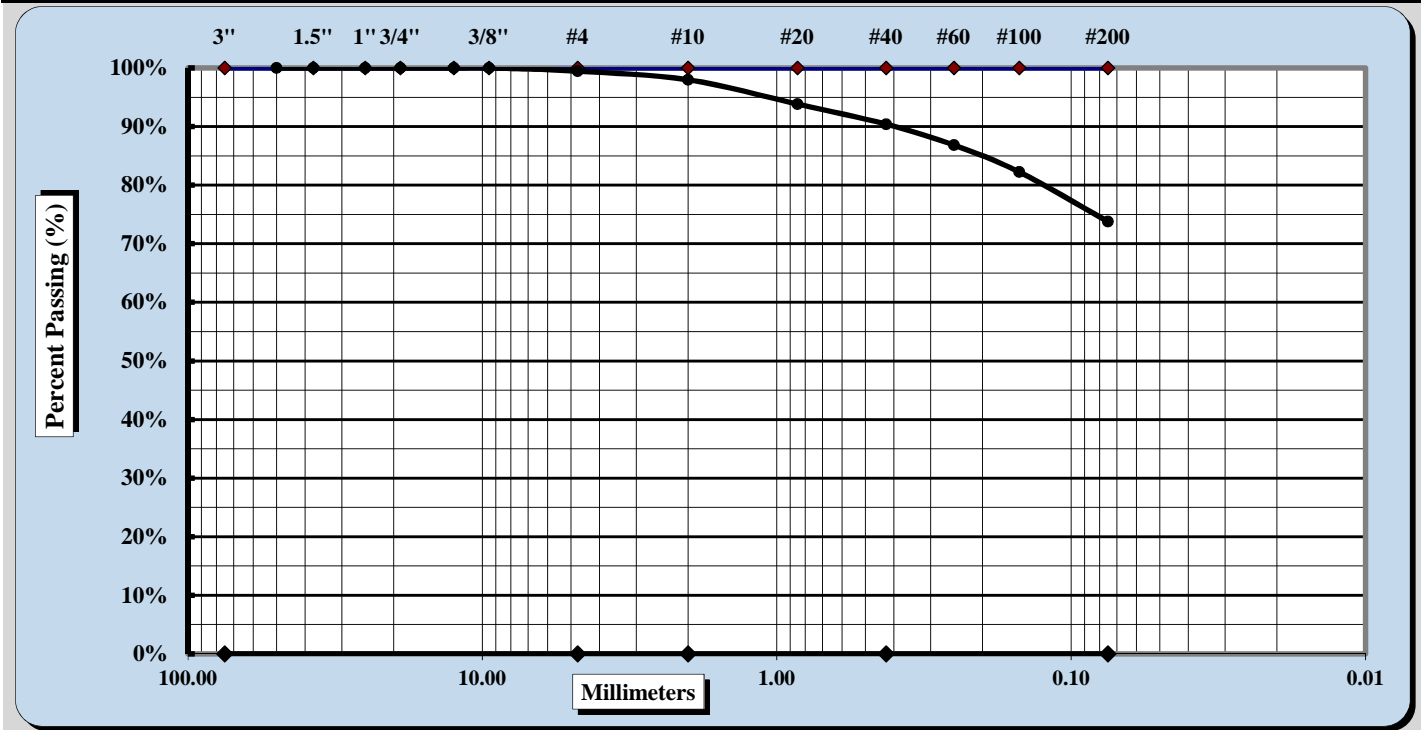


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW08 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 1-3 ft |

Sample Description: **LEAN CLAY WITH SAND (CL)** **A-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 1.5% | Fine Sand | 16.6% |
| Gravel | 0.5% | Medium Sand | 7.6% | Silt & Clay | 73.8% |
| Liquid Limit | 40 | Plastic Limit | 25 | Plastic Index | 15 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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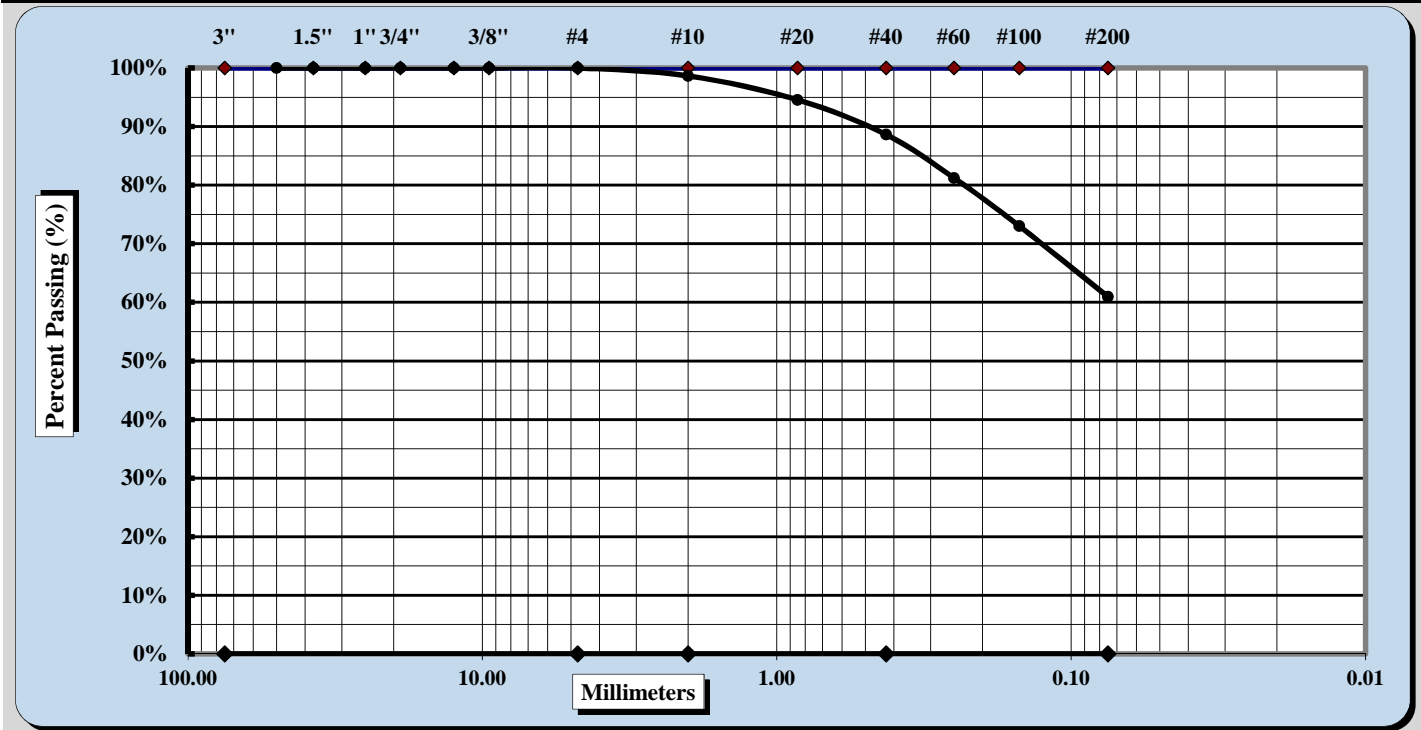


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW08 | Sample#: | S-9 |
| Log#: | 601 | Depth: | 29-30.4 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 1.3% | Fine Sand | 27.7% |
| Gravel | 0.0% | Medium Sand | 10.0% | Silt & Clay | 60.9% |
| Liquid Limit | 34 | Plastic Limit | 28 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
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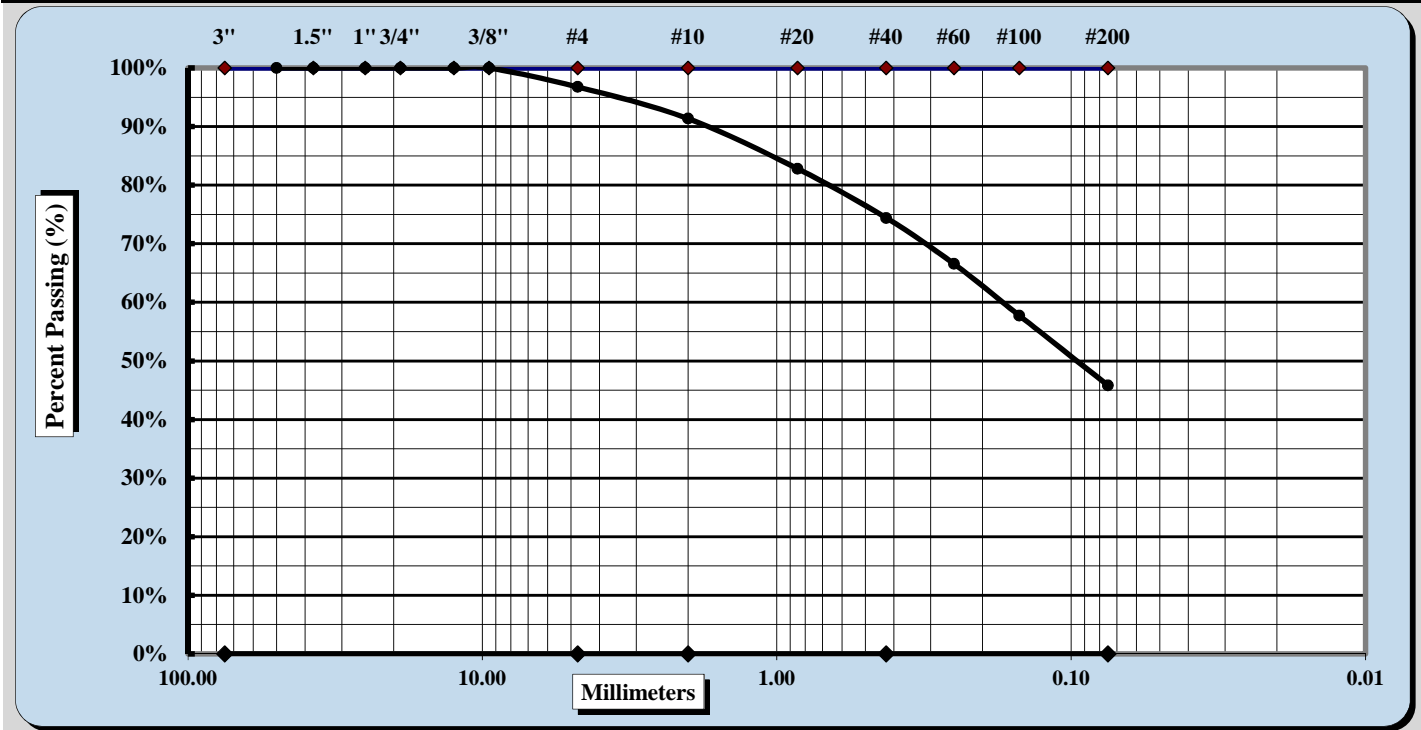


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW16 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 5.4% | Fine Sand | 28.6% |
| Gravel | 3.2% | Medium Sand | 16.9% | Silt & Clay | 45.8% |
| Liquid Limit | 32 | Plastic Limit | 27 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
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Signature

Geotechnical Lab Supervisor
Position

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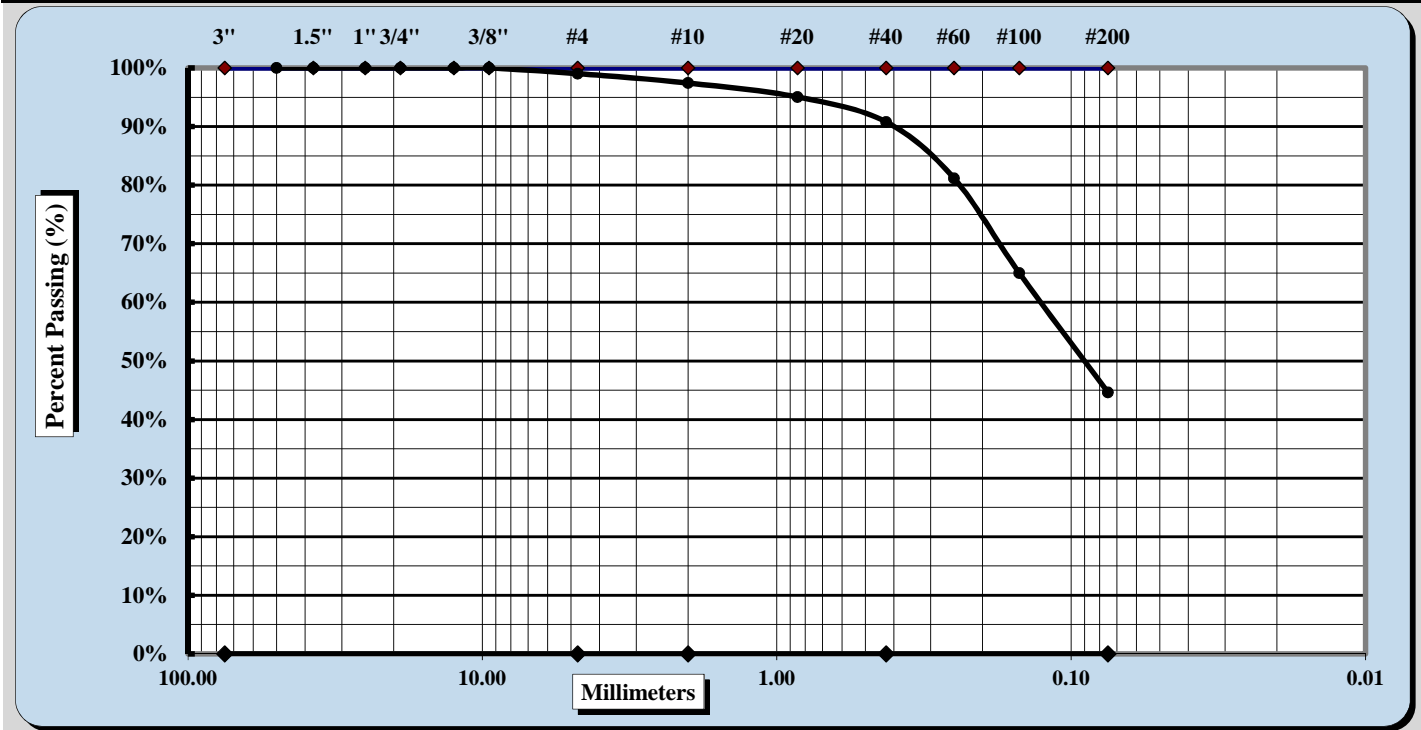


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW16 | Sample#: | S-9 |
| Log#: | 601 | Depth: | 28-30 ft |

Sample Description: **SILTY SAND (SM)** **A-4/A-5**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 1.6% | Fine Sand | 46.2% |
| Gravel | 1.0% | Medium Sand | 6.6% | Silt & Clay | 44.6% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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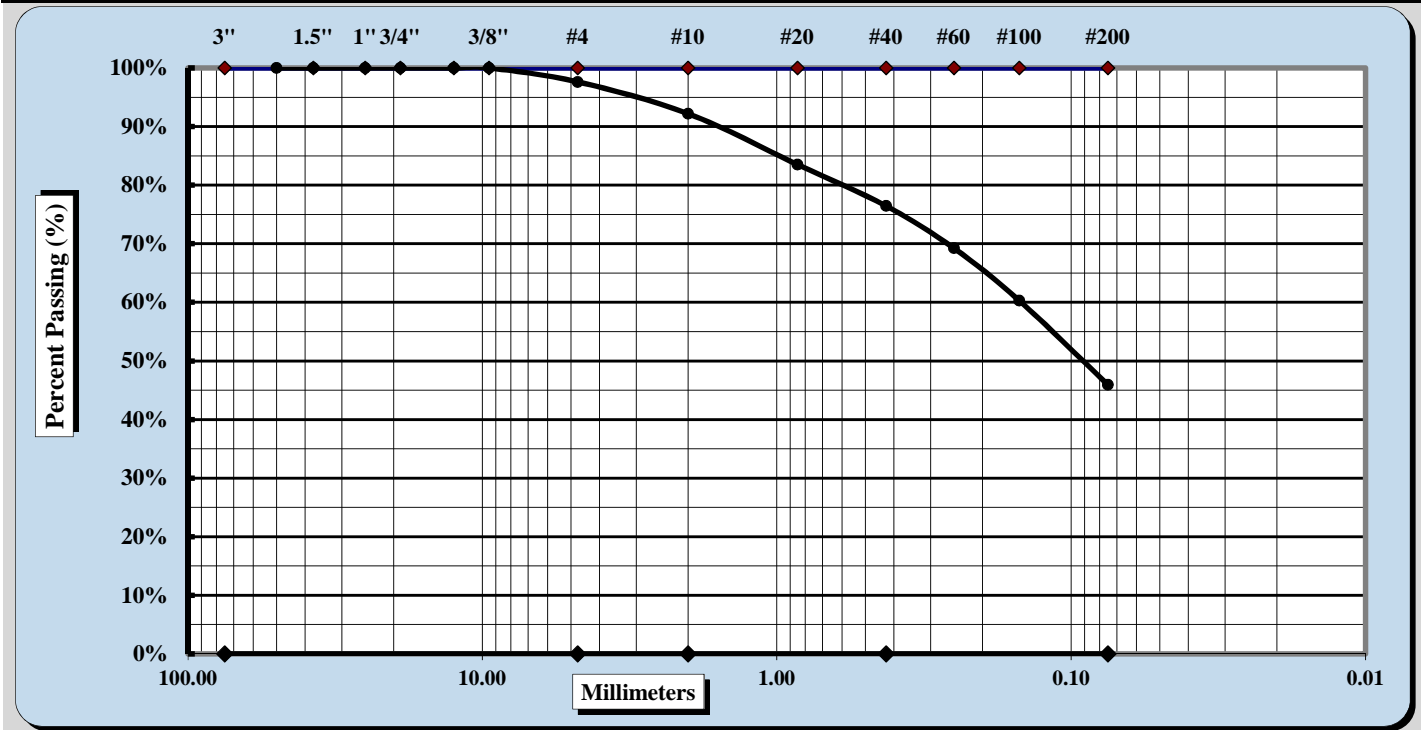


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19GWP-RW16 | Sample#: | S-12 |
| Log#: | 601 | Depth: | 43-43.4 ft |

Sample Description: **SILTY SAND (SM)** **A-4/A-5**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 5.4% | Fine Sand | 30.5% |
| Gravel | 2.4% | Medium Sand | 15.8% | Silt & Clay | 45.9% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Jimmy Hanson
Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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PARTICLE SIZE ANALYSIS OF SOIL

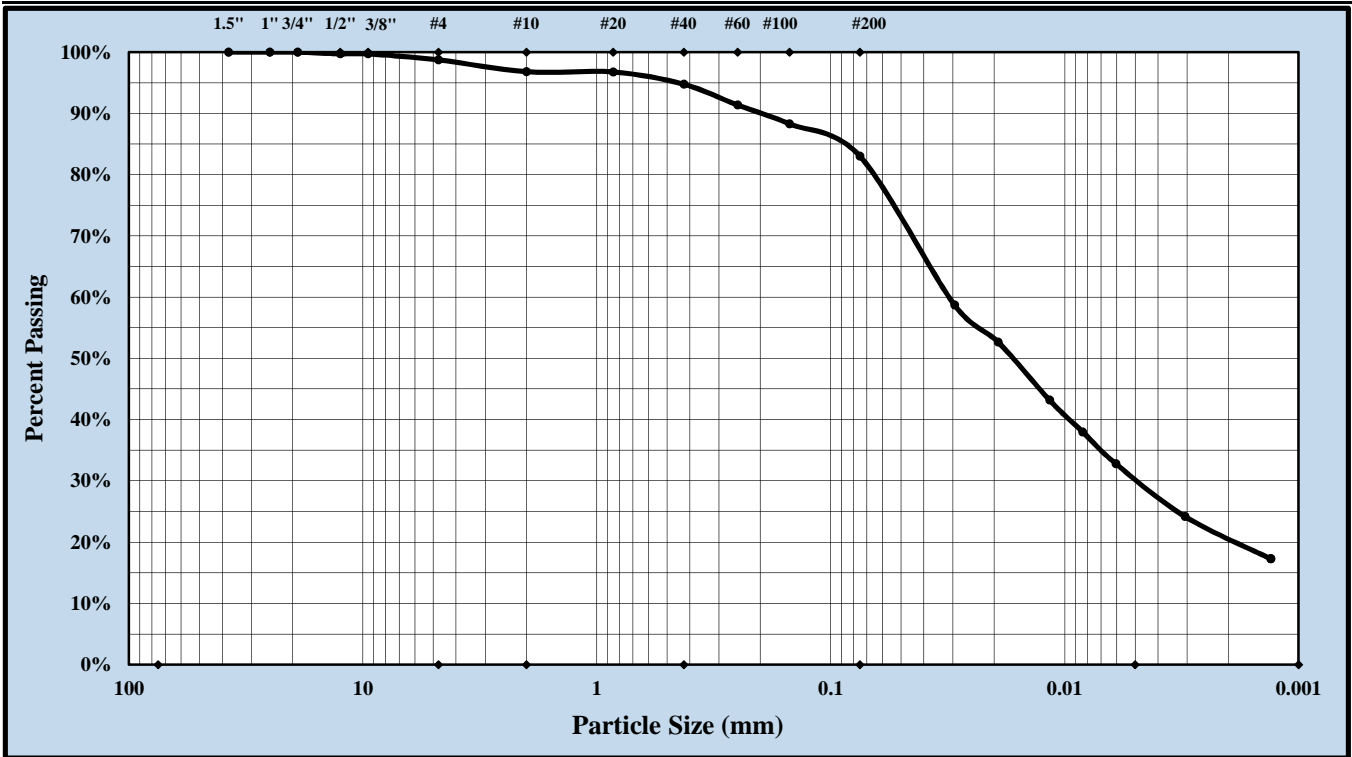


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|-----------------|---------------------------------|---------------|----------------------|
| S&ME Project #: | 1243-19-025 | Report Date: | 9/12/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | September 9-12, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19SWM-03 | | |
| | | | Depth: 6'-10' |

Sample Description: **LEAN CLAY WITH SAND (CL) / A-6**



| | | | |
|-------------|---------------------------------|-------------|-------------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt | < 0.075 and > 0.002 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | Clay | < 0.002 mm |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | Colloids | < 0.001 mm |

| | | | | | |
|-------------------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size: | 1/2" | Gravel: | 1.3% | Silt: | 62.5% |
| Silt & Clay (% Passing #200): | 83.0% | Total Sand: | 15.8% | Clay: | 20.5% |
| Assumed S.G. | 2.650 | | | | |
| Liquid Limit | 39 | Plastic Limit | 25 | Plastic Index | 14 |
| Coarse Sand: | 1.9% | Medium Sand: | 2.1% | Fine Sand: | 11.8% |

| | | | | | |
|---------------------------------|----------------------------------|---|--|-------------------------------|--|
| Description of Sand and Gravel | Rounded <input type="checkbox"/> | Angular <input checked="" type="checkbox"/> | Hard & Durable <input checked="" type="checkbox"/> | Soft <input type="checkbox"/> | Weathered & Friable <input type="checkbox"/> |
| Mechanical Stirring Apparatus A | Dispersion Period: | 1 min. | Dispersing Agent: | Sodium Hexametaphosphate: | 40 g./ Liter |

References / Comments / Deviations: **Virginia Test Method 25**

Jimmy Hanson
 Technical Responsibility

Signature

Geotechnical Lab Supervisor
 Position

9/12/2019
 Date

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PARTICLE SIZE ANALYSIS OF SOIL

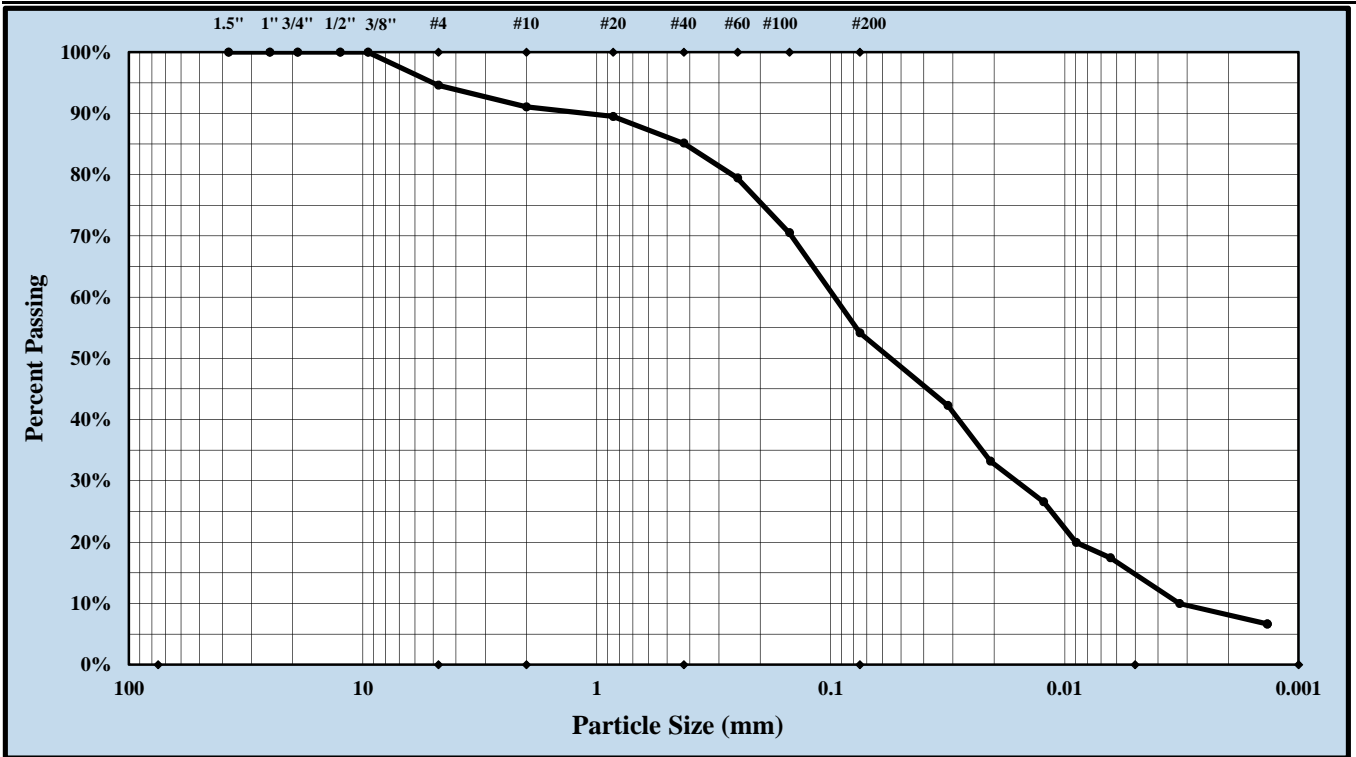


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|----------------------|
| S&ME Project #: | 1243-19-025 | Report Date: | 9/12/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | September 9-12, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19SWM-03 | Sample #: | S-2 |
| | | | Depth: 2'-4' |

Sample Description: **SANDY SILT (ML) / A-4**



| | | | |
|-------------|---------------------------------|-------------|-------------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt | < 0.075 and > 0.002 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | Clay | < 0.002 mm |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | Colloids | < 0.001 mm |

| | | | | | |
|-------------------------------|---------|---------------|-------|---------------|-------|
| Maximum Particle Size: | 3/8 in. | Gravel: | 5.4% | Silt: | 46.2% |
| Silt & Clay (% Passing #200): | 54.2% | Total Sand: | 40.4% | Clay: | 8.0% |
| Assumed S.G. | 2.650 | | | | |
| Liquid Limit | 40 | Plastic Limit | 30 | Plastic Index | 10 |
| Coarse Sand: | 3.5% | Medium Sand: | 5.9% | Fine Sand: | 31.0% |

| | | | | | |
|---------------------------------|----------------------------------|---|---|-------------------------------|---|
| Description of Sand and Gravel | Rounded <input type="checkbox"/> | Angular <input checked="" type="checkbox"/> | Hard & Durable <input type="checkbox"/> | Soft <input type="checkbox"/> | Weathered & Friable <input checked="" type="checkbox"/> |
| Mechanical Stirring Apparatus A | Dispersion Period: | 1 min. | Dispersing Agent: | Sodium Hexametaphosphate: | 40 g./ Liter |

References / Comments / Deviations: **Virginia Test Method 25**

Sand and gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|--|--------------------------|
| <u>Jimmy Hanson</u> Technical Responsibility | Signature | <u>Geotechnical Lab Supervisor</u> Position | <u>9/12/2019</u> Date |
|---|---------------|--|--------------------------|

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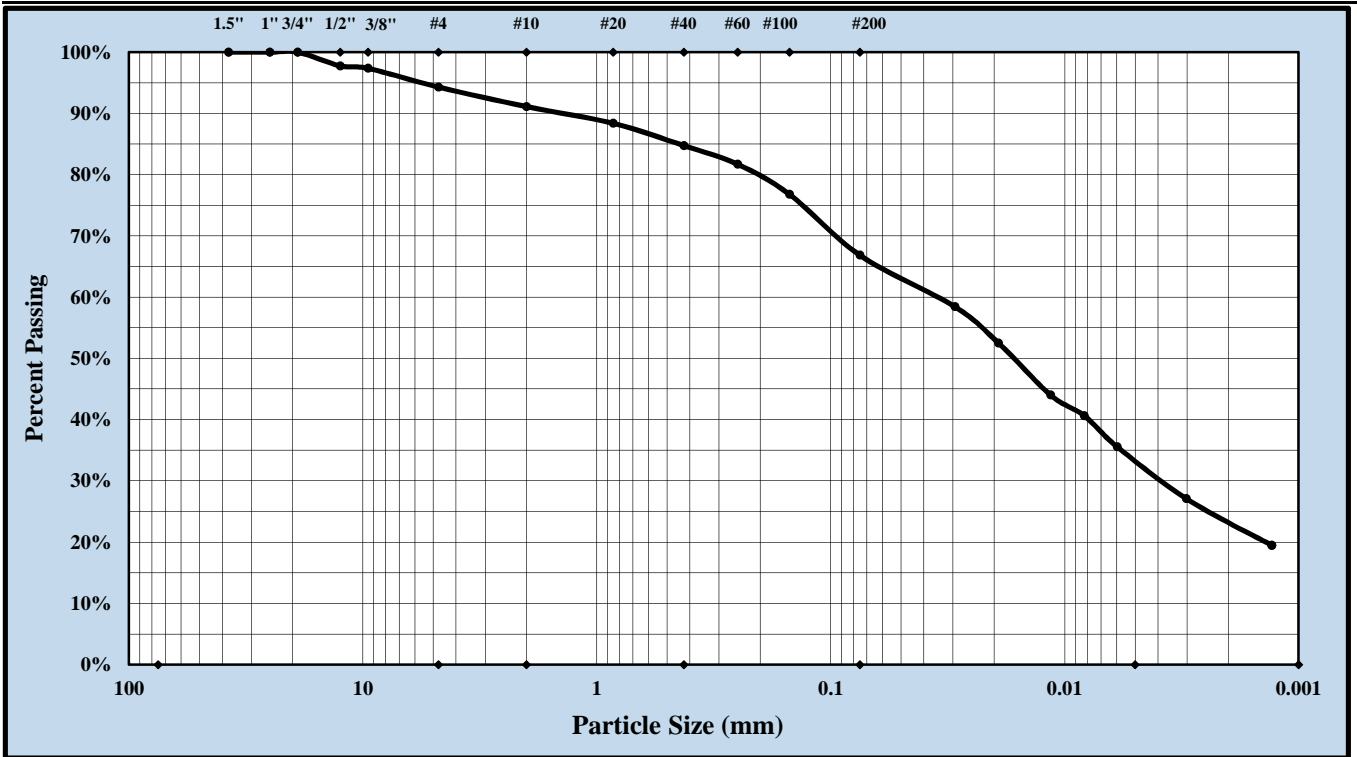
PARTICLE SIZE ANALYSIS OF SOIL



AASHTO T 88

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| S&ME Project #: | 1243-19-025 | Report Date: | 9/12/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | September 9-12, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19SWM-07 | | |
| | | Depth: | 15'-20' |

Sample Description: **SANDY FAT CLAY (CH) / A-7-6**



| | | | |
|-------------|---------------------------------|-------------|-------------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt | < 0.075 and > 0.002 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | Clay | < 0.002 mm |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | Colloids | < 0.001 mm |

| | | | | | |
|-------------------------------|---------|---------------|-------|---------------|-------|
| Maximum Particle Size: | 3/4 in. | Gravel: | 5.7% | Silt | 43.8% |
| Silt & Clay (% Passing #200): | 66.8% | Total Sand: | 27.5% | Clay | 23.0% |
| Assumed S.G. | 2.650 | | | | |
| Liquid Limit | 52 | Plastic Limit | 27 | Plastic Index | 25 |
| Coarse Sand: | 3.2% | Medium Sand: | 6.4% | Fine Sand: | 17.9% |

| | | | | | |
|---------------------------------|----------------------------------|---|--|-------------------------------|--|
| Description of Sand and Gravel | Rounded <input type="checkbox"/> | Angular <input checked="" type="checkbox"/> | Hard & Durable <input checked="" type="checkbox"/> | Soft <input type="checkbox"/> | Weathered & Friable <input type="checkbox"/> |
| Mechanical Stirring Apparatus A | Dispersion Period: | 1 min. | Dispersing Agent: | Sodium Hexametaphosphate: | 40 g./ Liter |

References / Comments / Deviations: **Virginia Test Method 25**

Sand and gravel sizes and fractions are per ASTM D2487

| | | | |
|---|--|--|--------------------------|
| <u>Jimmy Hanson</u> Technical Responsibility | | <u>Geotechnical Lab Supervisor</u> Position | <u>9/12/2019</u> Date |
|---|--|--|--------------------------|

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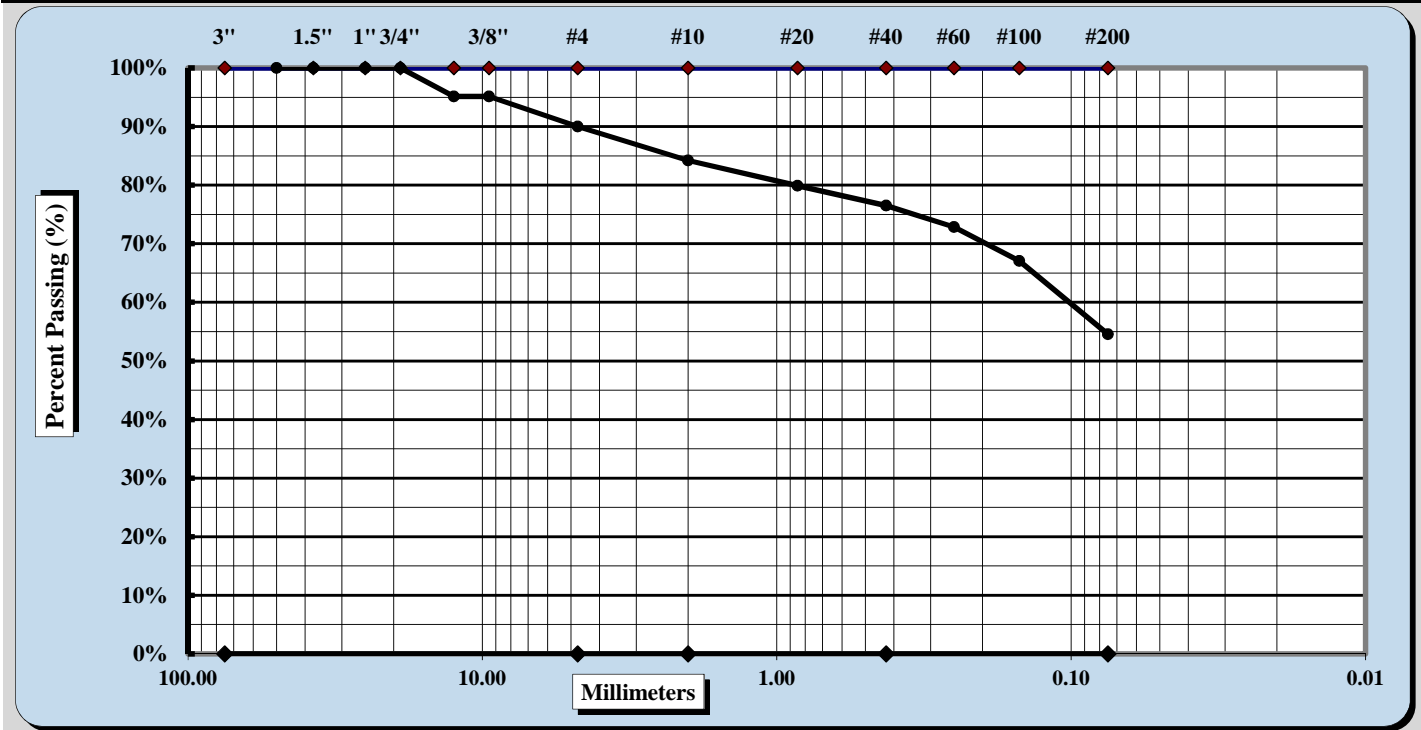


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19SWM-07 | Sample#: | S-4 |
| Log#: | 601 | Depth: | 6-8 ft |

Sample Description: SANDY SILT (ML) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 5.8% | Fine Sand | 22.0% |
| Gravel | 10.0% | Medium Sand | 7.7% | Silt & Clay | 54.6% |
| Liquid Limit | 40 | Plastic Limit | 26 | Plastic Index | 14 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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Date

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PARTICLE SIZE ANALYSIS OF SOIL

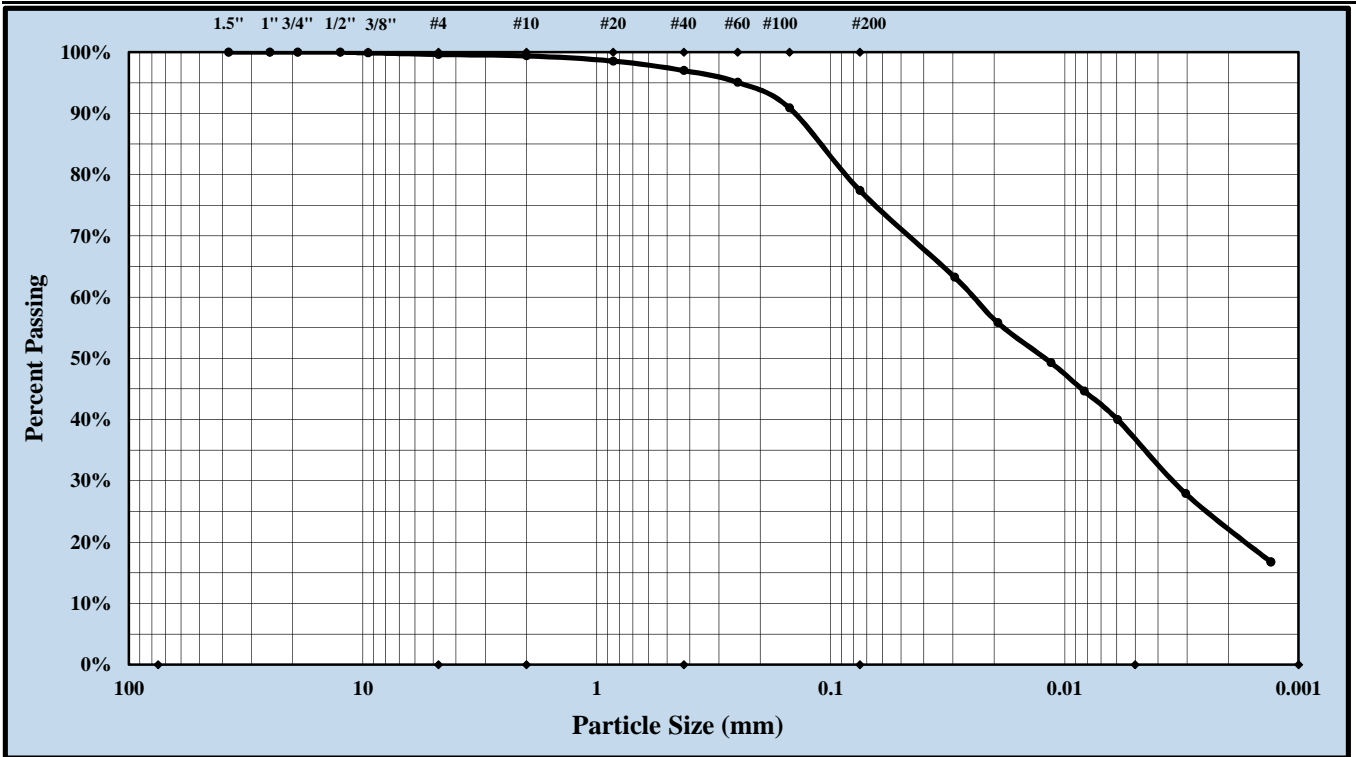


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|-----------------|---------------------------------|---------------|----------------------|
| S&ME Project #: | 1243-19-025 | Report Date: | 9/12/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | September 9-12, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19SWM-08 | | |
| | | | Depth: 15'-20' |

Sample Description: **FAT CLAY WITH SAND (CH) / A-7-6**



| | | | |
|-------------|---------------------------------|-------------|-------------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt | < 0.075 and > 0.002 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | Clay | < 0.002 mm |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | Colloids | < 0.001 mm |

| | | | | | |
|-------------------------------|--------|---------------|-------|---------------|-------|
| Maximum Particle Size: | No. 10 | Gravel: | 0.4% | Silt | 54.9% |
| Silt & Clay (% Passing #200): | 77.4% | Total Sand: | 22.2% | Clay | 22.5% |
| Assumed S.G. | 2.650 | | | | |
| Liquid Limit | 55 | Plastic Limit | 29 | Plastic Index | 26 |
| Coarse Sand: | 0.2% | Medium Sand: | 2.4% | Fine Sand: | 19.6% |

| | | | | | |
|---------------------------------|----------------------------------|---|--|-------------------------------|--|
| Description of Sand and Gravel | Rounded <input type="checkbox"/> | Angular <input checked="" type="checkbox"/> | Hard & Durable <input checked="" type="checkbox"/> | Soft <input type="checkbox"/> | Weathered & Friable <input type="checkbox"/> |
| Mechanical Stirring Apparatus A | Dispersion Period: | 1 min. | Dispersing Agent: | Sodium Hexametaphosphate: | 40 g./ Liter |

References / Comments / Deviations: **Virginia Test Method 25**

Sand and gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|--|-------------------|
| Jimmy Hanson <i>Technical Responsibility</i> | Signature | Geotechnical Lab Supervisor <i>Position</i> | 9/12/2019 Date |
|---|---------------|--|-------------------|

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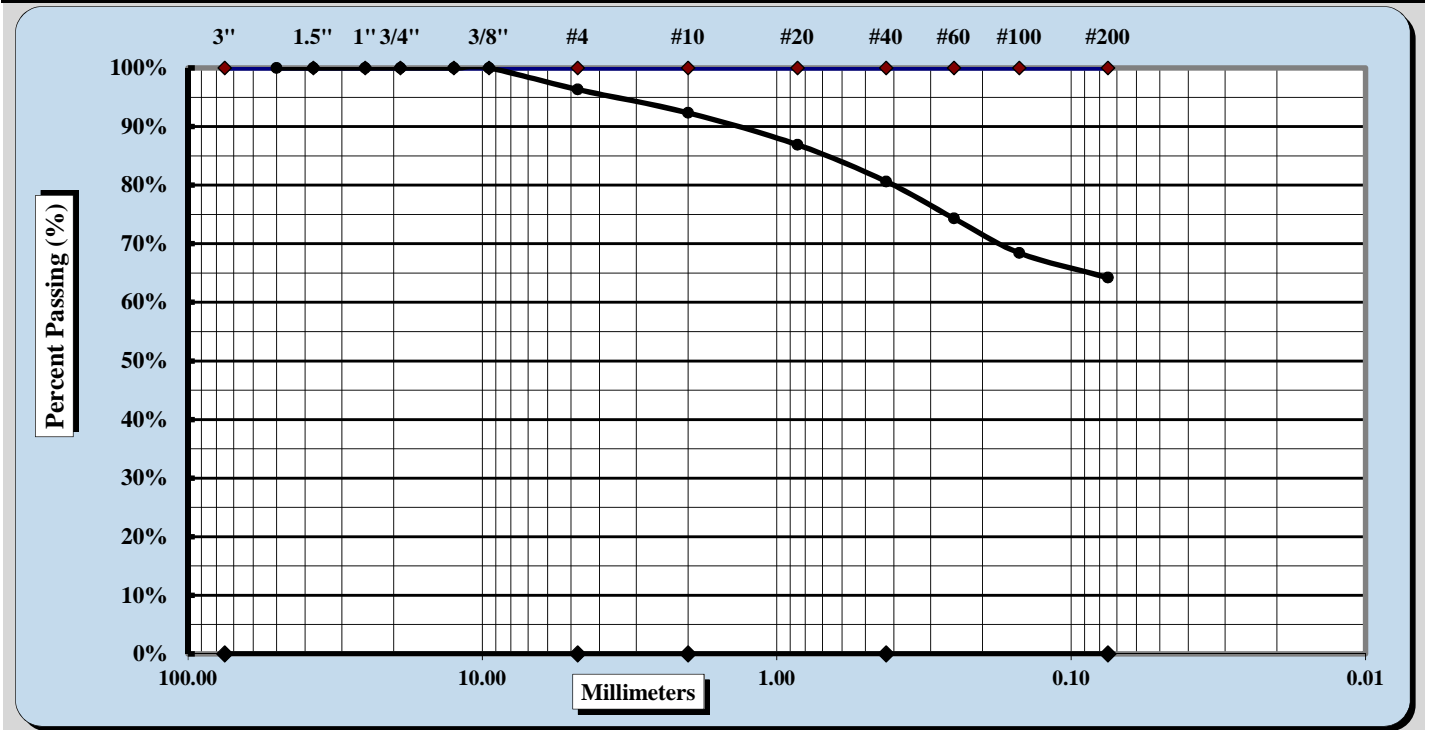


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19SWM-09 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: SANDY LEAN CLAY (CL) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.0% | Fine Sand | 16.4% |
| Gravel | 3.7% | Medium Sand | 11.7% | Silt & Clay | 64.2% |
| Liquid Limit | 39 | Plastic Limit | 24 | Plastic Index | 15 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

| | | | |
|---|--|--|--------------------------|
| <u>Jimmy Hanson</u> Technical Responsibility | | <u>Geotechnical Lab Supervisor</u> Position | <u>8/23/2019</u> Date |
|---|--|--|--------------------------|

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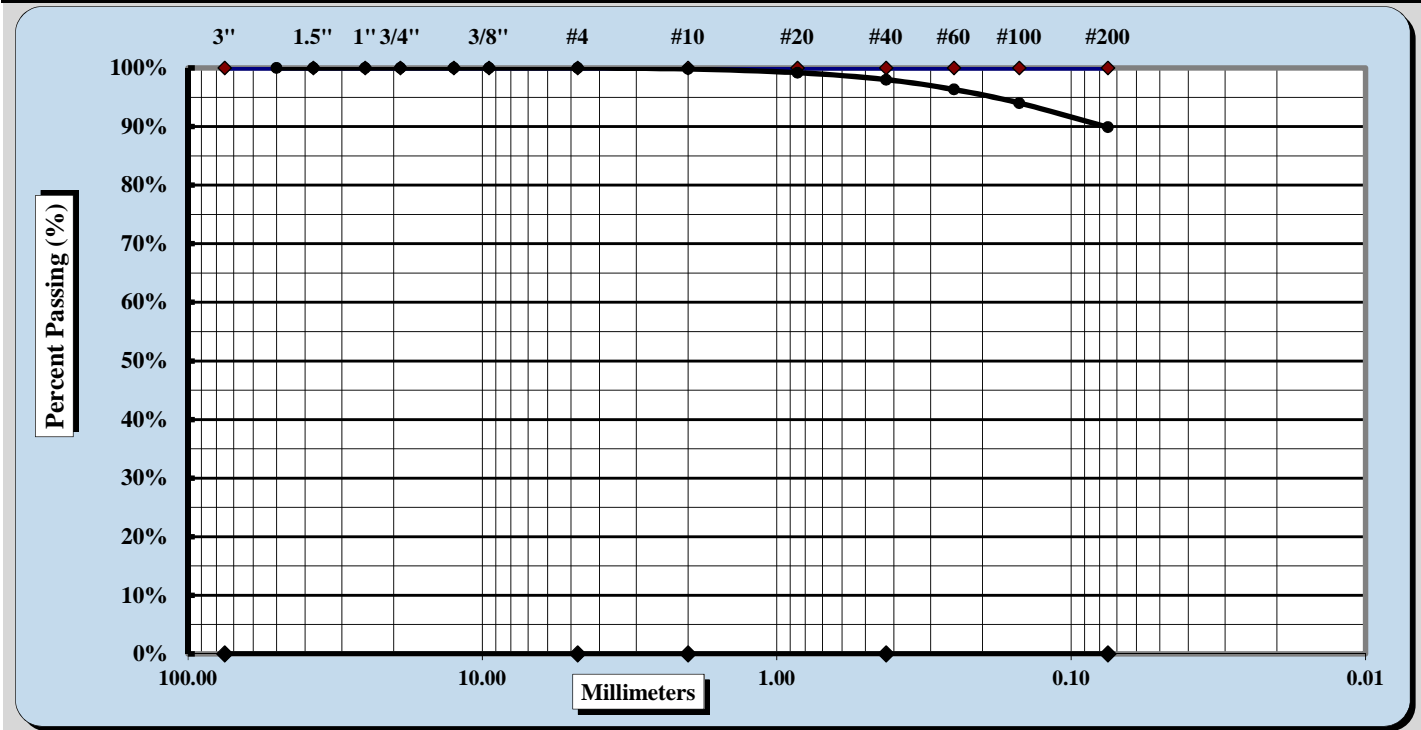


AASHTO T 88

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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19SWM-10 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: ELASTIC SILT (MH) A-7-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.2% | Fine Sand | 8.1% |
| Gravel | 0.0% | Medium Sand | 1.8% | Silt & Clay | 89.9% |
| Liquid Limit | 51 | Plastic Limit | 36 | Plastic Index | 15 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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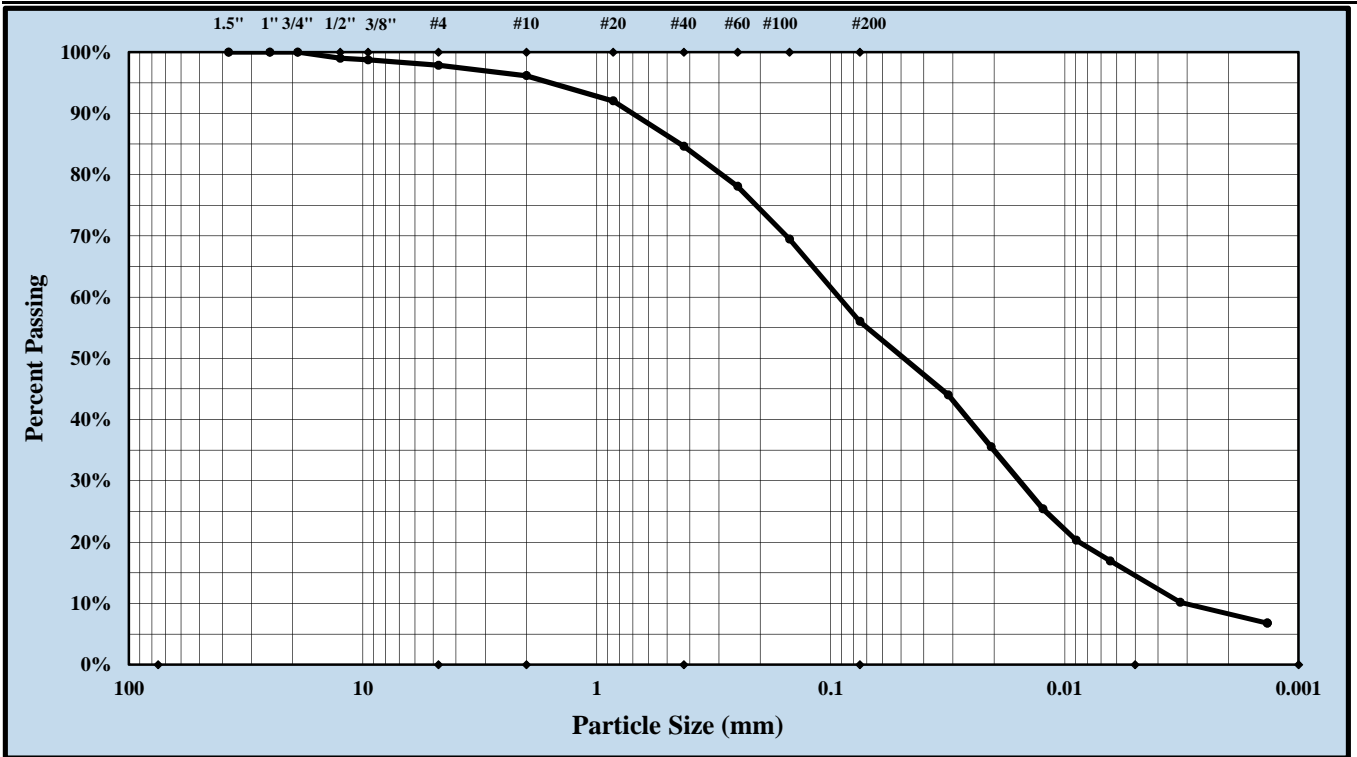
PARTICLE SIZE ANALYSIS OF SOIL



AASHTO T 88

| | | | |
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| S&ME Project #: | 1243-19-025 | Report Date: | 9/12/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | September 9-12, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Address: | Glen Allen, VA | | |
| Boring #: | 19SWM-15 | | |
| | | | Depth: 20'-25' |

Sample Description: **SANDY LEAN CLAY (CL) / A-4**



| | | | |
|-------------|---------------------------------|-------------|-------------------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm (#200) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt | < 0.075 and > 0.002 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | Clay | < 0.002 mm |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | Colloids | < 0.001 mm |

| | | | | | |
|-------------------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size: | 1/2" | Gravel: | 2.1% | Silt | 48.0% |
| Silt & Clay (% Passing #200): | 56.0% | Total Sand: | 41.8% | Clay | 8.0% |
| Assumed S.G. | 2.650 | | | | |
| Liquid Limit | 30 | Plastic Limit | 21 | Plastic Index | 9 |
| Coarse Sand: | 1.7% | Medium Sand: | 11.5% | Fine Sand: | 28.6% |

| | | | | | |
|---------------------------------|----------------------------------|---|--|-------------------------------|--|
| Description of Sand and Gravel | Rounded <input type="checkbox"/> | Angular <input checked="" type="checkbox"/> | Hard & Durable <input checked="" type="checkbox"/> | Soft <input type="checkbox"/> | Weathered & Friable <input type="checkbox"/> |
| Mechanical Stirring Apparatus A | Dispersion Period: | 1 min. | Dispersing Agent: | Sodium Hexametaphosphate: | 40 g./ Liter |

References / Comments / Deviations: **Virginia Test Method 25**

Sand and gravel sizes and fractions are per ASTM D2487

| | | | |
|---|---------------|--|-------------------|
| Jimmy Hanson <i>Technical Responsibility</i> | Signature | Geotechnical Lab Supervisor <i>Position</i> | 9/12/2019 Date |
|---|---------------|--|-------------------|

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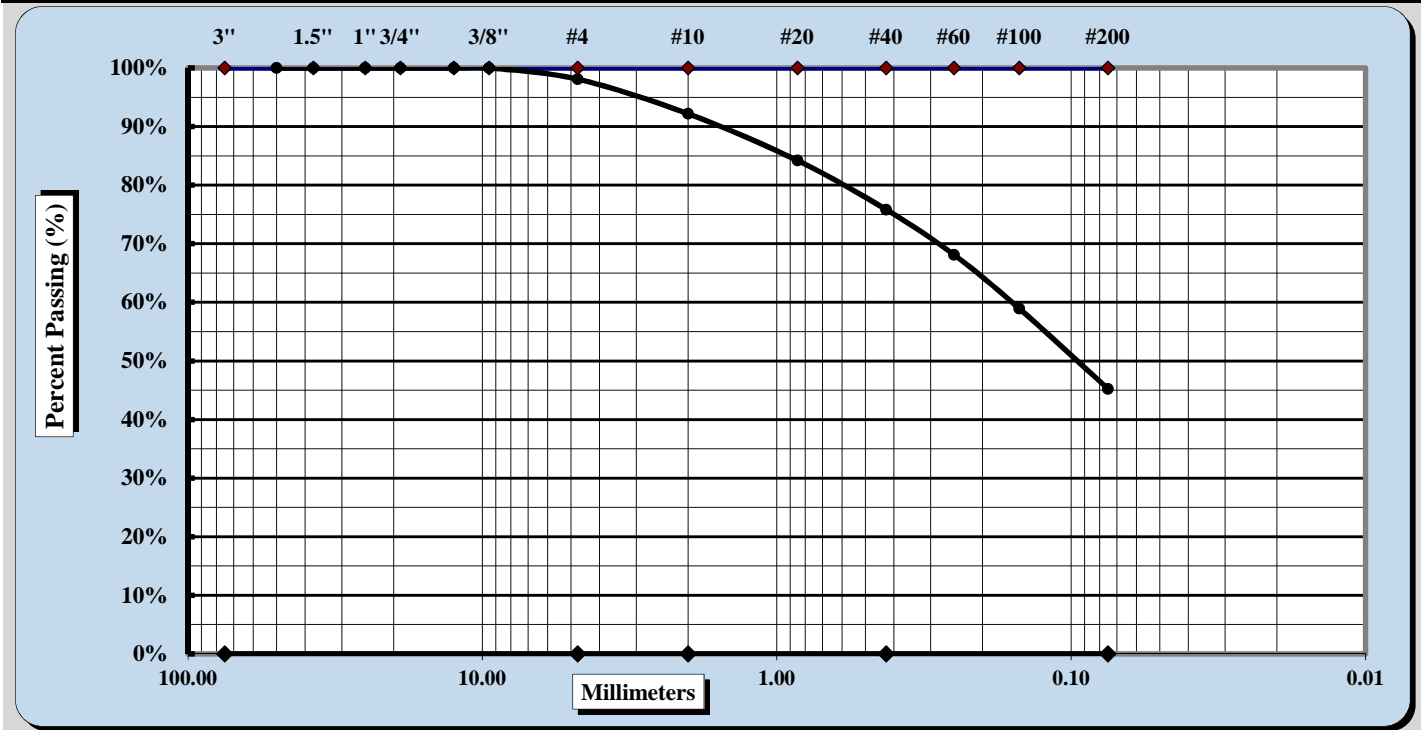


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19SWM-15 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 0-2 ft |

Sample Description: SILTY SAND (SM) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 5.9% | Fine Sand | 30.6% |
| Gravel | 1.9% | Medium Sand | 16.4% | Silt & Clay | 45.2% |
| Liquid Limit | 29 | Plastic Limit | 26 | Plastic Index | 3 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Jimmy Hanson
Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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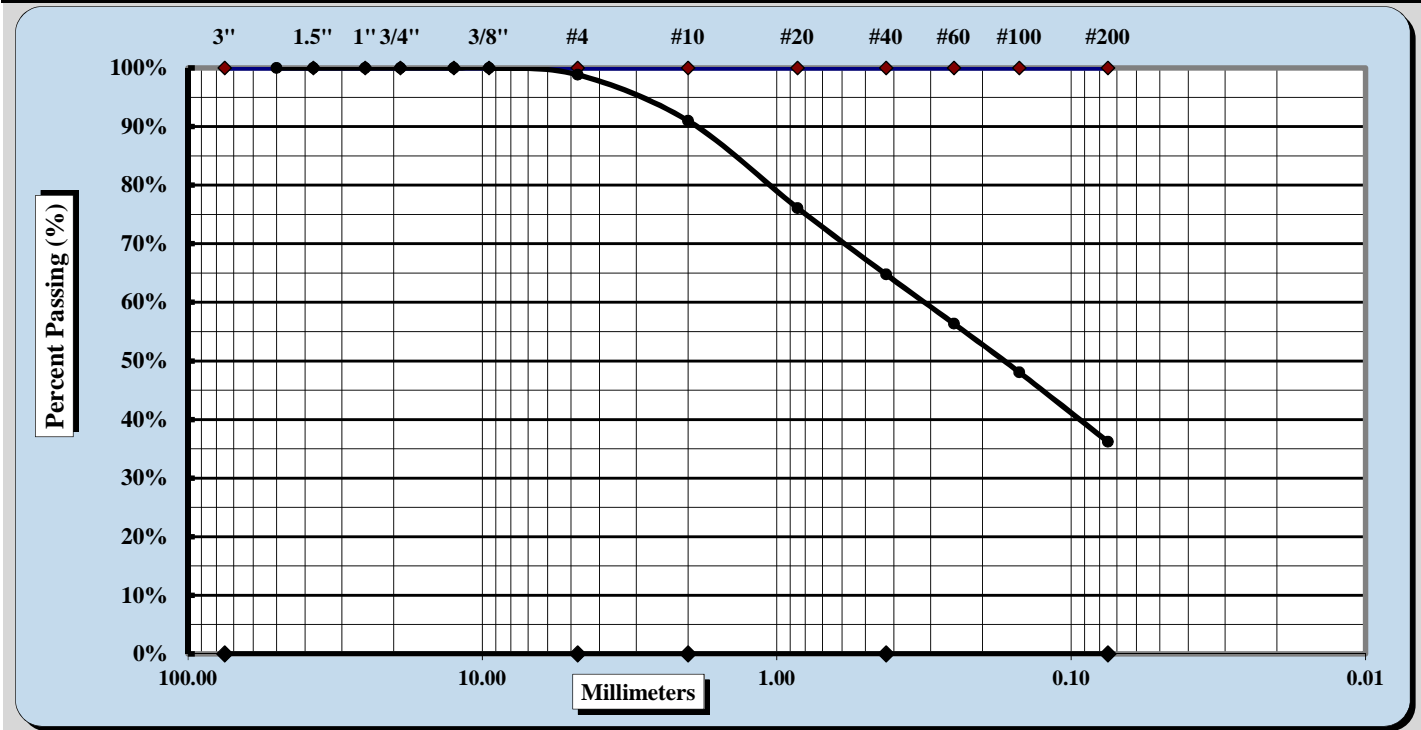


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|-----------------|---------------------------------|---------------|-------------------|
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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19SWM-15 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



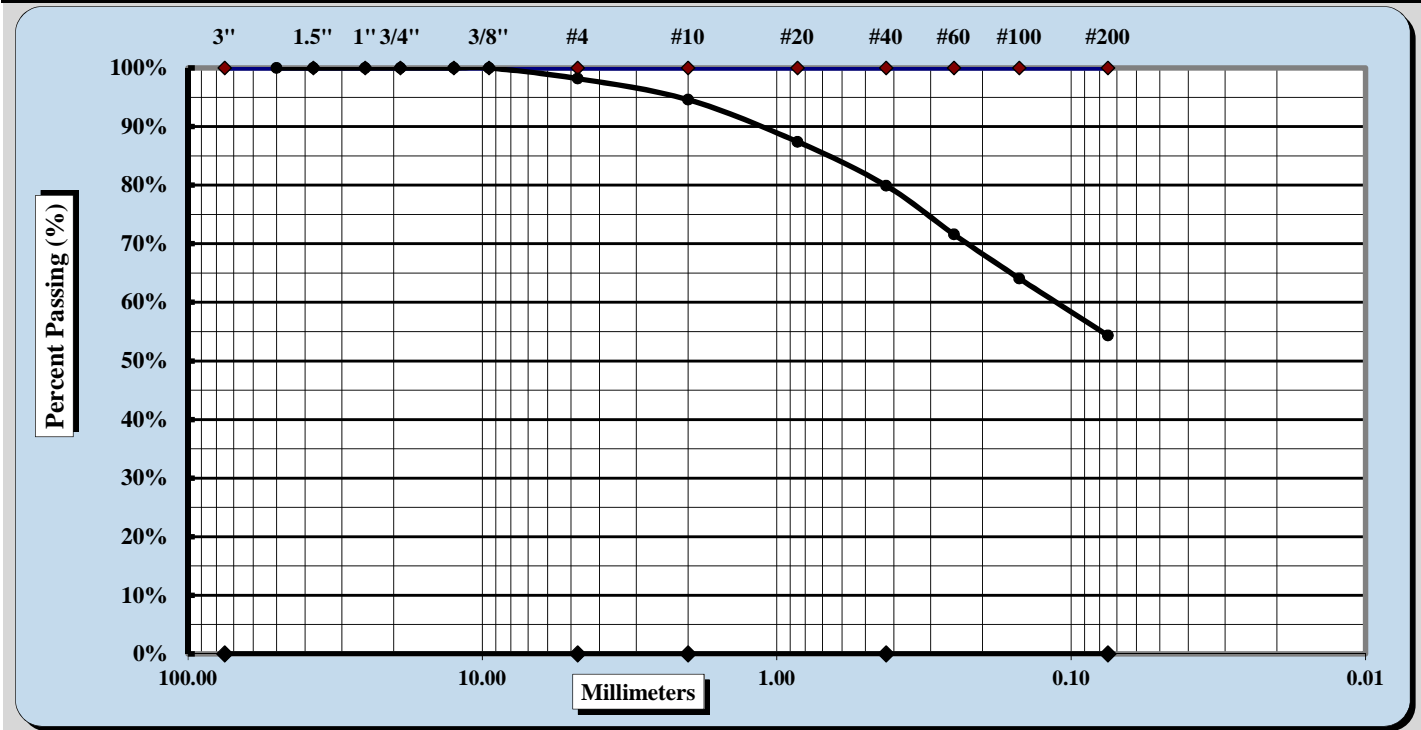


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR11 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 3.6% | Fine Sand | 25.6% |
| Gravel | 1.8% | Medium Sand | 14.7% | Silt & Clay | 54.3% |
| Liquid Limit | 38 | Plastic Limit | 28 | Plastic Index | 10 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
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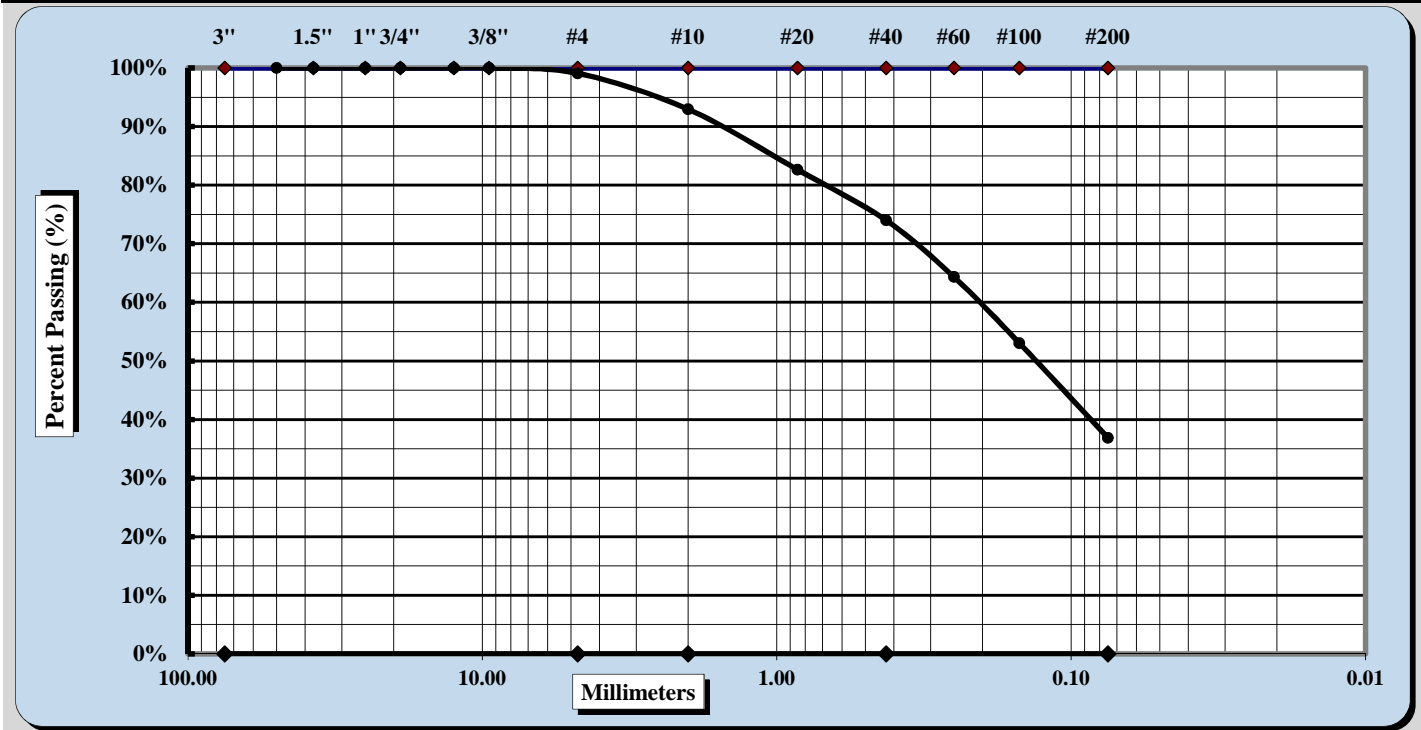


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|-----------------|---------------------------------|---------------|-------------------|
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| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR11 | Sample#: | S-13 |
| Log#: | 601 | Depth: | 53-53.8 ft |

Sample Description: **SILTY SAND (SM)** **A-4/A-5**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 6.1% | Fine Sand | 37.1% |
| Gravel | 0.9% | Medium Sand | 19.0% | Silt & Clay | 36.9% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

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Position

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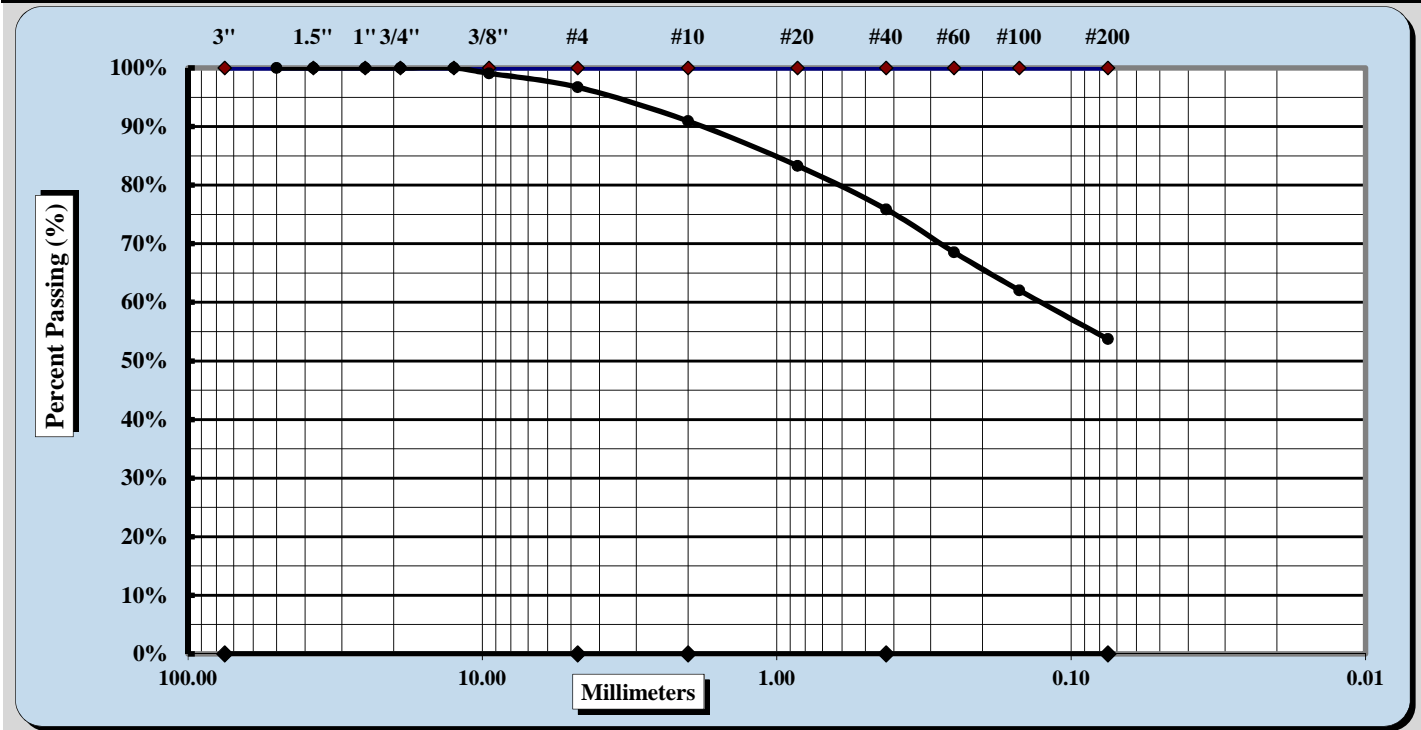


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| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR12 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 6.1-8.1 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 5.8% | Fine Sand | 22.2% |
| Gravel | 3.3% | Medium Sand | 15.1% | Silt & Clay | 53.7% |
| Liquid Limit | 36 | Plastic Limit | 28 | Plastic Index | 8 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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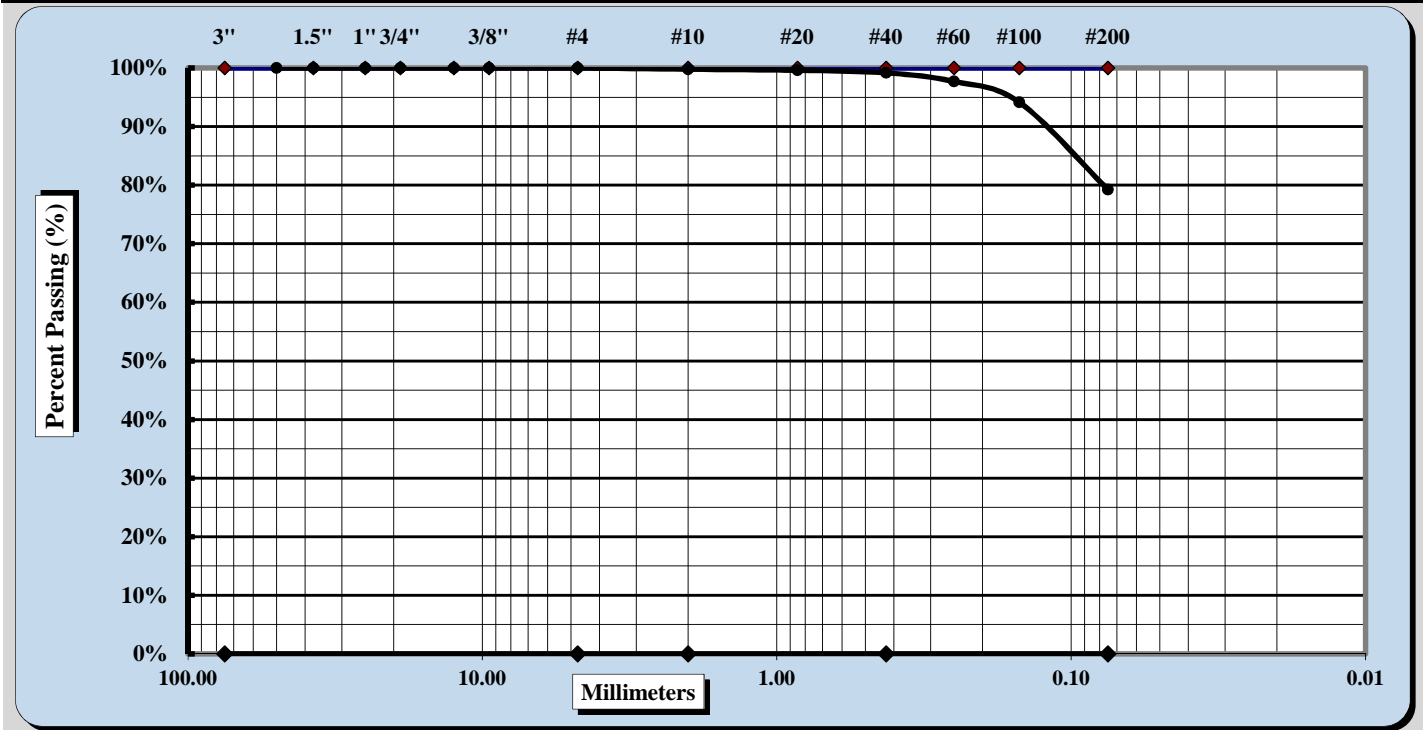


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| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR12 | Sample#: | S-7 |
| Log#: | 601 | Depth: | 23.1-25.1 ft |

Sample Description: **LEAN CLAY WITH SAND (CL)** **A-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.2% | Fine Sand | 19.9% |
| Gravel | 0.0% | Medium Sand | 0.6% | Silt & Clay | 79.3% |
| Liquid Limit | 35 | Plastic Limit | 24 | Plastic Index | 11 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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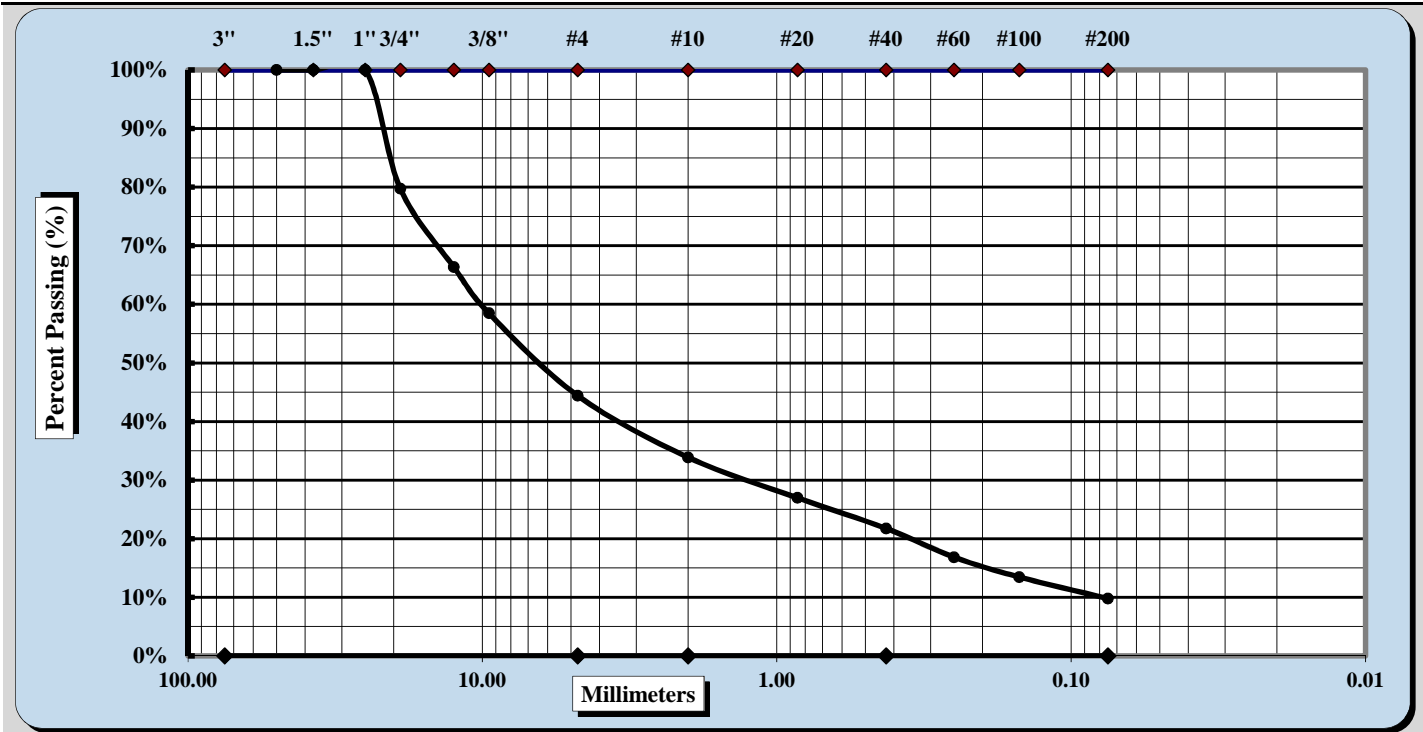


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| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR12 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 29.1-30.1 ft |

Sample Description:



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 3/4" | Coarse Sand | 10.5% | Fine Sand | 12.0% |
| Gravel | 55.6% | Medium Sand | 12.1% | Silt & Clay | 9.8% |
| Liquid Limit | N/A | Plastic Limit | N/A | Plastic Index | N/A |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: Virginia Test Method - 25

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

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Position

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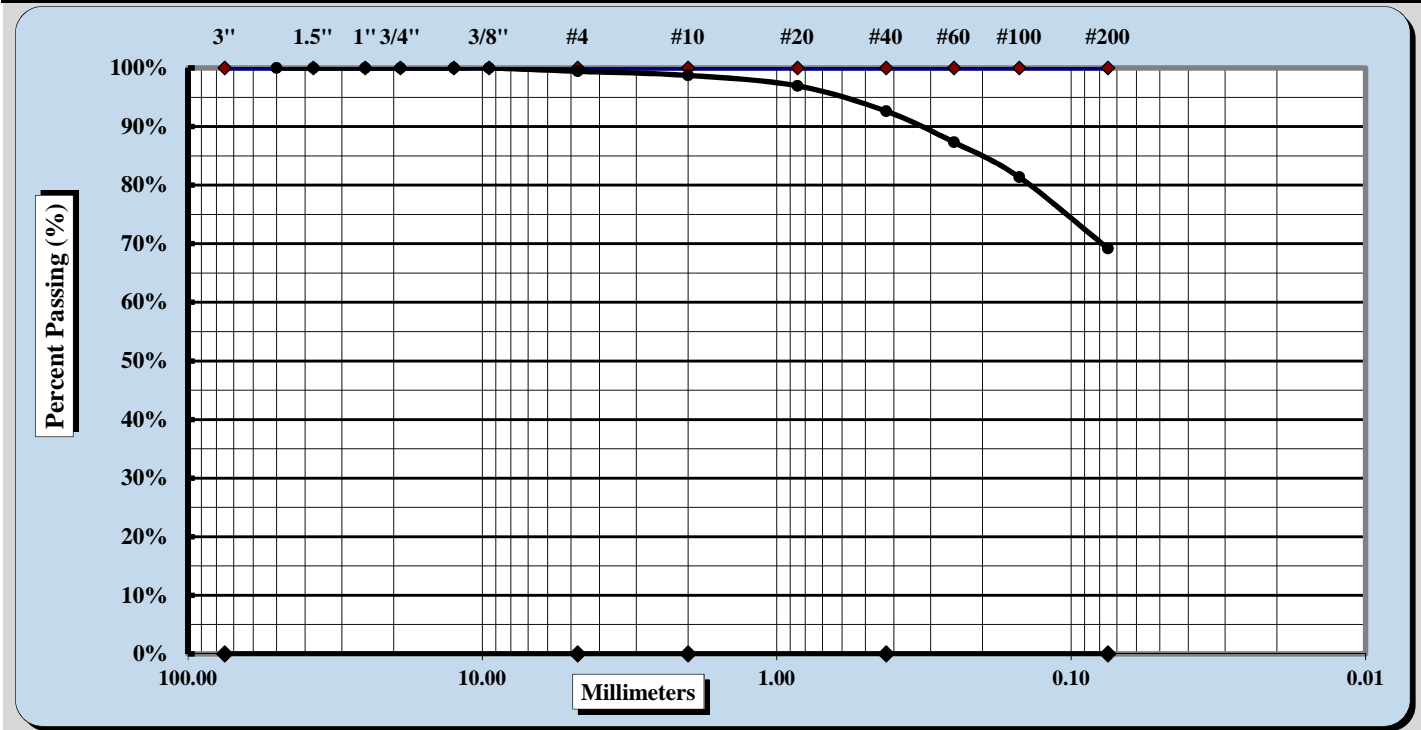


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-BR12 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 43.1-44 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 0.7% | Fine Sand | 23.4% |
| Gravel | 0.6% | Medium Sand | 6.1% | Silt & Clay | 69.2% |
| Liquid Limit | 29 | Plastic Limit | 28 | Plastic Index | 1 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Jimmy Hanson
Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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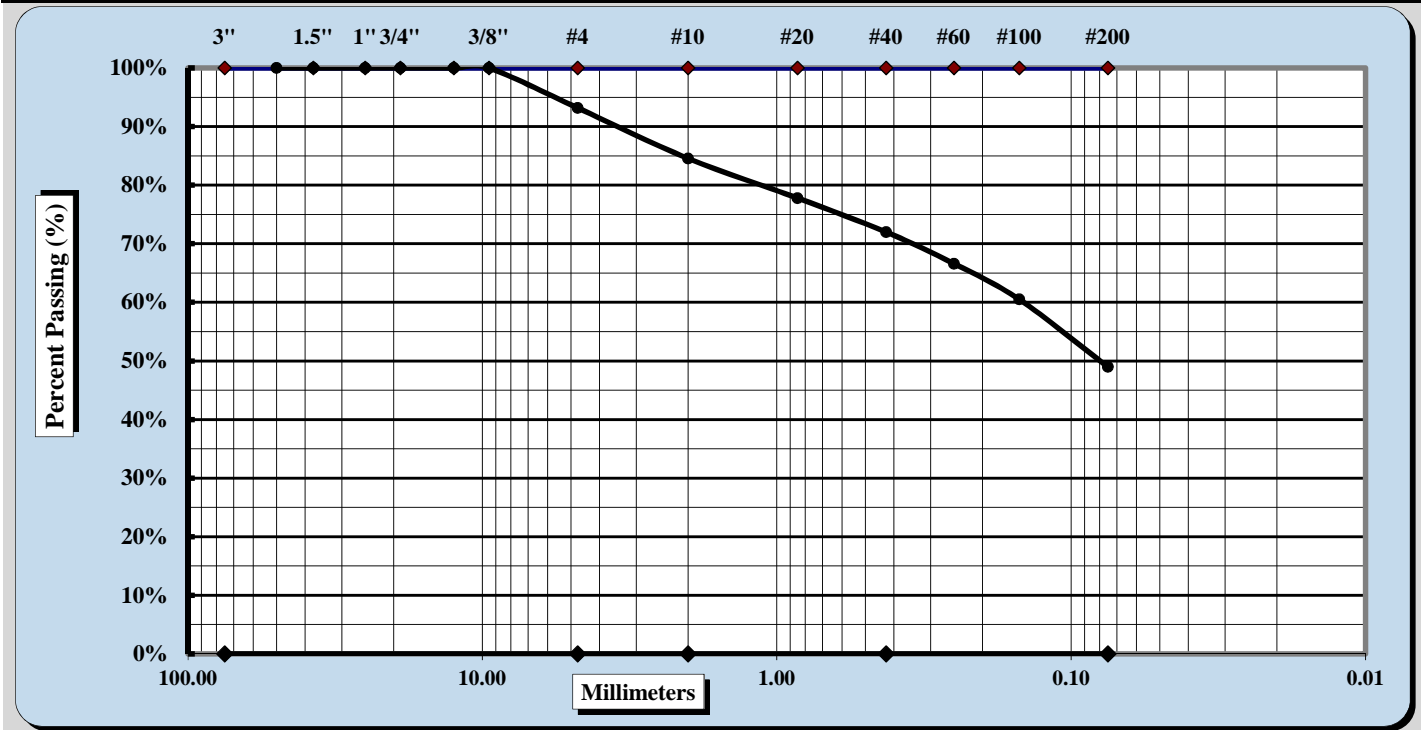


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW01 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 8.7% | Fine Sand | 23.0% |
| Gravel | 6.8% | Medium Sand | 12.6% | Silt & Clay | 49.0% |
| Liquid Limit | 35 | Plastic Limit | 31 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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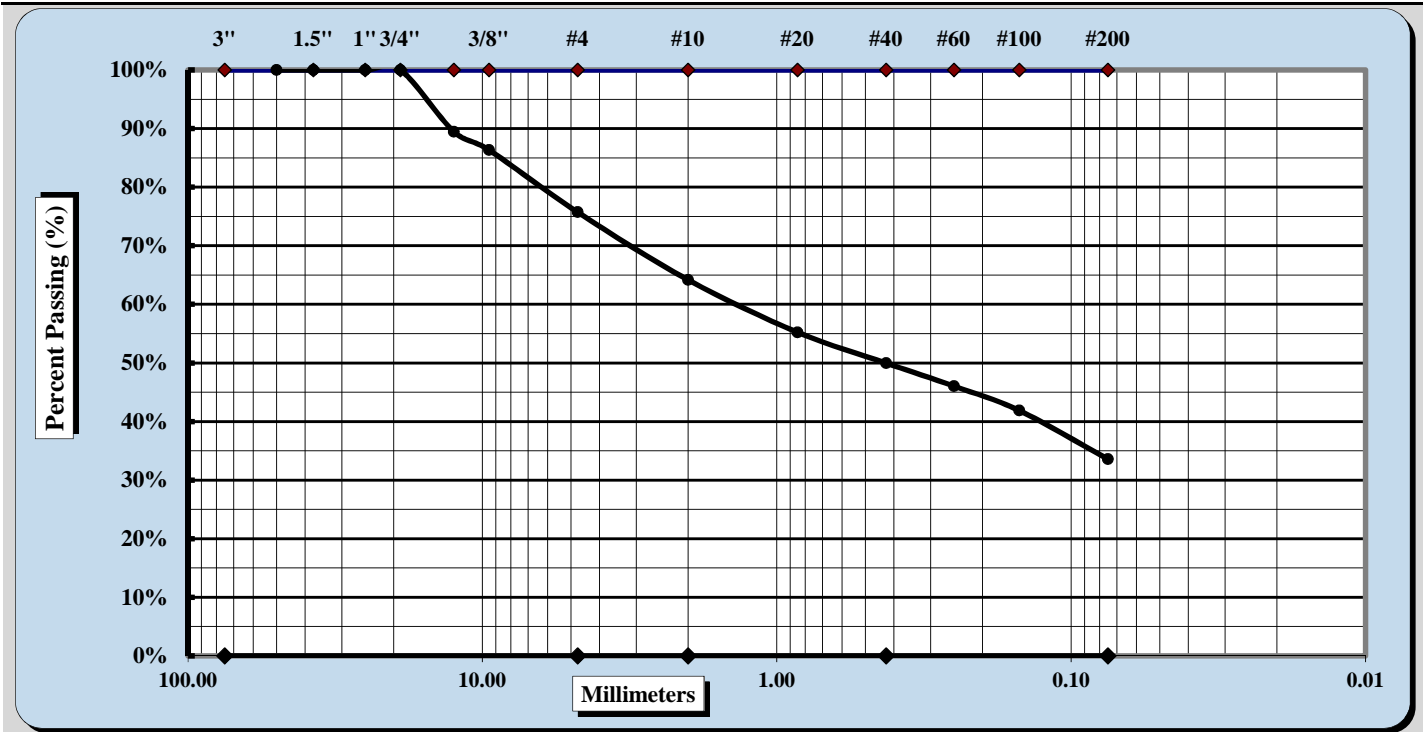


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|-----------------|---------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW01 | Sample#: | S-4 |
| Log#: | 601 | Depth: | 8-10 ft |

Sample Description:



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|-------------|-------|-------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 11.6% | Fine Sand | 16.4% |
| Gravel | 24.2% | Medium Sand | 14.2% | Silt & Clay | 33.6% |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

10/21/2019
Date

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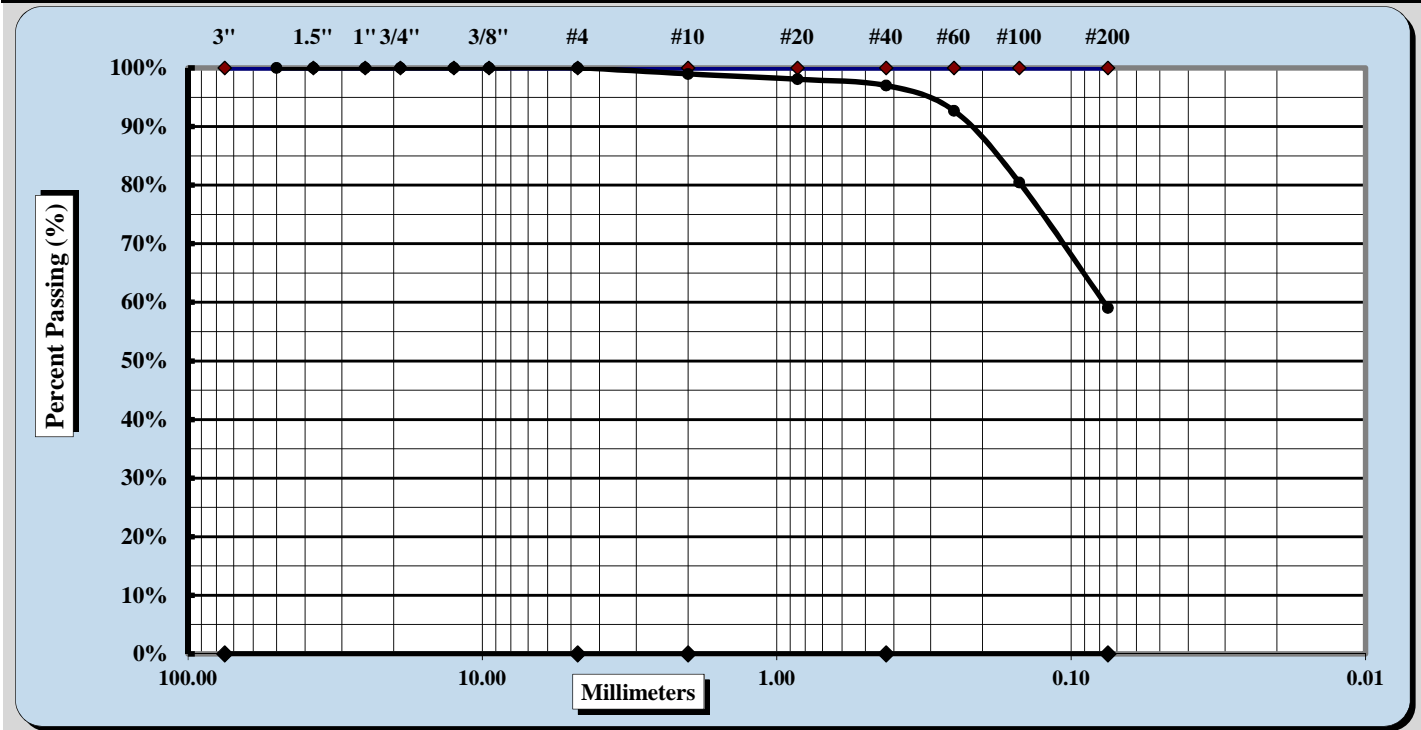


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW01 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 1.0% | Fine Sand | 38.0% |
| Gravel | 0.0% | Medium Sand | 2.0% | Silt & Clay | 59.1% |
| Liquid Limit | 27 | Plastic Limit | 24 | Plastic Index | 3 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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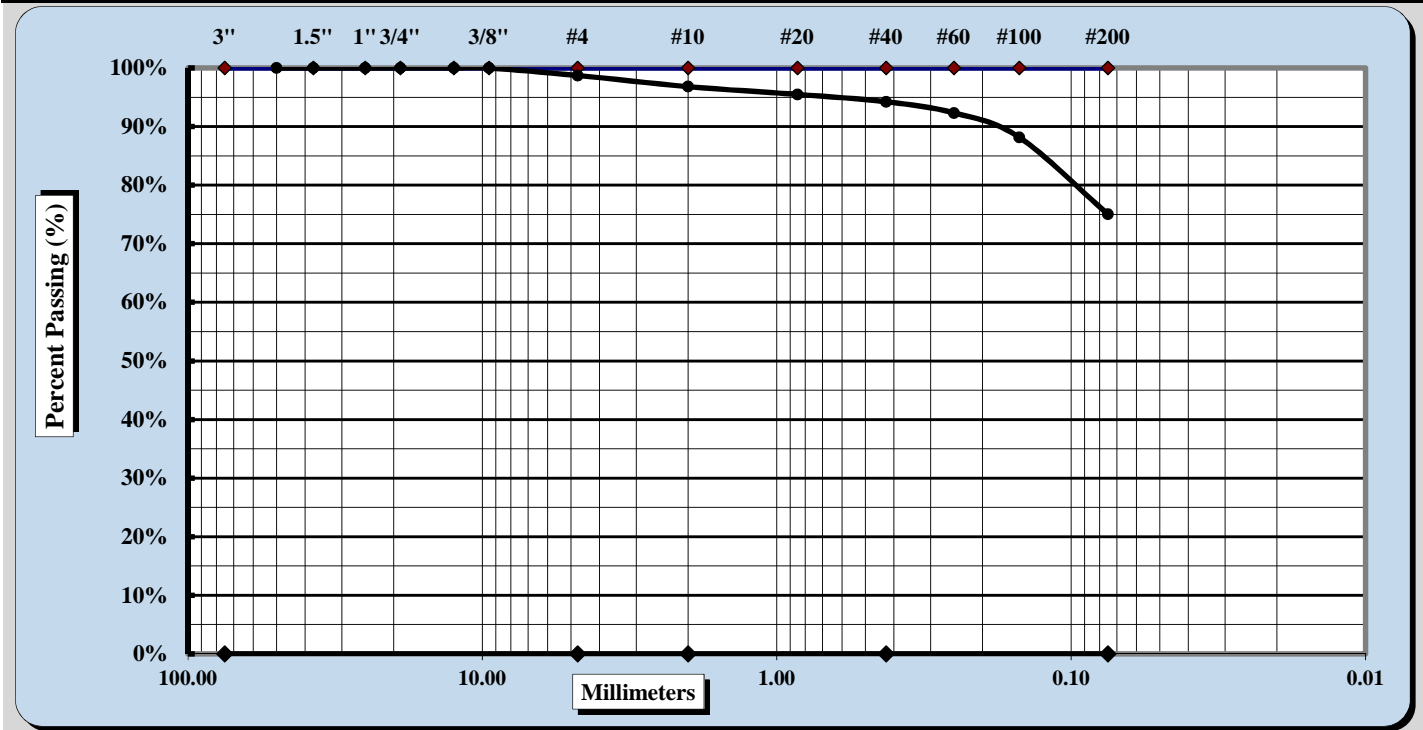


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW10 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 0-2 ft |

Sample Description: **LEAN CLAY WITH SAND (CL)** **A-7-6**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 1.9% | Fine Sand | 19.2% |
| Gravel | 1.3% | Medium Sand | 2.6% | Silt & Clay | 75.0% |
| Liquid Limit | 42 | Plastic Limit | 25 | Plastic Index | 17 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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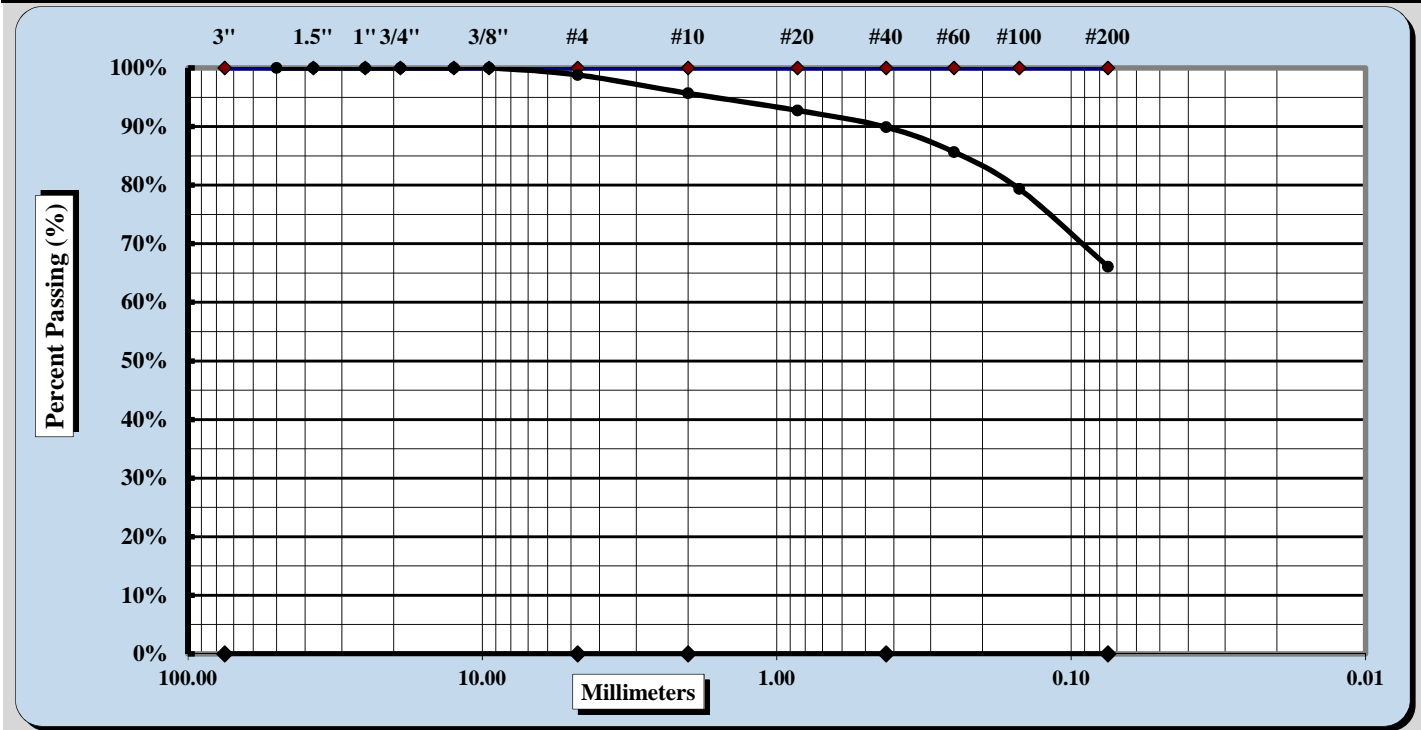


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW11 | Sample#: | S-3 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description: SANDY LEAN CLAY (CL) A-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 3.1% | Fine Sand | 23.8% |
| Gravel | 1.2% | Medium Sand | 5.8% | Silt & Clay | 66.1% |
| Liquid Limit | 35 | Plastic Limit | 22 | Plastic Index | 13 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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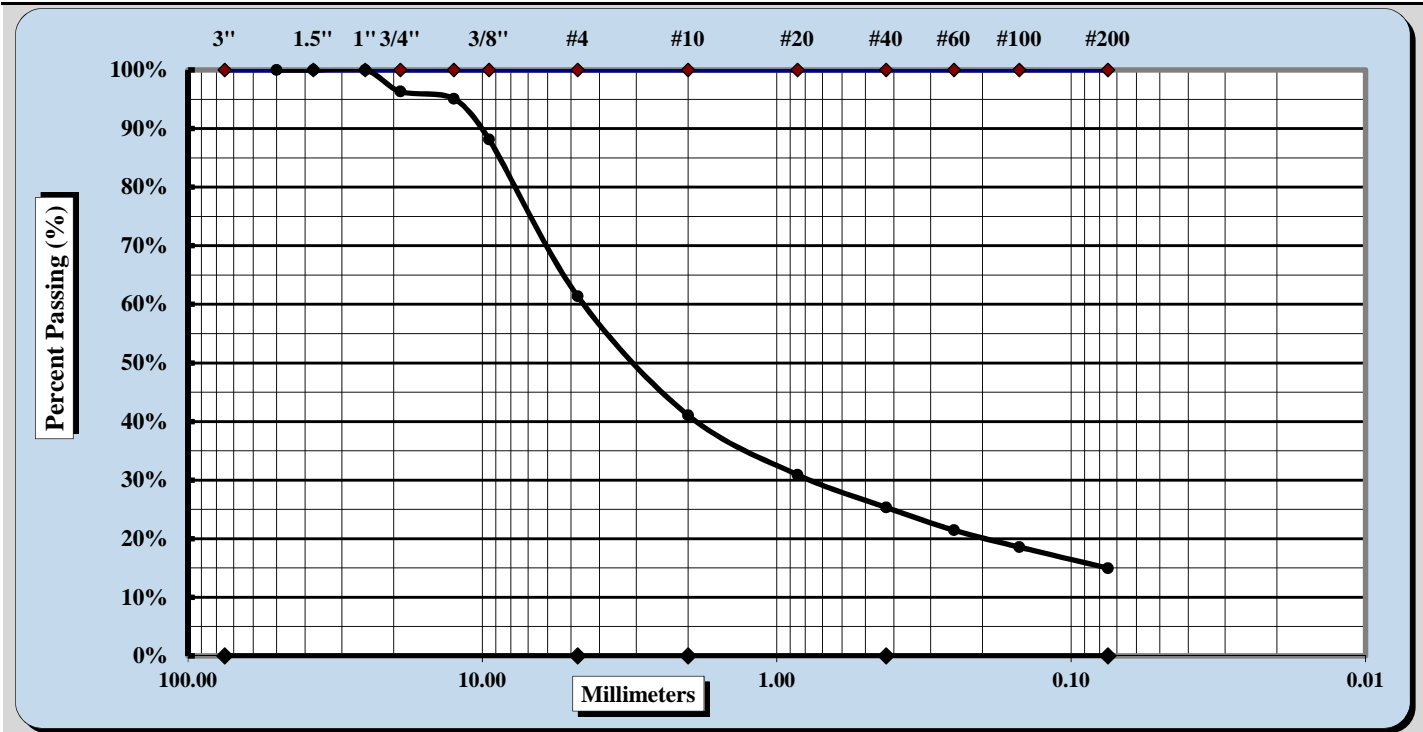


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| | | | |
|-----------------|---------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW12 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 0-2 ft |

Sample Description:



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|-------------|-------|-------------|-------|
| Maximum Particle Size | 3/4" | Coarse Sand | 20.4% | Fine Sand | 10.4% |
| Gravel | 38.6% | Medium Sand | 15.7% | Silt & Clay | 15.0% |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

10/21/2019
Date

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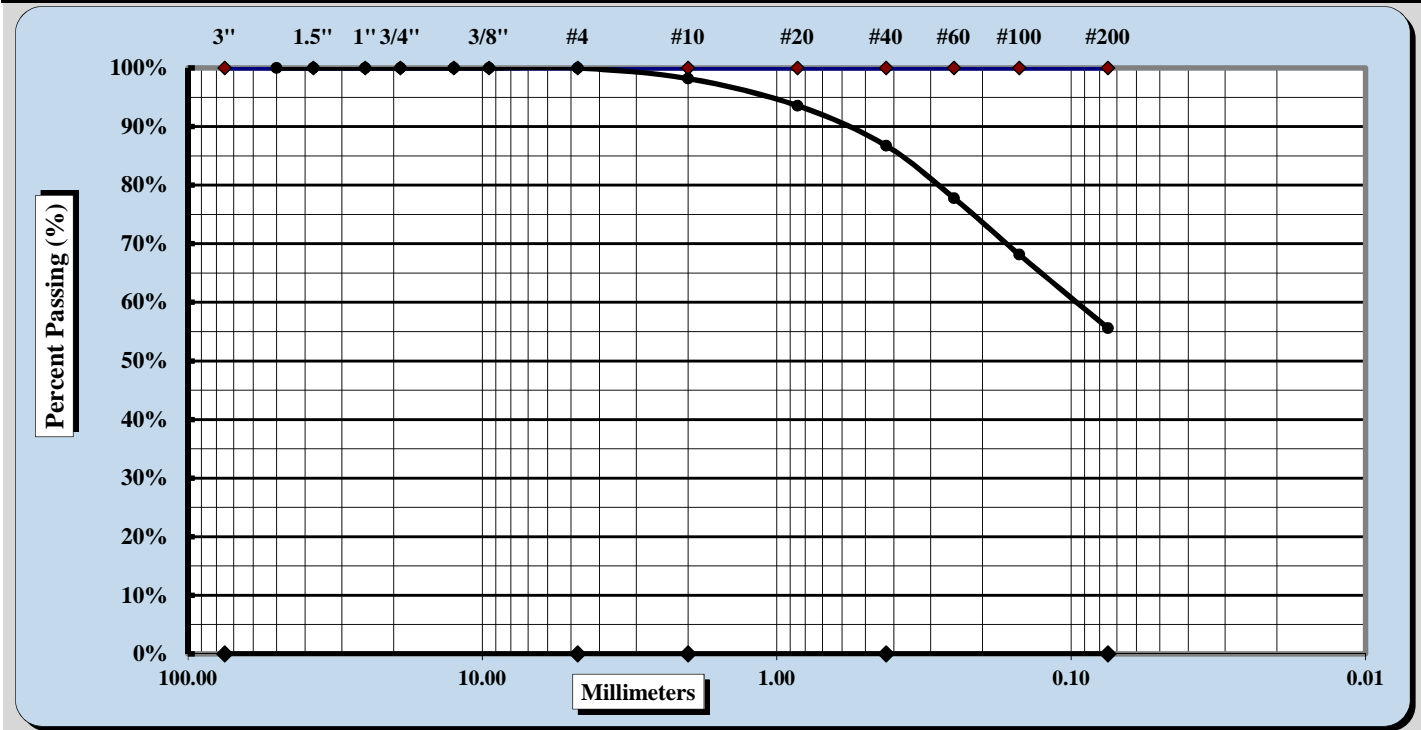


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW17 | Sample#: | S-4 |
| Log#: | 601 | Depth: | 8-10 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 1.8% | Fine Sand | 31.1% |
| Gravel | 0.0% | Medium Sand | 11.5% | Silt & Clay | 55.6% |
| Liquid Limit | 39 | Plastic Limit | 34 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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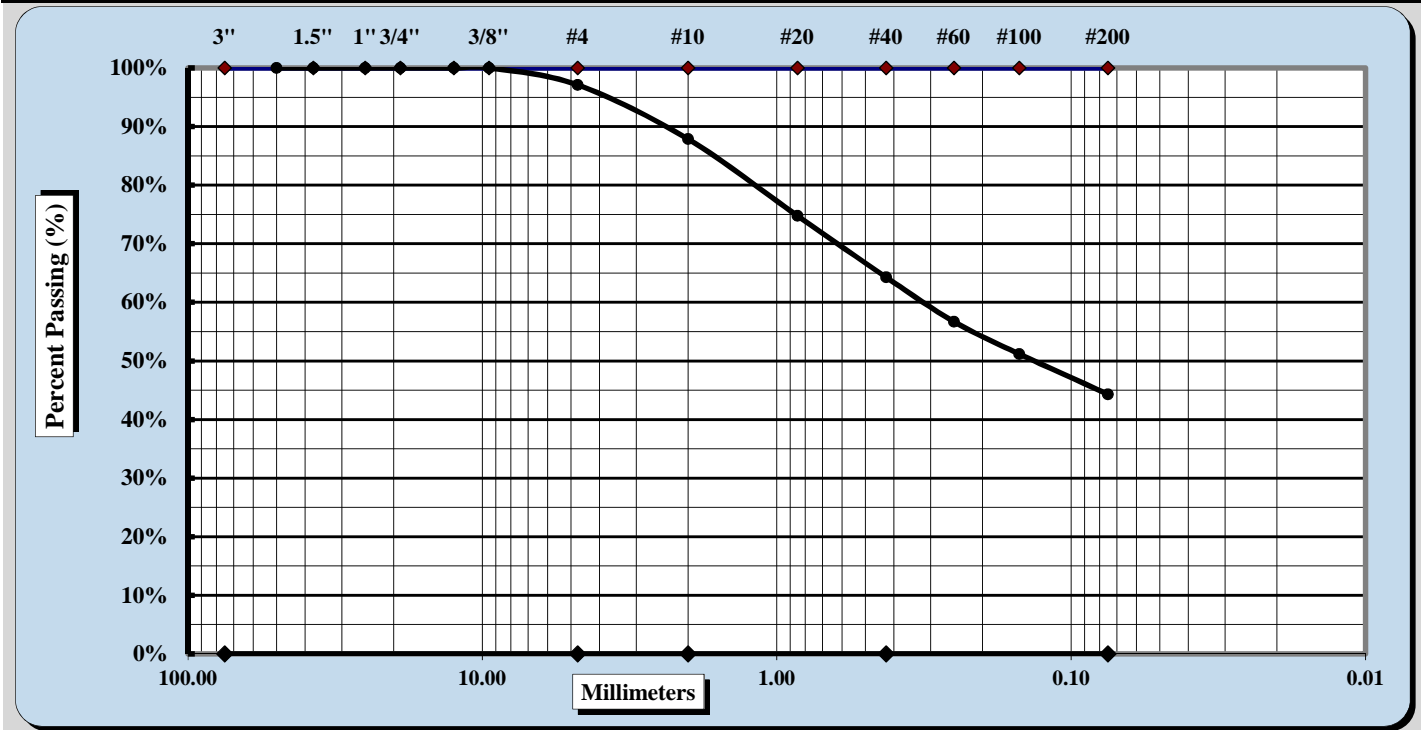


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|-----------------|---------------------------------|----------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report | |
| Client Address: | Glen Allen, VA | 43759 | |
| Sample I.D.: | 19X-N-RW17 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 38-40 ft |

Sample Description: **SILTY SAND (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 9.3% | Fine Sand | 20.0% |
| Gravel | 2.9% | Medium Sand | 23.6% | Silt & Clay | 44.3% |
| Liquid Limit | 33 | Plastic Limit | 26 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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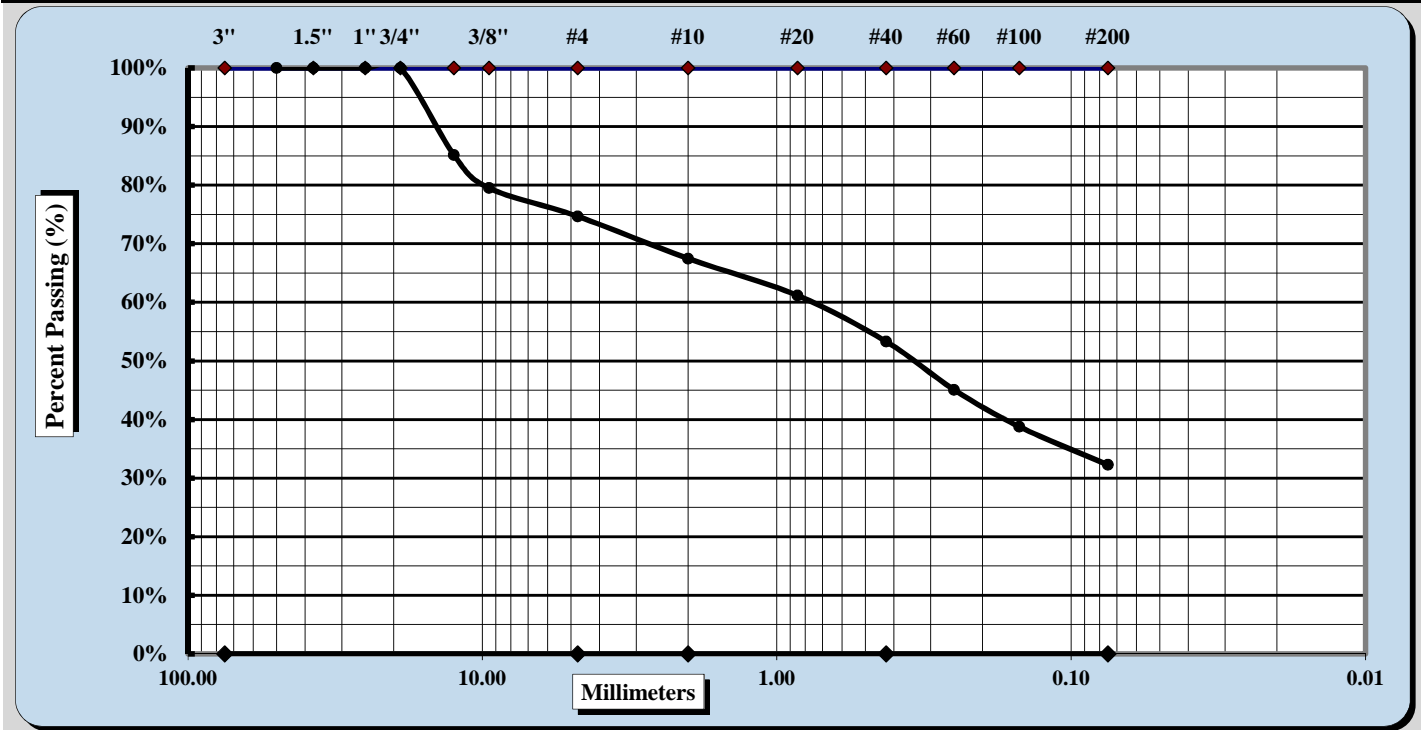


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW24 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 2.5-4.5 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 7.2% | Fine Sand | 21.0% |
| Gravel | 25.3% | Medium Sand | 14.2% | Silt & Clay | 32.3% |
| Liquid Limit | 32 | Plastic Limit | 26 | Plastic Index | 6 |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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Date

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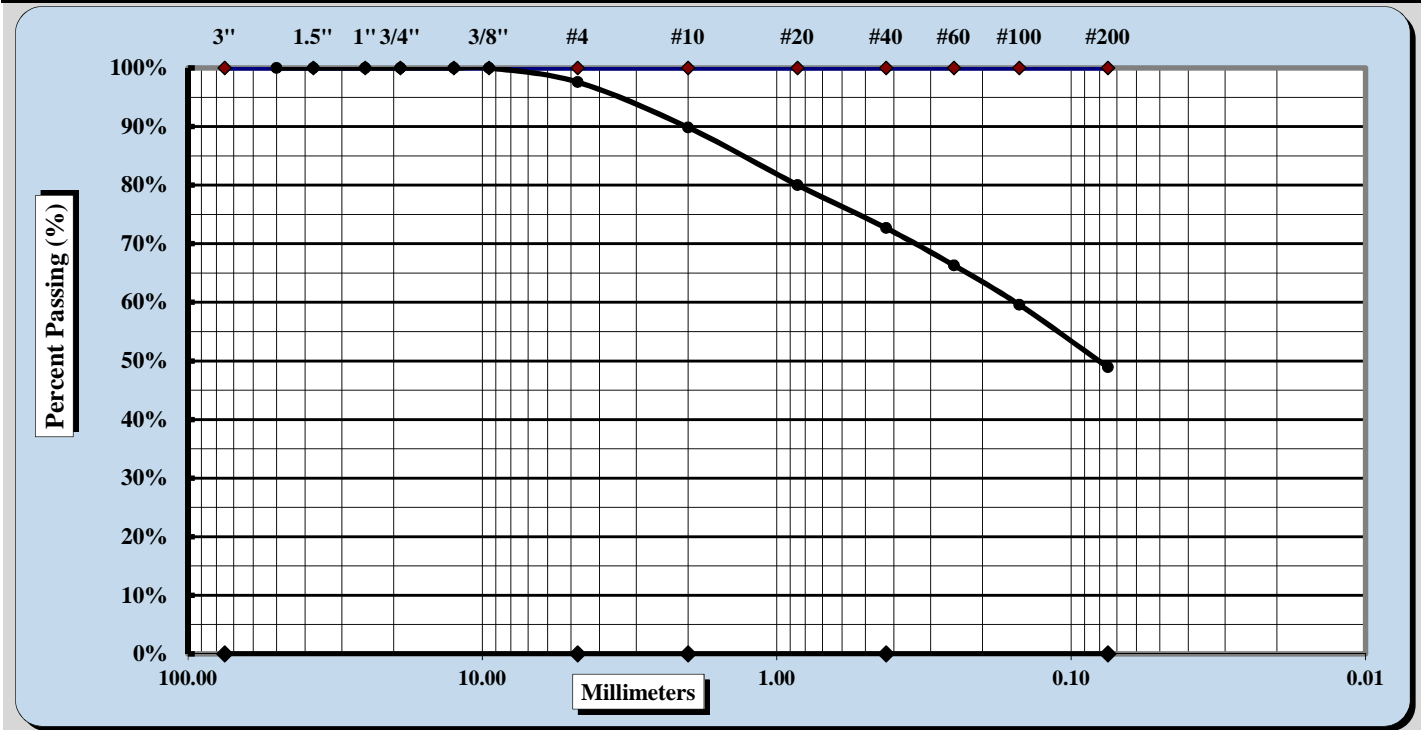


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-N-RW24 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 38.5-39.3 ft |

Sample Description: SILTY SAND (SM) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 7.7% | Fine Sand | 23.7% |
| Gravel | 2.4% | Medium Sand | 17.2% | Silt & Clay | 48.9% |
| Liquid Limit | 31 | Plastic Limit | 27 | Plastic Index | 4 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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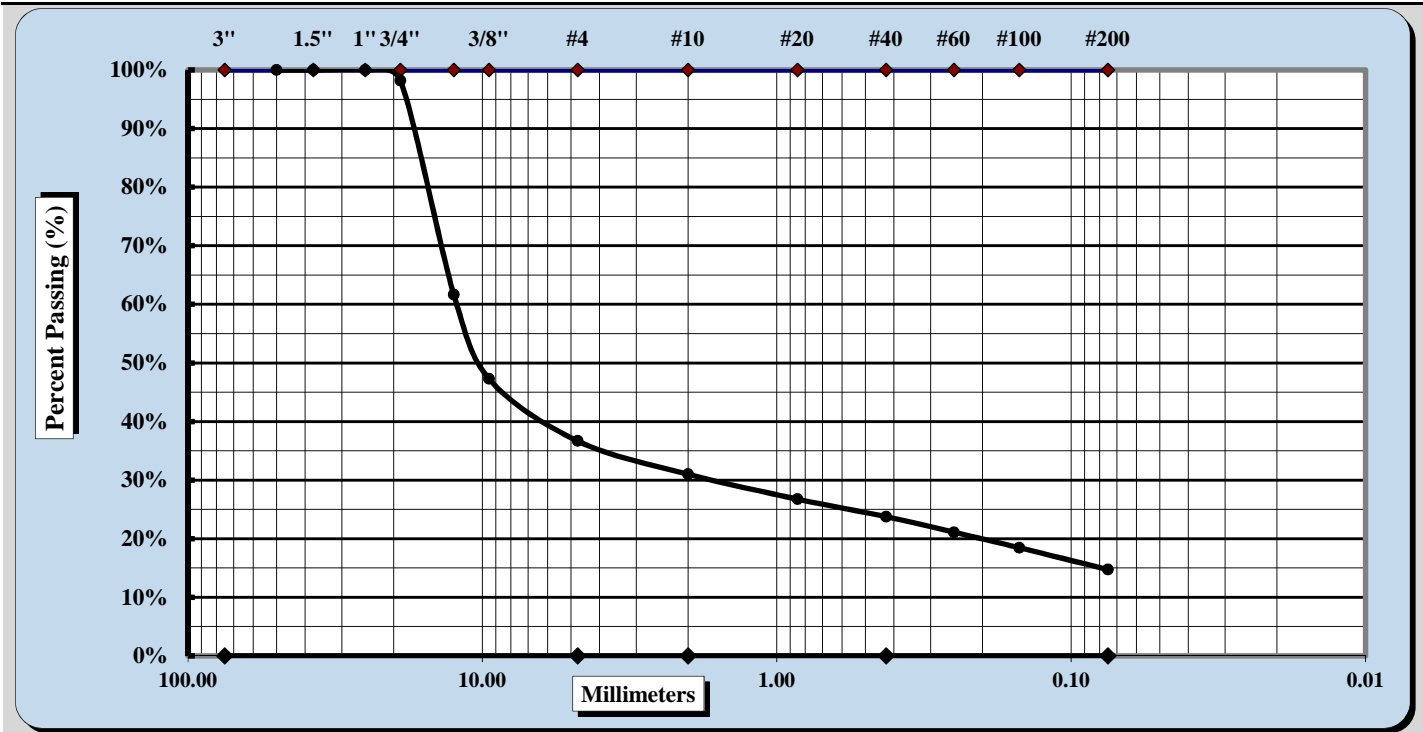


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|-----------------|---------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-SOS-P25 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 4-6 ft |

Sample Description:



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | < 0.075 mm |
| Coarse Sand | < 4.75 mm and > 2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|-------------|------|-------------|-------|
| Maximum Particle Size | 3/4" | Coarse Sand | 5.7% | Fine Sand | 9.0% |
| Gravel | 63.3% | Medium Sand | 7.3% | Silt & Clay | 14.7% |

| | | | | | |
|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input checked="" type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

10/21/2019
Date

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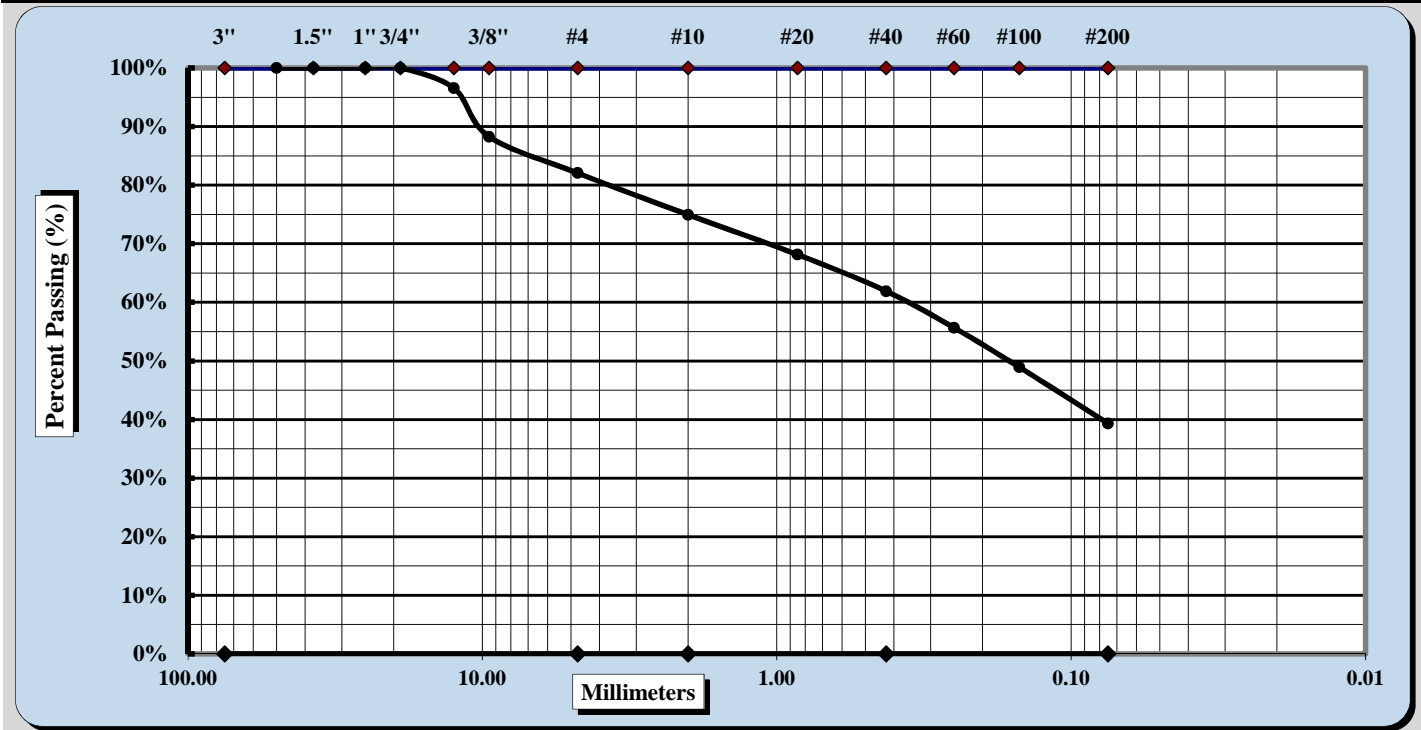


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-SOS-P26 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 7.1% | Fine Sand | 22.6% |
| Gravel | 17.9% | Medium Sand | 13.0% | Silt & Clay | 39.3% |
| Liquid Limit | 29 | Plastic Limit | 23 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
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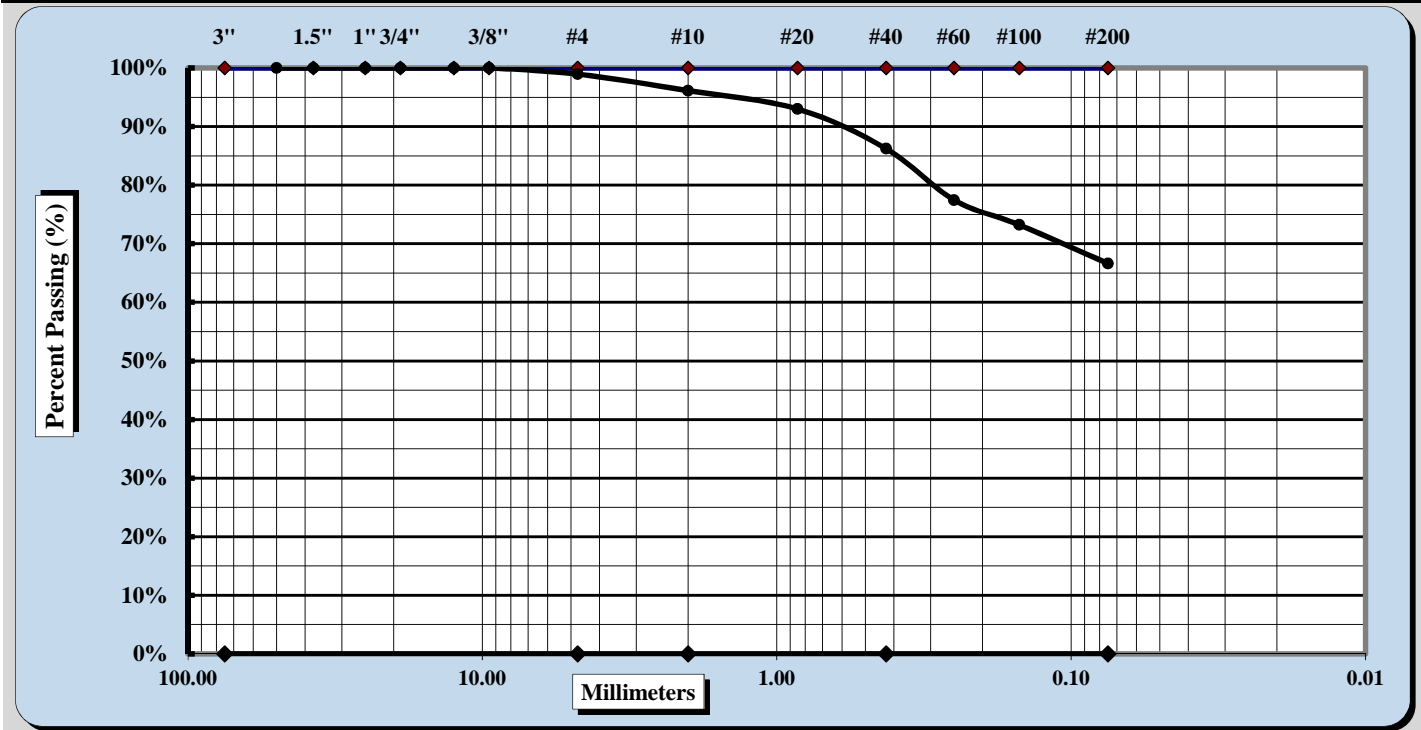


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|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-SOS-P32 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 5-7 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.8% | Fine Sand | 19.6% |
| Gravel | 1.0% | Medium Sand | 9.9% | Silt & Clay | 66.6% |
| Liquid Limit | 40 | Plastic Limit | 34 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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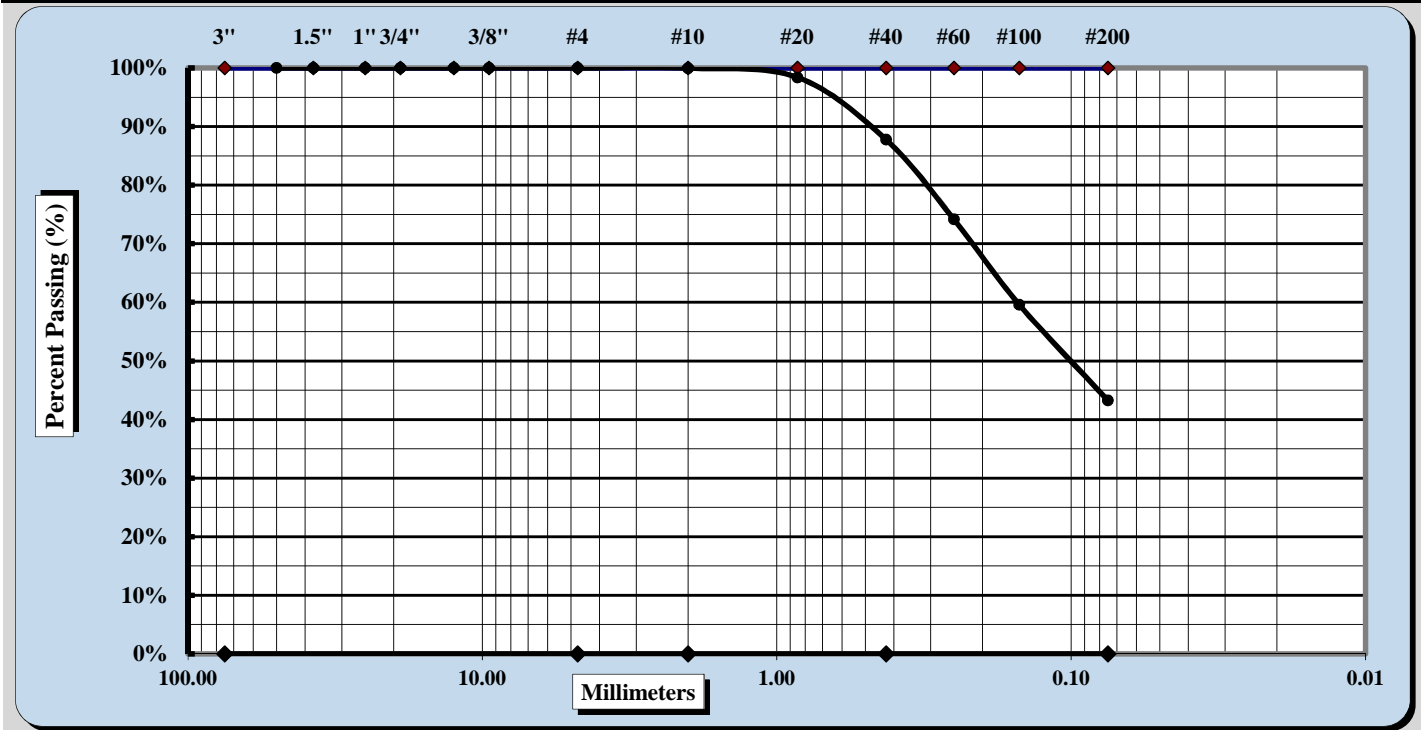


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| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-SOS-P35 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 3.5-5.5 ft |

Sample Description: **SILTY SAND (SM)** **A-4/A-5**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 0.0% | Fine Sand | 44.5% |
| Gravel | 0.0% | Medium Sand | 12.2% | Silt & Clay | 43.3% |
| Liquid Limit | NP | Plastic Limit | NP | Plastic Index | NP |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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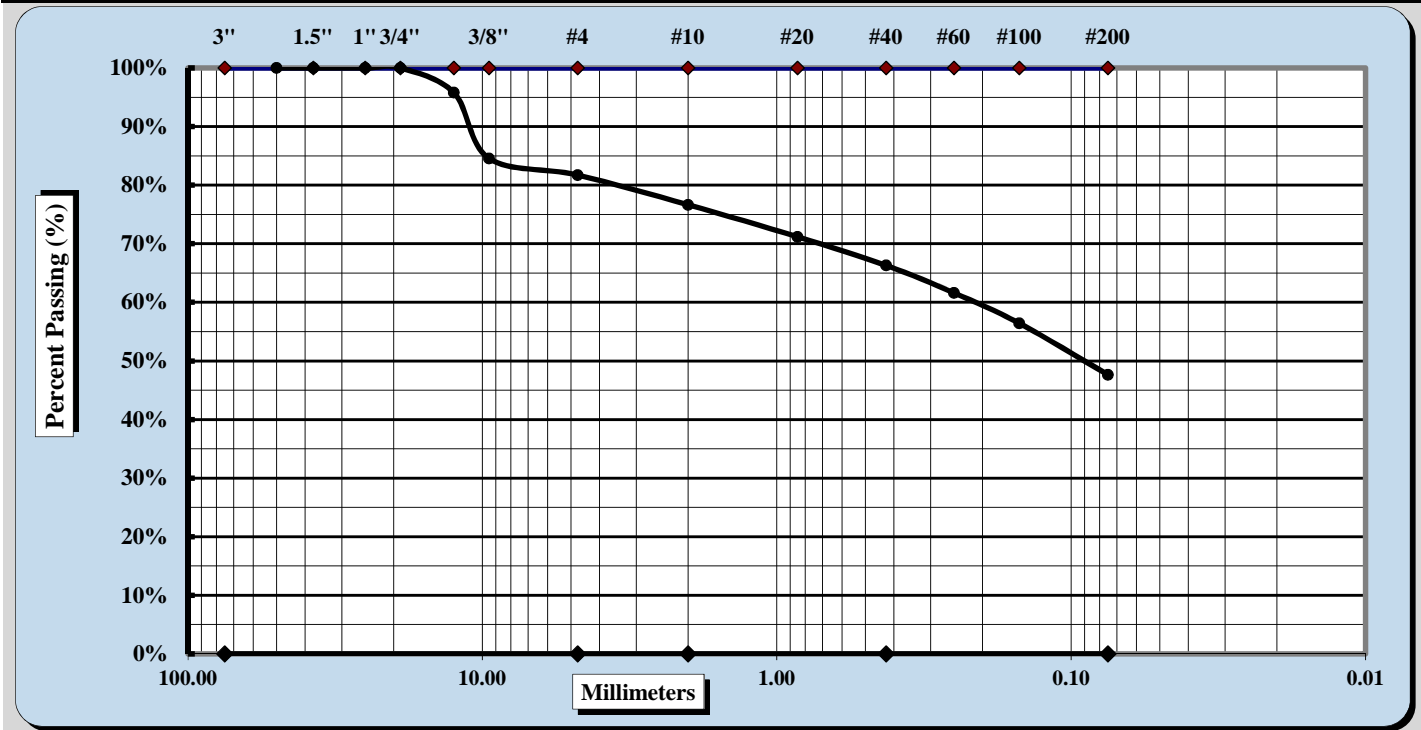


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-S-RW33 | Sample#: | S-1 |
| Log#: | 601 | Depth: | 1-3 ft |

Sample Description: **SILTY SAND WITH GRAVEL (SM)** **A-4**



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|-------|---------------|-------|---------------|-------|
| Maximum Particle Size | 1/2" | Coarse Sand | 5.1% | Fine Sand | 18.7% |
| Gravel | 18.3% | Medium Sand | 10.4% | Silt & Clay | 47.6% |
| Liquid Limit | 40 | Plastic Limit | 33 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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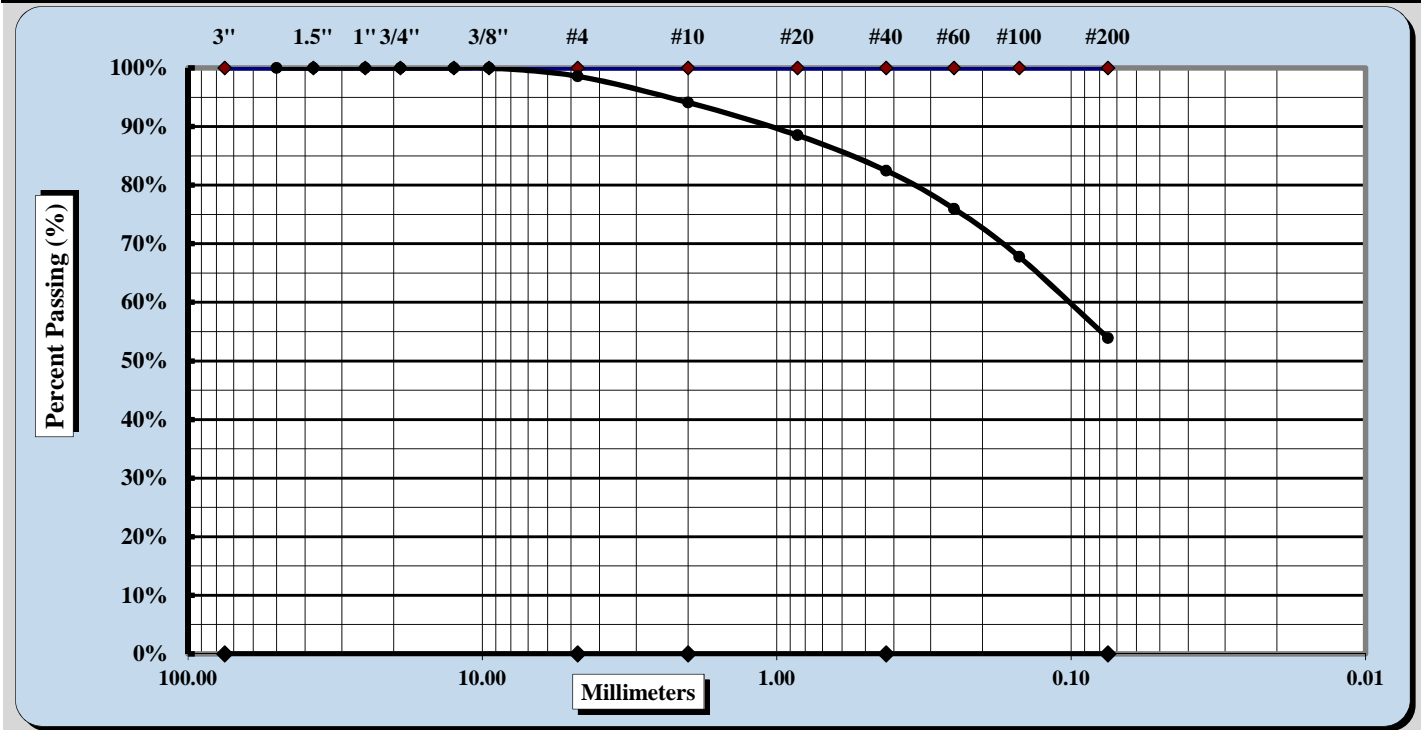


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-S-RW33 | Sample#: | S-8 |
| Log#: | 601 | Depth: | 23-25 ft |

Sample Description: SANDY SILT (ML) A-5



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 4.5% | Fine Sand | 28.6% |
| Gravel | 1.4% | Medium Sand | 11.6% | Silt & Clay | 53.9% |
| Liquid Limit | 41 | Plastic Limit | 36 | Plastic Index | 5 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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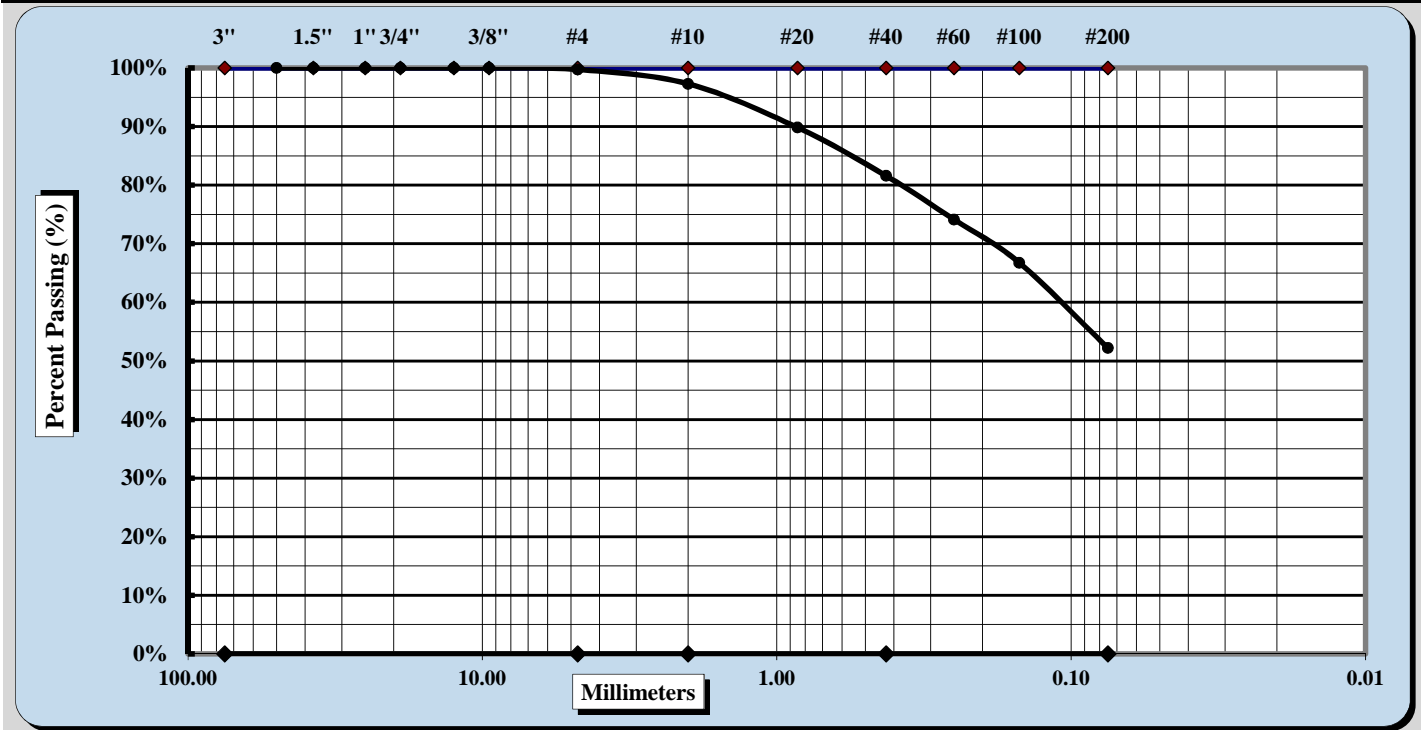


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-S-RW33 | Sample#: | S-10 |
| Log#: | 601 | Depth: | 33-34.8 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|-------|---------------|-------|
| Maximum Particle Size | #4 | Coarse Sand | 2.4% | Fine Sand | 29.4% |
| Gravel | 0.3% | Medium Sand | 15.7% | Silt & Clay | 52.2% |
| Liquid Limit | 33 | Plastic Limit | 27 | Plastic Index | 6 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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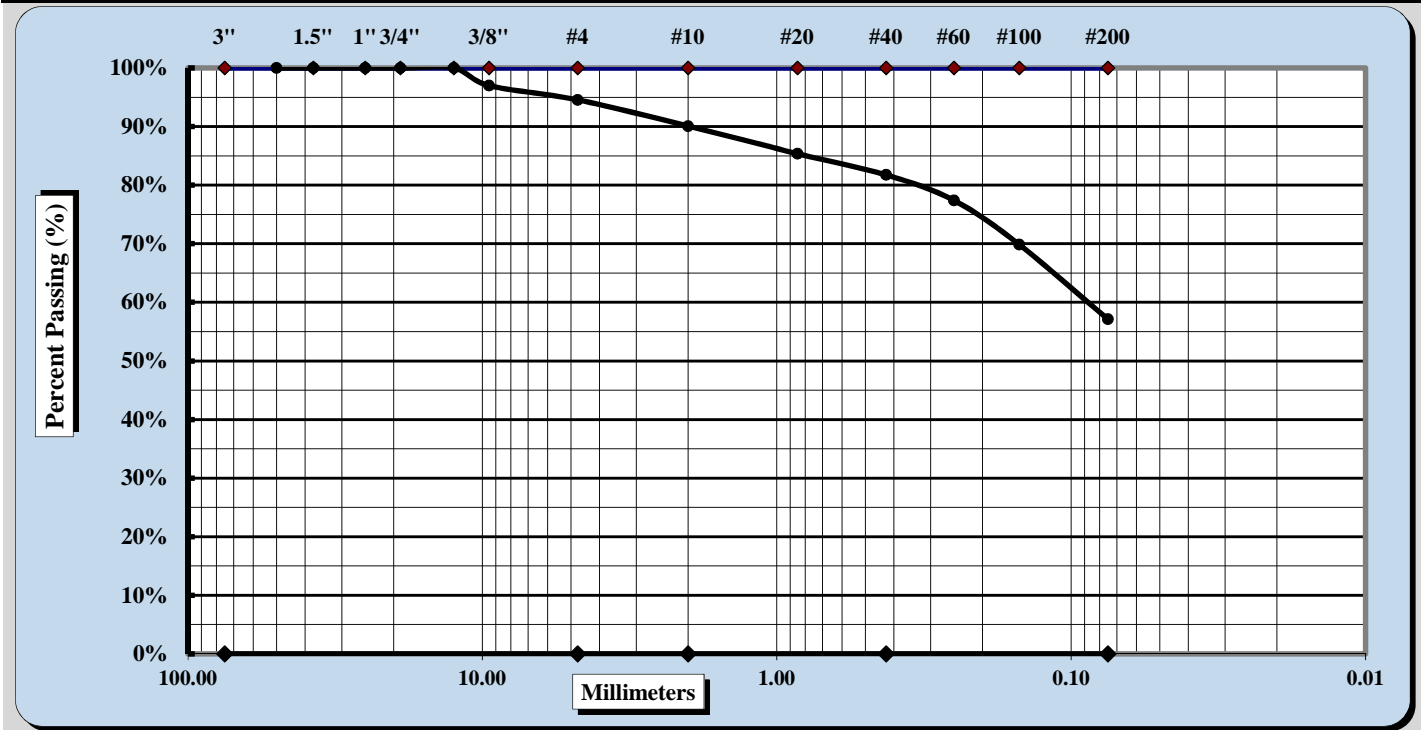


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-S-RW34 | Sample#: | S-2 |
| Log#: | 601 | Depth: | 2-4 ft |

Sample Description: SANDY LEAN CLAY (CL) A-7-6



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | 3/8" | Coarse Sand | 4.5% | Fine Sand | 24.6% |
| Gravel | 5.4% | Medium Sand | 8.4% | Silt & Clay | 57.1% |
| Liquid Limit | 42 | Plastic Limit | 22 | Plastic Index | 20 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

Signature

Geotechnical Lab Supervisor
Position

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Date

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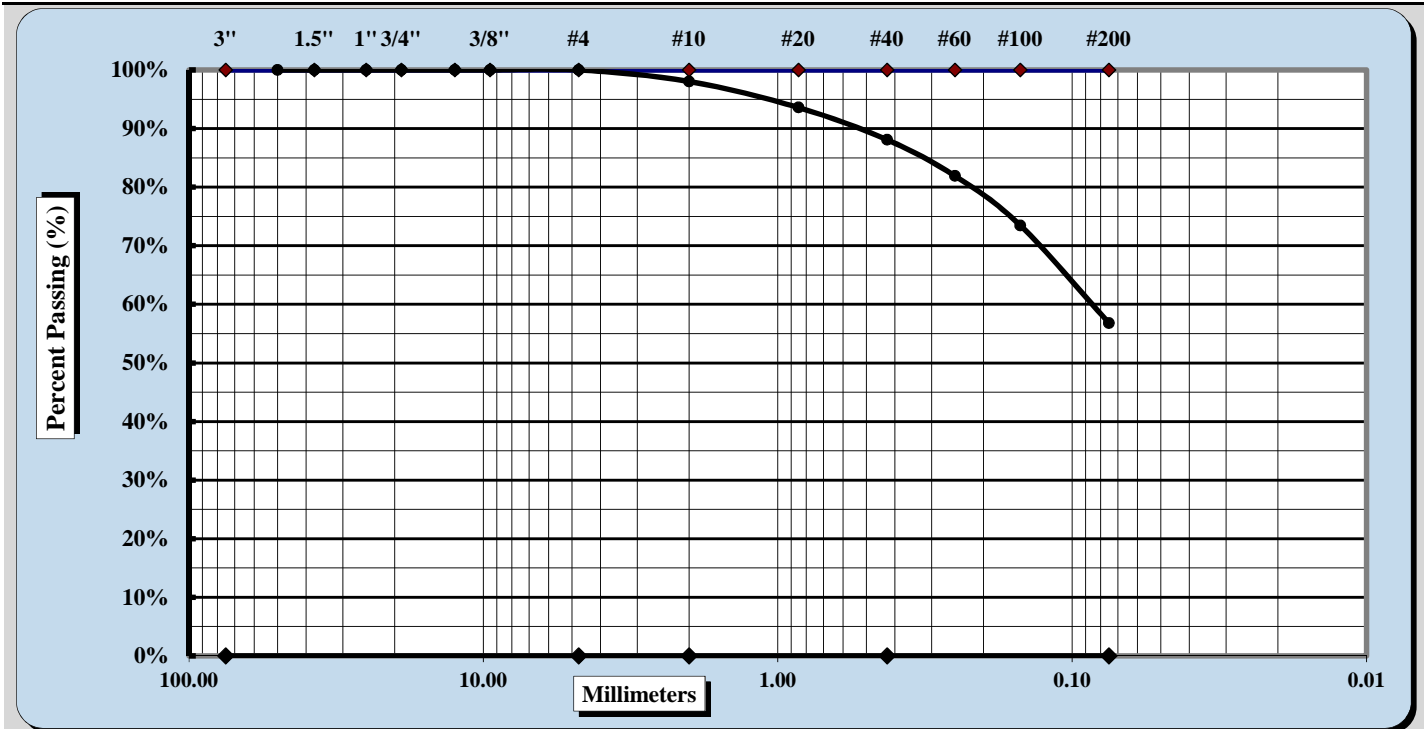


AASHTO T 88

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

| | | | |
|-----------------|---------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 8/24/19 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | August 5-16, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Sample I.D.: | 19X-S-RW34 | Sample#: | S-11 |
| Log#: | 601 | Depth: | 38-38.8 ft |

Sample Description: SANDY SILT (ML) A-4



| | | | |
|-------------|---------------------------------|---------------|---------------------------|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Fine Sand | < 0.425 mm and > 0.075 mm |
| Gravel | < 75 mm and > 4.75 mm (#4) | Silt and Clay | <0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | | |
| Medium Sand | < 2.00 mm and > 0.425 mm (#40) | | |

| | | | | | |
|-----------------------|------|---------------|------|---------------|-------|
| Maximum Particle Size | #10 | Coarse Sand | 2.0% | Fine Sand | 31.3% |
| Gravel | 0.0% | Medium Sand | 9.9% | Silt & Clay | 56.8% |
| Liquid Limit | 36 | Plastic Limit | 29 | Plastic Index | 7 |

| | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Description of Sand & Gravel Particles: | Rounded | <input type="checkbox"/> | Angular | <input checked="" type="checkbox"/> | |
| Hard & Durable | <input type="checkbox"/> | Soft | <input type="checkbox"/> | Weathered & Friable | <input checked="" type="checkbox"/> |

Notes / Deviations / References: **Virginia Test Method - 25**

Sand and Gravel sizes and fractions are per ASTM D2487

Jimmy Hanson
Technical Responsibility

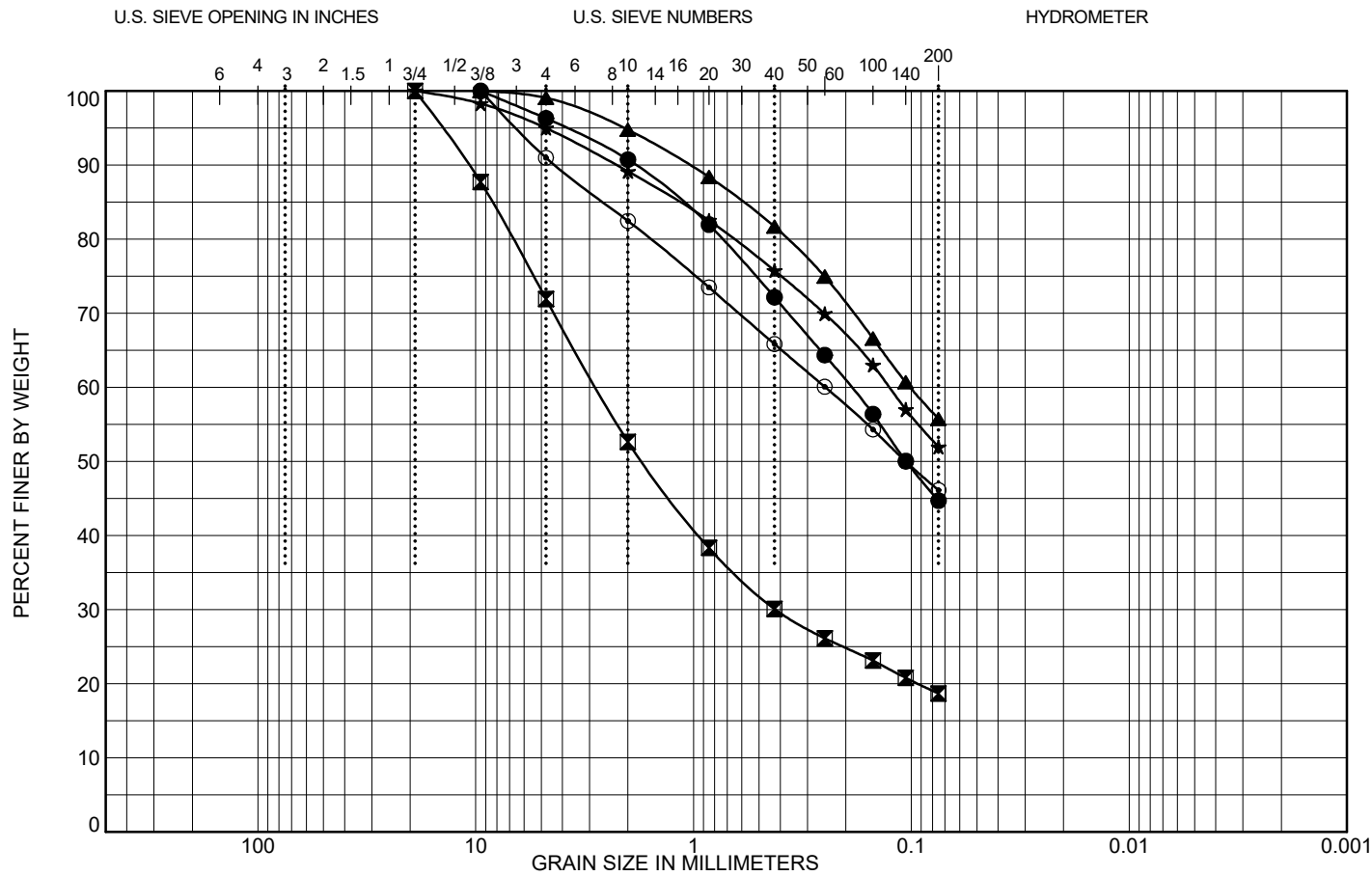
Signature

Geotechnical Lab Supervisor
Position

8/23/2019
Date

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T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|------|-------|------|
| ● | | | 0.189 | 9.5 |
| ☒ | | 0.42 | 2.786 | 19 |
| ▲ | | | 0.101 | 9.5 |
| ★ | | | 0.126 | 19 |
| ⊙ | | | 0.248 | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 8/6/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

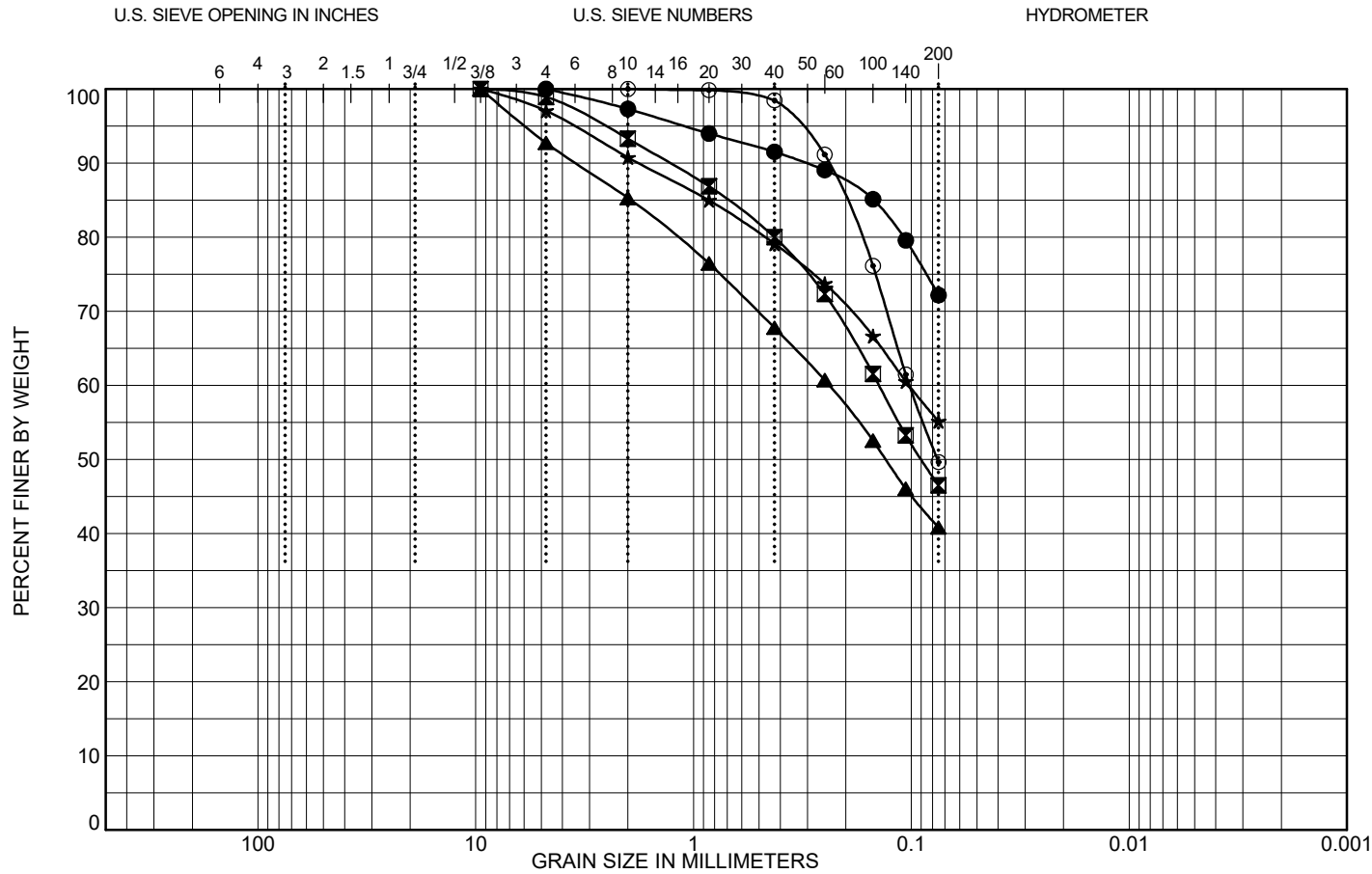
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● 19GWP-BR20 | SS-4 | 6.0 - 8.0 | 3.7 | 51.6 | 44.7 | 32 | 6 | 14.9 | | SILTY SAND(SM) | A-4 |
| ☒ 19GWP-BR20 | SS-14 | 53.0 - 55.0 | 28.1 | 53.2 | 18.7 | 27 | 5 | 4.0 | | SILTY SAND with GRAVEL(SM) | A-1-b |
| ▲ 19GWP-BR20 | SS-15 | 58.0 - 60.0 | 0.9 | 43.3 | 55.7 | 36 | 11 | 19.0 | | SANDY SILT(ML) | A-6 |
| ★ 19GWP-BR21 | S7 | 13.0 - 15.0 | 5.0 | 43.0 | 52.0 | 34 | 10 | 17.7 | | SANDY SILT(ML) | A-4 |
| ⊙ 19GWP-BR21 | S15 | 48.0 - 50.0 | 9.0 | 44.8 | 46.1 | 36 | 8 | 20.4 | | SILTY SAND(SM) | A-4 |



GRAIN SIZE DISTRIBUTION
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | | 4.76 |
| ⊠ | | | 0.141 | 9.5 |
| ▲ | | | 0.239 | 9.5 |
| ★ | | | 0.102 | 9.5 |
| ⊙ | | | 0.102 | 4.76 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 8/6/2019

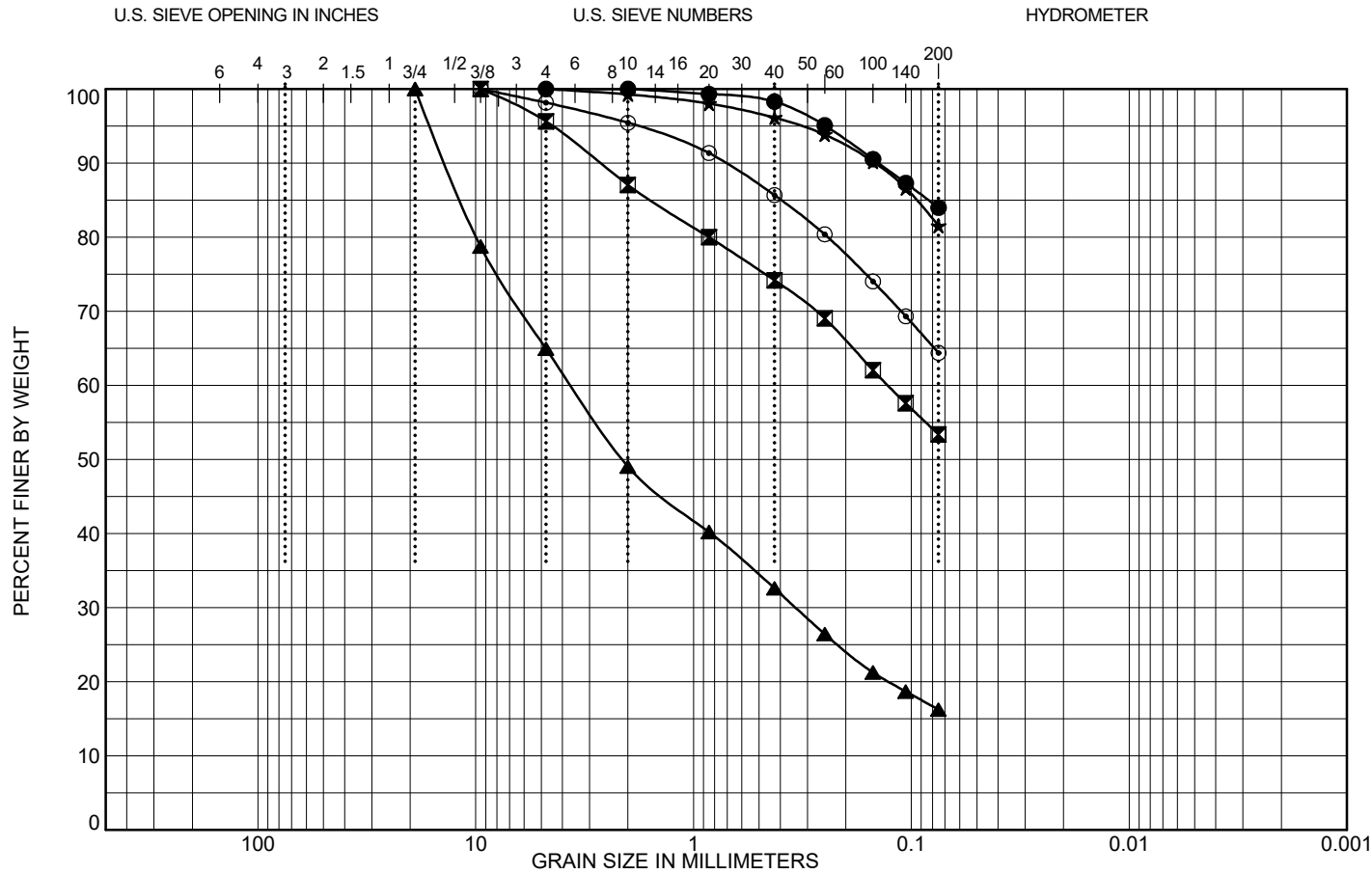
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● 19GWP-BR22 | S2 | 2.0 - 4.0 | 0.0 | 27.8 | 72.2 | 46 | 9 | 23.5 | | SILT with SAND(ML) | A-5 |
| ⊠ 19GWP-BR22 | S7 | 18.0 - 20.0 | 1.1 | 52.4 | 46.5 | 32 | 5 | 15.4 | | SILTY SAND(SM) | A-4 |
| ▲ 19GWP-BR22 | S11 | 33.0 - 33.9 | 7.3 | 51.9 | 40.8 | 29 | 6 | 13.4 | | SILTY SAND(SM) | A-4 |
| ★ 19GWP-BR23 | S6 | 13.0 - 15.0 | 3.0 | 41.9 | 55.1 | 40 | 11 | 25.4 | | SANDY SILT(ML) | A-6 |
| ⊙ 19GWP-BR23 | S8 | 23.0 - 25.0 | 0.0 | 50.4 | 49.6 | 43 | 4 | 23.4 | | SILTY SAND(SM) | A-5 |

GRAIN SIZE DISTRIBUTION
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|------|-------|------|
| ● | | | | 4.76 |
| ☒ | | | 0.128 | 9.5 |
| ▲ | | 0.34 | 3.638 | 19 |
| ★ | | | | 4.76 |
| ⊙ | | | | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 8/14/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

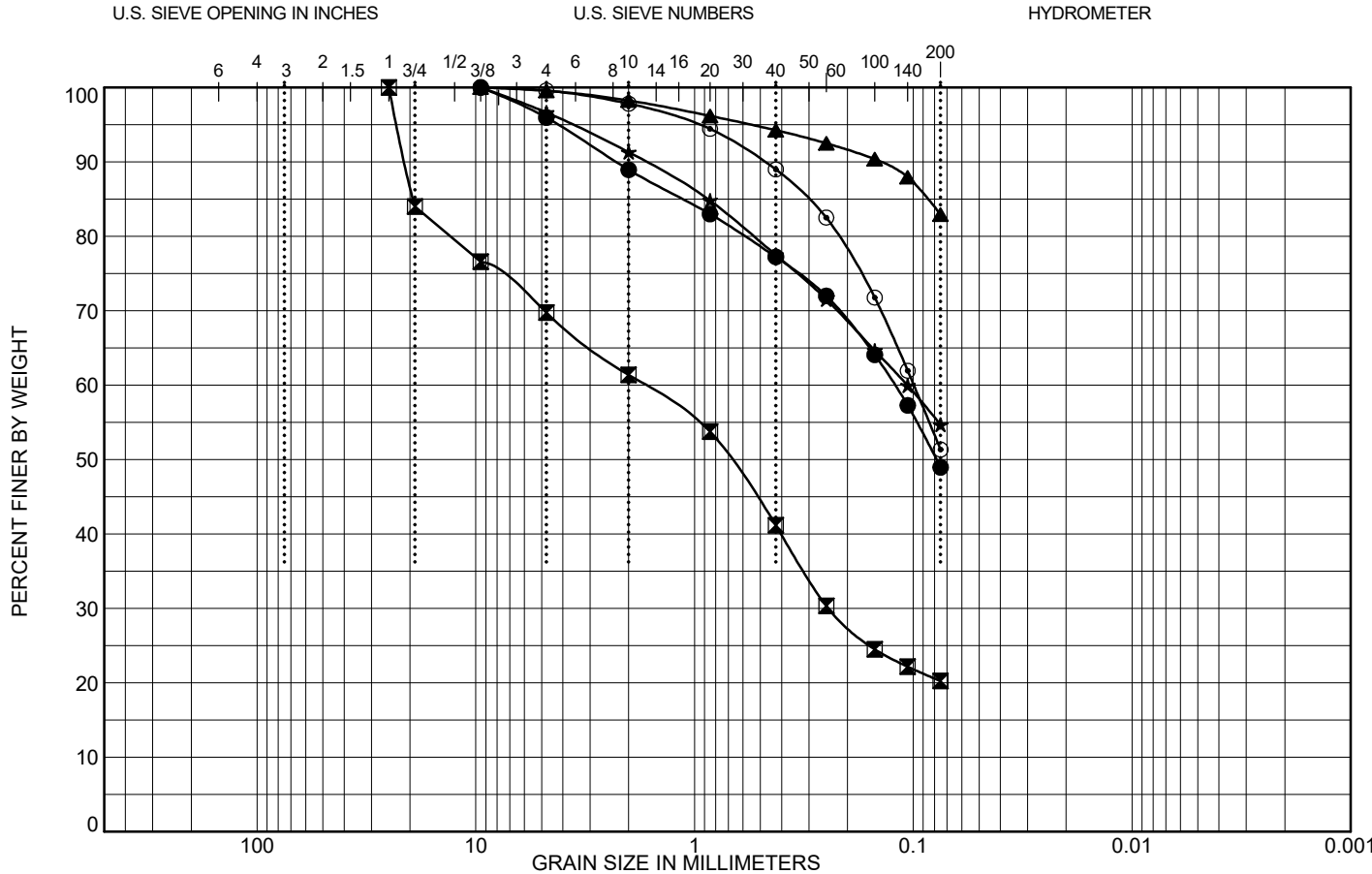
| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|-------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● | 19LOD-BR15 | S6 | 13.0 - 15.0 | 0.0 | 16.0 | 84.0 | 58 | 11 | 44.7 | | ELASTIC SILT with SAND(MH) | A-7-5 |
| ☒ | 19LOD-BR16 | SS-6 | 13.0 - 15.0 | 4.4 | 42.3 | 53.4 | 39 | 13 | 20.5 | | SANDY SILT(ML) | A-6 |
| ▲ | 19ODD-BR07 | S11 | 38.0 - 40.0 | 35.1 | 48.7 | 16.2 | | | | 12.2 | | |
| ★ | 19ODD-BR07 | S14 | 53.0 - 55.0 | 0.0 | 18.5 | 81.5 | 34 | 6 | 13.1 | | SILT with SAND(ML) | A-4 |
| ⊙ | 19ODD-BR08A | S2 | 4.0 - 6.0 | 1.9 | 33.8 | 64.4 | 39 | 12 | 22.8 | | SANDY SILT(ML) | A-6 |



GRAIN SIZE DISTRIBUTION
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19




| | D10 | D30 | D60 | D100 |
|---|-----|-------|-------|------|
| ● | | | 0.122 | 9.5 |
| ☒ | | 0.243 | 1.715 | 25 |
| ▲ | | | | 9.5 |
| ★ | | | 0.106 | 9.5 |
| ⊙ | | | 0.1 | 9.5 |

Test Method: VTM-25

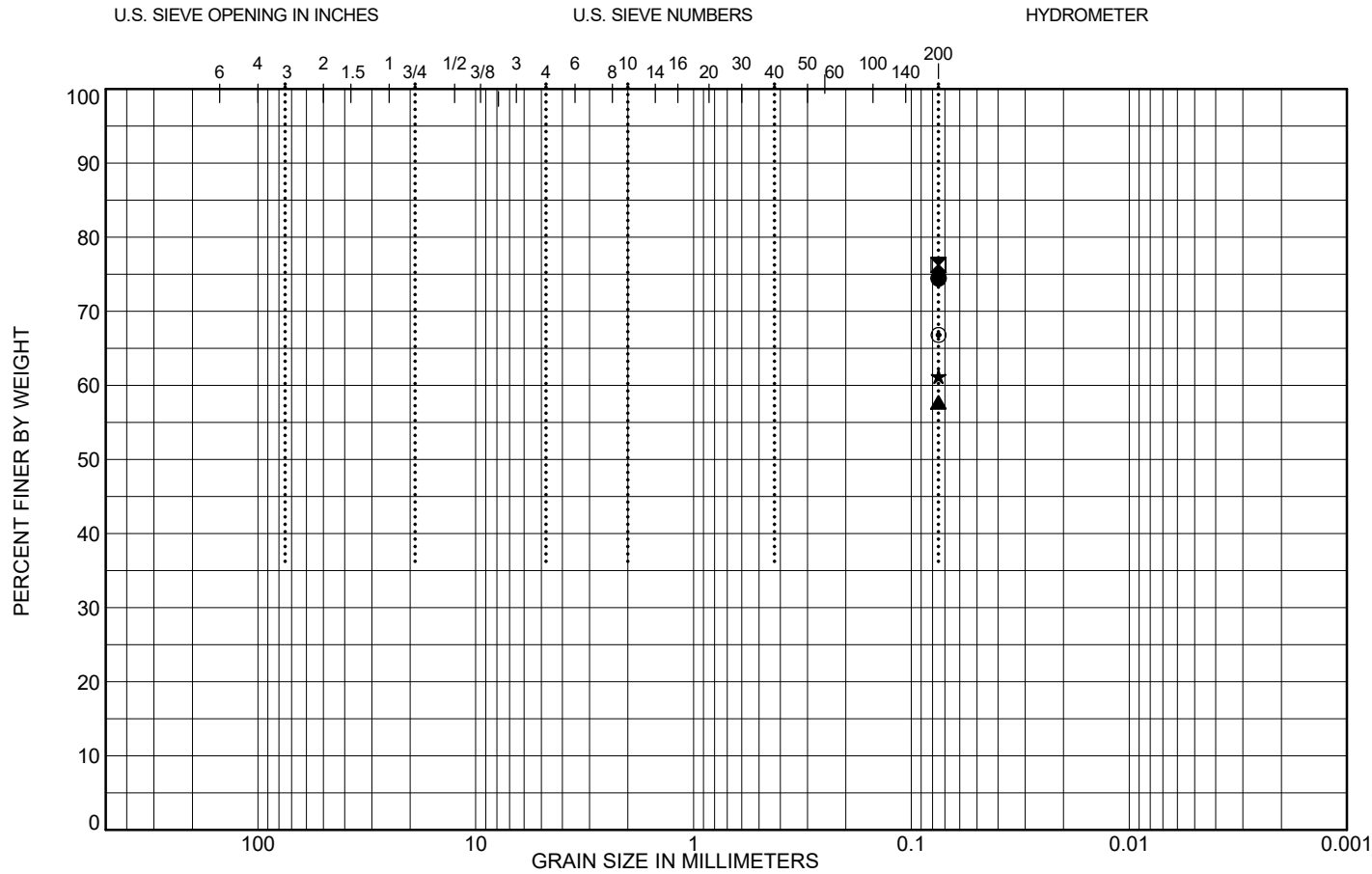
Tested By: SM/CL, SR Date: 8/16/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● 19ODD-BR08A | S15 | 58.0 - 59.4 | 4.1 | 47.0 | 49.0 | 34 | 6 | 16.7 | | SILTY SAND(SM) | A-4 |
| ☒ 19X-BR09 | S1 | 2.0 - 4.0 | 30.3 | 49.5 | 20.2 | | | 9.5 | | | |
| ▲ 19X-BR09 | TUBE | 8.0 - 10.0 | 0.5 | 16.6 | 82.9 | 46 | 12 | 32.7 | | SILT with SAND(ML) | A-7-5 |
| ★ 19X-BR10 | S2 | 4.0 - 6.0 | 3.4 | 41.9 | 54.7 | 45 | 10 | 27.4 | | SANDY SILT(ML) | A-5 |
| ⊙ 19X-BR10 | S10 | 38.0 - 39.0 | 0.4 | 48.3 | 51.3 | 31 | 5 | 14.6 | | SANDY SILT(ML) | A-4 |

| | | | |
|--|--|---|--------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 4 of 4 |
|--|--|---|--------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 496 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | |
| ☒ | | | | |
| ▲ | | | | |
| ★ | | | | |
| ⊙ | | | | |

Test Method: AASHTO T-11

Tested By: SM/CL, SR Date: 8/13/2019

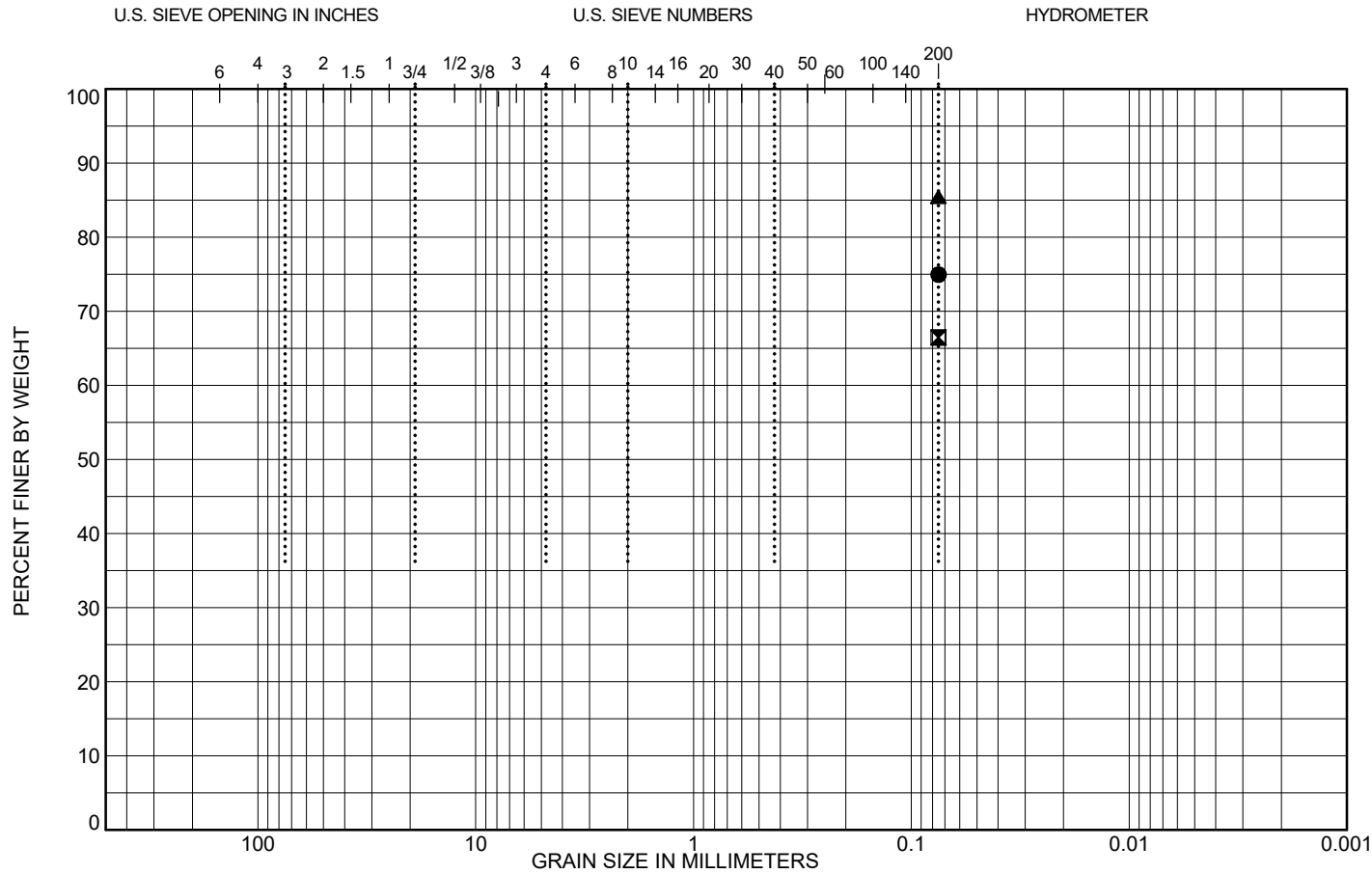
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|------|----|-------|-------------------------|--------|
| ● | 19LOD-BR15 | S3 | 4.0 - 6.0 | 25.6 | 74.4 | 45 | 18 | 24.3 | | | SILT with SAND(ML) | A-7-6 |
| ☒ | 19LOD-BR15 | S9 | 28.0 - 30.0 | 23.7 | 76.3 | 45 | 8 | 44.2 | | | SILT with SAND(ML) | A-5 |
| ▲ | 19LOD-BR16 | SS-9 | 28.0 - 30.0 | 42.3 | 57.7 | 29 | 7 | 23.6 | | | SANDY SILTY CLAY(CL-ML) | A-4 |
| ★ | 19LOD-BR16 | SS-14 | 53.0 - 54.8 | 38.8 | 61.2 | 39 | 10 | 18.4 | | | SANDY SILT(ML) | A-4 |
| ⊙ | 19ODD-BR07 | S1 | 2.0 - 4.0 | 33.2 | 66.8 | 40 | 13 | 21.8 | | | SANDY SILT(ML) | A-6 |

| | | |
|--|---|--------------------------|
| | MATERIALS FINER THAN 75µm_ #200 Wash | Fairfax County, Virginia |
| | I-495 NEXT Express Lanes | Project Number: 19-0012 |

Sheet 1 of 2

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | | | | |
|---|-----|-----|-----|------|
| | D10 | D30 | D60 | D100 |
| ● | | | | |
| ☒ | | | | |
| ▲ | | | | |
| | | | | |

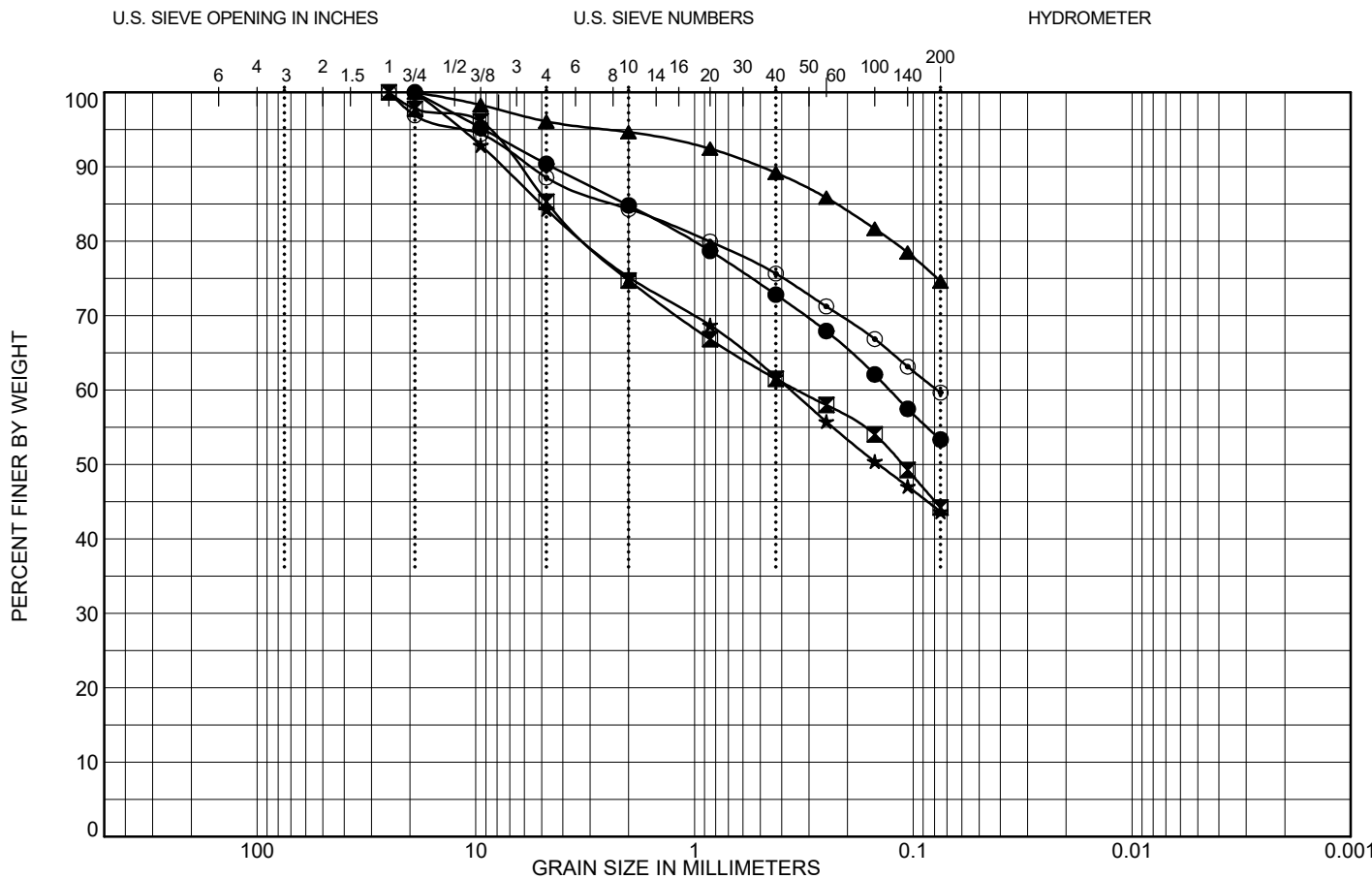
Test Method: AASHTO T-11

Tested By: SM/CL, SR Date: 8/16/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|-------------|-------|-------------|---------|-------|-------|-------|------|----|-------|-------------------------|--------|
| ● | 19ODD-BR07 | S10 | 33.0 - 35.0 | 25.1 | 74.9 | 34 | 12 | 23.7 | | | LEAN CLAY with SAND(CL) | A-6 |
| ☒ | 19ODD-BR08A | S8 | 23.0 - 25.0 | 33.5 | 66.5 | 40 | 14 | 21.8 | | | SANDY SILT(ML) | A-6 |
| ▲ | 19X-BR10 | S6 | 18.0 - 20.0 | 14.6 | 85.4 | 38 | 14 | 31.0 | | | LEAN CLAY(CL) | A-6 |
| | | | | | | | | | | | | |

| | | |
|--|---|--------------------------|
| | MATERIALS FINER THAN 75µm_ #200 Wash | Fairfax County, Virginia |
| | I-495 NEXT Express Lanes | Project Number: 19-0012 |




| | | | | |
|---|-----|-----|-------|------|
| | D10 | D30 | D60 | D100 |
| ● | | | 0.128 | 19 |
| ☒ | | | 0.339 | 25 |
| ▲ | | | | 19 |
| ★ | | | 0.364 | 19 |
| ⊙ | | | 0.078 | 25 |

Test Method: AASHTO T88

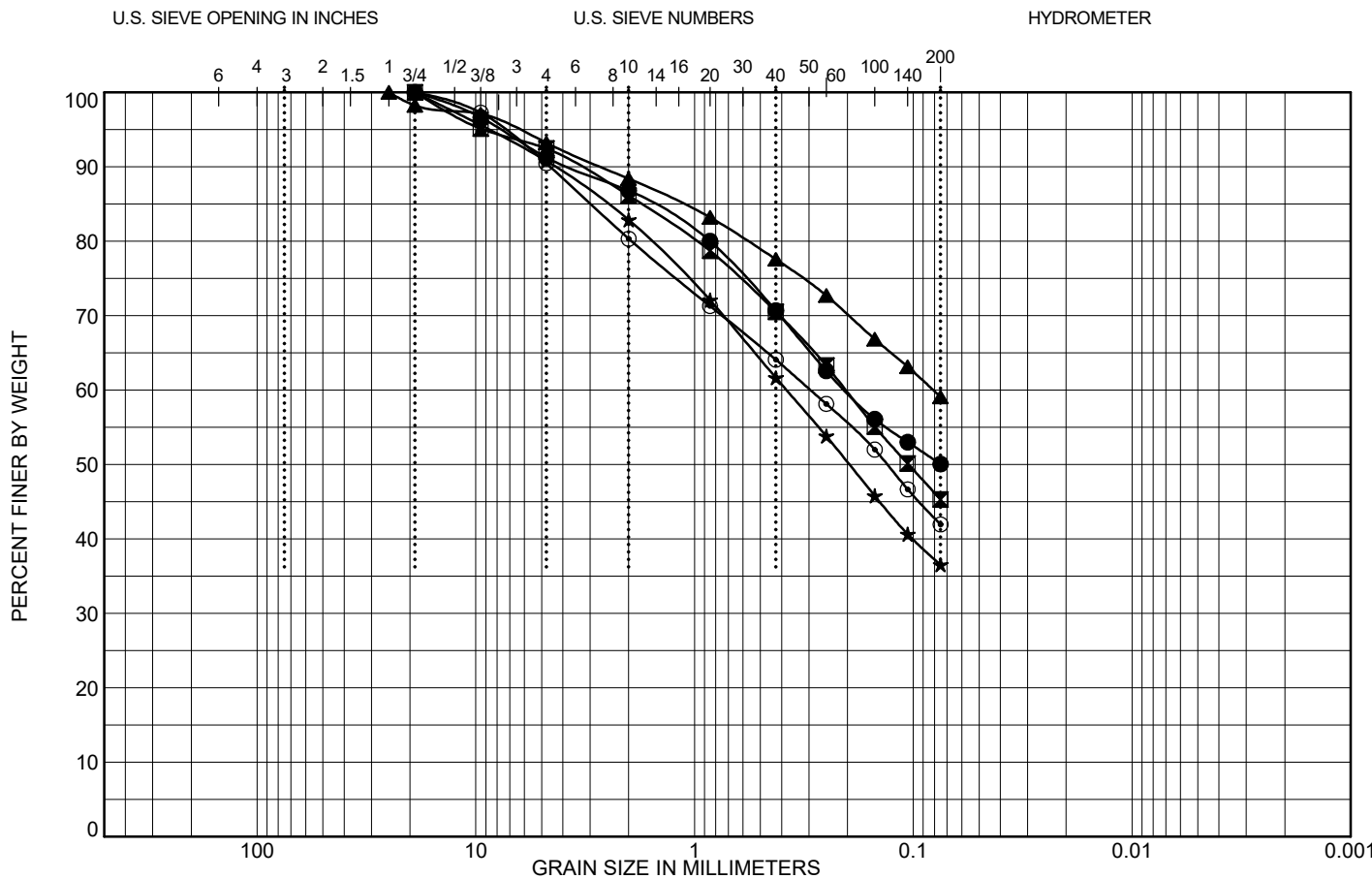
Tested By: SM/SR Date: 7/5/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification |
|---------------|-------|-----------|---------|-------|-------|-------|----|------|-------|----------------------------------|
| ● 19ODD-W-P01 | Bag | 2.0 - 8.0 | 9.6 | 37.0 | 53.3 | 42 | 18 | 18.3 | | SANDY LEAN CLAY(CL, A-7-6) |
| ☒ 19X-NOS-P01 | Bag | 2.3 - 6.3 | 14.7 | 41.0 | 44.2 | 32 | 6 | 16.2 | | SILTY SAND(SM, A-4) |
| ▲ 19X-NOS-P08 | Bag | 3.5 - 5.5 | 3.9 | 21.5 | 74.6 | 47 | 21 | 22.1 | | LEAN CLAY with SAND(CL, A-7-6) |
| ★ 19X-NOS-P10 | Bag | 3.0 - 6.0 | 15.7 | 40.6 | 43.6 | 34 | 13 | 1.2 | | CLAYEY SAND with GRAVEL(SC, A-6) |
| ⊙ 19X-NOS-P16 | Bag | 3.0 - 6.0 | 11.5 | 28.9 | 59.7 | 38 | 16 | 2.6 | | SANDY LEAN CLAY(CL, A-6) |

| | | | |
|--|--|---|--------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 1 of 3 |
|--|--|---|--------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES.GPJ S:\LUT\2014.GDT 7/26/19




| | | | | |
|---|-----|-----|-------|------|
| | D10 | D30 | D60 | D100 |
| ● | | | 0.204 | 19 |
| ⊠ | | | 0.204 | 19 |
| ▲ | | | 0.081 | 25 |
| ★ | | | 0.38 | 19 |
| ⊙ | | | 0.295 | 19 |

Test Method: AASHTO T88

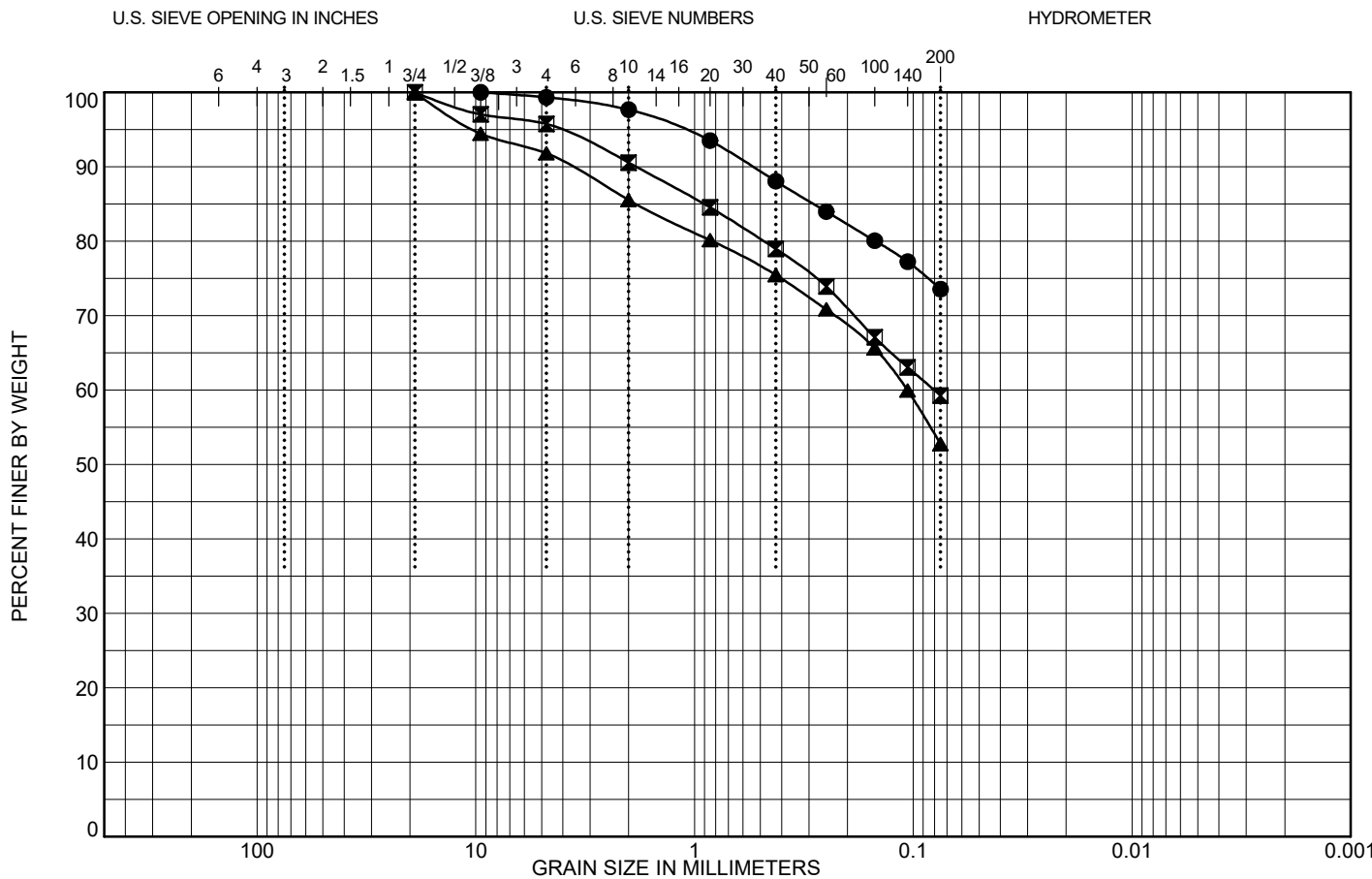
Tested By: SM/SR Date: 7/8/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification |
|---------------|-------|-----------|---------|-------|-------|-------|----|------|-------|--------------------------------|
| ● 19X-NOS-P19 | Bag | 3.0 - 6.0 | 8.8 | 41.2 | 50.1 | 34 | 12 | 0.8 | | SANDY LEAN CLAY(CL, A-6) |
| ⊠ 19X-NOS-P24 | Bag | 3.0 - 6.0 | 7.6 | 47.1 | 45.3 | 31 | 8 | 0.8 | | SILTY SAND(SM, A-4) |
| ▲ 19X-N-RW14 | Bag | 1.0 - 4.0 | 6.8 | 34.1 | 59.1 | 38 | 15 | 2.6 | | SANDY LEAN CLAY(CL, A-6) |
| ★ 19X-SOS-P24 | Bag | 2.6 - 5.6 | 9.2 | 54.2 | 36.5 | 25 | 6 | 4.8 | | SILTY, CLAYEY SAND(SC-SM, A-4) |
| ⊙ 19X-SOS-P31 | Bag | 3.5 - 5.5 | 9.6 | 48.5 | 41.9 | 34 | 12 | 11.6 | | CLAYEY SAND(SC, A-6) |

| | | | |
|--|--|---|--------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 2 of 3 |
|--|--|---|--------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES.GPJ S:\LUT\2014.GDT 7/28/19




| | | | | |
|---|-----|-----|-------|------|
| | D10 | D30 | D60 | D100 |
| ● | | | | 9.5 |
| ⊠ | | | 0.08 | 19 |
| ▲ | | | 0.106 | 19 |

Test Method: AASHTO T88

Tested By: SM/SR Date: 7/8/2019

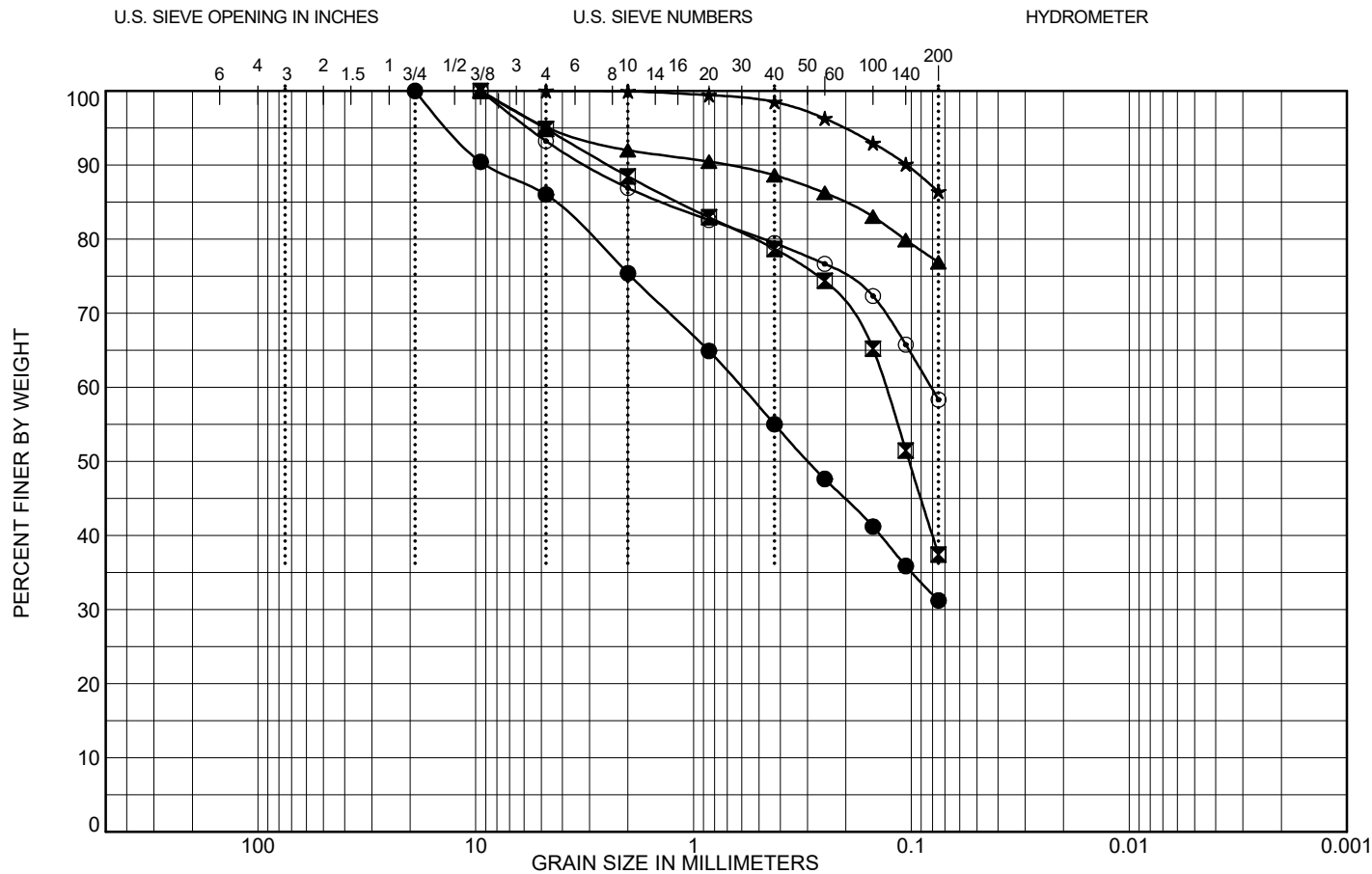
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification |
|---------------|-------|-----------|---------|-------|-------|-------|----|------|-------|--------------------------------|
| ● 19X-SOS-P40 | Bag | 2.0 - 5.5 | 0.7 | 25.8 | 73.5 | 42 | 22 | 9.0 | | LEAN CLAY with SAND(CL, A-7-6) |
| ⊠ 19X-S-RW28 | Bag | 3.0 - 6.0 | 4.3 | 36.5 | 59.3 | 39 | 15 | 20.2 | | SANDY LEAN CLAY(CL, A-6) |
| ▲ 19X-S-RW37 | Bag | 3.0 - 7.0 | 8.2 | 39.1 | 52.7 | 33 | 8 | 10.4 | | SANDY SILT(ML, A-4) |

| | | | |
|--|--|---|--------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 3 of 3 |
|--|--|---|--------------|

T&E GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES.GPJ SALUT2014.GDT 7/26/19

TLB GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.603 | 19 |
| ☒ | | | 0.131 | 9.5 |
| ▲ | | | | 9.5 |
| ★ | | | | 4.76 |
| ⊙ | | | 0.081 | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 8/1/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

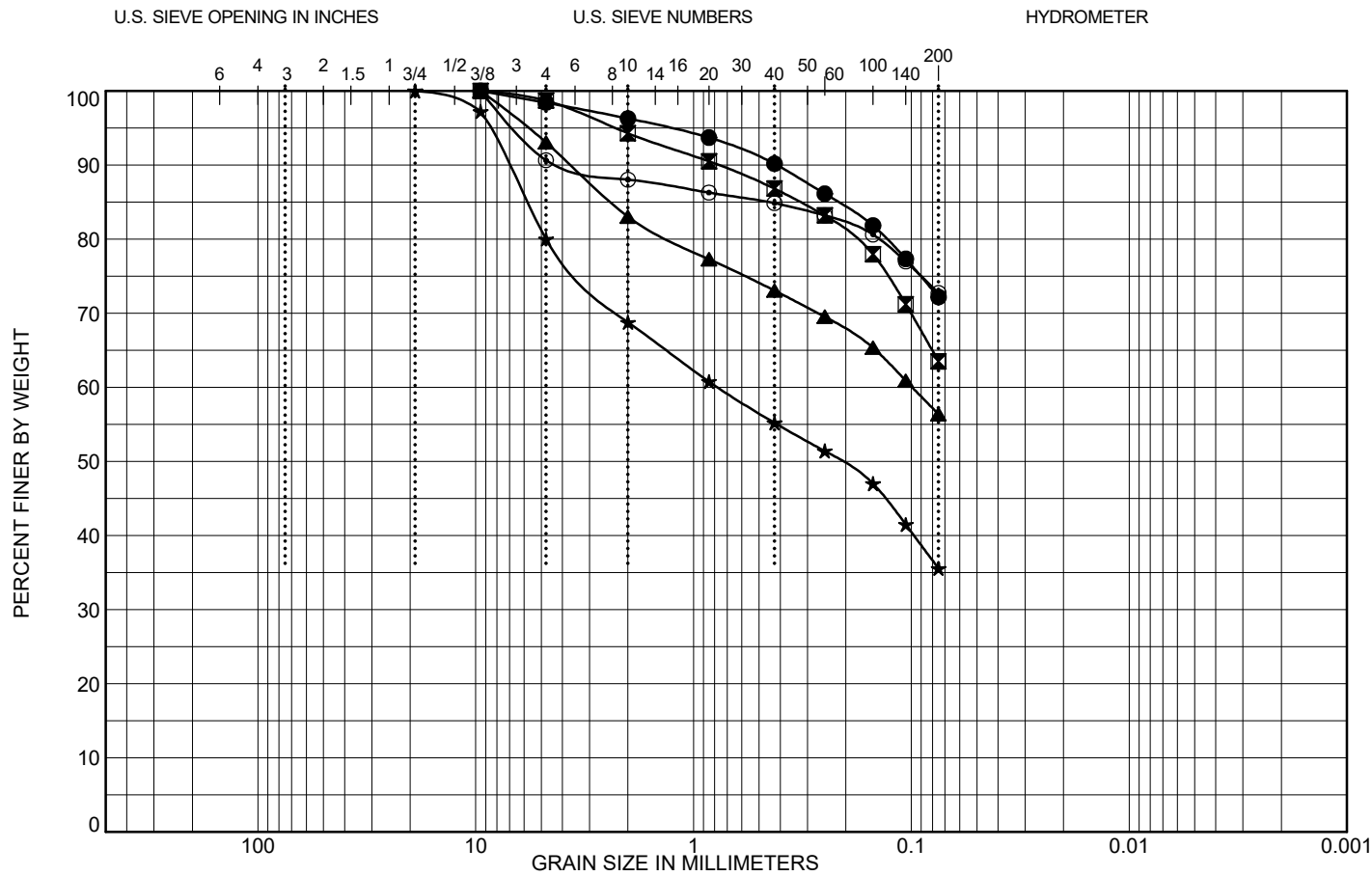
| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|------------------------|--------|
| ● | 19DTR-P08 | BULK | 3.0 - 6.0 | 14.0 | 54.8 | 31.2 | 31 | 7 | 10.6 | | SILTY SAND(SM) | A-2-4 |
| ☒ | 19DTR-P09 | S-2 | 3.5 - 5.5 | 5.1 | 57.4 | 37.4 | NP | NP | 4.4 | | SILTY SAND(SM) | A-4 |
| ▲ | 19DTR-RW01 | S5 | 8.0 - 10.0 | 4.9 | 18.2 | 76.9 | 52 | 30 | 22.5 | | FAT CLAY with SAND(CH) | A-7-6 |
| ★ | 19DTR-RW01 | S11 | 38.0 - 40.0 | 0.0 | 13.6 | 86.4 | 45 | 9 | 34.8 | | SILT(ML) | A-5 |
| ⊙ | 19DTR-RW02 | S7 | 18.0 - 20.0 | 6.8 | 34.9 | 58.3 | 36 | 9 | 19.2 | | SANDY SILT(ML) | A-4 |



GRAIN SIZE DISTRIBUTION
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19




| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | | 9.5 |
| ⊠ | | | | 9.5 |
| ▲ | | | 0.099 | 9.5 |
| ★ | | | 0.772 | 19 |
| ⊙ | | | | 9.5 |

Test Method: VTM-25

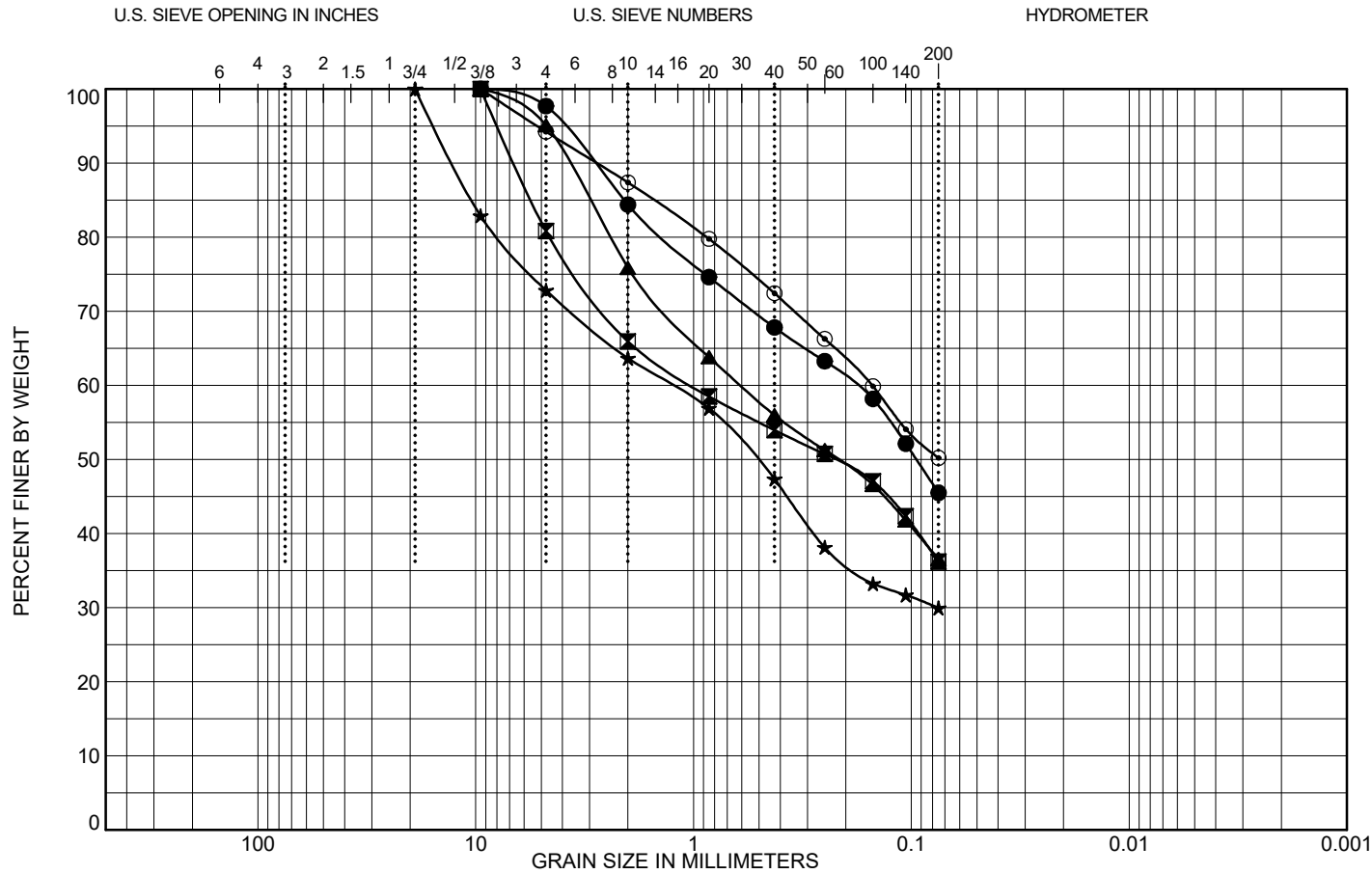
Tested By: SM/CL, SR Date: 8/2/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● 19DTR-RW02 | S12 | 43.0 - 45.0 | 1.6 | 26.2 | 72.2 | 39 | 7 | 18.2 | | SILT with SAND(ML) | A-4 |
| ⊠ 19DTR-RW03 | S-2 | 2.0 - 4.0 | 1.3 | 35.2 | 63.5 | 41 | 14 | 23.5 | | SANDY SILT(ML) | A-7-6 |
| ▲ 19DTR-RW03 | S-11 | 38.0 - 38.8 | 7.0 | 36.6 | 56.4 | 27 | 5 | 16.4 | | SANDY SILT(ML) | A-4 |
| ★ 19DTR-RW05 | S2 | 4.0 - 6.0 | 20.0 | 44.4 | 35.6 | 32 | 4 | 8.0 | | SILTY SAND with GRAVEL(SM) | A-4 |
| ⊙ 19DTR-RW05 | S6 | 18.0 - 20.0 | 9.4 | 17.9 | 72.7 | 38 | 8 | 32.8 | | SILT with SAND(ML) | A-4 |

| | | | |
|--|--|---|---------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 2 of 22 |
|--|--|---|---------------|

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-------|-------|------|
| ● | | | 0.18 | 9.5 |
| ☒ | | | 1.011 | 9.5 |
| ▲ | | | 0.606 | 9.5 |
| ★ | | 0.076 | 1.258 | 19 |
| ◎ | | | 0.152 | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 8/7/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

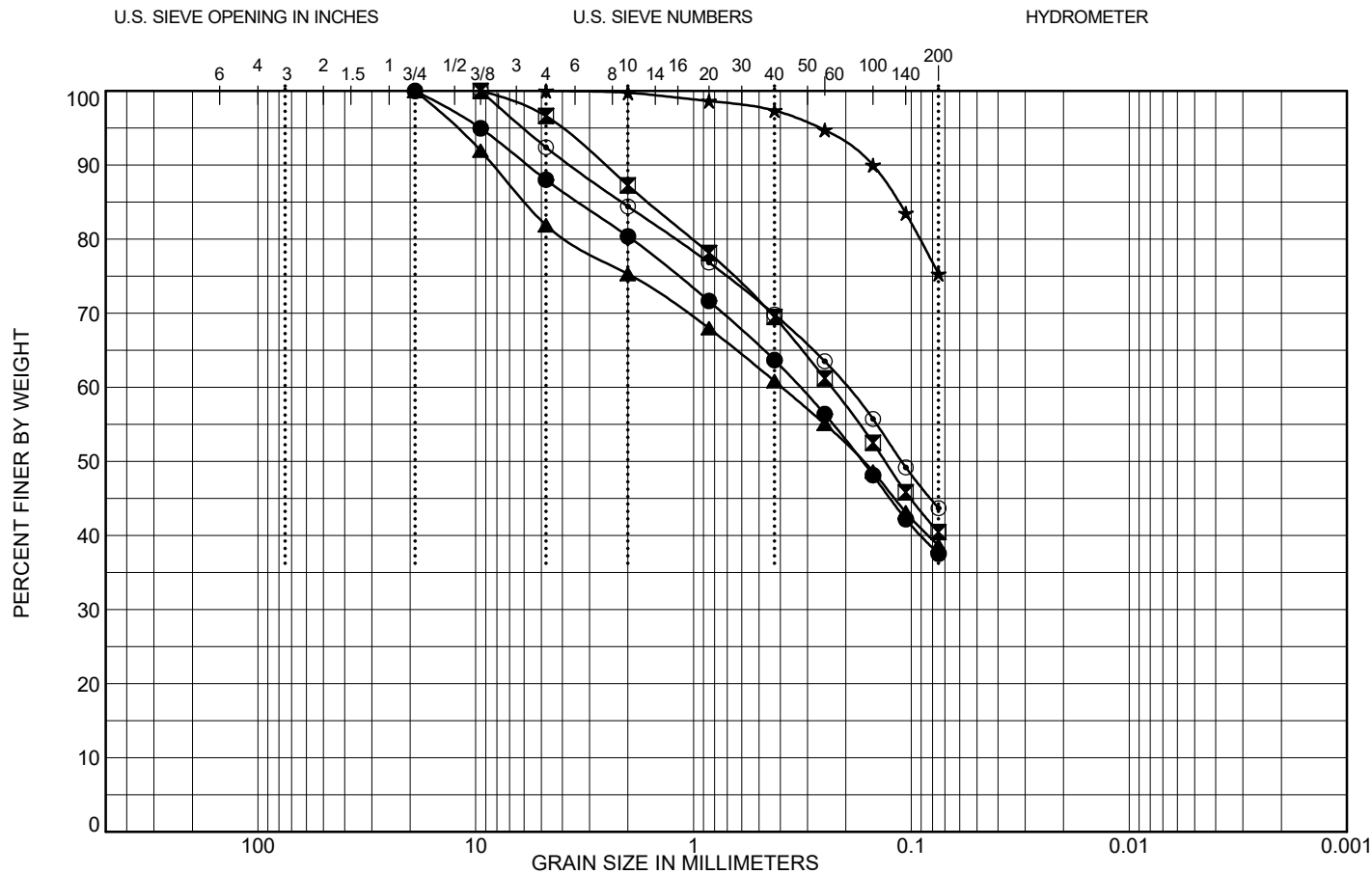
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● 19DTR-RW05 | S9 | 33.0 - 33.4 | 2.3 | 52.2 | 45.5 | 33 | 6 | 5.2 | | SILTY SAND(SM) | A-4 |
| ☒ 19DTR-RW07 | S2 | 4.0 - 6.0 | 19.2 | 44.6 | 36.2 | 37 | 4 | 10.9 | | SILTY SAND with GRAVEL(SM) | A-4 |
| ▲ 19DTR-RW07 | S7 | 20.0 - 20.9 | 4.9 | 58.5 | 36.5 | | | | 6.5 | | |
| ★ 19GTP-E-P08 | S1 | 1.0 - 2.5 | 27.2 | 42.9 | 30.0 | | | | 6.4 | | |
| ◎ 19GTP-E-P11 | S2 | 3.0 - 4.5 | 5.8 | 44.0 | 50.2 | 35 | 11 | 14.6 | | SANDY LEAN CLAY(CL) | A-6 |



GRAIN SIZE DISTRIBUTION
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.325 | 19 |
| ☒ | | | 0.233 | 9.5 |
| ▲ | | | 0.394 | 19 |
| ★ | | | | 4.76 |
| ⊙ | | | 0.199 | 9.5 |

Test Method: VTM-25

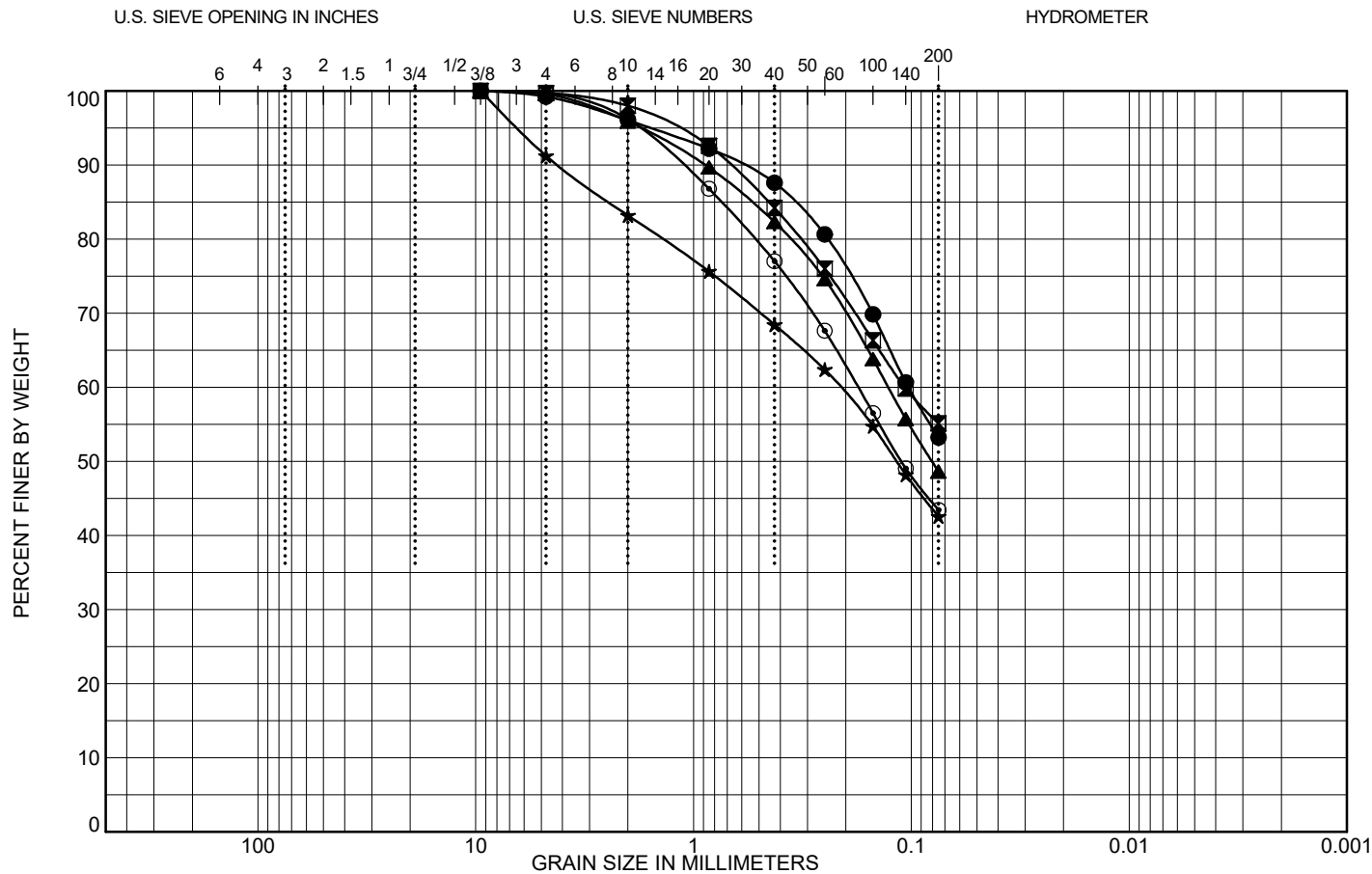
Tested By: SM/CL, SR Date: 8/8/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● | 19GWP-P01 | SS-3 | 4.0 - 6.0 | 12.0 | 50.5 | 37.5 | 33 | 5 | 9.3 | | SILTY SAND(SM) | A-4 |
| ☒ | 19GWP-P02 | SS-2 | 2.0 - 4.0 | 3.4 | 56.1 | 40.4 | 35 | 11 | 10.6 | | CLAYEY SAND(SC) | A-6 |
| ▲ | 19GWP-RW05 | SS-2 | 2.0 - 4.0 | 18.1 | 43.2 | 38.6 | 32 | 7 | 15.5 | | SILTY SAND with GRAVEL(SM) | A-4 |
| ★ | 19GWP-RW05 | SS-12 | 43.0 - 45.0 | 0.0 | 24.7 | 75.3 | 38 | 4 | 30.0 | | SILT with SAND(ML) | A-4 |
| ⊙ | 19GWP-RW09 | S6 | 13.0 - 15.0 | 7.6 | 48.7 | 43.7 | 33 | 6 | 16.3 | | SILTY SAND(SM) | A-4 |

| | | | |
|--|--|---|---------------|
| | <h3>GRAIN SIZE DISTRIBUTION</h3> <p>I-495 NEXT Express Lanes</p> | Fairfax County, Virginia Project Number: 19-0012 | Sheet 4 of 22 |
|--|--|---|---------------|

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19




| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.103 | 9.5 |
| ⊠ | | | 0.107 | 9.5 |
| ▲ | | | 0.127 | 9.5 |
| ★ | | | 0.213 | 9.5 |
| ⊙ | | | 0.176 | 9.5 |

Test Method: VTM-25

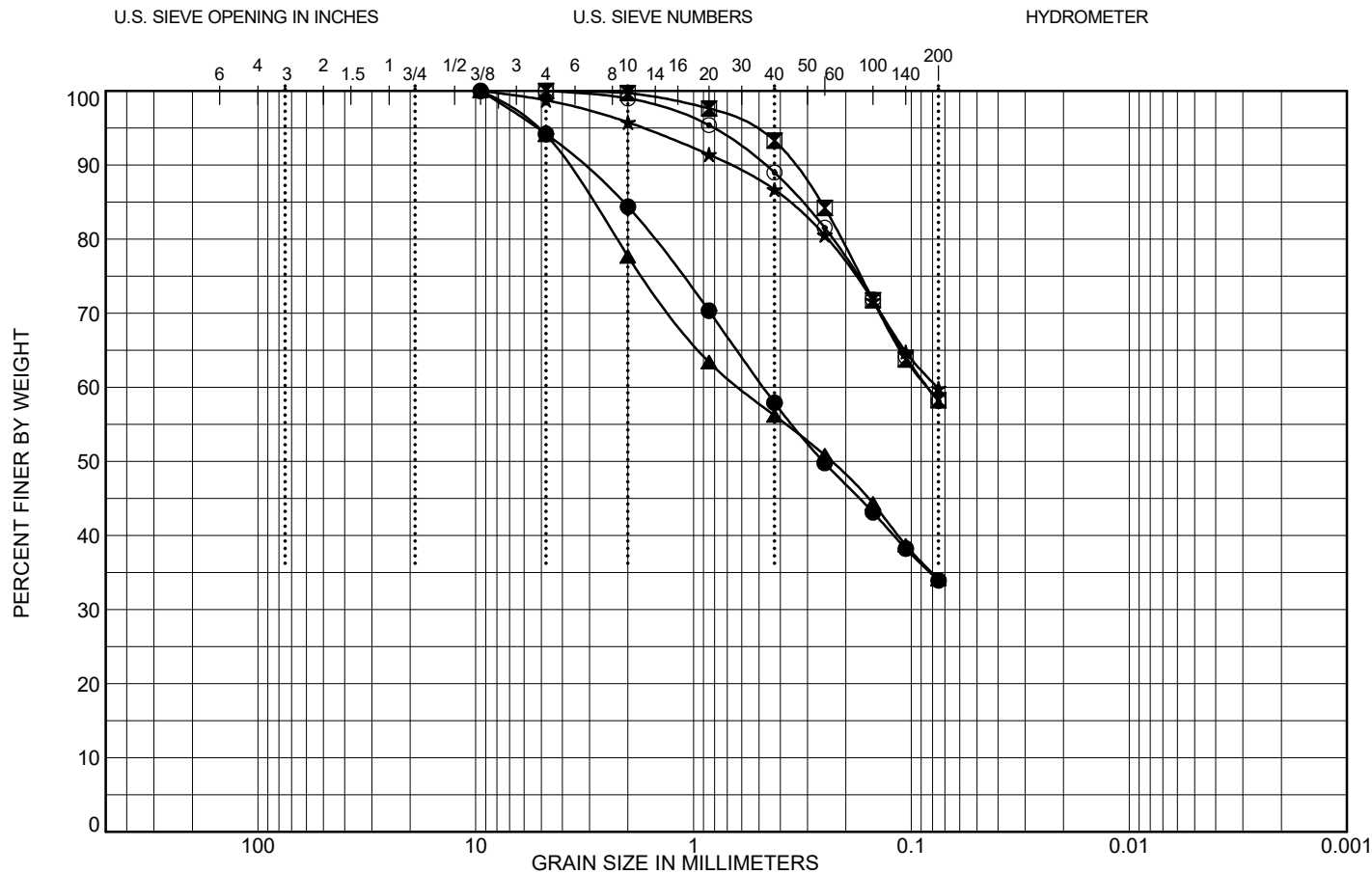
Tested By: SM/CL, SR Date: 8/8/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------|--------|
| ● 19GWP-RW09 | S13 | 48.0 - 50.0 | 0.8 | 46.0 | 53.2 | 32 | 4 | 17.7 | | SANDY SILT(ML) | A-4 |
| ⊠ 19GWP-RW10 | S-2 | 4.0 - 6.0 | 0.3 | 44.6 | 55.1 | 29 | 8 | 6.9 | | SANDY LEAN CLAY(CL) | A-4 |
| ▲ 19GWP-RW10 | S-9 | 33.0 - 33.9 | 0.4 | 51.0 | 48.6 | 31 | 6 | 9.8 | | SILTY SAND(SM) | A-4 |
| ★ 19GWP-RW11 | S-5 | 13.0 - 15.0 | 8.8 | 48.7 | 42.6 | 35 | 7 | 17.3 | | SILTY SAND(SM) | A-4 |
| ⊙ 19GWP-RW11 | S-12 | 48.0 - 48.5 | 0.2 | 56.3 | 43.4 | 28 | 5 | 12.4 | | SILTY SAND(SM) | A-4 |

| | | | |
|--|--|---|---------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 5 of 22 |
|--|--|---|---------------|

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.477 | 9.5 |
| ☒ | | | 0.084 | 4.76 |
| ▲ | | | 0.613 | 9.5 |
| ★ | | | 0.076 | 9.5 |
| ⊙ | | | 0.084 | 4.76 |

Test Method: VTM-25

Tested By: SM/CL, SR

Date: 9/6/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |
| | | | | | | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------------|--------|
| ● 19GWP-RW12 | S-1 | 0.0 - 2.0 | 5.8 | 60.3 | 33.9 | 32 | 4 | 9.6 | | SILTY SAND(SM) | A-2-4 |
| ☒ 19GWP-RW12 | S-6 | 13.0 - 15.0 | 0.0 | 41.7 | 58.3 | 29 | 5 | 10.3 | | SANDY SILT(ML) | A-4 |
| ▲ 19GWP-RW12 | S-8 | 23.0 - 24.0 | 6.0 | 59.9 | 34.1 | 29 | 7 | 11.9 | | SILTY, CLAYEY SAND(SC-SM) | A-2-4 |
| ★ 19GWP-RW13 | SS-3 | 4.0 - 6.0 | 1.3 | 38.9 | 59.8 | 28 | 5 | 16.3 | | SANDY SILT(ML) | A-4 |
| ⊙ 19GWP-RW13 | SS-8 | 23.0 - 24.4 | 0.0 | 41.9 | 58.1 | 32 | 4 | 12.5 | | SANDY SILT(ML) | A-4 |



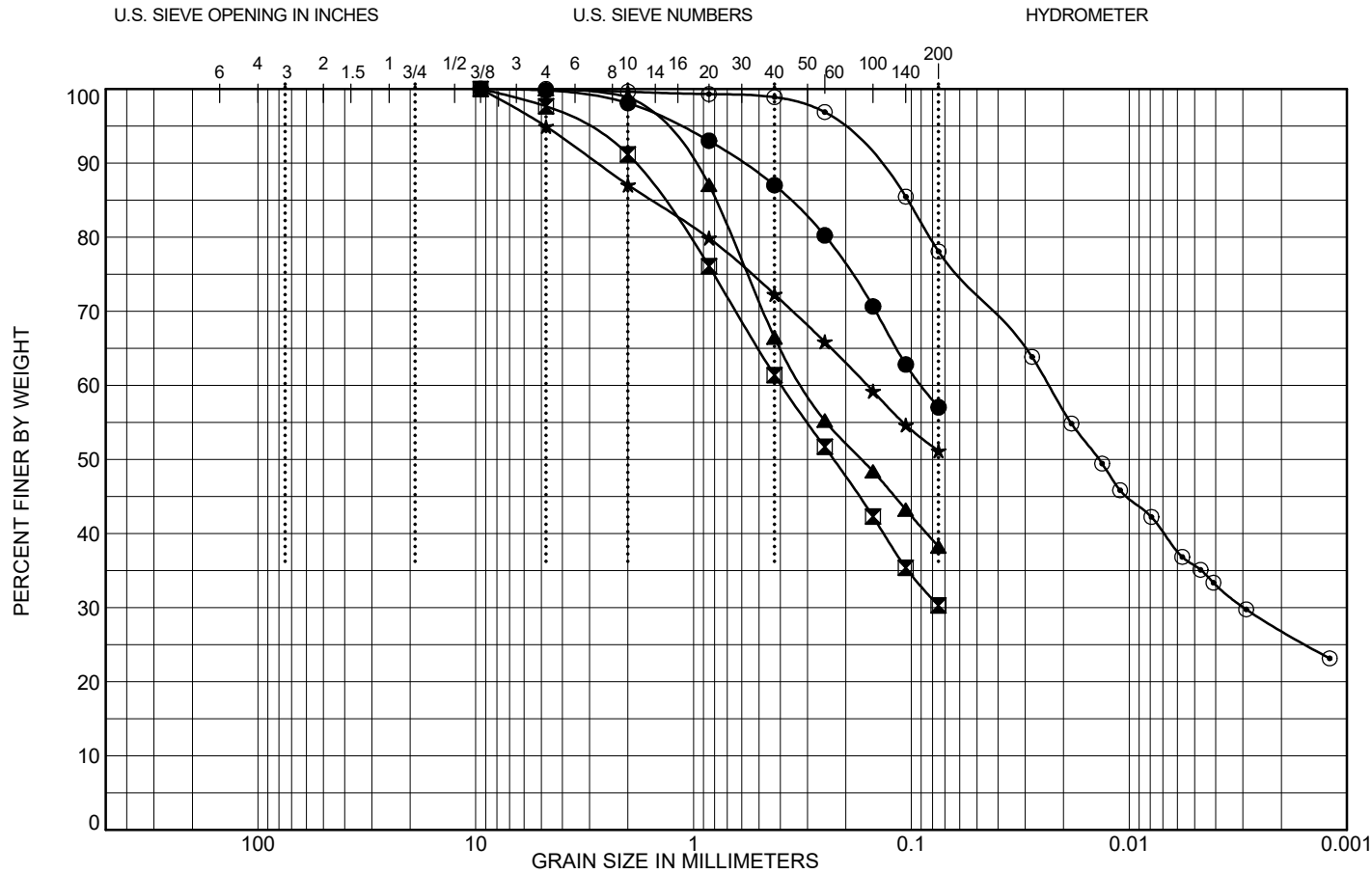
GRAIN SIZE DISTRIBUTION

I-495 NEXT Express Lanes

Fairfax County, Virginia

Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-------|-------|-------|------|
| ● | | | 0.09 | 9.5 |
| ⊠ | | | 0.395 | 9.5 |
| ▲ | | | 0.313 | 4.76 |
| ★ | | | 0.159 | 9.5 |
| ⊙ | 0.003 | 0.023 | 4.76 | |

Test Method: VTM-25

Tested By: SM/CL, SR Date: _____

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|----|------|-------|-------------------------|--------|
| ● 19GWP-RW13 | SS-14 | 53.0 - 53.8 | 0.2 | 42.8 | 57.0 | 31 | 6 | 15.5 | | SANDY SILT(ML) | A-4 |
| ⊠ 19GWP-RW15 | S3 | 4.0 - 5.7 | 2.3 | 67.3 | 30.3 | 34 | 6 | 15.1 | | SILTY SAND(SM) | A-2-4 |
| ▲ 19GWP-RW15 | S9 | 28.0 - 29.3 | 0.0 | 61.8 | 38.2 | 37 | 9 | 12.2 | | SILTY SAND(SM) | A-4 |
| ★ 19LOD-W-P14 | SS-2 | 3.5 - 5.5 | 5.1 | 43.8 | 51.2 | 37 | 10 | 15.2 | | SANDY SILT(ML) | A-4 |
| ⊙ 19SWM-05 | S-3 | 4.0 - 6.0 | 0.0 | 21.9 | 42.4 | 35.7 | 47 | 21 | 30.2 | LEAN CLAY with SAND(CL) | A-7-6 |



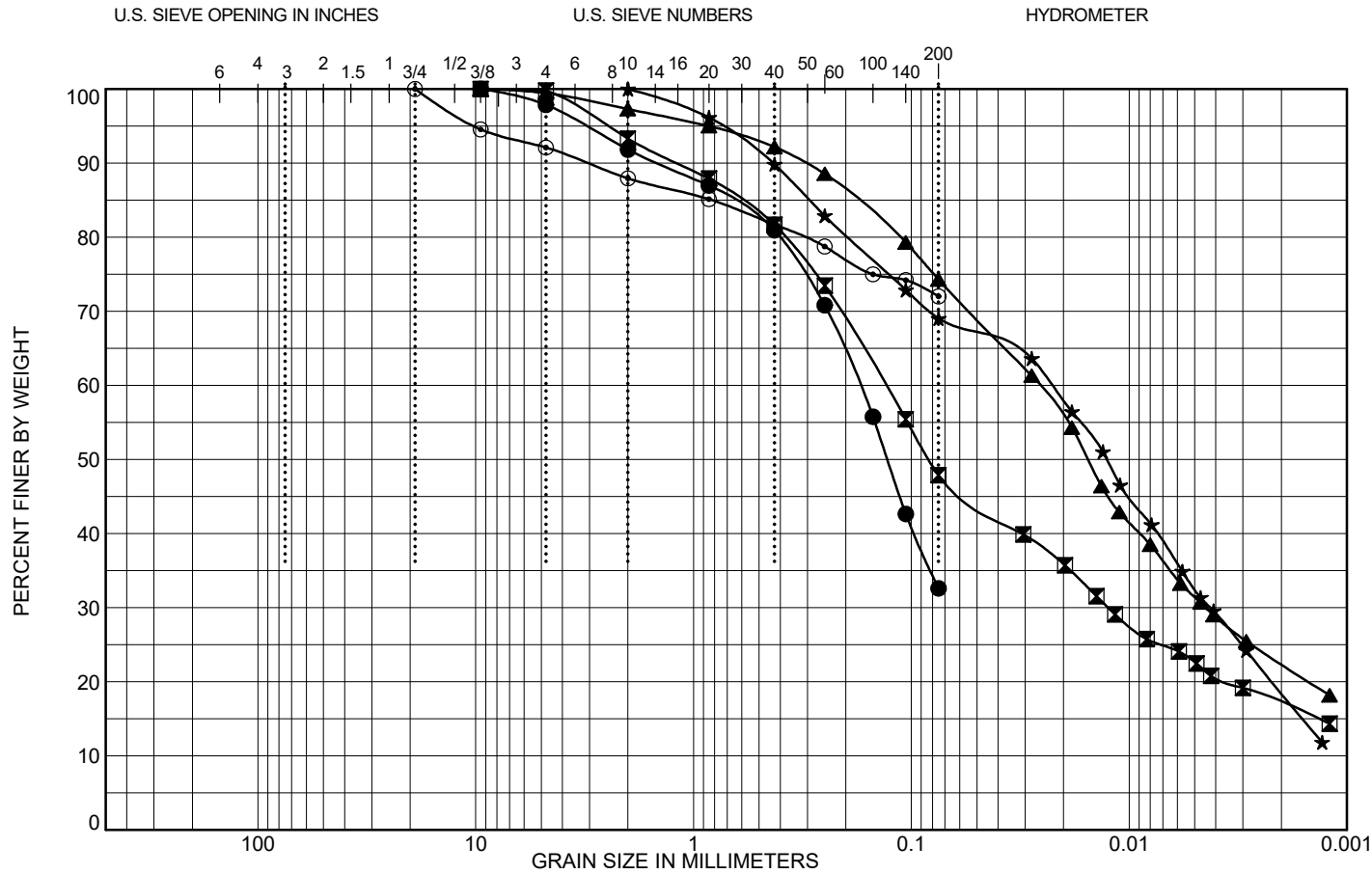
GRAIN SIZE DISTRIBUTION

I-495 NEXT Express Lanes

Fairfax County, Virginia

Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-------|-------|------|
| ● | | | 0.173 | 9.5 |
| ⊠ | | 0.012 | 0.132 | 9.5 |
| ▲ | | 0.004 | 0.026 | 9.5 |
| ★ | | 0.004 | 0.023 | 2 |
| ⊙ | | | | 19 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/19/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|----------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------------|--------|
| ● | 19SWM-05 | S-4 | 6.0 - 8.0 | 2.1 | 65.3 | 32.6 | 25 | 4 | 18.7 | | SILTY, CLAYEY SAND(SC-SM) | A-2-4 |
| ⊠ | 19SWM-05 | BULK | 15.0 - 20.0 | 0.2 | 51.9 | 25.3 | 22.6 | 30 | 10 | 29.0 | CLAYEY SAND(SC) | A-4 |
| ▲ | 19SWM-11 | SS-2 | 2.0 - 4.0 | 0.6 | 25.2 | 42.9 | 31.4 | 48 | 22 | 26.6 | LEAN CLAY with SAND(CL) | A-7-6 |
| ★ | 19SWM-11 | BULK | 20.0 - 25.0 | 0.0 | 31.0 | 36.5 | 32.5 | 46 | 18 | 18.8 | SANDY SILT(ML) | A-7-6 |
| ⊙ | 19SWM-12 | BULK | 0.0 - 5.0 | 7.9 | 20.1 | 72.0 | 46 | 21 | 16.4 | | LEAN CLAY with SAND(CL) | A-7-6 |



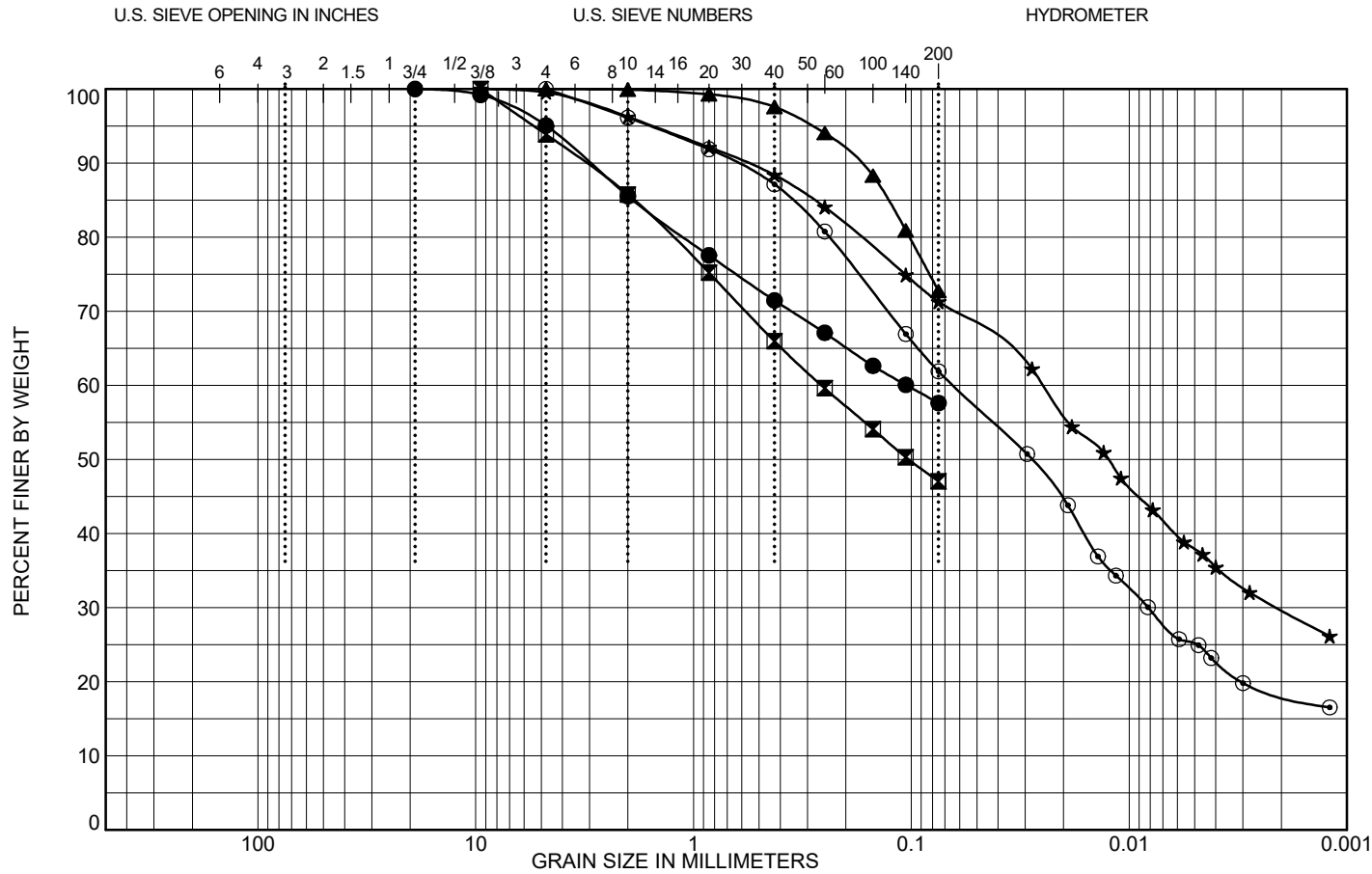
GRAIN SIZE DISTRIBUTION

I-495 NEXT Express Lanes

Fairfax County, Virginia

Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-------|-------|------|
| ● | | | 0.105 | 19 |
| ☒ | | | 0.258 | 9.5 |
| ▲ | | | | 4.76 |
| ★ | | 0.002 | 0.025 | 9.5 |
| ◎ | | 0.008 | 0.064 | 4.76 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: _____

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

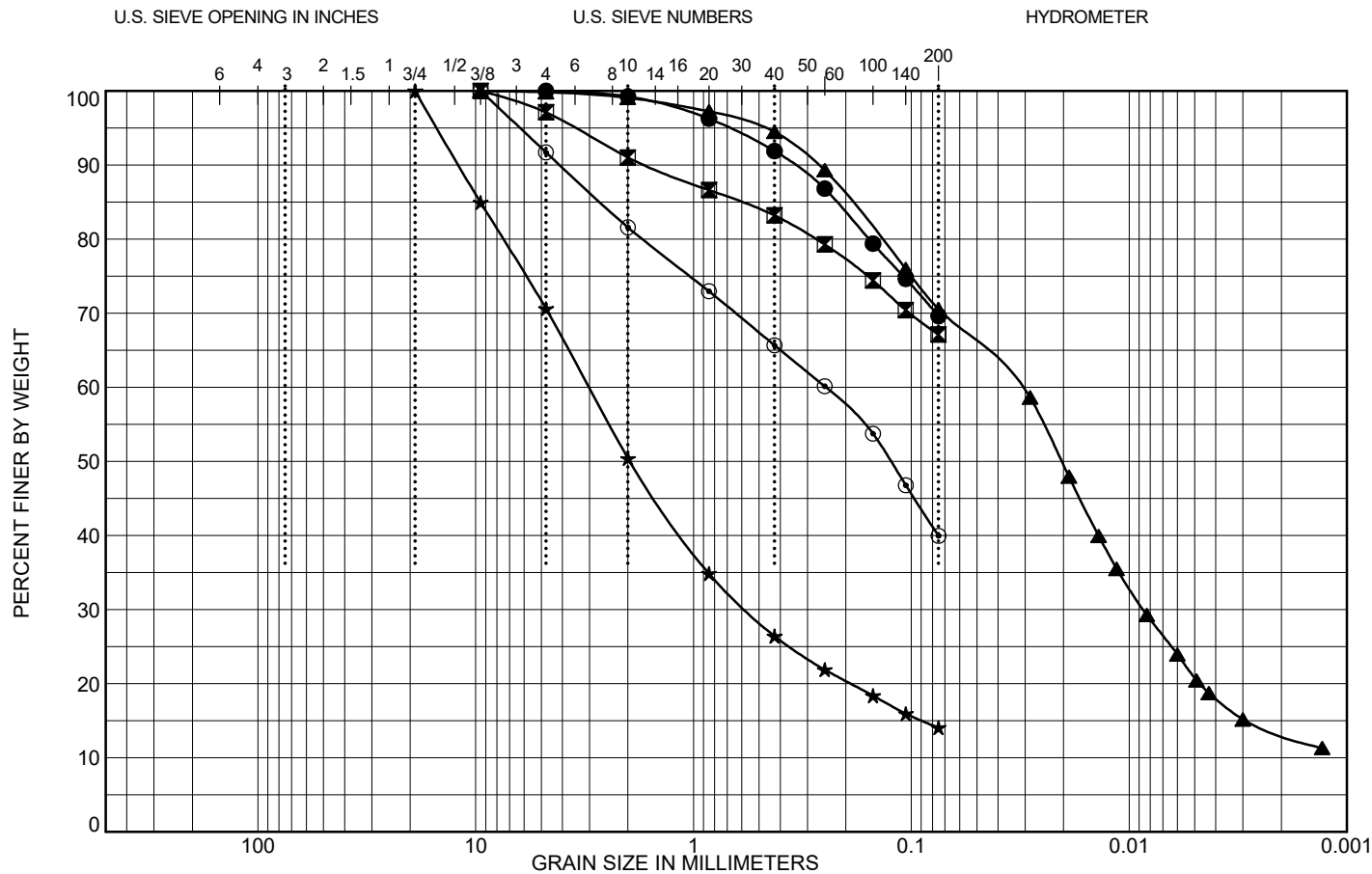
| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|----------|-------|-------------|---------|-------|-------|-------|----|----|-------|-------------------------|--------|
| ● | 19SWM-12 | BULK | 5.0 - 10.0 | 4.9 | 37.4 | 57.6 | | | | 1.3 | | |
| ☒ | 19SWM-12 | S4 | 6.0 - 8.0 | 6.2 | 46.8 | 47.0 | | 40 | 11 | 19.4 | SILTY SAND(SM) | A-6 |
| ▲ | 19SWM-12 | S7 | 18.0 - 20.0 | 0.0 | 27.3 | 72.7 | | 39 | 6 | 30.4 | SILT with SAND(ML) | A-4 |
| ★ | 19SWM-13 | SS-2 | 2.0 - 4.0 | 0.4 | 28.3 | 33.4 | 37.9 | 39 | 18 | 21.9 | LEAN CLAY with SAND(CL) | A-6 |
| ◎ | 19SWM-13 | BULK | 11.0 - 15.0 | 0.0 | 38.1 | 36.8 | 25.1 | 34 | 12 | 17.0 | SANDY LEAN CLAY(CL) | A-6 |



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Fairfax County, Virginia
Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-------|-------|------|
| ● | | | | 4.76 |
| ⊠ | | | | 9.5 |
| ▲ | | 0.009 | 0.032 | 9.5 |
| ★ | | 0.571 | 3.021 | 19 |
| ⊙ | | | 0.247 | 9.5 |

Test Method: VTM-25

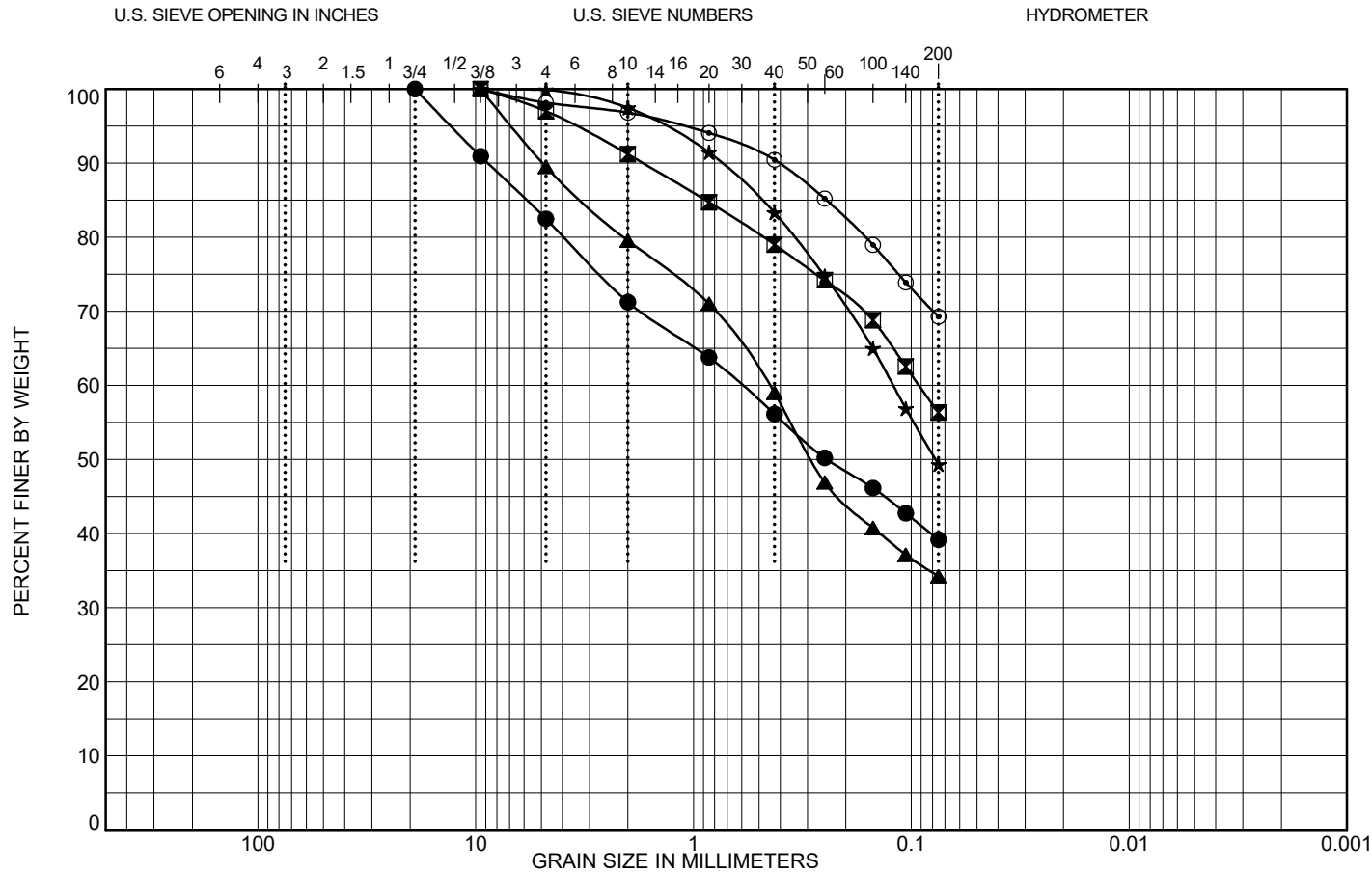
Tested By: SM/CL, SR Date: 9/3/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|-------------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------------------------|--------|
| ● | 19SWM-13 | SS-8 | 23.0 - 25.0 | 0.0 | 30.4 | 69.6 | 34 | 6 | 8.4 | | SANDY SILT(ML) | A-4 |
| ⊠ | 19SWM-14 | SS-1 | 0.0 - 2.0 | 2.9 | 30.0 | 67.1 | 47 | 23 | 24.7 | | SANDY LEAN CLAY(CL) | A-7-6 |
| ▲ | 19SWM-14 | BULK | 6.0 - 10.0 | 0.2 | 29.3 | 49.8 | 20.8 | 37 | 11 | 17.4 | SILT with SAND(ML) | A-6 |
| ★ | 19X-NOS-P02 | S1 | 2.0 - 4.0 | 29.4 | 56.5 | 14.1 | 18 | 4 | 4.6 | | SILTY, CLAYEY SAND with GRAVEL(SC-SM) | A-1-a |
| ⊙ | 19X-NOS-P03 | S1 | 5.0 - 7.0 | 8.3 | 51.7 | 39.9 | 34 | 7 | 15.9 | | SILTY SAND(SM) | A-4 |

| | | | |
|--|--|---|----------------|
| | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 10 of 22 |
|--|--|---|----------------|

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.603 | 19 |
| ⊠ | | | 0.092 | 9.5 |
| ▲ | | | 0.45 | 9.5 |
| ★ | | | 0.121 | 9.5 |
| ⊙ | | | | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/6/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-----------|---------|-------|-------|-------|----|----|-------|----------------------------|--------|
| ● 19X-NOS-P04 | S2 | 4.0 - 6.0 | 17.6 | 43.3 | 39.2 | | 35 | 10 | 17.1 | SILTY SAND with GRAVEL(SM) | A-4 |
| ⊠ 19X-NOS-P05 | S2 | 3.5 - 5.5 | 3.0 | 40.7 | 56.3 | | 38 | 10 | 11.2 | SANDY SILT(ML) | A-4 |
| ▲ 19X-NOS-P09 | S1 | 4.0 - 6.0 | 10.5 | 55.2 | 34.2 | | | | 13.3 | | |
| ★ 19X-NOS-P14 | S1 | 4.0 - 6.0 | 0.1 | 50.6 | 49.3 | | 56 | 12 | 37.5 | SILTY SAND(SM) | A-7-5 |
| ⊙ 19X-NOS-P15 | S3 | 5.5 - 7.5 | 1.8 | 28.9 | 69.3 | | 53 | 20 | 32.1 | SANDY ELASTIC SILT(MH) | A-7-5 |



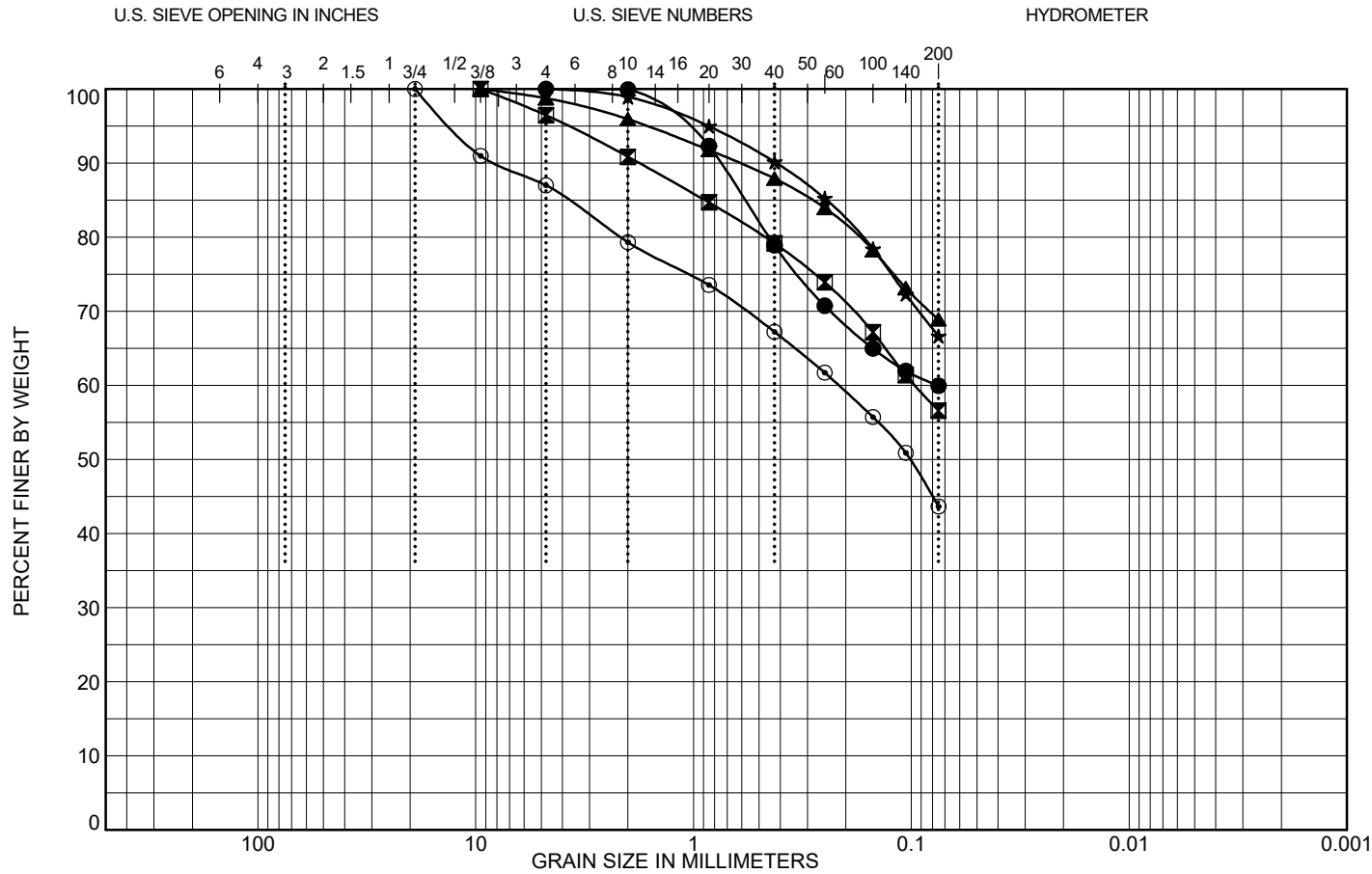
GRAIN SIZE DISTRIBUTION

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Fairfax County, Virginia

Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.076 | 4.76 |
| ⊠ | | | 0.096 | 9.5 |
| ▲ | | | | 9.5 |
| ★ | | | | 4.76 |
| ⊙ | | | 0.216 | 19 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/23/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

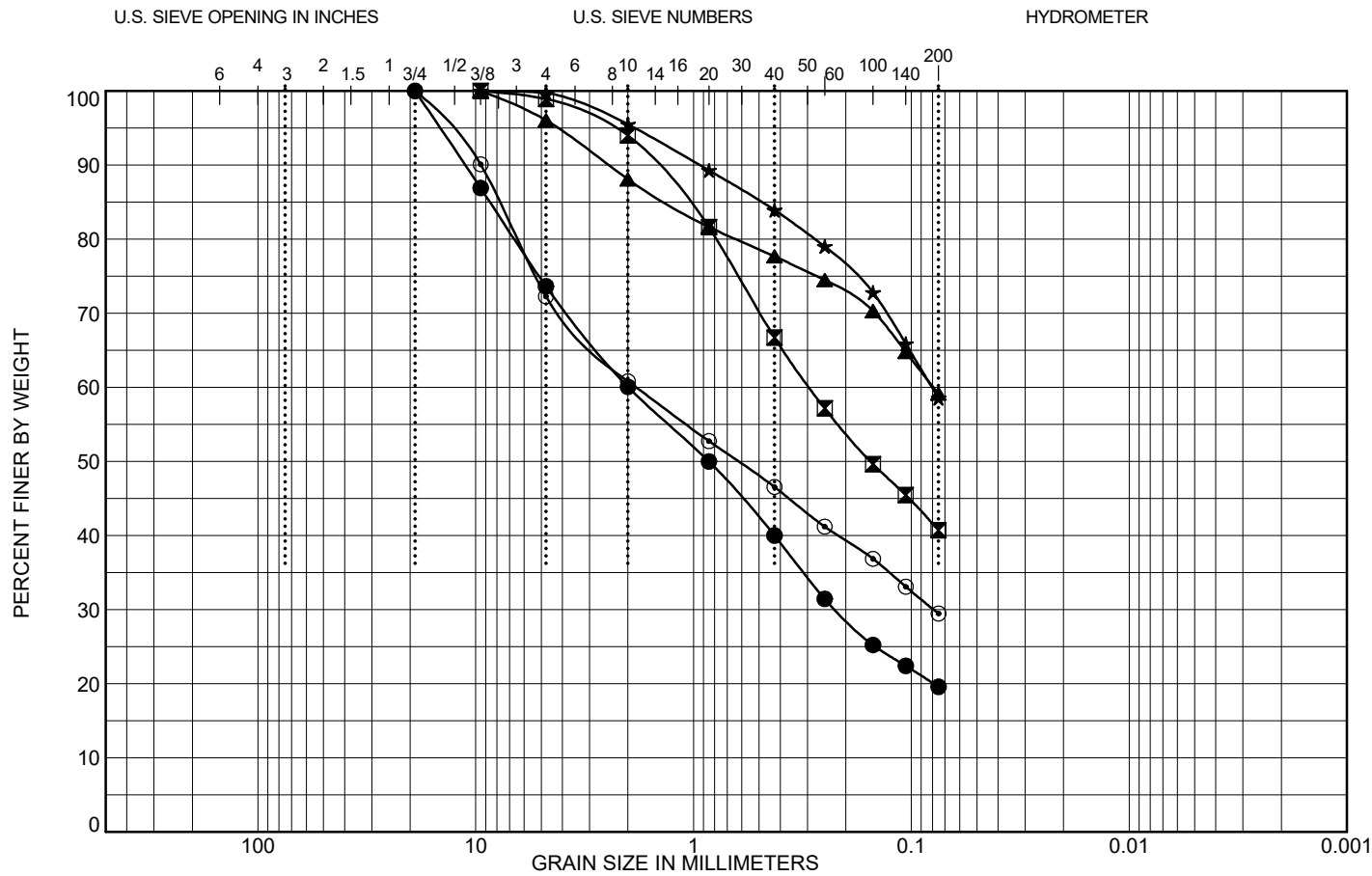
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-----------|---------|-------|-------|-------|----|------|-------|---------------------|--------|
| ● 19X-NOS-P17 | S3 | 7.6 - 9.6 | 0.0 | 40.1 | 59.9 | 36 | 10 | 24.6 | | SANDY SILT(ML) | A-4 |
| ⊠ 19X-NOS-P21 | S1 | 2.5 - 4.5 | 3.6 | 39.9 | 56.6 | 35 | 12 | 12.4 | | SANDY LEAN CLAY(CL) | A-6 |
| ▲ 19X-NOS-P23 | S2 | 4.5 - 6.5 | 1.3 | 29.9 | 68.9 | 38 | 15 | 15.1 | | SANDY LEAN CLAY(CL) | A-6 |
| ★ 19X-NOS-P25 | S1 | 2.0 - 4.0 | 0.0 | 33.4 | 66.6 | 36 | 8 | 13.9 | | SANDY SILT(ML) | A-4 |
| ⊙ 19X-N-RW02 | S1 | 2.3 - 4.3 | 13.0 | 43.3 | 43.6 | 40 | 11 | 19.1 | | SILTY SAND(SM) | A-6 |



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Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 10/19




| | D10 | D30 | D60 | D100 |
|---|-------|-------|-------|------|
| ● | | 0.222 | 1.989 | 19 |
| ☒ | | | 0.293 | 9.5 |
| ▲ | | | 0.079 | 9.5 |
| ★ | | | 0.08 | 9.5 |
| ⊙ | 0.079 | 1.838 | | 19 |

Test Method: VTM-25

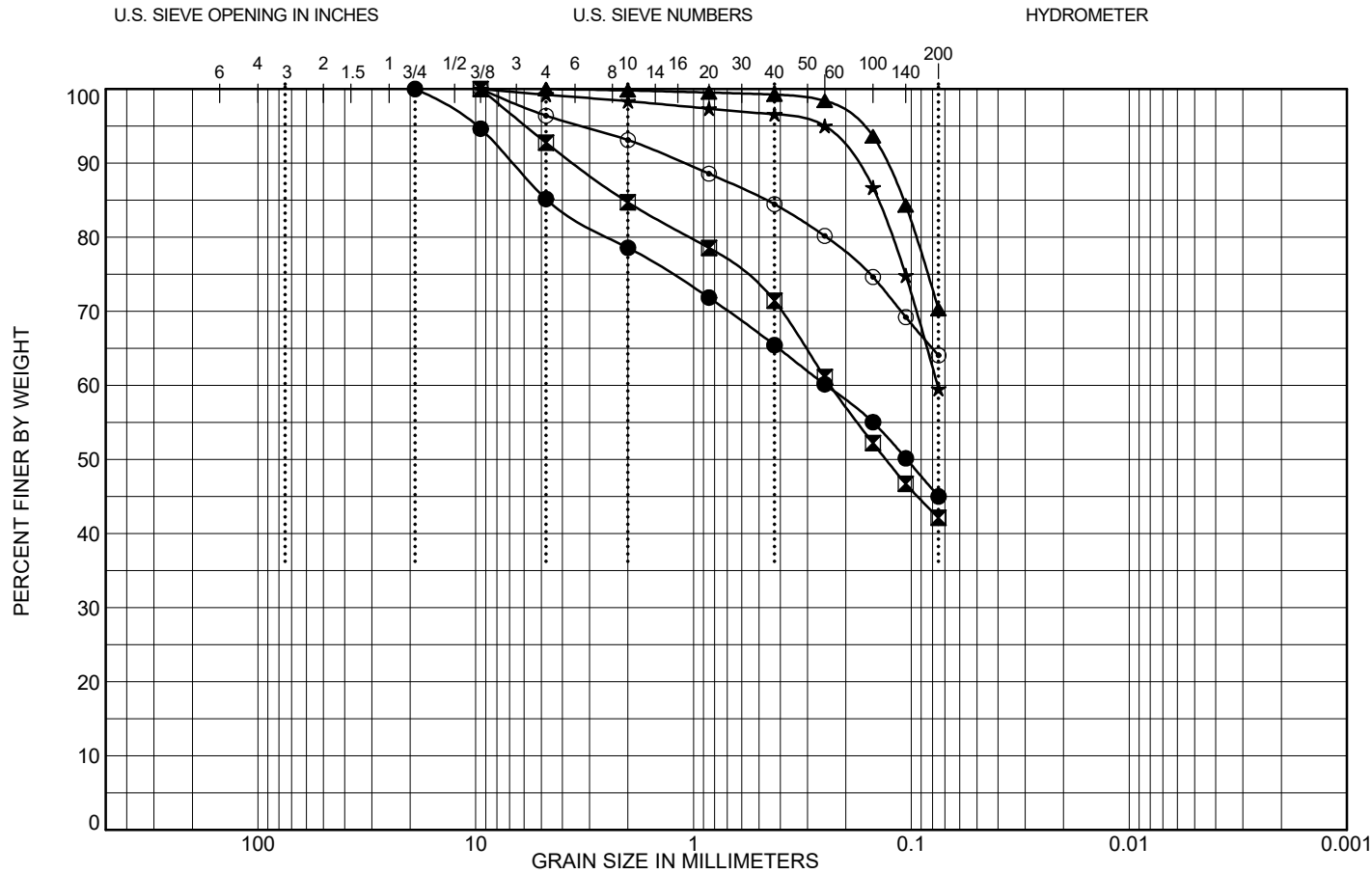
Tested By: SM/CL, SR Date: 9/9/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------------------|--------|
| ● | 19X-N-RW02 | S7 | 23.0 - 25.0 | 26.4 | 54.0 | 19.6 | 30 | 7 | 10.8 | | SILTY SAND with GRAVEL(SM) | A-2-4 |
| ☒ | 19X-N-RW02 | S11 | 43.0 - 43.5 | 1.1 | 58.2 | 40.7 | 32 | 6 | 17.8 | | SILTY SAND(SM) | A-4 |
| ▲ | 19X-N-RW03 | S3 | 6.0 - 8.0 | 4.0 | 36.9 | 59.1 | 36 | 10 | 21.7 | | SANDY SILT(ML) | A-4 |
| ★ | 19X-N-RW03 | S8 | 28.0 - 29.4 | 0.2 | 41.2 | 58.5 | 32 | 7 | 8.2 | | SANDY SILT(ML) | A-4 |
| ⊙ | 19X-N-RW04 | S8 | 23.0 - 25.0 | 27.8 | 42.8 | 29.5 | 38 | 10 | 13.6 | | SILTY SAND with GRAVEL(SM) | A-2-4 |

| | | | |
|--|--|---|----------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 13 of 22 |
|--|--|---|----------------|

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| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.246 | 19 |
| ⊠ | | | 0.235 | 9.5 |
| ▲ | | | | 4.76 |
| ★ | | | 0.076 | 9.5 |
| ⊙ | | | | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/9/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

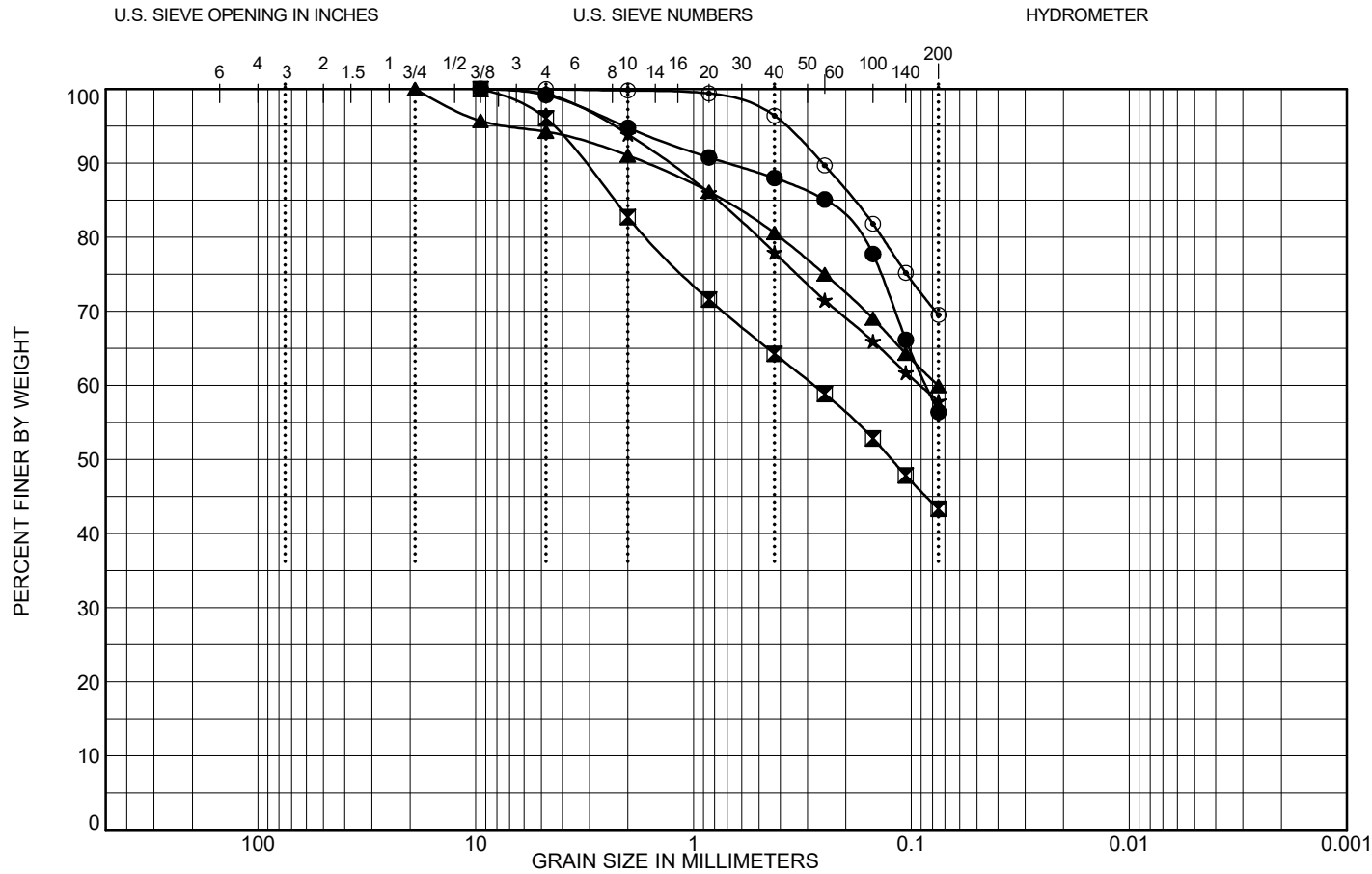
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● 19X-N-RW05 | SS-2 | 4.0 - 6.0 | 14.9 | 40.1 | 45.0 | 33 | 7 | 20.1 | | SILTY SAND(SM) | A-4 |
| ⊠ 19X-N-RW07 | SS-3 | 4.0 - 6.0 | 7.3 | 50.6 | 42.1 | 40 | 19 | 26.4 | | CLAYEY SAND(SC) | A-6 |
| ▲ 19X-N-RW08 | S-6 | 13.0 - 15.0 | 0.0 | 29.7 | 70.3 | 37 | 5 | 33.6 | | SILT with SAND(ML) | A-4 |
| ★ 19X-N-RW08 | S-8 | 23.0 - 24.3 | 0.8 | 39.7 | 59.5 | 30 | 4 | 13.3 | | SANDY SILT(ML) | A-4 |
| ⊙ 19X-N-RW13 | S1 | 0.0 - 2.0 | 3.6 | 32.3 | 64.0 | 41 | 12 | 19.8 | | SANDY SILT(ML) | A-7-6 |



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Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.085 | 9.5 |
| ⊠ | | | 0.28 | 9.5 |
| ▲ | | | 0.075 | 19 |
| ★ | | | 0.091 | 9.5 |
| ⊙ | | | | 4.76 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/9/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

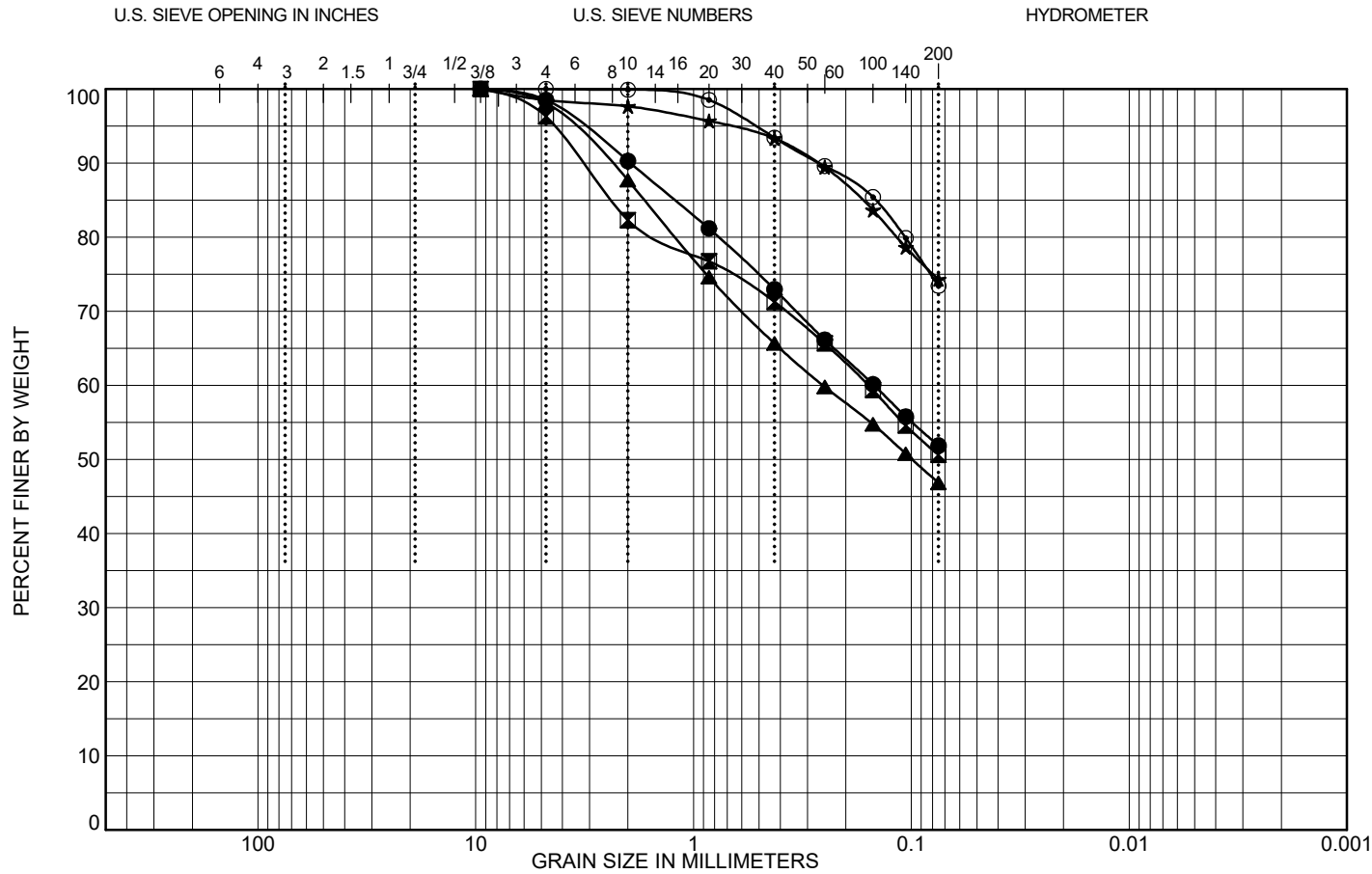
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|------------------------|--------|
| ● 19X-N-RW13 | S12 | 43.0 - 45.0 | 0.8 | 42.8 | 56.4 | 36 | 6 | 21.9 | | SANDY SILT(ML) | A-4 |
| ⊠ 19X-N-RW14 | S8 | 23.0 - 25.0 | 4.0 | 52.7 | 43.3 | 38 | 7 | 17.7 | | SILTY SAND(SM) | A-4 |
| ▲ 19X-N-RW15 | S2 | 2.0 - 4.0 | 5.8 | 34.3 | 59.9 | 39 | 12 | 18.6 | | SANDY SILT(ML) | A-6 |
| ★ 19X-N-RW15 | S11 | 38.0 - 40.0 | 0.7 | 41.5 | 57.9 | 37 | 8 | 19.1 | | SANDY SILT(ML) | A-4 |
| ⊙ 19X-N-RW16 | S5 | 13.0 - 15.0 | 0.0 | 30.5 | 69.5 | 51 | 12 | 36.3 | | SANDY ELASTIC SILT(MH) | A-7-5 |



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Fairfax County, Virginia
Project Number: 19-0012

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| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.148 | 9.5 |
| ⊠ | | | 0.158 | 9.5 |
| ▲ | | | 0.255 | 9.5 |
| ★ | | | | 9.5 |
| ⊙ | | | | 4.76 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/10/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

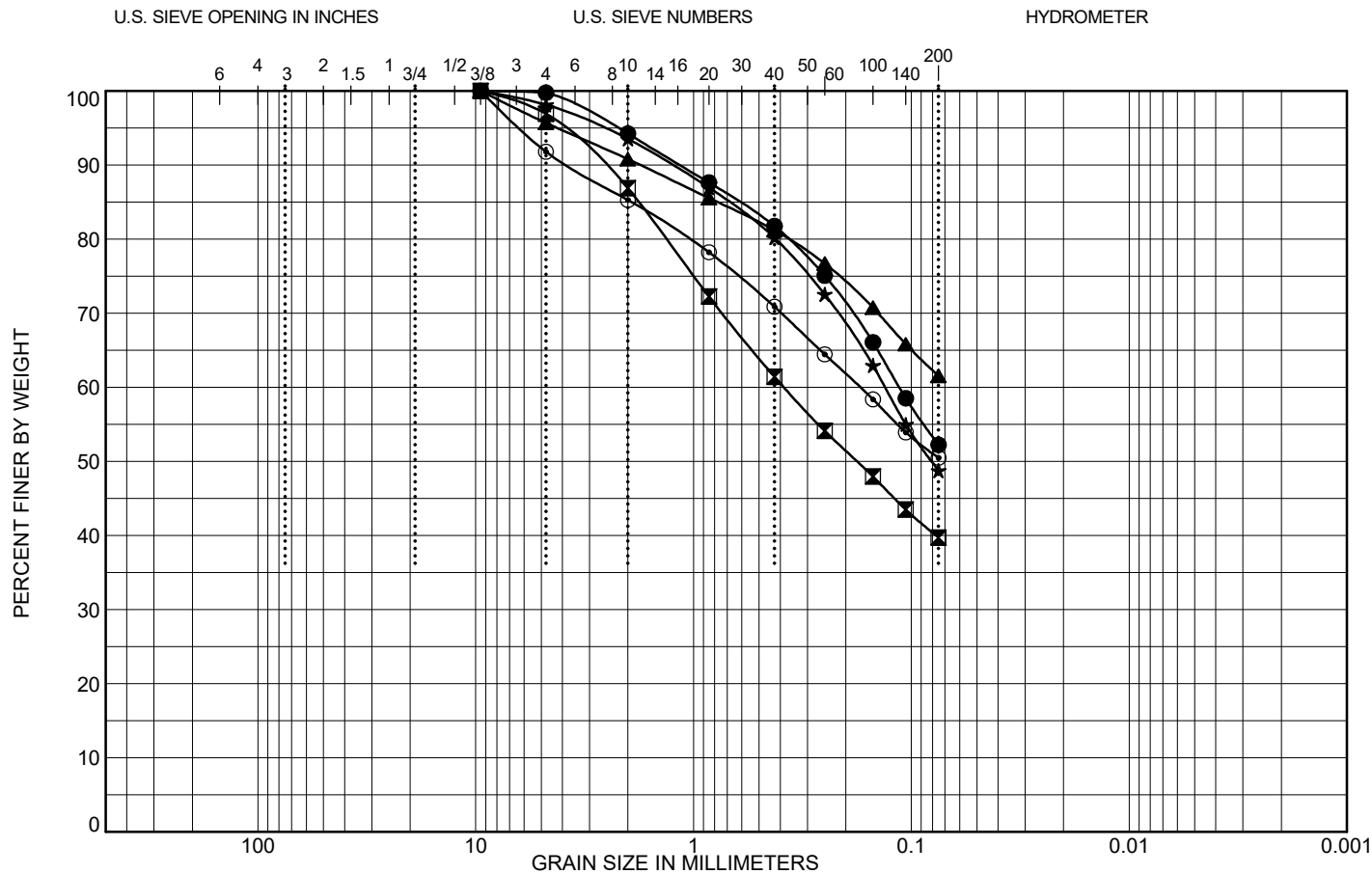
| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------|--------|
| ● | 19X-N-RW16 | S12 | 48.0 - 50.0 | 1.5 | 46.6 | 51.9 | 37 | 10 | 11.2 | | SANDY SILT(ML) | A-4 |
| ⊠ | 19X-N-RW18 | S3 | 4.0 - 6.0 | 3.8 | 45.6 | 50.6 | 39 | 14 | 22.5 | | SANDY LEAN CLAY(CL) | A-6 |
| ▲ | 19X-N-RW18 | S9 | 28.0 - 30.0 | 1.9 | 51.3 | 46.8 | 40 | 10 | 14.0 | | SILTY SAND(SM) | A-4 |
| ★ | 19X-N-RW20 | S2 | 2.0 - 4.0 | 1.5 | 24.2 | 74.3 | 38 | 11 | 21.3 | | SILT with SAND(ML) | A-6 |
| ⊙ | 19X-N-RW20 | S6 | 13.0 - 15.0 | 0.0 | 26.6 | 73.4 | 44 | 9 | 20.2 | | SILT with SAND(ML) | A-5 |



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| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.113 | 9.5 |
| ⊠ | | | 0.383 | 9.5 |
| ▲ | | | | 9.5 |
| ★ | | | 0.132 | 9.5 |
| ⊙ | | | 0.172 | 9.5 |

Test Method: VTM-25

Tested By: SM/CL, SR

Date: 9/10/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|----|------|-------|---------------------|--------|
| ● 19X-N-RW21 | S3 | 4.0 - 6.0 | 0.3 | 47.5 | 52.2 | 30 | 5 | 15.2 | | SANDY SILT(ML) | A-4 |
| ⊠ 19X-N-RW21 | S11 | 38.0 - 39.5 | 3.1 | 57.2 | 39.7 | 33 | 10 | 15.9 | | CLAYEY SAND(SC) | A-4 |
| ▲ 19X-N-RW22 | S1 | 0.0 - 2.0 | 4.3 | 34.1 | 61.5 | 29 | 8 | 14.9 | | SANDY LEAN CLAY(CL) | A-4 |
| ★ 19X-N-RW22 | S7 | 18.0 - 20.0 | 1.9 | 49.4 | 48.8 | 31 | 6 | 19.4 | | SILTY SAND(SM) | A-4 |
| ⊙ 19X-SOS-P29 | S1 | 1.5 - 3.5 | 8.2 | 41.3 | 50.5 | 34 | 10 | 15.9 | | SANDY SILT(ML) | A-4 |



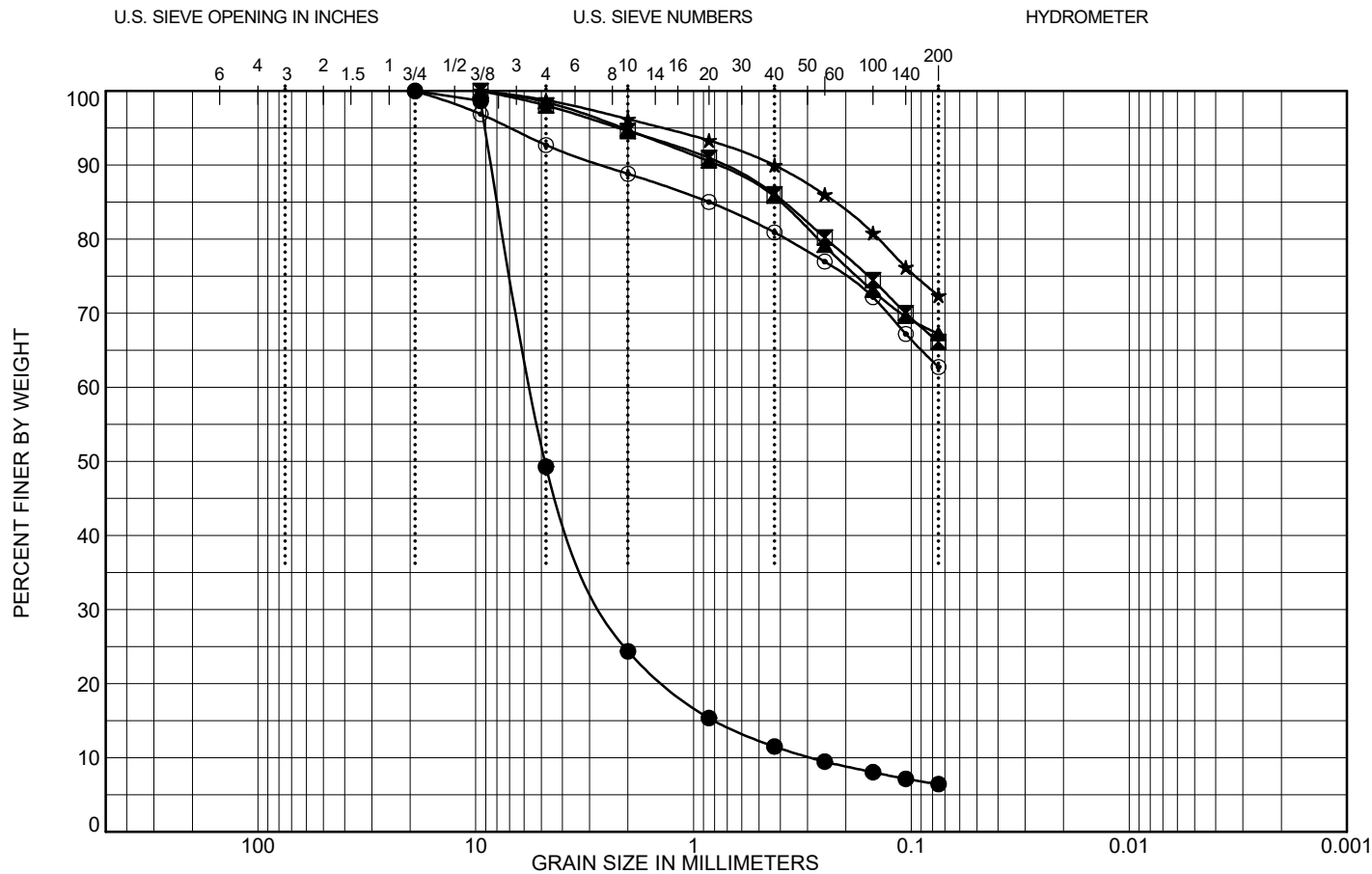
GRAIN SIZE DISTRIBUTION

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| | D10 | D30 | D60 | D100 |
|---|-------|-------|------|------|
| ● | 0.287 | 2.433 | 5.53 | 19 |
| ☒ | | | | 9.5 |
| ▲ | | | | 9.5 |
| ★ | | | | 9.5 |
| ⊙ | | | | 19 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/10/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

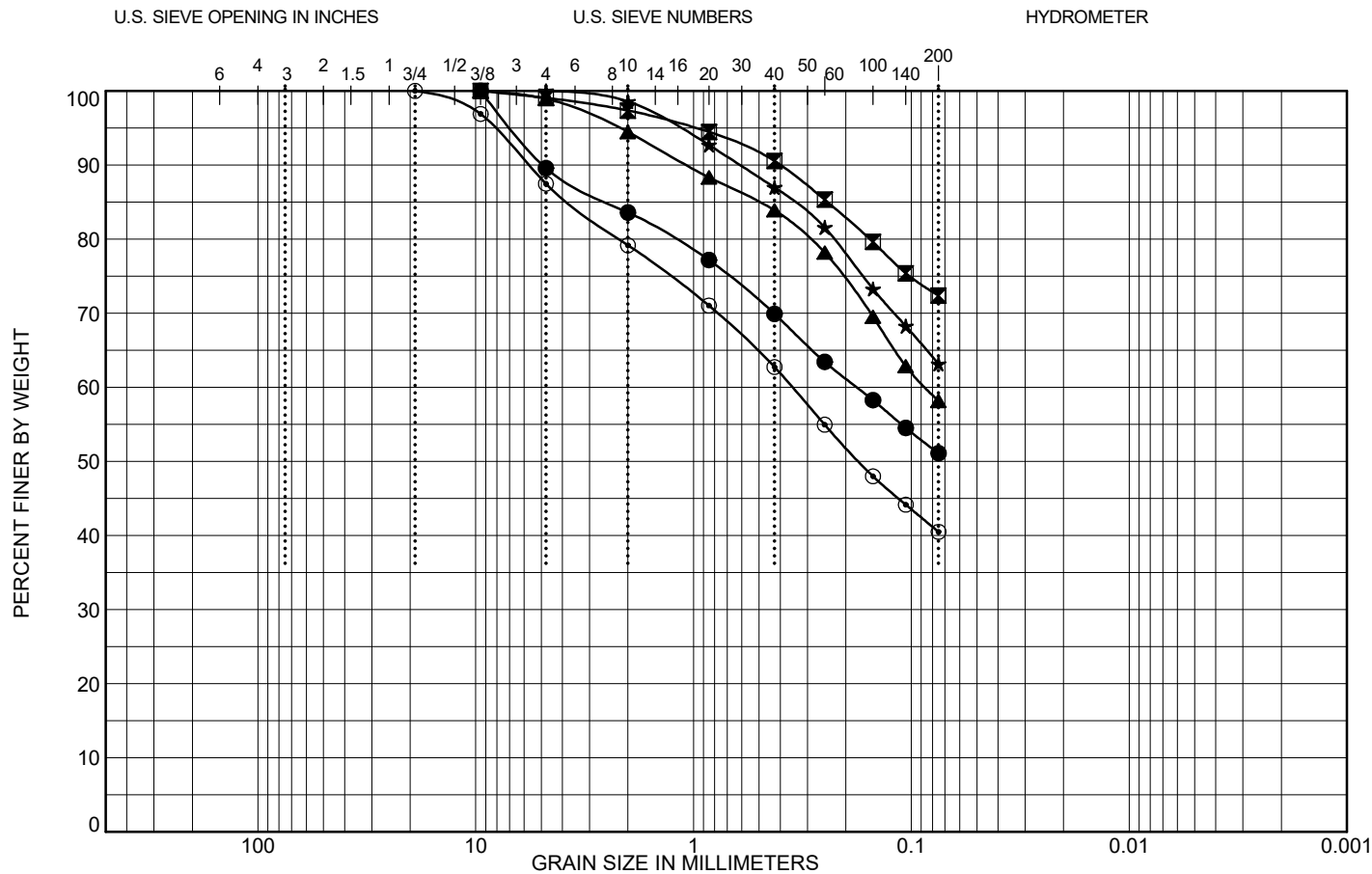
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|------------|---------|-------|-------|-------|----|------|-------|-------------------------|--------|
| ● 19X-SOS-P30 | S1 | 1.3 - 3.3 | 50.8 | 42.8 | 6.4 | | | | 1.9 | | |
| ☒ 19X-SOS-P33 | S-2 | 2.0 - 4.0 | 2.0 | 31.9 | 66.1 | 43 | 12 | 21.6 | | SANDY SILT(ML) | A-7-5 |
| ▲ 19X-SOS-P33 | Bag | 5.0 - 10.0 | 1.5 | 31.3 | 67.2 | 48 | 21 | 25.1 | | SANDY LEAN CLAY(CL) | A-7-6 |
| ★ 19X-SOS-P37 | S2 | 4.0 - 6.0 | 1.2 | 26.4 | 72.4 | 40 | 15 | 20.6 | | LEAN CLAY with SAND(CL) | A-6 |
| ⊙ 19X-SOS-P39 | S1 | 1.5 - 3.5 | 7.3 | 29.9 | 62.7 | 40 | 13 | 23.2 | | SANDY SILT(ML) | A-6 |



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| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.178 | 9.5 |
| ⊠ | | | | 9.5 |
| ▲ | | | 0.086 | 9.5 |
| ★ | | | | 4.76 |
| ⊙ | | | 0.353 | 19 |

Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/11/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

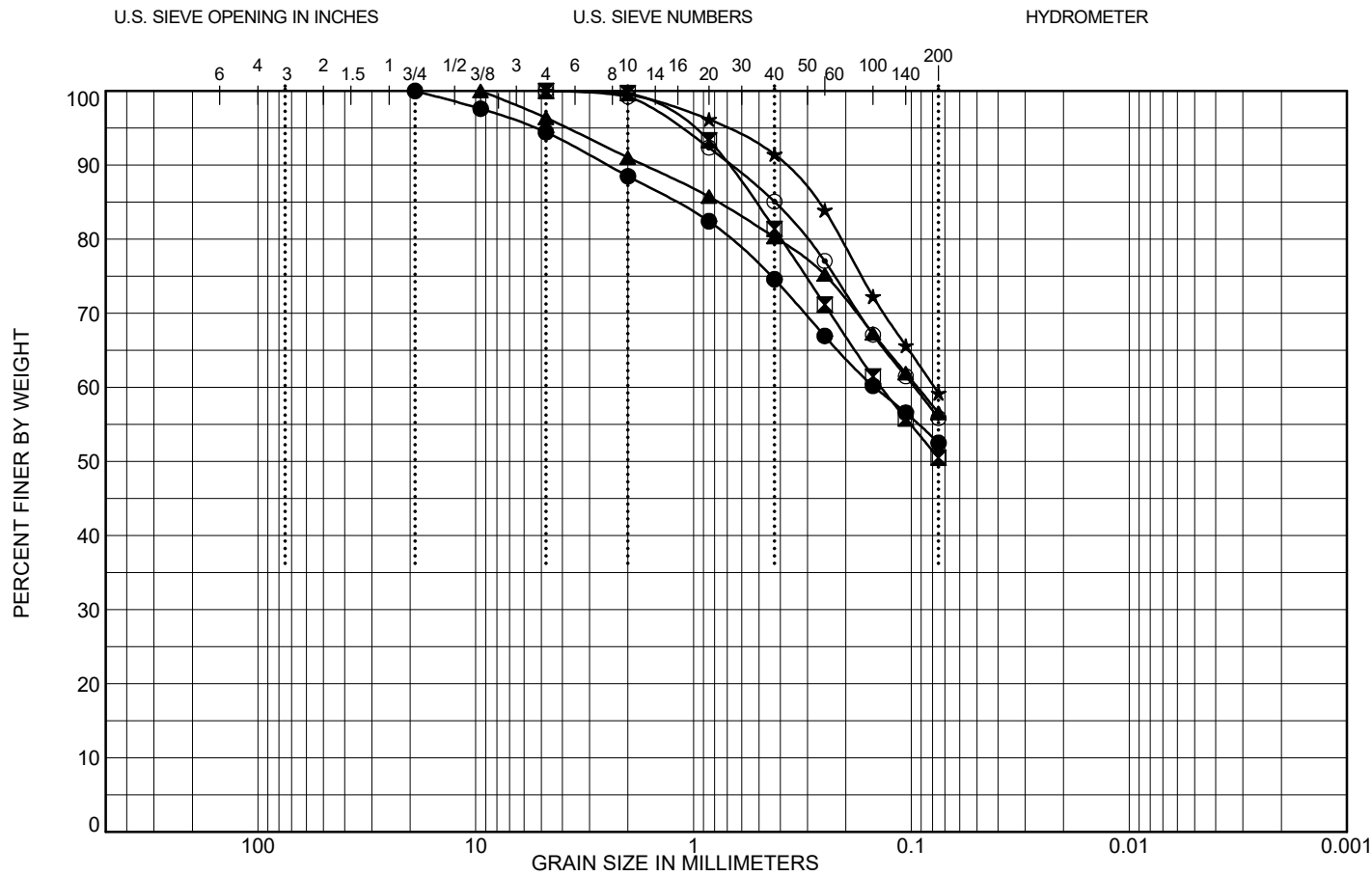
| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● 19X-SOS-P42 | S1 | 2.8 - 4.8 | 10.4 | 38.5 | 51.1 | 42 | 12 | 18.3 | | SANDY SILT(ML) | A-7-5 |
| ⊠ 19X-SOS-P45 | S2 | 4.5 - 6.5 | 0.9 | 26.7 | 72.4 | 40 | 6 | 27.8 | | SILT with SAND(ML) | A-4 |
| ▲ 19X-S-RW25 | S4 | 6.0 - 8.0 | 1.1 | 40.8 | 58.2 | 34 | 7 | 13.1 | | SANDY SILT(ML) | A-4 |
| ★ 19X-S-RW25 | S8 | 23.0 - 24.5 | 0.0 | 36.8 | 63.2 | 35 | 7 | 4.8 | | SANDY SILT(ML) | A-4 |
| ⊙ 19X-S-RW26 | S2 | 2.0 - 4.0 | 12.5 | 47.0 | 40.5 | 31 | 9 | 14.8 | | CLAYEY SAND(SC) | A-4 |



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Fairfax County, Virginia
Project Number: 19-0012

TLB GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19




| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.147 | 19 |
| ☒ | | | 0.137 | 4.76 |
| ▲ | | | 0.094 | 9.5 |
| ★ | | | 0.078 | 4.76 |
| ⊙ | | | 0.097 | 4.76 |

Test Method: VTM-25

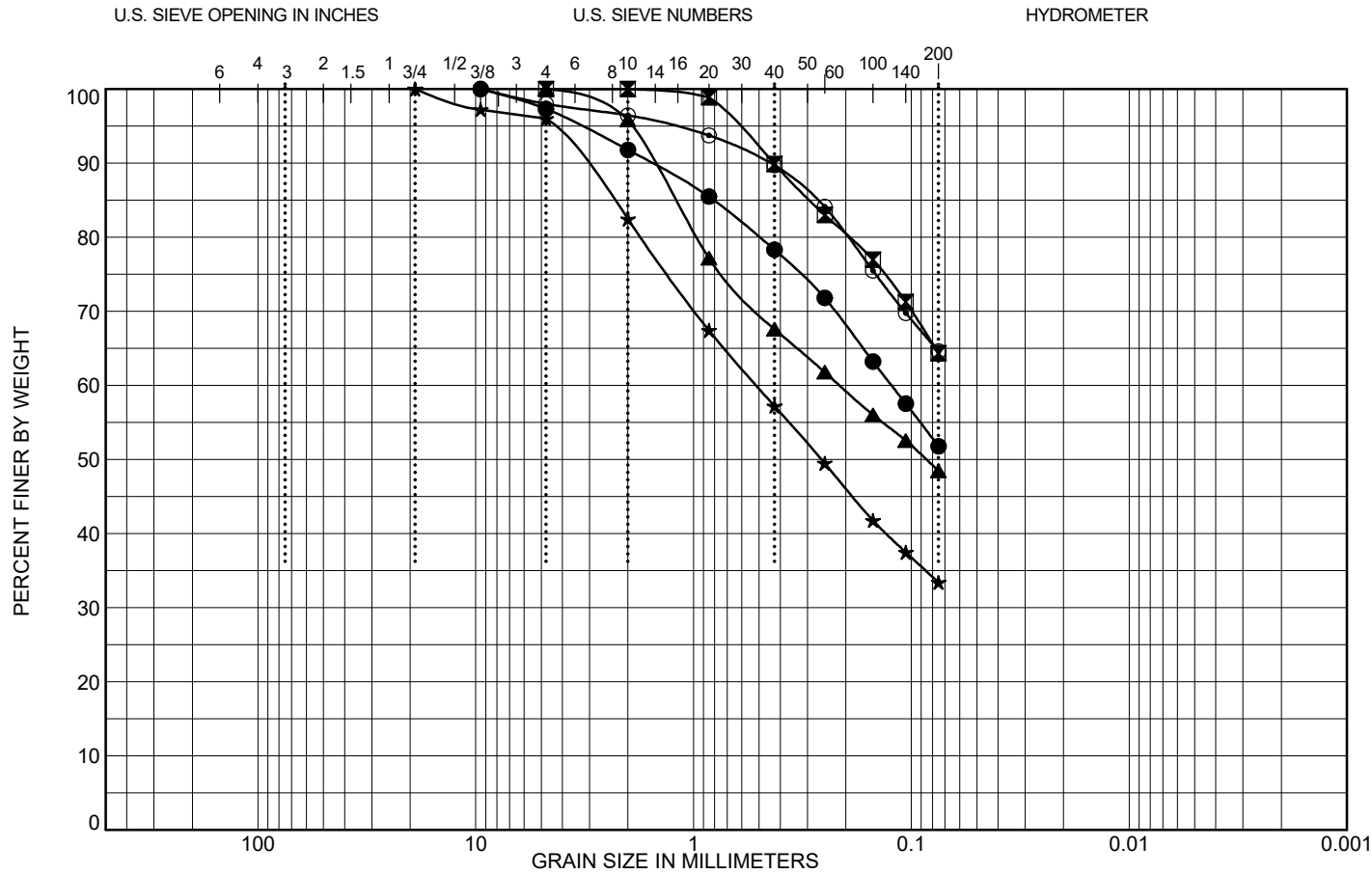
Tested By: SM/CL, SR Date: 9/11/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------|--------|
| ● | 19X-S-RW26 | S4 | 7.0 - 8.0 | 5.6 | 41.9 | 52.5 | | | | 19.2 | | |
| ☒ | 19X-S-RW26 | S10 | 33.0 - 35.0 | 0.0 | 49.5 | 50.5 | 35 | 5 | 21.0 | | SANDY SILT(ML) | A-4 |
| ▲ | 19X-S-RW27 | SS-3 | 4.0 - 6.0 | 3.6 | 39.8 | 56.5 | 39 | 10 | 18.3 | | SANDY SILT(ML) | A-4 |
| ★ | 19X-S-RW27 | SS-13 | 48.0 - 49.8 | 0.0 | 40.8 | 59.2 | 32 | 7 | 10.9 | | SANDY SILT(ML) | A-4 |
| ⊙ | 19X-S-RW28 | S11 | 38.0 - 39.4 | 0.0 | 44.1 | 55.8 | 36 | 7 | 12.5 | | SANDY SILT(ML) | A-4 |

| | | | |
|--|--|---|----------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 20 of 22 |
|--|--|---|----------------|

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 10/19




| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | 0.123 | 9.5 |
| ⊠ | | | | 4.76 |
| ▲ | | | 0.213 | 4.76 |
| ★ | | | 0.514 | 19 |
| ⊙ | | | | 9.5 |

Test Method: VTM-25

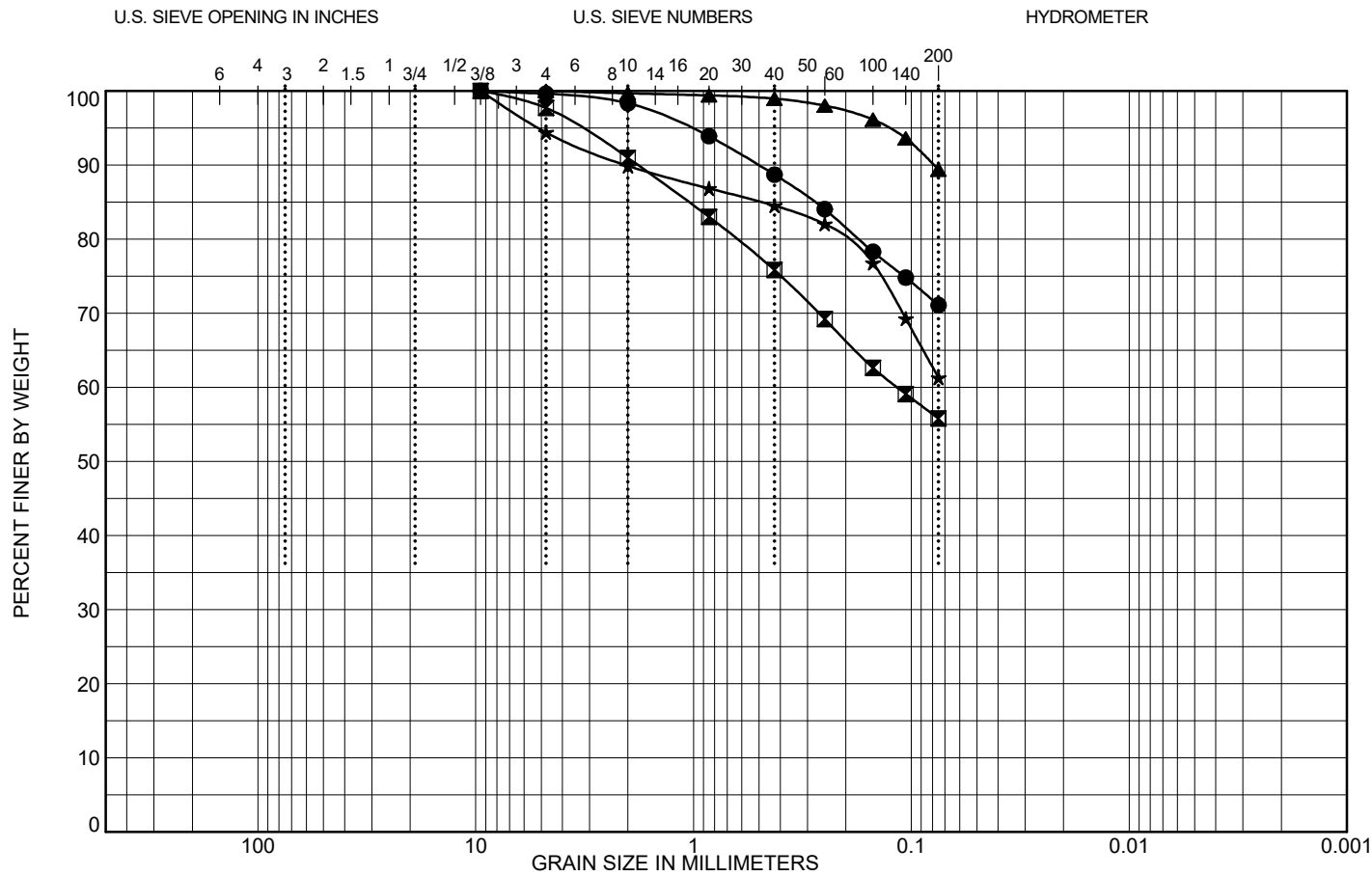
Tested By: SM/CL, SR Date: 9/12/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|----------------|--------|
| ● 19X-S-RW29 | S5 | 8.0 - 10.0 | 2.7 | 45.5 | 51.8 | 33 | 7 | 18.1 | | SANDY SILT(ML) | A-4 |
| ⊠ 19X-S-RW29 | S13 | 48.0 - 50.0 | 0.0 | 35.7 | 64.3 | 40 | 9 | 24.7 | | SANDY SILT(ML) | A-4 |
| ▲ 19X-S-RW30 | S2 | 2.0 - 4.0 | 0.0 | 51.6 | 48.4 | 39 | 7 | 16.9 | | SILTY SAND(SM) | A-4 |
| ★ 19X-S-RW30 | S7 | 18.0 - 19.4 | 4.0 | 62.6 | 33.4 | 40 | 9 | 13.7 | | SILTY SAND(SM) | A-2-4 |
| ⊙ 19X-S-RW31 | S4 | 7.0 - 9.0 | 2.0 | 33.4 | 64.6 | 46 | 13 | 22.7 | | SANDY SILT(ML) | A-7-5 |

| | | | |
|--|--|---|----------------|
|  | GRAIN SIZE DISTRIBUTION I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 21 of 22 |
|--|--|---|----------------|

T.B. GRAIN SIZE LANDSCAPE USGS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 10/19




| | D10 | D30 | D60 | D100 |
|---|-----|-----|-------|------|
| ● | | | | 9.5 |
| ⊠ | | | 0.116 | 9.5 |
| ▲ | | | | 4.76 |
| ★ | | | | 9.5 |

Test Method: VTM-25

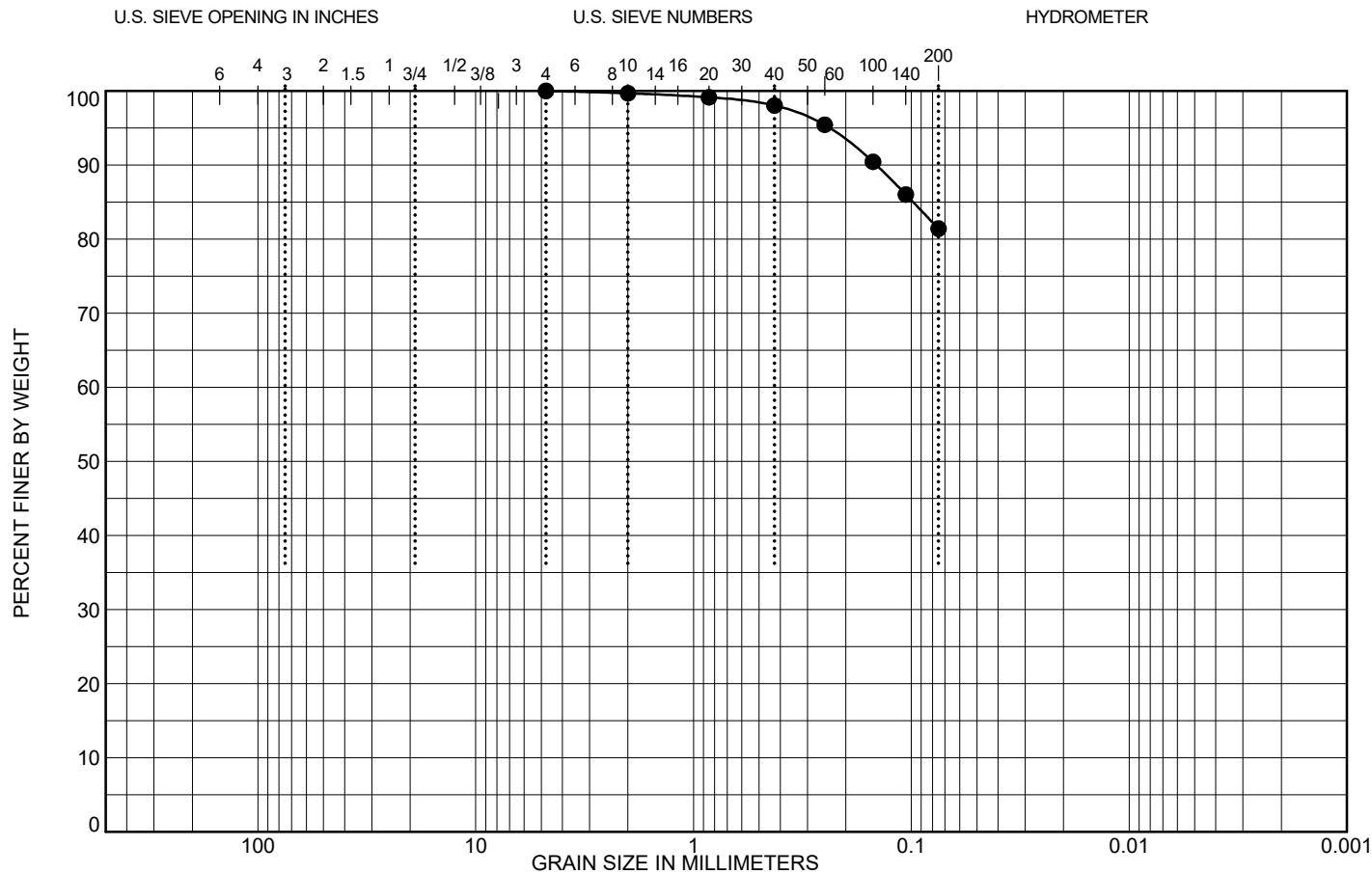
Tested By: SM/CL, SR Date: 9/12/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● | 19X-S-RW31 | S8 | 23.0 - 25.0 | 0.4 | 28.5 | 71.1 | 48 | 12 | 30.3 | | SILT with SAND(ML) | A-7-5 |
| ⊠ | 19X-S-RW36 | S4 | 9.0 - 11.0 | 2.3 | 41.9 | 55.8 | 39 | 13 | 22.1 | | SANDY SILT(ML) | A-6 |
| ▲ | 19X-S-RW36 | S5 | 13.0 - 15.0 | 0.0 | 10.6 | 89.4 | 37 | 15 | 32.6 | | LEAN CLAY(CL) | A-6 |
| ★ | 19X-S-RW37 | S6 | 18.0 - 20.0 | 5.6 | 33.1 | 61.3 | 42 | 8 | 23.3 | | SANDY SILT(ML) | A-5 |

| | | |
|--|--|--|
|  | <h2 style="margin: 0;">GRAIN SIZE DISTRIBUTION</h2> <p style="margin: 0;">I-495 NEXT Express Lanes</p> | <p style="margin: 0;">Fairfax County, Virginia</p> <p style="margin: 0;">Project Number: 19-0012</p> |
| | | <p style="margin: 0;">Sheet 22 of 22</p> |

TLB GRAIN SIZE LANDSCAPE USCS NEXT 406 ASSIGNMENT 5 GRJ SALUT2014.GDT 10/21/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | 4.76 |
| | | | | |
| | | | | |
| | | | | |

Test Method: ASTM D422

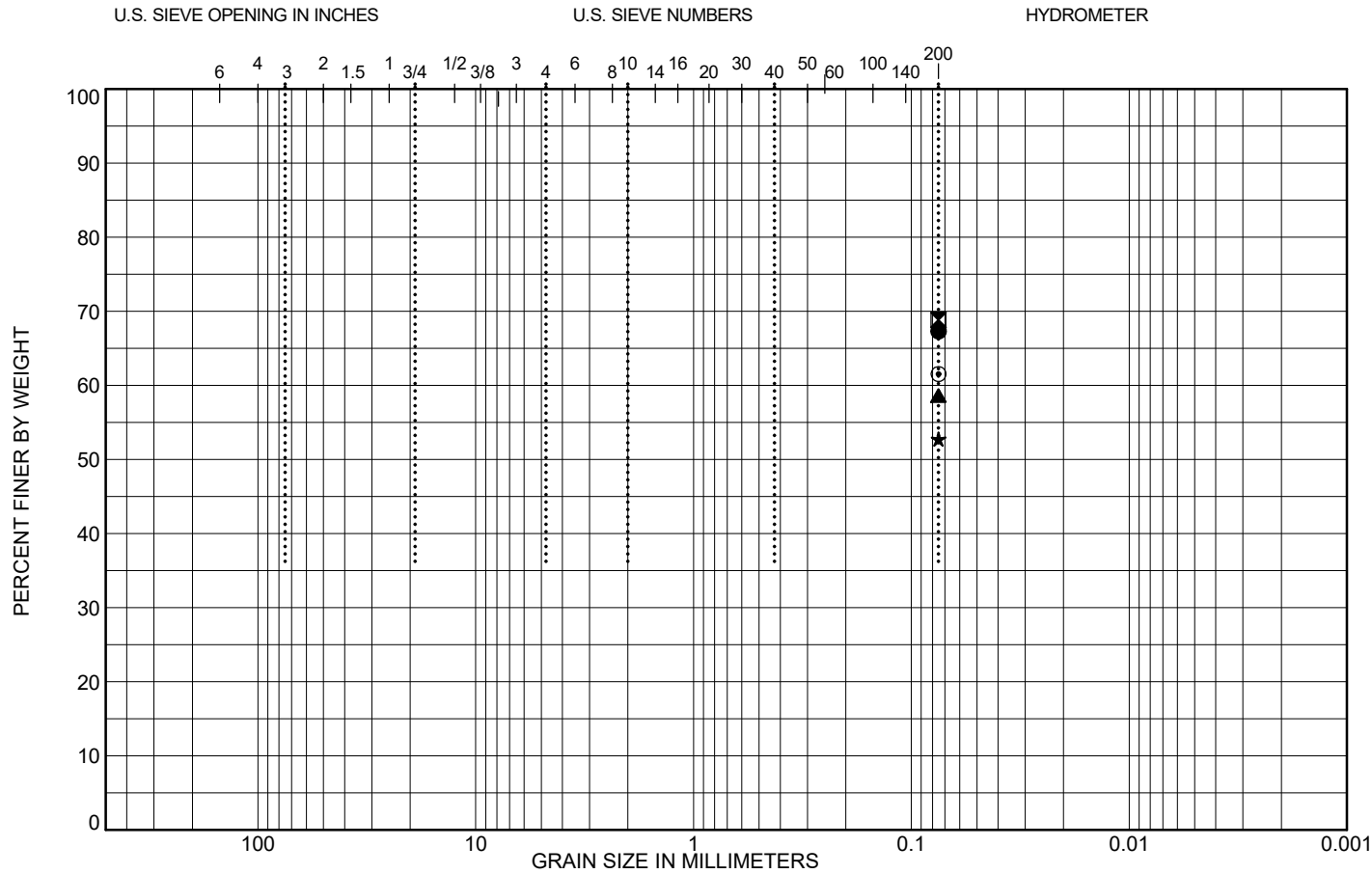
Tested By: SM Date: 10/16/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|----|------|-------|--------------------|--------|
| ● 19X-N-RW04 | ST-1 | 15.0 - 17.0 | 0.0 | 18.6 | 81.4 | 41 | 14 | 34.9 | | SILT with SAND(ML) | A-7-6 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| | | | |
|--|--|--|---------------------|
| | <h3>GRAIN SIZE DISTRIBUTION</h3> <p>I-495 NEXT Express Lanes</p> | <p>Fairfax County, Virginia</p> <p>Project Number: 19-0012</p> | <p>Sheet 1 of 1</p> |
|--|--|--|---------------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 496 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | |
| ☒ | | | | |
| ▲ | | | | |
| ★ | | | | |
| ◎ | | | | |

Test Method: AASHTO T-11

Tested By: SM/CL, SR Date: 9/3/2019

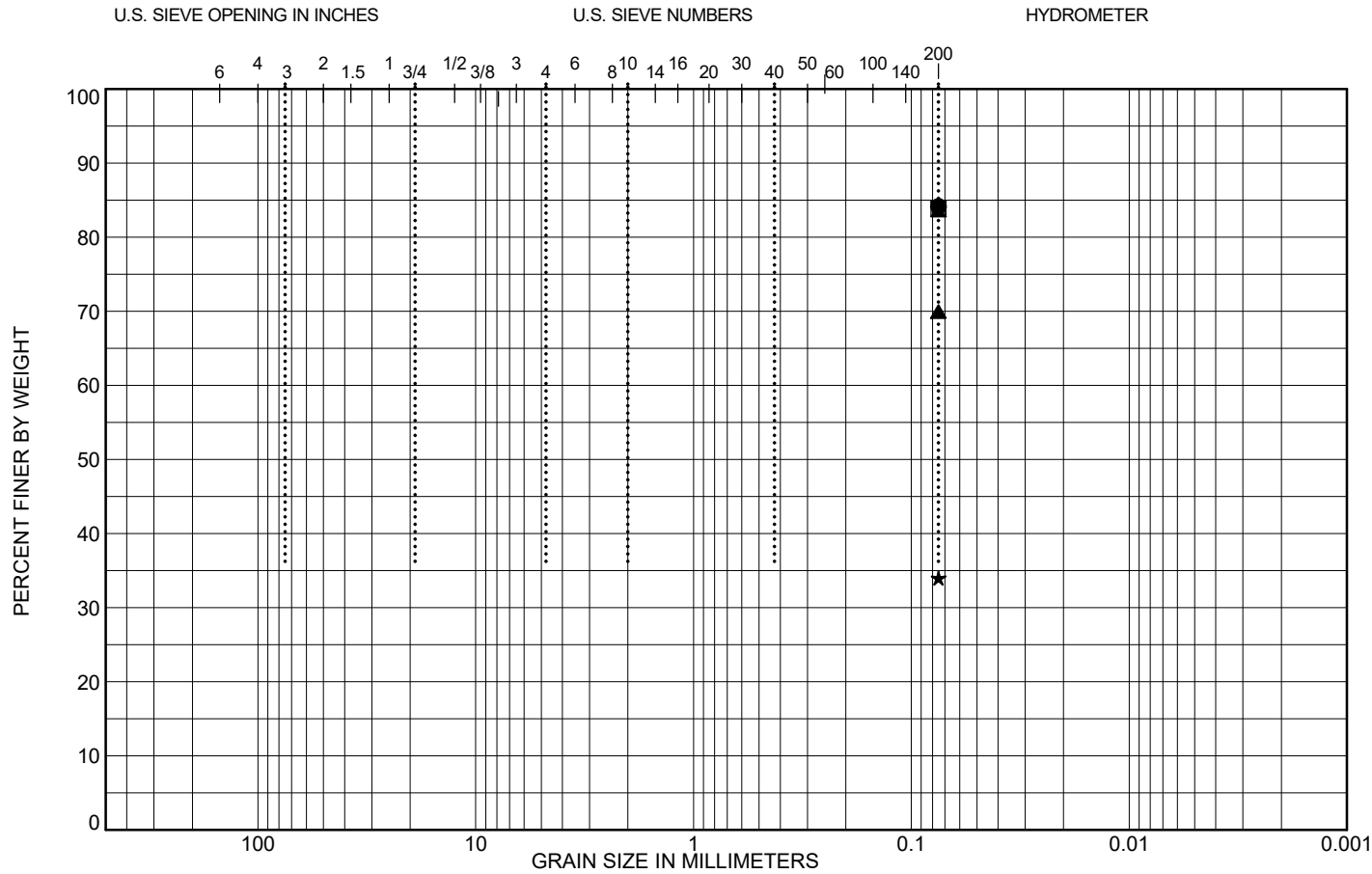
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|------|----|-------|----------------|--------|
| ● 19DTR-RW03 | S-6 | 13.0 - 15.0 | 32.7 | 67.3 | 40 | 11 | 20.8 | | | SANDY SILT(ML) | A-6 |
| ☒ 19GTP-E-P07 | S2 | 3.5 - 5.5 | 31.1 | 68.9 | 43 | 10 | 19.0 | | | SANDY SILT(ML) | A-5 |
| ▲ 19GWP-RW14 | SS-6 | 13.0 - 15.0 | 41.4 | 58.6 | 34 | 9 | 10.3 | | | SANDY SILT(ML) | A-4 |
| ★ 19LOD-W-P15 | SS-2 | 3.5 - 5.5 | 47.3 | 52.7 | 37 | 9 | 12.0 | | | SANDY SILT(ML) | A-4 |
| ◎ 19ODD-E-P02 | S1 | 2.0 - 4.0 | 38.5 | 61.5 | 41 | 14 | 18.0 | | | SANDY SILT(ML) | A-7-6 |

| | | |
|--|---|--------------------------|
| | MATERIALS FINER THAN 75µm_ #200 Wash | Fairfax County, Virginia |
| | I-495 NEXT Express Lanes | Project Number: 19-0012 |

Sheet 1 of 4

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | |
| ☒ | | | | |
| ▲ | | | | |
| ★ | | | | |
| ⊙ | | | | |

Test Method: AASHTO T-11

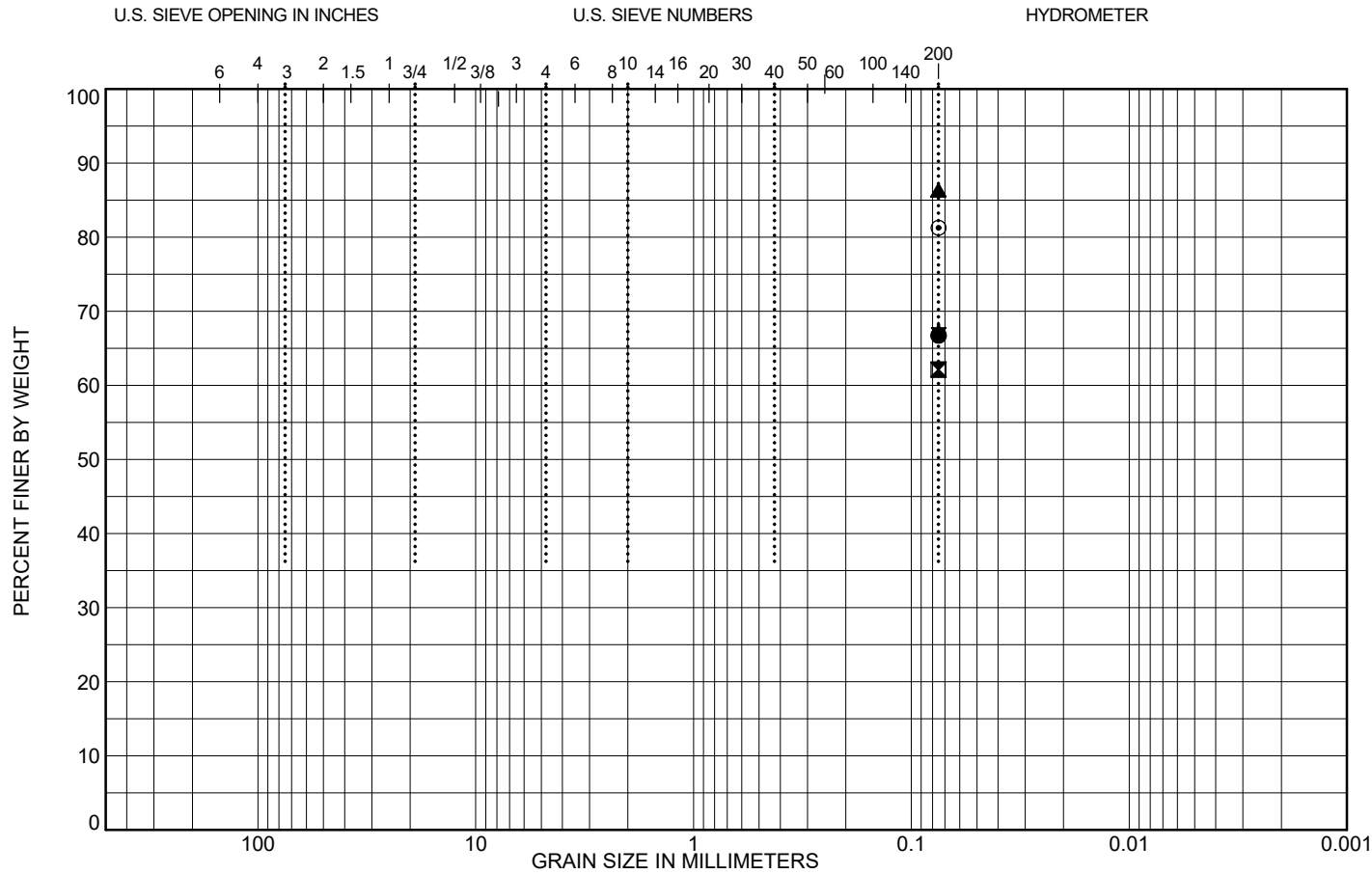
Tested By: SM/CL, SR Date: 9/9/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---------------|-------|-------------|---------|-------|-------|-------|------|----|-------|-------------------------|--------|
| ● 19ODD-E-P02 | S3 | 6.0 - 8.0 | 15.9 | 84.1 | 39 | 8 | 16.8 | | | SILT with SAND(ML) | A-4 |
| ☒ 19X-N-RW03 | S6 | 18.0 - 20.0 | 16.2 | 83.8 | 52 | 30 | 26.2 | | | FAT CLAY with SAND(CH) | A-7-6 |
| ▲ 19X-N-RW04 | S5 | 13.0 - 15.0 | 30.1 | 69.9 | 43 | 21 | 25.9 | | | SANDY LEAN CLAY(CL) | A-7-6 |
| ★ 19X-N-RW05 | SS-9 | 33.0 - 34.8 | 66.0 | 34.0 | 31 | 5 | 8.6 | | | SILTY SAND(SM) | A-2-4 |
| ⊙ 19X-N-RW06 | SS-2 | 2.0 - 4.0 | 15.8 | 84.2 | 38 | 15 | 31.7 | | | LEAN CLAY with SAND(CL) | A-6 |

| | | | |
|--|---|---|--------------|
| | MATERIALS FINER THAN 75µm_ #200 Wash I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 2 of 4 |
|--|---|---|--------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 10/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | |
| ☒ | | | | |
| ▲ | | | | |
| ★ | | | | |
| ◎ | | | | |

Test Method: AASHTO T-11

Tested By: SM/CL, SR Date: 9/12/2019

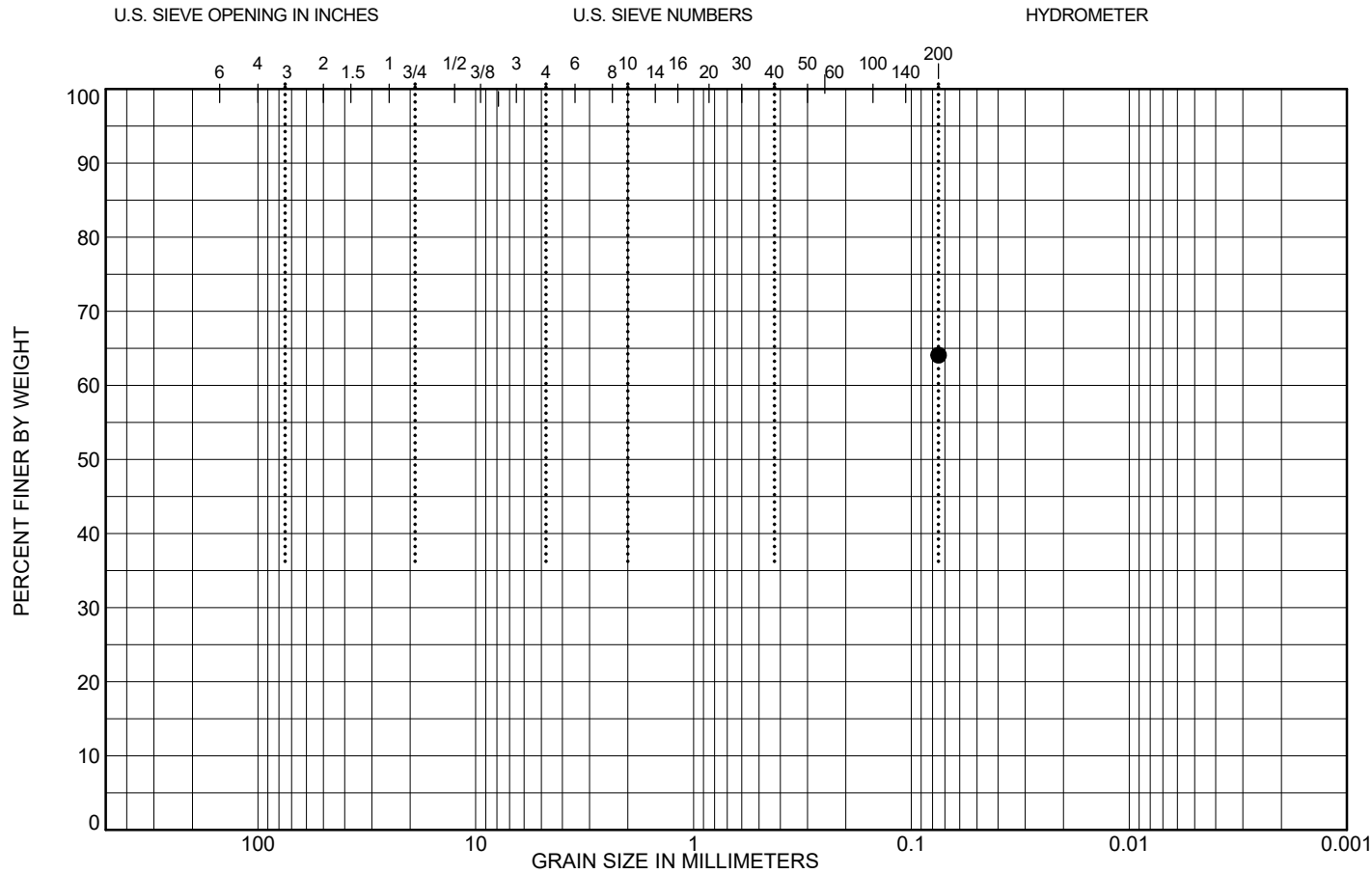
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |
| | | | | | | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|------|----|-------|----------------------------|--------|
| ● 19X-N-RW07 | SS-7 | 18.0 - 19.4 | 33.3 | 66.7 | 36 | 6 | 17.7 | | | SANDY SILT(ML) | A-4 |
| ☒ 19X-N-RW08 | S-2 | 2.0 - 4.0 | 37.9 | 62.1 | 45 | 13 | 23.5 | | | SANDY SILT(ML) | A-7-5 |
| ▲ 19X-N-RW08 | S-4 | 6.0 - 8.0 | 13.7 | 86.3 | 48 | 23 | 34.2 | | | LEAN CLAY(CL) | A-7-6 |
| ★ 19X-S-RW25 | S1 | 0.0 - 2.0 | 32.5 | 67.5 | 45 | 20 | 19.4 | | | SANDY LEAN CLAY(CL) | A-7-6 |
| ◎ 19X-S-RW28 | S4 | 6.0 - 8.0 | 18.7 | 81.3 | 52 | 22 | 27.3 | | | ELASTIC SILT with SAND(MH) | A-7-5 |

MATERIALS FINER THAN 75µm_ #200 Wash
I-495 NEXT Express Lanes

Fairfax County, Virginia
Project Number: 19-0012

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 04/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | |
| | | | | |
| | | | | |
| | | | | |

Test Method: AASHTO T-11

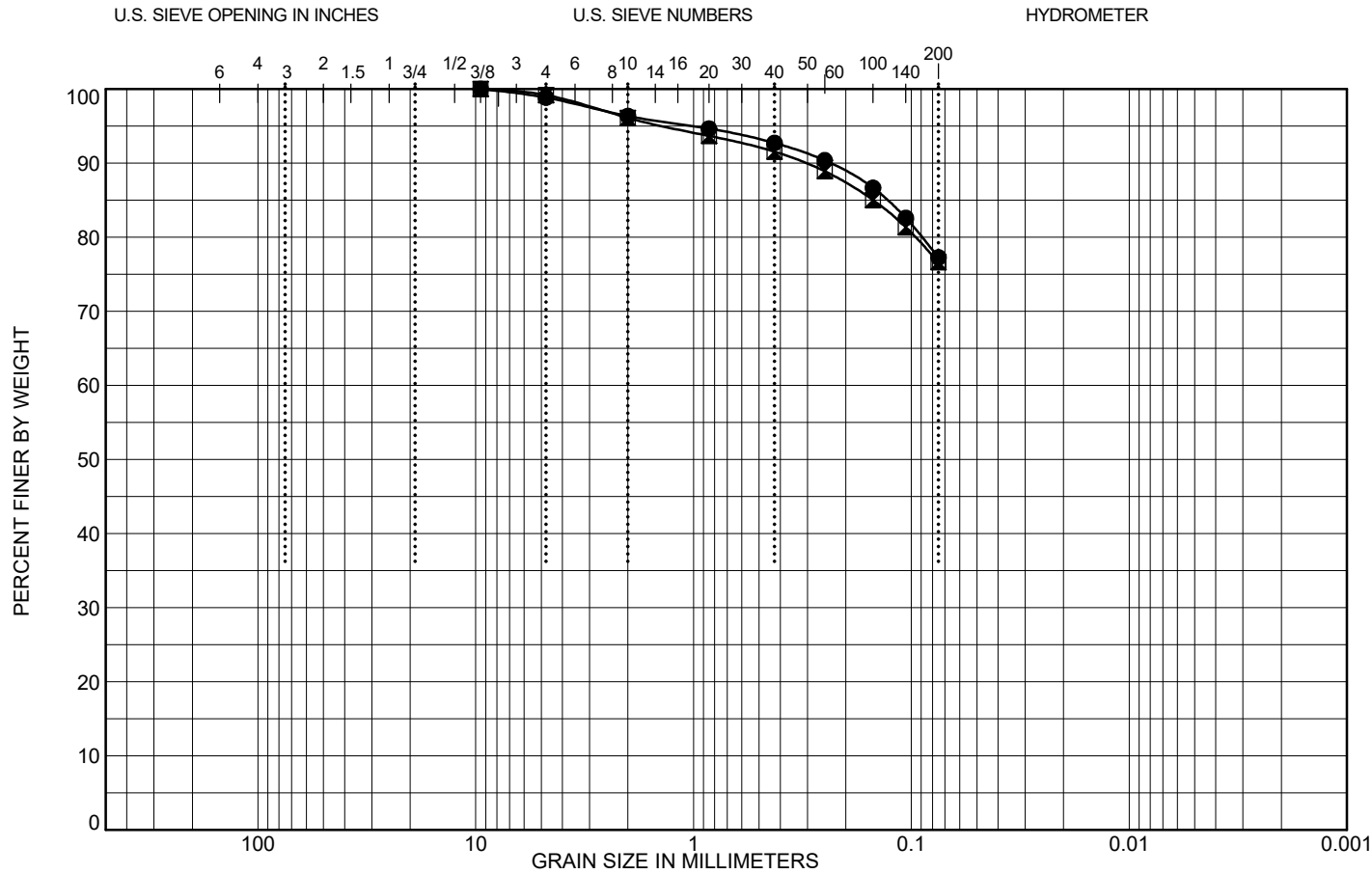
Tested By: SM/CL, SR Date: 9/11/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |
| | | | | | | |

| Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|--------------|-------|-------------|---------|-------|-------|-------|------|----|-------|----------------|--------|
| ● 19X-S-RW31 | S10 | 33.0 - 35.0 | 35.9 | 64.1 | 44 | 11 | 25.8 | | | SANDY SILT(ML) | A-7-5 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| | | | |
|--|---|---|--------------|
| | MATERIALS FINER THAN 75µm_ #200 Wash I-495 NEXT Express Lanes | Fairfax County, Virginia Project Number: 19-0012 | Sheet 4 of 4 |
|--|---|---|--------------|

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SAUJ72014.GDT 10/11/19



| | D10 | D30 | D60 | D100 |
|---|-----|-----|-----|------|
| ● | | | | 9.5 |
| ■ | | | | 9.5 |
| | | | | |
| | | | | |

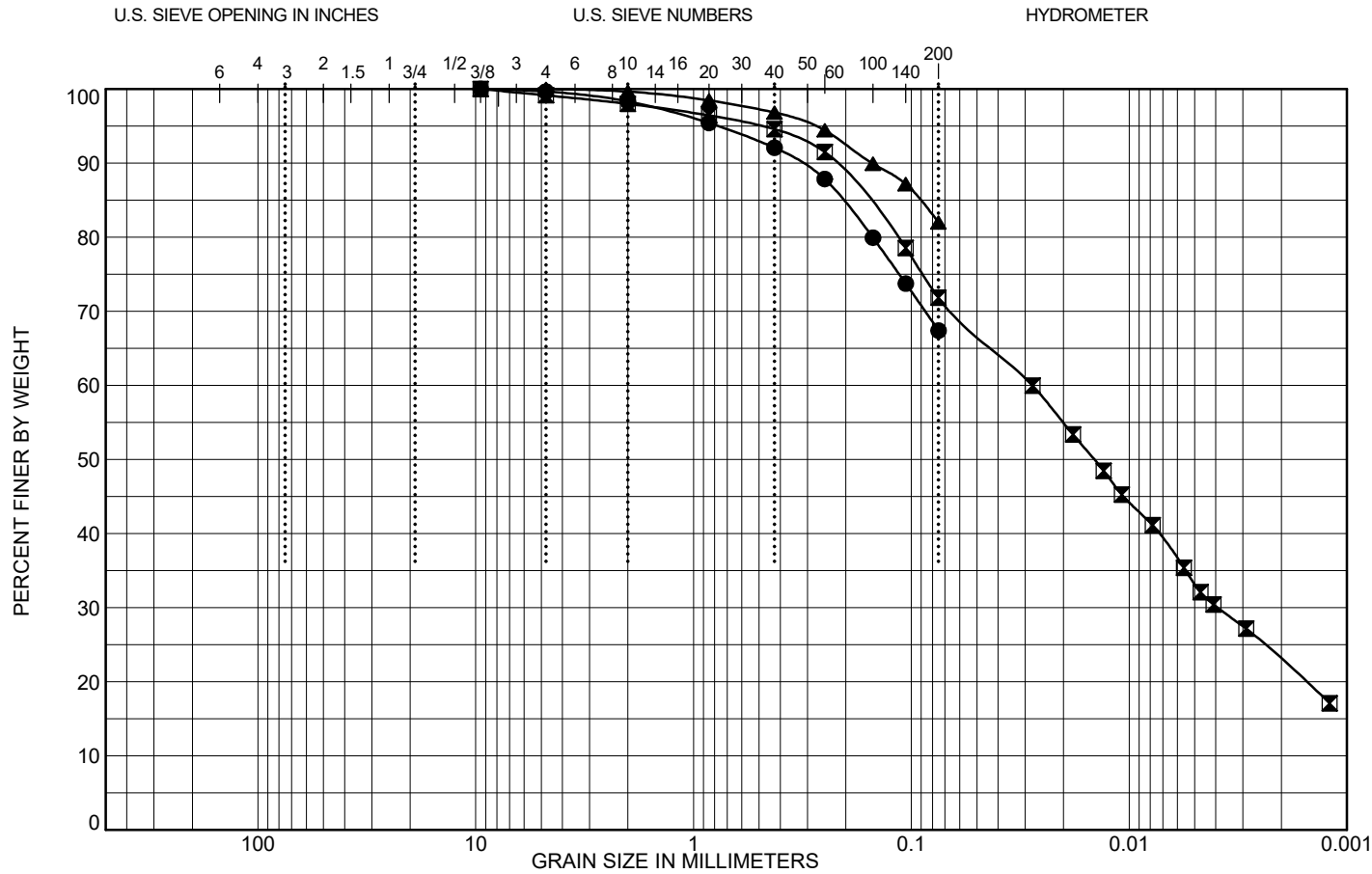
Test Method: VTM-25

Tested By: SM/CL, SR Date: 9/12/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|----------|-------|-----------|---------|-------|-------|-------|----|------|-------|-------------------------|--------|
| ● | 19SWM-01 | Bag | 0.0 - 8.0 | 1.2 | 21.6 | 77.3 | 43 | 17 | 18.6 | | LEAN CLAY with SAND(CL) | A-7-6 |
| ■ | 19SWM-04 | Bag | 0.0 - 8.0 | 0.8 | 22.6 | 76.6 | 35 | 14 | 27.7 | | LEAN CLAY with SAND(CL) | A-6 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

T.B. GRAIN SIZE LANDSCAPE USCS NEXT 495 EXPRESS LANES ASSIGNMENT 4.GPJ SAUJ72014.GDT 10/18/19



| | | | | |
|---|-----|-------|-------|------|
| | D10 | D30 | D60 | D100 |
| ● | | | | 9.5 |
| ⊠ | | 0.004 | 0.028 | 9.5 |
| ▲ | | | | 4.76 |
| | | | | |

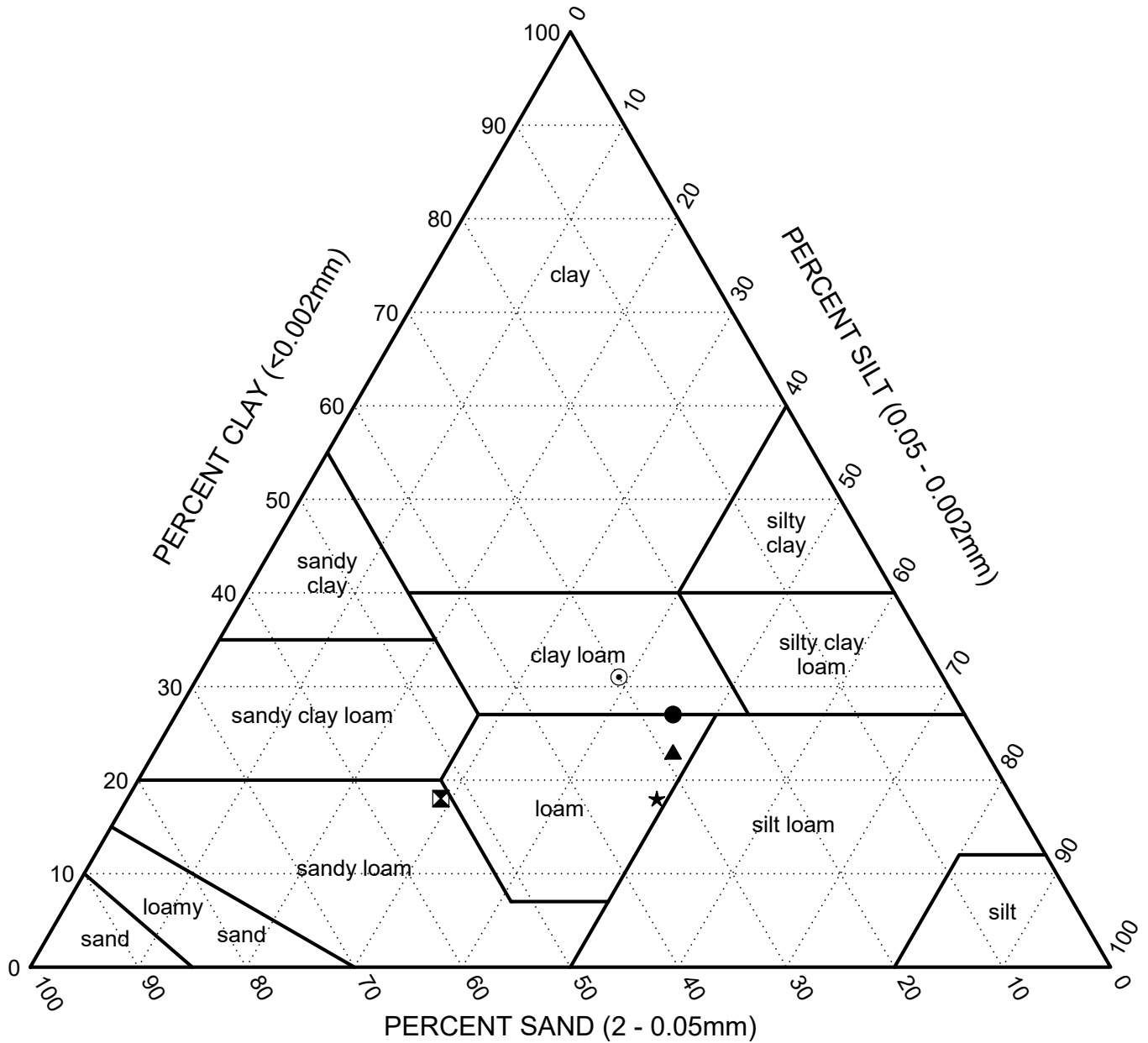
Test Method: VTM-25

Tested By: SM Date: 9/30/2019

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| | Boring | S No. | Depth | %Gravel | %Sand | %Silt | %Clay | LL | PI | MC(%) | Classification | AASHTO |
|---|----------|-------|-------------|---------|-------|-------|-------|----|------|-------|-------------------------|--------|
| ● | 19SWM-09 | Bag | 15.0 - 20.0 | 0.3 | 32.3 | 67.4 | 44 | 19 | 21.6 | | SANDY LEAN CLAY(CL) | A-7-6 |
| ⊠ | 19SWM-09 | Bag | 20.0 - 25.0 | 0.9 | 27.3 | 38.6 | 33.2 | 45 | 19 | 24.3 | LEAN CLAY with SAND(CL) | A-7-6 |
| ▲ | 19SWM-10 | Bag | 20.0 - 25.0 | 0.0 | 18.0 | 82.0 | 46 | 15 | 35.8 | | SILT with SAND(ML) | A-7-5 |
| | | | | | | | | | | | | |

Fractions normalized to 100% passing the 2mm (#10) sieve



Test Method: AASHTO T-88

| | Boring | Depth | Sand (%) | Silt (%) | Clay (%) | MC(%) | USDA Classification | Tested By | Date |
|---|----------|-------|----------|----------|----------|-------|---------------------|-----------|-----------|
| ● | 19SWM-05 | 4.0 | 27.5 | 45.4 | 27.1 | 30.2 | CLAY LOAM | SM/CL | 9/03/2019 |
| ⊠ | 19SWM-05 | 15.0 | 52.6 | 29.2 | 18.2 | 29.0 | SANDY LOAM | SR | 9/03/2019 |
| ▲ | 19SWM-11 | 2.0 | 29.1 | 47.8 | 23.0 | 26.6 | LOAM | SR | 9/03/2019 |
| ★ | 19SWM-11 | 20.0 | 33.2 | 48.3 | 18.5 | 18.8 | LOAM | SR | 9/03/2019 |
| ⊙ | 19SWM-13 | 2.0 | 29.8 | 39.4 | 30.9 | 21.9 | CLAY LOAM | SR | 9/06/2019 |

T1B: GRAIN SIZE LANDSCAPE USDA NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ 10/9/19



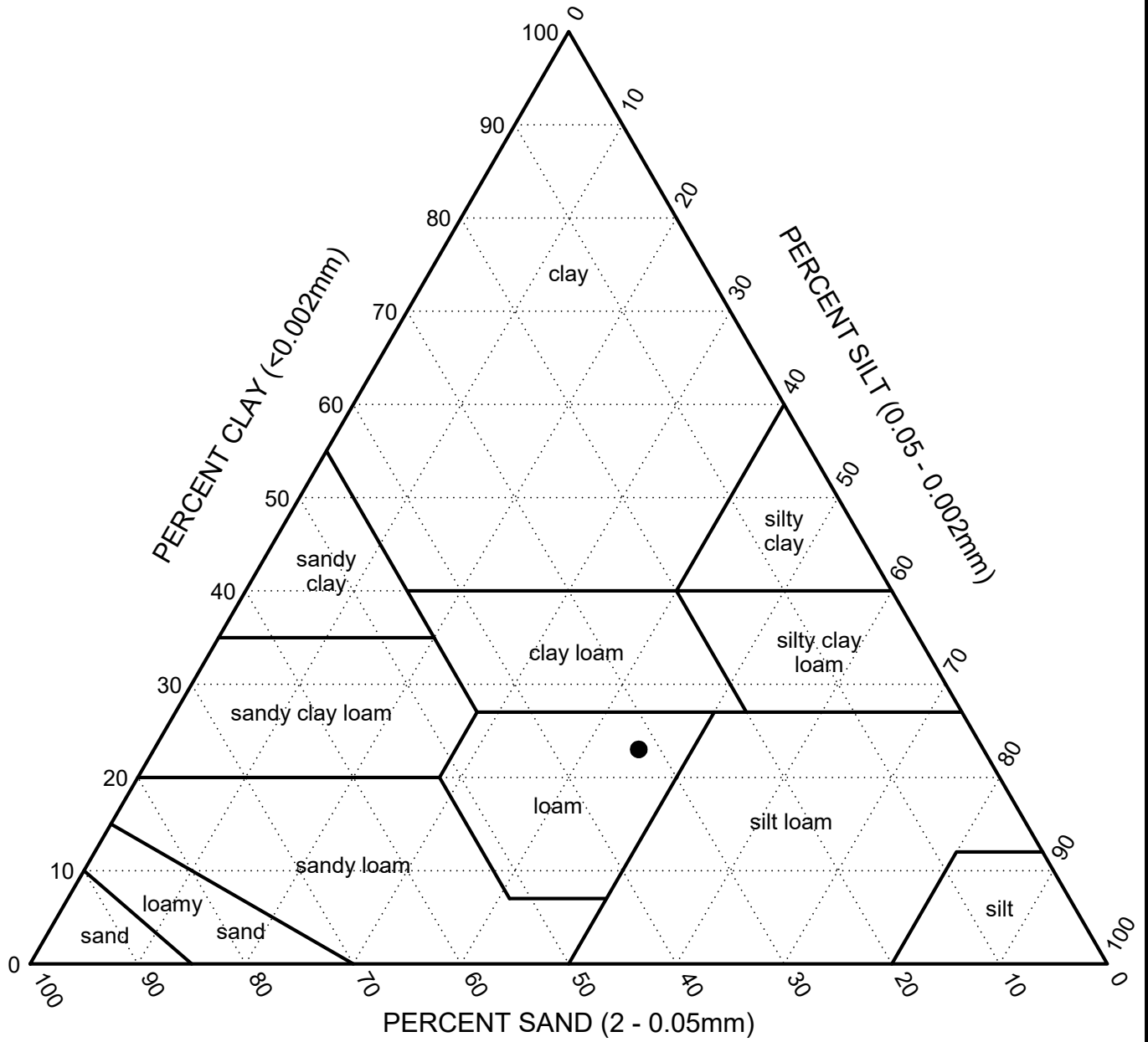
USDA Textural Classification Chart

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

Fractions normalized to 100% passing the 2mm (#10) sieve



Test Method: VTM-25

| | Boring | Depth | Sand (%) | Silt (%) | Clay (%) | MC(%) | USDA Classification | Tested By | Date |
|---|----------|-------|----------|----------|----------|-------|---------------------|-----------|-----------|
| ● | 19SWM-09 | 20.0 | 31.6 | 45.0 | 23.4 | 24.3 | LOAM | SM | 9/27/2019 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

T1B: GRAIN SIZE LANDSCAPE USDA NEXT 495 EXPRESS LANES ASSIGNMENT 4.GPJ 10/18/19



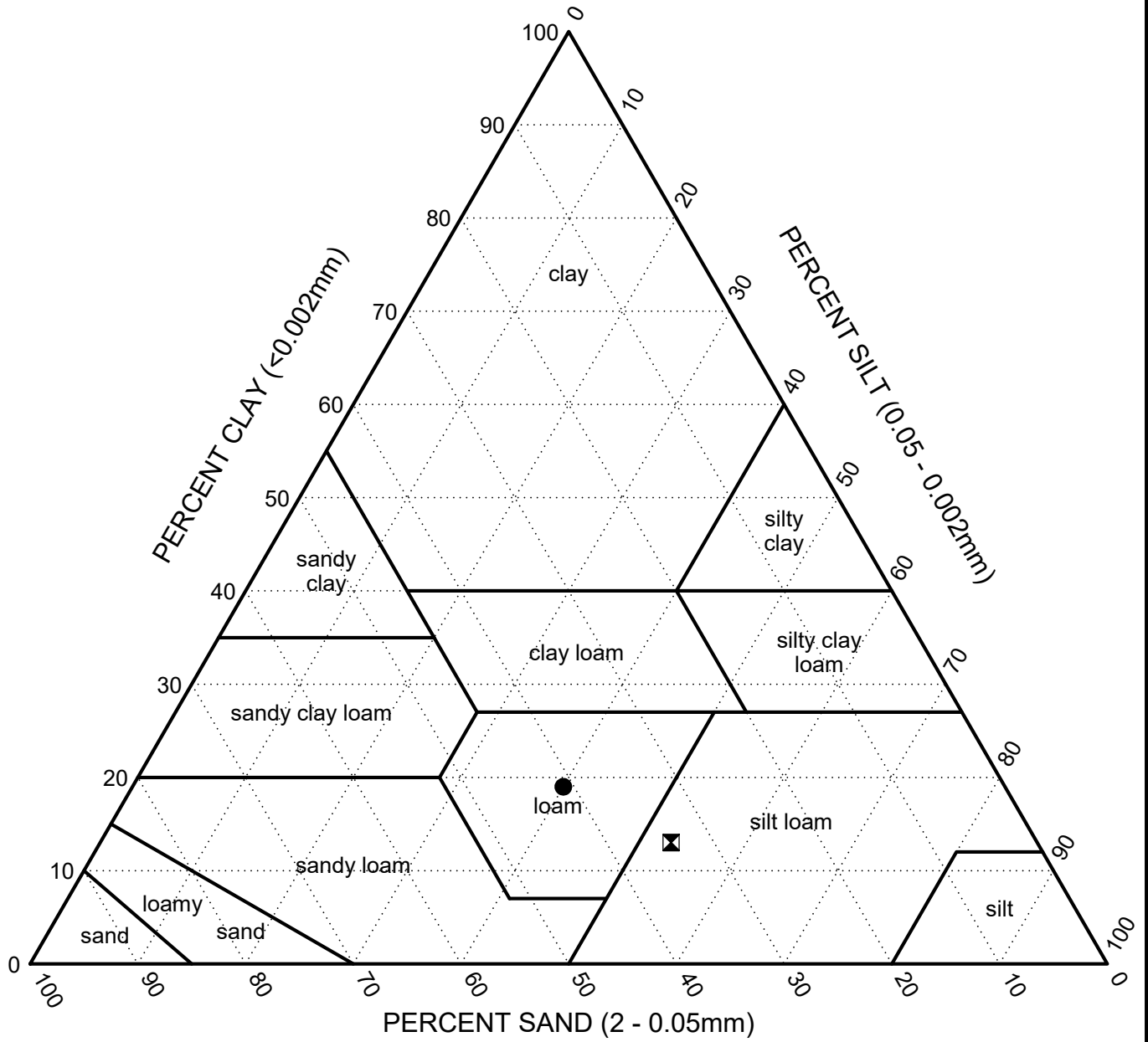
USDA Textural Classification Chart

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

Fractions normalized to 100% passing the 2mm (#10) sieve



Test Method: AASHTO T-88

| | Boring | Depth | Sand (%) | Silt (%) | Clay (%) | MC(%) | USDA Classification | Tested By | Date |
|---|----------|-------|----------|----------|----------|-------|---------------------|-----------|-----------|
| ● | 19SWM-13 | 11.0 | 40.6 | 40.3 | 19.1 | 17.0 | LOAM | SR | 9/06/2019 |
| ■ | 19SWM-14 | 6.0 | 33.8 | 52.7 | 13.4 | 17.4 | SILT LOAM | SR | 9/05/2019 |
| | | | | | | | | | |
| | | | | | | | | | |

T1B: GRAIN SIZE LANDSCAPE USDA NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ 10/9/19



USDA Textural Classification Chart

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT

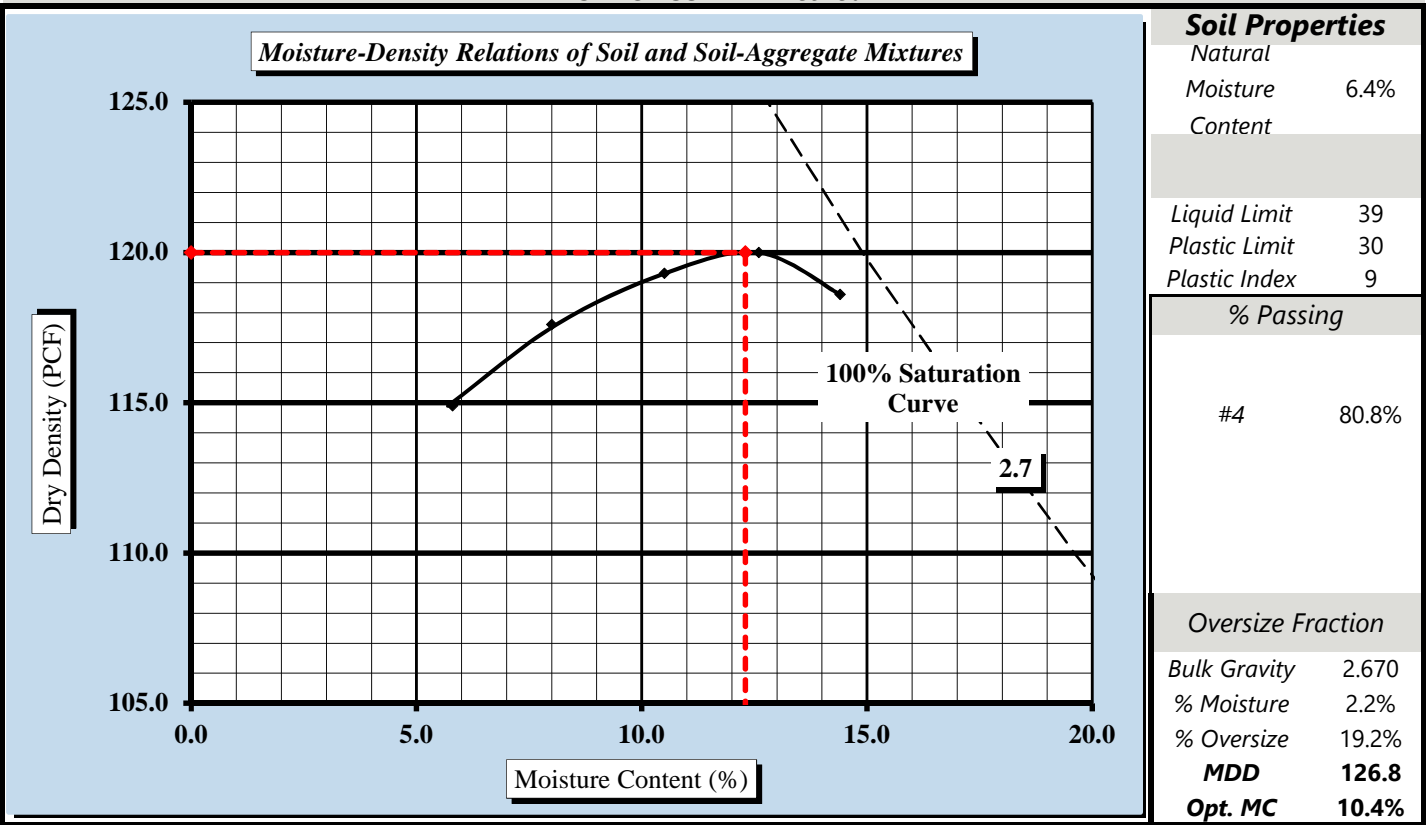


Quality Assurance

| | | | |
|---|--|---------------|-----------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Log No.: | 43-2927 |
| Project Name: | I-495 Between McLean and Dulles | Report Date: | 8/1/2019 |
| Client Name: | HDR Engineering Inc. | Test Date(s): | 7/31/2019 |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19DTR-P07 | | |
| | | | Depth: 1 - 3 ft |

Sample Description: SILTY SAND WITH GRAVEL (SM) / A-2-4

| | | | | |
|--------------------------------|-------|------|--------------------------|-------|
| Maximum Dry Density | 120.0 | PCF. | Optimum Moisture Content | 12.3% |
| AASHTO T99 - - Method A | | | | |



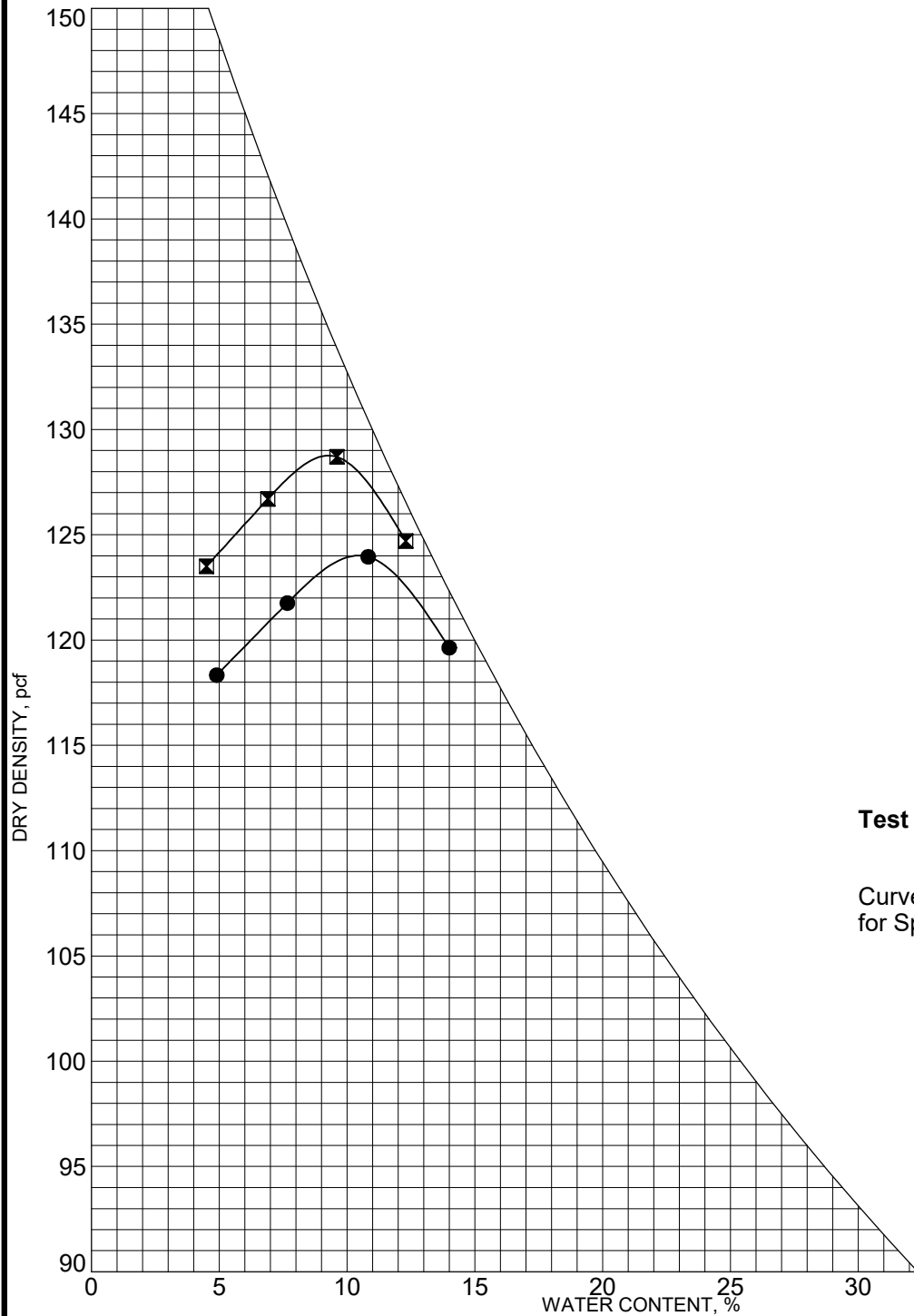
Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

| | | | |
|---|---------------|------------------------------------|-------------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | <u>Senior Engineer</u> Position | <u>8/1/2019</u> Date |
|---|---------------|------------------------------------|-------------------------|

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T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SALUT2014.GDT 9/17/19



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI | |
|--------|------------|-----------|----------------|---------------------------|-----------|------|----|---|
| ● | 19DTR-P08 | Bag | 3.0 - 6.0 | SILTY SAND(SM, A-2-4) | 124.0 | 10.4 | 31 | 7 |
| ⊠ | 19DTR-P08 | Bag | 3.0 - 6.0 | (OVERSIZE CORRECTION 14%) | *128.8 | *9.3 | | |
| | | | | | | | | |

Tested By: SR Date: 8/16/2019



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

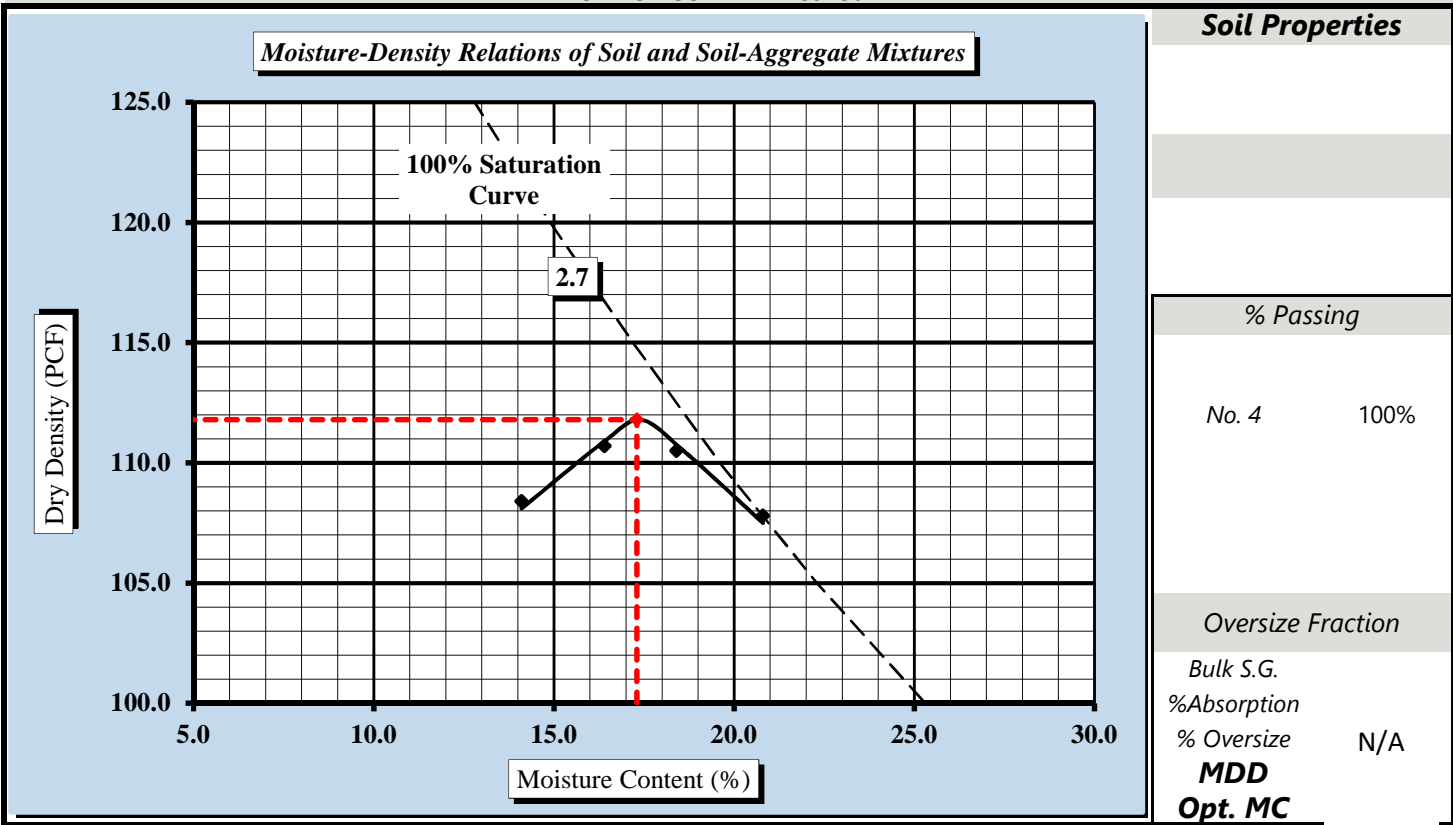
MOISTURE - DENSITY REPORT



Quality Assurance

| | | | |
|---|---------------------------------|-----------------------|-------------------------|
| S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777 | | | |
| S&ME Project #: | 1243-19-025 | Log No: 43-2927 | Report Date: 8/28/2019 |
| Project Name: | I-495 Between McLean and Dulles | | Test Date(s): 7/17/2019 |
| Client Name: | HDR Engineering, Inc. | Revised Report | |
| Client Address: | Glen Allen, Virginia | | |
| Sample ID: | 19GTP-E-12 | Sample Date: | 4/2019 |
| | | Depth: | 2- 8 ft |

| | | | |
|--------------------------------|-----------------------------|------|--------------------------------|
| Sample Description: | SANDY FAT CLAY (CH) / A-7-6 | | |
| Maximum Dry Density | 111.8 | PCF. | Optimum Moisture Content 17.3% |
| AASHTO T99 - - Method A | | | |



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

| | | | |
|--|---------------|---|---|
| <p><u>N. Randy Rainwater</u> Technical Responsibility</p> | Signature | <p><u>Senior Engineer</u> Position</p> | <p><u>8/28/2019</u> Date</p> |
|--|---------------|---|---|

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MOISTURE - DENSITY REPORT

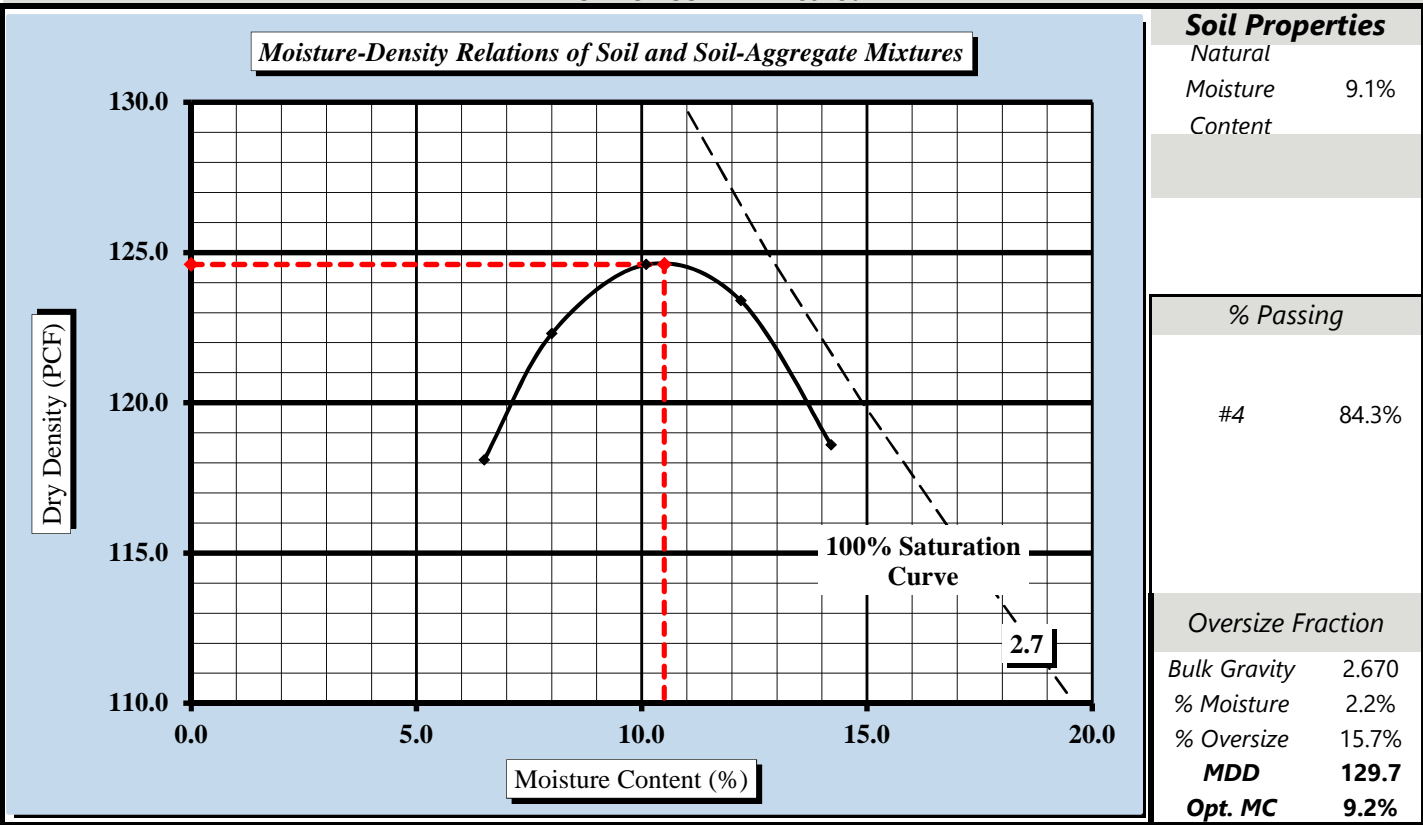


Quality Assurance

| | | | |
|---|--|---------------|-----------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Log No.: | 43-2927 |
| Project Name: | I-495 Between McLean and Dulles | Report Date: | 8/1/2019 |
| Client Name: | HDR Engineering Inc. | Test Date(s): | 7/11/2019 |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19GWP-P3 | | |
| | | | Depth: 1 - 7 ft |

Sample Description: CLAYEY SAND WITH GRAVEL (SC) / A-6

| | | | | |
|--------------------------------|-------|------|--------------------------|-------|
| Maximum Dry Density | 124.6 | PCF. | Optimum Moisture Content | 10.5% |
| AASHTO T99 - - Method A | | | | |



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

N. Randy Rainwater *N. Randy Rainwater* Senior Engineer 8/1/2019
 Technical Responsibility Signature Position Date

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MOISTURE - DENSITY REPORT

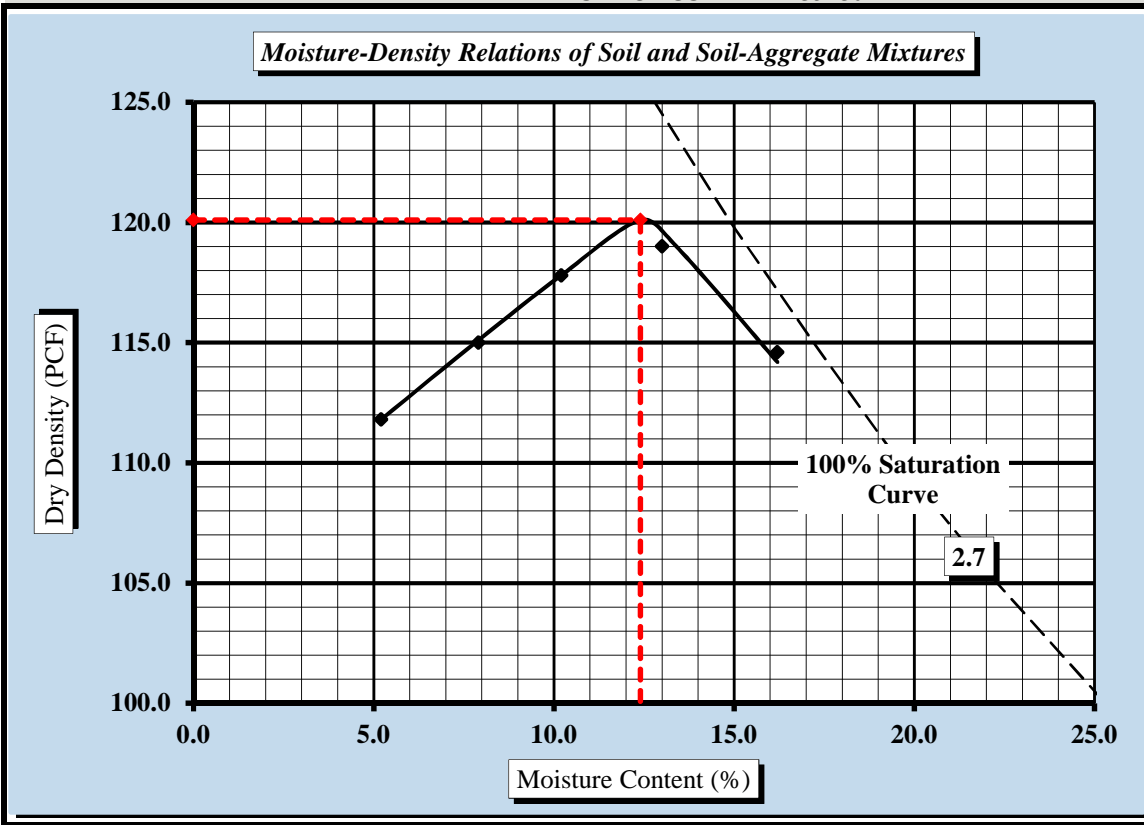


Quality Assurance

| | | | |
|---|---------------------------------|-----------------|-------------------------|
| S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777 | | | |
| S&ME Project #: | 1243-19-025 | Log No: 43-2927 | Report Date: 8/2/19 |
| Project Name: | I-495 Between McLean and Dulles | | Test Date(s): 7/17/2019 |
| Client Name: | HDR Engineering, Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample ID: | 19GWP-P7 | Sample Date: | 4/2019 |
| | | Depth: | 2.5 - 6.5 ft |
| Sample Description: SANDY LEAN CLAY (CL) / A-6 | | | |

| | | | | |
|---------------------|-------|------|--------------------------|-------|
| Maximum Dry Density | 120.1 | PCF. | Optimum Moisture Content | 12.4% |
|---------------------|-------|------|--------------------------|-------|

AASHTO T99 - - Method A



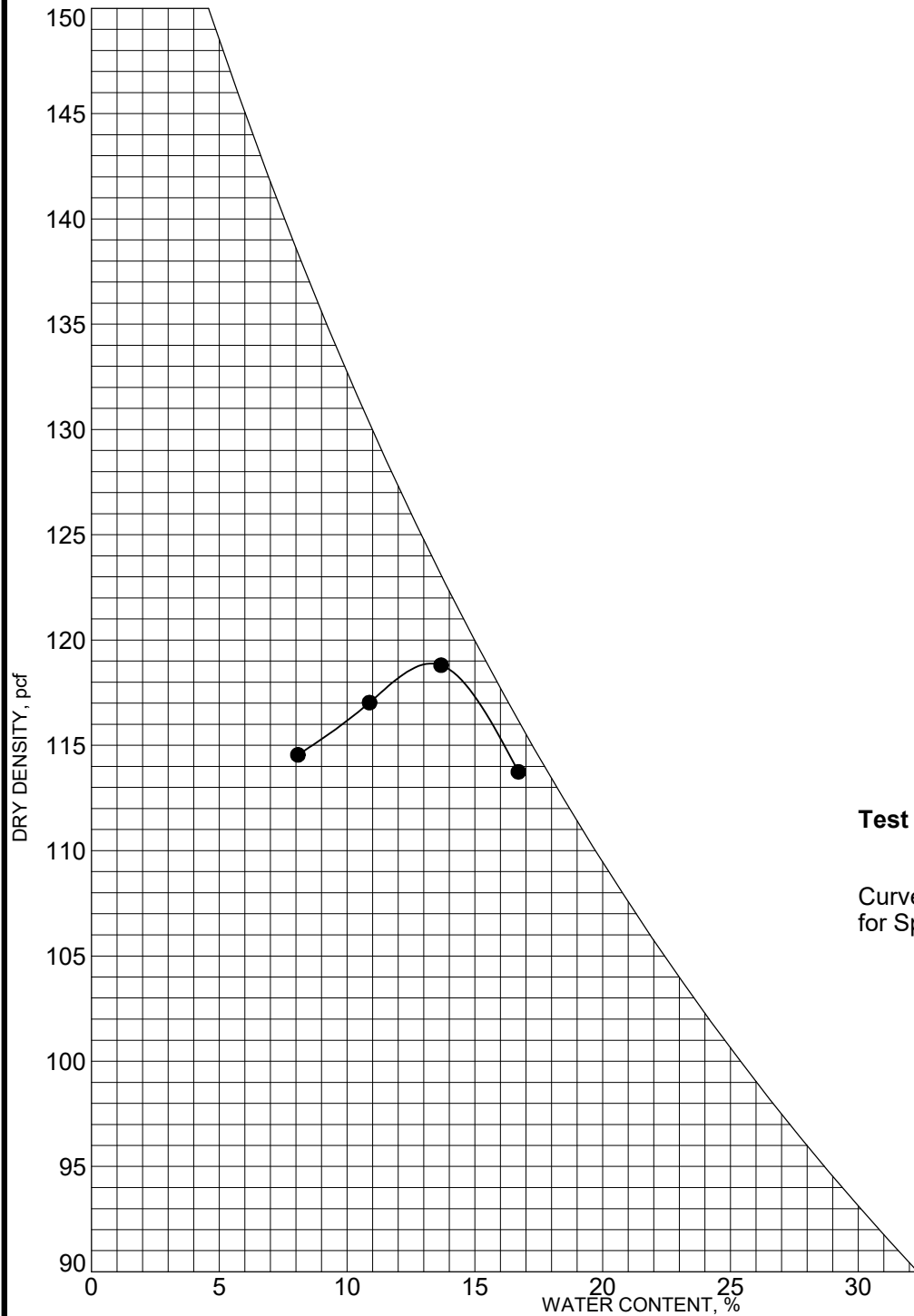
| Soil Properties | |
|-------------------|-------|
| Natural | |
| Moisture Content | 19.2% |
| % Passing | |
| No. 4 | 100% |
| Oversize Fraction | |
| Bulk S.G. | |
| % Absorption | |
| % Oversize | N/A |
| MDD | |
| Opt. MC | |

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

| | | | |
|---|---------------|------------------------------------|-------------------------|
| <u>N. Randy Rainwater</u> Technical Responsibility | Signature | <u>Senior Engineer</u> Position | <u>8/2/2019</u> Date |
|---|---------------|------------------------------------|-------------------------|

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* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|-----------------------------|------------------------|-----------|----|----|
| ● 19ODD-W-P01 | Bag | 2.0 - 8.0 | SANDY LEAN CLAY (CL, A-7-6) | 118.9 | 13.4 | 42 | 18 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/8/2019



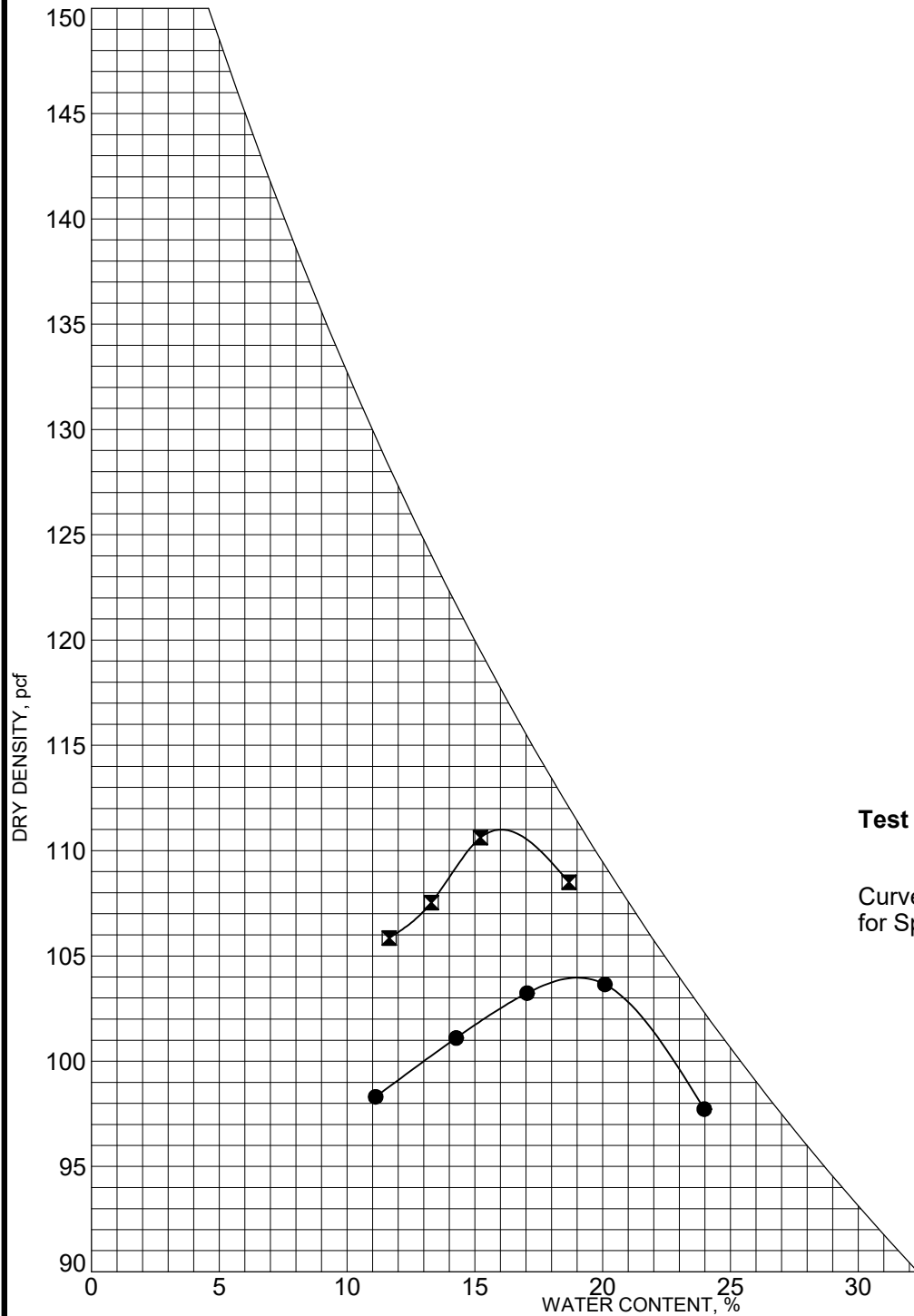
MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SALUT2014.GBT 10/18/19



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI | |
|--------|------------|-----------|----------------|--------------------------------|-----------|------|----|----|
| ● | 19SWM-01 | Bag | 0.0 - 8.0 | LEAN CLAY with SAND(CL, A-7-6) | 104.0 | 19.0 | 43 | 17 |
| ■ | 19SWM-04 | Bag | 0.0 - 8.0 | LEAN CLAY with SAND(CL, A-6) | 111.0 | 16.0 | 35 | 14 |
| | | | | | | | | |

Tested By: SR Date: 10/11/2019



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT



Quality Assurance

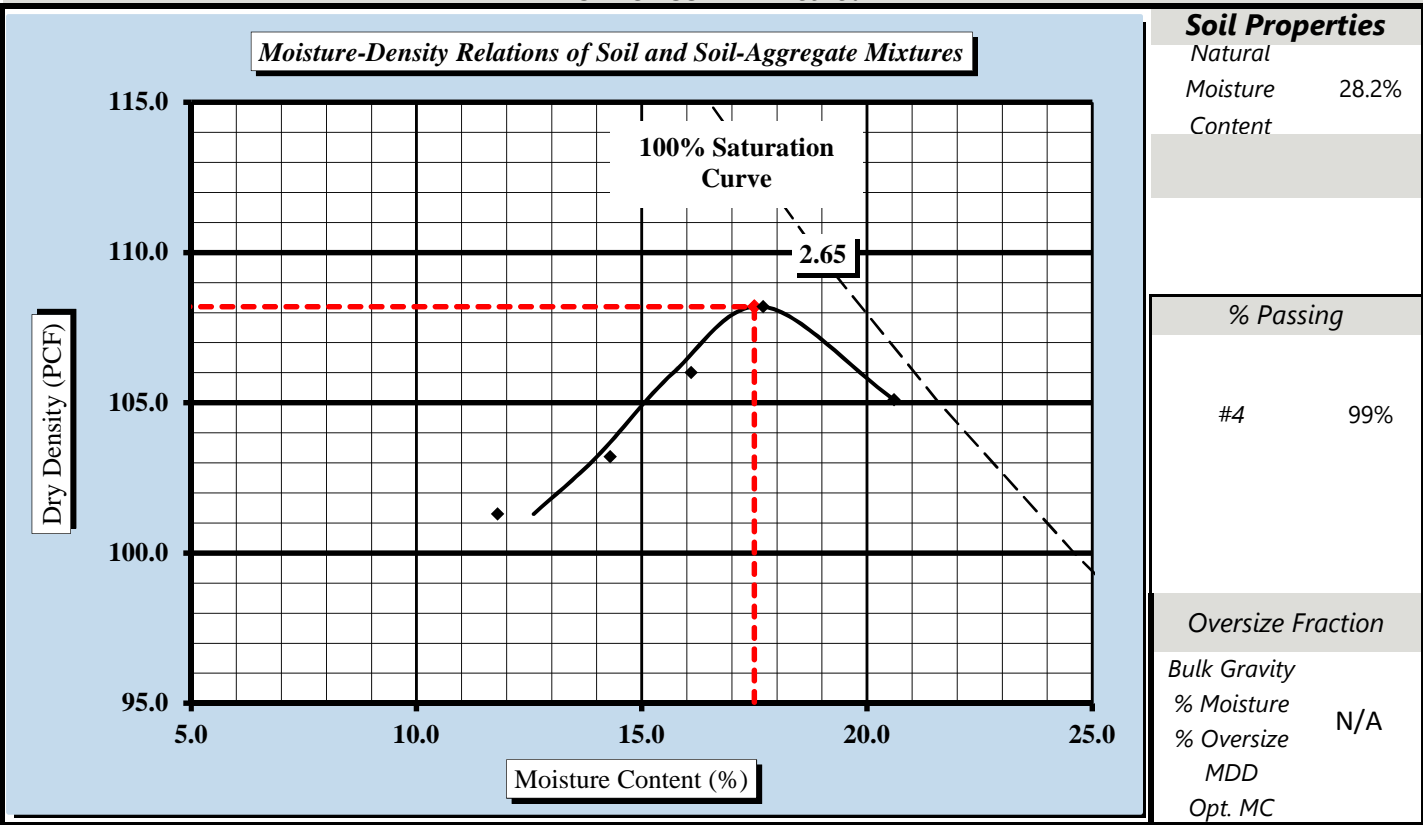
| | | | |
|---|--|---------------|-----------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Report Date: | 8/28/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | 8/27/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19SWM-03 | | |

Depth: 6'-10'

Sample Description: LEAN CLAY WITH SAND (CL) **A-6**

Maximum Dry Density 108.2 PCF. Optimum Moisture Content 17.7%

AASHTO T99 - - Method A

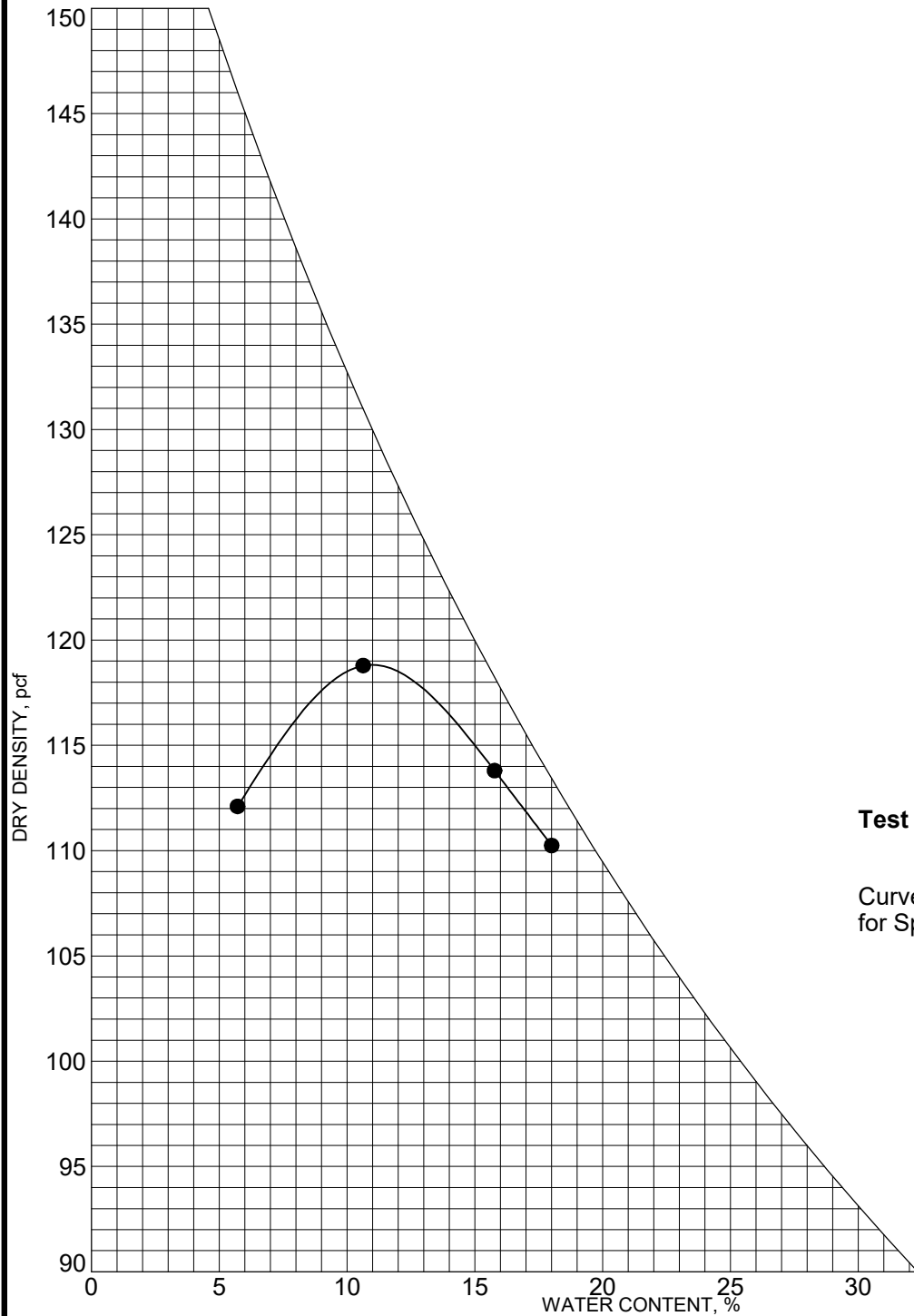


Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: **Virginia Test Method - 1**
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Perry Gazaway Perry Gazaway Senior Lab Technician 9/11/2019
 Technical Responsibility Signature Position Date

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Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|-------------|----------------------|------------------------|-----------|----|----|
| ● 19SWM-05 | Bag | 15.0 - 20.0 | CLAYEY SAND(SC, A-4) | 118.9 | 11.0 | 30 | 10 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SR

Date: 8/17/2019



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT

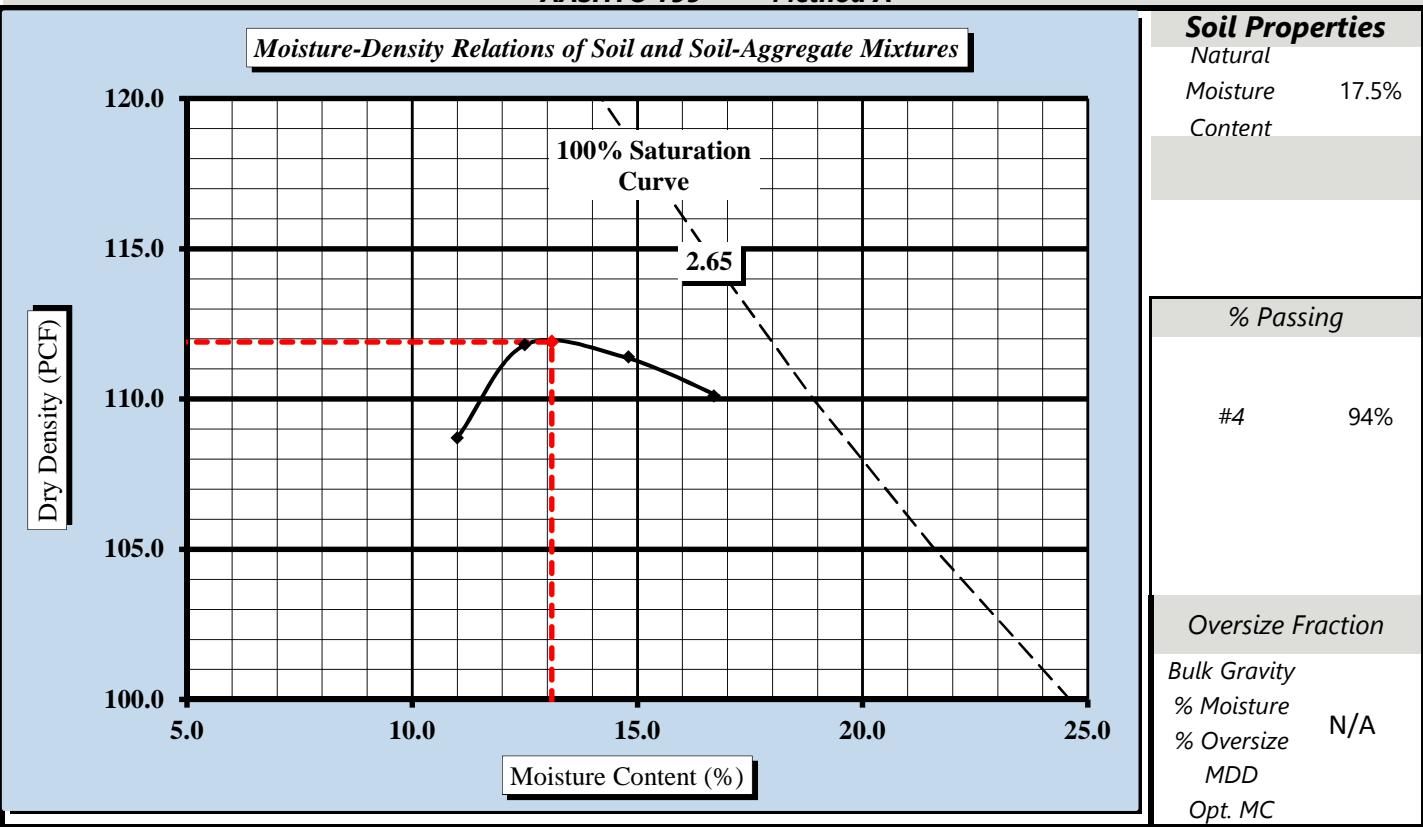


Quality Assurance

| | | | |
|---|--|---------------|-----------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Report Date: | 8/28/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | 8/27/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19SWM-07 | Depth: | 15'-20' |
| Sample Description: | SANDY FAT CLAY (CH) | A-7-6 | |

Maximum Dry Density 111.9 PCF. Optimum Moisture Content 13.1%

AASHTO T99 - - Method A



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: **Virginia Test Method - 1**
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Perry Gazaway Perry Gazaway Senior Lab Technician 8/28/2019
 Technical Responsibility Signature Position Date

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MOISTURE - DENSITY REPORT

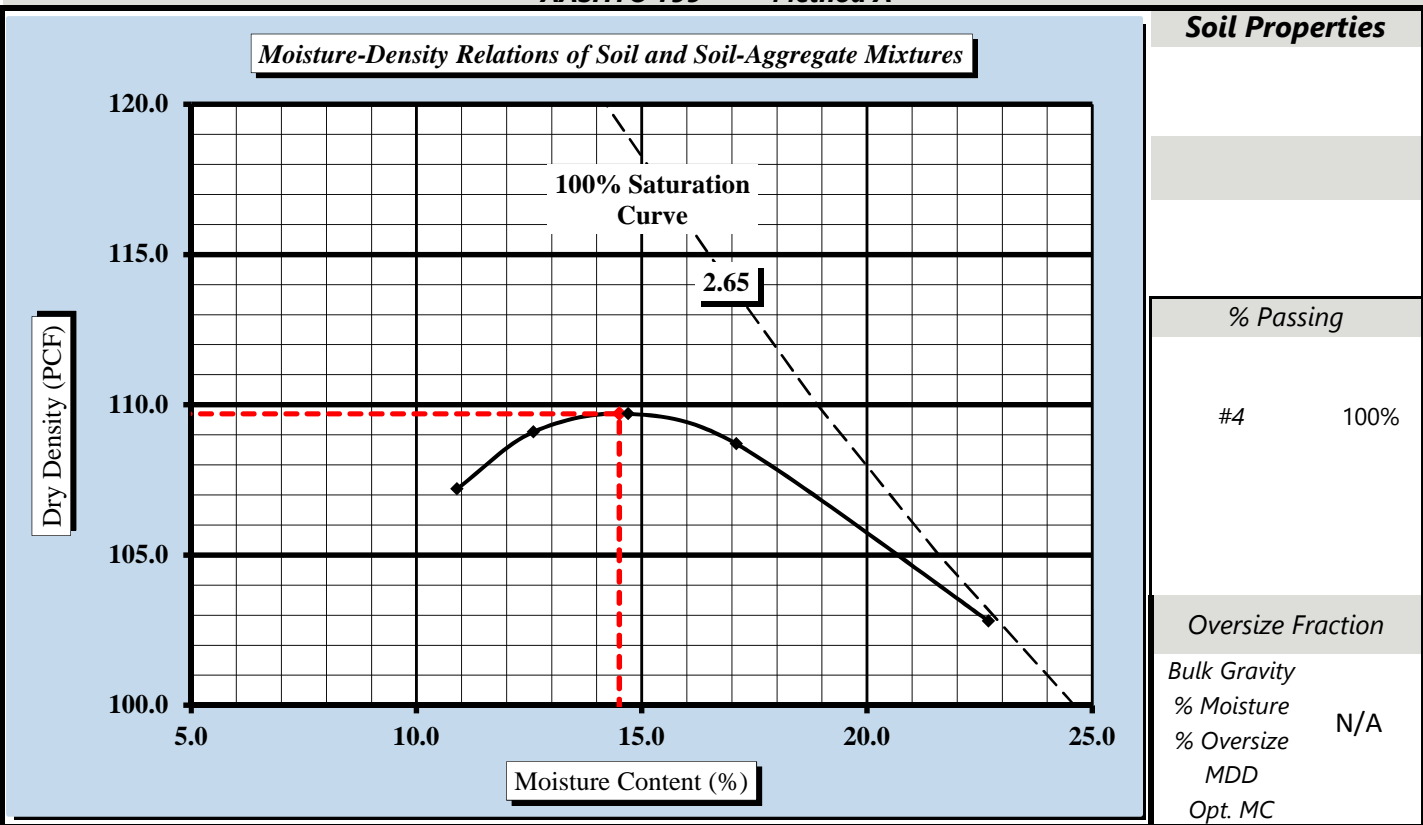


Quality Assurance

| | | | |
|---|--|---------------|-----------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Report Date: | 7/26/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | 7/23/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19SWM-08 | Depth: | 15'-20' |
| Sample Description: | FAT CLAY WITH SAND (CH) | A-7-6 | |

Maximum Dry Density 109.7 PCF. Optimum Moisture Content 14.5%

AASHTO T99 - - Method A



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: **Virginia Test Method - 1**
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Perry Gazaway
 Technical Responsibility

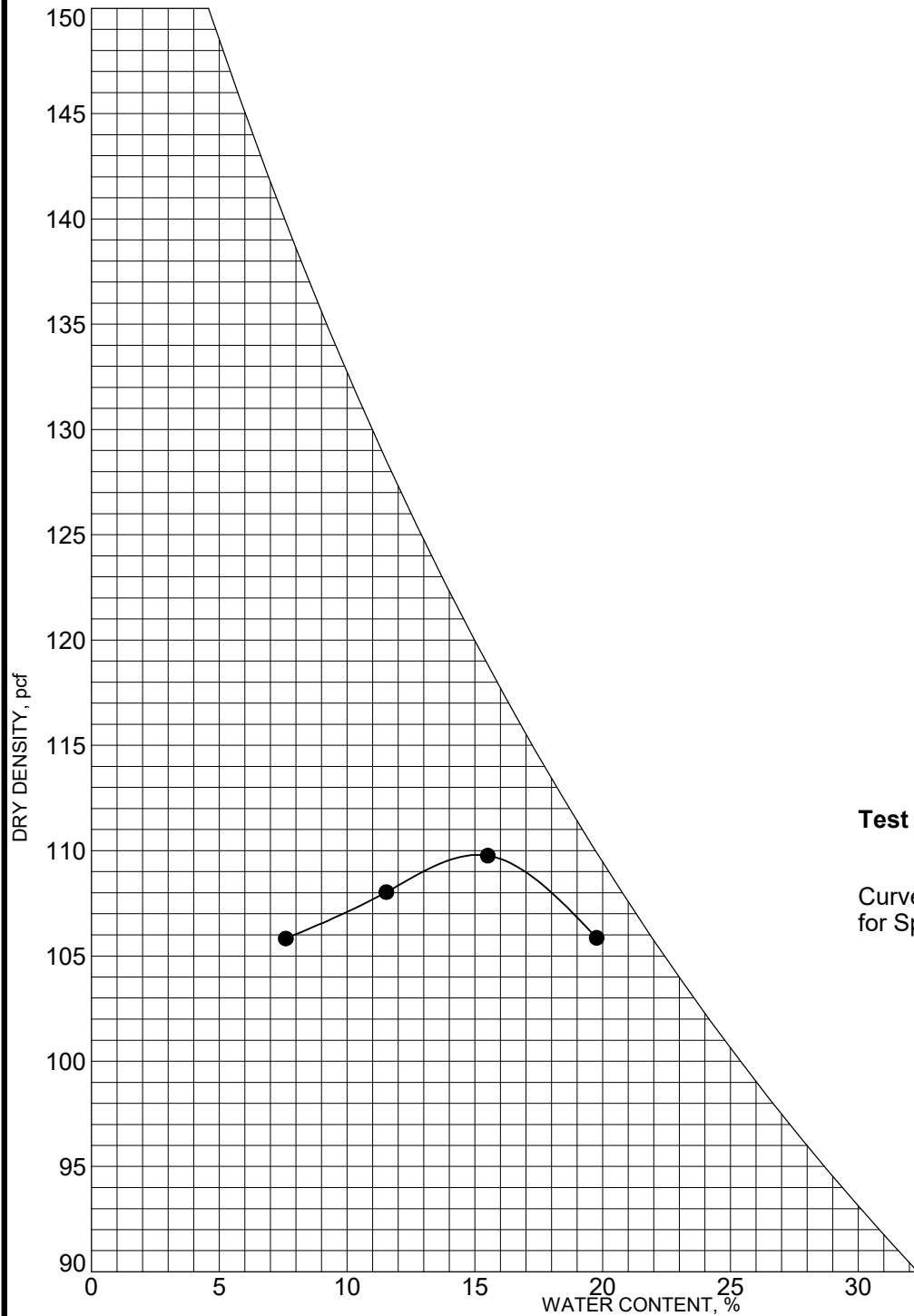
Perry Gazaway
 Signature

Senior Lab Technician
 Position

8/26/2019
 Date

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T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES ASSIGNMENT 4.GPJ SALUT2014.GBT 10/18/19



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|-------------|---------------------|------------------------|-----------|----|----|
| ● 19SWM-09 | Bag | 15.0 - 20.0 | SANDY LEAN CLAY(CL) | 109.8 | 15.0 | 44 | 19 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 9/28/2019

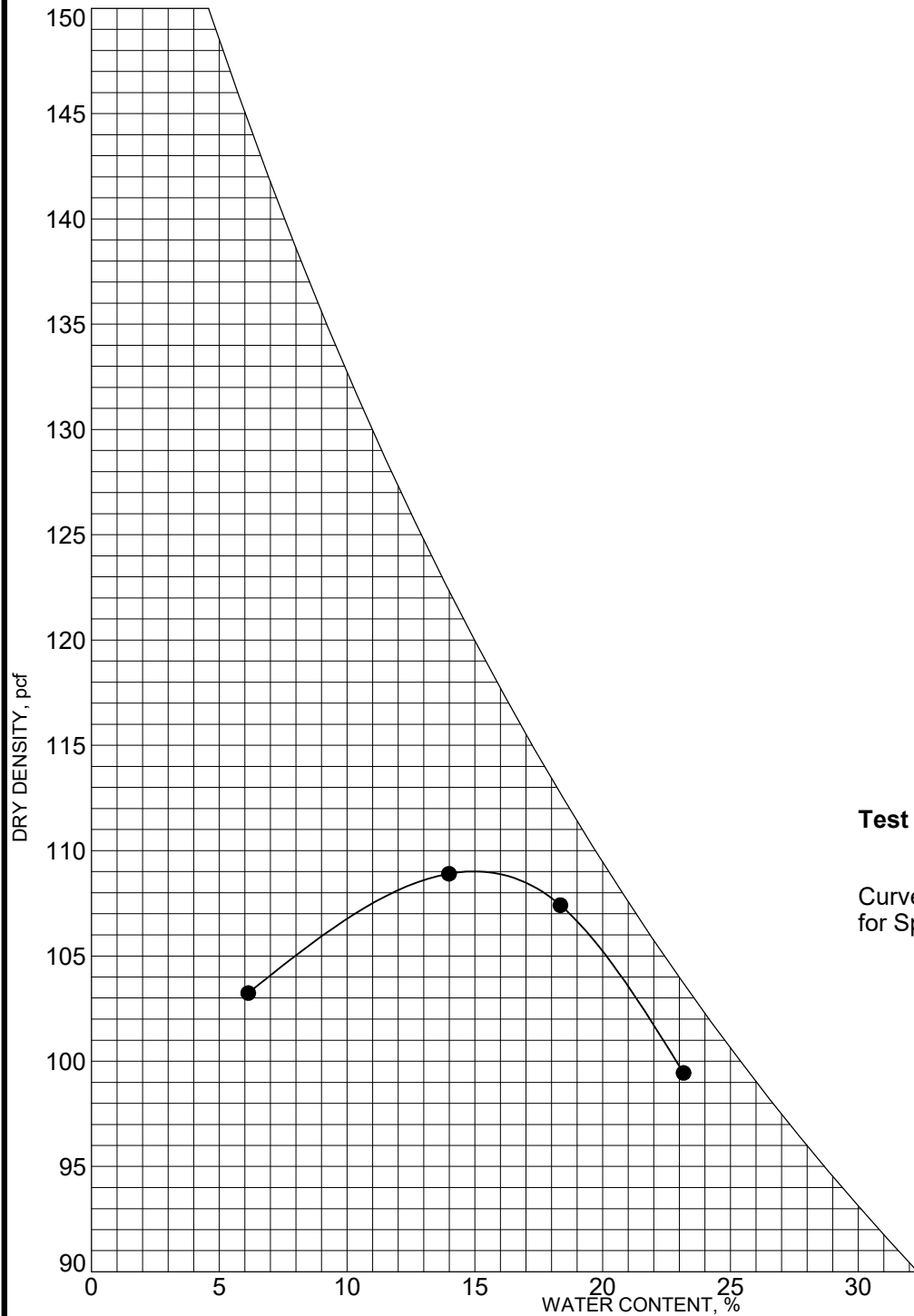


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|-------------|------------------------|------------------------|-----------|----|----|
| ● 19SWM-11 | Bag | 20.0 - 25.0 | SANDY SILT (ML, A-7-6) | 109.0 | 14.9 | 46 | 18 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 8/17/2019



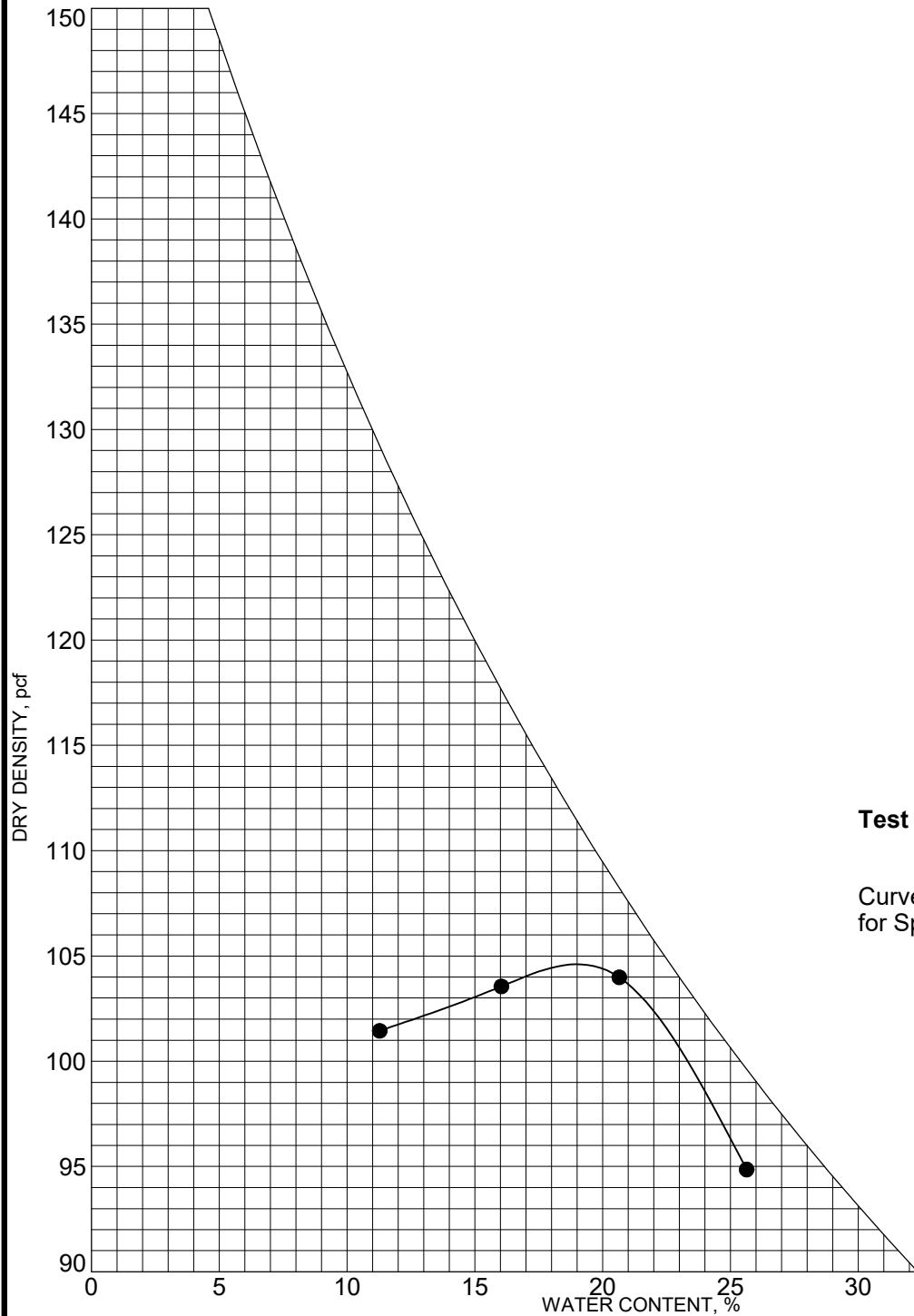
MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SALUTZ/2014.GDT 10/4/19



* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|-----------|--------------------------------|------------------------|-----------|----|----|
| ● 19SWM-12 | Bag | 0.0 - 5.0 | LEAN CLAY with SAND(CL, A-7-6) | 104.7 | 18.9 | 46 | 21 |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 9/5/2019



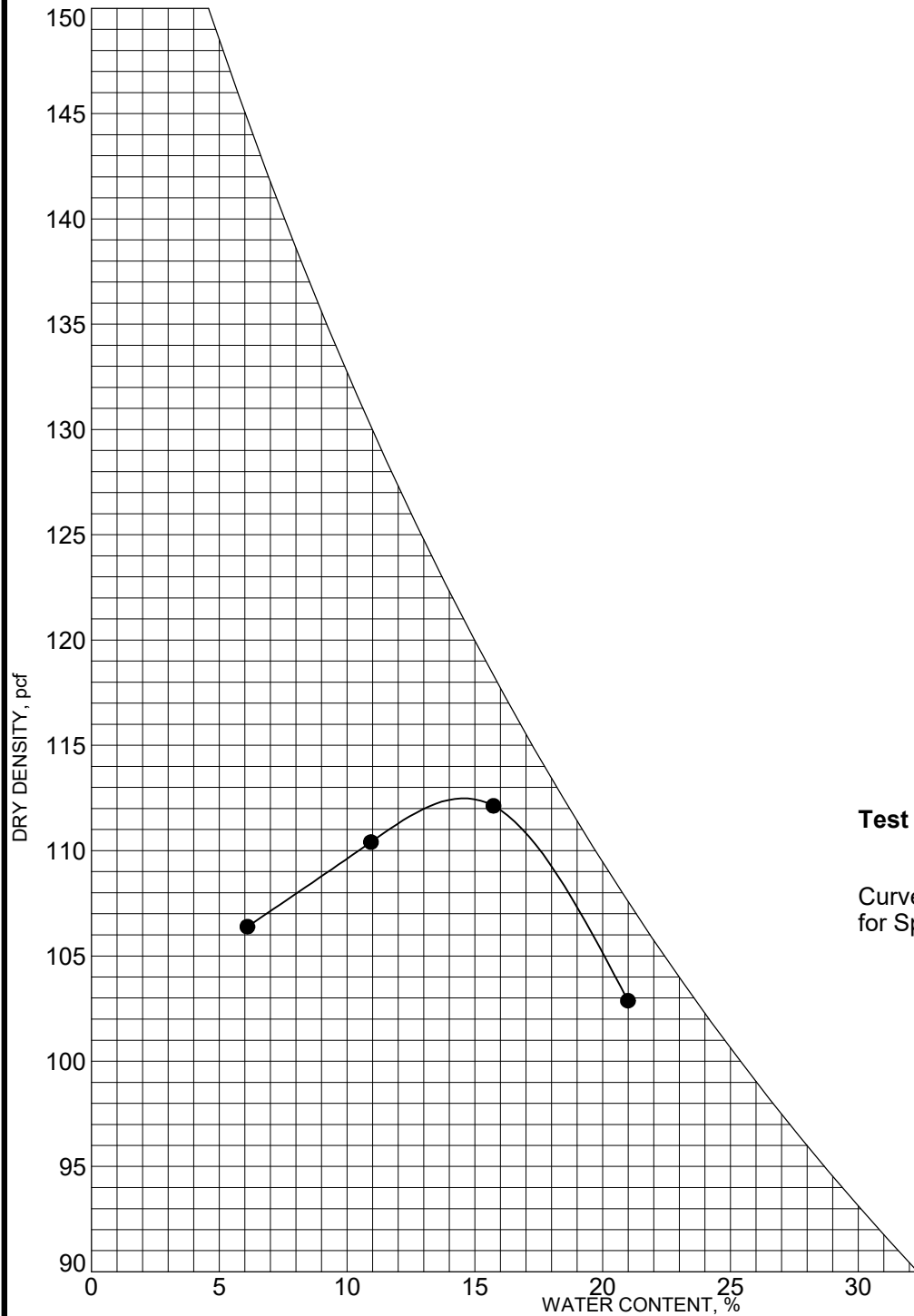
MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES ASSIGNMENT 2.GPJ SALUT2014.GBT 9/17/19



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|-------------|---------------------------|------------------------|-----------|----|----|
| ● 19SWM-13 | Bag | 11.0 - 15.0 | SANDY LEAN CLAY (CL, A-6) | 112.5 | 14.5 | 34 | 12 |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 8/17/2019



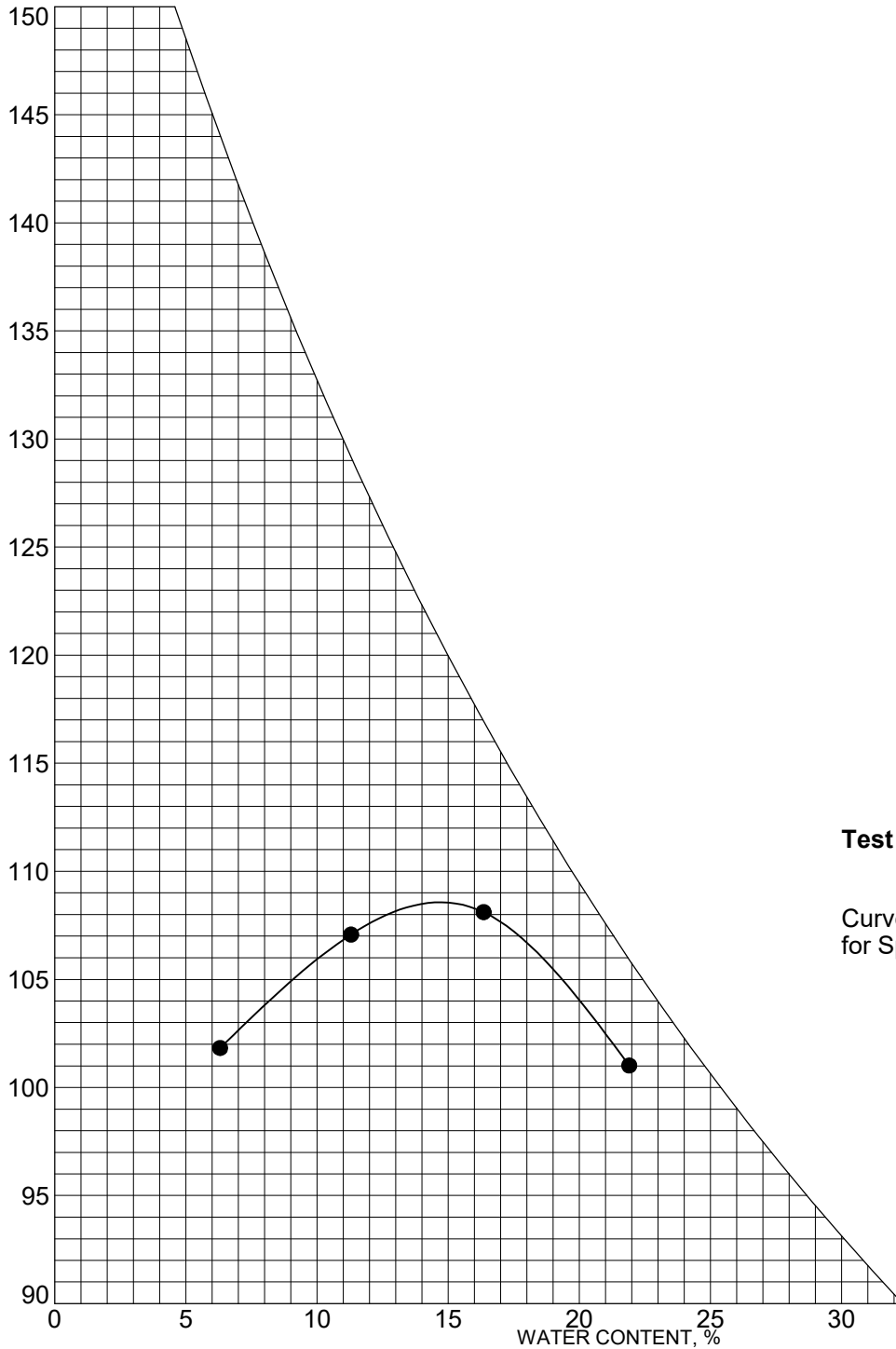
MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

DRY DENSITY, pcf



Test Method: VTM-1

Curve of 100% Saturation for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|------------|------------|------------|-------------------------|------------------------|-----------|----|----|
| ● 19SWM-14 | Bag | 6.0 - 10.0 | SILT with SAND(ML, A-6) | 108.8 | 14.6 | 37 | 11 |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 8/16/2019



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT

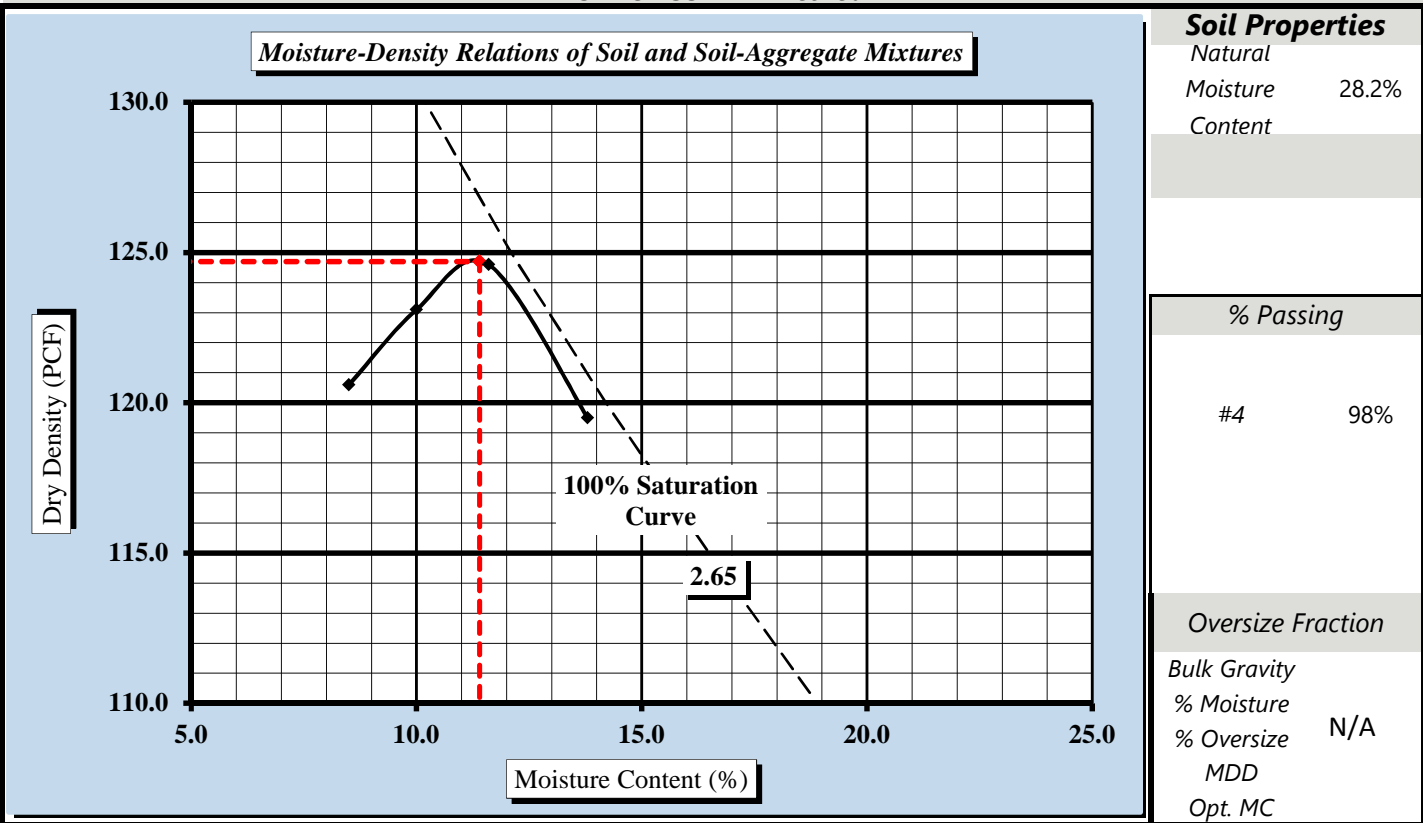


Quality Assurance

| | | | |
|---|--|---------------|----------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Report Date: | 8/28/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s): | 8/27/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19SWM-15 | | |
| | | | Depth: 20'-25' |

Sample Description: SANDY LEAN CLAY (CL) A-4

| | | | | |
|--------------------------------|-------|------|--------------------------|-------|
| Maximum Dry Density | 124.7 | PCF. | Optimum Moisture Content | 11.4% |
| AASHTO T99 - - Method A | | | | |



| Soil Properties | |
|-------------------|-------|
| Natural | |
| Moisture Content | 28.2% |
| | |
| % Passing | |
| #4 | 98% |
| | |
| Oversize Fraction | |
| Bulk Gravity | |
| % Moisture | |
| % Oversize | N/A |
| MDD | |
| Opt. MC | |

Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: **Virginia Test Method - 1**
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

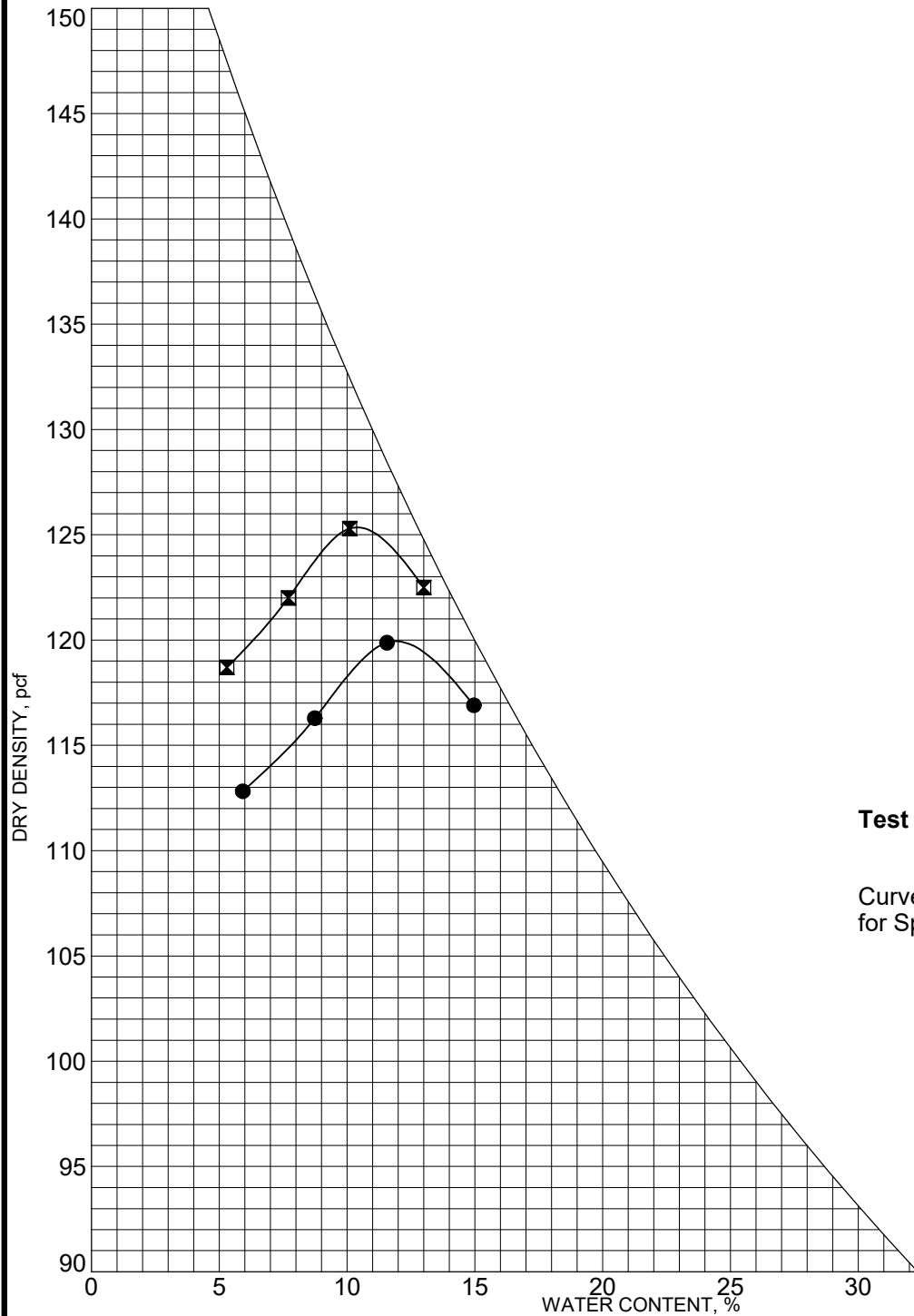
Perry Gazaway
 Technical Responsibility

Perry Gazaway
 Signature

Senior Lab Technician
 Position

8/28/2019
 Date

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Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI | |
|--------|-------------|-----------|----------------|-------------------------|-----------|-------|----|---|
| ● | 19X-NOS-P01 | Bag | 2.3 - 6.3 | SILTY SAND(SM, A-4) | 119.9 | 11.8 | 32 | 6 |
| ⊠ | 19X-NOS-P01 | Bag | 2.3 - 6.3 | Oversize Correction 15% | *125.4 | *10.4 | | |
| | | | | | | | | |

Tested By: SM, SR

Date: 7/8/2019

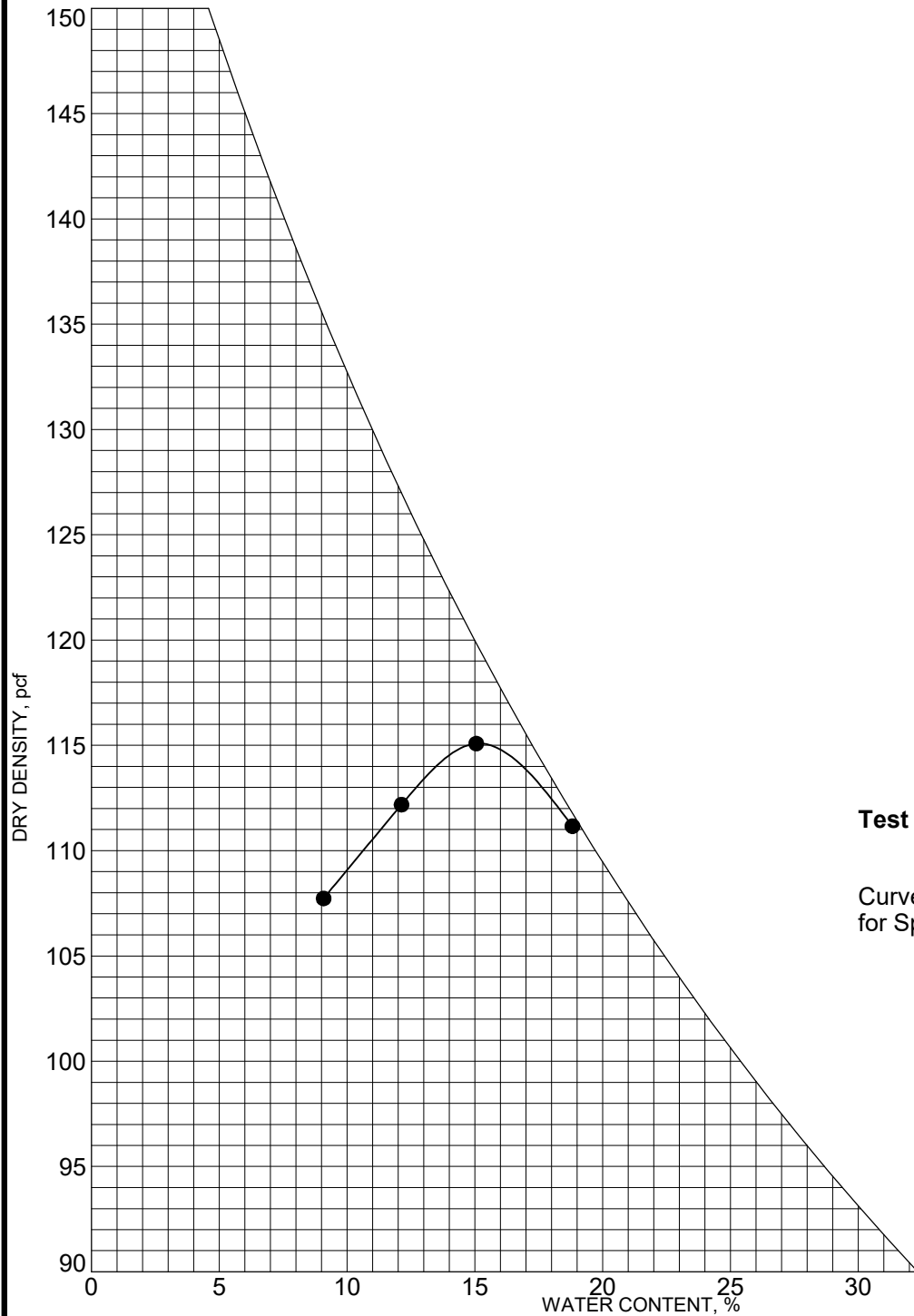


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|--------------------------------|------------------------|-----------|----|----|
| ● 19X-NOS-P08 | Bag | 3.5 - 5.5 | LEAN CLAY with SAND(CL, A-7-6) | 115.1 | 15.0 | 47 | 21 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/9/2019

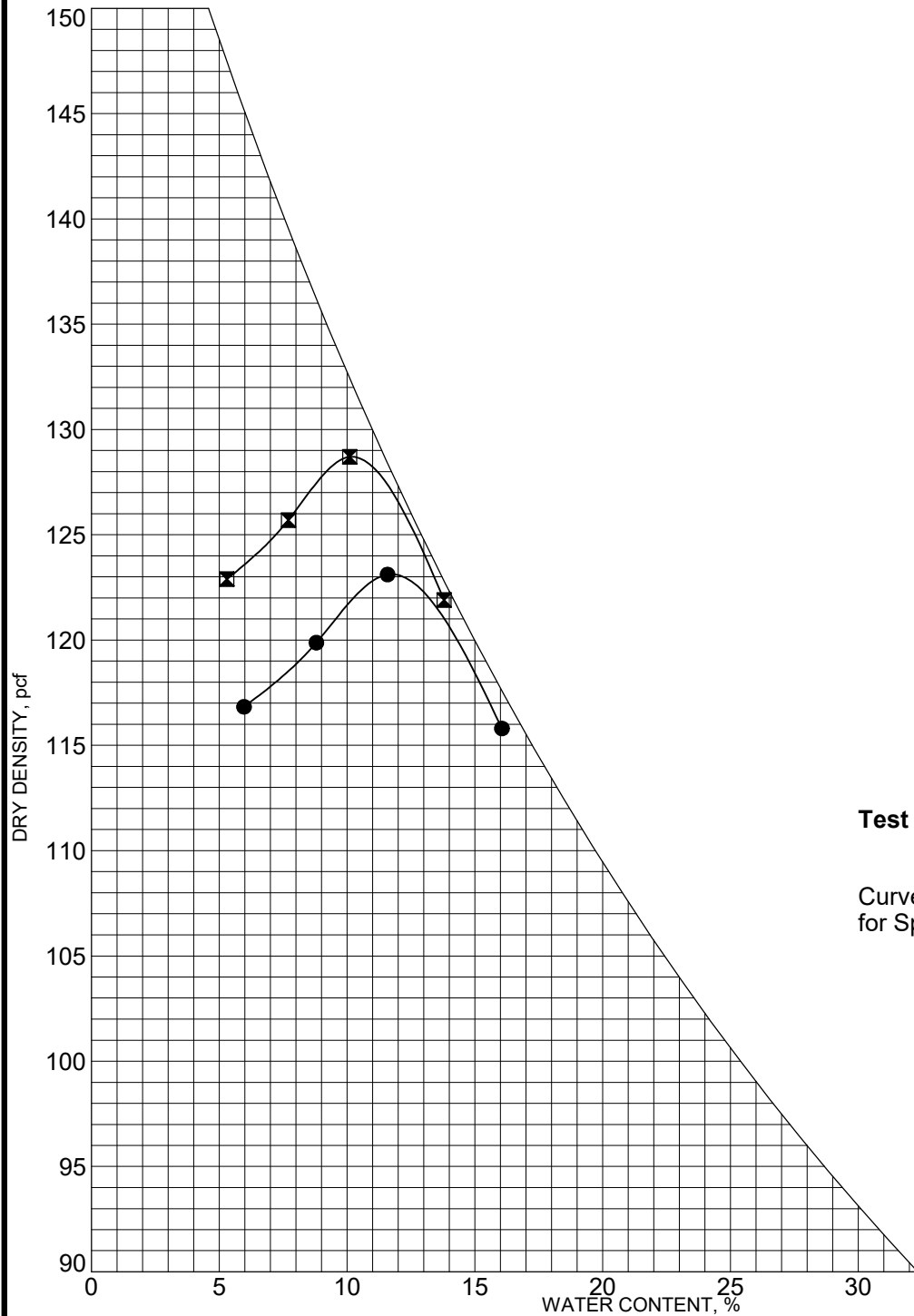


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI | |
|--------|-------------|-----------|----------------|----------------------------------|-----------|-------|----|----|
| ● | 19X-NOS-P10 | Bag | 3.0 - 6.0 | CLAYEY SAND with GRAVEL(SC, A-6) | 123.2 | 11.7 | 34 | 13 |
| ▲ | 19X-NOS-P10 | Bag | 3.0 - 6.0 | Oversize Correction 16% | *128.8 | *10.2 | | |
| | | | | | | | | |

Tested By: SM, SR

Date: 7/9/2019

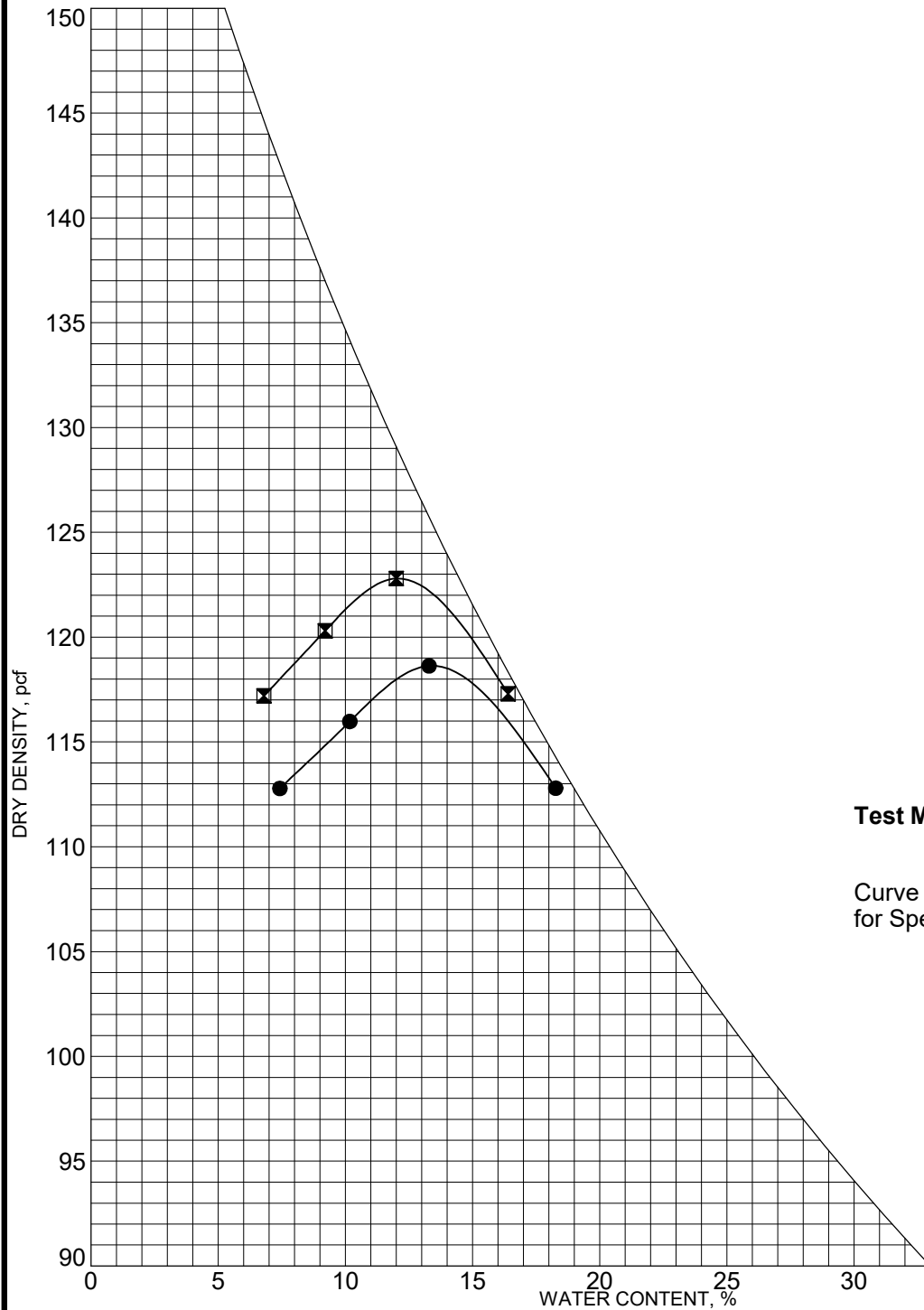


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.75

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI | |
|--------|-------------|-----------|----------------|---------------------------|-----------|-------|----|----|
| ● | 19X-NOS-P16 | Bag | 3.0 - 6.0 | SANDY LEAN CLAY (CL, A-6) | 118.7 | 13.3 | 38 | 16 |
| ⊠ | 19X-NOS-P16 | Bag | 3.0 - 6.0 | OVERSIZE CORRECTION 11.5% | *122.8 | *12.0 | | |
| | | | | | | | | |

Tested By: SM, SR

Date: 7/9/2019

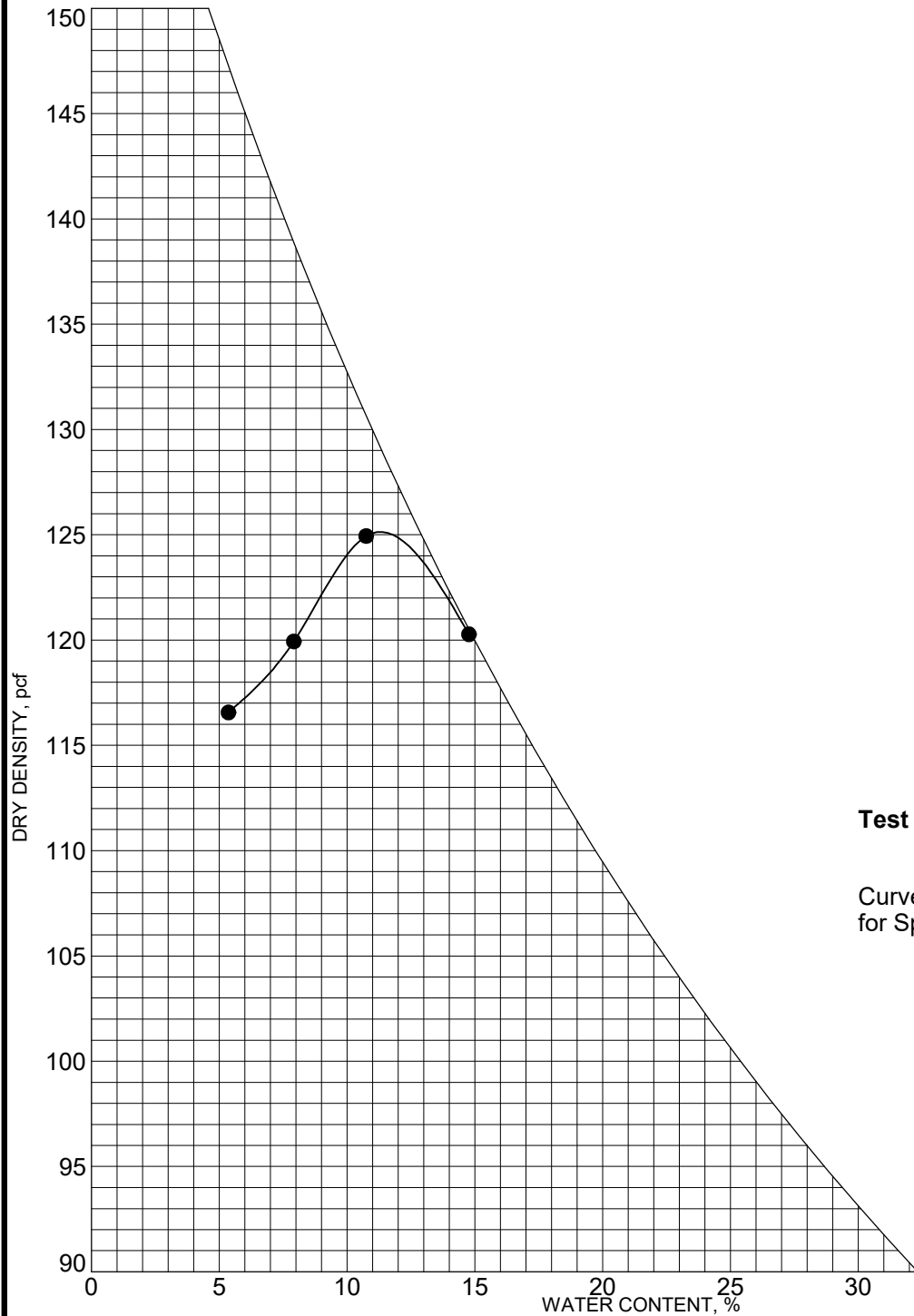


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|---------------------------|------------------------|-----------|----|----|
| ● 19X-NOS-P19 | Bag | 3.0 - 6.0 | SANDY LEAN CLAY (CL, A-6) | 125.2 | 11.4 | 34 | 12 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR

Date: 7/10/2019

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES (P1) SALU72014.GDT 7/24/19

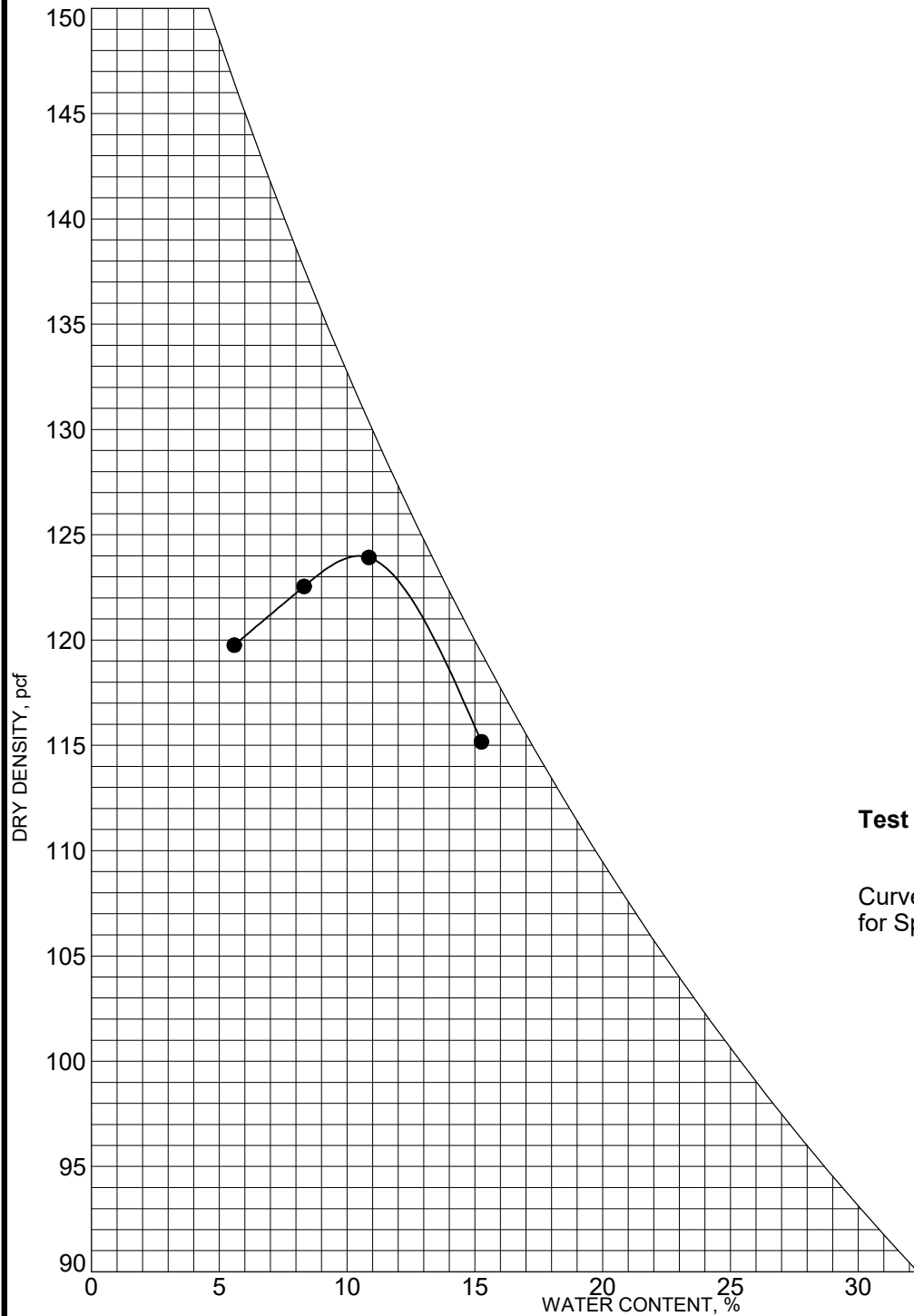


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|---------------------|------------------------|-----------|----|----|
| ● 19X-NOS-P24 | Bag | 3.0 - 6.0 | SILTY SAND(SM, A-4) | 124.0 | 10.5 | 31 | 8 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/10/2019

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES (P1) SALUT2014.GDT 7/24/19

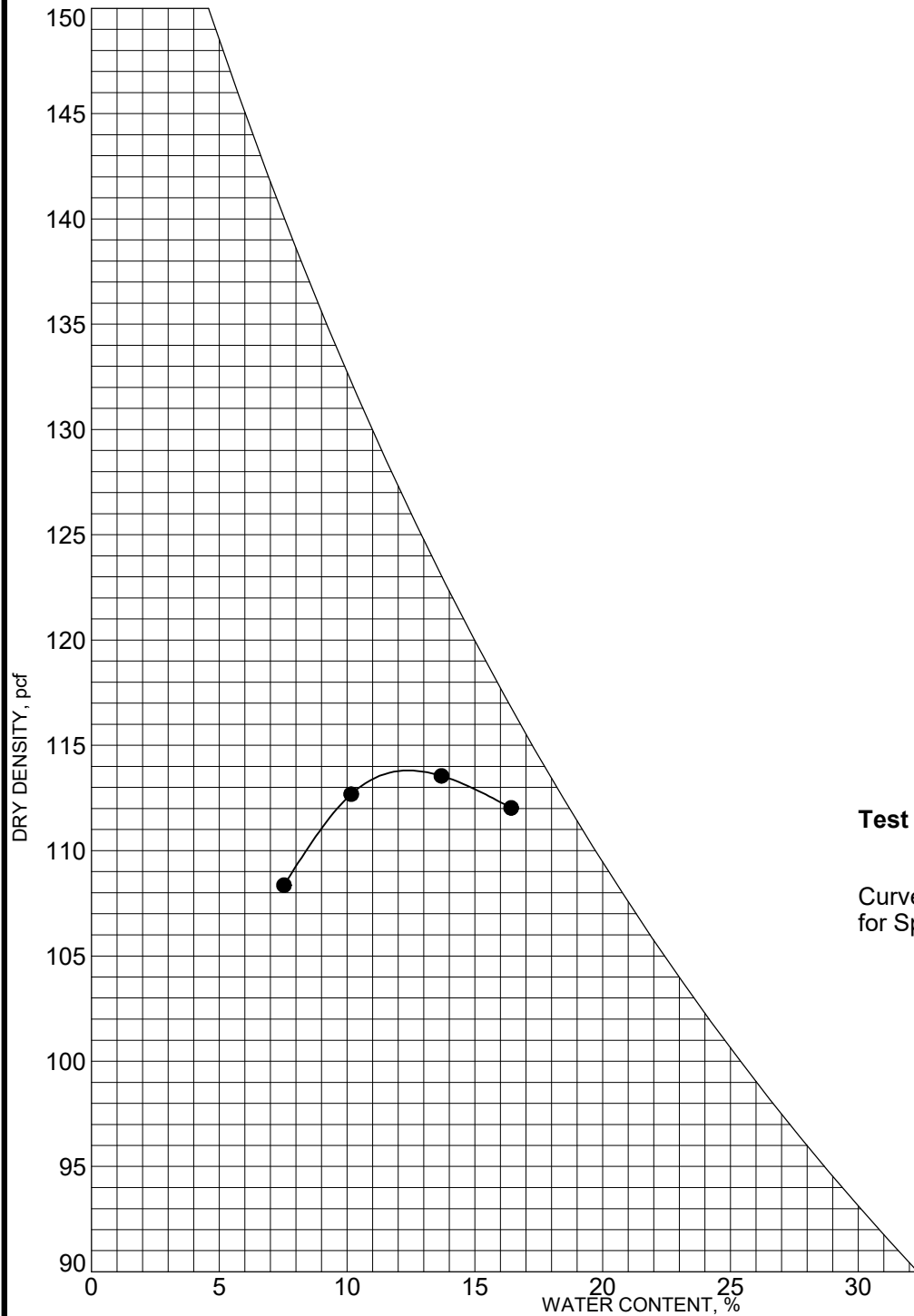


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|--------------|------------|-----------|---------------------------|------------------------|-----------|----|----|
| ● 19X-N-RW14 | Bag | 1.0 - 4.0 | SANDY LEAN CLAY (CL, A-6) | 113.8 | 12.5 | 38 | 15 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/9/2019

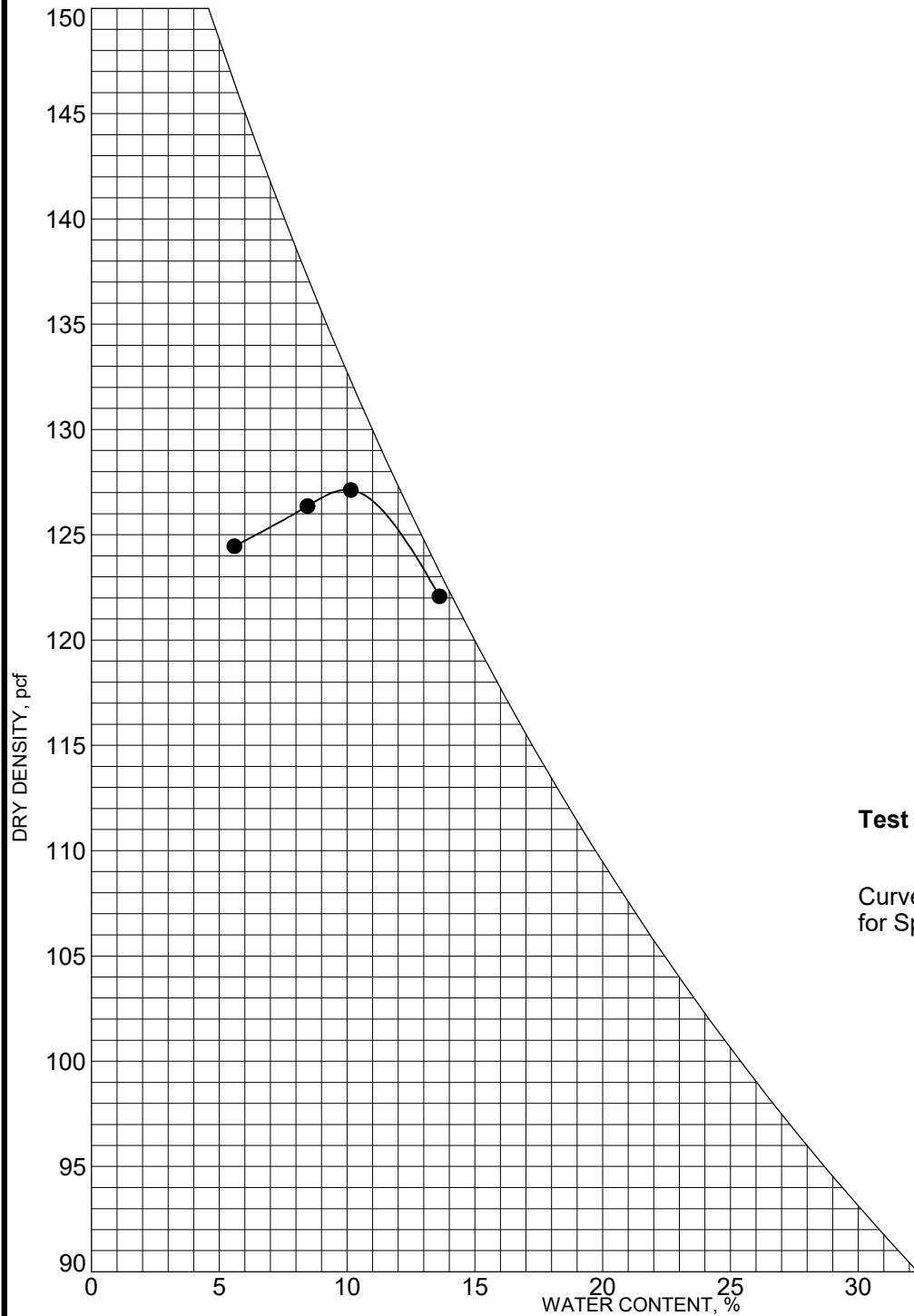


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|--------------------------------|------------------------|-----------|----|----|
| ● 19X-SOS-P24 | Bag | 2.6 - 5.6 | SILTY, CLAYEY SAND(SC-SM, A-4) | 127.2 | 10.2 | 25 | 6 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR

Date: 7/10/2019

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES (P1) SALUT2014.GDT 7/24/19



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT

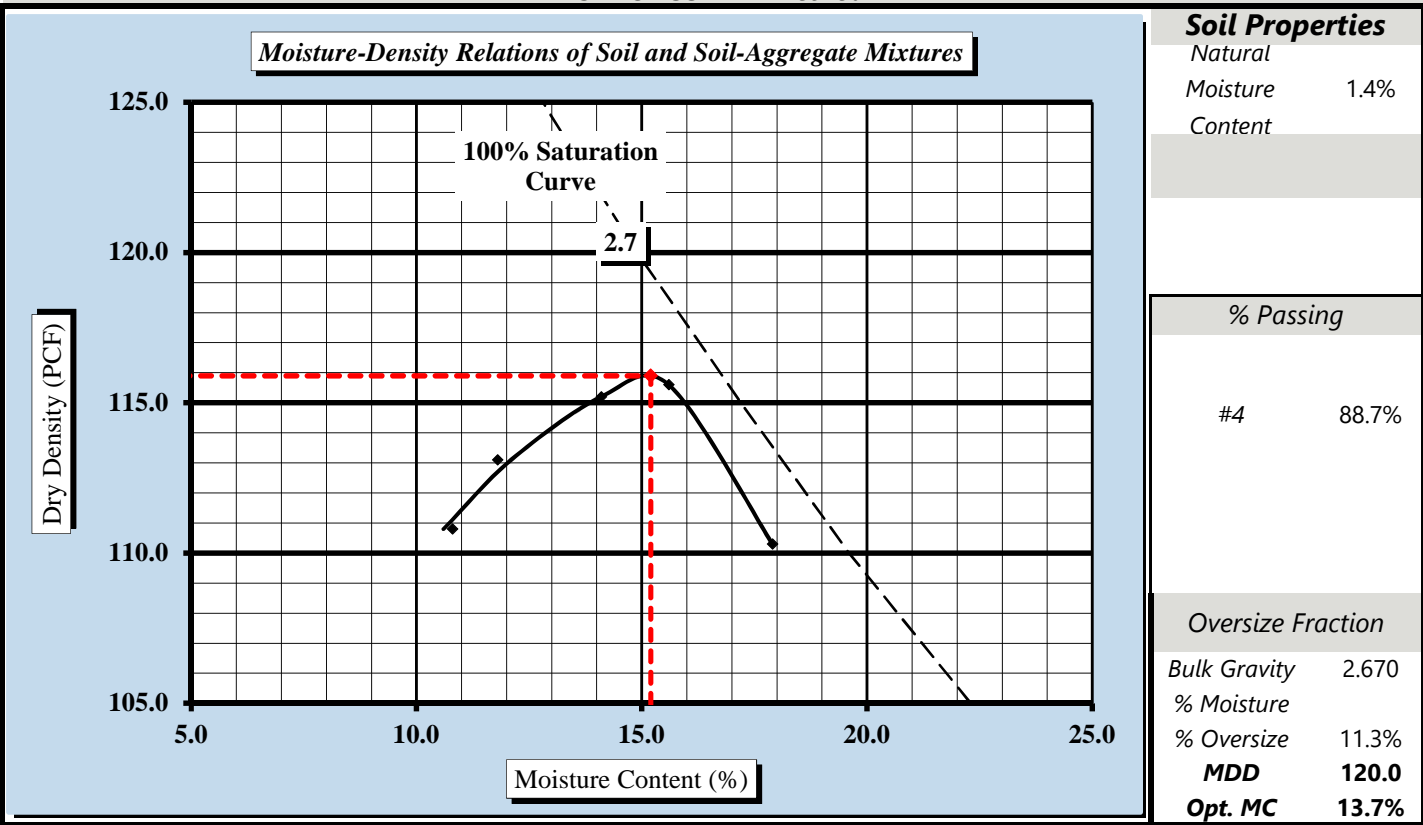


Quality Assurance

| | | | |
|---|--|---------------|---------------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Log No.: | 43-2927 |
| Project Name: | I-495 Between McLean and Dulles | Report Date: | 8/1/2019 |
| Client Name: | HDR Engineering Inc. | Test Date(s): | 7/30/2019 |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19X-SOS-P27 | | |
| | | | Depth: 1.5 - 7.5 ft |

| | | | |
|---------------------|------------------------|------|--------------------------------|
| Sample Description: | CLAYEY SAND (SC) / A-6 | | |
| Maximum Dry Density | 115.9 | PCF. | Optimum Moisture Content 15.2% |

AASHTO T99 - - Method A



| | | |
|--|---|--|
| Moisture-Density Curve Displayed: | Fine Fraction <input checked="" type="checkbox"/> | Corrected for Oversize Fraction (ASTM D 4718) <input type="checkbox"/> |
| Sieve Size used to separate the Oversize Fraction: | #4 Sieve <input checked="" type="checkbox"/> | 3/8 inch Sieve <input type="checkbox"/> 3/4 inch Sieve <input type="checkbox"/> |
| Mechanical Rammer <input type="checkbox"/> | Manual Rammer <input checked="" type="checkbox"/> | Moist Preparation <input type="checkbox"/> Dry Preparation <input checked="" type="checkbox"/> |

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

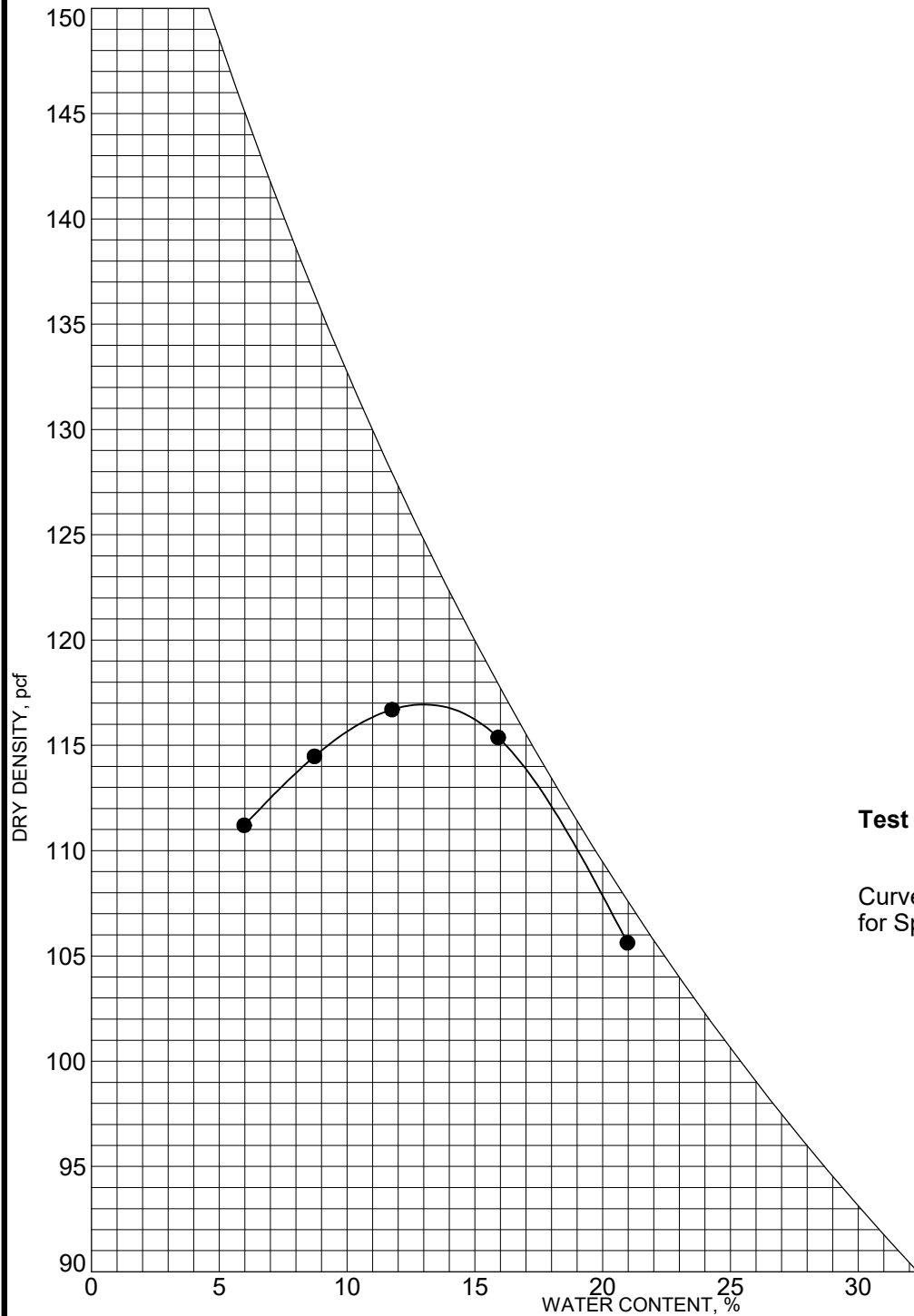
N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

8/1/2019
 Date

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Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|----------------------|------------------------|-----------|----|----|
| ● 19X-SOS-P31 | Bag | 3.5 - 5.5 | CLAYEY SAND(SC, A-6) | 117.0 | 13.0 | 34 | 12 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/11/2019

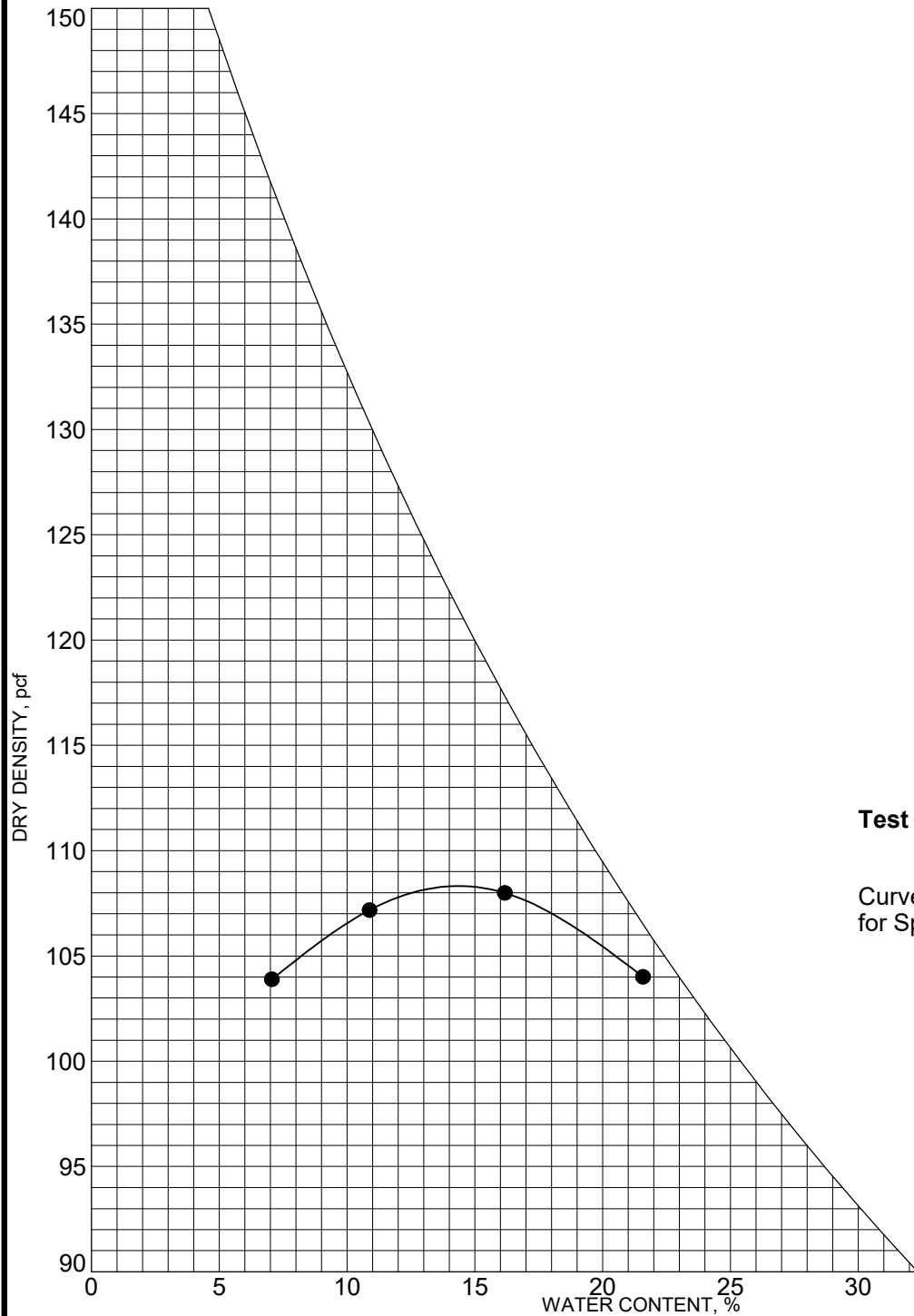


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|------------|-----------------------------|------------------------|-----------|----|----|
| ● 19X-SOS-P33 | Bag | 5.0 - 10.0 | SANDY LEAN CLAY (CL, A-7-6) | 108.3 | 14.2 | 48 | 21 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SR Date: 8/16/2019



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

MOISTURE - DENSITY REPORT

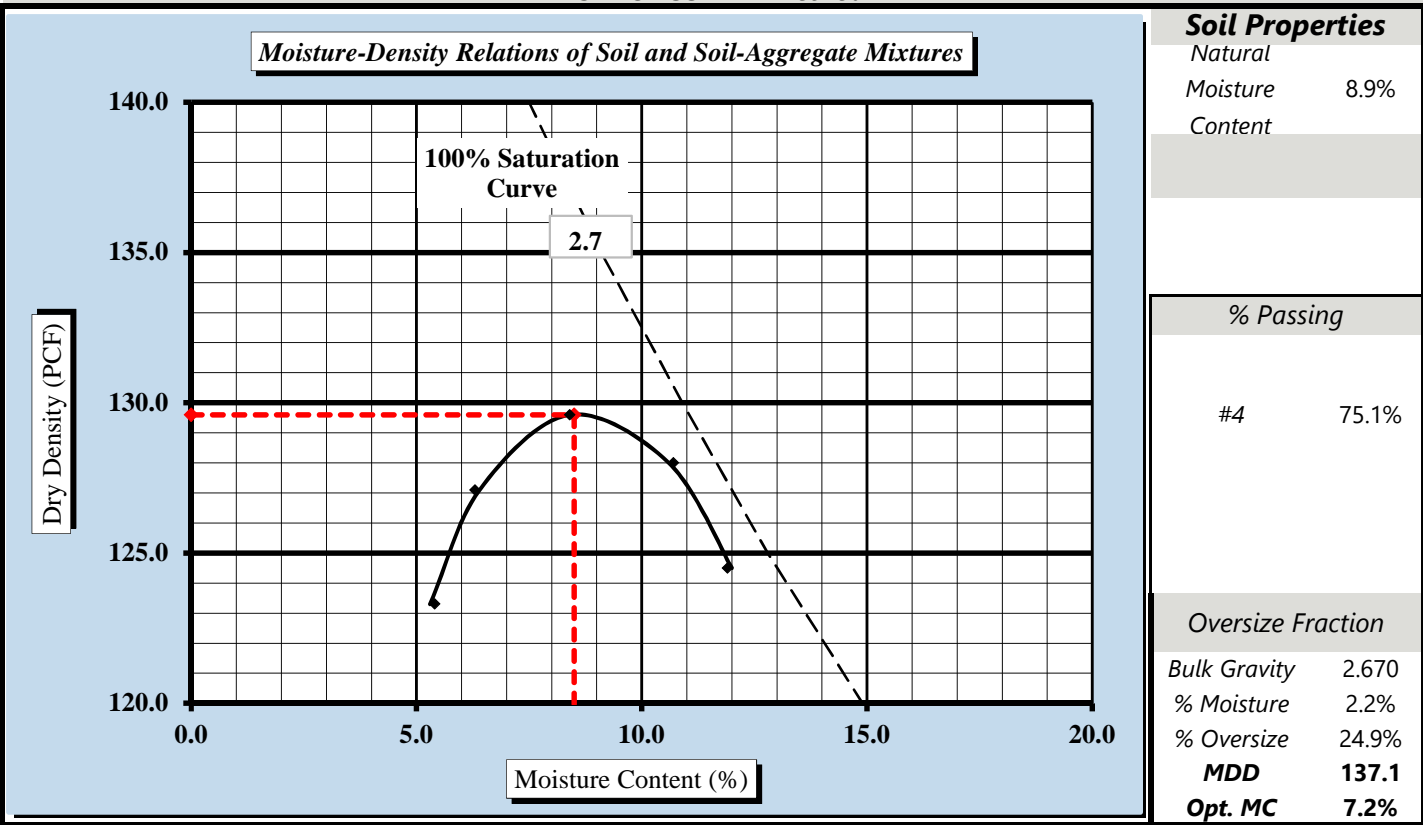


Quality Assurance

| | | | |
|---|--|---------------|---------------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Log No.: | 43-2927 |
| Project Name: | I-495 Between McLean and Dulles | Report Date: | 8/1/2019 |
| Client Name: | HDR Engineering Inc. | Test Date(s): | 7/30/2019 |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Sample ID: | 19X-SOS-P34 | | |
| | | | Depth: 1.5 - 5.5 FT |

Sample Description: CLAYEY SAND WITH GRAVEL (SC) / A-2-6

| | | | | |
|--------------------------------|-------|------|--------------------------|------|
| Maximum Dry Density | 129.6 | PCF. | Optimum Moisture Content | 8.5% |
| AASHTO T99 - - Method A | | | | |



Moisture-Density Curve Displayed: Fine Fraction Corrected for Oversize Fraction (ASTM D 4718)
 Sieve Size used to separate the Oversize Fraction: #4 Sieve 3/8 inch Sieve 3/4 inch Sieve
 Mechanical Rammer Manual Rammer Moist Preparation Dry Preparation

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

N. Randy Rainwater *N. Randy Rainwater* Senior Engineer 8/1/2019
 Technical Responsibility Signature Position Date

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MOISTURE - DENSITY REPORT

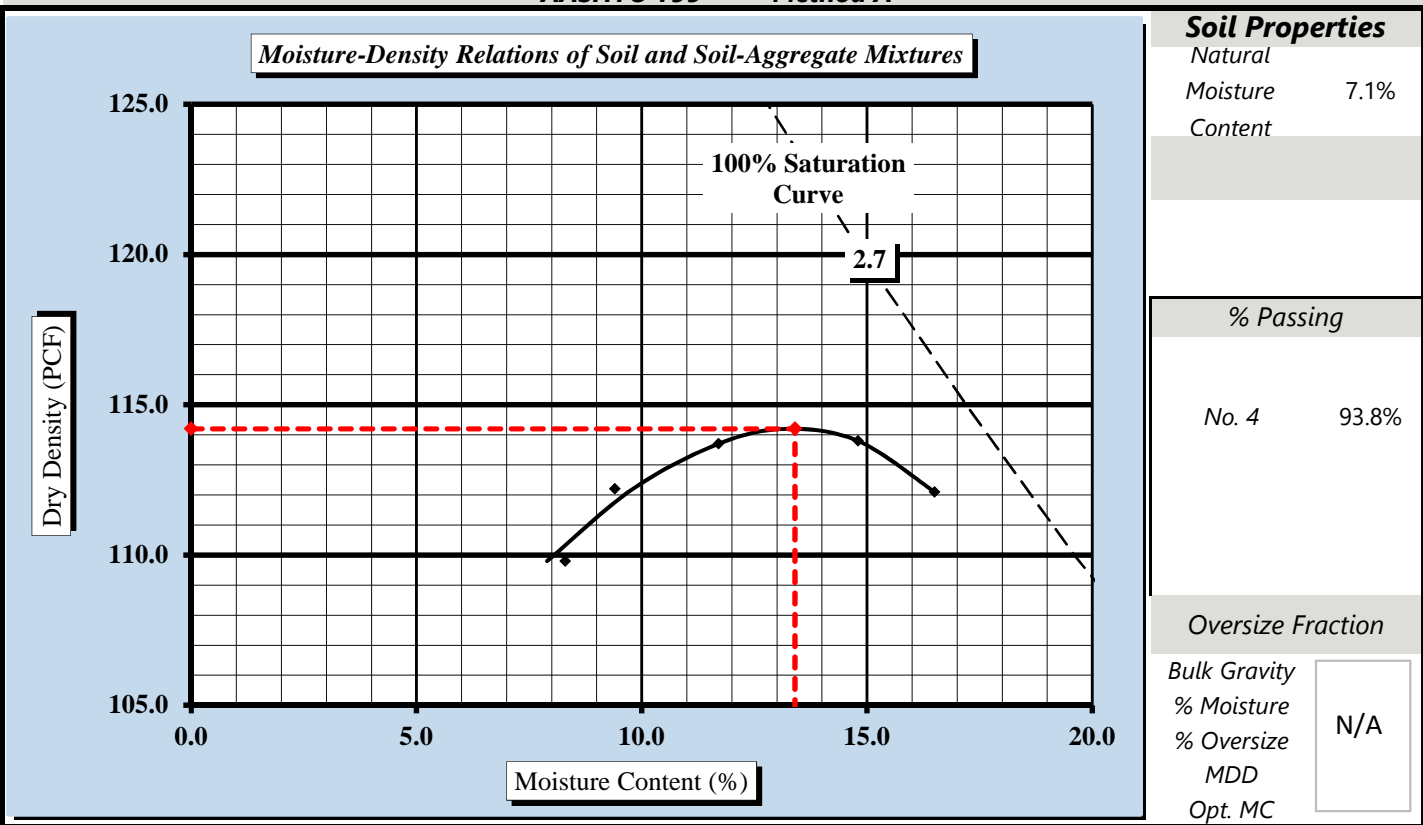


Quality Assurance

| | | | |
|---|--|---------------|-----------------|
| S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096 | | | |
| S&ME Project #: | 1243-19-025 | Log No.: | 43-2927 |
| Project Name: | I-495 Between McLean and Dulles | Report Date: | 7/29/19 |
| Client Name: | HDR Engineering Inc. | Test Date(s): | 7/10/2019 |
| Client Address: | 4880 Sadler Road, Suite 100, Glen Allen VA., 23060 | | |
| Boring #: | 19X-SOS-P36 | | |
| | | | Depth: 0 - 3 ft |

| | | | |
|---------------------|-----------------------|------|--------------------------------|
| Sample Description: | SANDY SILT (ML) / A-4 | | |
| Maximum Dry Density | 114.2 | PCF. | Optimum Moisture Content 13.4% |

AASHTO T99 - - Method A



| | | |
|--|---|--|
| Moisture-Density Curve Displayed: | Fine Fraction <input checked="" type="checkbox"/> | Corrected for Oversize Fraction (ASTM D 4718) <input type="checkbox"/> |
| Sieve Size used to separate the Oversize Fraction: | #4 Sieve <input checked="" type="checkbox"/> | 3/8 inch Sieve <input type="checkbox"/> 3/4 inch Sieve <input type="checkbox"/> |
| Mechanical Rammer <input type="checkbox"/> | Manual Rammer <input checked="" type="checkbox"/> | Moist Preparation <input type="checkbox"/> Dry Preparation <input checked="" type="checkbox"/> |

References / Comments / Deviations: Virginia Test Method - 1
 AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

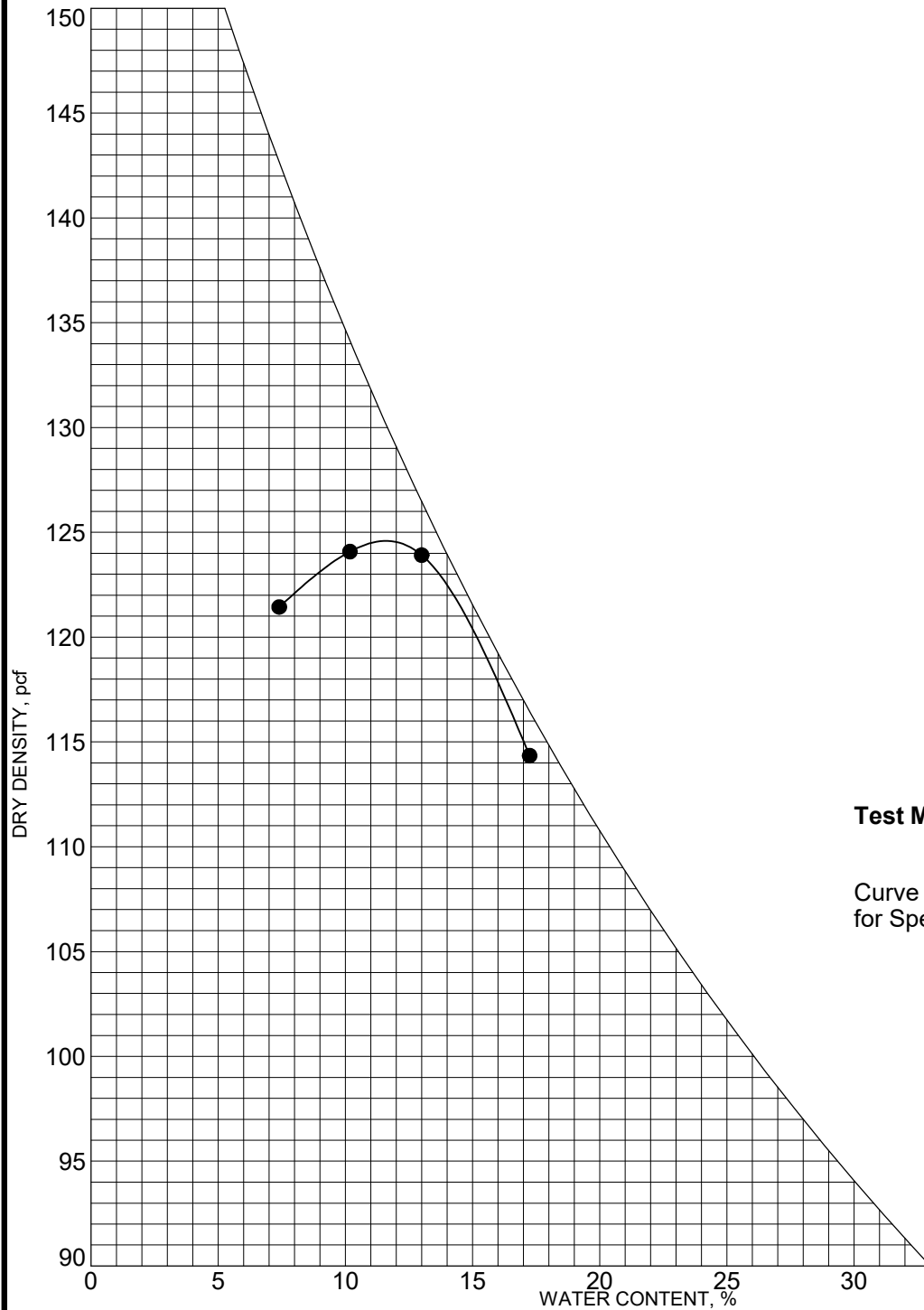
N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

7/25/2019
 Date

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Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.75

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|---------------|------------|-----------|---------------------------------|------------------------|-----------|----|----|
| ● 19X-SOS-P40 | Bag | 2.0 - 5.5 | LEAN CLAY with SAND (CL, A-7-6) | 124.6 | 11.6 | 42 | 22 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR

Date: 7/15/2019

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES (P1) SALUT2014.GDT 7/24/19

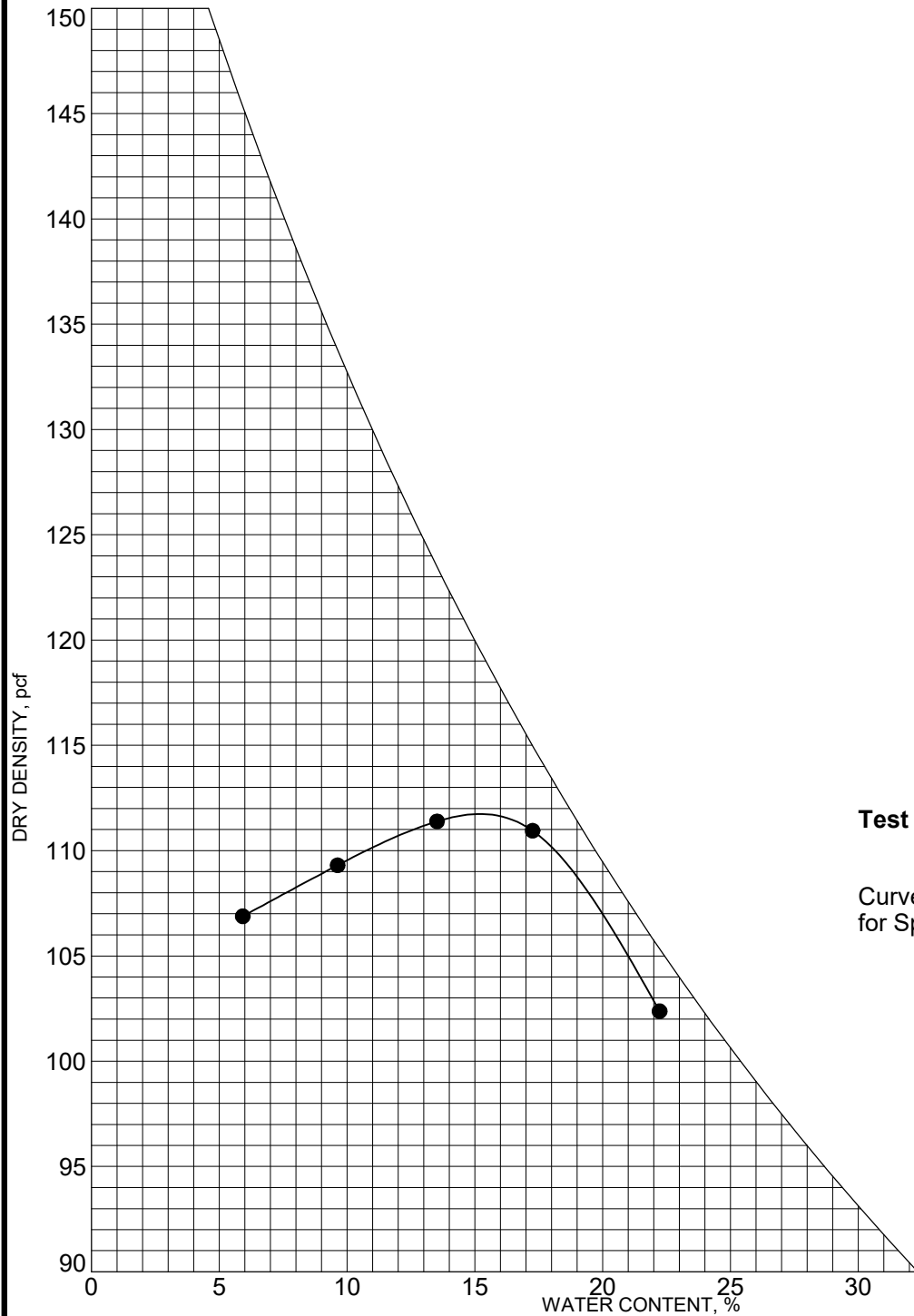


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|--------------|------------|-----------|---------------------------|------------------------|-----------|----|----|
| ● 19X-S-RW28 | Bag | 3.0 - 6.0 | SANDY LEAN CLAY (CL, A-6) | 111.8 | 15.3 | 39 | 15 |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR Date: 7/24/2019

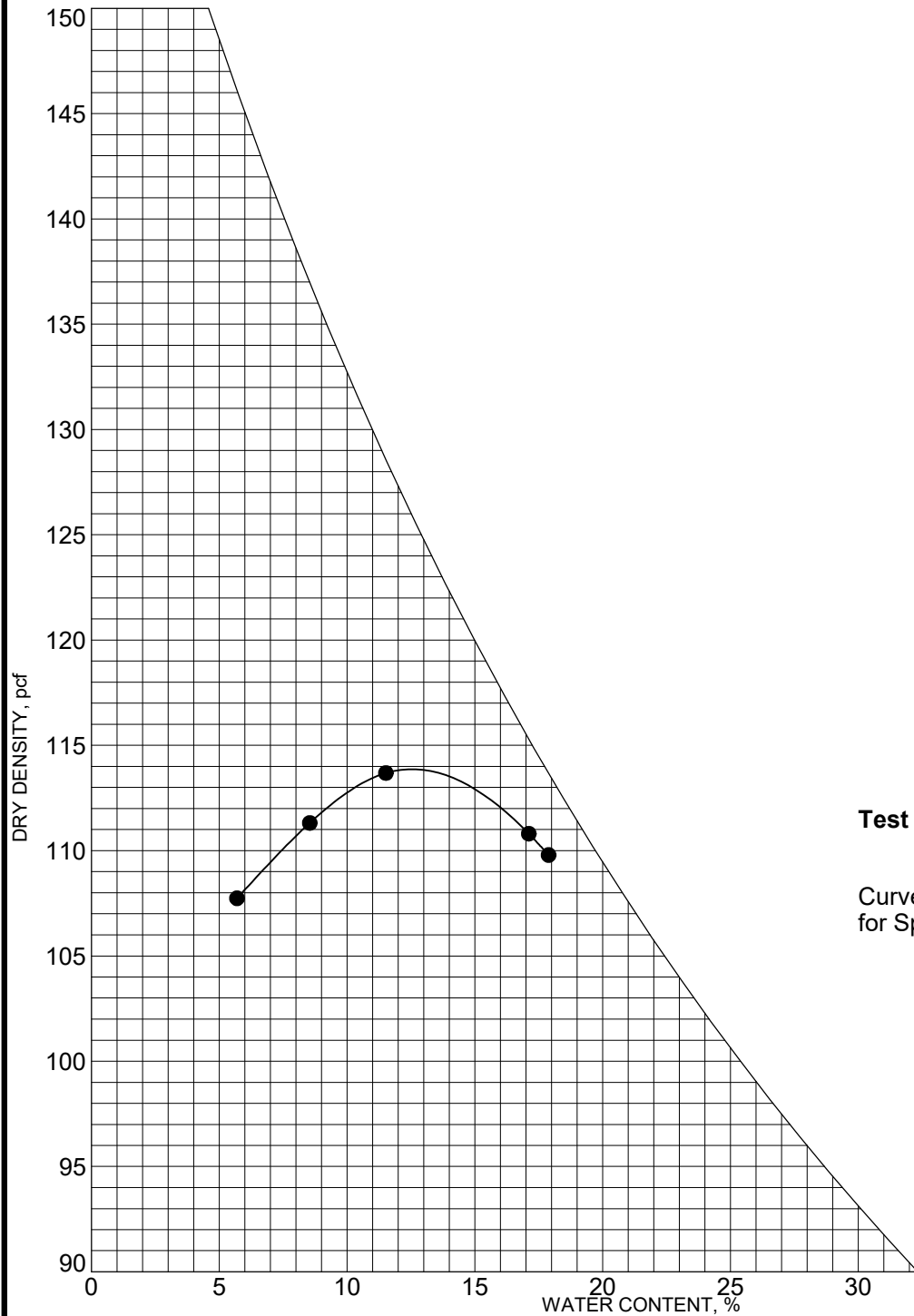


MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Test Method: VTM-1

Curve of 100% Saturation
for Specific Gravity Equal to: 2.7

* Oversize Correction

| Boring | Sample No. | Depth, Ft | Classification | Max. Dry Density (pcf) | Opt. MC % | LL | PI |
|--------------|------------|-----------|----------------------|------------------------|-----------|----|----|
| ● 19X-S-RW37 | Bag | 3.0 - 7.0 | SANDY SILT (ML, A-4) | 113.9 | 12.5 | 33 | 8 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Tested By: SM, SR

Date: 7/15/2019

T.B. COMPACTION MULTIPLE NEXT 495 EXPRESS LANES (P.L.) SALUT2014.GDT 7/24/19



MOISTURE-DENSITY RELATIONSHIP

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

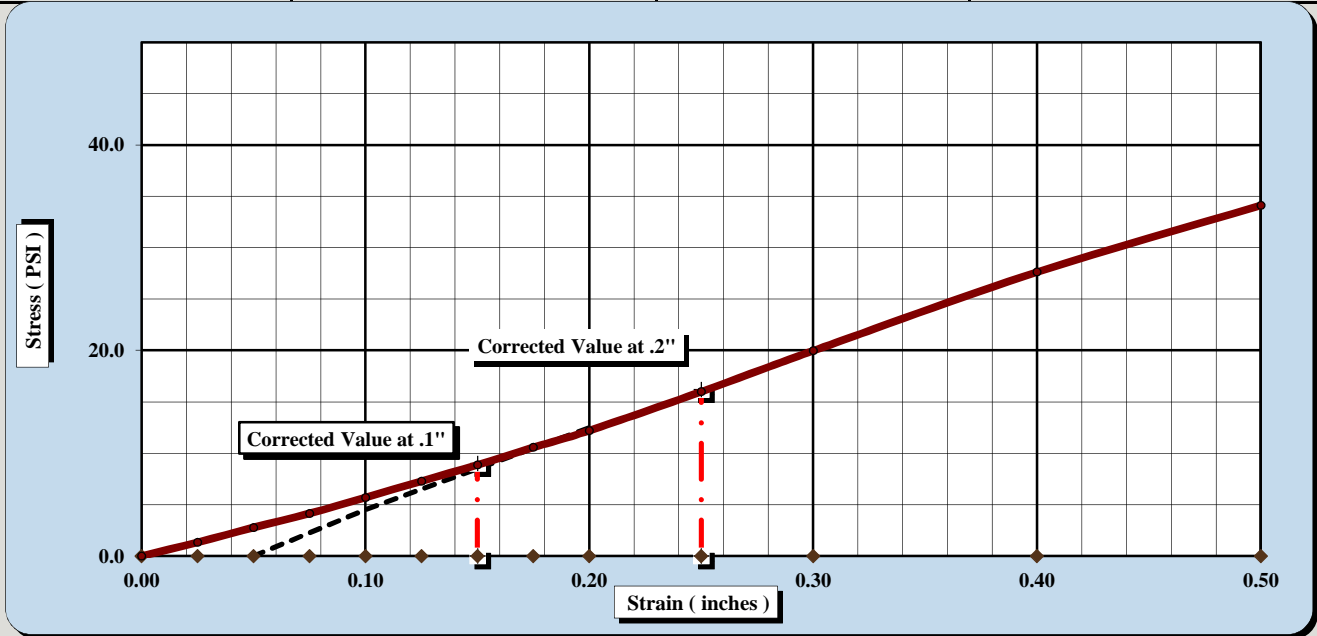
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|-----------------|---------------------------------|--------------|------------------|
| Project #: | 1243-19-025 | Report Date: | 8/1/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 15-19, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Boring #: | 19DTR-P07 | | |

Depth: 1 - 3 ft

Sample Description: SILTY SAND WITH GRAVEL (SM) / A-2-4

AASHTO T99 Method A Maximum Dry Density: 126.8 PCF Optimum Moisture Content: 10.4%

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|-----|
| CBR at 0.1 in. | 0.6 | CBR at 0.2 in. | 0.8 |
| | | CBR at 0.1 in. | 0.9 |
| | | CBR at 0.2 in. | 1.1 |



CBR Sample Preparation:

Grading was in accordance with the above method and compacted using the 6" diameter CBR mold. AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 56 | Final Dry Density (PCF) | 115.9 |
| Initial Dry Density (PCF) | 123.7 | Moisture Content (top 1" after soaking) | 21.4% |
| Moisture Content of the Compacted Specimen | 10.7% | Percent Swell | 6.8% |
| Percent Compaction | 97.6% | | |

Soak Time: 96 hr. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9

Notes/Deviations/References: Virginia Test Method - 8

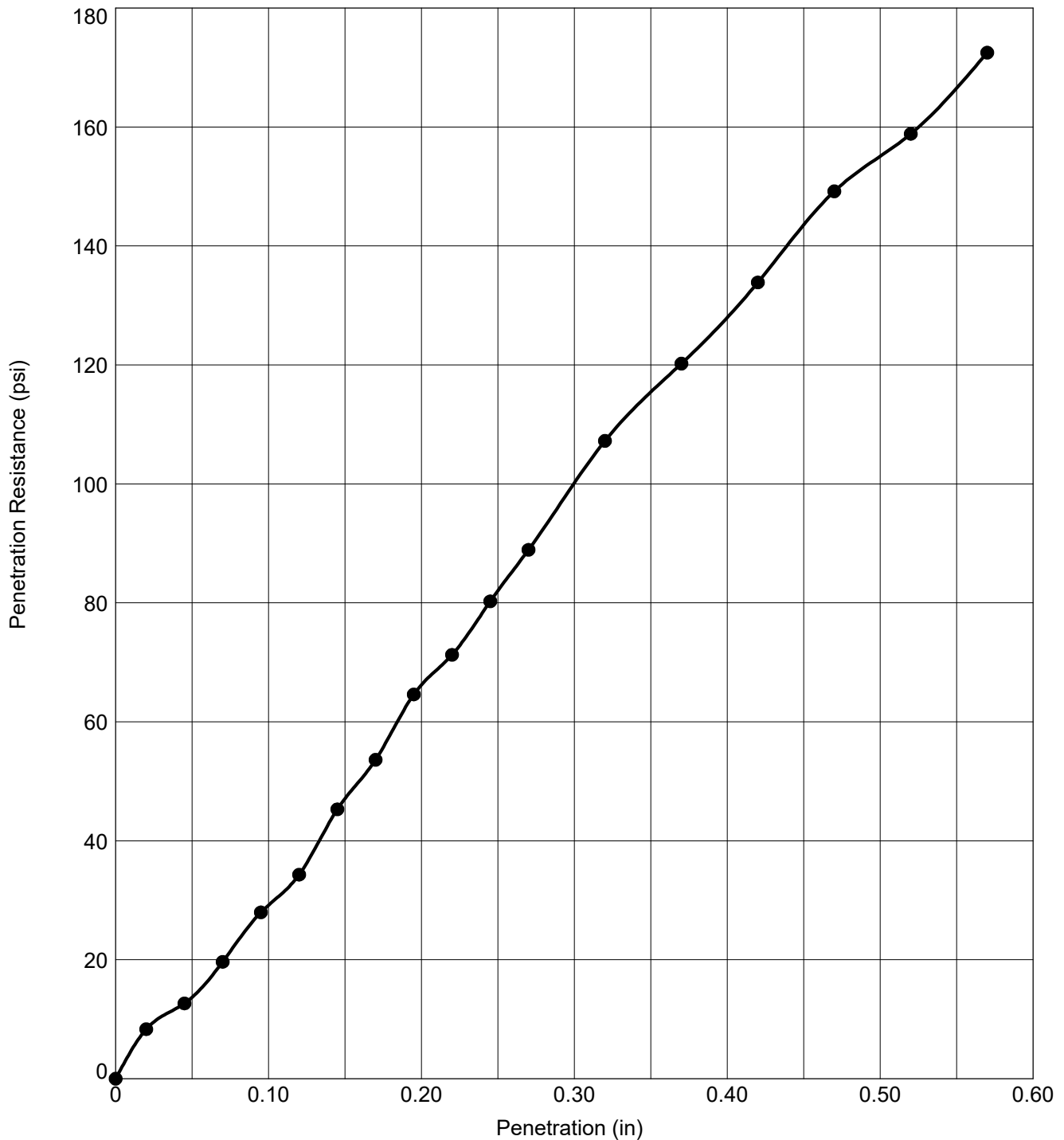
N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/1/2019
Date

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Sample Ident: 19DTR-P08 (Bag) Tested By: SM Date: 8/30/2019

Material Description: SILTY SAND (SM, A-2-4) (14% OVERSIZE CORRECTION)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 126.8 | 98.4 | 9.8 | 126.5 | 98.2 | 13.9 | 2.9 | 4.4 | 10.0 | 2.9 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8



PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

**CBR (CALIFORNIA BEARING RATIO)
OF LABORATORY COMPACTED SOIL**



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

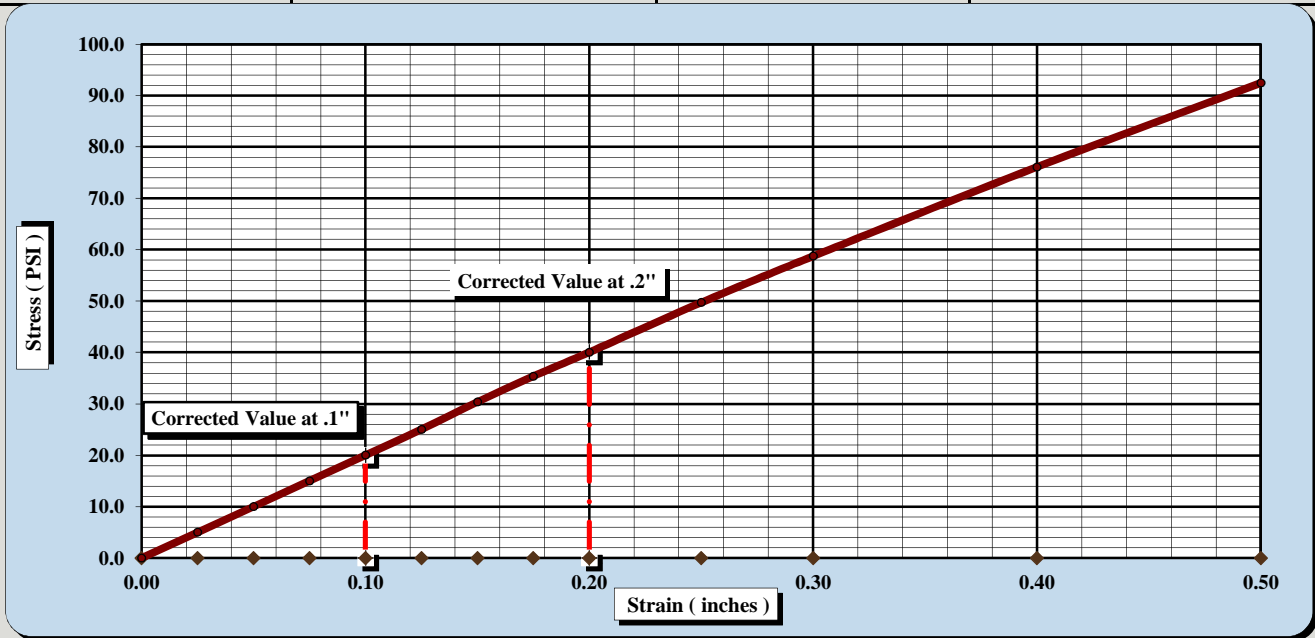
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|-----------------|---------------------------------|--------------|------------------|
| Project #: | 1243-19-025 | Report Date: | 8/2/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 19-23, 2019 |
| Client Name: | HDR Engineering, Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample ID: | 19GTP-E-12 | | |

Depth: 2 - 8 ft

Sample Description: SANDY FAT CLAY (CL) / A-7-6

AASHTO T99 Method A Maximum Dry Density: 111.8 PCF Optimum Moisture Content: 17.4%

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|-----|
| CBR at 0.1 in. | 2.0 | CBR at 0.1 in. | 2.0 |
| CBR at 0.2 in. | 2.7 | CBR at 0.2 in. | 2.7 |



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 65 | Final Dry Density (PCF) | 107.0 |
| Initial Dry Density (PCF) | 110.4 | Moisture Content (top 1" after soaking) | 27.7% |
| Moisture Content of the Compacted Specimen | 17.7% | Percent Swell | 3.2% |
| Percent Compaction | 98.8% | | |

Soak Time: 96 Hours Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9

Notes/Deviations/References: Virginia Test Method - 8

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/2/2019
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

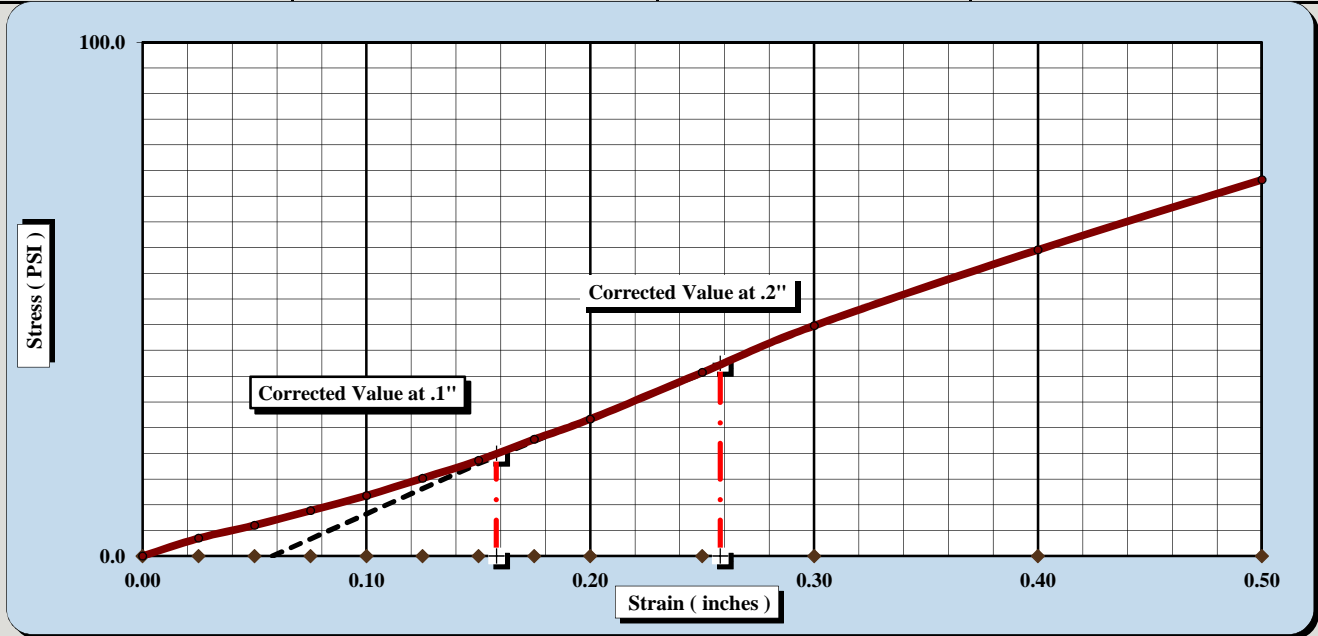
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|-----------------|---------------------------------|--------------|------------------|
| Project #: | 1243-19-025 | Report Date: | 8/1/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 15-19, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Boring #: | 19GWP-P3 | | |

Depth: 1 - 7 FT

Sample Description: CLAYEY SAND WITH GRAVEL (SC) / A-6

| | | | | | |
|------------|----------|----------------------|-----------|---------------------------|------|
| AASHTO T99 | Method A | Maximum Dry Density: | 129.7 PCF | Optimum Moisture Content: | 9.2% |
|------------|----------|----------------------|-----------|---------------------------|------|

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|-----|
| CBR at 0.1 in. | 1.2 | CBR at 0.2 in. | 1.8 |
| CBR at 0.1 in. | 2.0 | CBR at 0.2 in. | 2.5 |



CBR Sample Preparation:

Grading was in accordance with the above method and compacted using the 6" diameter CBR mold. AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 56 | Final Dry Density (PCF) | 119.1 |
| Initial Dry Density (PCF) | 124.5 | Moisture Content (top 1" after soaking) | 18.7% |
| Moisture Content of the Compacted Specimen | 9.5% | Percent Swell | 4.5% |
| Percent Compaction | 96.0% | | |

Soak Time: 96 hr. Surcharge Weight: 10.0 Surcharge Wt. per sq. Ft.: 50.9

Notes/Deviations/References: Virginia Test Method - 8

N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/1/2019
Date

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**CBR (CALIFORNIA BEARING RATIO)
OF LABORATORY COMPACTED SOIL**



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

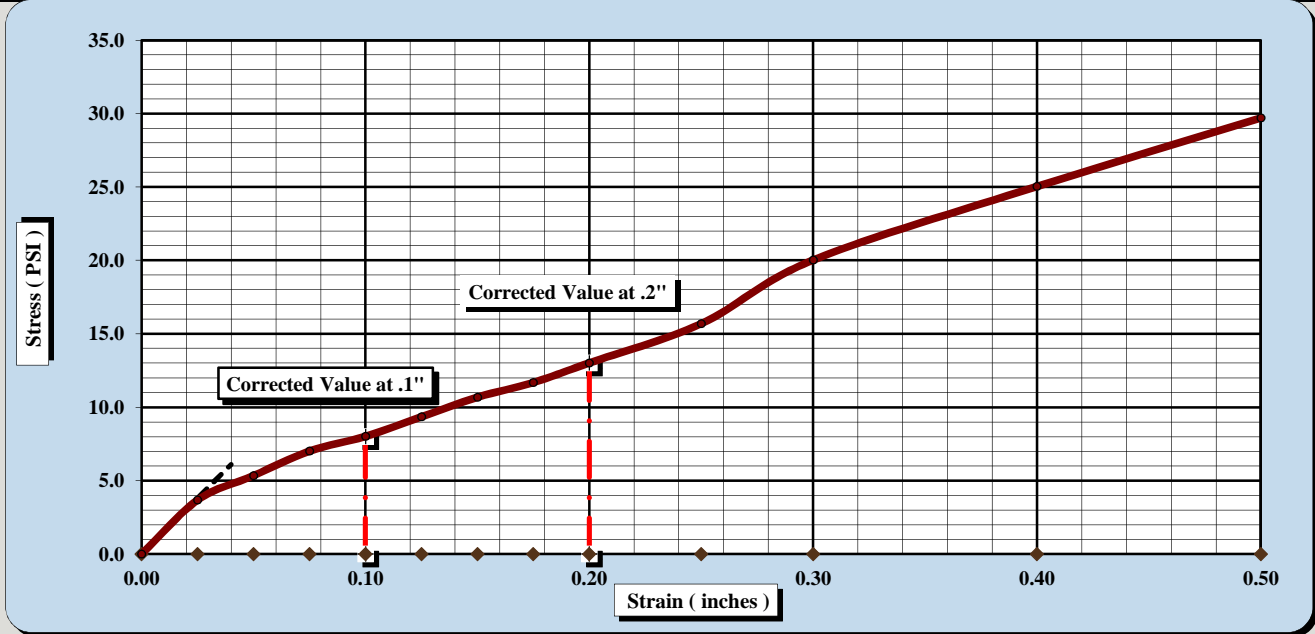
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|-----------------|---------------------------------|--------------|------------------|
| Project #: | 1243-19-025 | Report Date: | 8/2/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 19-23, 2019 |
| Client Name: | HDR Engineering, Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample ID: | 19GWP-P-7 | | |

Depth: 2.5 - 6.5 ft

Sample Description: SANDY LEAN CLAY (CL) / A-6

AASHTO T99 Method A Maximum Dry Density: 120.1 PCF Optimum Moisture Content: 12.4%

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|-----|
| CBR at 0.1 in. | 0.8 | CBR at 0.1 in. | 0.8 |
| CBR at 0.2 in. | 0.9 | CBR at 0.2 in. | 0.9 |



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 65 | Final Dry Density (PCF) | 109.6 |
| Initial Dry Density (PCF) | 118.5 | Moisture Content (top 1" after soaking) | 25.3% |
| Moisture Content of the Compacted Specimen | 12.2% | Percent Swell | 8.1% |
| Percent Compaction | 98.7% | | |

Soak Time: 96 Hours Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 51.1

Notes/Deviations/References: Virginia Test Method - 8

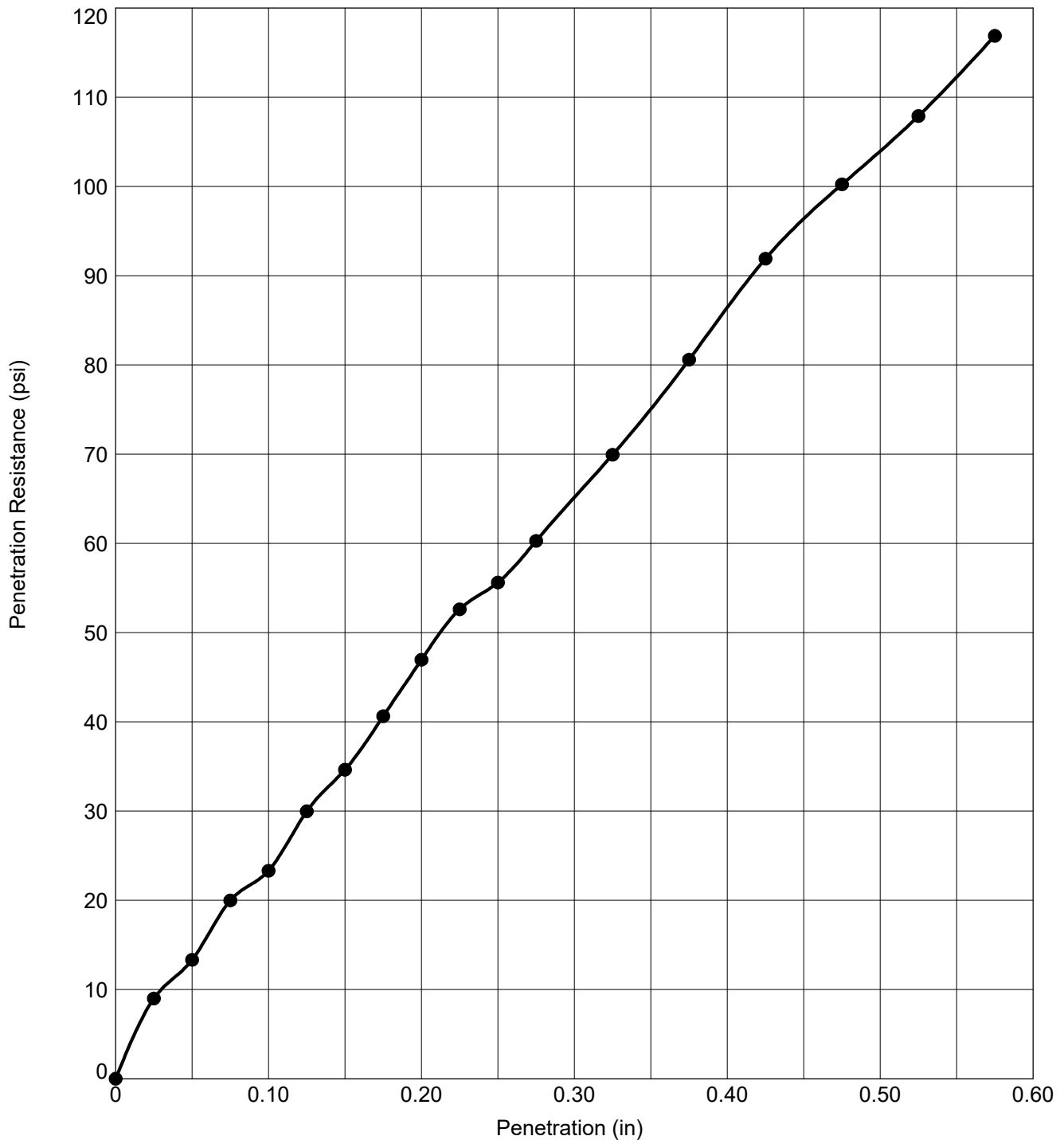
N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/2/2019
Date

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Sample Ident: 19ODD-W-P01 (Bag) Tested By: SM Date: 7/19/2019

Material Description: SANDY LEAN CLAY(CL, A-7-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 121.5 | 102.2 | 13.6 | 115.5 | 97.1 | 21.7 | 2.3 | 3.1 | 10.0 | 2.6 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

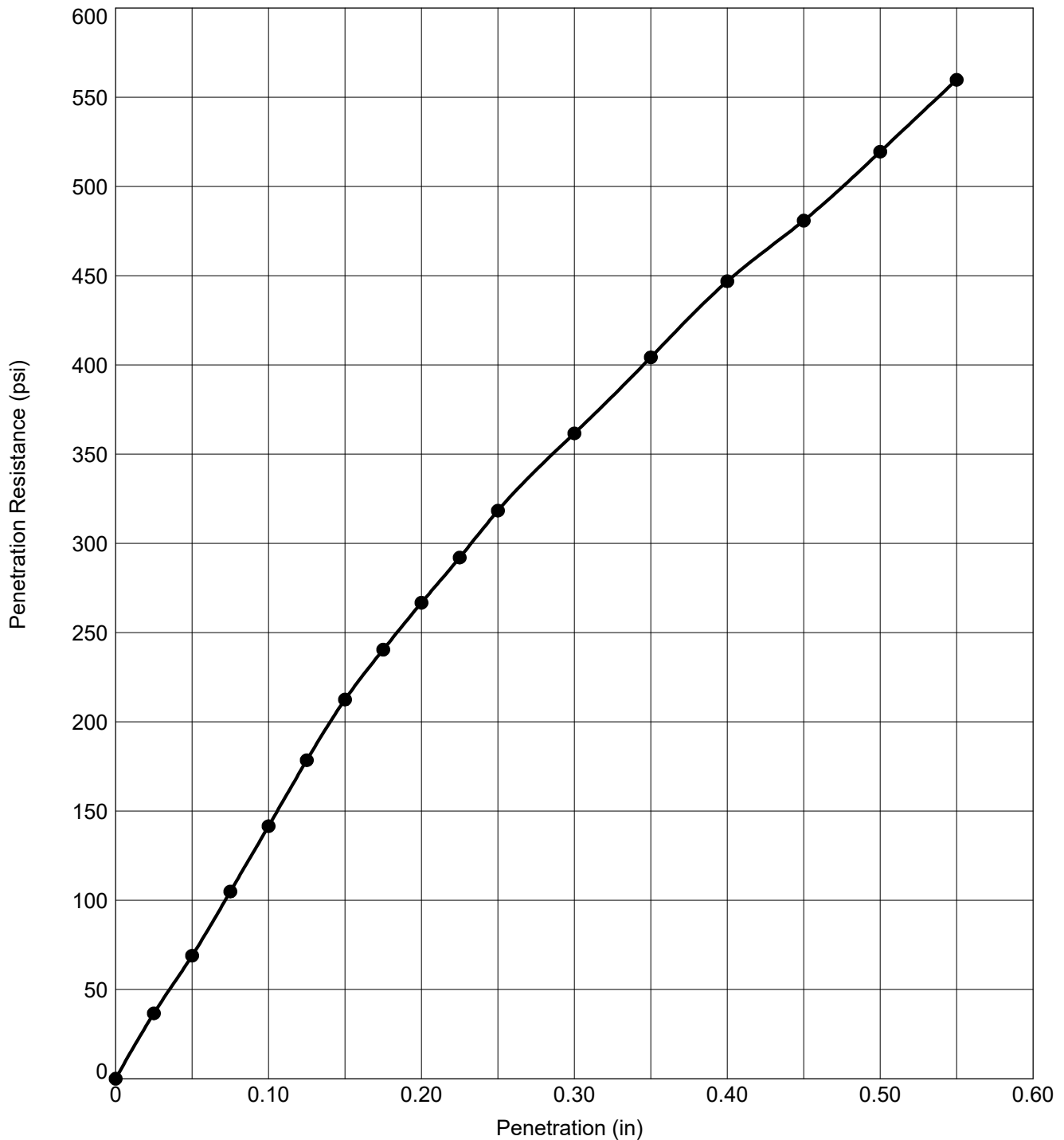


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-NOS-P01 (Bag) Tested By: SM Date: 7/19/2019

Material Description: Silty SAND(SM, A-4), OVERSIZE CORRECTION 15%

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 126.6 | 101.0 | 10.3 | 123.9 | 98.8 | 14.9 | 14.2 | 17.8 | 10.0 | 1.7 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

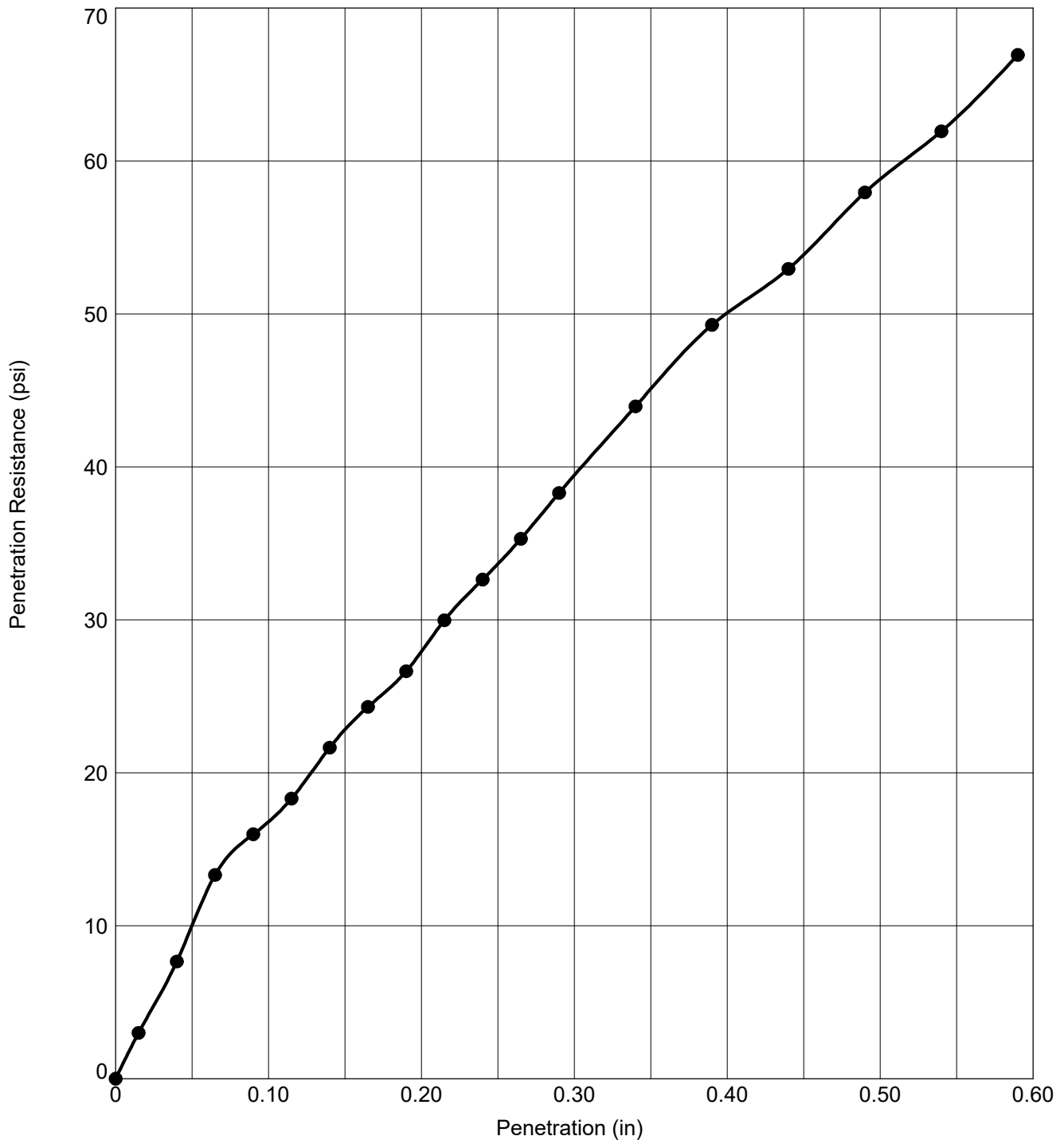


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-NOS-P08 (Bag) Tested By: SM Date: 7/19/2019

Material Description: LEAN CLAY with SAND(CL, A-7-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 117.8 | 102.3 | 15.4 | 109.8 | 95.4 | 26.9 | 1.7 | 1.9 | 10.0 | 3.8 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

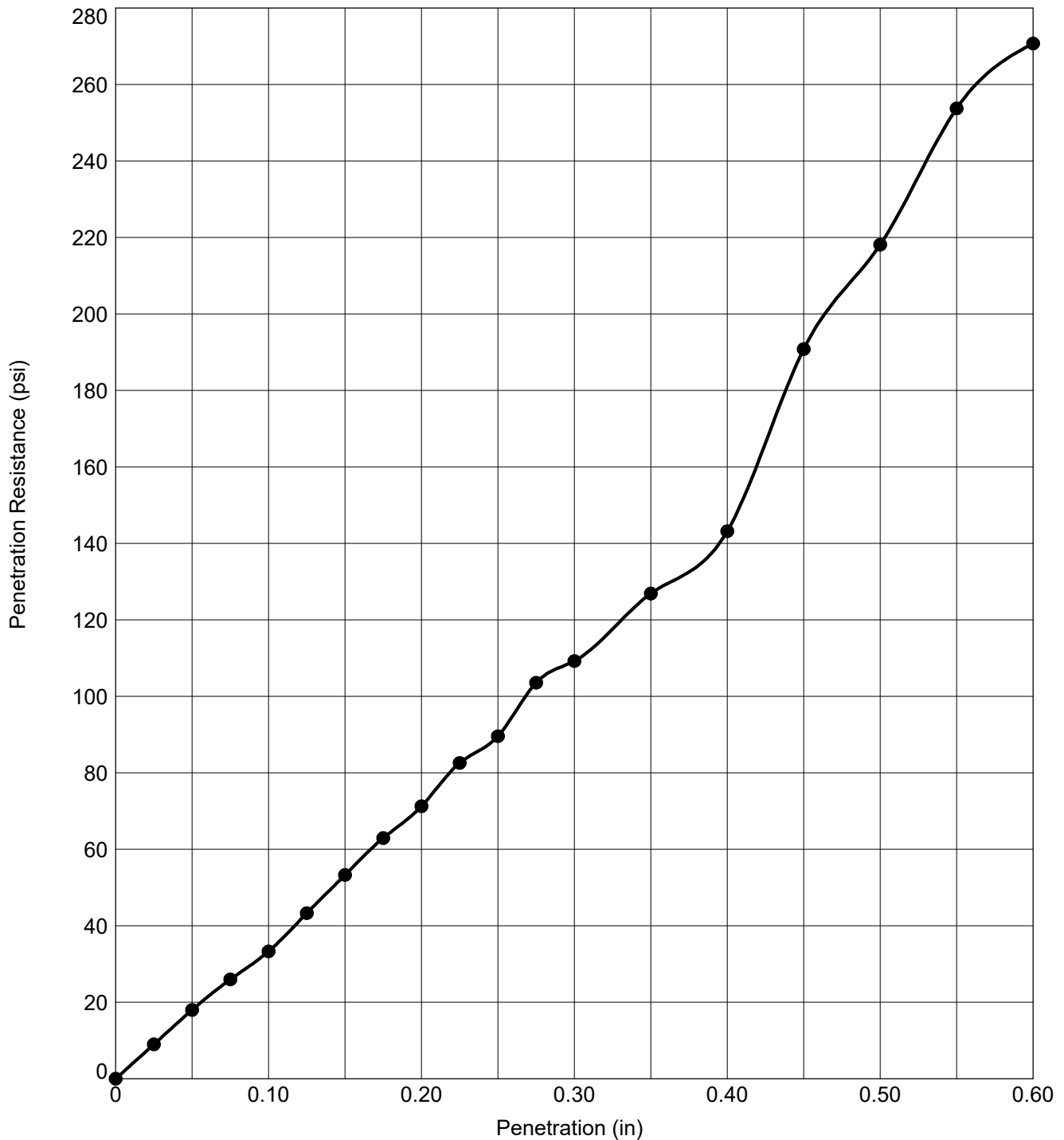


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-NOS-P10 (Bag) Tested By: SM Date: 7/19/2019

Material Description: Clayey SAND with Gravel(SC, A-6), OVERSIZE CORRECTION 16%

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 129.1 | 100.2 | 10.4 | 126.0 | 97.8 | 14.6 | 3.3 | 4.8 | 10.0 | 1.4 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

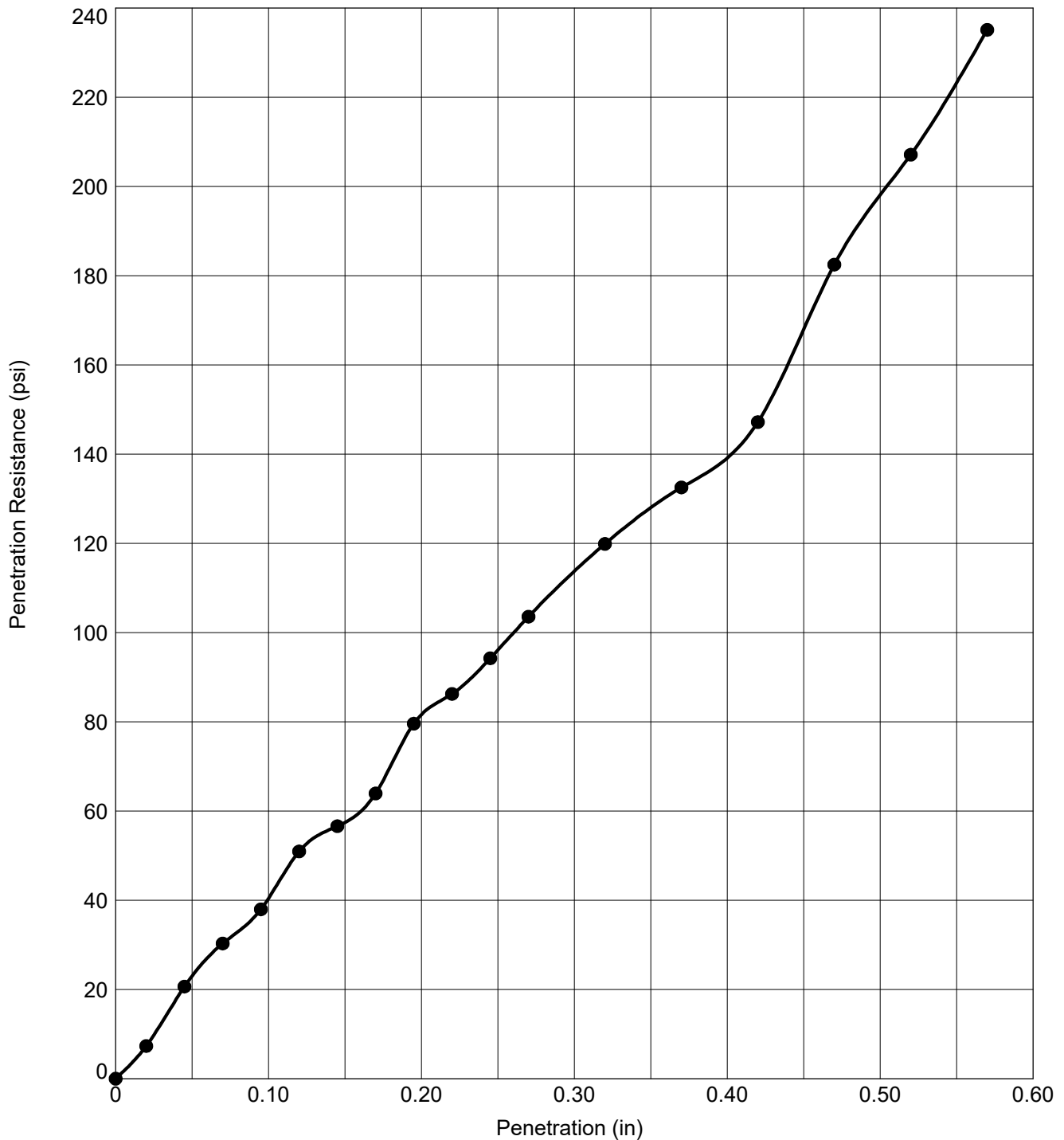
PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012





Sample Ident: 19X-NOS-P16 (Bag) Tested By: SM Date: 7/19/2019

Material Description: Sandy Lean CLAY(CL, A-6), OVERSIZE CORRECTION 11.5%

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 124.6 | 101.5 | 12.3 | 121.2 | 98.7 | 18.4 | 4.1 | 5.4 | 10.0 | 1.9 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

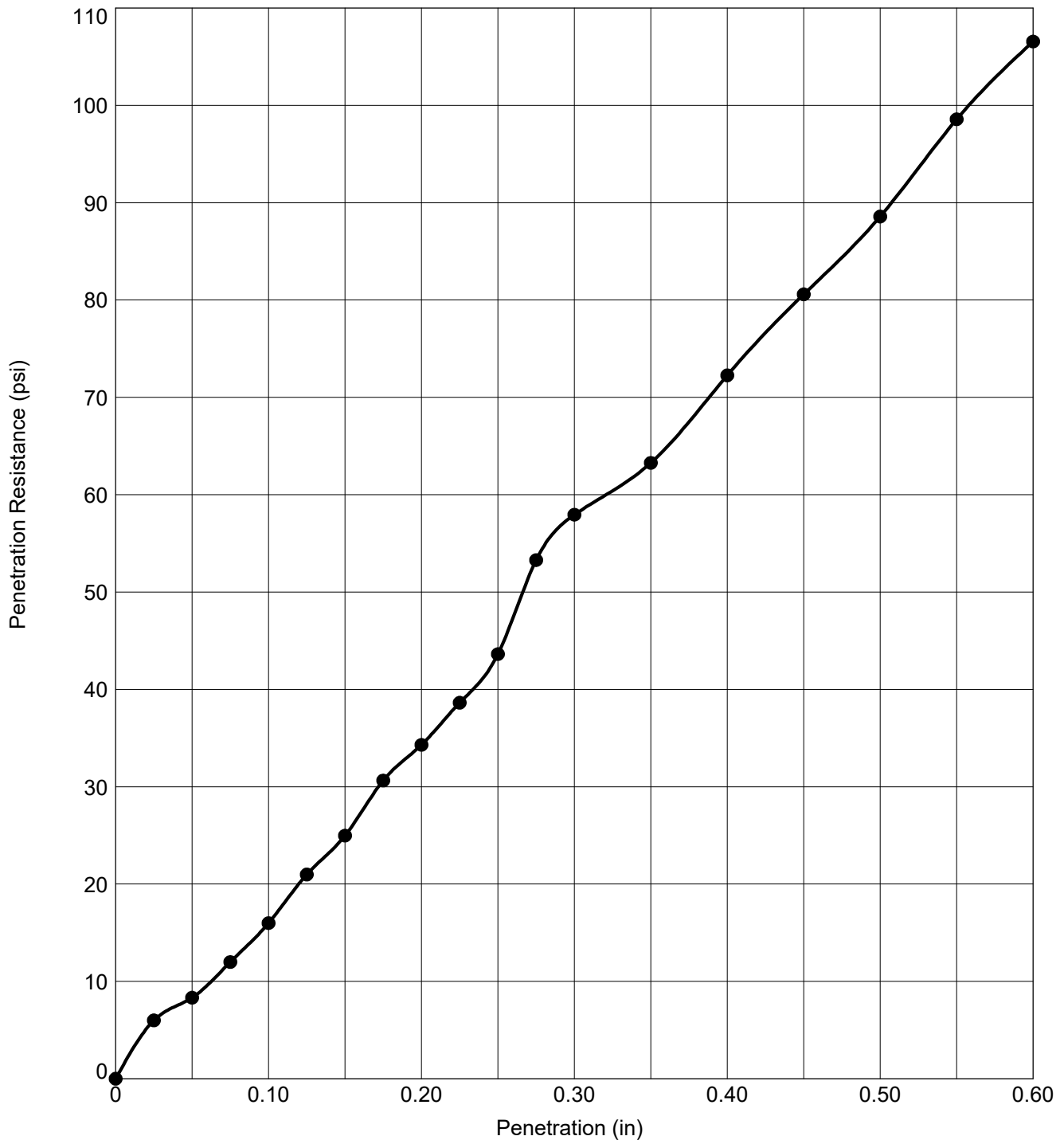


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-NOS-P19 (Bag) Tested By: SM Date: 7/22/2019

Material Description: SANDY LEAN CLAY (CL, A-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 128.9 | 103.0 | 11.5 | 126.8 | 101.3 | 16.6 | 1.6 | 2.3 | 10.0 | 4.1 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

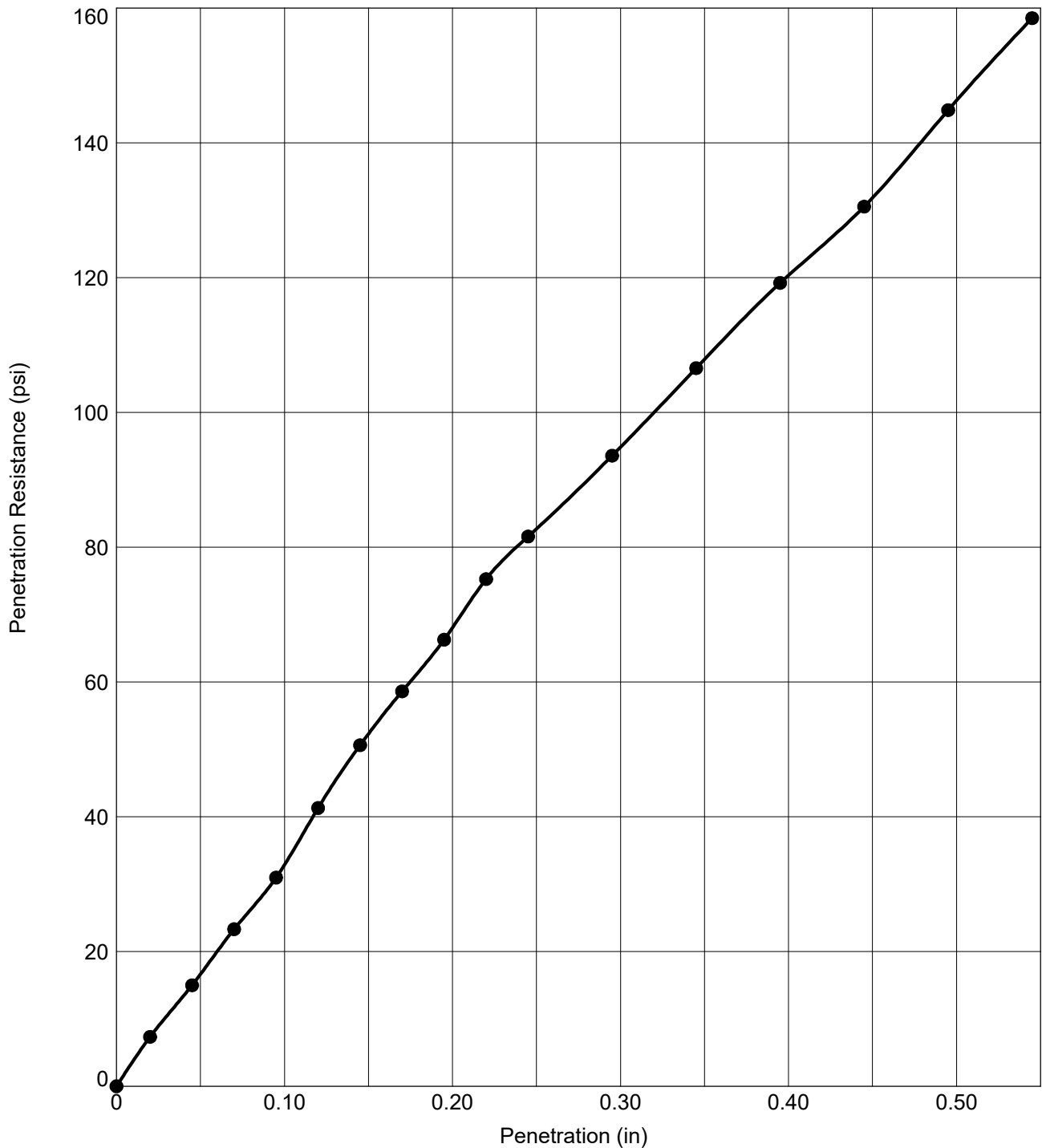


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-NOS-P24 (Bag) Tested By: SM Date: 7/22/2019

Material Description: SILTY SAND(SM, A-4)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 125.2 | 100.9 | 10.6 | 123.4 | 99.5 | 15.8 | 3.3 | 4.5 | 10.0 | 3.3 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

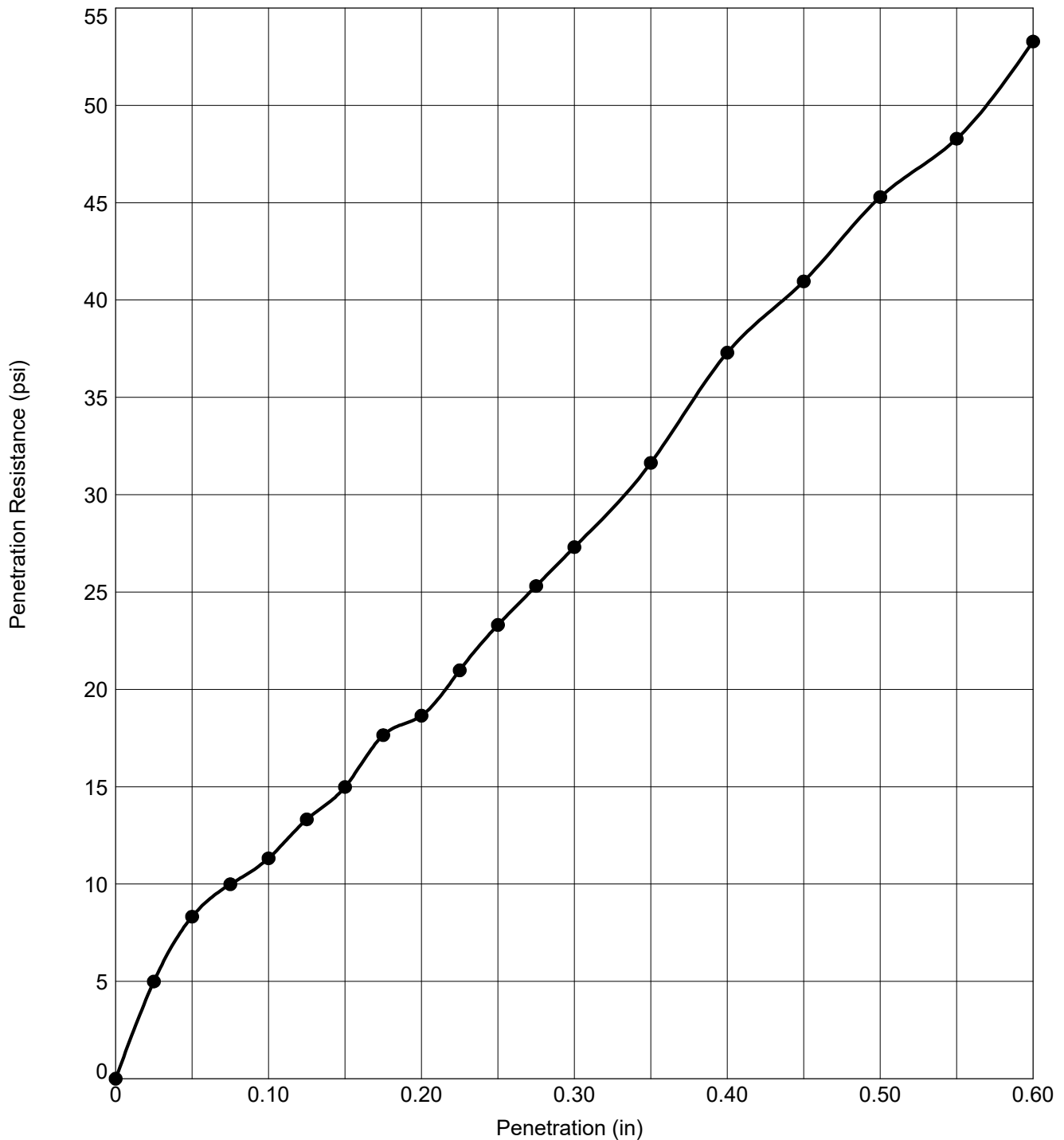


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-N-RW14 (Bag) Tested By: SM Date: 7/19/2019

Material Description: SANDY LEAN CLAY(CL, A-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 116.8 | 102.6 | 12.4 | 114.9 | 100.9 | 21.6 | 1.1 | 1.2 | 10.0 | 6.5 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

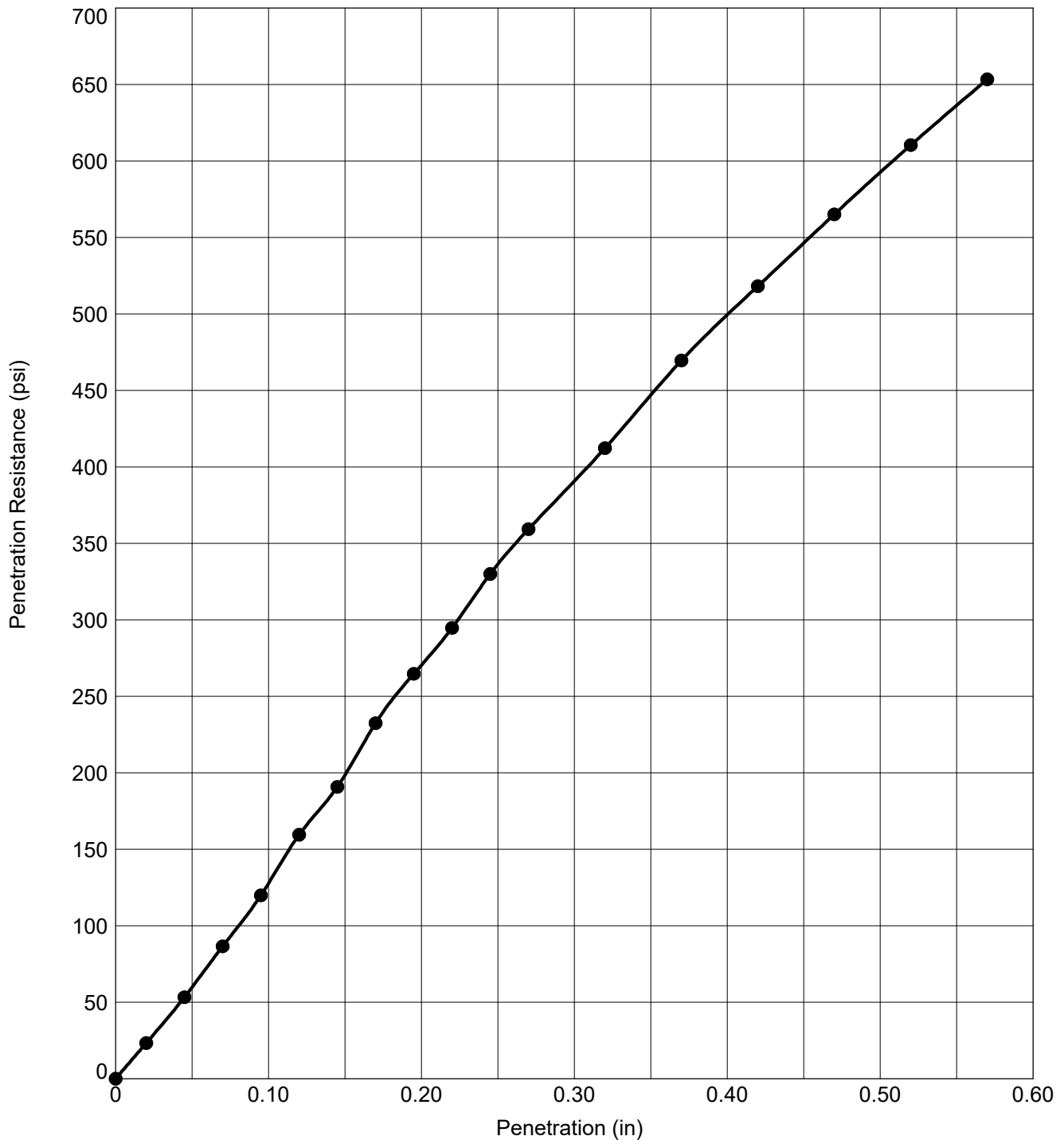


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-SOS-P24 (Bag) Tested By: SM Date: 7/22/2019

Material Description: SILTY, CLAYEY SAND(SC-SM, A-4)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 130.5 | 102.6 | 10.1 | 129.8 | 102.1 | 12 | 12.8 | 18.0 | 10.0 | 0.7 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8



PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

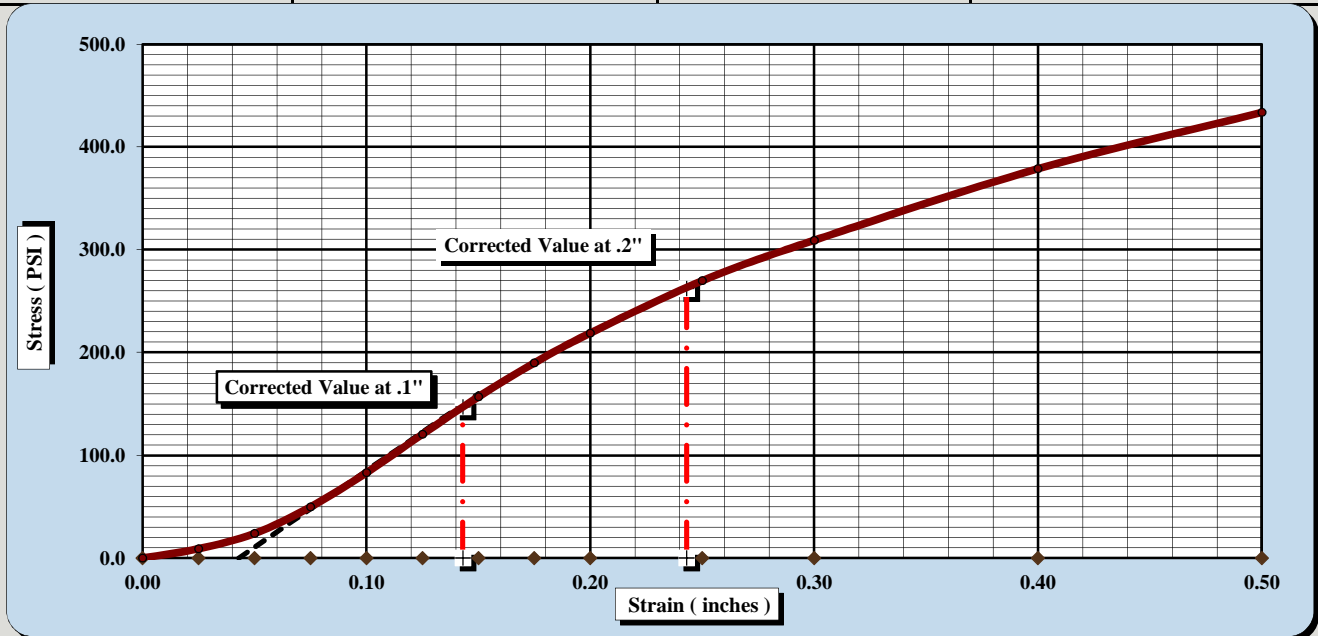
| | | | |
|-----------------|---------------------------------|--------------|--------------------|
| Project #: | 1243-19-025 | Report Date: | 8/1/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 15 - 19, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Boring #: | 19X-SOS-P27 | | |

Depth: 1.5 - 7.5 ft

Sample Description: CLAYEY SAND (SC) / A-6

AASHTO T99 Method A Maximum Dry Density: 120.0 PCF Optimum Moisture Content: 13.7%

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|------|
| CBR at 0.1 in. | 8.3 | CBR at 0.2 in. | 14.6 |
| | | CBR at 0.1 in. | 14.7 |
| | | CBR at 0.2 in. | 17.5 |



CBR Sample Preparation:

Grading was in accordance with the above method and compacted using the 6" diameter CBR mold. AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 56 | Final Dry Density (PCF) | 117.0 |
| Initial Dry Density (PCF) | 118.4 | Moisture Content (top 1" after soaking) | 17.8% |
| Moisture Content of the Compacted Specimen | 14.1% | Percent Swell | 1.2% |
| Percent Compaction | 98.7% | | |

Soak Time: 96 hr. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9

Notes/Deviations/References: Virginia Test Method - 8

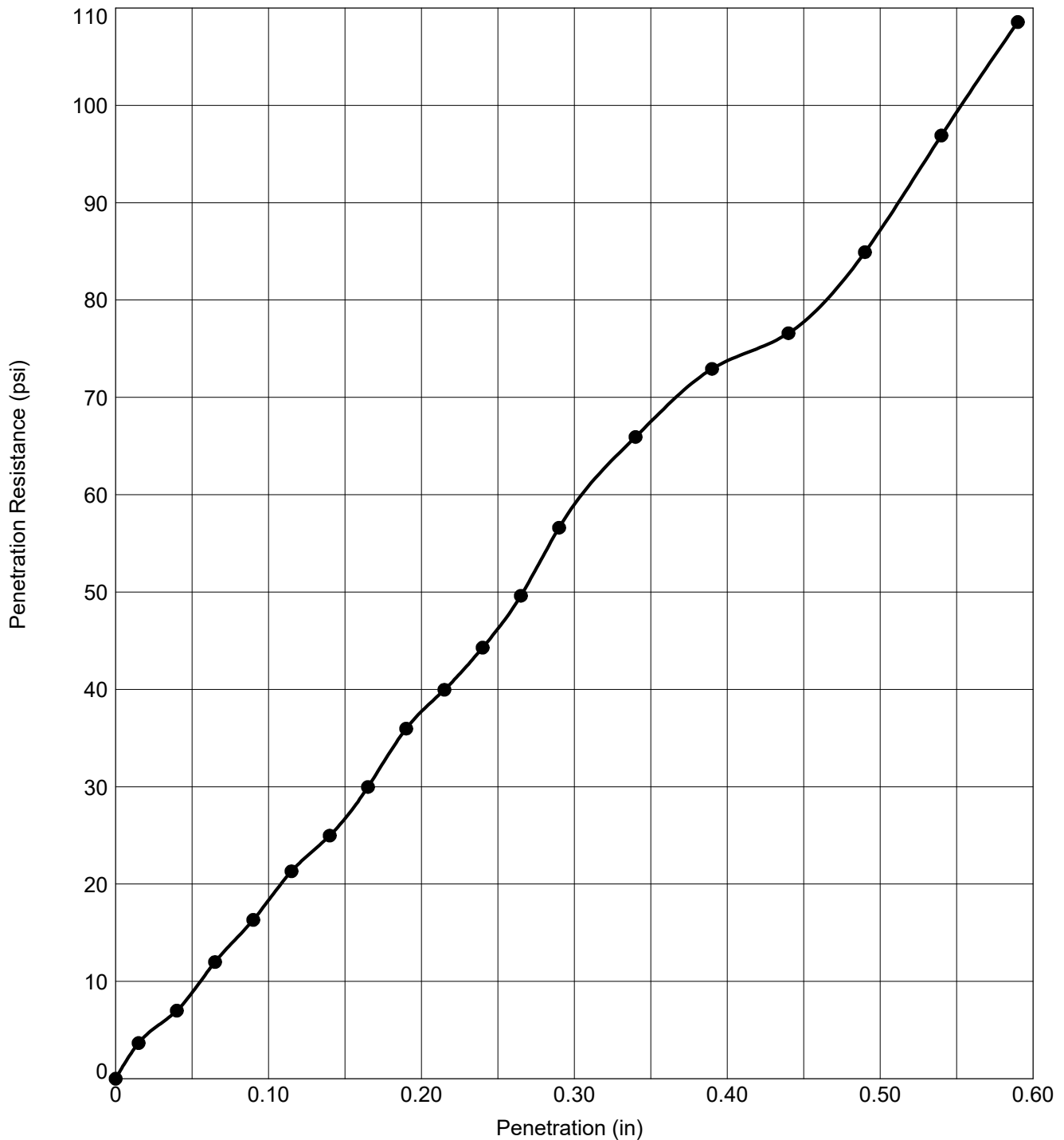
N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/1/2019
Date

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Sample Ident: 19X-SOS-P31 (Bag) Tested By: SM Date: 7/22/2019

Material Description: CLAYEY SAND(SC, A-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 120.5 | 103.0 | 13.6 | 120.5 | 103.0 | 17.1 | 1.8 | 2.5 | 10.0 | 2.9 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8



PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

**CBR (CALIFORNIA BEARING RATIO)
OF LABORATORY COMPACTED SOIL**



AASHTO T 193

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

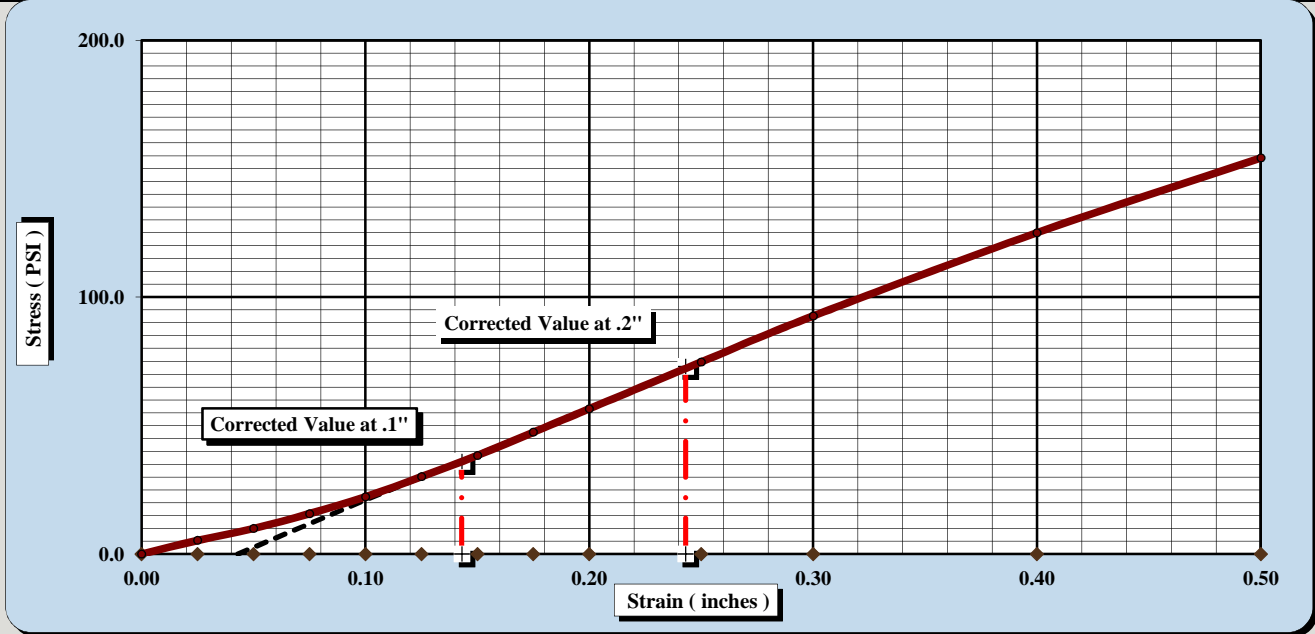
| | | | |
|-----------------|---------------------------------|--------------|--------------------|
| Project #: | 1243-19-025 | Report Date: | 8/1/2019 |
| Project Name: | I-495 Between McLean and Dulles | Test Date(s) | July 15 - 19, 2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, VA | | |
| Boring #: | 19X-SOS-P34 | | |

Depth: 1.5 - 5.5 ft

Sample Description: CLAYEYS SAND WITH GRAVEL (SC) / A-2-6

AASHTO T99 Method A Maximum Dry Density: 137.1 PCF Optimum Moisture Content: 7.2%

| Uncorrected CBR Values | | Corrected CBR Values | |
|------------------------|-----|----------------------|-----|
| CBR at 0.1 in. | 2.2 | CBR at 0.1 in. | 3.6 |
| CBR at 0.2 in. | 3.8 | CBR at 0.2 in. | 4.9 |



CBR Sample Preparation:

Grading was in accordance with the above method and compacted using the 6" diameter CBR mold. AASHTO T 193, Section 5.1.1

| Before Soaking | | After Soaking | |
|--|-------|---|-------|
| Compactive Effort (Blows per Layer) | 56 | Final Dry Density (PCF) | 130.0 |
| Initial Dry Density (PCF) | 133.9 | Moisture Content (top 1" after soaking) | 13.9% |
| Moisture Content of the Compacted Specimen | 8.9% | Percent Swell | 2.9% |
| Percent Compaction | 97.7% | | |

Soak Time: 96 hr. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9

Notes/Deviations/References: Virginia Test Method - 8

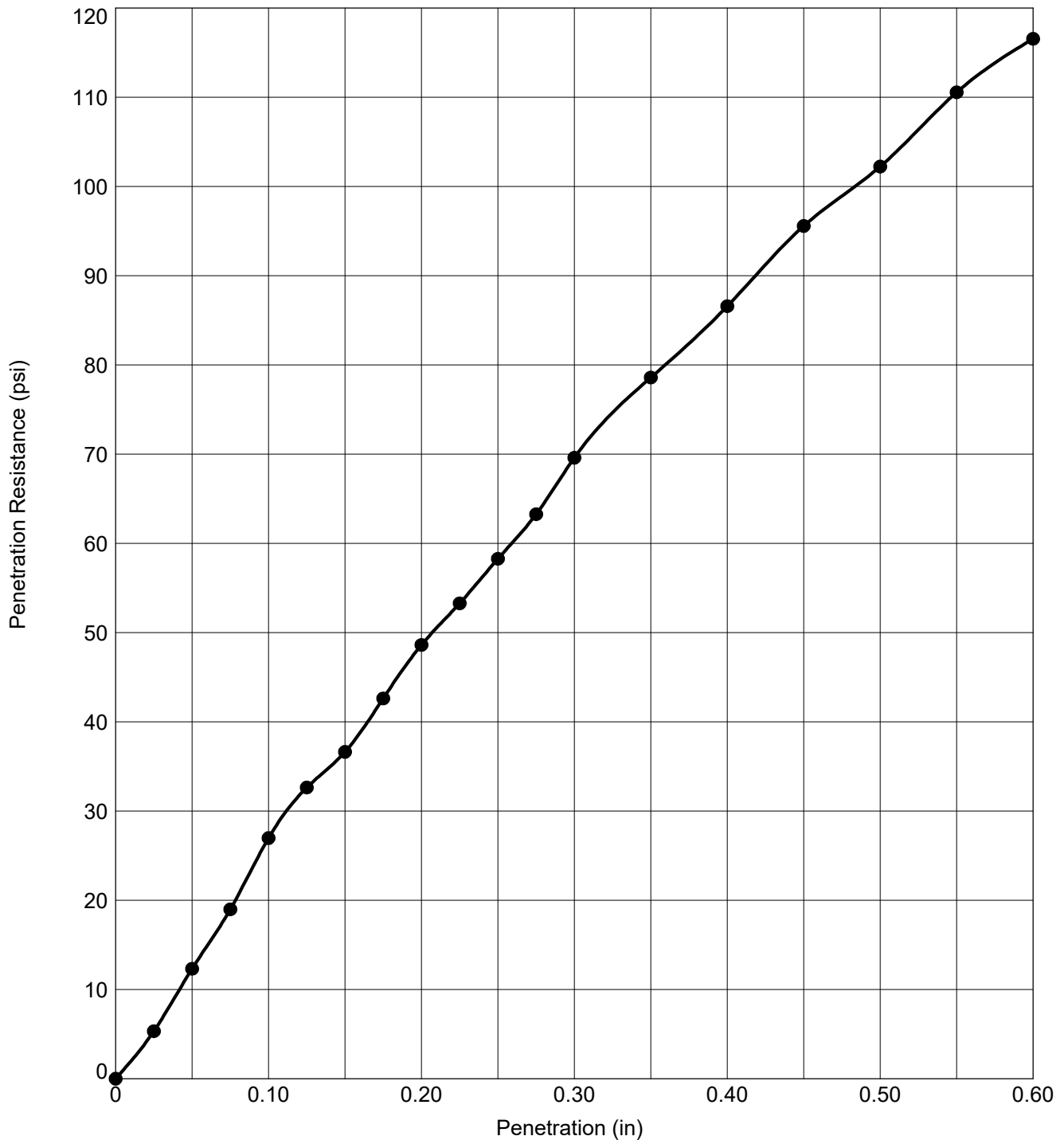
N. Randy Rainwater
Technical Responsibility

N. Randy Rainwater
Signature

Senior Engineer
Position

8/1/2019
Date

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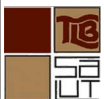


Sample Ident: 19X-SOS-P40 (Bag) Tested By: SM Date: 7/22/2019

Material Description: LEAN CLAY with SAND(CL, A-7-6)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 126.5 | 101.5 | 11.8 | 125.1 | 100.4 | 15.3 | 2.7 | 3.2 | 10.0 | 1.9 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8

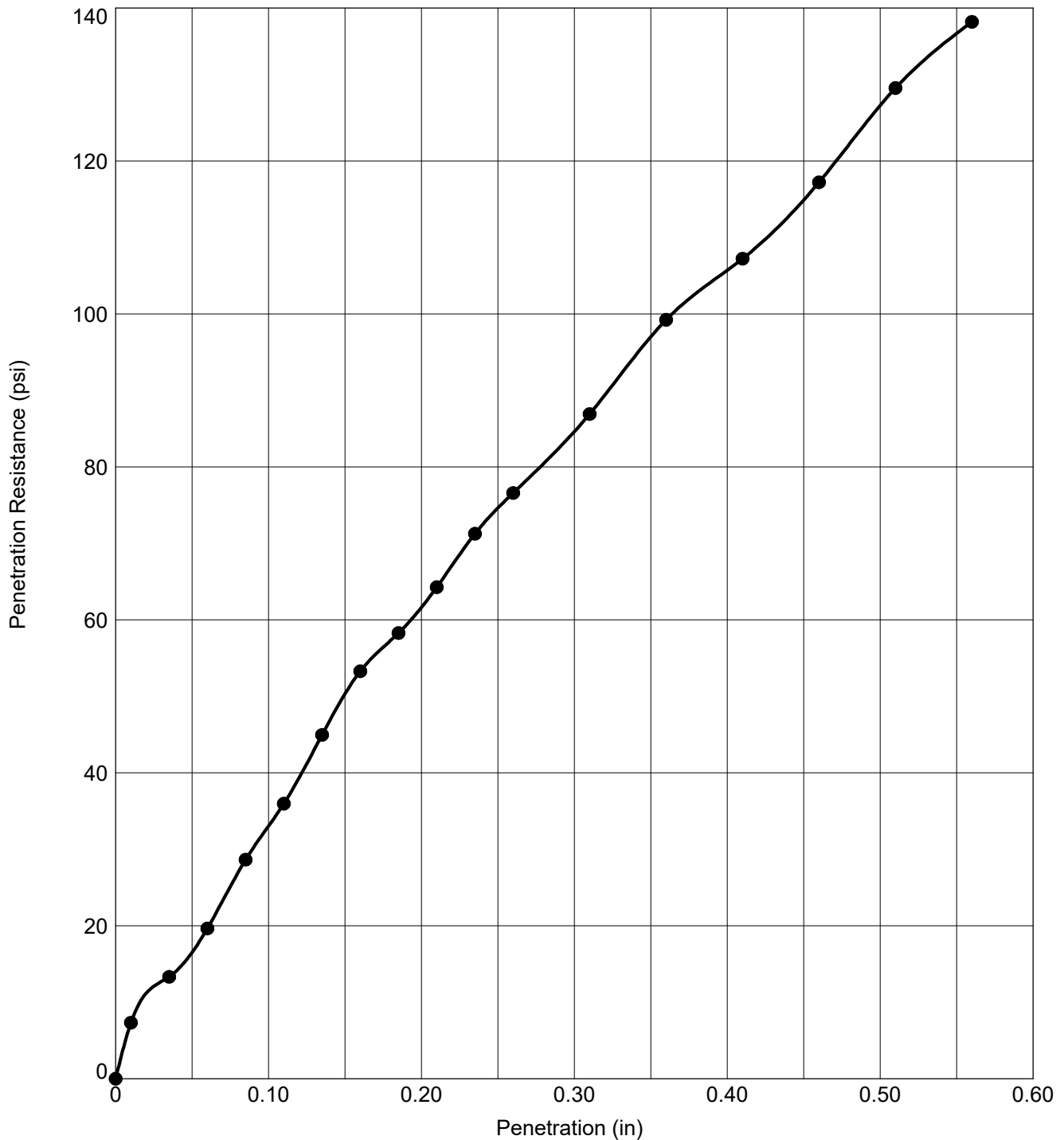


PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012



Sample Ident: 19X-S-RW37 (Bag) Tested By: SM Date: 7/22/2019

Material Description: SANDY SILT(ML, A-4)

| | Molded | | | Soaked | | | CBR | | Pen. Surcharge (lbs) | % Swell |
|---|---------------|---------------|------------|---------------|---------------|------------|--------|--------|----------------------|---------|
| | Density (pcf) | % Max Density | % Moisture | Density (pcf) | % Max Density | % Moisture | 0.1 in | 0.2 in | | |
| ● | 115.8 | 101.7 | 12.5 | 114.6 | 100.6 | 19.6 | 3.3 | 4.1 | 10.0 | 2.7 |
| | | | | | | | | | | |
| | | | | | | | | | | |

TEST METHOD: VTM-8



PENETRATION VS STRESS

Project: I-495 NEXT Express Lanes

Location: Fairfax County, Virginia

Project Number: 19-0012

pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|--------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR1 | Type: | Split spoon |
| | | Sample: | S - 3, 4, &5 |
| | | Depth: | 23 - 35 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.7 |
| pH Reading | 4.6 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|-------------------|-----------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR03 | Type: Split spoon | |
| | Sample: S - 9, & 10 | Depth: | 6 - 12 ft |

Sample Description: Reddish brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.7 |
| pH Reading | 3.8 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|----------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR6 | Type: | Split spoon |
| | | Sample: | S - 8, 9, & 10 |
| | | Depth: | 28 - 39.4 ft |

Sample Description: Brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.8 |
| pH Reading | 5.4 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|-------------------|------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 8/23/19 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GTP-BR-14 | Type: Split spoon | |
| | Sample: S - 8, 9, &10 | Depth: | 23 - 35 ft |

Sample Description: Reddish brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 8/23/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.5 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.6 |
| pH Reading | 4.7 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

8/23/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|-------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GTP-BR16 | Type: | Split spoon |
| | | Sample: | S-4, 5, & 6 |
| | | Depth: | 6 - 15 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.9 |
| pH Readings | 5.1 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|--|----------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 8/23/19 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GWP-BR17 | Type: Split spoon | |
| | | Sample: S - 3, 4, & 5 | Depth: 4.8 - 10.8 ft |

Sample Description: Yellowish clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 8/23/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.5 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.8 |
| pH Reading | 6.8 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

8/23/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

10/21/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|-------------------------|----------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GWP-BR19 | Type: Split spoon | Sample Date: Various |
| | | Sample: S - 9, 10, & 11 | Depth: 33 - 44.8 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.7 |
| pH Readings | 5.1 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|-------------------|------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-07 | Type: Split spoon | |
| | | Depth: | 20 - 25 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|---------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|-------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.9 |
| pH Readings | 5.7 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-08 | Type: Bulk | |
| | | Depth: | 20 - 25 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.9 |
| pH Readings | 4.6 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility


 Signature

Senior Engineer
 Position

9/16/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|--|-------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/13/2019 |
| Client Name: | HDR Engineering Inc. | Revised Report October 21, 2019 | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-15 | Type: Bulk | |
| | | | Depth: 15 - 20 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|---------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|-------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.9 |
| pH Readings | 6.4 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

10/21/2019
 Date

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pH of SOIL



AASHTO T289

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|------------------------|----------------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/19 |
| Project Name: | NEXT 495 Express Lanes | Test Date(s): | 9/13/2019 |
| Client Name: | HDR | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19X-BR11 | Type: Split spoon | |
| | | Sample: S-8, 9, & 10 | Depth: 28 - 40 ft |

Sample Description: Light brown clay

Equipment:

| | | | | | | |
|--------------|----------|-------|------------|---------|------|---------|
| Balance | S&ME ID# | 18435 | Cal. Date: | 4/2/19 | Due: | 4/2/20 |
| Sieve: #10 | S&ME ID# | 2487 | Cal. Date: | 4/2/19 | Due: | 10/2/19 |
| Thermometer: | S&ME ID# | 31493 | Cal. Date: | 12/7/18 | Due: | 12/7/19 |
| pH Meter: | S&ME ID# | 16576 | Cal. Date: | 9/13/19 | Due: | per use |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------|--------------|
| pH buffer 4.0 | 4.01 |
| pH buffer 7.0 | 7.00 |
| pH buffer 10.0 | 10.01 |
| Buffer Temperature °C | 23.7 |

Measuring pH of Soil

| Measurements | |
|----------------------------|--------------|
| Weight of Air Dry Soil (g) | 30.00 |
| Distilled Water (ml) | 30.00 |
| Temperature °C | 23.9 |
| pH Readings | 5.5 |

Notes / Deviations / References:

AASHTO T 289 Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing

Tori Igoe
 Technician Name

9/13/2019
 Date

N. Randy Rainwater
 Technical Responsibility


 Signature

Senior Engineer
 Position

9/16/2019
 Date

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Results Only Soil Testing for I-495 McLean to Dulles

September 23, 2019

**Prepared for:
Michael D. Kelso
S&ME, Inc.
1413 Topside Rd.
Louisville, TN 37777
mkelso@smeinc.com**

**Project X Job#: S190918D
Client Job or PO#: 1243-19-025**

Respectfully Submitted,

Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com





Soil Analysis Lab Results

Client: S&ME, Inc.
 Job Name: I-495 McLean to Dulles
 Client Job Number: 1243-19-025
 Project X Job Number: S190918D
 September 23, 2019

| | Method | AASHTO T290 | | AASHTO T291 | |
|------------------------|-----------|-------------------------------|--------|-----------------|--------|
| Bore# / Description | Depth | Sulfates | | Chlorides | |
| | | SO ₄ ²⁻ | | Cl ⁻ | |
| | (ft) | (mg/kg) | (wt%) | (mg/kg) | (wt%) |
| 19GTP-BR14 S8, S9, S10 | 23.0-35.0 | 4.0 | 0.0004 | 952.7 | 0.0953 |
| 19GWP-BR17 S3 ,S4,S5 | 4.8-10.8 | 7.1 | 0.0007 | 525.2 | 0.0525 |
| 19DTR-BR01 S3 , S4, S5 | 6.0-12.0 | ND | ND | 741.6 | 0.0742 |
| 19DTR-BR03 S9, S10 | 28.0-35.0 | ND | ND | 508.1 | 0.0508 |
| 19DTR-BR06 S8,S9, S10 | 28.0-39.4 | ND | ND | 426.3 | 0.0426 |
| 19GTP-BR16 S4 , S5, S6 | 6.0-15.0 | 7.9 | 0.0008 | 32.7 | 0.0033 |
| 19GWP-BR19 S9,S10,S11 | 33.0-44.8 | 2.2 | 0.0002 | 86.6 | 0.0087 |
| 19SWM-07 Bulk | 20.0-25.0 | 9.8 | 0.0010 | 30.7 | 0.0031 |
| 19SWM-08 Bulk | 20.0-25.0 | 1.3 | 0.0001 | 28.0 | 0.0028 |
| 19SWM-15 Bulk | 15.0-20.0 | 5.7 | 0.0006 | 40.4 | 0.0040 |
| 19X-BR11 S8,S9,S10 | 28.0-40.0 | 2.3 | 0.0002 | 40.5 | 0.0041 |

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
 mg/kg = milligrams per kilogram (parts per million) of dry soil weight
 ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
 Chemical Analysis performed on 1:3 Soil-To-Water extract

SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR01 | Type: | Split Spoon |
| | Sample: S-3, 4, & 5 | | Depth: 6 - 12 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | | Tare No. | | 150 |
|----------|--------------------|---------|--|----------|--------------------|---------|
| A | Tare Weight | | | A | Tare Weight | 29.74 |
| B | Wet Wt + Tare Wt | | | B | Wet Wt + Tare Wt | 148.43 |
| C | Dry Wt. + Tare Wt. | | | C | Dry Wt. + Tare Wt. | 123.61 |
| D | Water Weight | B-C | | D | Water Weight | B-C |
| E | Dry Weight | C-A | | E | Dry Weight | C-A |
| F | Moisture Content | 100*D/E | | F | Moisture Content | 100*D/E |
| | | | | | | 26.4% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| | | | | | |
|----------|-------------------------------------|------------|----------|-------------------------------------|------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 100.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 9.10 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 910 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|-------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR3 | Type: | Split Spoon |
| | Sample: S-9 & 10 | Depth: | 28 - 35 ft |

| | | | | | | |
|----------------------------|--------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Reddish brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | | C-1 |
|----------|--------------------|---------|----------|--------------------|---------|-------|
| A | Tare Weight | | A | Tare Weight | | 30.37 |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | | 95.51 |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | | 72.37 |
| D | Water Weight | B-C | D | Water Weight | B-C | 23.14 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 42.00 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 55.1% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 1.40 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 1400 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|--------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19DTR-BR6 | Type: | Split Spoon |
| | | Sample: | S-8, 9, & 10 |
| | | Depth: | 28 - 39.4 ft |

| | | | | | | |
|----------------------------|------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | | C-7 |
|----------|--------------------|---------|----------|--------------------|---------|--------|
| A | Tare Weight | | A | Tare Weight | | 30.83 |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | | 132.76 |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | | 94.65 |
| D | Water Weight | B-C | D | Water Weight | B-C | 38.11 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 63.82 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 59.7% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| | | | | | |
|----------|-------------------------------------|------------|----------|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 1.30 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 1300 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|-----------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 8/19/19 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |

| | | | |
|------------|------------|---------|----------------|
| Sample Id. | 19GTP-BR14 | Type: | Split spoon |
| Location: | | Sample: | S - 8, 9, & 10 |
| | | Depth: | 423 - 35 ft |

| | | | | | | | |
|----------------------------|----------|--------------------|-----------|---------------|-----------|-----------------|--|
| Sample Description: | | Reddish brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 | |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 | |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 | |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | | Tare No. | | C-34 |
|----------|--------------------|---------|--|----------|--------------------|---------|
| A | Tare Weight | | | A | Tare Weight | 30.78 |
| B | Wet Wt + Tare Wt | | | B | Wet Wt + Tare Wt | 100.68 |
| C | Dry Wt. + Tare Wt. | | | C | Dry Wt. + Tare Wt. | 75.91 |
| D | Water Weight | B-C | | D | Water Weight | B-C |
| E | Dry Weight | C-A | | E | Dry Weight | C-A |
| F | Moisture Content | 100*D/E | | F | Moisture Content | 100*D/E |
| | | | | | | 54.9% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| | | | | | |
|----------|-------------------------------------|------------|----------|-------------------------------------|------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 100.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 7.50 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 750 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

8/19/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|-------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GTP-BR16 | Type: | Split Spoon |
| | | Sample: | S-4, 5, & 6 |
| | | Depth: | 6 - 15 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | | C-2 |
|----------|--------------------|---------|----------|--------------------|---------|--------|
| A | Tare Weight | | A | Tare Weight | | 21.37 |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | | 113.21 |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | | 80.12 |
| D | Water Weight | B-C | D | Water Weight | B-C | 33.09 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 58.75 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 56.3% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 5.40 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 5400 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
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Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|----------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 8/19/19 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GWP-BR17 | Type: | Split spoon |
| | Sample: S - 3, 4, & 5 | | Depth: 4.8 - 10.8 ft |

| | | | | | | |
|----------------------------|----------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Yellowish brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | | Tare No. | | 157 |
|----------|--------------------|---------|--|----------|--------------------|---------|
| A | Tare Weight | | | A | Tare Weight | 30.02 |
| B | Wet Wt + Tare Wt | | | B | Wet Wt + Tare Wt | 98.91 |
| C | Dry Wt. + Tare Wt. | | | C | Dry Wt. + Tare Wt. | 78.51 |
| D | Water Weight | B-C | | D | Water Weight | B-C |
| E | Dry Weight | C-A | | E | Dry Weight | C-A |
| F | Moisture Content | 100*D/E | | F | Moisture Content | 100*D/E |
| | | | | | | 42.1% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 100.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 9.90 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 990 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

8/19/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|-------------------|---------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19GWP-BR19 | Type: Split Spoon | |
| | Sample: S-9, 10, & 11 | | Depth: 33 - 44.8 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | N 3 | |
|----------|--------------------|---------|----------|--------------------|---------|-------|
| A | Tare Weight | | A | Tare Weight | 31.49 | |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | 133.79 | |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | 106.87 | |
| D | Water Weight | B-C | D | Water Weight | B-C | 26.92 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 75.38 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 35.7% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| | | | | | |
|----------|-------------------------------------|------------|----------|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 4.50 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 4500 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
 Technical Responsibility

Signature

Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

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| | | | |
|-----------------|--------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-07 | Type: | Bulk |
| | | | Depth: 20 - 25 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | | Tare No. | | 142 |
|----------|--------------------|---------|--|----------|--------------------|---------|
| A | Tare Weight | | | A | Tare Weight | 30.29 |
| B | Wet Wt + Tare Wt | | | B | Wet Wt + Tare Wt | 103.67 |
| C | Dry Wt. + Tare Wt. | | | C | Dry Wt. + Tare Wt. | 77.46 |
| D | Water Weight | B-C | | D | Water Weight | B-C |
| E | Dry Weight | C-A | | E | Dry Weight | C-A |
| F | Moisture Content | 100*D/E | | F | Moisture Content | 100*D/E |
| | | | | | | 55.6% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| | | | | | |
|----------|-------------------------------------|------------|----------|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 3.50 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 3500 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

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9/10/2019
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N. Randy Rainwater
 Technical Responsibility

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Senior Engineer
 Position

9/16/2019
 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-08 | Type: Bulk | |
| | | Depth: | 20 - 25 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | | C-34 |
|----------|--------------------|---------|----------|--------------------|---------|--------|
| A | Tare Weight | | A | Tare Weight | | 30.77 |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | | 122.24 |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | | 85.22 |
| D | Water Weight | B-C | D | Water Weight | B-C | 37.02 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 54.45 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 68.0% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 6.30 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 6300 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

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SOIL RESISTIVITY



ASTM G 57

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| | | | |
|-----------------|--------------------------------|---------------|------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19SWM-15 | Type: | Bulk |
| | | Depth: | 15 - 20 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | Tare No. | | M4 | |
|----------|--------------------|---------|----------|--------------------|---------|-------|
| A | Tare Weight | | A | Tare Weight | 31.30 | |
| B | Wet Wt + Tare Wt | | B | Wet Wt + Tare Wt | 121.66 | |
| C | Dry Wt. + Tare Wt. | | C | Dry Wt. + Tare Wt. | 97.53 | |
| D | Water Weight | B-C | D | Water Weight | B-C | 24.13 |
| E | Dry Weight | C-A | E | Dry Weight | C-A | 66.23 |
| F | Moisture Content | 100*D/E | F | Moisture Content | 100*D/E | 36.4% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 8.50 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 8500 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
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Senior Engineer
 Position

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 Date

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SOIL RESISTIVITY



ASTM G 57

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|-----------------|--------------------------------|---------------|-------------------|
| Project #: | 1243-19-025 | Report Date: | 9/16/2019 |
| Project Name: | I-495 Between McLean nd Dulles | Test Date(s): | 9/10/2019 |
| Client Name: | HDR Engineering Inc. | | |
| Client Address: | Glen Allen, Virginia | | |
| Sample Id. | 19X-BR11 | Type: | Split Spoon |
| | Sample: S-8, 9, & 10 | | Depth: 28 - 40 ft |

| | | | | | | |
|----------------------------|------------------|----------|-----------|---------------|-----------|-----------------|
| Sample Description: | Light brown clay | | | | | |
| Equipment: | Soil box | S&ME ID# | Small Box | Box Constant: | 1 | |
| Balance | | S&ME ID# | 18435 | Cal. Date: | 4/2/2019 | Due: 4/2/2020 |
| Oven | | S&ME ID# | 12872 | Cal. Date: | 7/12/2019 | Due: 11/12/2019 |
| Decade Box: | | S&ME ID# | 19948 | Cal. Date: | 4/20/2019 | Due: 4/20/2020 |

Moisture Content Determination

As Received Condition (if received near saturation)

After 24-hr Condition

| Tare No. | | | | Tare No. | | C-38 |
|----------|--------------------|---------|--|----------|--------------------|---------|
| A | Tare Weight | | | A | Tare Weight | 31.28 |
| B | Wet Wt + Tare Wt | | | B | Wet Wt + Tare Wt | 140.29 |
| C | Dry Wt. + Tare Wt. | | | C | Dry Wt. + Tare Wt. | 113.40 |
| D | Water Weight | B-C | | D | Water Weight | B-C |
| E | Dry Weight | C-A | | E | Dry Weight | C-A |
| F | Moisture Content | 100*D/E | | F | Moisture Content | 100*D/E |
| | | | | | | 32.7% |

Resistivity (ohms - cm)

As Received Condition

After 24-hr Condition

| M | | | M | | |
|---|-------------------------------------|------------|---|-------------------------------------|-------------|
| M | Multiplier Dial Setting | N/A | M | Multiplier Dial Setting | 1000.00 |
| B | Balance Dial Reading to Null | N/A | B | Balance Dial Reading to Null | 7.10 |
| R | RESISTIVITY (Ω-cm), (MxBxBC) | N/A | R | RESISTIVITY (Ω-cm), (MxBxBC) | 7100 |

Notes / Deviations / References: **BC: Box Constant = 1**

24-hr conditioning achieved by saturating the soil with distilled water for 24 hours prior to testing.

Miller 400A Resistivity Meter, ID#26821

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Tori Igoe
 Technician Name

9/10/2019
 Date

N. Randy Rainwater
 Technical Responsibility

N. Randy Rainwater
 Signature

Senior Engineer
 Position

9/16/2019
 Date

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1405-A Parker Rd. Baltimore, MD 21227, Phone: (410) 737-9100, Fax: (410) 737-9101, Email: email@e2cr.com

Minimum Resistivity (AASHTO T288) and pH (AASHTO T289)

Project Name : I-495 Next Express Lanes
 Project Number : 19515-03
 Date : 9/24/2019

| Boring # | Sample # | Depth | Minimum Resistivity (AASHTO T288) | | pH (AASHTO T289) |
|------------|-----------|-------------|-------------------------------------|-------------------------------|------------------|
| | | | Moisture at Minimum Resistivity (%) | Minimum Resistivity, (ohm.cm) | |
| 19GWP-BR23 | Composite | 5.0'-11.0' | 20.87% | 1,360 | 4.9 |
| 19GWP-BR21 | Composite | 2.0'-8.0' | 26.83% | 2,730 | 7.7 |
| 19ODD-BR07 | Composite | 18.0'-30.0' | 19.79% | 1,410 | 6.0 |
| 19LOD-BR16 | Composite | 33.0'-45.0' | 8.76% | 4,080 | 6.1 |
| 19SWM-05 | BULK | 20.0'-25.0' | 28.63% | 1,270 | 6.4 |
| 19SWM-14 | BULK | 10.0'-15.0' | 35.87% | 2,200 | 5.7 |
| 19SWM-12 | BULK | 5.0'-10.0' | 41.89% | 6,940 | 6.0 |
| 19SWM-11 | BULK | 15.0'-20.0' | 36.03% | 1,230 | 6.6 |

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 Mailing Address: P. O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited • USACE Validated



LABORATORY REPORT

Report To: Soil and Land Use Technology, Inc.
Attn: Olivia Erony
1818 New York Avenue
Washington, DC 20002

Report Date: September 18, 2019
Job No.: 192101
Report No.: 431050
No. of Pages: 1

Report On: Laboratory Determination of Water Soluble Sulfates and Chlorides
Project: I-495 NEXT Express Lanes - Fairfax County, Virginia
Job No. 19-0012 (HDR # 10157273)

On September 6, 2019, eight soil samples were submitted for determination of water soluble sulfates and chlorides for the above referenced project. Testing was performed as specified by the client and in accordance with the following procedures:

AASHTO T 290, "Determining Water Soluble Sulfate Ion Content in Soil".

AASHTO T 291, "Determining Water Soluble Chloride Ion Content in Soil".

Results are presented in the following table.

| Sample ID: | Sample Depth (ft) | Water Soluble Sulfate Ion, mg/kg (ppm): | Water Soluble Chloride Ion, mg/kg (ppm): |
|------------|-------------------|---|--|
| 19GWP-BR21 | 2.0 – 8.0 | 65 | 10 |
| 19GWP-BR23 | 5.0 – 11.0 | <10 | 450 |
| 19LOD-BR16 | 33.0 – 45.0 | <10 | 60 |
| 19ODD-BR07 | 18.0 – 30.0 | <10 | 505 |
| 19SWM-05 | 20.0 – 25.0 | 12 | 235 |
| 19SWM-11 | 15.0 – 20.0 | 12 | 190 |
| 19SWM-12 | 5.0 – 10.0 | 53 | <10 |
| 19SWM-14 | 10.0 – 15.0 | <10 | 85 |

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805, extension 322.

Respectfully submitted,

BOWSER-MORNER, INC.

Karl A. Fletcher, Manager
Construction Materials and
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AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 Project Next
Lawrenceville, Georgia PROJECT NO.: SME #1243-19-025
DATE RECEIVED: 07-10-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19DTR-P07 SOURCE OF MATERIAL: 19DTR-P07

| | | |
|-----|---|---------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>P07</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.76</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, L_o , inch | <u>5.8</u> |
| | INITIAL AREA, A_o , in ² | <u>6.6</u> |
| | INITIAL VOLUME $A_o L_o$, in ³ | <u>37.8</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1342.02</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1342.02</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>10.7</u> 12.3 |
| | MAX. DRY DENSITY, pcf | <u>124.2</u> 120.0 |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>10.7</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>10.6</u> |
| | COMPACTION DRY DENSITY, γ_d , pcf | <u>122.3</u> |
| | TARGET DRY DENSITY, $\% \gamma_d$ <u>100</u> TARGET MOISTURE CONTENT, % | <u>10.7</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.5%</u> 101.9% |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>45</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>07-14-2019</u> |

13. GENERAL REMARKS: Maximum Dry Density and Optimum Moisture Content were revised by the requesting agency after the testing was completed (NRR of S&ME 8/2/19)

TESTED BY RLB DATE 07-14-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SME #1243-19-025 **LABORATORY:** Boudreau Engineering, Inc.
2. **PROJECT NAME:** I-495 Project Next Lawrenceville, Georgia
3. **SOURCE OF MATERIAL:** 19DTR-P07
4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 10.7% Moisture Content
5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
6. **MATERIAL TYPE (Type 1 or Type 2)** 2
7. **TEST DATE** 07-14-2019
8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | e _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.2 | 11.9 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00095 | 0.00091 | 0.00016 | 11,497 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00095 | 0.00091 | 0.00016 | 11,531 |
| | | | 98 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00095 | 0.00091 | 0.00016 | 11,515 |
| | | | 99 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00088 | 0.00094 | 0.00091 | 0.00016 | 11,440 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00095 | 0.00091 | 0.00016 | 11,554 |
| COLUMN AVERAGE | | | | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00095 | 0.00091 | 0.00016 | 11,508 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 43 |

| Project Name: I-495 Project Next | | | Identification Marks: 19DTR-P07 | | | | | | Material Source: 19DTR-P07 | | | | | |
|----------------------------------|----------------|------|---------------------------------|------|------|-----|-----|-----|----------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.8 | 23.4 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00194 | 0.00210 | 0.00202 | 0.00035 | 10,172 |
| | | | 97 | 25.9 | 23.4 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00194 | 0.00210 | 0.00202 | 0.00035 | 10,202 |
| | | | 98 | 25.8 | 23.4 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00193 | 0.00211 | 0.00202 | 0.00035 | 10,169 |
| | | | 99 | 25.9 | 23.4 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00193 | 0.00211 | 0.00202 | 0.00035 | 10,179 |
| | | | 100 | 25.9 | 23.5 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00194 | 0.00210 | 0.00202 | 0.00035 | 10,215 |
| | COLUMN AVERAGE | | 25.9 | 23.4 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00194 | 0.00210 | 0.00202 | 0.00035 | 10,187 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 20 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.9 | 34.1 | 3.8 | 5.8 | 5.2 | 0.6 | 0.00317 | 0.00339 | 0.00328 | 0.00057 | 9,149 |
| | | | 97 | 37.9 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00317 | 0.00338 | 0.00327 | 0.00057 | 9,184 |
| | | | 98 | 37.9 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00317 | 0.00338 | 0.00327 | 0.00057 | 9,174 |
| | | | 99 | 38.0 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00316 | 0.00339 | 0.00328 | 0.00057 | 9,193 |
| | | | 100 | 37.9 | 34.3 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00317 | 0.00339 | 0.00328 | 0.00057 | 9,191 |
| | COLUMN AVERAGE | | 37.9 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00317 | 0.00338 | 0.00328 | 0.00057 | 9,178 | |
| | STANDARD DEV. | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.0 | 45.1 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00454 | 0.00477 | 0.00466 | 0.00081 | 8,510 |
| | | | 97 | 50.0 | 45.1 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00454 | 0.00476 | 0.00465 | 0.00081 | 8,522 |
| | | | 98 | 50.1 | 45.2 | 4.9 | 7.6 | 6.9 | 0.7 | 0.00454 | 0.00478 | 0.00466 | 0.00081 | 8,526 |
| | | | 99 | 50.1 | 45.1 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00454 | 0.00478 | 0.00466 | 0.00081 | 8,510 |
| | | | 100 | 50.0 | 45.1 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00454 | 0.00477 | 0.00465 | 0.00081 | 8,523 |
| | COLUMN AVERAGE | | 50.0 | 45.1 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00454 | 0.00477 | 0.00466 | 0.00081 | 8,518 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 8 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 62.3 | 56.0 | 6.2 | 9.5 | 8.5 | 0.9 | 0.00595 | 0.00621 | 0.00608 | 0.00105 | 8,105 |
| | | | 97 | 62.3 | 56.1 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00595 | 0.00621 | 0.00608 | 0.00106 | 8,104 |
| | | | 98 | 62.2 | 56.0 | 6.2 | 9.5 | 8.5 | 0.9 | 0.00595 | 0.00621 | 0.00608 | 0.00106 | 8,102 |
| | | | 99 | 62.4 | 56.2 | 6.2 | 9.5 | 8.6 | 1.0 | 0.00595 | 0.00620 | 0.00608 | 0.00105 | 8,122 |
| | | | 100 | 62.3 | 56.2 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00596 | 0.00621 | 0.00609 | 0.00106 | 8,115 |
| | COLUMN AVERAGE | | 62.3 | 56.1 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00595 | 0.00621 | 0.00608 | 0.00106 | 8,110 | |
| | STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 | |

Project Name: I-495 Project Next

Identification Marks: 19DTR-P07

Material Source: 19DTR-P07

| | | | | | | | | | | | | | | |
|------------|-----|---------------|----------------|------|------|------|-----|-----|---------|---------|---------|---------|---------|---------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00097 | 0.00093 | 0.00016 | 11,157 |
| | | | 97 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00090 | 0.00097 | 0.00093 | 0.00016 | 11,207 |
| | | | 98 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00097 | 0.00093 | 0.00016 | 11,251 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00097 | 0.00093 | 0.00016 | 11,265 |
| | | | 100 | 13.6 | 11.9 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00097 | 0.00093 | 0.00016 | 11,214 |
| | | | COLUMN AVERAGE | | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00097 | 0.00093 | 0.00016 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 42 | |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00203 | 0.00220 | 0.00211 | 0.00037 | 9,615 |
| | | | 97 | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00204 | 0.00221 | 0.00212 | 0.00037 | 9,588 |
| | | | 98 | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00203 | 0.00220 | 0.00212 | 0.00037 | 9,632 |
| | | | 99 | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00203 | 0.00219 | 0.00211 | 0.00037 | 9,598 |
| | | | 100 | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00203 | 0.00220 | 0.00212 | 0.00037 | 9,599 |
| | | | COLUMN AVERAGE | | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00203 | 0.00220 | 0.00212 | 0.00037 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 37.4 | 33.7 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00341 | 0.00363 | 0.00352 | 0.00061 | 8,402 |
| | | | 97 | 37.4 | 33.8 | 3.6 | 5.7 | 5.2 | 0.6 | 0.00340 | 0.00364 | 0.00352 | 0.00061 | 8,442 |
| | | | 98 | 37.4 | 33.6 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00341 | 0.00363 | 0.00352 | 0.00061 | 8,402 |
| | | | 99 | 37.4 | 33.7 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00340 | 0.00364 | 0.00352 | 0.00061 | 8,414 |
| | | | 100 | 37.4 | 33.7 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00340 | 0.00363 | 0.00352 | 0.00061 | 8,428 |
| | | | COLUMN AVERAGE | | 37.4 | 33.7 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00340 | 0.00363 | 0.00352 | 0.00061 |
| | | STANDARD DEV. | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 17 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 49.4 | 44.4 | 5.0 | 7.5 | 6.8 | 0.8 | 0.00498 | 0.00520 | 0.00509 | 0.00088 | 7,668 |
| | | | 97 | 49.3 | 44.4 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00498 | 0.00520 | 0.00509 | 0.00088 | 7,671 |
| | | | 98 | 49.3 | 44.4 | 4.9 | 7.5 | 6.8 | 0.8 | 0.00498 | 0.00521 | 0.00509 | 0.00088 | 7,665 |
| | | | 99 | 49.4 | 44.5 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00497 | 0.00521 | 0.00509 | 0.00088 | 7,679 |
| | | | 100 | 49.4 | 44.5 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00498 | 0.00521 | 0.00510 | 0.00088 | 7,669 |
| | | | COLUMN AVERAGE | | 49.4 | 44.4 | 4.9 | 7.5 | 6.8 | 0.8 | 0.00498 | 0.00521 | 0.00509 | 0.00088 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 5 | |

Project Name: I-495 Project Next

Identification Marks: 19DTR-P07

Material Source: 19DTR-P07

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 61.8 | 55.7 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00645 | 0.00671 | 0.00658 | 0.00114 | 7,440 |
| | | | 97 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 0.9 | 0.00645 | 0.00671 | 0.00658 | 0.00114 | 7,447 |
| | | | 98 | 61.8 | 55.6 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00645 | 0.00671 | 0.00658 | 0.00114 | 7,425 |
| | | | 99 | 61.8 | 55.6 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00645 | 0.00672 | 0.00658 | 0.00114 | 7,425 |
| | | | 100 | 61.7 | 55.5 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00646 | 0.00672 | 0.00659 | 0.00114 | 7,413 |
| | COLUMN AVERAGE | | | 61.8 | 55.6 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00645 | 0.00671 | 0.00658 | 0.00114 | 7,430 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00108 | 0.00104 | 0.00018 | 9,946 |
| | | | 97 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00107 | 0.00103 | 0.00018 | 9,956 |
| | | | 98 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00098 | 0.00108 | 0.00103 | 0.00018 | 9,997 |
| | | | 99 | 13.8 | 11.7 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00108 | 0.00103 | 0.00018 | 9,950 |
| | | | 100 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00108 | 0.00103 | 0.00018 | 9,983 |
| | COLUMN AVERAGE | | | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00108 | 0.00103 | 0.00018 | 9,966 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 22 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.2 | 22.8 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00227 | 0.00243 | 0.00235 | 0.00041 | 8,514 |
| | | | 97 | 25.2 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00227 | 0.00244 | 0.00235 | 0.00041 | 8,518 |
| | | | 98 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00244 | 0.00235 | 0.00041 | 8,560 |
| | | | 99 | 25.2 | 22.8 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00226 | 0.00244 | 0.00235 | 0.00041 | 8,516 |
| | | | 100 | 25.2 | 22.8 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00227 | 0.00244 | 0.00236 | 0.00041 | 8,492 |
| | COLUMN AVERAGE | | | 25.2 | 22.8 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00227 | 0.00244 | 0.00235 | 0.00041 | 8,520 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 25 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 36.7 | 33.1 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00376 | 0.00398 | 0.00387 | 0.00067 | 7,518 |
| | | | 97 | 36.8 | 33.2 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00377 | 0.00398 | 0.00387 | 0.00067 | 7,531 |
| | | | 98 | 36.8 | 33.1 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00376 | 0.00399 | 0.00387 | 0.00067 | 7,516 |
| | | | 99 | 36.8 | 33.1 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00376 | 0.00398 | 0.00387 | 0.00067 | 7,524 |
| | | | 100 | 36.9 | 33.2 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00376 | 0.00398 | 0.00387 | 0.00067 | 7,541 |
| | COLUMN AVERAGE | | | 36.8 | 33.1 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00376 | 0.00398 | 0.00387 | 0.00067 | 7,526 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |

Project Name: I-495 Project Next

Identification Marks: 19DTR-P07

Material Source: 19DTR-P07

| | | | | | | | | | | | | | | |
|-------------|----------------|------|------|------|------|-----|-----|---------|---------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 48.5 | 43.6 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00542 | 0.00567 | 0.00555 | 0.00096 | 6,919 |
| | | | 97 | 48.7 | 43.8 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00543 | 0.00566 | 0.00555 | 0.00096 | 6,944 |
| | | | 98 | 48.6 | 43.7 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00543 | 0.00566 | 0.00555 | 0.00096 | 6,932 |
| | | | 99 | 48.6 | 43.7 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00543 | 0.00567 | 0.00555 | 0.00096 | 6,922 |
| | | | 100 | 48.6 | 43.7 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00544 | 0.00565 | 0.00555 | 0.00096 | 6,930 |
| | COLUMN AVERAGE | | 48.6 | 43.7 | 4.9 | 7.4 | 6.7 | 0.7 | 0.00543 | 0.00566 | 0.00555 | 0.00096 | 6,929 | |
| | STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 10 | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 61.0 | 54.9 | 6.1 | 9.3 | 8.4 | 0.9 | 0.00700 | 0.00724 | 0.00712 | 0.00124 | 6,773 |
| | | | 97 | 61.0 | 54.9 | 6.1 | 9.3 | 8.4 | 0.9 | 0.00700 | 0.00725 | 0.00713 | 0.00124 | 6,768 |
| | | | 98 | 61.0 | 54.8 | 6.2 | 9.3 | 8.4 | 0.9 | 0.00700 | 0.00725 | 0.00713 | 0.00124 | 6,762 |
| | | | 99 | 61.0 | 54.8 | 6.2 | 9.3 | 8.4 | 0.9 | 0.00701 | 0.00725 | 0.00713 | 0.00124 | 6,763 |
| | | | 100 | 60.9 | 54.8 | 6.1 | 9.3 | 8.4 | 0.9 | 0.00701 | 0.00724 | 0.00713 | 0.00124 | 6,759 |
| | COLUMN AVERAGE | | 61.0 | 54.8 | 6.1 | 9.3 | 8.4 | 0.9 | 0.00701 | 0.00725 | 0.00713 | 0.00124 | 6,765 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 6 | | |

TESTED BY

RLB

DATE

07-14-2019

Boudreau Engineering, Inc.

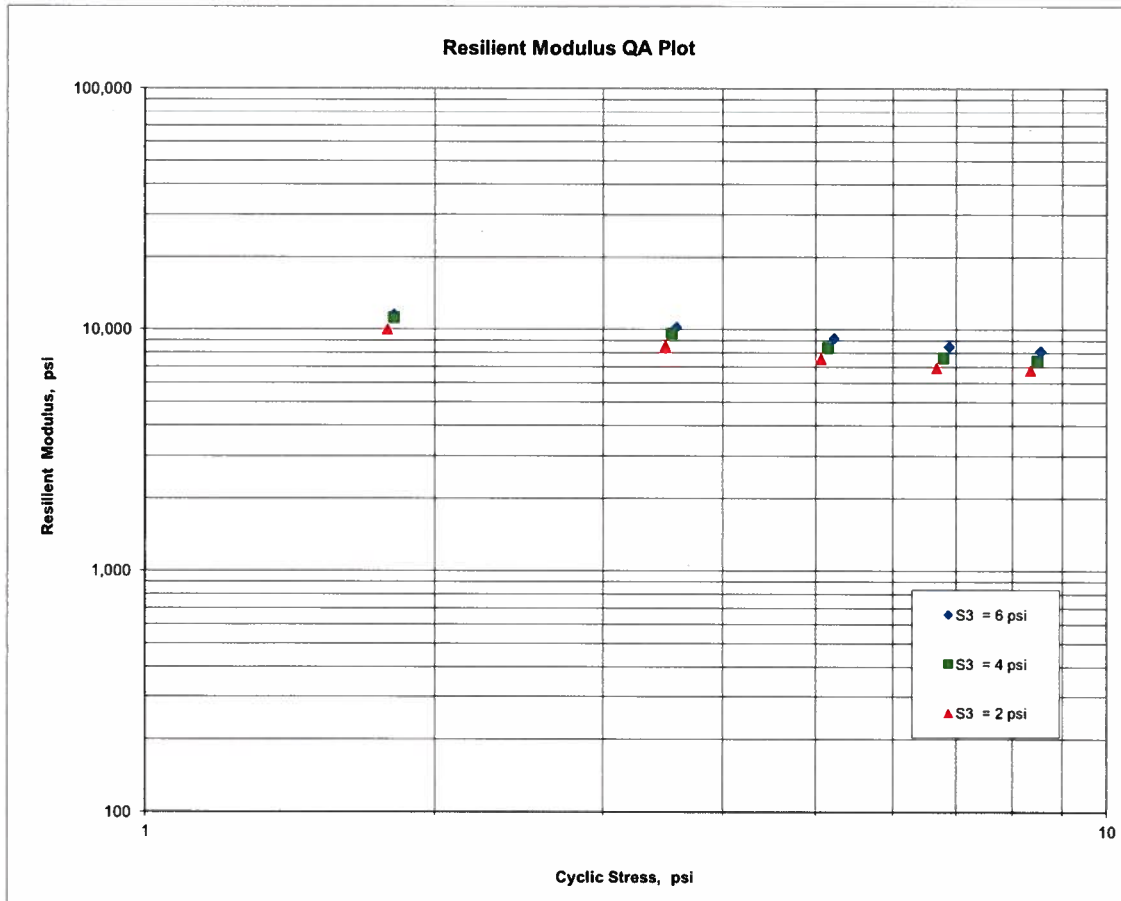
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19DTR-P07 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 10.7% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-14-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

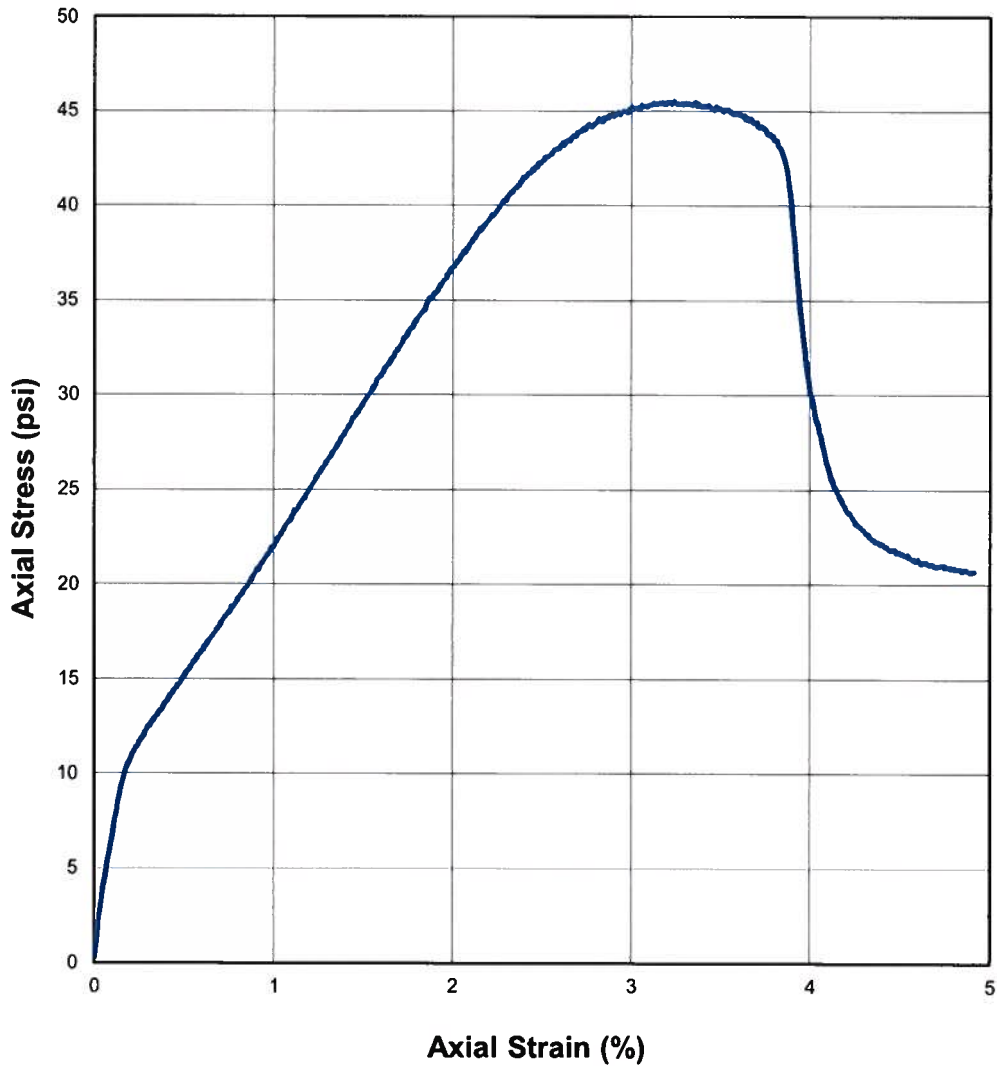
K1 = 10,241
 K2 = -0.25732
 K5 = 0.17050
 R² = 0.99



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19DTR-P07 |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 10.7% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-14-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 09-20-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19DTR-P08 SOURCE OF MATERIAL: 19DTR-P08

| | |
|---|-------------------|
| 1. SAMPLING DATE: | <u>N.R.</u> |
| 2. SAMPLE NUMBER: | <u>19DTR-P08</u> |
| 3. LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. TEST INFORMATION | |
| PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. SPECIMEN INFO.: | |
| SPECIMEN DIAM., inch | |
| TOP | <u>2.9</u> |
| MIDDLE | <u>2.9</u> |
| BOTTOM | <u>2.9</u> |
| AVERAGE | <u>2.9</u> |
| MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| NET DIAM., inch | <u>2.9</u> |
| HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.80</u> |
| HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| INITIAL LENGTH, L_0 , inch | <u>5.8</u> |
| INITIAL AREA, A_0 , in ² | <u>6.6</u> |
| INITIAL VOLUME $A_0 L_0$, in ³ | <u>38.1</u> |
| INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. SOIL SPECIMEN WEIGHT (for remolded samples): | |
| INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1372.78</u> |
| FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| WEIGHT OF WET SOIL USED, grams | <u>1372.78</u> |
| 9. SOIL PROPERTIES.: | |
| For Remolded Samples: | |
| IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| or | |
| OPTIMUM MOISTURE CONTENT, % | <u>9.3</u> |
| MAX. DRY DENSITY, pcf | <u>128.8</u> |
| For Tube Samples: | |
| IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| WET DENSITY, pcf | <u>N/A</u> |
| DRY DENSITY, pcf | <u>N/A</u> |
| 10. SPECIMEN PROPERTIES (for remolded samples): | |
| COMPACTION MOISTURE CONTENT, % | <u>9.3</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>9.2</u> |
| COMPACTION DRY DENSITY, γ_d , pcf | <u>125.8</u> |
| TARGET DRY DENSITY, % γ_d <u>100</u> TARGET MOISTURE CONTENT, % | <u>9.3</u> |
| COMPACTION LEVEL ACHIEVED | <u>97.6%</u> |
| 11. QUICK SHEAR TEST | |
| STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| TRIAxIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>36</u> |
| SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. TEST DATE | <u>09-24-2019</u> |
| 13. GENERAL REMARKS: | |

TESTED BY RLB DATE 09-24-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19DTR-P08
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 9.3% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 09-24-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00127 | 0.00114 | 0.00120 | 0.00021 | 8,623 |
| | | | 97 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00127 | 0.00113 | 0.00120 | 0.00021 | 8,625 |
| | | | 98 | 13.1 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00127 | 0.00113 | 0.00120 | 0.00021 | 8,613 |
| | | | 99 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00128 | 0.00114 | 0.00121 | 0.00021 | 8,637 |
| | | | 100 | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00127 | 0.00113 | 0.00120 | 0.00021 | 8,625 |
| COLUMN AVERAGE | | | | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00127 | 0.00113 | 0.00120 | 0.00021 | 8,625 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 |

| Project Name: I-495 NEXT Express Lanes | | Identification Marks: 19DTR-P08 | | | | | Material Source: 19DTR-P08 | | | | | | | |
|--|-----|---------------------------------|-----|------|------|-----|----------------------------|-----|---------|---------|---------|---------|---------|-------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00268 | 0.00280 | 0.00048 | 7.286 |
| | | | 97 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00267 | 0.00280 | 0.00048 | 7.240 |
| | | | 98 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00267 | 0.00280 | 0.00048 | 7.265 |
| | | | 99 | 25.5 | 23.1 | 2.3 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00268 | 0.00280 | 0.00048 | 7.303 |
| | | | 100 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00267 | 0.00280 | 0.00048 | 7.261 |
| COLUMN AVERAGE | | | | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00292 | 0.00267 | 0.00280 | 0.00048 | 7.271 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 24 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00471 | 0.00433 | 0.00452 | 0.00078 | 6.573 |
| | | | 97 | 37.3 | 33.7 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00471 | 0.00433 | 0.00452 | 0.00078 | 6.589 |
| | | | 98 | 37.4 | 33.7 | 3.6 | 5.7 | 5.1 | 0.6 | 0.00471 | 0.00433 | 0.00452 | 0.00078 | 6.596 |
| | | | 99 | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00471 | 0.00432 | 0.00452 | 0.00078 | 6.576 |
| | | | 100 | 37.3 | 33.7 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00471 | 0.00433 | 0.00452 | 0.00078 | 6.581 |
| COLUMN AVERAGE | | | | 37.3 | 33.7 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00471 | 0.00433 | 0.00452 | 0.00078 | 6.583 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 49.5 | 44.7 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00662 | 0.00612 | 0.00637 | 0.00110 | 6.194 |
| | | | 97 | 49.6 | 44.8 | 4.8 | 7.6 | 6.8 | 0.7 | 0.00663 | 0.00612 | 0.00638 | 0.00110 | 6.208 |
| | | | 98 | 49.6 | 44.8 | 4.7 | 7.5 | 6.8 | 0.7 | 0.00663 | 0.00611 | 0.00637 | 0.00110 | 6.212 |
| | | | 99 | 49.6 | 44.8 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00663 | 0.00612 | 0.00637 | 0.00110 | 6.201 |
| | | | 100 | 49.5 | 44.7 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00663 | 0.00611 | 0.00637 | 0.00110 | 6.203 |
| COLUMN AVERAGE | | | | 49.5 | 44.8 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00663 | 0.00612 | 0.00637 | 0.00110 | 6.204 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 7 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 62.1 | 56.2 | 5.9 | 9.5 | 8.6 | 0.9 | 0.00859 | 0.00792 | 0.00826 | 0.00142 | 6.009 |
| | | | 97 | 62.0 | 56.1 | 5.9 | 9.4 | 8.5 | 0.9 | 0.00859 | 0.00791 | 0.00825 | 0.00142 | 6.005 |
| | | | 98 | 62.1 | 56.2 | 5.9 | 9.5 | 8.6 | 0.9 | 0.00858 | 0.00791 | 0.00825 | 0.00142 | 6.010 |
| | | | 99 | 62.1 | 56.2 | 5.9 | 9.5 | 8.6 | 0.9 | 0.00860 | 0.00791 | 0.00825 | 0.00142 | 6.011 |
| | | | 100 | 62.1 | 56.2 | 5.9 | 9.5 | 8.6 | 0.9 | 0.00859 | 0.00791 | 0.00825 | 0.00142 | 6.014 |
| COLUMN AVERAGE | | | | 62.1 | 56.2 | 5.9 | 9.5 | 8.6 | 0.9 | 0.00859 | 0.00791 | 0.00825 | 0.00142 | 6.010 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 4 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19DTR-P08

Material Source: 19DTR-P08

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.4 | 11.7 | 1.7 | 2.0 | 1.8 | 0.3 | 0.00132 | 0.00116 | 0.00124 | 0.00021 | 8,341 |
| | | | 97 | 13.5 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00131 | 0.00116 | 0.00124 | 0.00021 | 8,375 |
| | | | 98 | 13.4 | 11.7 | 1.7 | 2.0 | 1.8 | 0.3 | 0.00132 | 0.00116 | 0.00124 | 0.00021 | 8,335 |
| | | | 99 | 13.5 | 11.7 | 1.7 | 2.0 | 1.8 | 0.3 | 0.00131 | 0.00116 | 0.00124 | 0.00021 | 8,349 |
| | | | 100 | 13.5 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00131 | 0.00117 | 0.00124 | 0.00021 | 8,372 |
| COLUMN AVERAGE | | | | 13.5 | 11.7 | 1.7 | 2.0 | 1.8 | 0.3 | 0.00131 | 0.00116 | 0.00124 | 0.00021 | 8,354 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00299 | 0.00052 | 6,616 |
| | | | 97 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00300 | 0.00052 | 6,600 |
| | | | 98 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00299 | 0.00052 | 6,604 |
| | | | 99 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00299 | 0.00052 | 6,598 |
| | | | 100 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00300 | 0.00052 | 6,602 |
| COLUMN AVERAGE | | | | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00314 | 0.00285 | 0.00299 | 0.00052 | 6,604 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 7 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 36.5 | 33.0 | 3.5 | 5.6 | 5.0 | 0.5 | 0.00526 | 0.00486 | 0.00506 | 0.00087 | 5,751 |
| | | | 97 | 36.4 | 32.9 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00528 | 0.00486 | 0.00507 | 0.00087 | 5,724 |
| | | | 98 | 36.2 | 32.7 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00526 | 0.00488 | 0.00507 | 0.00088 | 5,692 |
| | | | 99 | 36.4 | 32.9 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00525 | 0.00490 | 0.00507 | 0.00087 | 5,721 |
| | | | 100 | 36.4 | 32.9 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00525 | 0.00488 | 0.00507 | 0.00087 | 5,737 |
| COLUMN AVERAGE | | | | 36.4 | 32.9 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00526 | 0.00488 | 0.00507 | 0.00087 | 5,725 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 22 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 48.6 | 43.9 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00747 | 0.00694 | 0.00720 | 0.00124 | 5,381 |
| | | | 97 | 48.6 | 43.9 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00747 | 0.00695 | 0.00721 | 0.00124 | 5,382 |
| | | | 98 | 48.4 | 43.8 | 4.6 | 7.4 | 6.7 | 0.7 | 0.00747 | 0.00695 | 0.00721 | 0.00124 | 5,364 |
| | | | 99 | 48.4 | 43.7 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00747 | 0.00694 | 0.00721 | 0.00124 | 5,358 |
| | | | 100 | 48.5 | 43.9 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00746 | 0.00694 | 0.00720 | 0.00124 | 5,377 |
| COLUMN AVERAGE | | | | 48.5 | 43.9 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00747 | 0.00694 | 0.00721 | 0.00124 | 5,373 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19DTR-P08

Material Source: 19DTR-P08

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 61.2 | 55.3 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00952 | 0.00885 | 0.00919 | 0.00159 | 5,314 |
| | | | 97 | 61.2 | 55.3 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00952 | 0.00885 | 0.00919 | 0.00159 | 5,312 |
| | | | 98 | 61.1 | 55.3 | 5.8 | 9.3 | 8.4 | 0.9 | 0.00952 | 0.00886 | 0.00919 | 0.00159 | 5,311 |
| | | | 99 | 61.2 | 55.3 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00952 | 0.00886 | 0.00919 | 0.00159 | 5,315 |
| | | | 100 | 61.3 | 55.5 | 5.8 | 9.3 | 8.5 | 0.9 | 0.00952 | 0.00886 | 0.00919 | 0.00159 | 5,331 |
| COLUMN AVERAGE | | | | 61.2 | 55.3 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00952 | 0.00886 | 0.00919 | 0.00159 | 5,317 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.6 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00148 | 0.00134 | 0.00141 | 0.00024 | 7,161 |
| | | | 97 | 13.6 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00149 | 0.00135 | 0.00142 | 0.00024 | 7,159 |
| | | | 98 | 13.6 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00149 | 0.00134 | 0.00141 | 0.00024 | 7,147 |
| | | | 99 | 13.6 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00149 | 0.00134 | 0.00141 | 0.00024 | 7,142 |
| | | | 100 | 13.6 | 11.5 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00149 | 0.00134 | 0.00142 | 0.00024 | 7,146 |
| COLUMN AVERAGE | | | | 13.6 | 11.5 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00149 | 0.00134 | 0.00141 | 0.00024 | 7,151 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 23.9 | 21.5 | 2.4 | 3.6 | 3.3 | 0.4 | 0.00352 | 0.00328 | 0.00340 | 0.00059 | 5,594 |
| | | | 97 | 24.0 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00352 | 0.00328 | 0.00340 | 0.00059 | 5,628 |
| | | | 98 | 24.0 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00353 | 0.00328 | 0.00340 | 0.00059 | 5,621 |
| | | | 99 | 24.0 | 21.5 | 2.4 | 3.6 | 3.3 | 0.4 | 0.00353 | 0.00328 | 0.00340 | 0.00059 | 5,592 |
| | | | 100 | 23.9 | 21.6 | 2.3 | 3.6 | 3.3 | 0.4 | 0.00352 | 0.00328 | 0.00340 | 0.00059 | 5,613 |
| COLUMN AVERAGE | | | | 24.0 | 21.6 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00352 | 0.00328 | 0.00340 | 0.00059 | 5,610 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 16 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 35.3 | 31.9 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00589 | 0.00555 | 0.00572 | 0.00099 | 4,913 |
| | | | 97 | 35.3 | 31.8 | 3.5 | 5.4 | 4.8 | 0.5 | 0.00590 | 0.00556 | 0.00573 | 0.00099 | 4,902 |
| | | | 98 | 35.3 | 31.8 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00589 | 0.00556 | 0.00573 | 0.00099 | 4,908 |
| | | | 99 | 35.3 | 31.9 | 3.4 | 5.4 | 4.9 | 0.5 | 0.00590 | 0.00556 | 0.00573 | 0.00099 | 4,908 |
| | | | 100 | 35.3 | 31.8 | 3.5 | 5.4 | 4.8 | 0.5 | 0.00590 | 0.00557 | 0.00573 | 0.00099 | 4,894 |
| COLUMN AVERAGE | | | | 35.3 | 31.8 | 3.5 | 5.4 | 4.8 | 0.5 | 0.00590 | 0.00556 | 0.00573 | 0.00099 | 4,905 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 7 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19DTR-P08

Material Source: 19DTR-P08

| | | | | | | | | | | | | | | |
|---------------|-----|------|----------------|------|------|-----|------|------|---------|---------|---------|---------|---------|---------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 47.3 | 42.7 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00837 | 0.00790 | 0.00813 | 0.00140 | 4,628 |
| | | | 97 | 47.3 | 42.6 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00838 | 0.00789 | 0.00813 | 0.00140 | 4,629 |
| | | | 98 | 47.3 | 42.7 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00838 | 0.00788 | 0.00813 | 0.00140 | 4,634 |
| | | | 99 | 47.3 | 42.7 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00838 | 0.00789 | 0.00814 | 0.00140 | 4,631 |
| | | | 100 | 47.3 | 42.7 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00837 | 0.00789 | 0.00813 | 0.00140 | 4,637 |
| | | | COLUMN AVERAGE | | | | 47.3 | 42.7 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00838 | 0.00789 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | | 4 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 59.5 | 53.7 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01064 | 0.00999 | 0.01031 | 0.00178 | 4,600 |
| | | | 97 | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01065 | 0.00999 | 0.01032 | 0.00178 | 4,603 |
| | | | 98 | 59.7 | 54.0 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01065 | 0.00999 | 0.01032 | 0.00178 | 4,616 |
| | | | 99 | 59.5 | 53.7 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01065 | 0.00999 | 0.01032 | 0.00178 | 4,599 |
| | | | 100 | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01065 | 0.00999 | 0.01032 | 0.00178 | 4,603 |
| | | | COLUMN AVERAGE | | | | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.01065 | 0.00999 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | | 7 |

TESTED BY RLB DATE 09-24-2019

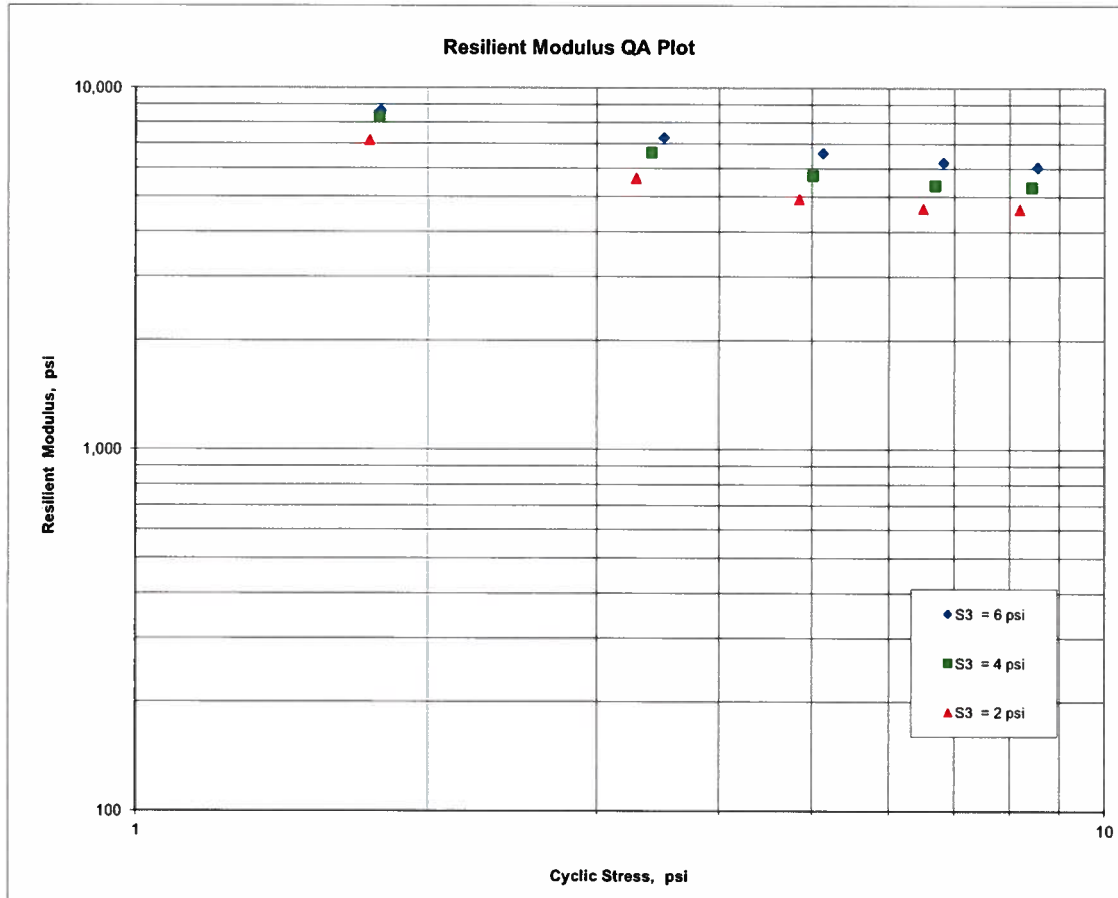
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|---|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19DTR-P08 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 9.3% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 09-24-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

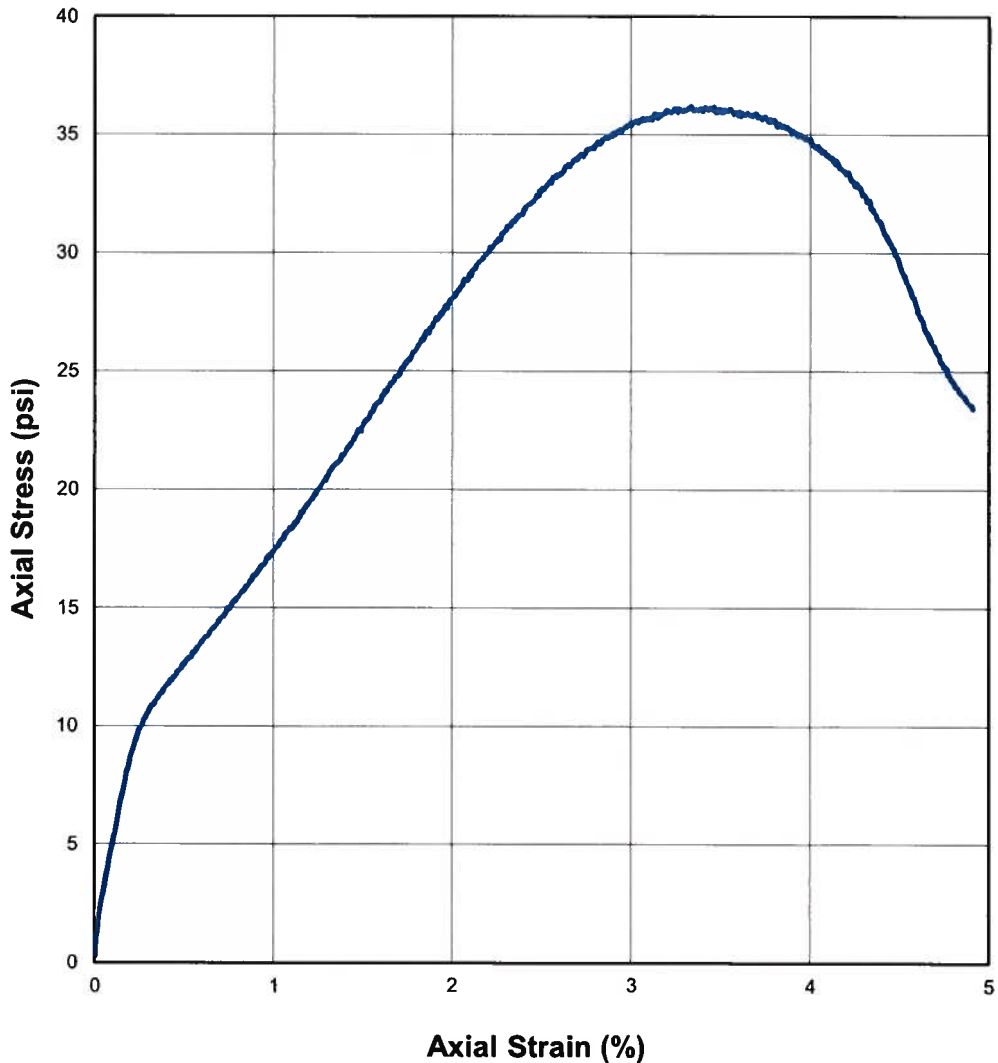
| | |
|------------------|----------|
| K1 = | 6,700 |
| K2 = | -0.27915 |
| K5 = | 0.24697 |
| R ² = | 0.97 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> |
| 3. SOURCE OF MATERIAL: | <u>19DTR-P08</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 9.3% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>09-24-2019</u> |





**AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)**

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 Project Next
Lawrenceville, Georgia PROJECT NO.: SME #1243-19-025
 DATE RECEIVED: 07-19-2019 QUANTITY (REPRESENTED): N.A.
 IDENTIFICATION MARKS: 19GTP-E-P12 SOURCE OF MATERIAL: 19GTP-E-P12

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>E-12</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.71</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, Lo, inch | <u>5.7</u> |
| | INITIAL AREA, Ao, in ² | <u>6.5</u> |
| | INITIAL VOLUME Ao Lo, in ³ | <u>37.3</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1267.07</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1267.07</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>17.3</u> |
| | MAX. DRY DENSITY, pcf | <u>111.8</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>17.3</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>17.1</u> |
| | COMPACTION DRY DENSITY, γ _d , pcf | <u>110.4</u> |
| | TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | <u>17.3</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.8%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>52</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>N</u> |
| 12. | TEST DATE | <u>07-25-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 07-25-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SME #1243-19-025 LABORATORY: Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 Project Next Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19GTP-E-P12
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 17.3% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 07-25-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | C ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00071 | 0.00072 | 0.00013 | 14,380 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00073 | 0.00071 | 0.00072 | 0.00013 | 14,410 |
| | | | 98 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00071 | 0.00073 | 0.00013 | 14,307 |
| | | | 99 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00071 | 0.00072 | 0.00013 | 14,445 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00071 | 0.00072 | 0.00013 | 14,435 |
| COLUMN AVERAGE | | | | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00071 | 0.00072 | 0.00013 | 14,395 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 56 |

Project Name: I-495 Project Next

Identification Marks: 19GTP-E-P12

Material Source: 19GTP-E-P12

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00153 | 0.00148 | 0.00150 | 0.00026 | 13,663 |
| | | | 97 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00153 | 0.00148 | 0.00151 | 0.00026 | 13,669 |
| | | | 98 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00153 | 0.00148 | 0.00150 | 0.00026 | 13,666 |
| | | | 99 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00154 | 0.00147 | 0.00150 | 0.00026 | 13,740 |
| | | | 100 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00153 | 0.00148 | 0.00151 | 0.00026 | 13,687 |
| COLUMN AVERAGE | | | | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00153 | 0.00148 | 0.00151 | 0.00026 | 13,685 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 32 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.4 | 34.7 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00245 | 0.00248 | 0.00043 | 12,225 |
| | | | 97 | 38.5 | 34.7 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00245 | 0.00248 | 0.00043 | 12,240 |
| | | | 98 | 38.5 | 34.7 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00245 | 0.00248 | 0.00043 | 12,225 |
| | | | 99 | 38.5 | 34.8 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00246 | 0.00249 | 0.00044 | 12,244 |
| | | | 100 | 38.5 | 34.7 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00245 | 0.00249 | 0.00044 | 12,230 |
| COLUMN AVERAGE | | | | 38.5 | 34.7 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00245 | 0.00249 | 0.00044 | 12,233 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.5 | 45.4 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00361 | 0.00353 | 0.00357 | 0.00063 | 11,133 |
| | | | 97 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00361 | 0.00354 | 0.00357 | 0.00063 | 11,142 |
| | | | 98 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00361 | 0.00353 | 0.00357 | 0.00063 | 11,156 |
| | | | 99 | 50.5 | 45.4 | 5.1 | 7.7 | 7.0 | 0.8 | 0.00361 | 0.00354 | 0.00357 | 0.00063 | 11,140 |
| | | | 100 | 50.6 | 45.5 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00360 | 0.00354 | 0.00357 | 0.00063 | 11,153 |
| COLUMN AVERAGE | | | | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00361 | 0.00354 | 0.00357 | 0.00063 | 11,145 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00482 | 0.00473 | 0.00477 | 0.00084 | 10,317 |
| | | | 97 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00483 | 0.00473 | 0.00478 | 0.00084 | 10,290 |
| | | | 98 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00482 | 0.00474 | 0.00478 | 0.00084 | 10,298 |
| | | | 99 | 62.3 | 56.0 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00481 | 0.00474 | 0.00477 | 0.00084 | 10,279 |
| | | | 100 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00481 | 0.00475 | 0.00478 | 0.00084 | 10,293 |
| COLUMN AVERAGE | | | | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00482 | 0.00474 | 0.00478 | 0.00084 | 10,295 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 14 |

| Project Name: I-495 Project Next | | | Identification Marks: 19GTP-E-P12 | | | | | | Material Source: 19GTP-E-P12 | | | | | |
|----------------------------------|-----|-----|-----------------------------------|------|------|-----|-----|-----|------------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.6 | 11.9 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00074 | 0.00076 | 0.00013 | 13,699 |
| | | | 97 | 13.7 | 11.9 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00077 | 0.00074 | 0.00076 | 0.00013 | 13,774 |
| | | | 98 | 13.6 | 11.9 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00075 | 0.00076 | 0.00013 | 13,644 |
| | | | 99 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00075 | 0.00077 | 0.00013 | 13,552 |
| | | | 100 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00074 | 0.00076 | 0.00013 | 13,627 |
| COLUMN AVERAGE | | | | 13.6 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00074 | 0.00076 | 0.00013 | 13,659 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 83 | |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00160 | 0.00162 | 0.00028 | 12,656 |
| | | | 97 | 25.7 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00165 | 0.00159 | 0.00162 | 0.00028 | 12,586 |
| | | | 98 | 25.8 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00165 | 0.00159 | 0.00162 | 0.00028 | 12,598 |
| | | | 99 | 25.8 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00164 | 0.00159 | 0.00162 | 0.00028 | 12,626 |
| | | | 100 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00159 | 0.00162 | 0.00028 | 12,641 |
| COLUMN AVERAGE | | | | 25.8 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00164 | 0.00159 | 0.00162 | 0.00028 | 12,621 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 29 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.2 | 34.4 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00263 | 0.00258 | 0.00261 | 0.00046 | 11,560 |
| | | | 97 | 38.3 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00257 | 0.00260 | 0.00046 | 11,603 |
| | | | 98 | 38.3 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00263 | 0.00258 | 0.00261 | 0.00046 | 11,599 |
| | | | 99 | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00257 | 0.00260 | 0.00046 | 11,603 |
| | | | 100 | 38.3 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00257 | 0.00260 | 0.00046 | 11,608 |
| COLUMN AVERAGE | | | | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00257 | 0.00261 | 0.00046 | 11,595 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 20 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 50.2 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00377 | 0.00371 | 0.00374 | 0.00065 | 10,585 |
| | | | 97 | 50.3 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00377 | 0.00370 | 0.00374 | 0.00065 | 10,604 |
| | | | 98 | 50.3 | 45.3 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00377 | 0.00370 | 0.00373 | 0.00065 | 10,613 |
| | | | 99 | 50.3 | 45.3 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00377 | 0.00369 | 0.00373 | 0.00065 | 10,633 |
| | | | 100 | 50.2 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00376 | 0.00369 | 0.00373 | 0.00065 | 10,622 |
| COLUMN AVERAGE | | | | 50.3 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00377 | 0.00370 | 0.00373 | 0.00065 | 10,612 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00001 | 0.00000 | 18 | |

| Project Name: I-495 Project Next | | | Identification Marks: 19GTP-E-P12 | | | | | | Material Source: 19GTP-E-P12 | | | | | |
|----------------------------------|-----|------|-----------------------------------|------|------|-----|-----|-----|------------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00500 | 0.00491 | 0.00496 | 0.00087 | 9,922 |
| | | | 97 | 62.4 | 56.1 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00500 | 0.00492 | 0.00496 | 0.00087 | 9,913 |
| | | | 98 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00500 | 0.00491 | 0.00496 | 0.00087 | 9,924 |
| | | | 99 | 62.4 | 56.1 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00499 | 0.00492 | 0.00495 | 0.00087 | 9,916 |
| | | | 100 | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00499 | 0.00492 | 0.00495 | 0.00087 | 9,932 |
| COLUMN AVERAGE | | | | 62.5 | 56.2 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00500 | 0.00492 | 0.00496 | 0.00087 | 9,922 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 8 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.9 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00082 | 0.00083 | 0.00015 | 12,359 |
| | | | 97 | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00084 | 0.00082 | 0.00083 | 0.00015 | 12,403 |
| | | | 98 | 14.0 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00082 | 0.00083 | 0.00015 | 12,401 |
| | | | 99 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00082 | 0.00083 | 0.00015 | 12,336 |
| | | | 100 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00084 | 0.00082 | 0.00083 | 0.00015 | 12,490 |
| COLUMN AVERAGE | | | | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00082 | 0.00083 | 0.00015 | 12,398 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 59 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00181 | 0.00175 | 0.00178 | 0.00031 | 11,385 |
| | | | 97 | 25.5 | 23.1 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00181 | 0.00175 | 0.00178 | 0.00031 | 11,346 |
| | | | 98 | 25.6 | 23.1 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00180 | 0.00175 | 0.00178 | 0.00031 | 11,410 |
| | | | 99 | 25.6 | 23.2 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00181 | 0.00175 | 0.00178 | 0.00031 | 11,392 |
| | | | 100 | 25.6 | 23.1 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00180 | 0.00176 | 0.00178 | 0.00031 | 11,371 |
| COLUMN AVERAGE | | | | 25.6 | 23.1 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00181 | 0.00175 | 0.00178 | 0.00031 | 11,381 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 24 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.0 | 34.3 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00285 | 0.00279 | 0.00282 | 0.00049 | 10,635 |
| | | | 97 | 38.0 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00285 | 0.00279 | 0.00282 | 0.00049 | 10,615 |
| | | | 98 | 38.0 | 34.3 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00285 | 0.00279 | 0.00282 | 0.00049 | 10,638 |
| | | | 99 | 37.9 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00285 | 0.00279 | 0.00282 | 0.00049 | 10,614 |
| | | | 100 | 37.9 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00286 | 0.00280 | 0.00283 | 0.00050 | 10,593 |
| COLUMN AVERAGE | | | | 38.0 | 34.2 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00285 | 0.00279 | 0.00282 | 0.00049 | 10,619 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 | |

Project Name: I-495 Project Next

Identification Marks: 19GTP-E-P12

Material Source: 19GTP-E-P12

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 50.0 | 45.0 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00403 | 0.00396 | 0.00399 | 0.00070 | 9,862 |
| | | | 97 | 49.9 | 44.9 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00403 | 0.00396 | 0.00399 | 0.00070 | 9,843 |
| | | | 98 | 49.9 | 44.9 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00403 | 0.00396 | 0.00399 | 0.00070 | 9,845 |
| | | | 99 | 50.0 | 44.9 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00402 | 0.00396 | 0.00399 | 0.00070 | 9,852 |
| | | | 100 | 50.0 | 45.0 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00403 | 0.00397 | 0.00400 | 0.00070 | 9,847 |
| COLUMN AVERAGE | | | | 50.0 | 44.9 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00403 | 0.00396 | 0.00399 | 0.00070 | 9,850 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 62.1 | 55.8 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00530 | 0.00521 | 0.00525 | 0.00092 | 9,305 |
| | | | 97 | 62.0 | 55.7 | 6.3 | 9.5 | 8.5 | 1.0 | 0.00529 | 0.00522 | 0.00526 | 0.00092 | 9,279 |
| | | | 98 | 62.1 | 55.8 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00529 | 0.00521 | 0.00525 | 0.00092 | 9,304 |
| | | | 99 | 62.2 | 55.8 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00529 | 0.00521 | 0.00525 | 0.00092 | 9,313 |
| | | | 100 | 62.1 | 55.8 | 6.3 | 9.5 | 8.5 | 1.0 | 0.00530 | 0.00522 | 0.00526 | 0.00092 | 9,289 |
| COLUMN AVERAGE | | | | 62.1 | 55.8 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00529 | 0.00521 | 0.00525 | 0.00092 | 9,298 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 14 |

TESTED BY RLB DATE 07-25-2019

Boudreau Engineering, Inc.

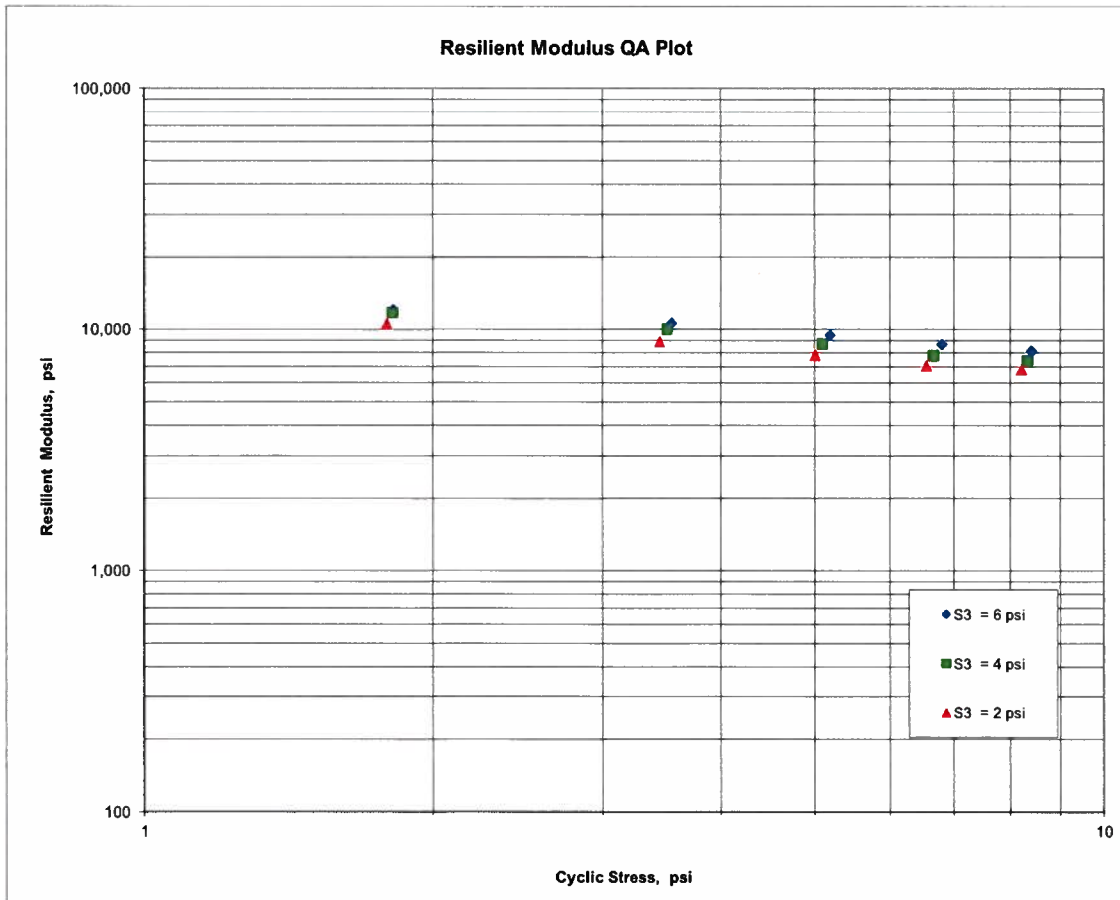
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19GTP-E-P12 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 17.3% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-25-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

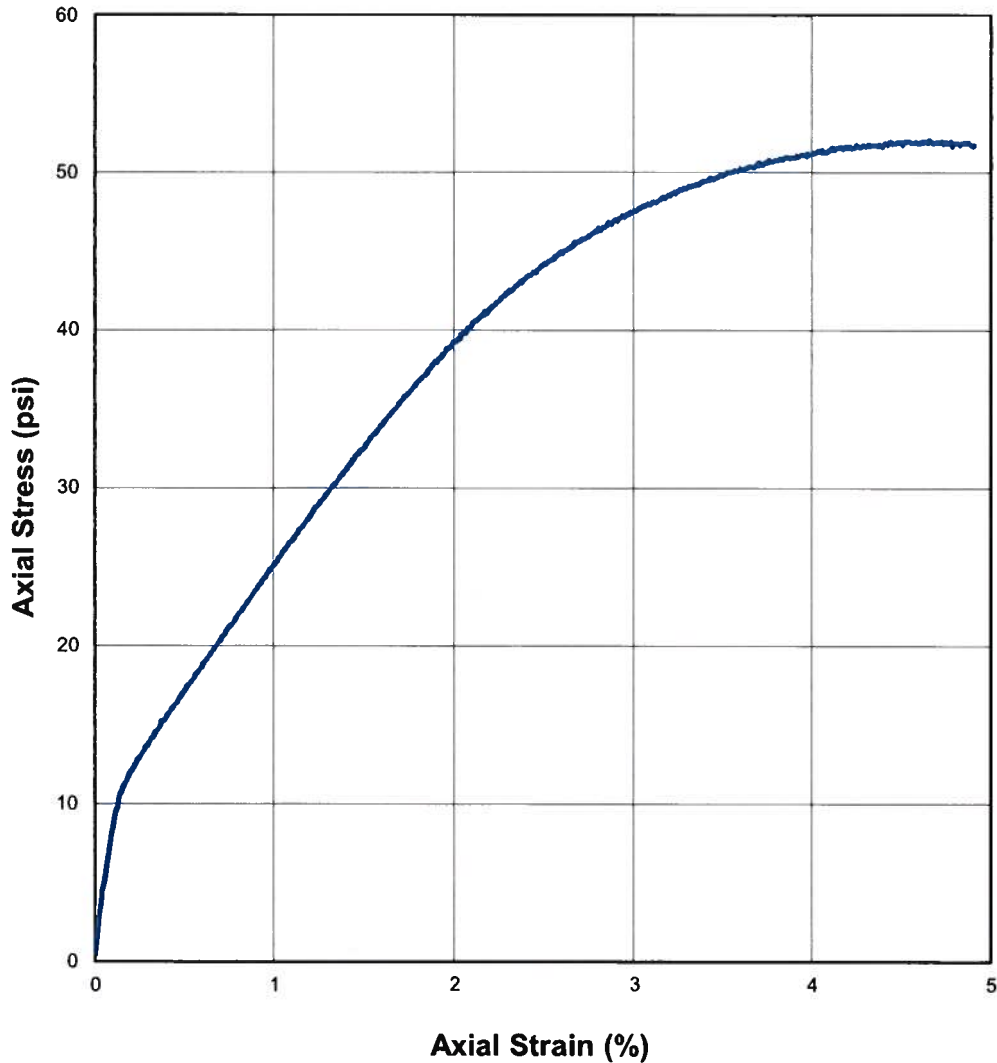
| | |
|------------------|----------|
| K1 = | 11,076 |
| K2 = | -0.28990 |
| K5 = | 0.16743 |
| R ² = | 0.99 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19GTP-E-P12 |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 17.3% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-25-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

| | |
|---|---|
| LABORATORY: <u>Boudreau Engineering, Inc.</u> | PROJECT NAME: <u>I-495 Project Next</u> |
| <u>Lawrenceville, Georgia</u> | PROJECT NO.: <u>SME #1243-19-025</u> |
| DATE RECEIVED: <u>07-10-2019</u> | QUANTITY (REPRESENTED): <u>N.A.</u> |
| IDENTIFICATION MARKS: <u>19GWP-P03</u> | SOURCE OF MATERIAL: <u>19GWP-P03</u> |

- | | |
|---|--|
| 1. SAMPLING DATE: | <u>N.R.</u> |
| 2. SAMPLE NUMBER: | <u>P3</u> |
| 3. LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. TEST INFORMATION | |
| PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. SPECIMEN INFO.: | |
| SPECIMEN DIAM., inch | |
| TOP | <u>2.9</u> |
| MIDDLE | <u>2.9</u> |
| BOTTOM | <u>2.9</u> |
| AVERAGE | <u>2.9</u> |
| MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| NET DIAM., inch | <u>2.9</u> |
| HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.74</u> |
| HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| INITIAL LENGTH, L_o , inch | <u>5.7</u> |
| INITIAL AREA, A_o , in ² | <u>6.5</u> |
| INITIAL VOLUME $A_o L_o$, in ³ | <u>37.6</u> |
| INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. SOIL SPECIMEN WEIGHT (for remolded samples): | |
| INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1337.58</u> |
| FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| WEIGHT OF WET SOIL USED, grams | <u>1337.58</u> |
| 9. SOIL PROPERTIES: | |
| For Remolded Samples: | |
| IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| or | |
| OPTIMUM MOISTURE CONTENT, % | 9.6 10.5 |
| MAX. DRY DENSITY, pcf | 124.8 124.6 |
| For Tube Samples: | |
| IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| WET DENSITY, pcf | <u>N/A</u> |
| DRY DENSITY, pcf | <u>N/A</u> |
| 10. SPECIMEN PROPERTIES (for remolded samples): | |
| COMPACTION MOISTURE CONTENT, % | <u>9.5</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>9.3</u> |
| COMPACTION DRY DENSITY, γ_d , pcf | <u>123.9</u> |
| TARGET DRY DENSITY, % γ_d <u>100</u> TARGET MOISTURE CONTENT, % | <u>9.5</u> |
| COMPACTION LEVEL ACHIEVED | 99.3% 99.4% |
| 11. QUICK SHEAR TEST | |
| STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD / X-SECTION AREA), psi | <u>61</u> |
| SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. TEST DATE | <u>07-14-2019</u> |
| 13. GENERAL REMARKS: | |
| | <u>Maximum Dry Density and Optimum Moisture Content were revised by the requesting agency after the testing was completed (NRR of S&ME 8/2/19)</u> |

TESTED BY RLB DATE 07-14-2019

Boudreau Engineering, Inc.

~~CONFIDENTIAL~~

AASHTO T307-99 REPORT FORM X1.1 Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. PROJECT NO(S): SME #1243-19-025
 2. PROJECT NAME: I-495 Project Next
 3. SOURCE OF MATERIAL: 19GWP-P03
 4. REMOLDING TARGETS: 100% Maximum Dry Density at 9.5% Moisture Content
 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) 1
 6. MATERIAL TYPE (Type 1 or Type 2) 2
 7. TEST DATE 07-14-2019
 8. RESILIENT MODULUS TESTING

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00077 | 0.00076 | 0.00013 | 13,741 |
| | | | 97 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00077 | 0.00076 | 0.00013 | 13,791 |
| | | | 98 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00075 | 0.00078 | 0.00076 | 0.00013 | 13,743 |
| | | | 99 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00076 | 0.00077 | 0.00076 | 0.00013 | 13,821 |
| | | | 100 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00076 | 0.00077 | 0.00076 | 0.00013 | 13,783 |
| COLUMN AVERAGE | | | | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00077 | 0.00076 | 0.00013 | 13,776 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 34 |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P03

Material Source: 19GWP-P03

| | | | | | | | | | | | | | | |
|------------|----------------|------|------|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00157 | 0.00161 | 0.00159 | 0.00028 | 13,091 |
| | | | 97 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00160 | 0.00159 | 0.00028 | 13,145 |
| | | | 98 | 26.3 | 23.9 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00161 | 0.00159 | 0.00028 | 13,130 |
| | | | 99 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00160 | 0.00159 | 0.00028 | 13,147 |
| | | | 100 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00160 | 0.00159 | 0.00028 | 13,086 |
| | COLUMN AVERAGE | | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00160 | 0.00159 | 0.00028 | 13,120 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 30 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00262 | 0.00258 | 0.00045 | 11,999 |
| | | | 97 | 39.1 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00254 | 0.00262 | 0.00258 | 0.00045 | 12,006 |
| | | | 98 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00262 | 0.00259 | 0.00045 | 11,979 |
| | | | 99 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00261 | 0.00258 | 0.00045 | 12,015 |
| | | | 100 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00254 | 0.00262 | 0.00258 | 0.00045 | 12,000 |
| | COLUMN AVERAGE | | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00262 | 0.00258 | 0.00045 | 12,000 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 51.7 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00359 | 0.00368 | 0.00364 | 0.00063 | 11,267 |
| | | | 97 | 51.7 | 46.7 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00359 | 0.00369 | 0.00364 | 0.00063 | 11,245 |
| | | | 98 | 51.8 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00360 | 0.00369 | 0.00364 | 0.00063 | 11,255 |
| | | | 99 | 51.8 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00359 | 0.00368 | 0.00363 | 0.00063 | 11,275 |
| | | | 100 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00359 | 0.00369 | 0.00364 | 0.00063 | 11,248 |
| | COLUMN AVERAGE | | 51.7 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00359 | 0.00368 | 0.00364 | 0.00063 | 11,258 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00468 | 0.00479 | 0.00474 | 0.00082 | 10,763 |
| | | | 97 | 64.5 | 58.1 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00469 | 0.00479 | 0.00474 | 0.00083 | 10,758 |
| | | | 98 | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00469 | 0.00479 | 0.00474 | 0.00083 | 10,758 |
| | | | 99 | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00469 | 0.00479 | 0.00474 | 0.00083 | 10,767 |
| | | | 100 | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00468 | 0.00478 | 0.00473 | 0.00082 | 10,764 |
| | COLUMN AVERAGE | | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00468 | 0.00479 | 0.00474 | 0.00083 | 10,762 | |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 4 | |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P03

Material Source: 19GWP-P03

| | | | | | | | | | | | | | | |
|------------|----------------|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00080 | 0.00079 | 0.00014 | 13,253 |
| | | | 97 | 13.8 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00079 | 0.00079 | 0.00014 | 13,325 |
| | | | 98 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00080 | 0.00079 | 0.00014 | 13,300 |
| | | | 99 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00079 | 0.00079 | 0.00014 | 13,309 |
| | | | 100 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00079 | 0.00079 | 0.00014 | 13,240 |
| | COLUMN AVERAGE | | | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00080 | 0.00079 | 0.00014 | 13,286 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 37 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 26.1 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00171 | 0.00169 | 0.00029 | 12,269 |
| | | | 97 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00172 | 0.00169 | 0.00030 | 12,286 |
| | | | 98 | 26.1 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00171 | 0.00169 | 0.00029 | 12,292 |
| | | | 99 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00171 | 0.00169 | 0.00029 | 12,288 |
| | | | 100 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00171 | 0.00169 | 0.00029 | 12,222 |
| | COLUMN AVERAGE | | | 26.1 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00167 | 0.00171 | 0.00169 | 0.00029 | 12,271 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 29 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00270 | 0.00279 | 0.00274 | 0.00048 | 11,231 |
| | | | 97 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00271 | 0.00279 | 0.00275 | 0.00048 | 11,216 |
| | | | 98 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00271 | 0.00279 | 0.00275 | 0.00048 | 11,212 |
| | | | 99 | 38.9 | 35.2 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00271 | 0.00278 | 0.00274 | 0.00048 | 11,255 |
| | | | 100 | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00270 | 0.00279 | 0.00275 | 0.00048 | 11,207 |
| | COLUMN AVERAGE | | | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00271 | 0.00278 | 0.00275 | 0.00048 | 11,224 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 19 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00386 | 0.00397 | 0.00392 | 0.00068 | 10,412 |
| | | | 97 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00386 | 0.00397 | 0.00391 | 0.00068 | 10,403 |
| | | | 98 | 51.5 | 46.4 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00398 | 0.00392 | 0.00068 | 10,385 |
| | | | 99 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00386 | 0.00397 | 0.00391 | 0.00068 | 10,430 |
| | | | 100 | 51.5 | 46.5 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00397 | 0.00392 | 0.00068 | 10,413 |
| | COLUMN AVERAGE | | | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00386 | 0.00397 | 0.00392 | 0.00068 | 10,408 |
| | STANDARD DEV. | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 16 |

Report Form X1.1

| Project Name: I-495 Project Next | | | Identification Marks: 19GWP-P03 | | | | | | Material Source: 19GWP-P03 | | | | | |
|----------------------------------|-----|------|---------------------------------|------|------|-----|-----|-----|----------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.4 | 58.1 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00512 | 0.00506 | 0.00088 | 10,064 |
| | | | 97 | 64.3 | 58.0 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00512 | 0.00506 | 0.00088 | 10,059 |
| | | | 98 | 64.4 | 58.1 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00513 | 0.00506 | 0.00088 | 10,068 |
| | | | 99 | 64.4 | 58.0 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00512 | 0.00506 | 0.00088 | 10,052 |
| | | | 100 | 64.4 | 58.1 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00512 | 0.00506 | 0.00088 | 10,062 |
| COLUMN AVERAGE | | | | 64.4 | 58.0 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00500 | 0.00512 | 0.00506 | 0.00088 | 10,061 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 6 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00084 | 0.00089 | 0.00087 | 0.00015 | 12,123 |
| | | | 97 | 14.3 | 12.1 | 2.1 | 2.2 | 1.9 | 0.3 | 0.00084 | 0.00089 | 0.00086 | 0.00015 | 12,316 |
| | | | 98 | 14.1 | 11.9 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00084 | 0.00089 | 0.00086 | 0.00015 | 12,131 |
| | | | 99 | 14.1 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00084 | 0.00089 | 0.00087 | 0.00015 | 12,130 |
| | | | 100 | 14.1 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00084 | 0.00089 | 0.00087 | 0.00015 | 12,149 |
| COLUMN AVERAGE | | | | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00084 | 0.00089 | 0.00086 | 0.00015 | 12,170 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 82 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00183 | 0.00192 | 0.00188 | 0.00033 | 11,034 |
| | | | 97 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00183 | 0.00192 | 0.00187 | 0.00033 | 11,040 |
| | | | 98 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00183 | 0.00191 | 0.00187 | 0.00033 | 11,009 |
| | | | 99 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00182 | 0.00191 | 0.00187 | 0.00033 | 11,067 |
| | | | 100 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00183 | 0.00191 | 0.00187 | 0.00033 | 11,083 |
| COLUMN AVERAGE | | | | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00183 | 0.00191 | 0.00187 | 0.00033 | 11,047 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 29 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.6 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00295 | 0.00306 | 0.00301 | 0.00052 | 10,156 |
| | | | 97 | 38.6 | 34.9 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00295 | 0.00305 | 0.00300 | 0.00052 | 10,194 |
| | | | 98 | 38.5 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00295 | 0.00306 | 0.00300 | 0.00052 | 10,160 |
| | | | 99 | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00296 | 0.00306 | 0.00301 | 0.00052 | 10,168 |
| | | | 100 | 38.7 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00296 | 0.00305 | 0.00301 | 0.00052 | 10,182 |
| COLUMN AVERAGE | | | | 38.6 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00295 | 0.00306 | 0.00300 | 0.00052 | 10,172 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 16 | |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P03

Material Source: 19GWP-P03

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.1 | 46.1 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00418 | 0.00430 | 0.00424 | 0.00074 | 9,529 |
| | | | 97 | 51.2 | 46.1 | 5.0 | 7.8 | 7.1 | 0.8 | 0.00418 | 0.00431 | 0.00424 | 0.00074 | 9,537 |
| | | | 98 | 51.2 | 46.2 | 5.0 | 7.8 | 7.1 | 0.8 | 0.00419 | 0.00431 | 0.00425 | 0.00074 | 9,535 |
| | | | 99 | 51.2 | 46.1 | 5.0 | 7.8 | 7.1 | 0.8 | 0.00418 | 0.00432 | 0.00425 | 0.00074 | 9,524 |
| | | | 100 | 51.2 | 46.1 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00418 | 0.00431 | 0.00425 | 0.00074 | 9,532 |
| COLUMN AVERAGE | | | | 51.2 | 46.1 | 5.0 | 7.8 | 7.1 | 0.8 | 0.00418 | 0.00431 | 0.00425 | 0.00074 | 9,531 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 5 | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00538 | 0.00551 | 0.00544 | 0.00095 | 9,298 |
| | | | 97 | 64.1 | 57.8 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00537 | 0.00551 | 0.00544 | 0.00095 | 9,315 |
| | | | 98 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00538 | 0.00551 | 0.00545 | 0.00095 | 9,299 |
| | | | 99 | 64.0 | 57.6 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00538 | 0.00551 | 0.00544 | 0.00095 | 9,284 |
| | | | 100 | 64.1 | 57.8 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00538 | 0.00551 | 0.00545 | 0.00095 | 9,309 |
| COLUMN AVERAGE | | | | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00538 | 0.00551 | 0.00544 | 0.00095 | 9,301 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 | |

TESTED BY RLB DATE 07-14-2019

Boudreau Engineering, Inc.

AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | <u>SME #1243-19-025</u> |
| 2. PROJECT NAME: | <u>I-495 Project Next</u> |
| 3. SOURCE OF MATERIAL: | <u>19GWP-P03</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 9.5% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>07-14-2019</u> |

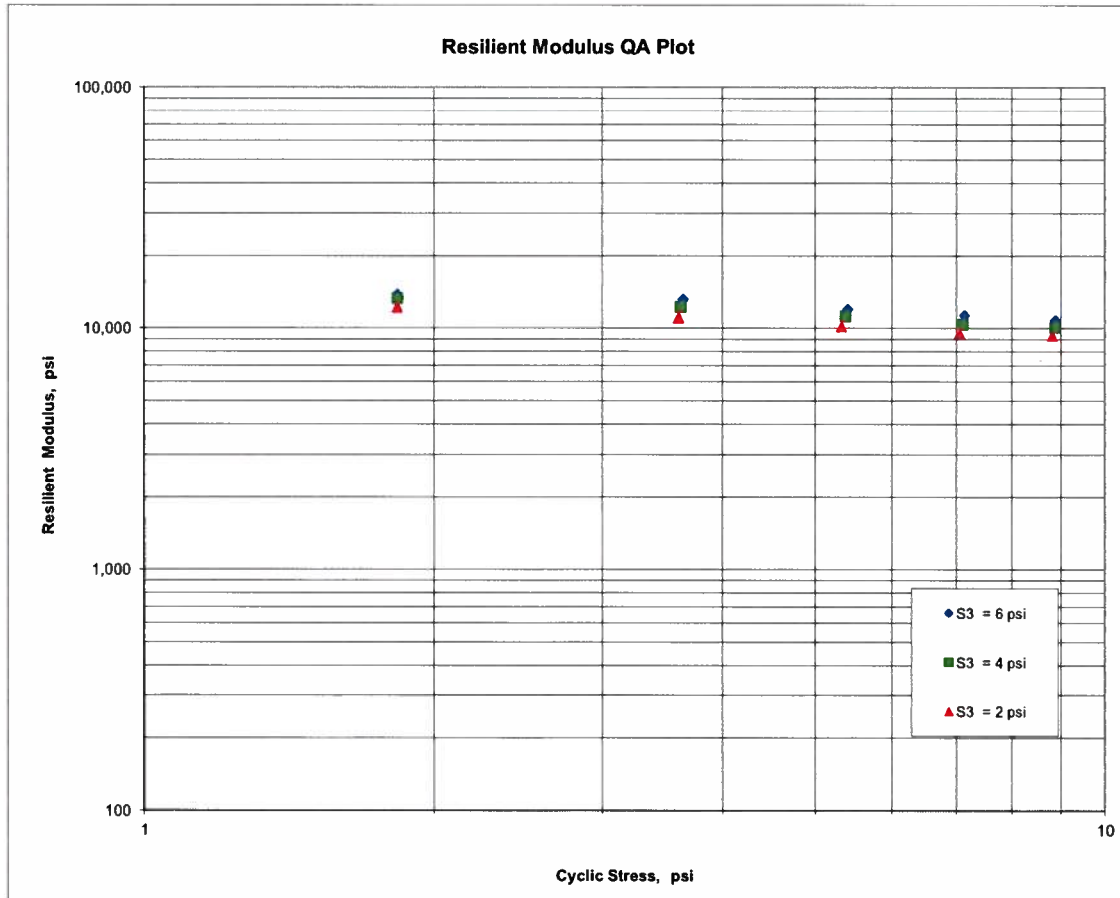
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = \underline{12,289}$$

$$K_2 = \underline{-0.17357}$$

$$K_5 = \underline{0.14123}$$

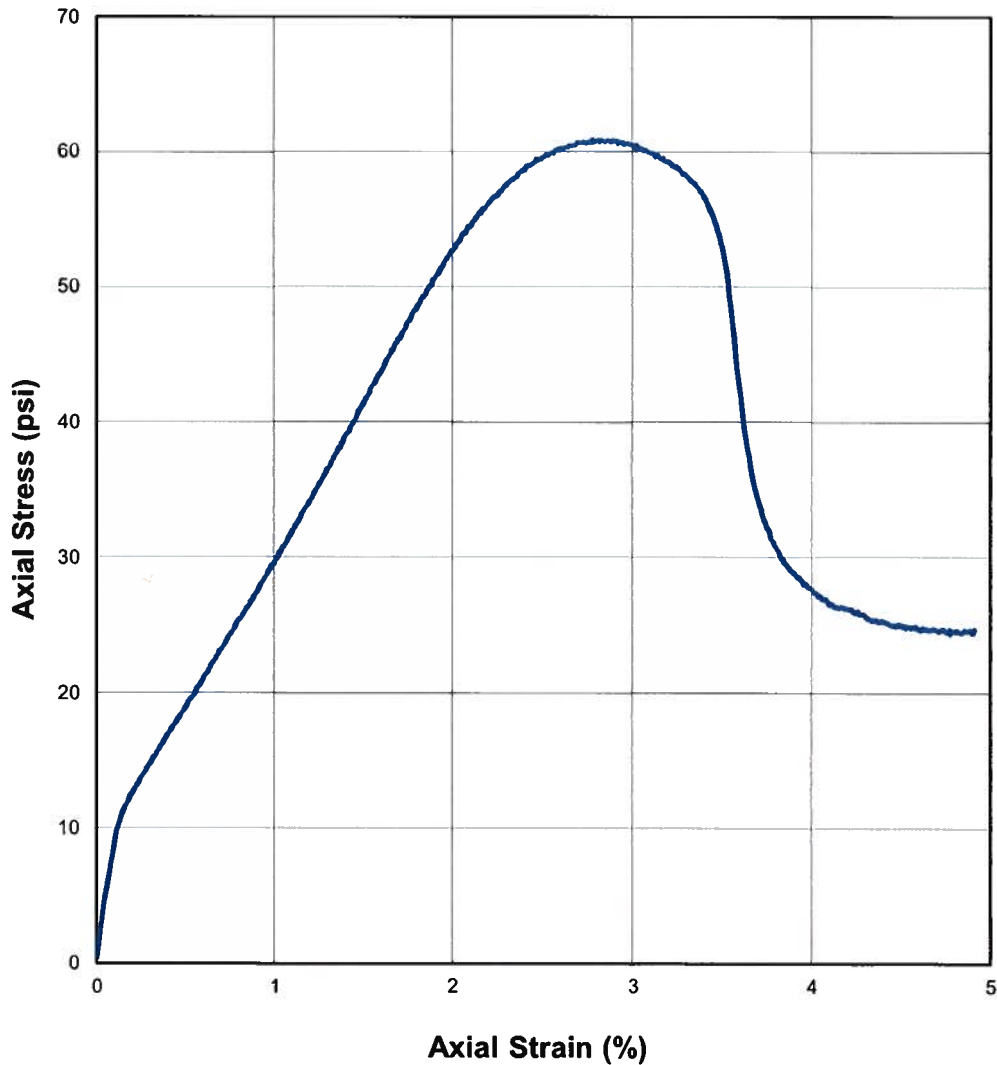
$$R^2 = \underline{0.98}$$



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | <u>SME #1243-19-025</u> |
| 2. PROJECT NAME: | <u>I-495 Project Next</u> |
| 3. SOURCE OF MATERIAL: | <u>19GWP-P03</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 9.5% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>07-14-2019</u> |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: L-495 Project Next
Lawrenceville, Georgia PROJECT NO.: SME #1243-19-025
DATE RECEIVED: 07-19-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19GWP-P07 SOURCE OF MATERIAL: 19GWP-P07

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>P-7</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.73</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, L_o , inch | <u>5.7</u> |
| | INITIAL AREA, A_o , in ² | <u>6.5</u> |
| | INITIAL VOLUME $A_o L_o$, in ³ | <u>37.4</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1302.69</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1302.69</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>12.4</u> |
| | MAX. DRY DENSITY, pcf | <u>120.1</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>12.4</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>12.3</u> |
| | COMPACTION DRY DENSITY, γ_d , pcf | <u>118.0</u> |
| | TARGET DRY DENSITY, $\% \gamma_d$ <u>100</u> TARGET MOISTURE CONTENT, % | <u>12.4</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.2%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>42</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>07-25-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 07-25-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SME #1243-19-025 **LABORATORY:** Boudreau Engineering, Inc.
2. **PROJECT NAME:** I-495 Project Next Lawrenceville, Georgia
3. **SOURCE OF MATERIAL:** 19GWP-P07
4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 12.4% Moisture Content
5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
6. **MATERIAL TYPE (Type 1 or Type 2)** 2
7. **TEST DATE** 07-25-2019
8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00089 | 0.00083 | 0.00086 | 0.00015 | 12,132 |
| | | | 97 | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00083 | 0.00086 | 0.00015 | 12,023 |
| | | | 98 | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00091 | 0.00082 | 0.00087 | 0.00015 | 11,981 |
| | | | 99 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00083 | 0.00086 | 0.00015 | 12,038 |
| | | | 100 | 13.2 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00089 | 0.00082 | 0.00086 | 0.00015 | 12,090 |
| COLUMN AVERAGE | | | | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00083 | 0.00086 | 0.00015 | 12,053 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 59 |

| Project Name: I-495 Project Next | | Identification Marks: 19GWP-P07 | | | | | Material Source: 19GWP-P07 | | | | | | | |
|----------------------------------|-----|---------------------------------|-----|------|------|-----|----------------------------|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00200 | 0.00185 | 0.00193 | 0.00034 | 10,561 |
| | | | 97 | 25.6 | 23.2 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00200 | 0.00186 | 0.00193 | 0.00034 | 10,563 |
| | | | 98 | 25.7 | 23.2 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00200 | 0.00186 | 0.00193 | 0.00034 | 10,592 |
| | | | 99 | 25.6 | 23.2 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00200 | 0.00186 | 0.00193 | 0.00034 | 10,558 |
| | | | 100 | 25.6 | 23.2 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00199 | 0.00186 | 0.00193 | 0.00034 | 10,554 |
| COLUMN AVERAGE | | | | 25.6 | 23.2 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00200 | 0.00186 | 0.00193 | 0.00034 | 10,566 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 15 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00323 | 0.00307 | 0.00315 | 0.00055 | 9,415 |
| | | | 97 | 37.5 | 33.8 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00323 | 0.00307 | 0.00315 | 0.00055 | 9,430 |
| | | | 98 | 37.6 | 33.8 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00324 | 0.00305 | 0.00315 | 0.00055 | 9,443 |
| | | | 99 | 37.6 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00323 | 0.00307 | 0.00315 | 0.00055 | 9,465 |
| | | | 100 | 37.6 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00324 | 0.00306 | 0.00315 | 0.00055 | 9,457 |
| COLUMN AVERAGE | | | | 37.6 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00324 | 0.00306 | 0.00315 | 0.00055 | 9,442 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 20 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 49.3 | 44.3 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00465 | 0.00437 | 0.00451 | 0.00079 | 8,631 |
| | | | 97 | 49.3 | 44.3 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00464 | 0.00439 | 0.00451 | 0.00079 | 8,627 |
| | | | 98 | 49.4 | 44.5 | 4.9 | 7.6 | 6.8 | 0.8 | 0.00464 | 0.00437 | 0.00451 | 0.00079 | 8,674 |
| | | | 99 | 49.4 | 44.4 | 4.9 | 7.6 | 6.8 | 0.8 | 0.00464 | 0.00437 | 0.00451 | 0.00079 | 8,659 |
| | | | 100 | 49.3 | 44.4 | 4.9 | 7.6 | 6.8 | 0.8 | 0.00465 | 0.00437 | 0.00451 | 0.00079 | 8,648 |
| COLUMN AVERAGE | | | | 49.4 | 44.4 | 4.9 | 7.6 | 6.8 | 0.8 | 0.00464 | 0.00437 | 0.00451 | 0.00079 | 8,648 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 19 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 61.1 | 54.9 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00611 | 0.00578 | 0.00594 | 0.00104 | 8,118 |
| | | | 97 | 61.1 | 55.0 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00611 | 0.00577 | 0.00594 | 0.00104 | 8,125 |
| | | | 98 | 61.1 | 55.0 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00612 | 0.00578 | 0.00595 | 0.00104 | 8,114 |
| | | | 99 | 61.2 | 55.0 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00611 | 0.00578 | 0.00594 | 0.00104 | 8,126 |
| | | | 100 | 61.1 | 55.0 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00611 | 0.00578 | 0.00594 | 0.00104 | 8,123 |
| COLUMN AVERAGE | | | | 61.1 | 55.0 | 6.2 | 9.4 | 8.4 | 0.9 | 0.00611 | 0.00578 | 0.00594 | 0.00104 | 8,121 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 5 | |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P07

Material Source: 19GWP-P07

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00084 | 0.00089 | 0.00015 | 11,739 |
| | | | 97 | 13.5 | 11.8 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00085 | 0.00088 | 0.00015 | 11,742 |
| | | | 98 | 13.6 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00084 | 0.00088 | 0.00015 | 11,884 |
| | | | 99 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00085 | 0.00088 | 0.00015 | 11,753 |
| | | | 100 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00084 | 0.00088 | 0.00015 | 11,841 |
| COLUMN AVERAGE | | | | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00084 | 0.00088 | 0.00015 | 11,792 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 66 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.4 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00207 | 0.00194 | 0.00201 | 0.00035 | 10,033 |
| | | | 97 | 25.3 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00207 | 0.00194 | 0.00200 | 0.00035 | 10,011 |
| | | | 98 | 25.4 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00207 | 0.00194 | 0.00200 | 0.00035 | 10,052 |
| | | | 99 | 25.4 | 23.0 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00206 | 0.00194 | 0.00200 | 0.00035 | 10,086 |
| | | | 100 | 25.4 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00207 | 0.00194 | 0.00200 | 0.00035 | 10,054 |
| COLUMN AVERAGE | | | | 25.4 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00207 | 0.00194 | 0.00200 | 0.00035 | 10,047 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 28 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00345 | 0.00326 | 0.00336 | 0.00059 | 8,706 |
| | | | 97 | 36.8 | 33.1 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00345 | 0.00325 | 0.00335 | 0.00058 | 8,687 |
| | | | 98 | 36.8 | 33.2 | 3.7 | 5.6 | 5.1 | 0.6 | 0.00345 | 0.00325 | 0.00335 | 0.00058 | 8,684 |
| | | | 99 | 36.9 | 33.2 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00346 | 0.00325 | 0.00336 | 0.00059 | 8,690 |
| | | | 100 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00345 | 0.00326 | 0.00336 | 0.00059 | 8,701 |
| COLUMN AVERAGE | | | | 36.9 | 33.2 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00345 | 0.00326 | 0.00336 | 0.00059 | 8,693 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 48.4 | 43.5 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00505 | 0.00477 | 0.00491 | 0.00086 | 7,773 |
| | | | 97 | 48.4 | 43.5 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00506 | 0.00477 | 0.00491 | 0.00086 | 7,772 |
| | | | 98 | 48.4 | 43.5 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00505 | 0.00477 | 0.00491 | 0.00086 | 7,781 |
| | | | 99 | 48.5 | 43.6 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00505 | 0.00477 | 0.00491 | 0.00086 | 7,789 |
| | | | 100 | 48.4 | 43.4 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00505 | 0.00477 | 0.00491 | 0.00086 | 7,763 |
| COLUMN AVERAGE | | | | 48.4 | 43.5 | 4.9 | 7.4 | 6.7 | 0.8 | 0.00505 | 0.00477 | 0.00491 | 0.00086 | 7,776 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P07

Material Source: 19GWP-P07

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 60.5 | 54.4 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00659 | 0.00624 | 0.00642 | 0.00112 | 7,443 |
| | | | 97 | 60.5 | 54.4 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00660 | 0.00625 | 0.00642 | 0.00112 | 7,433 |
| | | | 98 | 60.5 | 54.4 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00659 | 0.00625 | 0.00642 | 0.00112 | 7,435 |
| | | | 99 | 60.6 | 54.4 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00660 | 0.00625 | 0.00642 | 0.00112 | 7,445 |
| | | | 100 | 60.5 | 54.3 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00660 | 0.00624 | 0.00642 | 0.00112 | 7,433 |
| COLUMN AVERAGE | | | | 60.5 | 54.4 | 6.2 | 9.3 | 8.3 | 0.9 | 0.00659 | 0.00624 | 0.00642 | 0.00112 | 7,438 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 6 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.8 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00098 | 0.00017 | 10,464 |
| | | | 97 | 13.8 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00098 | 0.00017 | 10,425 |
| | | | 98 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00093 | 0.00097 | 0.00017 | 10,538 |
| | | | 99 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00102 | 0.00093 | 0.00098 | 0.00017 | 10,555 |
| | | | 100 | 13.8 | 11.7 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,536 |
| COLUMN AVERAGE | | | | 13.8 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00098 | 0.00017 | 10,504 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 56 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 24.9 | 22.5 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00230 | 0.00216 | 0.00223 | 0.00039 | 8,868 |
| | | | 97 | 24.9 | 22.5 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00229 | 0.00216 | 0.00223 | 0.00039 | 8,860 |
| | | | 98 | 24.9 | 22.5 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00229 | 0.00216 | 0.00222 | 0.00039 | 8,901 |
| | | | 99 | 25.0 | 22.5 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00230 | 0.00215 | 0.00222 | 0.00039 | 8,899 |
| | | | 100 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00229 | 0.00216 | 0.00223 | 0.00039 | 8,908 |
| COLUMN AVERAGE | | | | 24.9 | 22.5 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00229 | 0.00216 | 0.00223 | 0.00039 | 8,887 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 22 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 36.3 | 32.6 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00378 | 0.00358 | 0.00368 | 0.00064 | 7,793 |
| | | | 97 | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00378 | 0.00357 | 0.00368 | 0.00064 | 7,804 |
| | | | 98 | 36.3 | 32.6 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00379 | 0.00357 | 0.00368 | 0.00064 | 7,778 |
| | | | 99 | 36.3 | 32.6 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00378 | 0.00357 | 0.00368 | 0.00064 | 7,797 |
| | | | 100 | 36.4 | 32.7 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00379 | 0.00358 | 0.00368 | 0.00064 | 7,802 |
| COLUMN AVERAGE | | | | 36.3 | 32.7 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00378 | 0.00357 | 0.00368 | 0.00064 | 7,795 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 10 |

Project Name: I-495 Project Next

Identification Marks: 19GWP-P07

Material Source: 19GWP-P07

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 47.6 | 42.7 | 4.9 | 7.3 | 6.5 | 0.8 | 0.00547 | 0.00519 | 0.00533 | 0.00093 | 7,040 |
| | | | 97 | 47.7 | 42.8 | 4.9 | 7.3 | 6.6 | 0.8 | 0.00546 | 0.00519 | 0.00533 | 0.00093 | 7,053 |
| | | | 98 | 47.8 | 42.9 | 4.9 | 7.3 | 6.6 | 0.7 | 0.00547 | 0.00520 | 0.00533 | 0.00093 | 7,063 |
| | | | 99 | 47.6 | 42.7 | 4.9 | 7.3 | 6.5 | 0.7 | 0.00546 | 0.00520 | 0.00533 | 0.00093 | 7,043 |
| | | | 100 | 47.6 | 42.7 | 4.9 | 7.3 | 6.5 | 0.8 | 0.00547 | 0.00520 | 0.00533 | 0.00093 | 7,033 |
| COLUMN AVERAGE | | | | 47.7 | 42.8 | 4.9 | 7.3 | 6.6 | 0.8 | 0.00547 | 0.00520 | 0.00533 | 0.00093 | 7,046 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 59.6 | 53.6 | 6.1 | 9.1 | 8.2 | 0.9 | 0.00708 | 0.00674 | 0.00691 | 0.00121 | 6,804 |
| | | | 97 | 59.8 | 53.7 | 6.1 | 9.2 | 8.2 | 0.9 | 0.00708 | 0.00674 | 0.00691 | 0.00121 | 6,824 |
| | | | 98 | 59.8 | 53.6 | 6.1 | 9.2 | 8.2 | 0.9 | 0.00708 | 0.00675 | 0.00692 | 0.00121 | 6,811 |
| | | | 99 | 59.7 | 53.5 | 6.2 | 9.1 | 8.2 | 0.9 | 0.00709 | 0.00674 | 0.00691 | 0.00121 | 6,799 |
| | | | 100 | 59.7 | 53.7 | 6.1 | 9.2 | 8.2 | 0.9 | 0.00709 | 0.00673 | 0.00691 | 0.00121 | 6,818 |
| COLUMN AVERAGE | | | | 59.7 | 53.6 | 6.1 | 9.1 | 8.2 | 0.9 | 0.00708 | 0.00674 | 0.00691 | 0.00121 | 6,811 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 |

TESTED BY RLB DATE 07-25-2019

Boudreau Engineering, Inc.

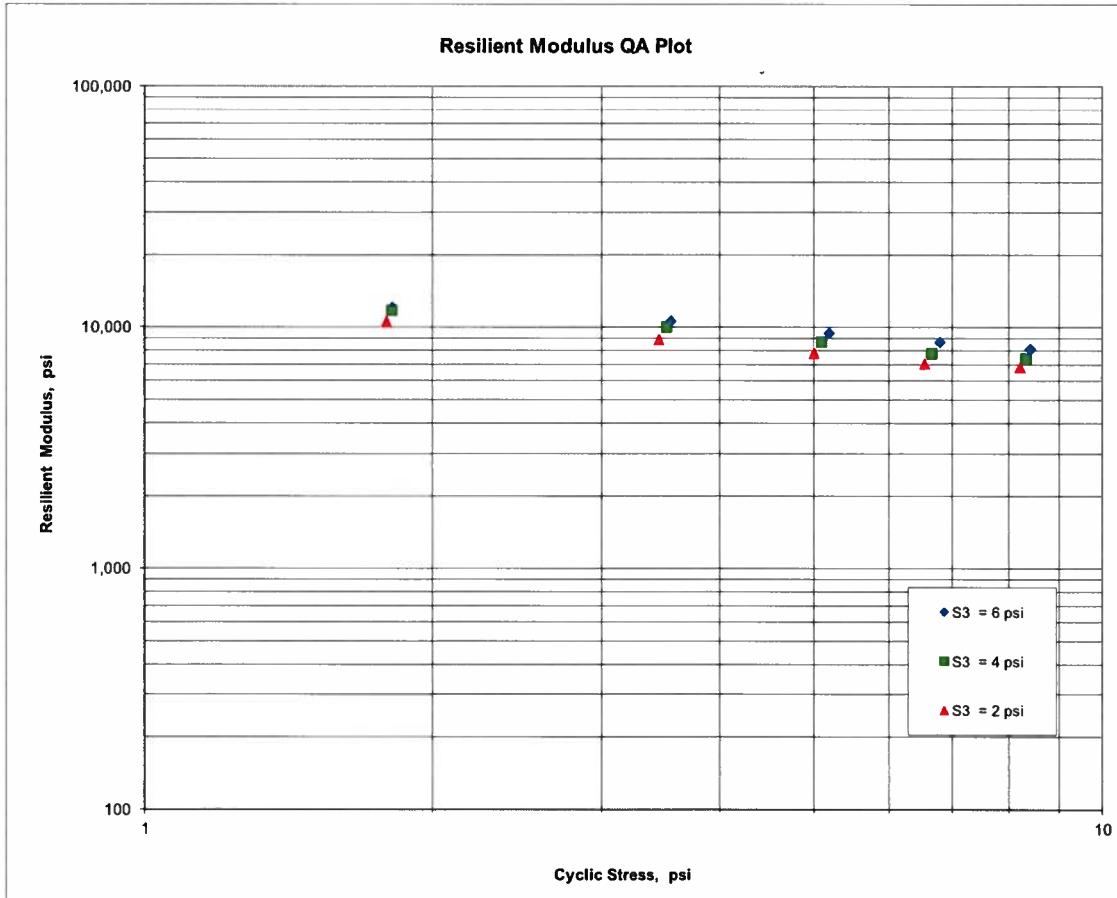
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19GWP-P07 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 12.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-25-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

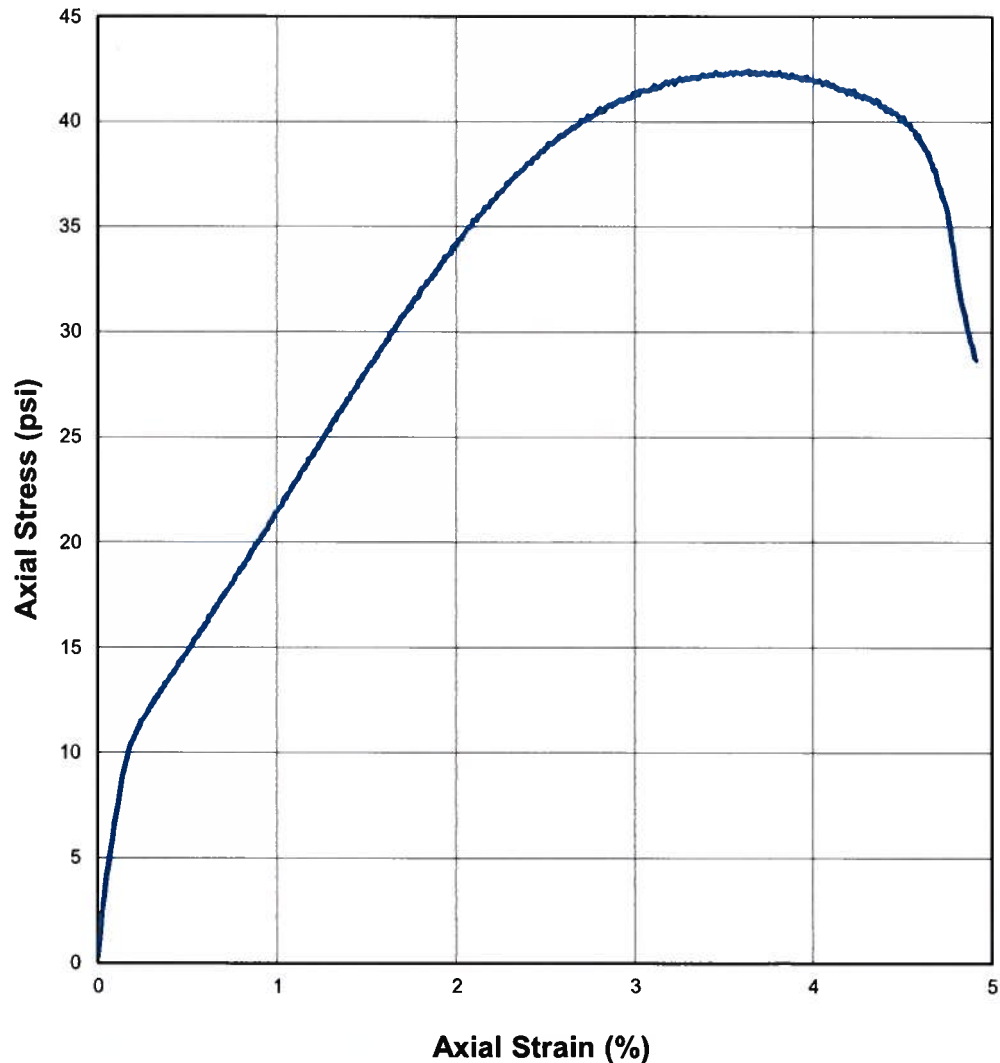
| | |
|------------------|----------|
| K1 = | 11,076 |
| K2 = | -0.28990 |
| K5 = | 0.16743 |
| R ² = | 0.99 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19GWP-P07 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 12.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-25-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19ODD-W-P01 SOURCE OF MATERIAL: 19ODD-W-P01

| | | |
|-----|--|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>W-P01</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.75</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, L_o , inch | <u>5.7</u> |
| | INITIAL AREA, A_o , in ² | <u>6.5</u> |
| | INITIAL VOLUME $A_o L_o$, in ³ | <u>37.5</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1302.88</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1302.88</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>13.4</u> |
| | MAX. DRY DENSITY, pcf | <u>118.9</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>13.4</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>13.3</u> |
| | COMPACTION DRY DENSITY, γ_d , pcf | <u>116.7</u> |
| | TARGET DRY DENSITY, % γ_d <u>100</u> TARGET MOISTURE CONTENT, % | <u>13.4</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.1%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>52</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-04-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-04-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19ODD-W-P01
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 13.4% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-04-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | e _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00081 | 0.00079 | 0.00014 | 13,418 |
| | | | 97 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00082 | 0.00079 | 0.00014 | 13,418 |
| | | | 98 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00081 | 0.00079 | 0.00014 | 13,397 |
| | | | 99 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00082 | 0.00079 | 0.00014 | 13,323 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00075 | 0.00081 | 0.00078 | 0.00014 | 13,425 |
| COLUMN AVERAGE | | | | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00076 | 0.00082 | 0.00079 | 0.00014 | 13,396 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 43 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19ODD-W-P01

Material Source: 19ODD-W-P01

| | | | | | | | | | | | | | | |
|------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.0 | 23.5 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00160 | 0.00178 | 0.00169 | 0.00029 | 12,274 |
| | | | 97 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00161 | 0.00177 | 0.00169 | 0.00029 | 12,334 |
| | | | 98 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00177 | 0.00168 | 0.00029 | 12,286 |
| | | | 99 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00161 | 0.00177 | 0.00169 | 0.00029 | 12,281 |
| | | | 100 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00160 | 0.00177 | 0.00169 | 0.00029 | 12,293 |
| | COLUMN AVERAGE | | | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00160 | 0.00177 | 0.00169 | 0.00029 | 12,293 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 24 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.5 | 34.8 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00288 | 0.00277 | 0.00048 | 11,055 |
| | | | 97 | 38.4 | 34.7 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00288 | 0.00277 | 0.00048 | 11,033 |
| | | | 98 | 38.4 | 34.7 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00288 | 0.00276 | 0.00048 | 11,045 |
| | | | 99 | 38.4 | 34.7 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00288 | 0.00276 | 0.00048 | 11,036 |
| | | | 100 | 38.5 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00288 | 0.00277 | 0.00048 | 11,053 |
| | COLUMN AVERAGE | | | 38.5 | 34.7 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00288 | 0.00276 | 0.00048 | 11,044 |
| | STANDARD DEV. | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.6 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00396 | 0.00069 | 10,101 |
| | | | 97 | 50.6 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00397 | 0.00069 | 10,113 |
| | | | 98 | 50.6 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00397 | 0.00069 | 10,108 |
| | | | 99 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00396 | 0.00069 | 10,089 |
| | | | 100 | 50.6 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00397 | 0.00069 | 10,117 |
| | COLUMN AVERAGE | | | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00382 | 0.00411 | 0.00396 | 0.00069 | 10,106 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 62.8 | 56.6 | 6.2 | 9.6 | 8.7 | 1.0 | 0.00509 | 0.00540 | 0.00525 | 0.00091 | 9,482 |
| | | | 97 | 62.8 | 56.6 | 6.2 | 9.6 | 8.7 | 1.0 | 0.00509 | 0.00539 | 0.00524 | 0.00091 | 9,488 |
| | | | 98 | 62.7 | 56.4 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00511 | 0.00539 | 0.00525 | 0.00091 | 9,445 |
| | | | 99 | 62.8 | 56.5 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00509 | 0.00540 | 0.00525 | 0.00091 | 9,475 |
| | | | 100 | 62.6 | 56.3 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00510 | 0.00540 | 0.00525 | 0.00091 | 9,438 |
| | COLUMN AVERAGE | | | 62.7 | 56.5 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00510 | 0.00540 | 0.00525 | 0.00091 | 9,466 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 23 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19ODD-W-P01

Material Source: 19ODD-W-P01

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00084 | 0.00081 | 0.00014 | 12,932 |
| | | | 97 | 13.6 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00085 | 0.00082 | 0.00014 | 12,812 |
| | | | 98 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00079 | 0.00085 | 0.00082 | 0.00014 | 12,765 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00085 | 0.00082 | 0.00014 | 12,864 |
| | | | 100 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00085 | 0.00082 | 0.00014 | 12,904 |
| COLUMN AVERAGE | | | | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00085 | 0.00082 | 0.00014 | 12,855 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 68 | |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.8 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00170 | 0.00189 | 0.00180 | 0.00031 | 11,411 |
| | | | 97 | 25.8 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00171 | 0.00189 | 0.00180 | 0.00031 | 11,387 |
| | | | 98 | 25.7 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00170 | 0.00188 | 0.00179 | 0.00031 | 11,425 |
| | | | 99 | 25.7 | 23.2 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00170 | 0.00189 | 0.00180 | 0.00031 | 11,378 |
| | | | 100 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00170 | 0.00189 | 0.00179 | 0.00031 | 11,423 |
| COLUMN AVERAGE | | | | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00170 | 0.00189 | 0.00180 | 0.00031 | 11,405 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 21 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.1 | 34.3 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00284 | 0.00311 | 0.00297 | 0.00052 | 10,163 |
| | | | 97 | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00283 | 0.00308 | 0.00296 | 0.00052 | 10,226 |
| | | | 98 | 38.2 | 34.5 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00282 | 0.00310 | 0.00296 | 0.00052 | 10,246 |
| | | | 99 | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00281 | 0.00309 | 0.00295 | 0.00051 | 10,250 |
| | | | 100 | 38.0 | 34.3 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00281 | 0.00309 | 0.00295 | 0.00051 | 10,220 |
| COLUMN AVERAGE | | | | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00282 | 0.00309 | 0.00296 | 0.00052 | 10,221 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00001 | 0.00000 | 35 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 50.1 | 45.1 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00409 | 0.00442 | 0.00425 | 0.00074 | 9,323 |
| | | | 97 | 50.3 | 45.3 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00410 | 0.00441 | 0.00425 | 0.00074 | 9,369 |
| | | | 98 | 50.1 | 45.1 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00409 | 0.00440 | 0.00425 | 0.00074 | 9,345 |
| | | | 99 | 50.1 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00409 | 0.00441 | 0.00425 | 0.00074 | 9,343 |
| | | | 100 | 50.1 | 45.1 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00409 | 0.00441 | 0.00425 | 0.00074 | 9,342 |
| COLUMN AVERAGE | | | | 50.1 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00409 | 0.00441 | 0.00425 | 0.00074 | 9,344 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 16 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19ODD-W-P01

Material Source: 19ODD-W-P01

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 62.4 | 56.1 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00541 | 0.00575 | 0.00558 | 0.00097 | 8,845 |
| | | | 97 | 62.5 | 56.2 | 6.2 | 9.6 | 8.6 | 1.0 | 0.00541 | 0.00576 | 0.00558 | 0.00097 | 8,859 |
| | | | 98 | 62.5 | 56.3 | 6.2 | 9.6 | 8.6 | 0.9 | 0.00541 | 0.00575 | 0.00558 | 0.00097 | 8,878 |
| | | | 99 | 62.6 | 56.3 | 6.2 | 9.6 | 8.6 | 1.0 | 0.00541 | 0.00575 | 0.00558 | 0.00097 | 8,879 |
| | | | 100 | 62.5 | 56.3 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00541 | 0.00575 | 0.00558 | 0.00097 | 8,868 |
| | COLUMN AVERAGE | | | 62.5 | 56.2 | 6.2 | 9.6 | 8.6 | 1.0 | 0.00541 | 0.00575 | 0.00558 | 0.00097 | 8,866 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 14 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00088 | 0.00094 | 0.00091 | 0.00016 | 11,343 |
| | | | 97 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00094 | 0.00092 | 0.00016 | 11,381 |
| | | | 98 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00088 | 0.00095 | 0.00091 | 0.00016 | 11,367 |
| | | | 99 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00094 | 0.00091 | 0.00016 | 11,404 |
| | | | 100 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00088 | 0.00094 | 0.00091 | 0.00016 | 11,330 |
| | COLUMN AVERAGE | | | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00088 | 0.00094 | 0.00091 | 0.00016 | 11,365 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 30 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00192 | 0.00210 | 0.00201 | 0.00035 | 10,110 |
| | | | 97 | 25.6 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00192 | 0.00210 | 0.00201 | 0.00035 | 10,127 |
| | | | 98 | 25.5 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00192 | 0.00210 | 0.00201 | 0.00035 | 10,063 |
| | | | 99 | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00193 | 0.00210 | 0.00201 | 0.00035 | 10,087 |
| | | | 100 | 25.5 | 23.1 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00193 | 0.00210 | 0.00201 | 0.00035 | 10,075 |
| | COLUMN AVERAGE | | | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00192 | 0.00210 | 0.00201 | 0.00035 | 10,092 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 26 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00309 | 0.00338 | 0.00324 | 0.00056 | 9,245 |
| | | | 97 | 37.7 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00311 | 0.00338 | 0.00324 | 0.00056 | 9,211 |
| | | | 98 | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00310 | 0.00338 | 0.00324 | 0.00056 | 9,222 |
| | | | 99 | 37.7 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00310 | 0.00338 | 0.00324 | 0.00056 | 9,208 |
| | | | 100 | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00310 | 0.00337 | 0.00324 | 0.00056 | 9,244 |
| | COLUMN AVERAGE | | | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00310 | 0.00338 | 0.00324 | 0.00056 | 9,226 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19ODD-W-P01

Material Source: 19ODD-W-P01

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 49.7 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00444 | 0.00478 | 0.00461 | 0.00080 | 8,532 |
| | | | 97 | 49.6 | 44.7 | 4.9 | 7.6 | 6.8 | 0.8 | 0.00443 | 0.00478 | 0.00460 | 0.00080 | 8,531 |
| | | | 98 | 49.6 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00444 | 0.00478 | 0.00461 | 0.00080 | 8,520 |
| | | | 99 | 49.7 | 44.8 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00444 | 0.00478 | 0.00461 | 0.00080 | 8,545 |
| | | | 100 | 49.7 | 44.7 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00444 | 0.00478 | 0.00461 | 0.00080 | 8,534 |
| | COLUMN AVERAGE | | | 49.7 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00444 | 0.00478 | 0.00461 | 0.00080 | 8,533 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 9 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00617 | 0.00599 | 0.00104 | 8,181 |
| | | | 97 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00617 | 0.00599 | 0.00104 | 8,176 |
| | | | 98 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00616 | 0.00599 | 0.00104 | 8,177 |
| | | | 99 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00618 | 0.00600 | 0.00104 | 8,176 |
| | | | 100 | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00618 | 0.00599 | 0.00104 | 8,171 |
| | COLUMN AVERAGE | | | 61.9 | 55.7 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00581 | 0.00617 | 0.00599 | 0.00104 | 8,176 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 4 |

TESTED BY RLB DATE 08-04-2019



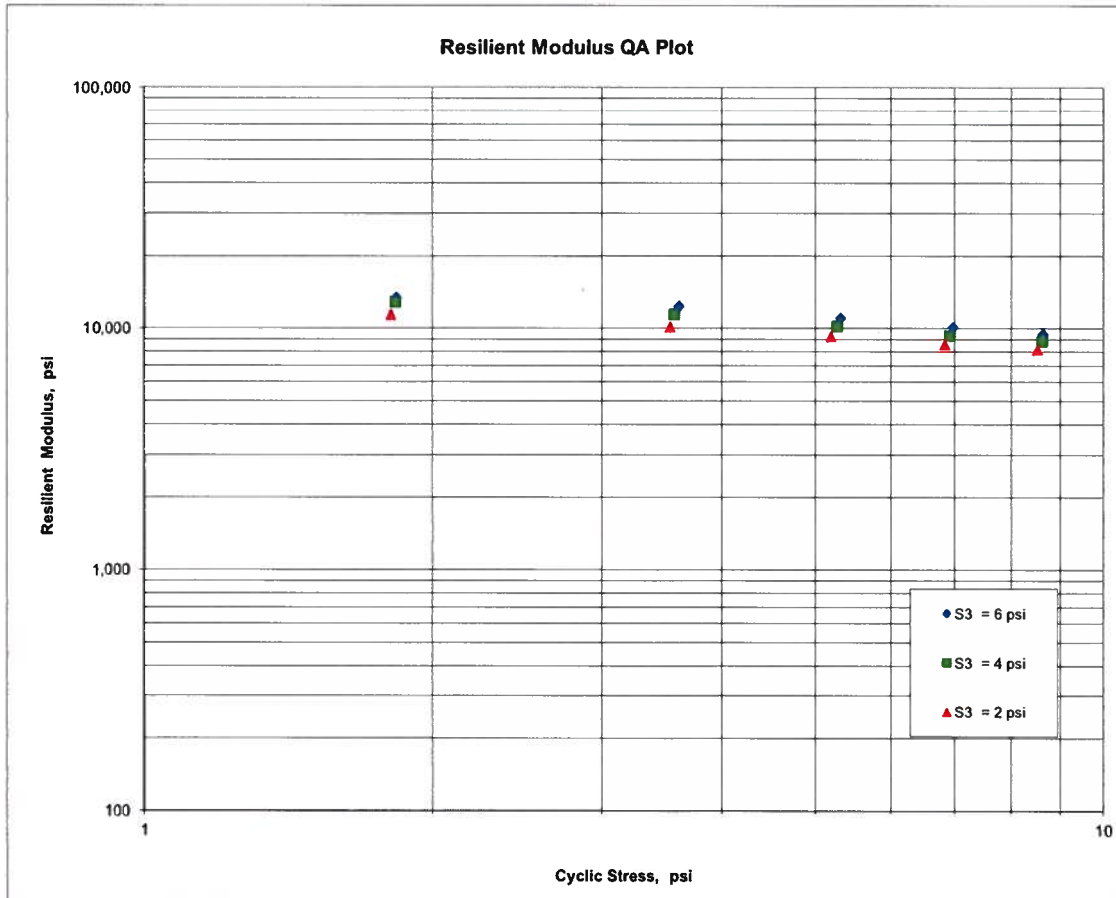
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|--|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19ODD-W-P01 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 13.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

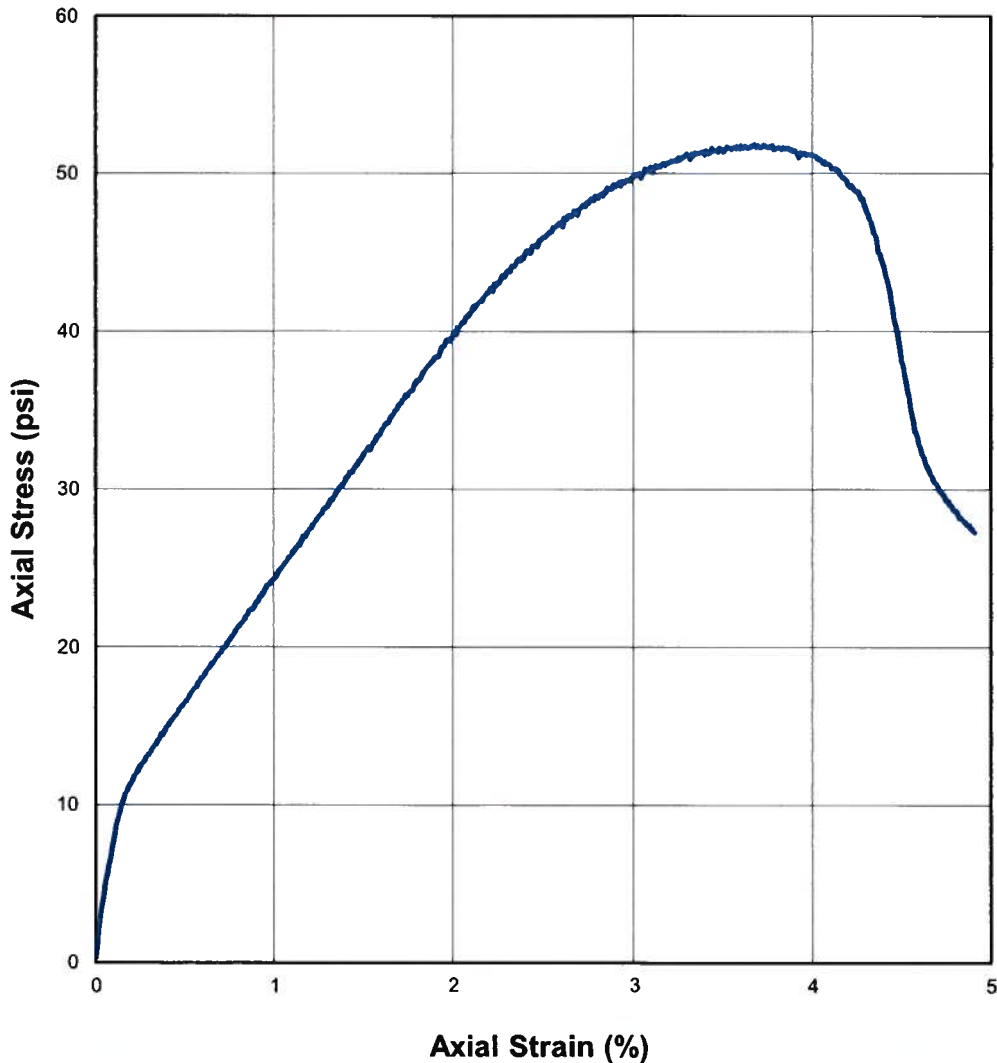
| | |
|------------------|----------|
| K1 = | 11,902 |
| K2 = | -0.22862 |
| K5 = | 0.15904 |
| R ² = | 0.98 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> |
| 3. SOURCE OF MATERIAL: | <u>19ODD-W-P01</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 13.4% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>08-04-2019</u> |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-NOS-P01 SOURCE OF MATERIAL: 19X-NOS-P01

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>NOS-P01</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.74</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, Lo, inch | <u>5.7</u> |
| | INITIAL AREA, Ao, in ² | <u>6.5</u> |
| | INITIAL VOLUME Ao Lo, in ³ | <u>37.5</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1338.03</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1338.03</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>10.4</u> |
| | MAX. DRY DENSITY, pcf | <u>125.4</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>10.4</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>10.3</u> |
| | COMPACTION DRY DENSITY, γ _d , pcf | <u>123.2</u> |
| | TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | <u>10.4</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.3%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>42</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-04-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-04-2019

Boudreau Engineering, Inc.

(770) 962-0933

AASHTO T307-99 REPORT FORM X1.1 Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

| | | |
|---|---|--|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> | LABORATORY: <u>Boudreau Engineering, Inc.</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> | <u>Lawrenceville, Georgia</u> |
| 3. SOURCE OF MATERIAL: | <u>19X-NOS-P01</u> | |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 10.4% Moisture Content</u> | |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> | |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> | |
| 7. TEST DATE | <u>08-04-2019</u> | |
| 8. RESILIENT MODULUS TESTING | | |

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | C ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | e _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00090 | 0.00090 | 0.00016 | 11,644 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00089 | 0.00090 | 0.00016 | 11,645 |
| | | | 98 | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00089 | 0.00090 | 0.00016 | 11,606 |
| | | | 99 | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00090 | 0.00090 | 0.00016 | 11,568 |
| | | | 100 | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00090 | 0.00090 | 0.00016 | 11,561 |
| COLUMN AVERAGE | | | | 13.2 | 11.8 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00090 | 0.00090 | 0.00090 | 0.00016 | 11,605 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 40 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P01

Material Source: 19X-NOS-P01

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.8 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00203 | 0.00202 | 0.00202 | 0.00035 | 10,146 |
| | | | 97 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00203 | 0.00202 | 0.00202 | 0.00035 | 10,184 |
| | | | 98 | 25.8 | 23.3 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00203 | 0.00203 | 0.00203 | 0.00035 | 10,133 |
| | | | 99 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00203 | 0.00202 | 0.00203 | 0.00035 | 10,176 |
| | | | 100 | 25.9 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00202 | 0.00202 | 0.00202 | 0.00035 | 10,197 |
| COLUMN AVERAGE | | | | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00203 | 0.00202 | 0.00202 | 0.00035 | 10,167 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 27 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00328 | 0.00328 | 0.00328 | 0.00057 | 9,231 |
| | | | 97 | 38.1 | 34.3 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00328 | 0.00328 | 0.00328 | 0.00057 | 9,220 |
| | | | 98 | 38.0 | 34.3 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00328 | 0.00329 | 0.00328 | 0.00057 | 9,201 |
| | | | 99 | 38.1 | 34.4 | 3.8 | 5.8 | 5.3 | 0.6 | 0.00328 | 0.00328 | 0.00328 | 0.00057 | 9,213 |
| | | | 100 | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00328 | 0.00328 | 0.00328 | 0.00057 | 9,251 |
| COLUMN AVERAGE | | | | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00328 | 0.00328 | 0.00328 | 0.00057 | 9,223 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 19 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00462 | 0.00460 | 0.00461 | 0.00080 | 8,684 |
| | | | 97 | 50.6 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00462 | 0.00459 | 0.00461 | 0.00080 | 8,700 |
| | | | 98 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00461 | 0.00460 | 0.00460 | 0.00080 | 8,702 |
| | | | 99 | 50.7 | 45.7 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00462 | 0.00459 | 0.00461 | 0.00080 | 8,727 |
| | | | 100 | 50.6 | 45.6 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00463 | 0.00459 | 0.00461 | 0.00080 | 8,709 |
| COLUMN AVERAGE | | | | 50.6 | 45.6 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00462 | 0.00460 | 0.00461 | 0.00080 | 8,704 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 16 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 63.2 | 57.0 | 6.3 | 9.7 | 8.7 | 1.0 | 0.00594 | 0.00592 | 0.00593 | 0.00103 | 8,453 |
| | | | 97 | 63.2 | 57.0 | 6.3 | 9.7 | 8.7 | 1.0 | 0.00594 | 0.00592 | 0.00593 | 0.00103 | 8,459 |
| | | | 98 | 63.3 | 57.1 | 6.2 | 9.7 | 8.8 | 1.0 | 0.00594 | 0.00592 | 0.00593 | 0.00103 | 8,478 |
| | | | 99 | 63.4 | 57.1 | 6.3 | 9.7 | 8.8 | 1.0 | 0.00593 | 0.00592 | 0.00593 | 0.00103 | 8,482 |
| | | | 100 | 63.3 | 57.0 | 6.3 | 9.7 | 8.7 | 1.0 | 0.00593 | 0.00592 | 0.00593 | 0.00103 | 8,471 |
| COLUMN AVERAGE | | | | 63.3 | 57.0 | 6.3 | 9.7 | 8.7 | 1.0 | 0.00594 | 0.00592 | 0.00593 | 0.00103 | 8,469 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 12 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P01

Material Source: 19X-NOS-P01

| | | | | | | | | | | | | | | |
|------------|----------------|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00095 | 0.00093 | 0.00016 | 11,129 |
| | | | 97 | 13.5 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00094 | 0.00093 | 0.00016 | 11,081 |
| | | | 98 | 13.6 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00094 | 0.00093 | 0.00016 | 11,220 |
| | | | 99 | 13.5 | 11.7 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00094 | 0.00093 | 0.00016 | 11,078 |
| | | | 100 | 13.6 | 11.8 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00094 | 0.00093 | 0.00016 | 11,181 |
| | COLUMN AVERAGE | | | 13.6 | 11.8 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00093 | 0.00094 | 0.00093 | 0.00016 | 11,138 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 62 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00220 | 0.00222 | 0.00221 | 0.00038 | 9,117 |
| | | | 97 | 25.4 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00220 | 0.00222 | 0.00221 | 0.00038 | 9,145 |
| | | | 98 | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00219 | 0.00222 | 0.00220 | 0.00038 | 9,146 |
| | | | 99 | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00219 | 0.00221 | 0.00220 | 0.00038 | 9,131 |
| | | | 100 | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00219 | 0.00222 | 0.00220 | 0.00038 | 9,133 |
| | COLUMN AVERAGE | | | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00219 | 0.00222 | 0.00220 | 0.00038 | 9,135 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 37.4 | 33.6 | 3.8 | 5.7 | 5.2 | 0.6 | 0.00367 | 0.00368 | 0.00367 | 0.00064 | 8,059 |
| | | | 97 | 37.5 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00366 | 0.00367 | 0.00367 | 0.00064 | 8,098 |
| | | | 98 | 37.4 | 33.6 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00366 | 0.00368 | 0.00367 | 0.00064 | 8,066 |
| | | | 99 | 37.4 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00366 | 0.00368 | 0.00367 | 0.00064 | 8,085 |
| | | | 100 | 37.4 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00366 | 0.00368 | 0.00367 | 0.00064 | 8,088 |
| | COLUMN AVERAGE | | | 37.4 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00366 | 0.00368 | 0.00367 | 0.00064 | 8,079 |
| | STANDARD DEV. | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 16 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 49.8 | 44.8 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00522 | 0.00521 | 0.00522 | 0.00091 | 7,563 |
| | | | 97 | 49.8 | 44.8 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00523 | 0.00521 | 0.00522 | 0.00091 | 7,563 |
| | | | 98 | 49.8 | 44.8 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00523 | 0.00522 | 0.00522 | 0.00091 | 7,557 |
| | | | 99 | 49.8 | 44.9 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00522 | 0.00522 | 0.00522 | 0.00091 | 7,570 |
| | | | 100 | 49.8 | 44.9 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00521 | 0.00522 | 0.00522 | 0.00091 | 7,571 |
| | COLUMN AVERAGE | | | 49.8 | 44.9 | 5.0 | 7.6 | 6.9 | 0.8 | 0.00522 | 0.00522 | 0.00522 | 0.00091 | 7,565 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 6 | |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-NOS-P01 | | | | | | Material Source: 19X-NOS-P01 | | | | | |
|--|----------------|------|-----------------------------------|------|------|-----|-----|---------|------------------------------|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 62.6 | 56.4 | 6.2 | 9.6 | 8.6 | 1.0 | 0.00665 | 0.00664 | 0.00664 | 0.00116 | 7,473 |
| | | | 97 | 62.7 | 56.4 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00665 | 0.00663 | 0.00664 | 0.00116 | 7,475 |
| | | | 98 | 62.7 | 56.4 | 6.2 | 9.6 | 8.6 | 1.0 | 0.00665 | 0.00663 | 0.00664 | 0.00116 | 7,481 |
| | | | 99 | 62.7 | 56.5 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00665 | 0.00663 | 0.00664 | 0.00116 | 7,489 |
| | | | 100 | 62.7 | 56.4 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00665 | 0.00663 | 0.00664 | 0.00116 | 7,479 |
| | COLUMN AVERAGE | | 62.7 | 56.4 | 6.3 | 9.6 | 8.6 | 1.0 | 0.00665 | 0.00663 | 0.00664 | 0.00116 | 7,479 | |
| STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 6 | | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.7 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00108 | 0.00019 | 9,474 |
| | | | 97 | 13.8 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00108 | 0.00019 | 9,482 |
| | | | 98 | 13.7 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00107 | 0.00019 | 9,430 |
| | | | 99 | 13.7 | 11.6 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00108 | 0.00019 | 9,463 |
| | | | 100 | 13.7 | 11.6 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00107 | 0.00019 | 9,471 |
| | COLUMN AVERAGE | | 13.7 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00107 | 0.00108 | 0.00107 | 0.00019 | 9,464 | |
| STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 20 | | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 24.7 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00254 | 0.00256 | 0.00255 | 0.00044 | 7,690 |
| | | | 97 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00253 | 0.00257 | 0.00255 | 0.00044 | 7,730 |
| | | | 98 | 24.8 | 22.4 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00254 | 0.00257 | 0.00255 | 0.00044 | 7,719 |
| | | | 99 | 24.9 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00253 | 0.00257 | 0.00255 | 0.00044 | 7,730 |
| | | | 100 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00254 | 0.00257 | 0.00255 | 0.00044 | 7,727 |
| | COLUMN AVERAGE | | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00254 | 0.00257 | 0.00255 | 0.00044 | 7,719 | |
| STANDARD DEV. | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 | | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 36.5 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00421 | 0.00425 | 0.00423 | 0.00074 | 6,818 |
| | | | 97 | 36.5 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00420 | 0.00427 | 0.00423 | 0.00074 | 6,815 |
| | | | 98 | 36.6 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00422 | 0.00423 | 0.00423 | 0.00074 | 6,843 |
| | | | 99 | 36.6 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00420 | 0.00425 | 0.00423 | 0.00074 | 6,842 |
| | | | 100 | 36.5 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00421 | 0.00424 | 0.00423 | 0.00074 | 6,825 |
| | COLUMN AVERAGE | | 36.5 | 32.8 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00421 | 0.00425 | 0.00423 | 0.00074 | 6,829 | |
| STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 13 | | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P01

Material Source: 19X-NOS-P01

| | | | | | | | | | | | | | | |
|-------------|----------------|------|---------------|------|------|-----|-----|-----|---------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 48.9 | 43.9 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00594 | 0.00594 | 0.00594 | 0.00103 | 6,509 |
| | | | 97 | 48.9 | 43.9 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00594 | 0.00593 | 0.00594 | 0.00103 | 6,505 |
| | | | 98 | 48.8 | 43.8 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00595 | 0.00595 | 0.00595 | 0.00104 | 6,486 |
| | | | 99 | 48.8 | 43.8 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00595 | 0.00594 | 0.00594 | 0.00103 | 6,487 |
| | | | 100 | 48.8 | 43.8 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00595 | 0.00594 | 0.00595 | 0.00104 | 6,491 |
| | COLUMN AVERAGE | | | 48.8 | 43.8 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00595 | 0.00594 | 0.00594 | 0.00103 | 6,496 |
| | | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00754 | 0.00753 | 0.00753 | 0.00131 | 6,477 |
| | | | 97 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00754 | 0.00752 | 0.00753 | 0.00131 | 6,476 |
| | | | 98 | 61.7 | 55.5 | 6.2 | 9.5 | 8.5 | 1.0 | 0.00755 | 0.00752 | 0.00753 | 0.00131 | 6,484 |
| | | | 99 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00754 | 0.00752 | 0.00753 | 0.00131 | 6,472 |
| | | | 100 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00755 | 0.00752 | 0.00753 | 0.00131 | 6,470 |
| | COLUMN AVERAGE | | | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00754 | 0.00752 | 0.00753 | 0.00131 | 6,476 |
| | | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 5 | |

TESTED BY RLB DATE 08-04-2019

Boudreau Engineering, Inc.

AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P01 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 10.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |

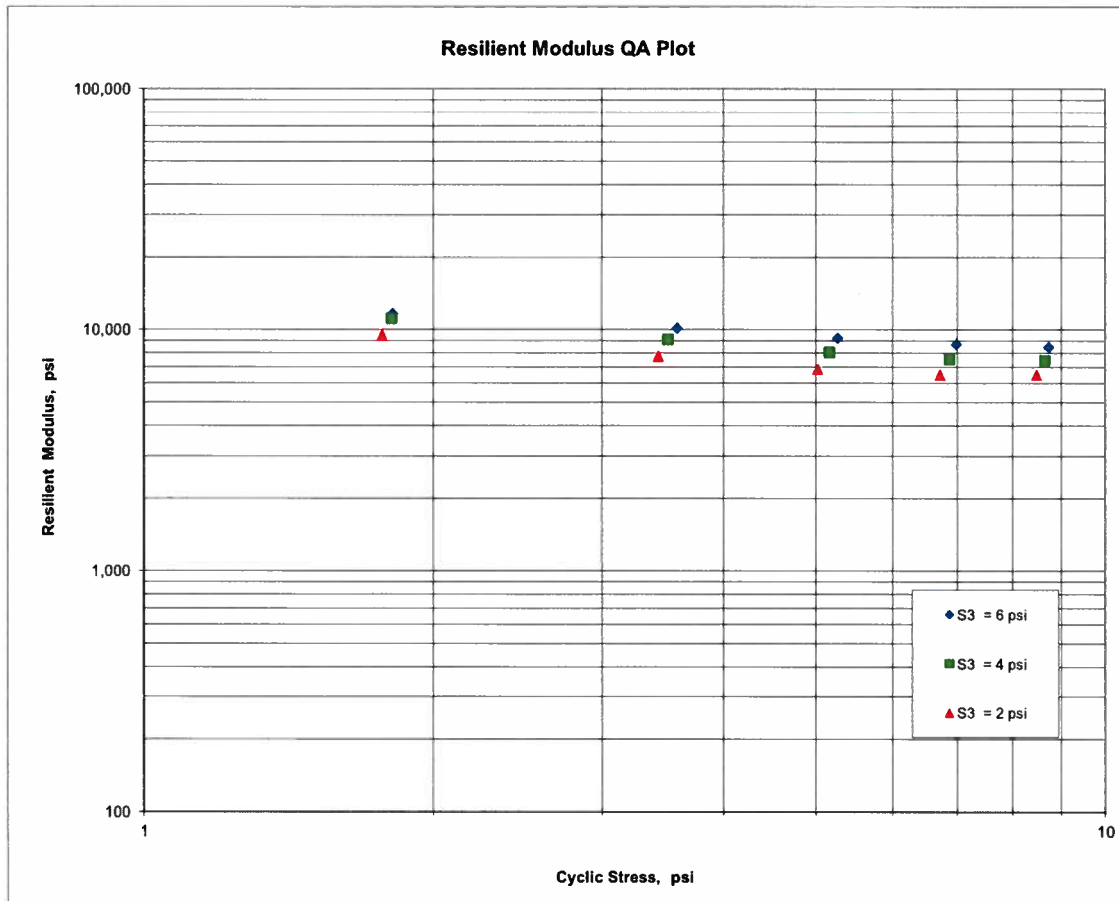
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 8,817$$

$$K_2 = -0.24288$$

$$K_5 = 0.25055$$

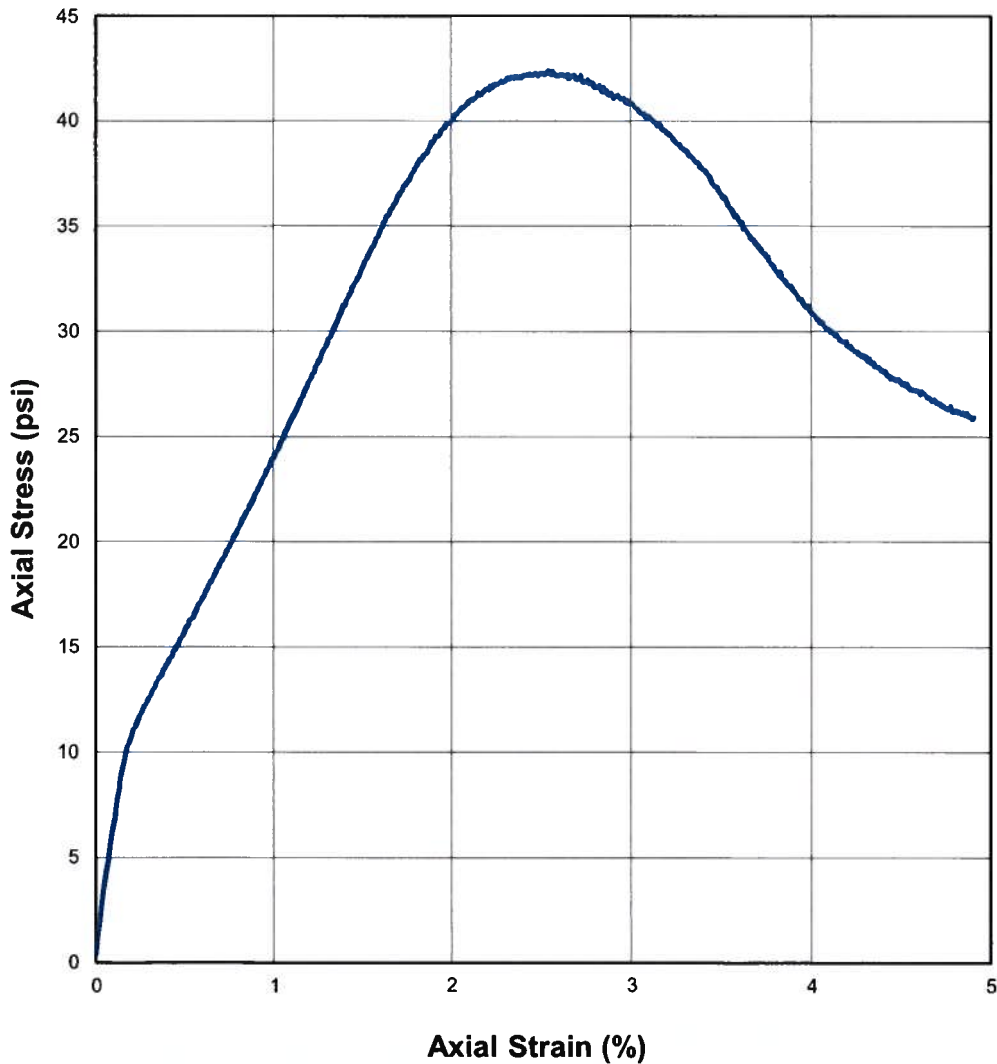
$$R^2 = 0.98$$



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P01 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 10.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-NOS-P08 SOURCE OF MATERIAL: 19X-NOS-P08

- | | |
|---|-------------------|
| 1. SAMPLING DATE: | <u>N.R.</u> |
| 2. SAMPLE NUMBER: | <u>NOS-P08</u> |
| 3. LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. TEST INFORMATION | |
| PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. SPECIMEN INFO.: | |
| SPECIMEN DIAM., inch | |
| TOP | <u>2.9</u> |
| MIDDLE | <u>2.9</u> |
| BOTTOM | <u>2.9</u> |
| AVERAGE | <u>2.9</u> |
| MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| NET DIAM., inch | <u>2.9</u> |
| HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.71</u> |
| HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| INITIAL LENGTH, L_o , inch | <u>5.7</u> |
| INITIAL AREA, A_o , in ² | <u>6.5</u> |
| INITIAL VOLUME $A_o L_o$, in ³ | <u>37.2</u> |
| INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. SOIL SPECIMEN WEIGHT (for remolded samples): | |
| INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1283.06</u> |
| FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| WEIGHT OF WET SOIL USED, grams | <u>1283.06</u> |
| 9. SOIL PROPERTIES.: | |
| For Remolded Samples: | |
| IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| or | |
| OPTIMUM MOISTURE CONTENT, % | <u>15.0</u> |
| MAX. DRY DENSITY, pcf | <u>115.1</u> |
| For Tube Samples: | |
| IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| WET DENSITY, pcf | <u>N/A</u> |
| DRY DENSITY, pcf | <u>N/A</u> |
| 10. SPECIMEN PROPERTIES (for remolded samples): | |
| COMPACTION MOISTURE CONTENT, % | <u>15.0</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>14.7</u> |
| COMPACTION DRY DENSITY, γ_d , pcf | <u>114.2</u> |
| TARGET DRY DENSITY, % γ_d <u>100</u> TARGET MOISTURE CONTENT, % | <u>15.0</u> |
| COMPACTION LEVEL ACHIEVED | <u>99.2%</u> |
| 11. QUICK SHEAR TEST | |
| STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>43</u> |
| SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. TEST DATE | <u>08-04-2019</u> |
| 13. GENERAL REMARKS: | |

TESTED BY RLB DATE 08-04-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19X-NOS-P08
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 15% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-04-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------|------------------------------|-----------|--------------------------------|----------------------------|-----------------------------|----------------------------------|------------------------------|-------------------------------|-----------------------------|-----------------------------|---------------------------------|------------------|-------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S_3 | S_{cyclic} | c_1 | P_{max} | P_{cyclic} | $P_{contact}$ | S_{max} | S_{cyclic} | $S_{contact}$ | H_1 | H_2 | H_{avg} | ϵ_r | M_r |
| UNIT | psi | psi | -- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.0 | 11.6 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00079 | 0.00084 | 0.00082 | 0.00014 | 12,501 |
| | | | 97 | 13.0 | 11.6 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00079 | 0.00085 | 0.00082 | 0.00014 | 12,451 |
| | | | 98 | 13.0 | 11.6 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00078 | 0.00084 | 0.00081 | 0.00014 | 12,521 |
| | | | 99 | 13.1 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00078 | 0.00085 | 0.00082 | 0.00014 | 12,543 |
| | | | 100 | 13.0 | 11.6 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00079 | 0.00084 | 0.00081 | 0.00014 | 12,562 |
| COLUMN AVERAGE | | | | 13.0 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00079 | 0.00084 | 0.00081 | 0.00014 | 12,516 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 43 |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-NOS-P08 | | | | | | Material Source: 19X-NOS-P08 | | | | | |
|--|----------------|------|-----------------------------------|------|------|-----|-----|-----|------------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.3 | 22.8 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00176 | 0.00185 | 0.00181 | 0.00032 | 11,068 |
| | | | 97 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00176 | 0.00186 | 0.00181 | 0.00032 | 11,146 |
| | | | 98 | 25.3 | 22.8 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00175 | 0.00186 | 0.00180 | 0.00032 | 11,081 |
| | | | 99 | 25.3 | 22.8 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00176 | 0.00185 | 0.00181 | 0.00032 | 11,061 |
| | | | 100 | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00176 | 0.00186 | 0.00181 | 0.00032 | 11,078 |
| | COLUMN AVERAGE | | | 25.3 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00176 | 0.00185 | 0.00181 | 0.00032 | 11,087 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 34 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00304 | 0.00053 | 9,597 |
| | | | 97 | 37.0 | 33.2 | 3.8 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00303 | 0.00053 | 9,577 |
| | | | 98 | 37.0 | 33.2 | 3.8 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00304 | 0.00053 | 9,570 |
| | | | 99 | 37.0 | 33.2 | 3.8 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00304 | 0.00053 | 9,559 |
| | | | 100 | 36.9 | 33.1 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00303 | 0.00053 | 9,553 |
| | COLUMN AVERAGE | | | 37.0 | 33.2 | 3.8 | 5.7 | 5.1 | 0.6 | 0.00296 | 0.00311 | 0.00304 | 0.00053 | 9,571 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 48.5 | 43.4 | 5.0 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00448 | 0.00439 | 0.00077 | 8,651 |
| | | | 97 | 48.5 | 43.5 | 5.0 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00449 | 0.00440 | 0.00077 | 8,640 |
| | | | 98 | 48.6 | 43.5 | 5.1 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00449 | 0.00440 | 0.00077 | 8,657 |
| | | | 99 | 48.5 | 43.4 | 5.0 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00449 | 0.00440 | 0.00077 | 8,637 |
| | | | 100 | 48.4 | 43.4 | 5.0 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00449 | 0.00440 | 0.00077 | 8,638 |
| | COLUMN AVERAGE | | | 48.5 | 43.5 | 5.0 | 7.4 | 6.7 | 0.8 | 0.00431 | 0.00449 | 0.00440 | 0.00077 | 8,645 |
| STANDARD DEV. | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 60.1 | 53.8 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00576 | 0.00596 | 0.00586 | 0.00103 | 8,033 |
| | | | 97 | 59.9 | 53.6 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00575 | 0.00596 | 0.00586 | 0.00103 | 8,008 |
| | | | 98 | 60.0 | 53.7 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00576 | 0.00596 | 0.00586 | 0.00103 | 8,019 |
| | | | 99 | 60.0 | 53.6 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00575 | 0.00596 | 0.00586 | 0.00103 | 8,013 |
| | | | 100 | 60.0 | 53.7 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00576 | 0.00597 | 0.00586 | 0.00103 | 8,014 |
| | COLUMN AVERAGE | | | 60.0 | 53.7 | 6.3 | 9.2 | 8.2 | 1.0 | 0.00576 | 0.00596 | 0.00586 | 0.00103 | 8,017 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P08

Material Source: 19X-NOS-P08

| | | | | | | | | | | | | | | |
|---------------|----------------|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.4 | 11.6 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00087 | 0.00084 | 0.00015 | 12,129 |
| | | | 97 | 13.4 | 11.6 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00087 | 0.00084 | 0.00015 | 12,130 |
| | | | 98 | 13.4 | 11.6 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00088 | 0.00084 | 0.00015 | 12,075 |
| | | | 99 | 13.3 | 11.6 | 1.8 | 2.0 | 1.8 | 0.3 | 0.00081 | 0.00087 | 0.00084 | 0.00015 | 12,053 |
| | | | 100 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00080 | 0.00088 | 0.00084 | 0.00015 | 12,210 |
| | COLUMN AVERAGE | | | 13.4 | 11.6 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00087 | 0.00084 | 0.00015 | 12,119 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 61 | |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.0 | 22.6 | 2.5 | 3.8 | 3.5 | 0.4 | 0.00184 | 0.00196 | 0.00190 | 0.00033 | 10,381 |
| | | | 97 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00183 | 0.00196 | 0.00190 | 0.00033 | 10,403 |
| | | | 98 | 25.0 | 22.5 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00184 | 0.00197 | 0.00191 | 0.00033 | 10,346 |
| | | | 99 | 25.0 | 22.5 | 2.5 | 3.8 | 3.5 | 0.4 | 0.00184 | 0.00198 | 0.00191 | 0.00033 | 10,335 |
| | | | 100 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00184 | 0.00196 | 0.00190 | 0.00033 | 10,420 |
| | COLUMN AVERAGE | | | 25.0 | 22.6 | 2.5 | 3.8 | 3.5 | 0.4 | 0.00184 | 0.00197 | 0.00190 | 0.00033 | 10,377 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 37 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 36.6 | 32.9 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00308 | 0.00327 | 0.00317 | 0.00056 | 9,069 |
| | | | 97 | 36.7 | 32.9 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00308 | 0.00327 | 0.00317 | 0.00056 | 9,068 |
| | | | 98 | 36.6 | 32.8 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00308 | 0.00327 | 0.00318 | 0.00056 | 9,040 |
| | | | 99 | 36.5 | 32.8 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00308 | 0.00328 | 0.00318 | 0.00056 | 9,016 |
| | | | 100 | 36.6 | 32.9 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00309 | 0.00327 | 0.00318 | 0.00056 | 9,051 |
| | COLUMN AVERAGE | | | 36.6 | 32.8 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00308 | 0.00327 | 0.00318 | 0.00056 | 9,049 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 22 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 48.0 | 42.9 | 5.0 | 7.4 | 6.6 | 0.8 | 0.00455 | 0.00475 | 0.00465 | 0.00081 | 8,076 |
| | | | 97 | 47.9 | 42.8 | 5.0 | 7.3 | 6.6 | 0.8 | 0.00453 | 0.00477 | 0.00465 | 0.00082 | 8,061 |
| | | | 98 | 48.0 | 43.0 | 5.0 | 7.4 | 6.6 | 0.8 | 0.00455 | 0.00476 | 0.00465 | 0.00081 | 8,086 |
| | | | 99 | 48.0 | 42.9 | 5.1 | 7.4 | 6.6 | 0.8 | 0.00454 | 0.00476 | 0.00465 | 0.00082 | 8,075 |
| | | | 100 | 48.1 | 43.0 | 5.0 | 7.4 | 6.6 | 0.8 | 0.00455 | 0.00476 | 0.00466 | 0.00082 | 8,090 |
| | COLUMN AVERAGE | | | 48.0 | 42.9 | 5.0 | 7.4 | 6.6 | 0.8 | 0.00454 | 0.00476 | 0.00465 | 0.00082 | 8,078 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 11 | |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-NOS-P08 | | | | | | Material Source: 19X-NOS-P08 | | | | | |
|--|----------------|------|-----------------------------------|------|------|-----|-----|-----|------------------------------|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 59.6 | 53.3 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00605 | 0.00628 | 0.00617 | 0.00108 | 7,568 |
| | | | 97 | 59.6 | 53.3 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00606 | 0.00629 | 0.00617 | 0.00108 | 7,559 |
| | | | 98 | 59.7 | 53.4 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00606 | 0.00628 | 0.00617 | 0.00108 | 7,565 |
| | | | 99 | 59.6 | 53.3 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00605 | 0.00628 | 0.00617 | 0.00108 | 7,565 |
| | | | 100 | 59.6 | 53.3 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00606 | 0.00628 | 0.00617 | 0.00108 | 7,565 |
| | COLUMN AVERAGE | | | 59.6 | 53.3 | 6.3 | 9.1 | 8.2 | 1.0 | 0.00606 | 0.00628 | 0.00617 | 0.00108 | 7,565 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 3 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.7 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00095 | 0.00092 | 0.00016 | 10,913 |
| | | | 97 | 13.6 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00090 | 0.00095 | 0.00092 | 0.00016 | 10,890 |
| | | | 98 | 13.6 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00095 | 0.00092 | 0.00016 | 10,909 |
| | | | 99 | 13.7 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00096 | 0.00092 | 0.00016 | 10,922 |
| | | | 100 | 13.6 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00096 | 0.00092 | 0.00016 | 10,858 |
| | COLUMN AVERAGE | | | 13.6 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00089 | 0.00095 | 0.00092 | 0.00016 | 10,898 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 25 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 24.8 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00201 | 0.00213 | 0.00207 | 0.00036 | 9,430 |
| | | | 97 | 24.8 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00202 | 0.00213 | 0.00207 | 0.00036 | 9,429 |
| | | | 98 | 24.8 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00202 | 0.00213 | 0.00207 | 0.00036 | 9,422 |
| | | | 99 | 24.8 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00202 | 0.00214 | 0.00208 | 0.00036 | 9,391 |
| | | | 100 | 24.8 | 22.3 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00202 | 0.00213 | 0.00207 | 0.00036 | 9,438 |
| | COLUMN AVERAGE | | | 24.8 | 22.3 | 2.5 | 3.8 | 3.4 | 0.4 | 0.00202 | 0.00213 | 0.00207 | 0.00036 | 9,422 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 36.2 | 32.5 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00333 | 0.00350 | 0.00341 | 0.00060 | 8,334 |
| | | | 97 | 36.3 | 32.5 | 3.8 | 5.6 | 5.0 | 0.6 | 0.00332 | 0.00349 | 0.00341 | 0.00060 | 8,346 |
| | | | 98 | 36.2 | 32.4 | 3.8 | 5.5 | 5.0 | 0.6 | 0.00332 | 0.00350 | 0.00341 | 0.00060 | 8,317 |
| | | | 99 | 36.2 | 32.5 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00333 | 0.00350 | 0.00341 | 0.00060 | 8,332 |
| | | | 100 | 36.3 | 32.5 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00333 | 0.00349 | 0.00341 | 0.00060 | 8,347 |
| | COLUMN AVERAGE | | | 36.2 | 32.5 | 3.7 | 5.6 | 5.0 | 0.6 | 0.00332 | 0.00349 | 0.00341 | 0.00060 | 8,335 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P08

Material Source: 19X-NOS-P08

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00484 | 0.00505 | 0.00495 | 0.00087 | 7,519 |
| | | | 97 | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00484 | 0.00504 | 0.00494 | 0.00087 | 7,524 |
| | | | 98 | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00485 | 0.00505 | 0.00495 | 0.00087 | 7,514 |
| | | | 99 | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00484 | 0.00504 | 0.00494 | 0.00087 | 7,523 |
| | | | 100 | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00485 | 0.00504 | 0.00494 | 0.00087 | 7,523 |
| | COLUMN AVERAGE | | | 47.5 | 42.5 | 5.0 | 7.3 | 6.5 | 0.8 | 0.00484 | 0.00504 | 0.00494 | 0.00087 | 7,521 |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 4 | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 59.1 | 52.8 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00640 | 0.00663 | 0.00652 | 0.00114 | 7,093 |
| | | | 97 | 59.2 | 52.9 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00641 | 0.00662 | 0.00651 | 0.00114 | 7,109 |
| | | | 98 | 59.1 | 52.7 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00641 | 0.00662 | 0.00651 | 0.00114 | 7,086 |
| | | | 99 | 59.1 | 52.8 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00640 | 0.00663 | 0.00651 | 0.00114 | 7,094 |
| | | | 100 | 59.1 | 52.8 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00641 | 0.00664 | 0.00652 | 0.00114 | 7,081 |
| | COLUMN AVERAGE | | | 59.1 | 52.8 | 6.3 | 9.1 | 8.1 | 1.0 | 0.00641 | 0.00663 | 0.00652 | 0.00114 | 7,093 |
| | STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 11 | |

TESTED BY RLB DATE 08-04-2019

Boudreau Engineering, Inc.

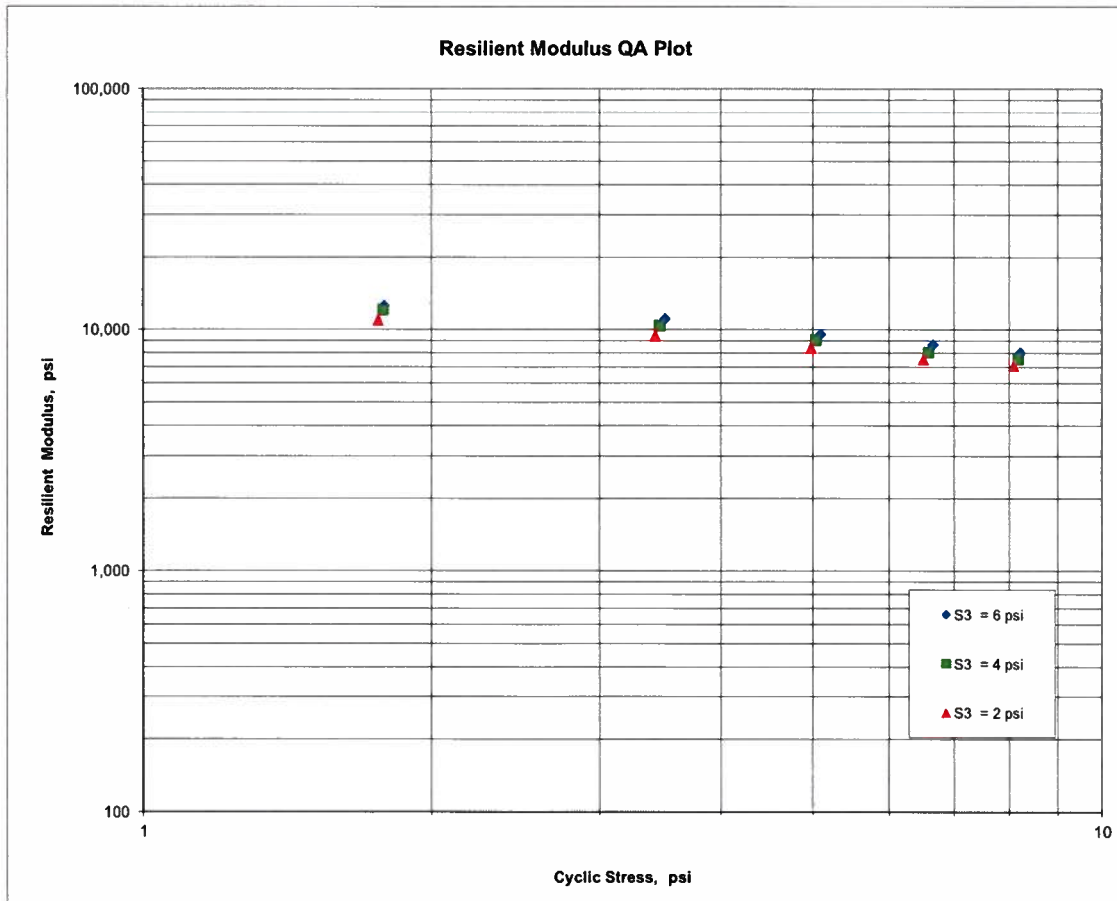
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P08 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 15% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

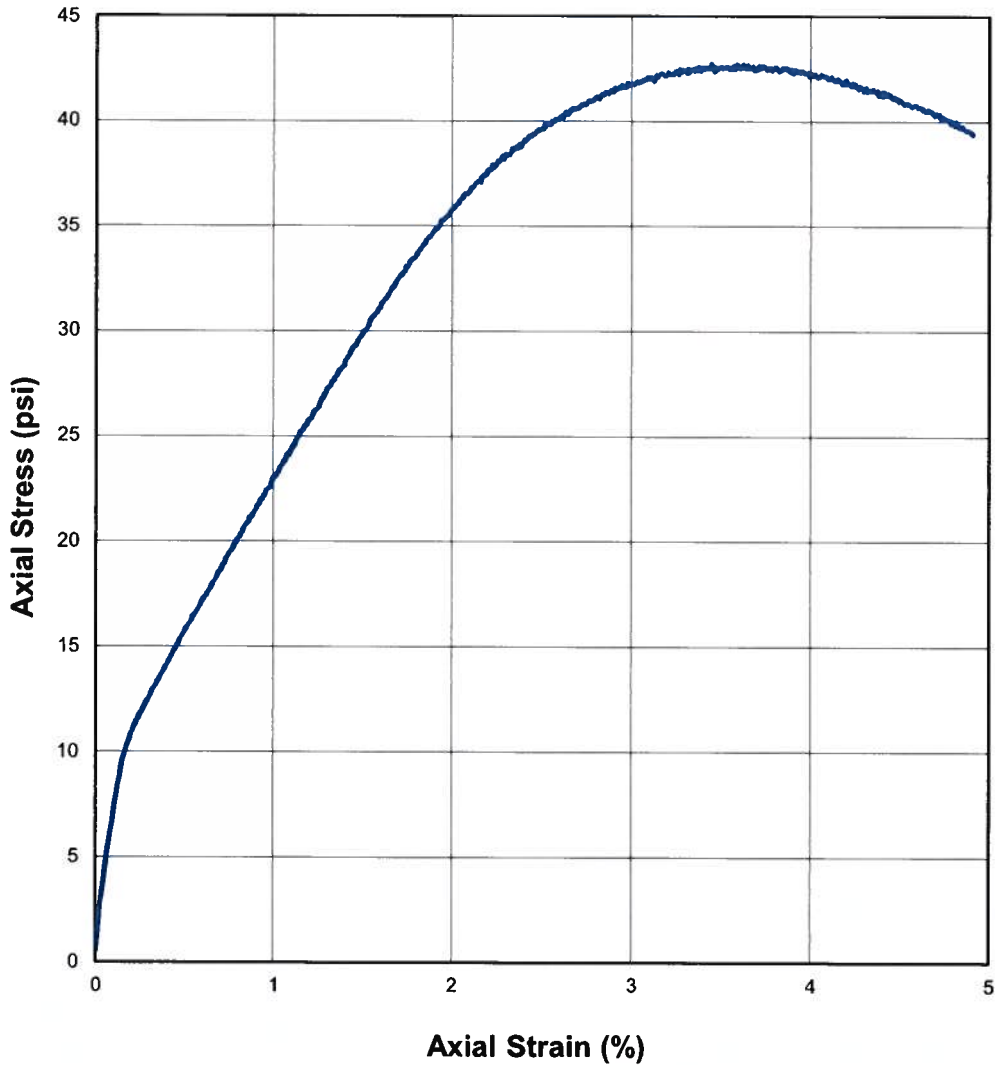
K1 = 12,118
 K2 = -0.29982
 K5 = 0.13235
 R² = 0.98



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P08 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 15% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |





**AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)**

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
 DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
 IDENTIFICATION MARKS: 19X-NOS-P10 SOURCE OF MATERIAL: 19X-NOS-P10

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>NOS-P10</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.74</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, Lo, inch | <u>5.7</u> |
| | INITIAL AREA, Ao, in ² | <u>6.5</u> |
| | INITIAL VOLUME Ao Lo, in ³ | <u>37.5</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1378.13</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1378.13</u> |
| 9. | SOIL PROPERTIES: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>10.2</u> |
| | MAX. DRY DENSITY, pcf | <u>128.8</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>10.2</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>10.0</u> |
| | COMPACTION DRY DENSITY, γ _d , pcf | <u>126.9</u> |
| | TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | <u>10.2</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.5%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAxIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>74</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-05-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-05-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 **LABORATORY:** Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19X-NOS-P10
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 10.2% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-05-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00064 | 0.00064 | 0.00064 | 0.00011 | 16,540 |
| | | | 97 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00064 | 0.00063 | 0.00063 | 0.00011 | 16,672 |
| | | | 98 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00064 | 0.00063 | 0.00064 | 0.00011 | 16,575 |
| | | | 99 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00064 | 0.00064 | 0.00064 | 0.00011 | 16,492 |
| | | | 100 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00064 | 0.00063 | 0.00064 | 0.00011 | 16,492 |
| COLUMN AVERAGE | | | | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00064 | 0.00064 | 0.00064 | 0.00011 | 16,554 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 75 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P10

Material Source: 19X-NOS-P10

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00133 | 0.00131 | 0.00132 | 0.00023 | 15,780 |
| | | | 97 | 26.2 | 23.8 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00133 | 0.00131 | 0.00132 | 0.00023 | 15,868 |
| | | | 98 | 26.1 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00132 | 0.00132 | 0.00023 | 15,776 |
| | | | 99 | 26.3 | 23.8 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00132 | 0.00132 | 0.00023 | 15,893 |
| | | | 100 | 26.2 | 23.8 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00131 | 0.00131 | 0.00131 | 0.00023 | 15,912 |
| COLUMN AVERAGE | | | | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00131 | 0.00132 | 0.00023 | 15,846 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 64 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 39.0 | 35.3 | 3.7 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00214 | 0.00215 | 0.00038 | 14,376 |
| | | | 97 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00215 | 0.00216 | 0.00038 | 14,332 |
| | | | 98 | 39.0 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00215 | 0.00216 | 0.00038 | 14,366 |
| | | | 99 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00215 | 0.00216 | 0.00038 | 14,336 |
| | | | 100 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00215 | 0.00216 | 0.00038 | 14,352 |
| COLUMN AVERAGE | | | | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00217 | 0.00215 | 0.00216 | 0.00038 | 14,352 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 19 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00307 | 0.00305 | 0.00306 | 0.00053 | 13,389 |
| | | | 97 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00307 | 0.00305 | 0.00306 | 0.00053 | 13,385 |
| | | | 98 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00307 | 0.00305 | 0.00306 | 0.00053 | 13,381 |
| | | | 99 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00307 | 0.00306 | 0.00306 | 0.00053 | 13,388 |
| | | | 100 | 51.7 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00308 | 0.00305 | 0.00306 | 0.00053 | 13,377 |
| COLUMN AVERAGE | | | | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00307 | 0.00305 | 0.00306 | 0.00053 | 13,384 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 5 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.4 | 58.0 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00401 | 0.00399 | 0.00400 | 0.00070 | 12,734 |
| | | | 97 | 64.2 | 57.9 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00402 | 0.00399 | 0.00401 | 0.00070 | 12,694 |
| | | | 98 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00402 | 0.00399 | 0.00400 | 0.00070 | 12,703 |
| | | | 99 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00402 | 0.00399 | 0.00401 | 0.00070 | 12,706 |
| | | | 100 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00402 | 0.00400 | 0.00401 | 0.00070 | 12,692 |
| COLUMN AVERAGE | | | | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00402 | 0.00399 | 0.00401 | 0.00070 | 12,706 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P10

Material Source: 19X-NOS-P10

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00066 | 0.00066 | 0.00011 | 15,985 |
| | | | 97 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00065 | 0.00066 | 0.00011 | 16,016 |
| | | | 98 | 13.8 | 12.1 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00066 | 0.00066 | 0.00011 | 16,145 |
| | | | 99 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00065 | 0.00066 | 0.00011 | 16,021 |
| | | | 100 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00065 | 0.00066 | 0.00011 | 16,082 |
| COLUMN AVERAGE | | | | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00066 | 0.00066 | 0.00066 | 0.00011 | 16,050 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 64 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00141 | 0.00141 | 0.00025 | 14,720 |
| | | | 97 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00141 | 0.00141 | 0.00025 | 14,703 |
| | | | 98 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00141 | 0.00140 | 0.00141 | 0.00025 | 14,739 |
| | | | 99 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00141 | 0.00140 | 0.00141 | 0.00025 | 14,724 |
| | | | 100 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00141 | 0.00141 | 0.00025 | 14,625 |
| COLUMN AVERAGE | | | | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00141 | 0.00141 | 0.00025 | 14,702 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 45 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00228 | 0.00229 | 0.00040 | 13,477 |
| | | | 97 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00229 | 0.00229 | 0.00040 | 13,476 |
| | | | 98 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00229 | 0.00229 | 0.00229 | 0.00040 | 13,473 |
| | | | 99 | 38.9 | 35.1 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00228 | 0.00229 | 0.00040 | 13,468 |
| | | | 100 | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00230 | 0.00229 | 0.00229 | 0.00040 | 13,453 |
| COLUMN AVERAGE | | | | 38.9 | 35.1 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00229 | 0.00229 | 0.00040 | 13,469 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00327 | 0.00325 | 0.00326 | 0.00057 | 12,511 |
| | | | 97 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00328 | 0.00325 | 0.00326 | 0.00057 | 12,515 |
| | | | 98 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00327 | 0.00326 | 0.00326 | 0.00057 | 12,500 |
| | | | 99 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00328 | 0.00325 | 0.00326 | 0.00057 | 12,509 |
| | | | 100 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00327 | 0.00326 | 0.00326 | 0.00057 | 12,503 |
| COLUMN AVERAGE | | | | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00327 | 0.00325 | 0.00326 | 0.00057 | 12,508 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 6 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P10

Material Source: 19X-NOS-P10

| | | | | | | | | | | | | | | |
|---------------|----------------|------|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.2 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00425 | 0.00422 | 0.00423 | 0.00074 | 12,014 |
| | | | 97 | 64.3 | 58.0 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00425 | 0.00423 | 0.00424 | 0.00074 | 12,017 |
| | | | 98 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00424 | 0.00423 | 0.00424 | 0.00074 | 12,018 |
| | | | 99 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00425 | 0.00423 | 0.00424 | 0.00074 | 12,006 |
| | | | 100 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00425 | 0.00422 | 0.00424 | 0.00074 | 12,005 |
| | COLUMN AVERAGE | | | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00425 | 0.00423 | 0.00424 | 0.00074 | 12,012 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 6 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.1 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00075 | 0.00074 | 0.00075 | 0.00013 | 14,069 |
| | | | 97 | 14.2 | 12.0 | 2.1 | 2.2 | 1.8 | 0.3 | 0.00074 | 0.00075 | 0.00074 | 0.00013 | 14,192 |
| | | | 98 | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00074 | 0.00075 | 0.00074 | 0.00013 | 14,220 |
| | | | 99 | 14.1 | 11.9 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00074 | 0.00075 | 0.00074 | 0.00013 | 14,038 |
| | | | 100 | 14.1 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00074 | 0.00075 | 0.00074 | 0.00013 | 14,010 |
| | COLUMN AVERAGE | | | 14.1 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00074 | 0.00075 | 0.00074 | 0.00013 | 14,106 |
| STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 94 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00159 | 0.00159 | 0.00028 | 12,987 |
| | | | 97 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00158 | 0.00159 | 0.00028 | 13,003 |
| | | | 98 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00159 | 0.00159 | 0.00028 | 12,993 |
| | | | 99 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00159 | 0.00159 | 0.00028 | 12,974 |
| | | | 100 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00159 | 0.00159 | 0.00028 | 12,978 |
| | COLUMN AVERAGE | | | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00159 | 0.00159 | 0.00028 | 12,987 |
| STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 12 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.8 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00253 | 0.00252 | 0.00252 | 0.00044 | 12,200 |
| | | | 97 | 38.8 | 35.0 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00253 | 0.00253 | 0.00253 | 0.00044 | 12,165 |
| | | | 98 | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00252 | 0.00253 | 0.00252 | 0.00044 | 12,216 |
| | | | 99 | 38.7 | 35.0 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00252 | 0.00253 | 0.00253 | 0.00044 | 12,164 |
| | | | 100 | 38.7 | 35.0 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00253 | 0.00252 | 0.00252 | 0.00044 | 12,169 |
| | COLUMN AVERAGE | | | 38.8 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00252 | 0.00252 | 0.00252 | 0.00044 | 12,183 |
| STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 24 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P10

Material Source: 19X-NOS-P10

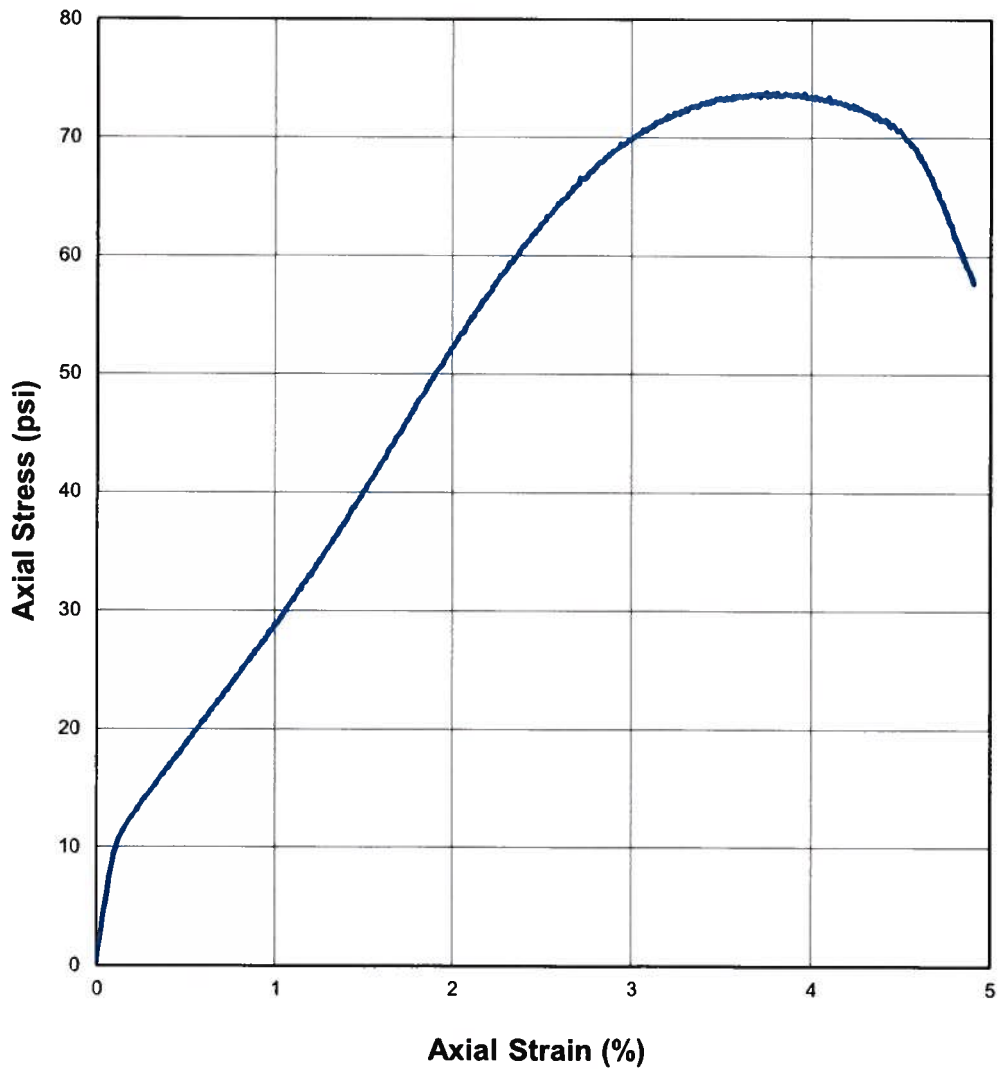
| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.3 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00355 | 0.00355 | 0.00355 | 0.00062 | 11,429 |
| | | | 97 | 51.3 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00355 | 0.00354 | 0.00355 | 0.00062 | 11,444 |
| | | | 98 | 51.3 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00355 | 0.00354 | 0.00354 | 0.00062 | 11,458 |
| | | | 99 | 51.3 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00355 | 0.00355 | 0.00355 | 0.00062 | 11,445 |
| | | | 100 | 51.2 | 46.1 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00356 | 0.00354 | 0.00355 | 0.00062 | 11,418 |
| COLUMN AVERAGE | | | | 51.3 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00355 | 0.00354 | 0.00355 | 0.00062 | 11,439 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 16 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00459 | 0.00457 | 0.00458 | 0.00080 | 11,075 |
| | | | 97 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00459 | 0.00456 | 0.00458 | 0.00080 | 11,071 |
| | | | 98 | 64.1 | 57.7 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00459 | 0.00456 | 0.00457 | 0.00080 | 11,085 |
| | | | 99 | 64.0 | 57.6 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00458 | 0.00458 | 0.00458 | 0.00080 | 11,067 |
| | | | 100 | 64.0 | 57.6 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00458 | 0.00457 | 0.00457 | 0.00080 | 11,075 |
| COLUMN AVERAGE | | | | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00458 | 0.00457 | 0.00457 | 0.00080 | 11,075 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 7 |

TESTED BY RLB DATE 08-05-2019

AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P10 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 10.2% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-05-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-NOS-P16 SOURCE OF MATERIAL: 19X-NOS-P16

- | | |
|---|------------|
| 1. SAMPLING DATE: | N.R. |
| 2. SAMPLE NUMBER: | NOS-P16 |
| 3. LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | 1 |
| 4. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 5. APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | N/A |
| 6. TEST INFORMATION | |
| PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | N |
| TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | N |
| TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | 15 |
| 7. SPECIMEN INFO.: | |
| SPECIMEN DIAM., inch | |
| TOP | 2.9 |
| MIDDLE | 2.9 |
| BOTTOM | 2.9 |
| AVERAGE | 2.9 |
| MEMBRANE THICKNESS (1), inch | 0.00 |
| MEMBRANE THICKNESS (2), inch | 0.00 |
| NET DIAM., inch | 2.9 |
| HEIGHT OF SPECIMEN, CAP AND BASE, inch | 5.74 |
| HEIGHT OF CAP AND BASE, inch | 0.0 |
| INITIAL LENGTH, Lo, inch | 5.7 |
| INITIAL AREA, Ao, in ² | 6.5 |
| INITIAL VOLUME Ao Lo, in ³ | 37.5 |
| INITIAL WEIGHT, grams (for tube samples) | N/A |
| 8. SOIL SPECIMEN WEIGHT (for remolded samples): | |
| INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | 1328.47 |
| FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | 0.00 |
| WEIGHT OF WET SOIL USED, grams | 1328.47 |
| 9. SOIL PROPERTIES.: | |
| For Remolded Samples: | |
| IN SITU MOISTURE CONTENT (NUCLEAR), % | N/A |
| IN SITU WET DENSITY (NUCLEAR), pcf | N/A |
| or | |
| OPTIMUM MOISTURE CONTENT, % | 12.0 |
| MAX. DRY DENSITY, pcf | 122.8 |
| For Tube Samples: | |
| IN SITU MOISTURE CONTENT, % | N/A |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | N/A |
| WET DENSITY, pcf | N/A |
| DRY DENSITY, pcf | N/A |
| 10. SPECIMEN PROPERTIES (for remolded samples): | |
| COMPACTION MOISTURE CONTENT, % | 12.0 |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | 11.9 |
| COMPACTION DRY DENSITY, γ _d , pcf | 120.5 |
| TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | 12.0 |
| COMPACTION LEVEL ACHIEVED | 98.1% |
| 11. QUICK SHEAR TEST | |
| STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | Y |
| TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | 87 |
| SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | Y |
| 12. TEST DATE | 08-04-2019 |
| 13. GENERAL REMARKS: | |

TESTED BY RLB DATE 08-04-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19X-NOS-P16
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 12% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-04-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|---------------------|---------------------|---|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT | Recov. Def. LVDT | Average Recov. Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00065 | 0.00066 | 0.00066 | 0.00011 | 15,903 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00065 | 0.00067 | 0.00066 | 0.00011 | 15,975 |
| | | | 98 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00065 | 0.00066 | 0.00065 | 0.00011 | 16,093 |
| | | | 99 | 13.3 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00064 | 0.00067 | 0.00066 | 0.00011 | 16,051 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00065 | 0.00066 | 0.00066 | 0.00011 | 15,952 |
| COLUMN AVERAGE | | | | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00065 | 0.00066 | 0.00066 | 0.00011 | 15,995 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 77 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P16

Material Source: 19X-NOS-P16

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00133 | 0.00136 | 0.00134 | 0.00023 | 15,499 |
| | | | 97 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00133 | 0.00137 | 0.00135 | 0.00023 | 15,446 |
| | | | 98 | 26.2 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00137 | 0.00134 | 0.00023 | 15,524 |
| | | | 99 | 26.1 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00133 | 0.00136 | 0.00134 | 0.00023 | 15,475 |
| | | | 100 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00137 | 0.00135 | 0.00023 | 15,530 |
| COLUMN AVERAGE | | | | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00132 | 0.00137 | 0.00135 | 0.00023 | 15,495 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 35 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 39.1 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00211 | 0.00219 | 0.00215 | 0.00037 | 14,436 |
| | | | 97 | 39.2 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00212 | 0.00217 | 0.00215 | 0.00037 | 14,481 |
| | | | 98 | 39.2 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00211 | 0.00218 | 0.00215 | 0.00037 | 14,483 |
| | | | 99 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00212 | 0.00218 | 0.00215 | 0.00037 | 14,418 |
| | | | 100 | 39.2 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00211 | 0.00219 | 0.00215 | 0.00037 | 14,459 |
| COLUMN AVERAGE | | | | 39.1 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00211 | 0.00218 | 0.00215 | 0.00037 | 14,456 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 28 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 52.1 | 47.0 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00297 | 0.00304 | 0.00300 | 0.00052 | 13,744 |
| | | | 97 | 51.9 | 46.9 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00296 | 0.00304 | 0.00300 | 0.00052 | 13,713 |
| | | | 98 | 52.0 | 46.9 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00297 | 0.00304 | 0.00300 | 0.00052 | 13,719 |
| | | | 99 | 52.0 | 46.9 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00296 | 0.00304 | 0.00300 | 0.00052 | 13,705 |
| | | | 100 | 52.0 | 46.9 | 5.0 | 8.0 | 7.2 | 0.8 | 0.00296 | 0.00305 | 0.00300 | 0.00052 | 13,726 |
| COLUMN AVERAGE | | | | 52.0 | 46.9 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00296 | 0.00304 | 0.00300 | 0.00052 | 13,721 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 15 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.7 | 58.3 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00384 | 0.00393 | 0.00389 | 0.00068 | 13,166 |
| | | | 97 | 64.7 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00385 | 0.00393 | 0.00389 | 0.00068 | 13,176 |
| | | | 98 | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00384 | 0.00395 | 0.00389 | 0.00068 | 13,178 |
| | | | 99 | 64.8 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00384 | 0.00394 | 0.00389 | 0.00068 | 13,199 |
| | | | 100 | 64.8 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00384 | 0.00394 | 0.00389 | 0.00068 | 13,173 |
| COLUMN AVERAGE | | | | 64.7 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00384 | 0.00394 | 0.00389 | 0.00068 | 13,178 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 12 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P16

Material Source: 19X-NOS-P16

| | | | | | | | | | | | | | | |
|------------|----------------|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00068 | 0.00070 | 0.00069 | 0.00012 | 15,193 |
| | | | 97 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00068 | 0.00070 | 0.00069 | 0.00012 | 15,351 |
| | | | 98 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00067 | 0.00070 | 0.00069 | 0.00012 | 15,255 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00068 | 0.00071 | 0.00069 | 0.00012 | 15,120 |
| | | | 100 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00067 | 0.00070 | 0.00068 | 0.00012 | 15,377 |
| | COLUMN AVERAGE | | | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00068 | 0.00070 | 0.00069 | 0.00012 | 15,259 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 107 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00143 | 0.00147 | 0.00145 | 0.00025 | 14,257 |
| | | | 97 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00147 | 0.00145 | 0.00025 | 14,350 |
| | | | 98 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00148 | 0.00145 | 0.00025 | 14,306 |
| | | | 99 | 26.1 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00143 | 0.00147 | 0.00145 | 0.00025 | 14,328 |
| | | | 100 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00147 | 0.00145 | 0.00025 | 14,303 |
| | COLUMN AVERAGE | | | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00147 | 0.00145 | 0.00025 | 14,309 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 35 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00225 | 0.00233 | 0.00229 | 0.00040 | 13,517 |
| | | | 97 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00226 | 0.00233 | 0.00229 | 0.00040 | 13,487 |
| | | | 98 | 39.1 | 35.3 | 3.7 | 6.0 | 5.4 | 0.6 | 0.00225 | 0.00233 | 0.00229 | 0.00040 | 13,539 |
| | | | 99 | 38.9 | 35.1 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00226 | 0.00233 | 0.00229 | 0.00040 | 13,466 |
| | | | 100 | 39.0 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00225 | 0.00233 | 0.00229 | 0.00040 | 13,520 |
| | COLUMN AVERAGE | | | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00225 | 0.00233 | 0.00229 | 0.00040 | 13,506 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 29 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 51.8 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00315 | 0.00324 | 0.00319 | 0.00056 | 12,846 |
| | | | 97 | 51.7 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00315 | 0.00324 | 0.00320 | 0.00056 | 12,822 |
| | | | 98 | 51.9 | 46.9 | 5.0 | 7.9 | 7.2 | 0.8 | 0.00315 | 0.00324 | 0.00319 | 0.00056 | 12,893 |
| | | | 99 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00315 | 0.00324 | 0.00319 | 0.00056 | 12,820 |
| | | | 100 | 51.8 | 46.7 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00315 | 0.00324 | 0.00319 | 0.00056 | 12,857 |
| | COLUMN AVERAGE | | | 51.8 | 46.7 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00315 | 0.00324 | 0.00319 | 0.00056 | 12,848 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 30 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P16

Material Source: 19X-NOS-P16

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.7 | 58.3 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00406 | 0.00415 | 0.00410 | 0.00072 | 12,478 |
| | | | 97 | 64.6 | 58.3 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00406 | 0.00415 | 0.00410 | 0.00071 | 12,478 |
| | | | 98 | 64.6 | 58.3 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00404 | 0.00415 | 0.00410 | 0.00071 | 12,485 |
| | | | 99 | 64.8 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00406 | 0.00415 | 0.00411 | 0.00072 | 12,495 |
| | | | 100 | 64.8 | 58.4 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00404 | 0.00416 | 0.00410 | 0.00071 | 12,504 |
| COLUMN AVERAGE | | | | 64.7 | 58.3 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00405 | 0.00415 | 0.00410 | 0.00071 | 12,488 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.1 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00075 | 0.00078 | 0.00076 | 0.00013 | 13,738 |
| | | | 97 | 14.0 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00075 | 0.00077 | 0.00076 | 0.00013 | 13,610 |
| | | | 98 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00075 | 0.00078 | 0.00076 | 0.00013 | 13,677 |
| | | | 99 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00075 | 0.00078 | 0.00077 | 0.00013 | 13,622 |
| | | | 100 | 14.1 | 11.9 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00076 | 0.00078 | 0.00077 | 0.00013 | 13,630 |
| COLUMN AVERAGE | | | | 14.0 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00075 | 0.00078 | 0.00076 | 0.00013 | 13,655 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 53 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00165 | 0.00162 | 0.00028 | 12,773 |
| | | | 97 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00164 | 0.00162 | 0.00028 | 12,756 |
| | | | 98 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00165 | 0.00161 | 0.00028 | 12,810 |
| | | | 99 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00165 | 0.00162 | 0.00028 | 12,737 |
| | | | 100 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00158 | 0.00165 | 0.00161 | 0.00028 | 12,799 |
| COLUMN AVERAGE | | | | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00159 | 0.00165 | 0.00162 | 0.00028 | 12,775 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 30 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00248 | 0.00256 | 0.00252 | 0.00044 | 12,229 |
| | | | 97 | 38.8 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00247 | 0.00256 | 0.00252 | 0.00044 | 12,232 |
| | | | 98 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00248 | 0.00255 | 0.00252 | 0.00044 | 12,236 |
| | | | 99 | 38.8 | 35.1 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00248 | 0.00256 | 0.00252 | 0.00044 | 12,239 |
| | | | 100 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00248 | 0.00256 | 0.00252 | 0.00044 | 12,224 |
| COLUMN AVERAGE | | | | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00248 | 0.00256 | 0.00252 | 0.00044 | 12,232 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 6 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P16

Material Source: 19X-NOS-P16

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.6 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00342 | 0.00352 | 0.00347 | 0.00060 | 11,799 |
| | | | 97 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00342 | 0.00352 | 0.00347 | 0.00060 | 11,759 |
| | | | 98 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00343 | 0.00351 | 0.00347 | 0.00060 | 11,764 |
| | | | 99 | 51.6 | 46.6 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00342 | 0.00351 | 0.00347 | 0.00060 | 11,796 |
| | | | 100 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00342 | 0.00352 | 0.00347 | 0.00060 | 11,750 |
| | COLUMN AVERAGE | | | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00342 | 0.00352 | 0.00347 | 0.00060 | 11,773 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 23 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 64.5 | 58.1 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00436 | 0.00448 | 0.00442 | 0.00077 | 11,546 |
| | | | 97 | 64.4 | 58.0 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00437 | 0.00448 | 0.00442 | 0.00077 | 11,522 |
| | | | 98 | 64.5 | 58.2 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00436 | 0.00448 | 0.00442 | 0.00077 | 11,553 |
| | | | 99 | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00437 | 0.00447 | 0.00442 | 0.00077 | 11,547 |
| | | | 100 | 64.4 | 58.1 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00437 | 0.00448 | 0.00442 | 0.00077 | 11,531 |
| | COLUMN AVERAGE | | | 64.5 | 58.1 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00437 | 0.00448 | 0.00442 | 0.00077 | 11,540 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |

TESTED BY RLB DATE 08-04-2019

Report Form X1.1

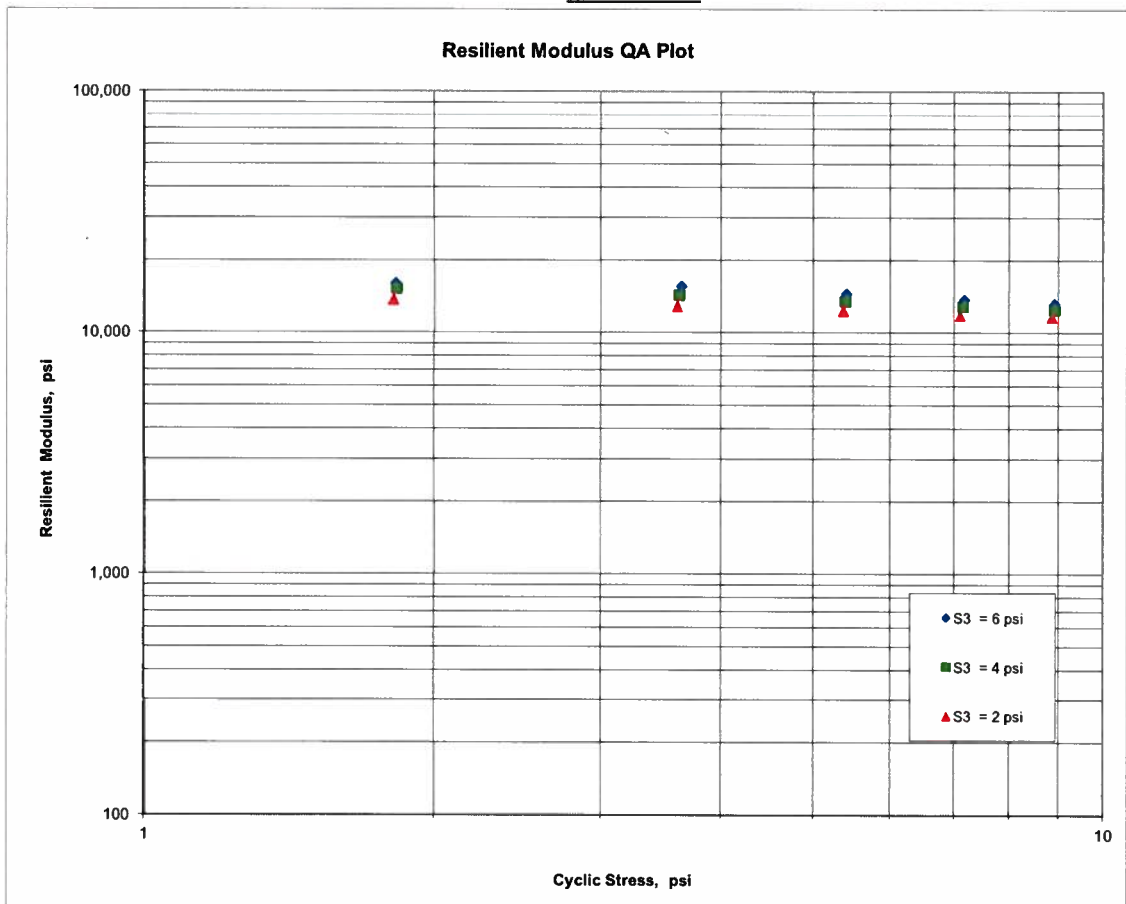
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|---|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> |
| 3. SOURCE OF MATERIAL: | <u>19X-NOS-P16</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 12% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>08-04-2019</u> |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

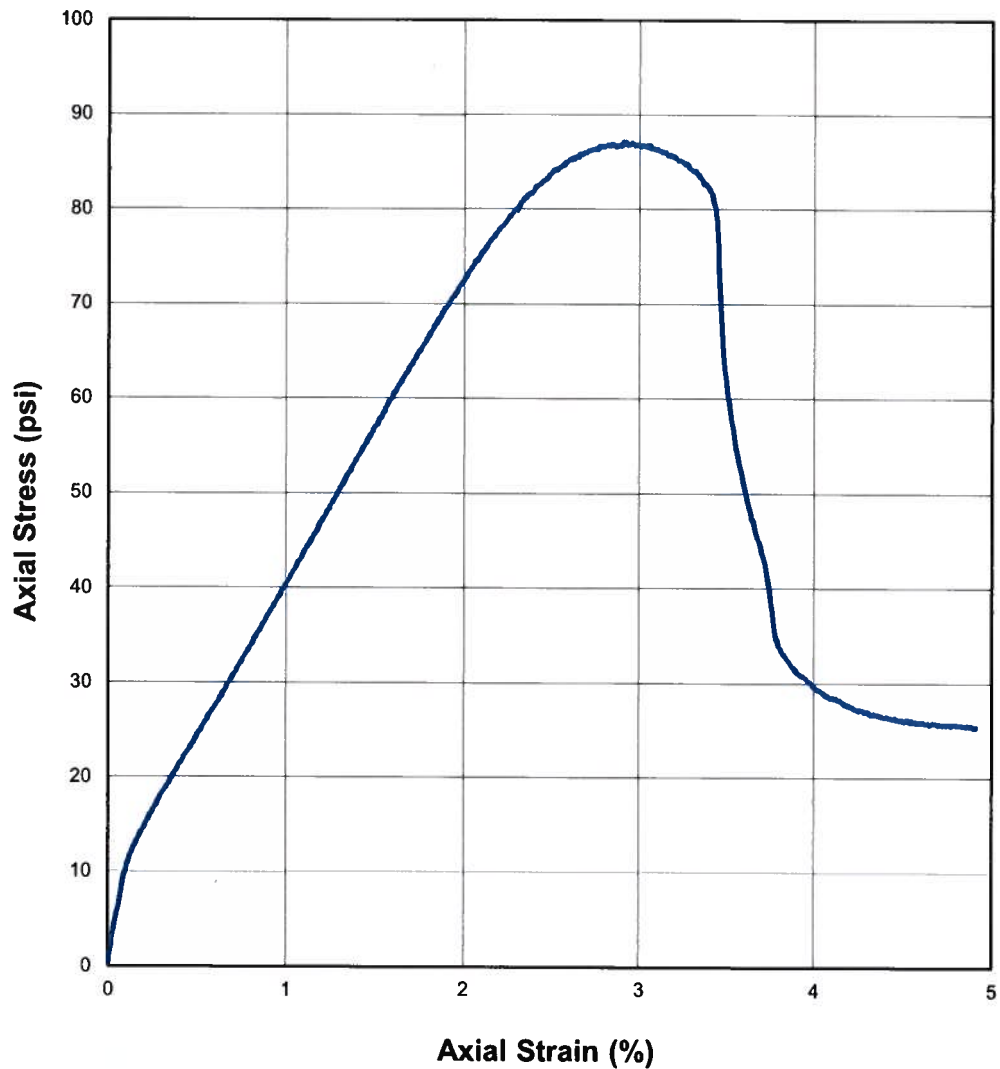
| | |
|---------|----------|
| $K_1 =$ | 13,439 |
| $K_2 =$ | -0.12017 |
| $K_5 =$ | 0.14663 |
| $R^2 =$ | 0.98 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P16 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 12% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |





AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 LABORATORY: Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19X-NOS-P19
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 11.4% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-04-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | C ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | e _r | M _v |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.2 | 11.9 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00085 | 0.00092 | 0.00089 | 0.00015 | 11,827 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00086 | 0.00091 | 0.00089 | 0.00015 | 11,802 |
| | | | 98 | 13.2 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00086 | 0.00092 | 0.00089 | 0.00016 | 11,703 |
| | | | 99 | 13.2 | 11.9 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00087 | 0.00091 | 0.00089 | 0.00015 | 11,741 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00086 | 0.00092 | 0.00089 | 0.00016 | 11,746 |
| COLUMN AVERAGE | | | | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00086 | 0.00092 | 0.00089 | 0.00015 | 11,764 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 50 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P19

Material Source: 19X-NOS-P19

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.9 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00193 | 0.00205 | 0.00199 | 0.00035 | 10,338 |
| | | | 97 | 25.8 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00193 | 0.00205 | 0.00199 | 0.00035 | 10,309 |
| | | | 98 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00193 | 0.00205 | 0.00199 | 0.00035 | 10,339 |
| | | | 99 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00193 | 0.00205 | 0.00199 | 0.00035 | 10,336 |
| | | | 100 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00192 | 0.00205 | 0.00199 | 0.00035 | 10,358 |
| COLUMN AVERAGE | | | | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00193 | 0.00205 | 0.00199 | 0.00035 | 10,336 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00314 | 0.00331 | 0.00322 | 0.00056 | 9,375 |
| | | | 97 | 38.0 | 34.3 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00314 | 0.00330 | 0.00322 | 0.00056 | 9,342 |
| | | | 98 | 38.1 | 34.3 | 3.8 | 5.8 | 5.3 | 0.6 | 0.00314 | 0.00332 | 0.00323 | 0.00056 | 9,344 |
| | | | 99 | 38.2 | 34.4 | 3.8 | 5.8 | 5.3 | 0.6 | 0.00314 | 0.00331 | 0.00323 | 0.00056 | 9,348 |
| | | | 100 | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00314 | 0.00331 | 0.00323 | 0.00056 | 9,358 |
| COLUMN AVERAGE | | | | 38.1 | 34.4 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00314 | 0.00331 | 0.00323 | 0.00056 | 9,353 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 14 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00444 | 0.00465 | 0.00455 | 0.00079 | 8,795 |
| | | | 97 | 50.5 | 45.4 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00444 | 0.00465 | 0.00455 | 0.00079 | 8,778 |
| | | | 98 | 50.4 | 45.4 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00444 | 0.00465 | 0.00454 | 0.00079 | 8,778 |
| | | | 99 | 50.4 | 45.4 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00444 | 0.00465 | 0.00455 | 0.00079 | 8,779 |
| | | | 100 | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00444 | 0.00466 | 0.00455 | 0.00079 | 8,779 |
| COLUMN AVERAGE | | | | 50.5 | 45.5 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00444 | 0.00465 | 0.00455 | 0.00079 | 8,782 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 7 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 62.9 | 56.6 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00576 | 0.00602 | 0.00589 | 0.00103 | 8,451 |
| | | | 97 | 63.0 | 56.7 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00576 | 0.00602 | 0.00589 | 0.00103 | 8,459 |
| | | | 98 | 63.0 | 56.7 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00576 | 0.00601 | 0.00588 | 0.00102 | 8,464 |
| | | | 99 | 63.0 | 56.7 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00577 | 0.00602 | 0.00589 | 0.00103 | 8,450 |
| | | | 100 | 62.9 | 56.6 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00576 | 0.00601 | 0.00589 | 0.00103 | 8,448 |
| COLUMN AVERAGE | | | | 63.0 | 56.7 | 6.3 | 9.6 | 8.7 | 1.0 | 0.00576 | 0.00601 | 0.00589 | 0.00103 | 8,454 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 7 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P19

Material Source: 19X-NOS-P19

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.6 | 11.9 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00095 | 0.00090 | 0.00016 | 11,635 |
| | | | 97 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00086 | 0.00095 | 0.00090 | 0.00016 | 11,563 |
| | | | 98 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00095 | 0.00090 | 0.00016 | 11,655 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00095 | 0.00090 | 0.00016 | 11,593 |
| | | | 100 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00086 | 0.00095 | 0.00090 | 0.00016 | 11,600 |
| COLUMN AVERAGE | | | | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00085 | 0.00095 | 0.00090 | 0.00016 | 11,609 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 36 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00200 | 0.00216 | 0.00208 | 0.00036 | 9,800 |
| | | | 97 | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00200 | 0.00216 | 0.00208 | 0.00036 | 9,805 |
| | | | 98 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00199 | 0.00215 | 0.00207 | 0.00036 | 9,882 |
| | | | 99 | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00199 | 0.00216 | 0.00207 | 0.00036 | 9,815 |
| | | | 100 | 25.7 | 23.2 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00199 | 0.00216 | 0.00207 | 0.00036 | 9,817 |
| COLUMN AVERAGE | | | | 25.6 | 23.2 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00199 | 0.00216 | 0.00208 | 0.00036 | 9,824 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 33 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 37.5 | 33.8 | 3.8 | 5.7 | 5.2 | 0.6 | 0.00339 | 0.00357 | 0.00348 | 0.00061 | 8,529 |
| | | | 97 | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00338 | 0.00357 | 0.00348 | 0.00061 | 8,551 |
| | | | 98 | 37.6 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00338 | 0.00356 | 0.00347 | 0.00060 | 8,556 |
| | | | 99 | 37.6 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00338 | 0.00358 | 0.00348 | 0.00061 | 8,549 |
| | | | 100 | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00338 | 0.00357 | 0.00348 | 0.00061 | 8,543 |
| COLUMN AVERAGE | | | | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00338 | 0.00357 | 0.00348 | 0.00061 | 8,545 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 49.8 | 44.8 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00490 | 0.00513 | 0.00501 | 0.00087 | 7,843 |
| | | | 97 | 49.7 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00490 | 0.00513 | 0.00502 | 0.00087 | 7,831 |
| | | | 98 | 49.7 | 44.8 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00491 | 0.00512 | 0.00502 | 0.00087 | 7,838 |
| | | | 99 | 49.7 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00491 | 0.00512 | 0.00501 | 0.00087 | 7,835 |
| | | | 100 | 49.7 | 44.8 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00491 | 0.00512 | 0.00501 | 0.00087 | 7,844 |
| COLUMN AVERAGE | | | | 49.7 | 44.7 | 5.0 | 7.6 | 6.8 | 0.8 | 0.00490 | 0.00512 | 0.00501 | 0.00087 | 7,838 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 5 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P19

Material Source: 19X-NOS-P19

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 62.4 | 56.2 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00630 | 0.00655 | 0.00642 | 0.00112 | 7,678 |
| | | | 97 | 62.4 | 56.1 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00631 | 0.00655 | 0.00643 | 0.00112 | 7,665 |
| | | | 98 | 62.4 | 56.2 | 6.2 | 9.5 | 8.6 | 1.0 | 0.00631 | 0.00655 | 0.00643 | 0.00112 | 7,675 |
| | | | 99 | 62.4 | 56.1 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00630 | 0.00655 | 0.00642 | 0.00112 | 7,675 |
| | | | 100 | 62.4 | 56.2 | 6.2 | 9.5 | 8.6 | 1.0 | 0.00631 | 0.00655 | 0.00643 | 0.00112 | 7,673 |
| COLUMN AVERAGE | | | | 62.4 | 56.1 | 6.3 | 9.5 | 8.6 | 1.0 | 0.00630 | 0.00655 | 0.00643 | 0.00112 | 7,673 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 5 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00106 | 0.00101 | 0.00018 | 10,332 |
| | | | 97 | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00107 | 0.00101 | 0.00018 | 10,210 |
| | | | 98 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00097 | 0.00106 | 0.00102 | 0.00018 | 10,163 |
| | | | 99 | 13.9 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00106 | 0.00101 | 0.00018 | 10,216 |
| | | | 100 | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00107 | 0.00101 | 0.00018 | 10,248 |
| COLUMN AVERAGE | | | | 13.9 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00106 | 0.00101 | 0.00018 | 10,234 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 63 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.2 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00225 | 0.00242 | 0.00233 | 0.00041 | 8,586 |
| | | | 97 | 25.2 | 22.7 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00225 | 0.00242 | 0.00233 | 0.00041 | 8,545 |
| | | | 98 | 25.2 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00224 | 0.00242 | 0.00233 | 0.00041 | 8,592 |
| | | | 99 | 25.3 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00225 | 0.00242 | 0.00234 | 0.00041 | 8,587 |
| | | | 100 | 25.2 | 22.7 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00224 | 0.00242 | 0.00233 | 0.00041 | 8,558 |
| COLUMN AVERAGE | | | | 25.2 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00224 | 0.00242 | 0.00233 | 0.00041 | 8,574 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 21 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00375 | 0.00395 | 0.00385 | 0.00067 | 7,587 |
| | | | 97 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00375 | 0.00395 | 0.00385 | 0.00067 | 7,599 |
| | | | 98 | 36.9 | 33.2 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00374 | 0.00395 | 0.00385 | 0.00067 | 7,584 |
| | | | 99 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00376 | 0.00395 | 0.00385 | 0.00067 | 7,582 |
| | | | 100 | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00376 | 0.00395 | 0.00385 | 0.00067 | 7,585 |
| COLUMN AVERAGE | | | | 37.0 | 33.3 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00375 | 0.00395 | 0.00385 | 0.00067 | 7,587 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 7 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P19

Material Source: 19X-NOS-P19

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 48.9 | 44.0 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00562 | 0.00550 | 0.00096 | 7,019 |
| | | | 97 | 49.1 | 44.1 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00562 | 0.00550 | 0.00096 | 7,046 |
| | | | 98 | 49.0 | 44.1 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00562 | 0.00550 | 0.00096 | 7,040 |
| | | | 99 | 49.1 | 44.1 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00561 | 0.00550 | 0.00096 | 7,052 |
| | | | 100 | 48.9 | 44.0 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00563 | 0.00550 | 0.00096 | 7,013 |
| COLUMN AVERAGE | | | | 49.0 | 44.0 | 5.0 | 7.5 | 6.7 | 0.8 | 0.00538 | 0.00562 | 0.00550 | 0.00096 | 7,034 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00687 | 0.00715 | 0.00701 | 0.00122 | 6,936 |
| | | | 97 | 61.6 | 55.3 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00687 | 0.00714 | 0.00701 | 0.00122 | 6,938 |
| | | | 98 | 61.7 | 55.5 | 6.2 | 9.4 | 8.5 | 0.9 | 0.00688 | 0.00713 | 0.00701 | 0.00122 | 6,958 |
| | | | 99 | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00688 | 0.00713 | 0.00700 | 0.00122 | 6,942 |
| | | | 100 | 61.7 | 55.4 | 6.3 | 9.4 | 8.5 | 1.0 | 0.00687 | 0.00714 | 0.00701 | 0.00122 | 6,944 |
| COLUMN AVERAGE | | | | 61.6 | 55.4 | 6.2 | 9.4 | 8.5 | 1.0 | 0.00687 | 0.00714 | 0.00701 | 0.00122 | 6,944 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 9 |

TESTED BY RLB DATE 08-04-2019

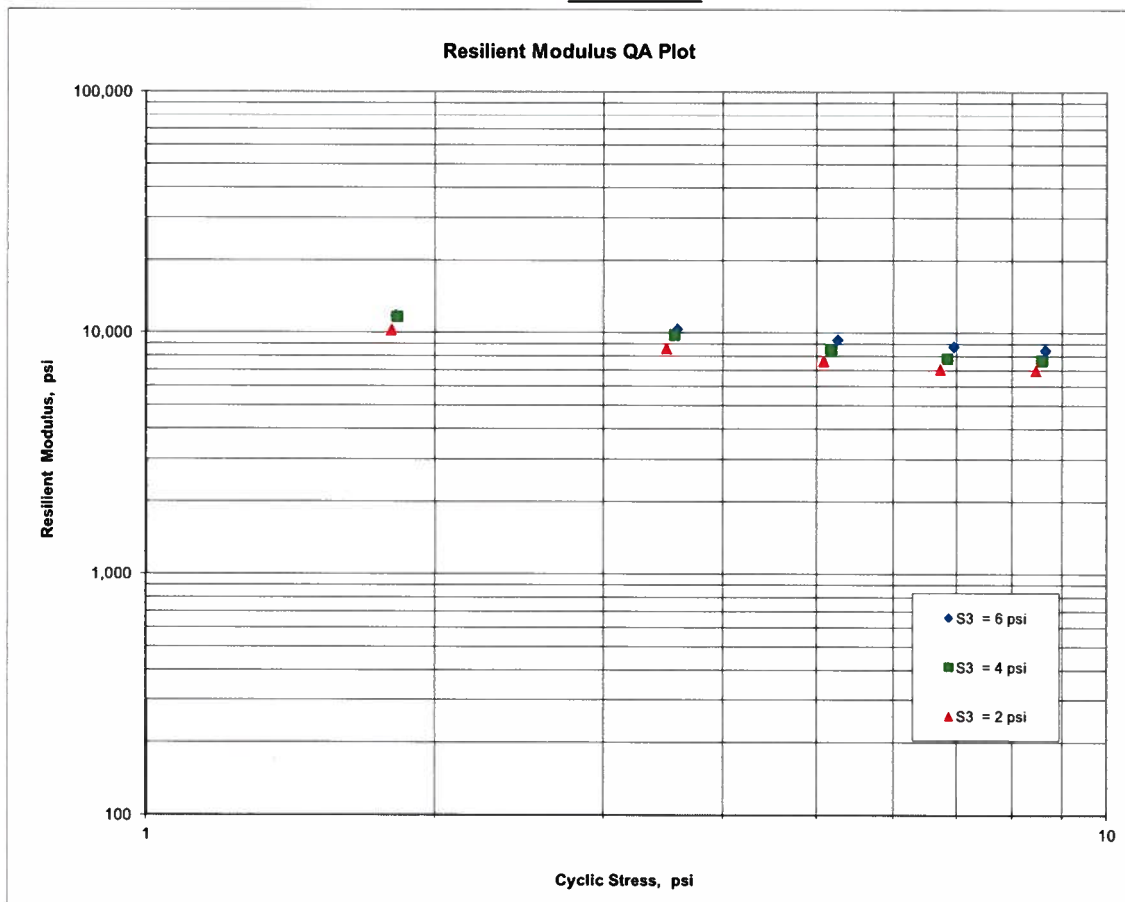
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P19 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 11.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

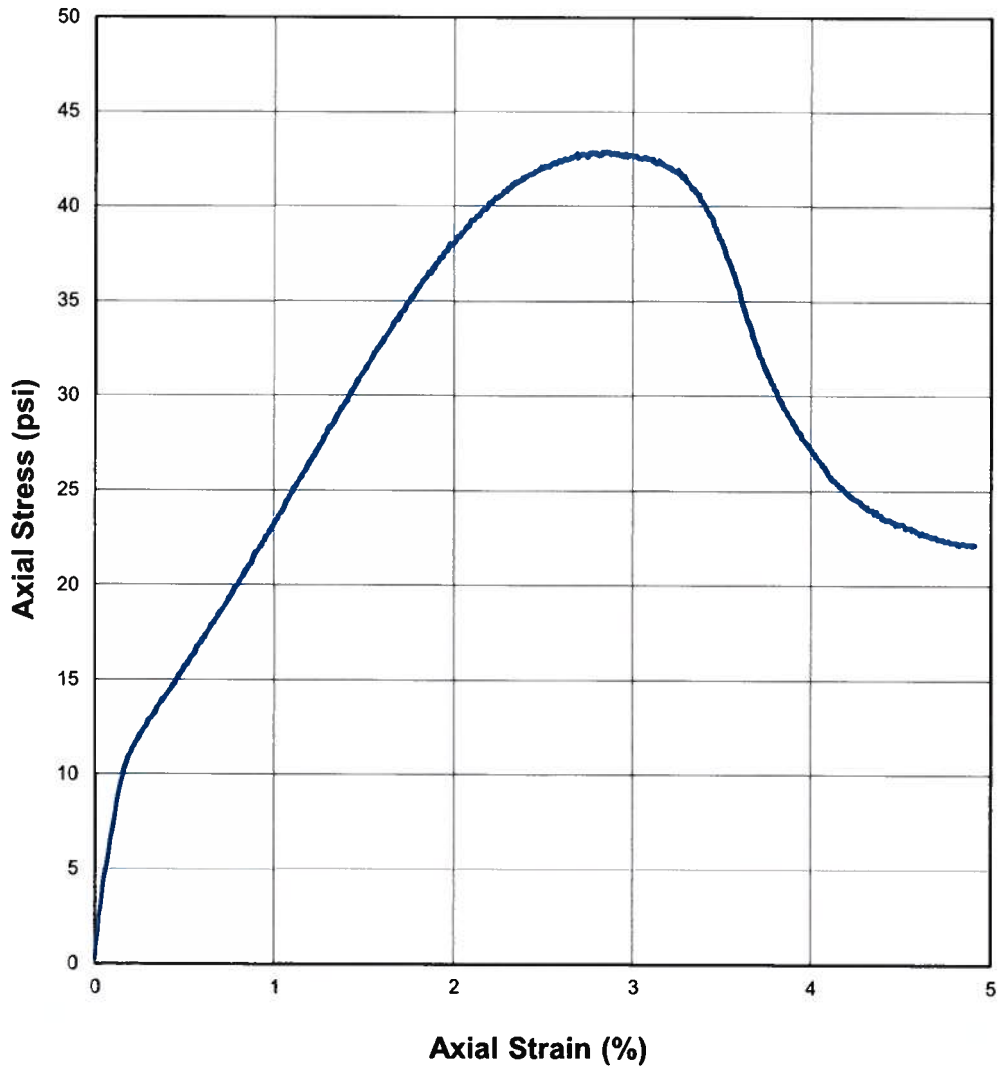
| | |
|------------------|----------|
| K1 = | 10,328 |
| K2 = | -0.25414 |
| K5 = | 0.17901 |
| R ² = | 0.98 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|--|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P19 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 11.4% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-04-2019 |





**AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)**

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
 DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
 IDENTIFICATION MARKS: 19X-NOS-P24 SOURCE OF MATERIAL: 19X-NOS-P24

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>NOS-P24</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.74</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, Lo, inch | <u>5.7</u> |
| | INITIAL AREA, Ao, in ² | <u>6.5</u> |
| | INITIAL VOLUME Ao Lo, in ³ | <u>37.5</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1328.02</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1328.02</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>10.5</u> |
| | MAX. DRY DENSITY, pcf | <u>124.0</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>10.5</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>10.5</u> |
| | COMPACTION DRY DENSITY, γ _d , pcf | <u>122.0</u> |
| | TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | <u>10.5</u> |
| | COMPACTION LEVEL ACHIEVED | <u>98.4%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAxIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>38</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-05-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-05-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 **LABORATORY:** Boudreau Engineering, Inc.
2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
3. **SOURCE OF MATERIAL:** 19X-NOS-P24
4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 10.5% Moisture Content
5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
6. **MATERIAL TYPE (Type 1 or Type 2)** 2
7. **TEST DATE** 08-05-2019
8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.1 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00091 | 0.00093 | 0.00016 | 10,990 |
| | | | 97 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00091 | 0.00094 | 0.00016 | 11,109 |
| | | | 98 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00091 | 0.00094 | 0.00016 | 11,064 |
| | | | 99 | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00097 | 0.00091 | 0.00094 | 0.00016 | 11,014 |
| | | | 100 | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00091 | 0.00093 | 0.00016 | 11,081 |
| COLUMN AVERAGE | | | | 13.1 | 11.8 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00091 | 0.00094 | 0.00016 | 11,052 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 49 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P24

Material Source: 19X-NOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|-------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.2 | 22.9 | 2.3 | 3.9 | 3.5 | 0.4 | 0.00221 | 0.00212 | 0.00217 | 0.00038 | 9,304 |
| | | | 97 | 25.3 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00222 | 0.00211 | 0.00217 | 0.00038 | 9,316 |
| | | | 98 | 25.3 | 23.0 | 2.3 | 3.9 | 3.5 | 0.4 | 0.00222 | 0.00211 | 0.00217 | 0.00038 | 9,326 |
| | | | 99 | 25.3 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00221 | 0.00212 | 0.00217 | 0.00038 | 9,313 |
| | | | 100 | 25.3 | 23.0 | 2.3 | 3.9 | 3.5 | 0.4 | 0.00222 | 0.00212 | 0.00217 | 0.00038 | 9,323 |
| COLUMN AVERAGE | | | | 25.3 | 23.0 | 2.3 | 3.9 | 3.5 | 0.4 | 0.00222 | 0.00212 | 0.00217 | 0.00038 | 9,316 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00358 | 0.00340 | 0.00349 | 0.00061 | 8,464 |
| | | | 97 | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.6 | 0.00357 | 0.00340 | 0.00349 | 0.00061 | 8,459 |
| | | | 98 | 37.1 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00357 | 0.00341 | 0.00349 | 0.00061 | 8,453 |
| | | | 99 | 37.2 | 33.7 | 3.5 | 5.7 | 5.2 | 0.5 | 0.00359 | 0.00340 | 0.00350 | 0.00061 | 8,464 |
| | | | 100 | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00358 | 0.00340 | 0.00349 | 0.00061 | 8,467 |
| COLUMN AVERAGE | | | | 37.2 | 33.6 | 3.6 | 5.7 | 5.1 | 0.5 | 0.00358 | 0.00340 | 0.00349 | 0.00061 | 8,462 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 5 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 49.3 | 44.5 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00499 | 0.00477 | 0.00488 | 0.00085 | 8,021 |
| | | | 97 | 49.2 | 44.5 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00499 | 0.00476 | 0.00488 | 0.00085 | 8,016 |
| | | | 98 | 49.3 | 44.5 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00499 | 0.00476 | 0.00487 | 0.00085 | 8,032 |
| | | | 99 | 49.4 | 44.6 | 4.8 | 7.6 | 6.8 | 0.7 | 0.00499 | 0.00477 | 0.00488 | 0.00085 | 8,038 |
| | | | 100 | 49.3 | 44.6 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00499 | 0.00476 | 0.00488 | 0.00085 | 8,028 |
| COLUMN AVERAGE | | | | 49.3 | 44.5 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00499 | 0.00476 | 0.00488 | 0.00085 | 8,027 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 61.7 | 55.7 | 6.0 | 9.4 | 8.5 | 0.9 | 0.00641 | 0.00612 | 0.00626 | 0.00109 | 7,812 |
| | | | 97 | 61.7 | 55.7 | 6.0 | 9.4 | 8.5 | 0.9 | 0.00640 | 0.00612 | 0.00626 | 0.00109 | 7,816 |
| | | | 98 | 61.6 | 55.7 | 6.0 | 9.4 | 8.5 | 0.9 | 0.00641 | 0.00612 | 0.00626 | 0.00109 | 7,813 |
| | | | 99 | 61.6 | 55.7 | 5.9 | 9.4 | 8.5 | 0.9 | 0.00641 | 0.00612 | 0.00627 | 0.00109 | 7,812 |
| | | | 100 | 61.7 | 55.7 | 5.9 | 9.4 | 8.5 | 0.9 | 0.00640 | 0.00612 | 0.00626 | 0.00109 | 7,821 |
| COLUMN AVERAGE | | | | 61.6 | 55.7 | 6.0 | 9.4 | 8.5 | 0.9 | 0.00641 | 0.00612 | 0.00626 | 0.00109 | 7,815 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 4 | |

Report Form X1.1

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P24

Material Source: 19X-NOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,554 |
| | | | 97 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,549 |
| | | | 98 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,538 |
| | | | 99 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,548 |
| | | | 100 | 13.4 | 11.6 | 1.8 | 2.0 | 1.8 | 0.3 | 0.00101 | 0.00093 | 0.00097 | 0.00017 | 10,521 |
| COLUMN AVERAGE | | | | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00101 | 0.00094 | 0.00097 | 0.00017 | 10,542 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 24.7 | 22.4 | 2.3 | 3.8 | 3.4 | 0.4 | 0.00240 | 0.00226 | 0.00233 | 0.00041 | 8,441 |
| | | | 97 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00239 | 0.00226 | 0.00233 | 0.00041 | 8,478 |
| | | | 98 | 24.7 | 22.4 | 2.3 | 3.8 | 3.4 | 0.4 | 0.00240 | 0.00226 | 0.00233 | 0.00041 | 8,451 |
| | | | 99 | 24.8 | 22.4 | 2.3 | 3.8 | 3.4 | 0.4 | 0.00240 | 0.00226 | 0.00233 | 0.00041 | 8,473 |
| | | | 100 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00239 | 0.00226 | 0.00233 | 0.00041 | 8,476 |
| COLUMN AVERAGE | | | | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00240 | 0.00226 | 0.00233 | 0.00041 | 8,464 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 36.3 | 32.7 | 3.6 | 5.5 | 5.0 | 0.5 | 0.00398 | 0.00379 | 0.00389 | 0.00068 | 7,391 |
| | | | 97 | 36.2 | 32.7 | 3.6 | 5.5 | 5.0 | 0.5 | 0.00398 | 0.00379 | 0.00389 | 0.00068 | 7,386 |
| | | | 98 | 36.3 | 32.8 | 3.5 | 5.6 | 5.0 | 0.5 | 0.00398 | 0.00379 | 0.00388 | 0.00068 | 7,411 |
| | | | 99 | 36.2 | 32.7 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00398 | 0.00378 | 0.00388 | 0.00068 | 7,401 |
| | | | 100 | 36.2 | 32.6 | 3.6 | 5.5 | 5.0 | 0.5 | 0.00398 | 0.00379 | 0.00389 | 0.00068 | 7,381 |
| COLUMN AVERAGE | | | | 36.2 | 32.7 | 3.5 | 5.5 | 5.0 | 0.5 | 0.00398 | 0.00379 | 0.00389 | 0.00068 | 7,394 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 48.2 | 43.6 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00566 | 0.00540 | 0.00553 | 0.00096 | 6,926 |
| | | | 97 | 48.3 | 43.6 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00566 | 0.00539 | 0.00552 | 0.00096 | 6,931 |
| | | | 98 | 48.3 | 43.6 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00567 | 0.00540 | 0.00553 | 0.00096 | 6,924 |
| | | | 99 | 48.3 | 43.5 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00567 | 0.00539 | 0.00553 | 0.00096 | 6,916 |
| | | | 100 | 48.3 | 43.6 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00567 | 0.00539 | 0.00553 | 0.00096 | 6,930 |
| COLUMN AVERAGE | | | | 48.3 | 43.6 | 4.7 | 7.4 | 6.7 | 0.7 | 0.00566 | 0.00539 | 0.00553 | 0.00096 | 6,925 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 6 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P24

Material Source: 19X-NOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 60.9 | 55.0 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00720 | 0.00687 | 0.00704 | 0.00123 | 6,867 |
| | | | 97 | 60.9 | 55.0 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00719 | 0.00687 | 0.00703 | 0.00122 | 6,877 |
| | | | 98 | 60.8 | 55.0 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00720 | 0.00688 | 0.00704 | 0.00123 | 6,862 |
| | | | 99 | 60.9 | 55.1 | 5.8 | 9.3 | 8.4 | 0.9 | 0.00721 | 0.00688 | 0.00704 | 0.00123 | 6,873 |
| | | | 100 | 60.9 | 55.0 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00721 | 0.00687 | 0.00704 | 0.00123 | 6,866 |
| COLUMN AVERAGE | | | | 60.9 | 55.0 | 5.9 | 9.3 | 8.4 | 0.9 | 0.00720 | 0.00688 | 0.00704 | 0.00123 | 6,869 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 6 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.6 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00116 | 0.00109 | 0.00113 | 0.00020 | 8,920 |
| | | | 97 | 13.5 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00115 | 0.00110 | 0.00113 | 0.00020 | 8,889 |
| | | | 98 | 13.5 | 11.3 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00116 | 0.00110 | 0.00113 | 0.00020 | 8,863 |
| | | | 99 | 13.6 | 11.4 | 2.2 | 2.1 | 1.7 | 0.3 | 0.00115 | 0.00110 | 0.00112 | 0.00020 | 8,911 |
| | | | 100 | 13.6 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00115 | 0.00110 | 0.00112 | 0.00020 | 8,921 |
| COLUMN AVERAGE | | | | 13.5 | 11.4 | 2.1 | 2.1 | 1.7 | 0.3 | 0.00115 | 0.00110 | 0.00112 | 0.00020 | 8,901 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 25 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 24.1 | 21.8 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00275 | 0.00262 | 0.00268 | 0.00047 | 7,129 |
| | | | 97 | 24.1 | 21.8 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00276 | 0.00262 | 0.00269 | 0.00047 | 7,124 |
| | | | 98 | 24.2 | 21.8 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00275 | 0.00262 | 0.00268 | 0.00047 | 7,141 |
| | | | 99 | 24.2 | 21.9 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00275 | 0.00262 | 0.00269 | 0.00047 | 7,163 |
| | | | 100 | 24.1 | 21.8 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00275 | 0.00262 | 0.00269 | 0.00047 | 7,134 |
| COLUMN AVERAGE | | | | 24.1 | 21.8 | 2.3 | 3.7 | 3.3 | 0.4 | 0.00275 | 0.00262 | 0.00269 | 0.00047 | 7,138 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 15 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 35.3 | 31.8 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00454 | 0.00434 | 0.00444 | 0.00077 | 6,292 |
| | | | 97 | 35.3 | 31.9 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00454 | 0.00435 | 0.00444 | 0.00077 | 6,301 |
| | | | 98 | 35.3 | 31.9 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00453 | 0.00435 | 0.00444 | 0.00077 | 6,305 |
| | | | 99 | 35.2 | 31.7 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00454 | 0.00434 | 0.00444 | 0.00077 | 6,286 |
| | | | 100 | 35.4 | 32.0 | 3.4 | 5.4 | 4.9 | 0.5 | 0.00454 | 0.00435 | 0.00444 | 0.00077 | 6,320 |
| COLUMN AVERAGE | | | | 35.3 | 31.8 | 3.5 | 5.4 | 4.9 | 0.5 | 0.00454 | 0.00435 | 0.00444 | 0.00077 | 6,301 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-NOS-P24

Material Source: 19X-NOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 47.2 | 42.5 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00640 | 0.00612 | 0.00626 | 0.00109 | 5.973 |
| | | | 97 | 47.2 | 42.6 | 4.7 | 7.2 | 6.5 | 0.7 | 0.00639 | 0.00612 | 0.00626 | 0.00109 | 5.979 |
| | | | 98 | 47.2 | 42.6 | 4.7 | 7.2 | 6.5 | 0.7 | 0.00639 | 0.00612 | 0.00626 | 0.00109 | 5.977 |
| | | | 99 | 47.1 | 42.5 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00639 | 0.00613 | 0.00626 | 0.00109 | 5.964 |
| | | | 100 | 47.2 | 42.6 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00639 | 0.00612 | 0.00626 | 0.00109 | 5.982 |
| COLUMN AVERAGE | | | | 47.2 | 42.5 | 4.6 | 7.2 | 6.5 | 0.7 | 0.00639 | 0.00612 | 0.00626 | 0.00109 | 5.975 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 7 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.00811 | 0.00775 | 0.00793 | 0.00138 | 5.957 |
| | | | 97 | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.00811 | 0.00776 | 0.00793 | 0.00138 | 5.957 |
| | | | 98 | 59.5 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.00812 | 0.00776 | 0.00794 | 0.00138 | 5.957 |
| | | | 99 | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.00811 | 0.00776 | 0.00794 | 0.00138 | 5.954 |
| | | | 100 | 59.6 | 53.8 | 5.7 | 9.1 | 8.2 | 0.9 | 0.00811 | 0.00776 | 0.00794 | 0.00138 | 5.959 |
| COLUMN AVERAGE | | | | 59.6 | 53.8 | 5.8 | 9.1 | 8.2 | 0.9 | 0.00811 | 0.00776 | 0.00794 | 0.00138 | 5.957 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 2 |

TESTED BY RLB DATE 08-05-2019

Boudreau Engineering, Inc.

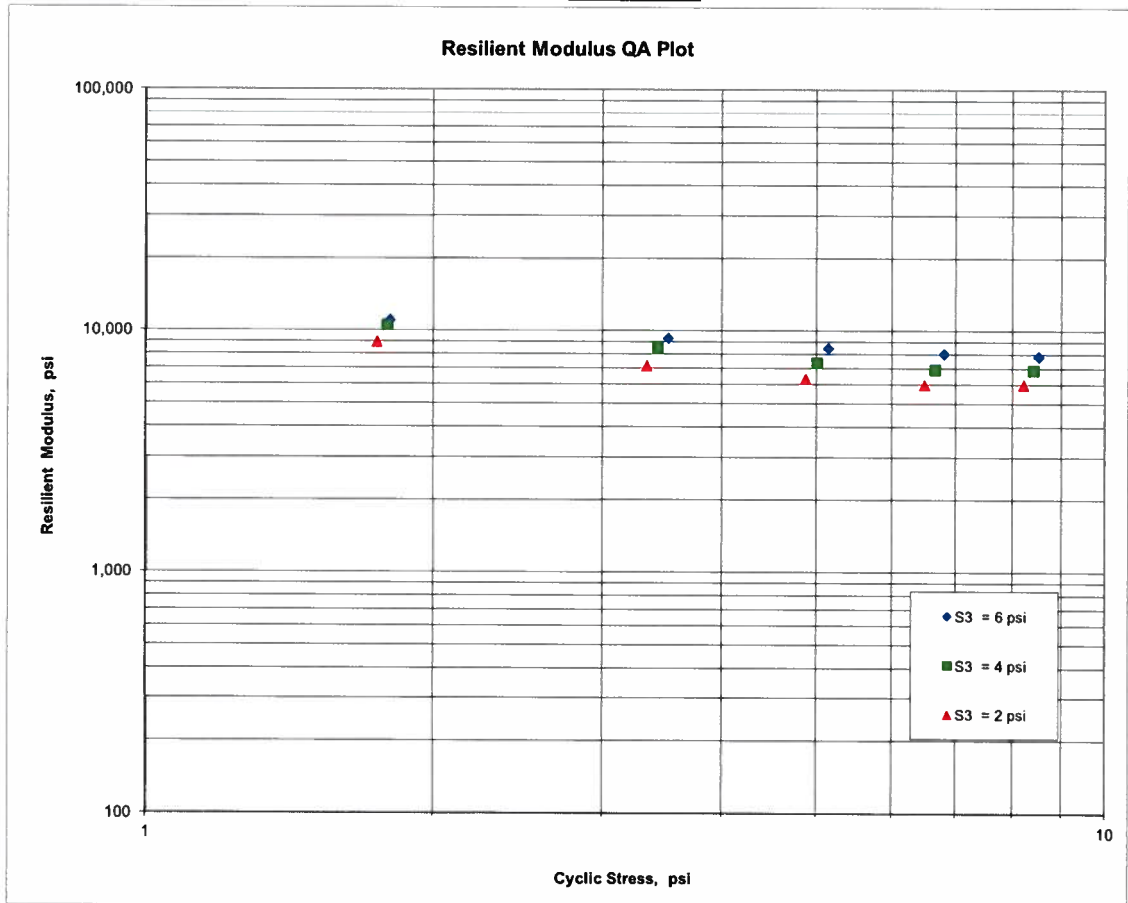
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|---|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-NOS-P24 |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 10.5% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-05-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

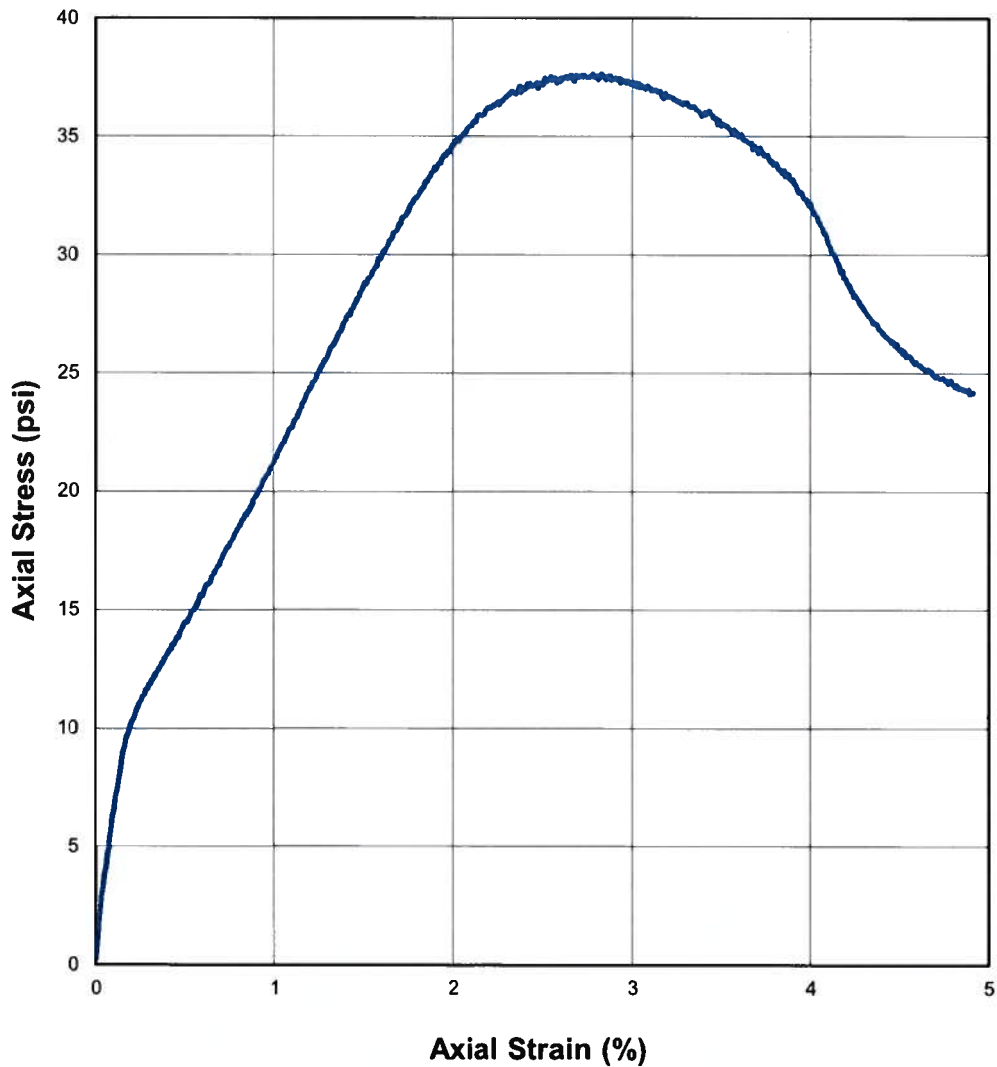
| | |
|------------------|----------|
| K1 = | 8,333 |
| K2 = | -0.26336 |
| K5 = | 0.25326 |
| R ² = | 0.97 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> |
| 3. SOURCE OF MATERIAL: | <u>19X-NOS-P24</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 10.5% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>08-05-2019</u> |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-N-RW14 SOURCE OF MATERIAL: 19X-N-RW14

- | | |
|---|-------------------|
| 1. SAMPLING DATE: | <u>N.R.</u> |
| 2. SAMPLE NUMBER: | <u>N-RW14</u> |
| 3. LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. TEST INFORMATION | |
| PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. SPECIMEN INFO.: | |
| SPECIMEN DIAM., inch | |
| TOP | <u>2.9</u> |
| MIDDLE | <u>2.9</u> |
| BOTTOM | <u>2.9</u> |
| AVERAGE | <u>2.9</u> |
| MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| NET DIAM., inch | <u>2.9</u> |
| HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.74</u> |
| HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| INITIAL LENGTH, L_o , inch | <u>5.7</u> |
| INITIAL AREA, A_o , in ² | <u>6.5</u> |
| INITIAL VOLUME $A_o L_o$, in ³ | <u>37.5</u> |
| INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. SOIL SPECIMEN WEIGHT (for remolded samples): | |
| INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1238.45</u> |
| FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| WEIGHT OF WET SOIL USED, grams | <u>1238.45</u> |
| 9. SOIL PROPERTIES.: | |
| For Remolded Samples: | |
| IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| or | |
| OPTIMUM MOISTURE CONTENT, % | <u>12.5</u> |
| MAX. DRY DENSITY, pcf | <u>113.8</u> |
| For Tube Samples: | |
| IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| WET DENSITY, pcf | <u>N/A</u> |
| DRY DENSITY, pcf | <u>N/A</u> |
| 10. SPECIMEN PROPERTIES (for remolded samples): | |
| COMPACTION MOISTURE CONTENT, % | <u>12.5</u> |
| MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>12.3</u> |
| COMPACTION DRY DENSITY, γ_d , pcf | <u>111.9</u> |
| TARGET DRY DENSITY, $\% \gamma_d$ <u>100</u> TARGET MOISTURE CONTENT, % | <u>12.5</u> |
| COMPACTION LEVEL ACHIEVED | <u>98.3%</u> |
| 11. QUICK SHEAR TEST | |
| STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>31</u> |
| SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. TEST DATE | <u>08-05-2019</u> |
| 13. GENERAL REMARKS: | |

TESTED BY RLB DATE 08-05-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 LABORATORY: Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19X-N-RW14
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 12.5% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-05-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.0 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,574 |
| | | | 97 | 13.1 | 11.7 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00108 | 0.00105 | 0.00107 | 0.00019 | 9,659 |
| | | | 98 | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00107 | 0.00106 | 0.00106 | 0.00019 | 9,692 |
| | | | 99 | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00107 | 0.00106 | 0.00107 | 0.00019 | 9,691 |
| | | | 100 | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00107 | 0.00106 | 0.00107 | 0.00019 | 9,670 |
| COLUMN AVERAGE | | | | 13.1 | 11.7 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,657 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 49 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-N-RW14

Material Source: 19X-N-RW14

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00249 | 0.00248 | 0.00249 | 0.00043 | 8,100 |
| | | | 97 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00250 | 0.00249 | 0.00249 | 0.00043 | 8,104 |
| | | | 98 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00251 | 0.00247 | 0.00249 | 0.00043 | 8,119 |
| | | | 99 | 25.5 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00250 | 0.00249 | 0.00249 | 0.00043 | 8,115 |
| | | | 100 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00249 | 0.00248 | 0.00249 | 0.00043 | 8,136 |
| COLUMN AVERAGE | | | | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00250 | 0.00248 | 0.00249 | 0.00043 | 8,115 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 14 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00405 | 0.00402 | 0.00404 | 0.00070 | 7,304 |
| | | | 97 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00406 | 0.00401 | 0.00404 | 0.00070 | 7,281 |
| | | | 98 | 37.1 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00405 | 0.00402 | 0.00403 | 0.00070 | 7,287 |
| | | | 99 | 37.0 | 33.4 | 3.6 | 5.7 | 5.1 | 0.6 | 0.00405 | 0.00403 | 0.00404 | 0.00070 | 7,257 |
| | | | 100 | 37.1 | 33.4 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00406 | 0.00403 | 0.00404 | 0.00070 | 7,273 |
| COLUMN AVERAGE | | | | 37.1 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00406 | 0.00402 | 0.00404 | 0.00070 | 7,280 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 17 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 49.0 | 44.2 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00577 | 0.00571 | 0.00574 | 0.00100 | 6,764 |
| | | | 97 | 49.1 | 44.3 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00578 | 0.00571 | 0.00574 | 0.00100 | 6,775 |
| | | | 98 | 49.1 | 44.3 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00578 | 0.00570 | 0.00574 | 0.00100 | 6,777 |
| | | | 99 | 49.2 | 44.3 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00577 | 0.00571 | 0.00574 | 0.00100 | 6,776 |
| | | | 100 | 49.2 | 44.4 | 4.8 | 7.5 | 6.8 | 0.7 | 0.00578 | 0.00571 | 0.00574 | 0.00100 | 6,786 |
| COLUMN AVERAGE | | | | 49.1 | 44.3 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00578 | 0.00571 | 0.00574 | 0.00100 | 6,776 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 61.3 | 55.3 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00754 | 0.00742 | 0.00748 | 0.00130 | 6,493 |
| | | | 97 | 61.4 | 55.3 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00754 | 0.00743 | 0.00749 | 0.00130 | 6,496 |
| | | | 98 | 61.4 | 55.3 | 6.0 | 9.4 | 8.5 | 0.9 | 0.00755 | 0.00744 | 0.00749 | 0.00131 | 6,488 |
| | | | 99 | 61.3 | 55.3 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00755 | 0.00743 | 0.00749 | 0.00130 | 6,484 |
| | | | 100 | 61.3 | 55.2 | 6.1 | 9.4 | 8.4 | 0.9 | 0.00754 | 0.00743 | 0.00749 | 0.00130 | 6,476 |
| COLUMN AVERAGE | | | | 61.4 | 55.3 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00755 | 0.00743 | 0.00749 | 0.00130 | 6,487 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 8 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-N-RW14

Material Source: 19X-N-RW14

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.5 | 11.8 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,657 |
| | | | 97 | 13.4 | 11.7 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,583 |
| | | | 98 | 13.5 | 11.7 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00109 | 0.00105 | 0.00107 | 0.00019 | 9,626 |
| | | | 99 | 13.5 | 11.7 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,624 |
| | | | 100 | 13.5 | 11.7 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,603 |
| COLUMN AVERAGE | | | | 13.5 | 11.7 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00108 | 0.00106 | 0.00107 | 0.00019 | 9,619 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 27 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00261 | 0.00256 | 0.00259 | 0.00045 | 7,672 |
| | | | 97 | 24.9 | 22.5 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00260 | 0.00256 | 0.00258 | 0.00045 | 7,656 |
| | | | 98 | 24.9 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00260 | 0.00257 | 0.00258 | 0.00045 | 7,673 |
| | | | 99 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00259 | 0.00258 | 0.00258 | 0.00045 | 7,685 |
| | | | 100 | 25.0 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00260 | 0.00257 | 0.00258 | 0.00045 | 7,687 |
| COLUMN AVERAGE | | | | 24.9 | 22.6 | 2.4 | 3.8 | 3.5 | 0.4 | 0.00260 | 0.00257 | 0.00258 | 0.00045 | 7,674 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 12 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00440 | 0.00435 | 0.00438 | 0.00076 | 6,562 |
| | | | 97 | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00440 | 0.00436 | 0.00438 | 0.00076 | 6,557 |
| | | | 98 | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00440 | 0.00436 | 0.00438 | 0.00076 | 6,558 |
| | | | 99 | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00440 | 0.00436 | 0.00438 | 0.00076 | 6,562 |
| | | | 100 | 36.4 | 32.8 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00439 | 0.00436 | 0.00438 | 0.00076 | 6,582 |
| COLUMN AVERAGE | | | | 36.3 | 32.7 | 3.6 | 5.6 | 5.0 | 0.6 | 0.00440 | 0.00436 | 0.00438 | 0.00076 | 6,564 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 48.0 | 43.1 | 4.8 | 7.3 | 6.6 | 0.7 | 0.00640 | 0.00633 | 0.00636 | 0.00111 | 5,955 |
| | | | 97 | 48.0 | 43.1 | 4.8 | 7.3 | 6.6 | 0.7 | 0.00640 | 0.00633 | 0.00637 | 0.00111 | 5,949 |
| | | | 98 | 48.1 | 43.3 | 4.8 | 7.4 | 6.6 | 0.7 | 0.00640 | 0.00633 | 0.00637 | 0.00111 | 5,972 |
| | | | 99 | 48.0 | 43.2 | 4.9 | 7.4 | 6.6 | 0.7 | 0.00641 | 0.00634 | 0.00637 | 0.00111 | 5,952 |
| | | | 100 | 48.1 | 43.3 | 4.8 | 7.4 | 6.6 | 0.7 | 0.00640 | 0.00634 | 0.00637 | 0.00111 | 5,967 |
| COLUMN AVERAGE | | | | 48.0 | 43.2 | 4.8 | 7.4 | 6.6 | 0.7 | 0.00640 | 0.00634 | 0.00637 | 0.00111 | 5,959 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-N-RW14

Material Source: 19X-N-RW14

| | | | | | | | | | | | | | | |
|-------------|-----|---------------|----------------|------|------|------|-----|-----|---------|---------|---------|---------|---------|---------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 60.5 | 54.4 | 6.0 | 9.3 | 8.3 | 0.9 | 0.00831 | 0.00821 | 0.00826 | 0.00144 | 5,789 |
| | | | 97 | 60.4 | 54.4 | 6.0 | 9.2 | 8.3 | 0.9 | 0.00832 | 0.00820 | 0.00826 | 0.00144 | 5,788 |
| | | | 98 | 60.4 | 54.4 | 6.0 | 9.2 | 8.3 | 0.9 | 0.00832 | 0.00821 | 0.00827 | 0.00144 | 5,778 |
| | | | 99 | 60.4 | 54.4 | 6.1 | 9.3 | 8.3 | 0.9 | 0.00832 | 0.00822 | 0.00827 | 0.00144 | 5,780 |
| | | | 100 | 60.4 | 54.4 | 6.0 | 9.2 | 8.3 | 0.9 | 0.00832 | 0.00822 | 0.00827 | 0.00144 | 5,780 |
| | | | COLUMN AVERAGE | | 60.4 | 54.4 | 6.0 | 9.2 | 8.3 | 0.9 | 0.00832 | 0.00821 | 0.00826 | 0.00144 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 5 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.7 | 11.6 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00120 | 0.00119 | 0.00120 | 0.00021 | 8,494 |
| | | | 97 | 13.6 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00120 | 0.00119 | 0.00119 | 0.00021 | 8,456 |
| | | | 98 | 13.6 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00121 | 0.00119 | 0.00120 | 0.00021 | 8,420 |
| | | | 99 | 13.7 | 11.6 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00121 | 0.00118 | 0.00120 | 0.00021 | 8,486 |
| | | | 100 | 13.6 | 11.5 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00120 | 0.00119 | 0.00120 | 0.00021 | 8,414 |
| | | | COLUMN AVERAGE | | 13.7 | 11.5 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00120 | 0.00119 | 0.00120 | 0.00021 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 37 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 24.4 | 22.1 | 2.4 | 3.7 | 3.4 | 0.4 | 0.00289 | 0.00286 | 0.00288 | 0.00050 | 6,735 |
| | | | 97 | 24.4 | 22.0 | 2.4 | 3.7 | 3.4 | 0.4 | 0.00290 | 0.00286 | 0.00288 | 0.00050 | 6,728 |
| | | | 98 | 24.4 | 22.0 | 2.3 | 3.7 | 3.4 | 0.4 | 0.00290 | 0.00286 | 0.00288 | 0.00050 | 6,726 |
| | | | 99 | 24.4 | 22.0 | 2.4 | 3.7 | 3.4 | 0.4 | 0.00289 | 0.00286 | 0.00288 | 0.00050 | 6,719 |
| | | | 100 | 24.4 | 22.0 | 2.4 | 3.7 | 3.4 | 0.4 | 0.00289 | 0.00285 | 0.00287 | 0.00050 | 6,726 |
| | | | COLUMN AVERAGE | | 24.4 | 22.0 | 2.4 | 3.7 | 3.4 | 0.4 | 0.00289 | 0.00286 | 0.00288 | 0.00050 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 6 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 35.5 | 31.9 | 3.6 | 5.4 | 4.9 | 0.6 | 0.00488 | 0.00483 | 0.00485 | 0.00085 | 5,783 |
| | | | 97 | 35.6 | 32.0 | 3.6 | 5.4 | 4.9 | 0.5 | 0.00487 | 0.00484 | 0.00486 | 0.00085 | 5,785 |
| | | | 98 | 35.6 | 32.0 | 3.6 | 5.5 | 4.9 | 0.5 | 0.00488 | 0.00484 | 0.00486 | 0.00085 | 5,794 |
| | | | 99 | 35.6 | 32.0 | 3.6 | 5.5 | 4.9 | 0.6 | 0.00487 | 0.00483 | 0.00485 | 0.00085 | 5,800 |
| | | | 100 | 35.6 | 32.0 | 3.6 | 5.4 | 4.9 | 0.6 | 0.00488 | 0.00483 | 0.00486 | 0.00085 | 5,785 |
| | | | COLUMN AVERAGE | | 35.6 | 32.0 | 3.6 | 5.4 | 4.9 | 0.5 | 0.00488 | 0.00483 | 0.00486 | 0.00085 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 7 | |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-N-RW14 | | | | | | Material Source: 19X-N-RW14 | | | | | |
|--|----------------|------|----------------------------------|------|------|-----|-----|---------|-----------------------------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 47.0 | 42.2 | 4.8 | 7.2 | 6.5 | 0.7 | 0.00704 | 0.00698 | 0.00701 | 0.00122 | 5,294 |
| | | | 97 | 47.0 | 42.2 | 4.8 | 7.2 | 6.5 | 0.7 | 0.00704 | 0.00698 | 0.00701 | 0.00122 | 5,286 |
| | | | 98 | 47.0 | 42.2 | 4.7 | 7.2 | 6.5 | 0.7 | 0.00704 | 0.00698 | 0.00701 | 0.00122 | 5,292 |
| | | | 99 | 47.1 | 42.4 | 4.7 | 7.2 | 6.5 | 0.7 | 0.00705 | 0.00698 | 0.00701 | 0.00122 | 5,307 |
| | | | 100 | 47.0 | 42.2 | 4.8 | 7.2 | 6.5 | 0.7 | 0.00704 | 0.00697 | 0.00701 | 0.00122 | 5,296 |
| | COLUMN AVERAGE | | 47.0 | 42.2 | 4.8 | 7.2 | 6.5 | 0.7 | 0.00704 | 0.00698 | 0.00701 | 0.00122 | 5,295 | |
| STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 | | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 59.2 | 53.2 | 6.0 | 9.1 | 8.1 | 0.9 | 0.00911 | 0.00900 | 0.00905 | 0.00158 | 5,166 |
| | | | 97 | 59.0 | 53.1 | 6.0 | 9.0 | 8.1 | 0.9 | 0.00912 | 0.00900 | 0.00906 | 0.00158 | 5,147 |
| | | | 98 | 59.2 | 53.2 | 6.0 | 9.1 | 8.1 | 0.9 | 0.00911 | 0.00901 | 0.00906 | 0.00158 | 5,161 |
| | | | 99 | 59.2 | 53.2 | 6.0 | 9.1 | 8.1 | 0.9 | 0.00912 | 0.00900 | 0.00906 | 0.00158 | 5,161 |
| | | | 100 | 59.1 | 53.1 | 6.0 | 9.0 | 8.1 | 0.9 | 0.00911 | 0.00901 | 0.00906 | 0.00158 | 5,144 |
| | COLUMN AVERAGE | | 59.1 | 53.2 | 6.0 | 9.1 | 8.1 | 0.9 | 0.00911 | 0.00900 | 0.00906 | 0.00158 | 5,156 | |
| STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 | | |

TESTED BY RLB DATE 08-05-2019

AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-N-RW14 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 12.5% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-05-2019 |

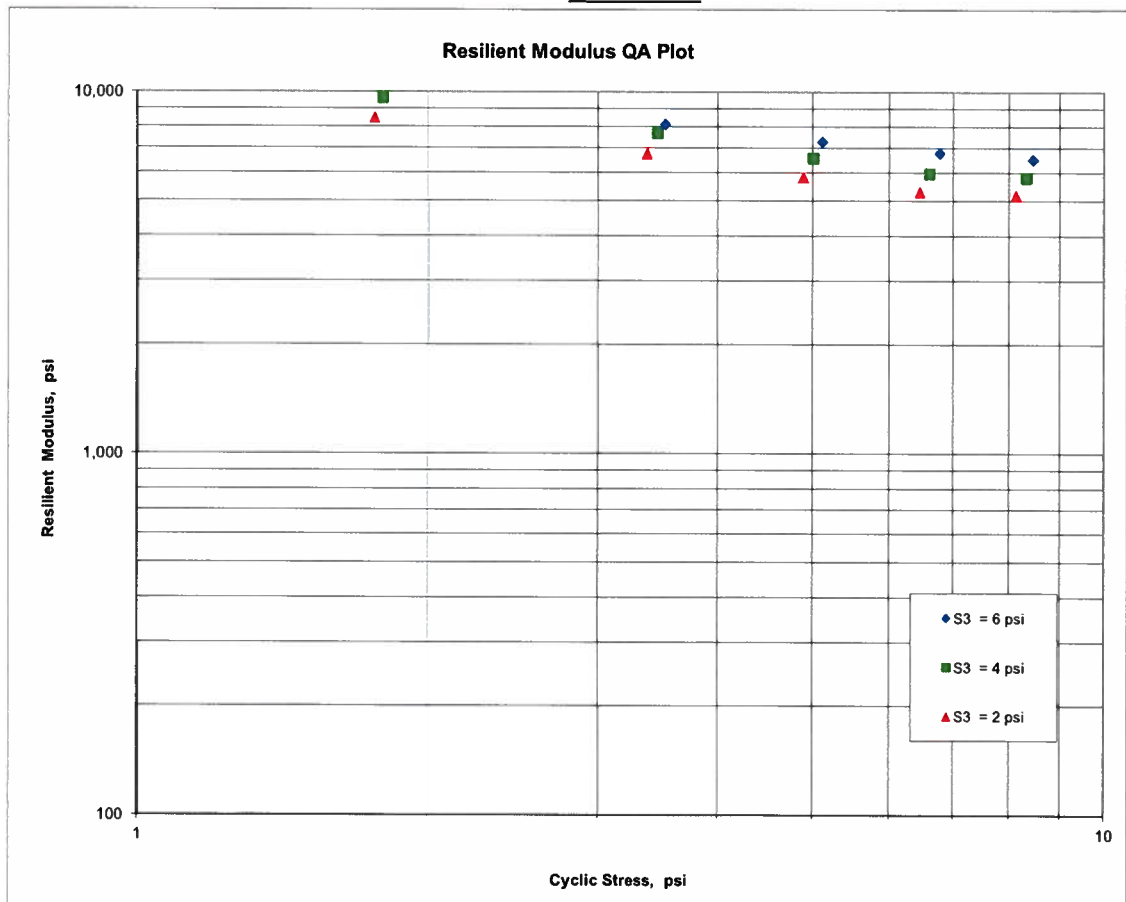
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 8,533$$

$$K_2 = -0.31438$$

$$K_5 = 0.19679$$

$$R^2 = 0.98$$



AASHTO T 307-99

Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials (RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-SOS-P24 SOURCE OF MATERIAL: 19X-SOS-P24

- | | | |
|-----|---|------------|
| 1. | SAMPLING DATE: | N.R. |
| 2. | SAMPLE NUMBER: | SOS-P24 |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | 1 |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | N/A |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | N |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | N |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | 15 |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | 2.9 |
| | MIDDLE | 2.9 |
| | BOTTOM | 2.9 |
| | AVERAGE | 2.9 |
| | MEMBRANE THICKNESS (1), inch | 0.00 |
| | MEMBRANE THICKNESS (2), inch | 0.00 |
| | NET DIAM., inch | 2.9 |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | 5.70 |
| | HEIGHT OF CAP AND BASE, inch | 0.0 |
| | INITIAL LENGTH, L_o , inch | 5.7 |
| | INITIAL AREA, A_o , in ² | 6.5 |
| | INITIAL VOLUME $A_o L_o$, in ³ | 37.1 |
| | INITIAL WEIGHT, grams (for tube samples) | N/A |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | 1359.38 |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | 0.00 |
| | WEIGHT OF WET SOIL USED, grams | 1359.38 |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | N/A |
| | IN SITU WET DENSITY (NUCLEAR), pcf | N/A |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | 10.2 |
| | MAX. DRY DENSITY, pcf | 127.2 |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | N/A |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | N/A |
| | WET DENSITY, pcf | N/A |
| | DRY DENSITY, pcf | N/A |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | 10.2 |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | 9.9 |
| | COMPACTION DRY DENSITY, γ_d , pcf | 126.6 |
| | TARGET DRY DENSITY, $\% \gamma_d$ <u>100</u> TARGET MOISTURE CONTENT, % | 10.2 |
| | COMPACTION LEVEL ACHIEVED | 99.5% |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | Y |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | 49 |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | Y |
| 12. | TEST DATE | 08-05-2019 |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-05-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 LABORATORY: Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19X-SOS-P24
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 10.2% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-05-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.4 | 12.1 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00080 | 0.00083 | 0.00082 | 0.00014 | 12,904 |
| | | | 97 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00080 | 0.00084 | 0.00082 | 0.00014 | 12,770 |
| | | | 98 | 13.4 | 12.1 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00080 | 0.00083 | 0.00082 | 0.00014 | 12,910 |
| | | | 99 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00080 | 0.00084 | 0.00082 | 0.00014 | 12,720 |
| | | | 100 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00080 | 0.00084 | 0.00082 | 0.00014 | 12,815 |
| COLUMN AVERAGE | | | | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00080 | 0.00084 | 0.00082 | 0.00014 | 12,824 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 83 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P24

Material Source: 19X-SOS-P24

| | | | | | | | | | | | | | | |
|------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.1 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00181 | 0.00179 | 0.00031 | 11,544 |
| | | | 97 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00182 | 0.00179 | 0.00032 | 11,467 |
| | | | 98 | 26.1 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00182 | 0.00179 | 0.00031 | 11,519 |
| | | | 99 | 26.1 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00181 | 0.00179 | 0.00031 | 11,519 |
| | | | 100 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00182 | 0.00180 | 0.00032 | 11,451 |
| | COLUMN AVERAGE | | | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00177 | 0.00182 | 0.00179 | 0.00031 | 11,500 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 39 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00284 | 0.00292 | 0.00288 | 0.00051 | 10,587 |
| | | | 97 | 38.6 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00283 | 0.00292 | 0.00287 | 0.00050 | 10,588 |
| | | | 98 | 38.6 | 34.8 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00283 | 0.00292 | 0.00288 | 0.00051 | 10,572 |
| | | | 99 | 38.7 | 35.0 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00283 | 0.00293 | 0.00288 | 0.00051 | 10,604 |
| | | | 100 | 38.7 | 35.0 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00283 | 0.00291 | 0.00287 | 0.00050 | 10,640 |
| | COLUMN AVERAGE | | | 38.6 | 34.9 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00283 | 0.00292 | 0.00288 | 0.00050 | 10,598 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 26 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 51.4 | 46.4 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00403 | 0.00397 | 0.00070 | 10,207 |
| | | | 97 | 51.3 | 46.3 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00405 | 0.00397 | 0.00070 | 10,181 |
| | | | 98 | 51.3 | 46.3 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00404 | 0.00397 | 0.00070 | 10,180 |
| | | | 99 | 51.4 | 46.4 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00404 | 0.00397 | 0.00070 | 10,202 |
| | | | 100 | 51.4 | 46.4 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00404 | 0.00397 | 0.00070 | 10,201 |
| | COLUMN AVERAGE | | | 51.3 | 46.3 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00390 | 0.00404 | 0.00397 | 0.00070 | 10,194 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.3 | 58.0 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00498 | 0.00513 | 0.00506 | 0.00089 | 10,030 |
| | | | 97 | 64.3 | 58.0 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00498 | 0.00513 | 0.00505 | 0.00089 | 10,022 |
| | | | 98 | 64.3 | 58.0 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00498 | 0.00513 | 0.00505 | 0.00089 | 10,026 |
| | | | 99 | 64.3 | 58.1 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00498 | 0.00514 | 0.00506 | 0.00089 | 10,028 |
| | | | 100 | 64.3 | 58.0 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00497 | 0.00513 | 0.00505 | 0.00089 | 10,041 |
| | COLUMN AVERAGE | | | 64.3 | 58.0 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00498 | 0.00513 | 0.00505 | 0.00089 | 10,029 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 7 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P24

Material Source: 19X-SOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.7 | 12.0 | 1.7 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,343 |
| | | | 97 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,290 |
| | | | 98 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,315 |
| | | | 99 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,246 |
| | | | 100 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,261 |
| COLUMN AVERAGE | | | | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00083 | 0.00087 | 0.00085 | 0.00015 | 12,291 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 40 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00192 | 0.00199 | 0.00195 | 0.00034 | 10,430 |
| | | | 97 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00191 | 0.00199 | 0.00195 | 0.00034 | 10,458 |
| | | | 98 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00191 | 0.00199 | 0.00195 | 0.00034 | 10,442 |
| | | | 99 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00191 | 0.00199 | 0.00195 | 0.00034 | 10,418 |
| | | | 100 | 25.9 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00190 | 0.00200 | 0.00195 | 0.00034 | 10,503 |
| COLUMN AVERAGE | | | | 25.8 | 23.3 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00191 | 0.00199 | 0.00195 | 0.00034 | 10,450 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 33 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00313 | 0.00326 | 0.00320 | 0.00056 | 9,416 |
| | | | 97 | 38.2 | 34.4 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00314 | 0.00326 | 0.00320 | 0.00056 | 9,409 |
| | | | 98 | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00314 | 0.00326 | 0.00320 | 0.00056 | 9,431 |
| | | | 99 | 38.2 | 34.4 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00313 | 0.00326 | 0.00320 | 0.00056 | 9,401 |
| | | | 100 | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00313 | 0.00326 | 0.00320 | 0.00056 | 9,426 |
| COLUMN AVERAGE | | | | 38.2 | 34.5 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00314 | 0.00326 | 0.00320 | 0.00056 | 9,417 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 50.8 | 45.9 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00441 | 0.00455 | 0.00448 | 0.00079 | 8,937 |
| | | | 97 | 50.9 | 45.9 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00441 | 0.00455 | 0.00448 | 0.00079 | 8,946 |
| | | | 98 | 50.8 | 45.8 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00441 | 0.00456 | 0.00448 | 0.00079 | 8,927 |
| | | | 99 | 51.0 | 45.9 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00442 | 0.00455 | 0.00448 | 0.00079 | 8,955 |
| | | | 100 | 51.0 | 46.0 | 5.0 | 7.8 | 7.1 | 0.8 | 0.00442 | 0.00455 | 0.00449 | 0.00079 | 8,960 |
| COLUMN AVERAGE | | | | 50.9 | 45.9 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00441 | 0.00455 | 0.00448 | 0.00079 | 8,945 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P24

Material Source: 19X-SOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.0 | 57.7 | 6.2 | 9.8 | 8.9 | 1.0 | 0.00556 | 0.00571 | 0.00564 | 0.00099 | 8,946 |
| | | | 97 | 63.9 | 57.6 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00557 | 0.00571 | 0.00564 | 0.00099 | 8,933 |
| | | | 98 | 63.8 | 57.6 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00556 | 0.00572 | 0.00564 | 0.00099 | 8,915 |
| | | | 99 | 63.9 | 57.6 | 6.2 | 9.8 | 8.8 | 1.0 | 0.00557 | 0.00571 | 0.00564 | 0.00099 | 8,925 |
| | | | 100 | 63.9 | 57.7 | 6.2 | 9.8 | 8.8 | 1.0 | 0.00557 | 0.00572 | 0.00564 | 0.00099 | 8,929 |
| COLUMN AVERAGE | | | | 63.9 | 57.7 | 6.2 | 9.8 | 8.8 | 1.0 | 0.00557 | 0.00571 | 0.00564 | 0.00099 | 8,929 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.9 | 11.7 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00098 | 0.00104 | 0.00101 | 0.00018 | 10,148 |
| | | | 97 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00098 | 0.00103 | 0.00101 | 0.00018 | 10,141 |
| | | | 98 | 14.0 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00103 | 0.00101 | 0.00018 | 10,209 |
| | | | 99 | 13.9 | 11.7 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00104 | 0.00101 | 0.00018 | 10,148 |
| | | | 100 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00104 | 0.00101 | 0.00018 | 10,156 |
| COLUMN AVERAGE | | | | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00099 | 0.00104 | 0.00101 | 0.00018 | 10,160 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 28 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00237 | 0.00232 | 0.00041 | 8,627 |
| | | | 97 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00227 | 0.00237 | 0.00232 | 0.00041 | 8,640 |
| | | | 98 | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00237 | 0.00231 | 0.00041 | 8,646 |
| | | | 99 | 25.2 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00237 | 0.00231 | 0.00041 | 8,621 |
| | | | 100 | 25.3 | 22.8 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00237 | 0.00232 | 0.00041 | 8,604 |
| COLUMN AVERAGE | | | | 25.3 | 22.9 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00226 | 0.00237 | 0.00232 | 0.00041 | 8,628 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 16 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 37.5 | 33.8 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00366 | 0.00380 | 0.00373 | 0.00066 | 7,910 |
| | | | 97 | 37.6 | 33.9 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00367 | 0.00380 | 0.00373 | 0.00066 | 7,935 |
| | | | 98 | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00367 | 0.00380 | 0.00373 | 0.00066 | 7,905 |
| | | | 99 | 37.4 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00367 | 0.00380 | 0.00373 | 0.00066 | 7,887 |
| | | | 100 | 37.5 | 33.7 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00367 | 0.00379 | 0.00373 | 0.00066 | 7,901 |
| COLUMN AVERAGE | | | | 37.5 | 33.8 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00367 | 0.00380 | 0.00373 | 0.00066 | 7,908 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P24

Material Source: 19X-SOS-P24

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 50.2 | 45.2 | 4.9 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00521 | 0.00515 | 0.00090 | 7,678 |
| | | | 97 | 50.1 | 45.2 | 4.9 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00522 | 0.00515 | 0.00090 | 7,669 |
| | | | 98 | 50.1 | 45.2 | 4.9 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00521 | 0.00515 | 0.00090 | 7,673 |
| | | | 99 | 50.1 | 45.2 | 5.0 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00521 | 0.00514 | 0.00090 | 7,668 |
| | | | 100 | 50.2 | 45.2 | 4.9 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00522 | 0.00515 | 0.00090 | 7,668 |
| COLUMN AVERAGE | | | | 50.1 | 45.2 | 4.9 | 7.7 | 6.9 | 0.8 | 0.00508 | 0.00521 | 0.00515 | 0.00090 | 7,671 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 4 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 63.1 | 56.9 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00632 | 0.00647 | 0.00640 | 0.00112 | 7,764 |
| | | | 97 | 63.2 | 57.0 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00632 | 0.00648 | 0.00640 | 0.00112 | 7,774 |
| | | | 98 | 63.1 | 56.8 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00632 | 0.00648 | 0.00640 | 0.00112 | 7,757 |
| | | | 99 | 63.2 | 56.9 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00632 | 0.00648 | 0.00640 | 0.00112 | 7,769 |
| | | | 100 | 63.1 | 56.8 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00633 | 0.00647 | 0.00640 | 0.00112 | 7,757 |
| COLUMN AVERAGE | | | | 63.1 | 56.9 | 6.2 | 9.7 | 8.7 | 1.0 | 0.00632 | 0.00648 | 0.00640 | 0.00112 | 7,764 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 7 |

TESTED BY RLB DATE 08-05-2019

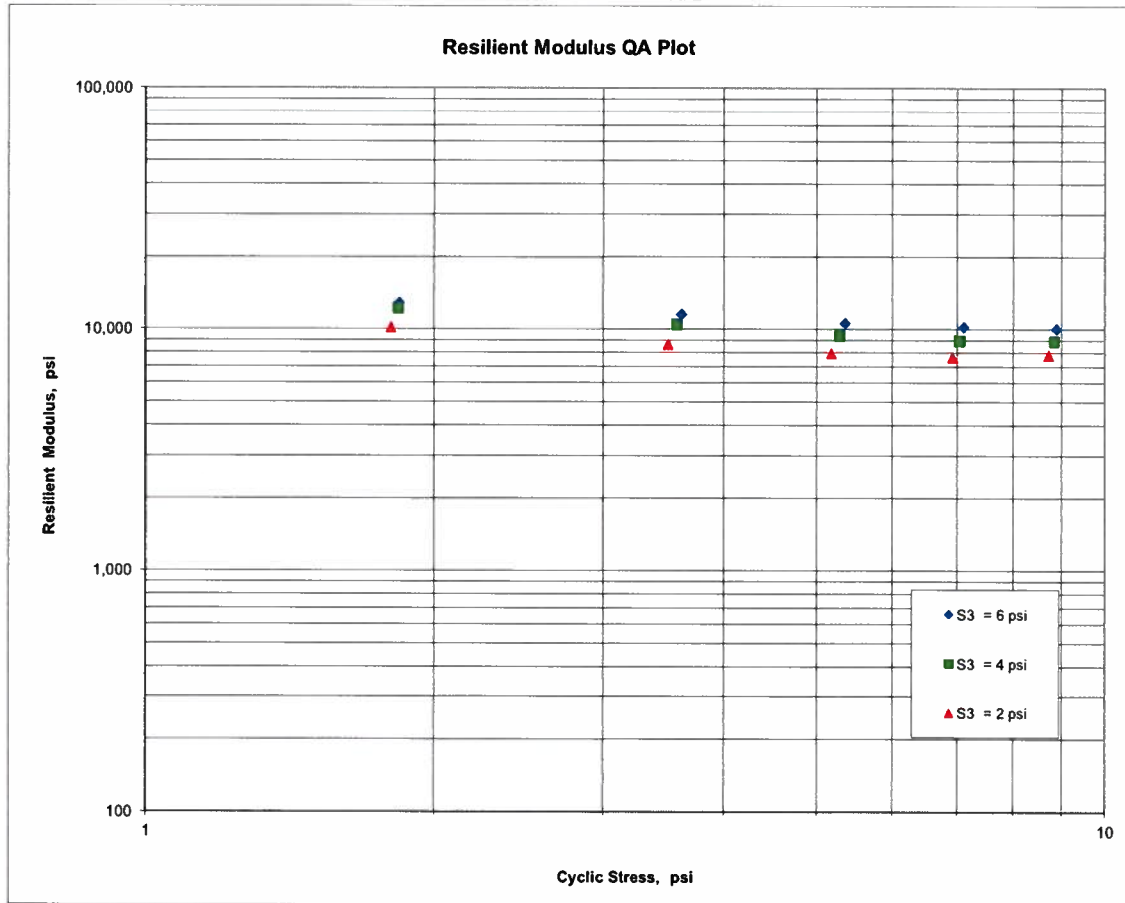
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|---|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P24 |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 10.2% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-05-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

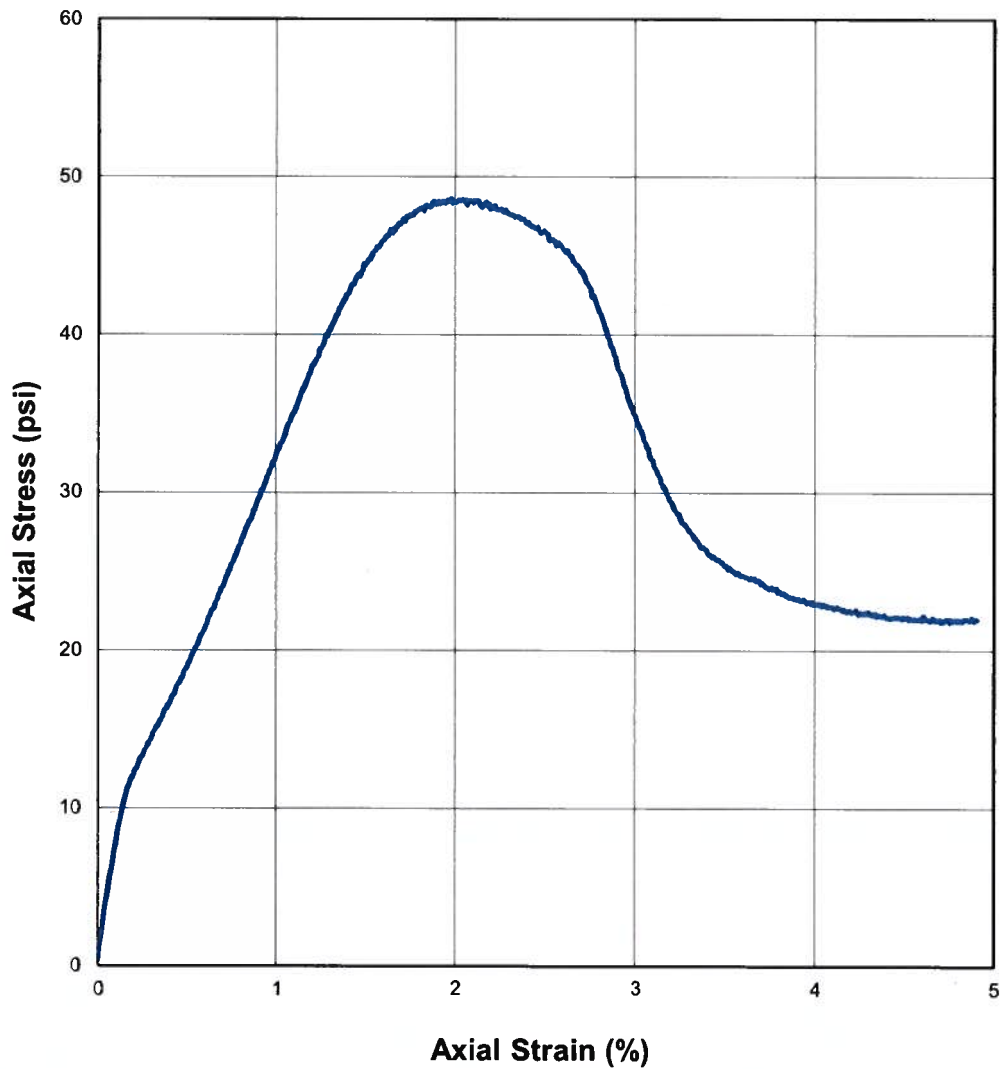
| | |
|------------------|----------|
| K1 = | 9,345 |
| K2 = | -0.18645 |
| K5 = | 0.25069 |
| R ² = | 0.98 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|--|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P24 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 10.2% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-05-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 Project Next
Lawrenceville, Georgia PROJECT NO.: SME #1243-19-025
DATE RECEIVED: 07-10-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-SOS-P27 SOURCE OF MATERIAL: 19X-SOS-P27

- | | | | |
|-----|--|---|-------------------------|
| 1. | SAMPLING DATE: | | N.R. |
| 2. | SAMPLE NUMBER: | | P27 |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | | 1 |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | | 2 |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | | N/A |
| 6. | TEST INFORMATION | | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | | N |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | | N |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | | 15 |
| 7. | SPECIMEN INFO.: | | |
| | SPECIMEN DIAM., inch | | |
| | TOP | | 2.9 |
| | MIDDLE | | 2.9 |
| | BOTTOM | | 2.9 |
| | AVERAGE | | 2.9 |
| | MEMBRANE THICKNESS (1), inch | | 0.00 |
| | MEMBRANE THICKNESS (2), inch | | 0.00 |
| | NET DIAM., inch | | 2.9 |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | | 5.75 |
| | HEIGHT OF CAP AND BASE, inch | | 0.0 |
| | INITIAL LENGTH, Lo, inch | | 5.7 |
| | INITIAL AREA, Ao, in ² | | 6.5 |
| | INITIAL VOLUME Ao Lo, in ³ | | 37.7 |
| | INITIAL WEIGHT, grams (for tube samples) | | N/A |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | | 1317.74 |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | | 0.00 |
| | WEIGHT OF WET SOIL USED, grams | | 1317.74 |
| 9. | SOIL PROPERTIES.: | | |
| | For Remolded Samples: | | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | | N/A |
| | IN SITU WET DENSITY (NUCLEAR), pcf | | N/A |
| | or | | |
| | OPTIMUM MOISTURE CONTENT, % | | 14.1 15.2 |
| | MAX. DRY DENSITY, pcf | | 118.4 115.9 |
| | For Tube Samples: | | |
| | IN SITU MOISTURE CONTENT, % | | N/A |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | | N/A |
| | WET DENSITY, pcf | | N/A |
| | DRY DENSITY, pcf | | N/A |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | | |
| | COMPACTION MOISTURE CONTENT, % | | 14.1 |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | | 13.8 |
| | COMPACTION DRY DENSITY, γ _d , pcf | | 116.9 |
| | TARGET DRY DENSITY, % γ _d , 100 | TARGET MOISTURE CONTENT, % | 14.1 |
| | COMPACTION LEVEL ACHIEVED | | 98.7% 100.9% |
| 11. | QUICK SHEAR TEST | | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | | Y |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | | 69 |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | | Y |
| 12. | TEST DATE | | 07-18-2019 |
| 13. | GENERAL REMARKS: | Maximum Dry Density and Optimum Moisture Content were revised by the requesting agency after the testing was completed (NRR of S&ME 8/2/19) | |

TESTED BY RLB DATE 07-18-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SME #1243-19-025
 2. **PROJECT NAME:** I-495 Project Next
 3. **SOURCE OF MATERIAL:** 19X-SOS-P27
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 14.1% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 07-18-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|---------------------|---------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT | Recov. Def. LVDT | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | C ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.5 | 12.1 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00067 | 0.00063 | 0.00065 | 0.00011 | 16,326 |
| | | | 97 | 13.5 | 12.1 | 1.4 | 2.1 | 1.9 | 0.2 | 0.00068 | 0.00062 | 0.00065 | 0.00011 | 16,403 |
| | | | 98 | 13.5 | 12.1 | 1.4 | 2.1 | 1.9 | 0.2 | 0.00068 | 0.00063 | 0.00065 | 0.00011 | 16,322 |
| | | | 99 | 13.5 | 12.1 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00067 | 0.00063 | 0.00065 | 0.00011 | 16,332 |
| | | | 100 | 13.5 | 12.1 | 1.4 | 2.1 | 1.9 | 0.2 | 0.00068 | 0.00063 | 0.00066 | 0.00011 | 16,244 |
| COLUMN AVERAGE | | | | 13.5 | 12.1 | 1.4 | 2.1 | 1.9 | 0.2 | 0.00068 | 0.00063 | 0.00065 | 0.00011 | 16,325 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 56 |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P27

Material Source: 19X-SOS-P27

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|------|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.6 | 24.1 | 2.5 | 4.1 | 3.7 | 0.4 | 0.00144 | 0.00135 | 0.00139 | 0.00024 | 15,193 |
| | | | 97 | 26.5 | 24.1 | 2.5 | 4.1 | 3.7 | 0.4 | 0.00144 | 0.00135 | 0.00140 | 0.00024 | 15,143 |
| | | | 98 | 26.6 | 24.1 | 2.5 | 4.1 | 3.7 | 0.4 | 0.00144 | 0.00134 | 0.00139 | 0.00024 | 15,186 |
| | | | 99 | 26.5 | 24.0 | 2.5 | 4.0 | 3.7 | 0.4 | 0.00144 | 0.00135 | 0.00140 | 0.00024 | 15,088 |
| | | | 100 | 26.5 | 24.1 | 2.5 | 4.0 | 3.7 | 0.4 | 0.00144 | 0.00134 | 0.00139 | 0.00024 | 15,179 |
| COLUMN AVERAGE | | | | 26.5 | 24.1 | 2.5 | 4.1 | 3.7 | 0.4 | 0.00144 | 0.00135 | 0.00139 | 0.00024 | 15,158 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 44 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 39.6 | 35.8 | 3.8 | 6.0 | 5.5 | 0.6 | 0.00235 | 0.00222 | 0.00229 | 0.00040 | 13,742 |
| | | | 97 | 39.5 | 35.7 | 3.8 | 6.0 | 5.5 | 0.6 | 0.00235 | 0.00222 | 0.00228 | 0.00040 | 13,732 |
| | | | 98 | 39.6 | 35.8 | 3.8 | 6.0 | 5.5 | 0.6 | 0.00236 | 0.00221 | 0.00228 | 0.00040 | 13,749 |
| | | | 99 | 39.5 | 35.8 | 3.8 | 6.0 | 5.5 | 0.6 | 0.00236 | 0.00222 | 0.00229 | 0.00040 | 13,729 |
| | | | 100 | 39.4 | 35.6 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00222 | 0.00229 | 0.00040 | 13,673 |
| COLUMN AVERAGE | | | | 39.5 | 35.7 | 3.8 | 6.0 | 5.5 | 0.6 | 0.00235 | 0.00222 | 0.00229 | 0.00040 | 13,725 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 30 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 52.3 | 47.2 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00337 | 0.00318 | 0.00328 | 0.00057 | 12,660 |
| | | | 97 | 52.3 | 47.2 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00337 | 0.00318 | 0.00328 | 0.00057 | 12,653 |
| | | | 98 | 52.4 | 47.3 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00337 | 0.00318 | 0.00328 | 0.00057 | 12,681 |
| | | | 99 | 52.4 | 47.3 | 5.0 | 8.0 | 7.2 | 0.8 | 0.00338 | 0.00318 | 0.00328 | 0.00057 | 12,668 |
| | | | 100 | 52.4 | 47.3 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00338 | 0.00318 | 0.00328 | 0.00057 | 12,662 |
| COLUMN AVERAGE | | | | 52.4 | 47.3 | 5.1 | 8.0 | 7.2 | 0.8 | 0.00337 | 0.00318 | 0.00328 | 0.00057 | 12,665 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 65.1 | 58.7 | 6.4 | 9.9 | 9.0 | 1.0 | 0.00443 | 0.00418 | 0.00431 | 0.00075 | 11,973 |
| | | | 97 | 65.2 | 58.8 | 6.4 | 9.9 | 9.0 | 1.0 | 0.00443 | 0.00418 | 0.00431 | 0.00075 | 11,984 |
| | | | 98 | 65.2 | 58.8 | 6.3 | 10.0 | 9.0 | 1.0 | 0.00442 | 0.00418 | 0.00430 | 0.00075 | 12,000 |
| | | | 99 | 65.1 | 58.8 | 6.4 | 9.9 | 9.0 | 1.0 | 0.00443 | 0.00418 | 0.00431 | 0.00075 | 11,981 |
| | | | 100 | 65.1 | 58.8 | 6.3 | 9.9 | 9.0 | 1.0 | 0.00443 | 0.00418 | 0.00430 | 0.00075 | 11,995 |
| COLUMN AVERAGE | | | | 65.1 | 58.8 | 6.4 | 9.9 | 9.0 | 1.0 | 0.00443 | 0.00418 | 0.00431 | 0.00075 | 11,987 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P27

Material Source: 19X-SOS-P27

| | | | | | | | | | | | | | | |
|------------|----------------|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.9 | 12.1 | 1.8 | 2.1 | 1.9 | 0.3 | 0.00072 | 0.00066 | 0.00069 | 0.00012 | 15,441 |
| | | | 97 | 13.9 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00066 | 0.00068 | 0.00012 | 15,516 |
| | | | 98 | 13.9 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00065 | 0.00068 | 0.00012 | 15,590 |
| | | | 99 | 13.9 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00065 | 0.00068 | 0.00012 | 15,554 |
| | | | 100 | 13.8 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00066 | 0.00068 | 0.00012 | 15,526 |
| | COLUMN AVERAGE | | | 13.9 | 12.1 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00066 | 0.00068 | 0.00012 | 15,525 |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 55 | |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00155 | 0.00144 | 0.00150 | 0.00026 | 13,980 |
| | | | 97 | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00155 | 0.00145 | 0.00150 | 0.00026 | 13,976 |
| | | | 98 | 26.3 | 23.9 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00155 | 0.00144 | 0.00150 | 0.00026 | 13,988 |
| | | | 99 | 26.3 | 23.9 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00156 | 0.00144 | 0.00150 | 0.00026 | 13,986 |
| | | | 100 | 26.3 | 23.9 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00156 | 0.00144 | 0.00150 | 0.00026 | 13,968 |
| | COLUMN AVERAGE | | | 26.3 | 23.8 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00155 | 0.00144 | 0.00150 | 0.00026 | 13,980 |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 39.2 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00239 | 0.00247 | 0.00043 | 12,595 |
| | | | 97 | 39.3 | 35.5 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00254 | 0.00238 | 0.00246 | 0.00043 | 12,647 |
| | | | 98 | 39.2 | 35.5 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00238 | 0.00247 | 0.00043 | 12,626 |
| | | | 99 | 39.2 | 35.4 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00238 | 0.00247 | 0.00043 | 12,590 |
| | | | 100 | 39.3 | 35.5 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00239 | 0.00247 | 0.00043 | 12,640 |
| | COLUMN AVERAGE | | | 39.2 | 35.5 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00255 | 0.00239 | 0.00247 | 0.00043 | 12,620 |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 26 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 52.0 | 46.9 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00364 | 0.00344 | 0.00354 | 0.00062 | 11,629 |
| | | | 97 | 51.9 | 46.9 | 5.0 | 7.9 | 7.2 | 0.8 | 0.00365 | 0.00343 | 0.00354 | 0.00062 | 11,632 |
| | | | 98 | 51.9 | 46.8 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00364 | 0.00344 | 0.00354 | 0.00062 | 11,596 |
| | | | 99 | 51.9 | 46.9 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00364 | 0.00343 | 0.00354 | 0.00062 | 11,631 |
| | | | 100 | 51.9 | 46.9 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00365 | 0.00344 | 0.00354 | 0.00062 | 11,612 |
| | COLUMN AVERAGE | | | 51.9 | 46.9 | 5.1 | 7.9 | 7.2 | 0.8 | 0.00365 | 0.00344 | 0.00354 | 0.00062 | 11,620 |
| | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 16 | |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P27

Material Source: 19X-SOS-P27

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 65.0 | 58.6 | 6.4 | 9.9 | 9.0 | 1.0 | 0.00474 | 0.00447 | 0.00461 | 0.00080 | 11,173 |
| | | | 97 | 65.0 | 58.7 | 6.3 | 9.9 | 9.0 | 1.0 | 0.00474 | 0.00447 | 0.00461 | 0.00080 | 11,183 |
| | | | 98 | 65.0 | 58.6 | 6.3 | 9.9 | 9.0 | 1.0 | 0.00473 | 0.00447 | 0.00460 | 0.00080 | 11,185 |
| | | | 99 | 64.9 | 58.6 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00474 | 0.00448 | 0.00461 | 0.00080 | 11,163 |
| | | | 100 | 64.9 | 58.6 | 6.3 | 9.9 | 9.0 | 1.0 | 0.00474 | 0.00448 | 0.00461 | 0.00080 | 11,165 |
| | COLUMN AVERAGE | | | 65.0 | 58.6 | 6.3 | 9.9 | 9.0 | 1.0 | 0.00474 | 0.00447 | 0.00461 | 0.00080 | 11,174 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.2 | 12.1 | 2.1 | 2.2 | 1.8 | 0.3 | 0.00079 | 0.00073 | 0.00076 | 0.00013 | 13,932 |
| | | | 97 | 14.2 | 12.1 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00073 | 0.00076 | 0.00013 | 13,990 |
| | | | 98 | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00073 | 0.00076 | 0.00013 | 13,944 |
| | | | 99 | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00074 | 0.00076 | 0.00013 | 13,901 |
| | | | 100 | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00073 | 0.00076 | 0.00013 | 13,869 |
| | COLUMN AVERAGE | | | 14.2 | 12.0 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00073 | 0.00076 | 0.00013 | 13,927 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 46 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00163 | 0.00168 | 0.00029 | 12,353 |
| | | | 97 | 26.2 | 23.8 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00163 | 0.00168 | 0.00029 | 12,432 |
| | | | 98 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00162 | 0.00168 | 0.00029 | 12,419 |
| | | | 99 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00164 | 0.00168 | 0.00029 | 12,316 |
| | | | 100 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00163 | 0.00168 | 0.00029 | 12,374 |
| | COLUMN AVERAGE | | | 26.1 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00173 | 0.00163 | 0.00168 | 0.00029 | 12,379 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 48 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00280 | 0.00265 | 0.00273 | 0.00047 | 11,337 |
| | | | 97 | 38.9 | 35.2 | 3.7 | 5.9 | 5.4 | 0.6 | 0.00279 | 0.00266 | 0.00272 | 0.00047 | 11,334 |
| | | | 98 | 39.0 | 35.2 | 3.7 | 6.0 | 5.4 | 0.6 | 0.00280 | 0.00265 | 0.00272 | 0.00047 | 11,354 |
| | | | 99 | 38.9 | 35.2 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00281 | 0.00265 | 0.00273 | 0.00047 | 11,309 |
| | | | 100 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00280 | 0.00266 | 0.00273 | 0.00047 | 11,303 |
| | COLUMN AVERAGE | | | 38.9 | 35.2 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00280 | 0.00265 | 0.00273 | 0.00047 | 11,328 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 21 |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P27

Material Source: 19X-SOS-P27

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00398 | 0.00377 | 0.00387 | 0.00067 | 10,559 |
| | | | 97 | 51.7 | 46.6 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00398 | 0.00377 | 0.00387 | 0.00067 | 10,562 |
| | | | 98 | 51.6 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00399 | 0.00377 | 0.00388 | 0.00067 | 10,551 |
| | | | 99 | 51.7 | 46.7 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00397 | 0.00377 | 0.00387 | 0.00067 | 10,582 |
| | | | 100 | 51.7 | 46.6 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00398 | 0.00377 | 0.00388 | 0.00067 | 10,566 |
| COLUMN AVERAGE | | | | 51.7 | 46.6 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00398 | 0.00377 | 0.00387 | 0.00067 | 10,564 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00513 | 0.00486 | 0.00500 | 0.00087 | 10,256 |
| | | | 97 | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00513 | 0.00486 | 0.00500 | 0.00087 | 10,264 |
| | | | 98 | 64.6 | 58.3 | 6.4 | 9.9 | 8.9 | 1.0 | 0.00514 | 0.00485 | 0.00500 | 0.00087 | 10,241 |
| | | | 99 | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00514 | 0.00487 | 0.00500 | 0.00087 | 10,244 |
| | | | 100 | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00513 | 0.00486 | 0.00499 | 0.00087 | 10,262 |
| COLUMN AVERAGE | | | | 64.7 | 58.4 | 6.3 | 9.9 | 8.9 | 1.0 | 0.00513 | 0.00486 | 0.00500 | 0.00087 | 10,253 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |

TESTED BY RLB DATE 07-18-2019

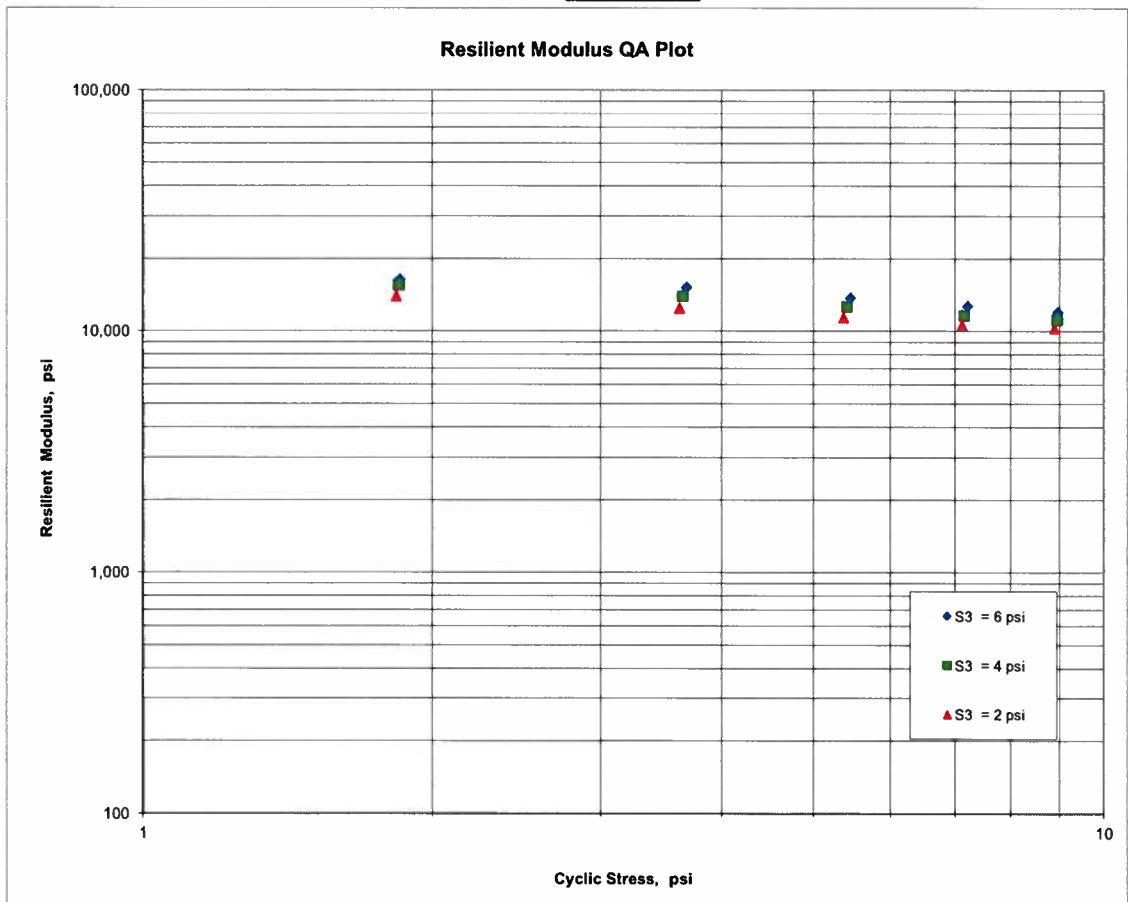
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P27 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 14.1% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-18-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

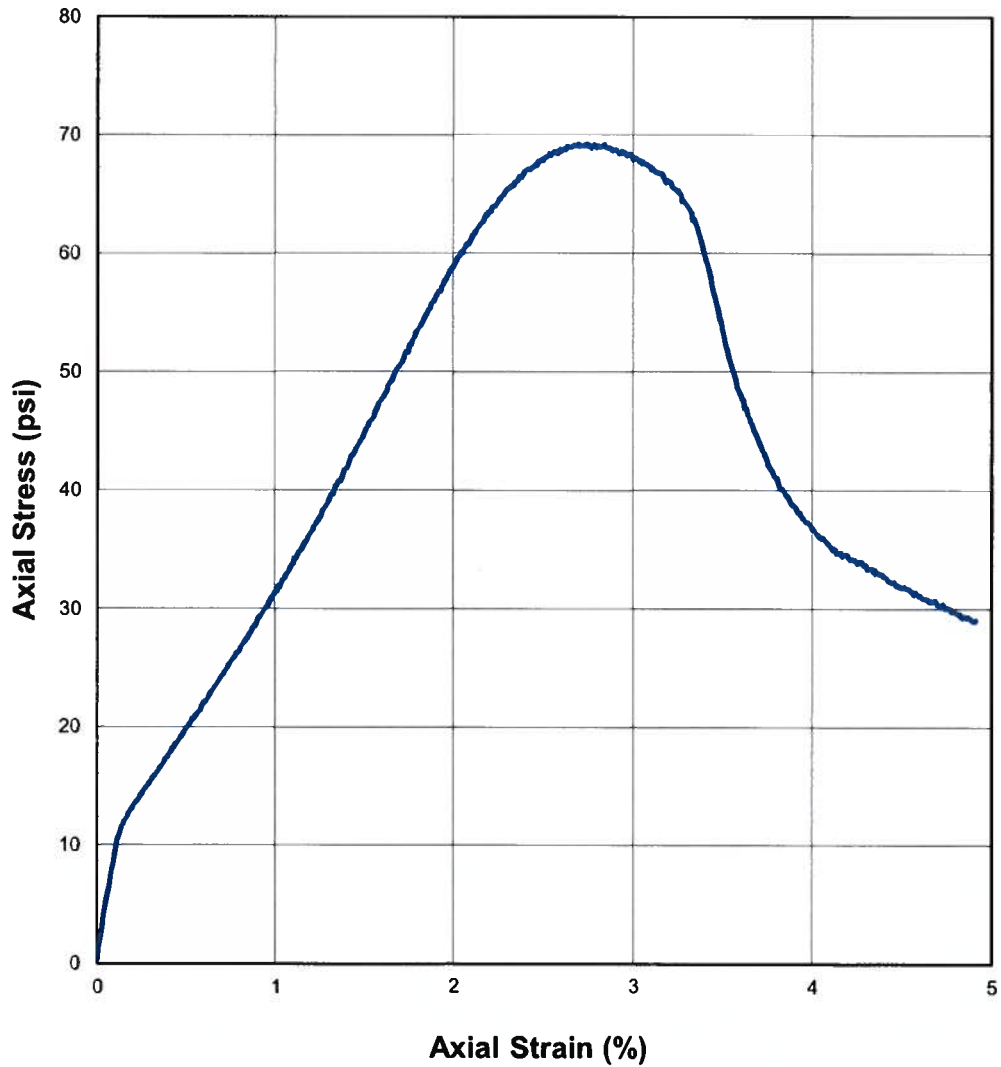
| | |
|------------------|----------|
| K1 = | 14,201 |
| K2 = | -0.20454 |
| K5 = | 0.16304 |
| R ² = | 0.98 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P27 |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 14.1% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-18-2019 |





**AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)**

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SalUT #19-0012
 DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
 IDENTIFICATION MARKS: 19X-SOS-P31 SOURCE OF MATERIAL: 19X-SOS-P31

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>SOS-P31</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.77</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, Lo, inch | <u>5.8</u> |
| | INITIAL AREA, Ao, in ² | <u>6.6</u> |
| | INITIAL VOLUME Ao Lo, in ³ | <u>37.8</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1282.80</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1282.80</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>13.0</u> |
| | MAX. DRY DENSITY, pcf | <u>117.0</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>13.0</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>12.8</u> |
| | COMPACTION DRY DENSITY, γ _d , pcf | <u>114.4</u> |
| | TARGET DRY DENSITY, %γ _d <u>100</u> TARGET MOISTURE CONTENT, % | <u>13.0</u> |
| | COMPACTION LEVEL ACHIEVED | <u>97.8%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>47</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-06-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-06-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012 LABORATORY: Boudreau Engineering, Inc.
 2. **PROJECT NAME:** I-495 NEXT Express Lanes Lawrenceville, Georgia
 3. **SOURCE OF MATERIAL:** 19X-SOS-P31
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 13% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-06-2019
 8. **RESILIENT MODULUS TESTING**

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00096 | 0.00098 | 0.00097 | 0.00017 | 10,884 |
| | | | 97 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00094 | 0.00098 | 0.00096 | 0.00017 | 11,016 |
| | | | 98 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00095 | 0.00098 | 0.00097 | 0.00017 | 10,872 |
| | | | 99 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00095 | 0.00097 | 0.00096 | 0.00017 | 10,874 |
| | | | 100 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00095 | 0.00098 | 0.00096 | 0.00017 | 10,893 |
| COLUMN AVERAGE | | | | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00095 | 0.00098 | 0.00096 | 0.00017 | 10,908 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 61 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P31

Material Source: 19X-SOS-P31

| | | | | | | | | | | | | | | |
|------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00213 | 0.00221 | 0.00217 | 0.00038 | 9,574 |
| | | | 97 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00212 | 0.00221 | 0.00217 | 0.00038 | 9,579 |
| | | | 98 | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00212 | 0.00221 | 0.00216 | 0.00038 | 9,607 |
| | | | 99 | 26.0 | 23.5 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00213 | 0.00221 | 0.00217 | 0.00038 | 9,563 |
| | | | 100 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00212 | 0.00221 | 0.00216 | 0.00037 | 9,618 |
| | COLUMN AVERAGE | | | 26.0 | 23.6 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00212 | 0.00221 | 0.00217 | 0.00038 | 9,588 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 23 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.3 | 34.5 | 3.8 | 5.8 | 5.3 | 0.6 | 0.00348 | 0.00362 | 0.00355 | 0.00062 | 8,568 |
| | | | 97 | 38.4 | 34.6 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00348 | 0.00362 | 0.00355 | 0.00062 | 8,598 |
| | | | 98 | 38.3 | 34.6 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00348 | 0.00362 | 0.00355 | 0.00061 | 8,582 |
| | | | 99 | 38.3 | 34.5 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00347 | 0.00362 | 0.00355 | 0.00061 | 8,577 |
| | | | 100 | 38.3 | 34.6 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00348 | 0.00362 | 0.00355 | 0.00062 | 8,577 |
| | COLUMN AVERAGE | | | 38.3 | 34.6 | 3.7 | 5.8 | 5.3 | 0.6 | 0.00348 | 0.00362 | 0.00355 | 0.00061 | 8,580 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 50.5 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00499 | 0.00515 | 0.00507 | 0.00088 | 7,924 |
| | | | 97 | 50.7 | 45.7 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00499 | 0.00514 | 0.00507 | 0.00088 | 7,945 |
| | | | 98 | 50.6 | 45.6 | 5.0 | 7.7 | 7.0 | 0.8 | 0.00498 | 0.00516 | 0.00507 | 0.00088 | 7,922 |
| | | | 99 | 50.6 | 45.6 | 4.9 | 7.7 | 7.0 | 0.8 | 0.00499 | 0.00516 | 0.00507 | 0.00088 | 7,927 |
| | | | 100 | 50.6 | 45.7 | 4.9 | 7.7 | 7.0 | 0.7 | 0.00499 | 0.00515 | 0.00507 | 0.00088 | 7,939 |
| | COLUMN AVERAGE | | | 50.6 | 45.6 | 4.9 | 7.7 | 7.0 | 0.8 | 0.00499 | 0.00515 | 0.00507 | 0.00088 | 7,932 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 63.0 | 56.8 | 6.2 | 9.6 | 8.7 | 1.0 | 0.00654 | 0.00674 | 0.00664 | 0.00115 | 7,536 |
| | | | 97 | 63.0 | 56.8 | 6.2 | 9.6 | 8.7 | 1.0 | 0.00655 | 0.00674 | 0.00664 | 0.00115 | 7,524 |
| | | | 98 | 63.1 | 56.8 | 6.2 | 9.6 | 8.7 | 1.0 | 0.00654 | 0.00674 | 0.00664 | 0.00115 | 7,536 |
| | | | 99 | 62.9 | 56.8 | 6.2 | 9.6 | 8.7 | 0.9 | 0.00654 | 0.00675 | 0.00665 | 0.00115 | 7,525 |
| | | | 100 | 63.1 | 56.9 | 6.2 | 9.6 | 8.7 | 0.9 | 0.00654 | 0.00675 | 0.00665 | 0.00115 | 7,537 |
| | COLUMN AVERAGE | | | 63.0 | 56.8 | 6.2 | 9.6 | 8.7 | 0.9 | 0.00654 | 0.00675 | 0.00664 | 0.00115 | 7,531 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 7 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P31

Material Source: 19X-SOS-P31

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.7 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00099 | 0.00098 | 0.00017 | 10,776 |
| | | | 97 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00095 | 0.00099 | 0.00097 | 0.00017 | 10,782 |
| | | | 98 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00099 | 0.00098 | 0.00017 | 10,765 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00099 | 0.00097 | 0.00017 | 10,813 |
| | | | 100 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00098 | 0.00097 | 0.00017 | 10,846 |
| COLUMN AVERAGE | | | | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00096 | 0.00099 | 0.00097 | 0.00017 | 10,796 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | | 33 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00222 | 0.00230 | 0.00226 | 0.00039 | 9,058 |
| | | | 97 | 25.7 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00221 | 0.00231 | 0.00226 | 0.00039 | 9,064 |
| | | | 98 | 25.7 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00222 | 0.00231 | 0.00227 | 0.00039 | 9,032 |
| | | | 99 | 25.7 | 23.3 | 2.4 | 3.9 | 3.6 | 0.4 | 0.00222 | 0.00231 | 0.00226 | 0.00039 | 9,049 |
| | | | 100 | 25.8 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00223 | 0.00230 | 0.00226 | 0.00039 | 9,059 |
| COLUMN AVERAGE | | | | 25.7 | 23.3 | 2.5 | 3.9 | 3.6 | 0.4 | 0.00222 | 0.00231 | 0.00226 | 0.00039 | 9,052 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | | 13 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 37.7 | 34.0 | 3.7 | 5.7 | 5.2 | 0.6 | 0.00374 | 0.00388 | 0.00381 | 0.00066 | 7,848 |
| | | | 97 | 37.8 | 34.1 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00374 | 0.00388 | 0.00381 | 0.00066 | 7,893 |
| | | | 98 | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00374 | 0.00388 | 0.00381 | 0.00066 | 7,866 |
| | | | 99 | 37.8 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00374 | 0.00389 | 0.00382 | 0.00066 | 7,854 |
| | | | 100 | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00375 | 0.00389 | 0.00382 | 0.00066 | 7,855 |
| COLUMN AVERAGE | | | | 37.7 | 34.0 | 3.7 | 5.8 | 5.2 | 0.6 | 0.00374 | 0.00388 | 0.00381 | 0.00066 | 7,863 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | | 18 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 49.8 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00563 | 0.00555 | 0.00096 | 7,125 |
| | | | 97 | 49.9 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00563 | 0.00555 | 0.00096 | 7,138 |
| | | | 98 | 49.8 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00564 | 0.00555 | 0.00096 | 7,118 |
| | | | 99 | 49.8 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00564 | 0.00556 | 0.00096 | 7,115 |
| | | | 100 | 49.8 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00563 | 0.00555 | 0.00096 | 7,122 |
| COLUMN AVERAGE | | | | 49.8 | 44.9 | 4.9 | 7.6 | 6.9 | 0.8 | 0.00547 | 0.00563 | 0.00555 | 0.00096 | 7,124 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | | 9 |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-SOS-P31 | | | | | | Material Source: 19X-SOS-P31 | | | | | |
|--|-----|------|-----------------------------------|------|------|-----|-----|-----|------------------------------|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 62.6 | 56.4 | 6.2 | 9.6 | 8.6 | 0.9 | 0.00712 | 0.00731 | 0.00721 | 0.00125 | 6,890 |
| | | | 97 | 62.5 | 56.3 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00712 | 0.00731 | 0.00721 | 0.00125 | 6,877 |
| | | | 98 | 62.5 | 56.3 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00712 | 0.00732 | 0.00722 | 0.00125 | 6,870 |
| | | | 99 | 62.6 | 56.5 | 6.2 | 9.6 | 8.6 | 0.9 | 0.00711 | 0.00732 | 0.00722 | 0.00125 | 6,893 |
| | | | 100 | 62.6 | 56.4 | 6.2 | 9.6 | 8.6 | 0.9 | 0.00712 | 0.00732 | 0.00722 | 0.00125 | 6,881 |
| COLUMN AVERAGE | | | | 62.6 | 56.4 | 6.2 | 9.5 | 8.6 | 0.9 | 0.00712 | 0.00732 | 0.00722 | 0.00125 | 6,882 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 9 | |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.0 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,647 |
| | | | 97 | 14.0 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,649 |
| | | | 98 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,652 |
| | | | 99 | 13.9 | 11.8 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,626 |
| | | | 100 | 14.0 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,680 |
| COLUMN AVERAGE | | | | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00106 | 0.00110 | 0.00108 | 0.00019 | 9,651 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 19 | |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.5 | 23.1 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00245 | 0.00257 | 0.00251 | 0.00044 | 8,096 |
| | | | 97 | 25.4 | 23.0 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00246 | 0.00256 | 0.00251 | 0.00044 | 8,056 |
| | | | 98 | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00246 | 0.00256 | 0.00251 | 0.00044 | 8,061 |
| | | | 99 | 25.4 | 22.9 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00246 | 0.00256 | 0.00251 | 0.00043 | 8,036 |
| | | | 100 | 25.5 | 23.0 | 2.5 | 3.9 | 3.5 | 0.4 | 0.00247 | 0.00256 | 0.00251 | 0.00044 | 8,063 |
| COLUMN AVERAGE | | | | 25.4 | 23.0 | 2.4 | 3.9 | 3.5 | 0.4 | 0.00246 | 0.00256 | 0.00251 | 0.00044 | 8,063 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 22 | |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00409 | 0.00426 | 0.00417 | 0.00072 | 7,081 |
| | | | 97 | 37.3 | 33.6 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00409 | 0.00426 | 0.00418 | 0.00072 | 7,095 |
| | | | 98 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00410 | 0.00425 | 0.00417 | 0.00072 | 7,062 |
| | | | 99 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00410 | 0.00427 | 0.00418 | 0.00072 | 7,061 |
| | | | 100 | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00410 | 0.00426 | 0.00418 | 0.00072 | 7,064 |
| COLUMN AVERAGE | | | | 37.2 | 33.5 | 3.7 | 5.7 | 5.1 | 0.6 | 0.00410 | 0.00426 | 0.00418 | 0.00072 | 7,073 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 15 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P31

Material Source: 19X-SOS-P31

| | | | | | | | | | | | | | | |
|-------------|----------------|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 49.2 | 44.3 | 4.9 | 7.5 | 6.8 | 0.8 | 0.00591 | 0.00611 | 0.00601 | 0.00104 | 6,496 |
| | | | 97 | 49.4 | 44.5 | 4.9 | 7.5 | 6.8 | 0.8 | 0.00591 | 0.00611 | 0.00601 | 0.00104 | 6,514 |
| | | | 98 | 49.3 | 44.4 | 4.9 | 7.5 | 6.8 | 0.8 | 0.00591 | 0.00612 | 0.00601 | 0.00104 | 6,505 |
| | | | 99 | 49.3 | 44.5 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00592 | 0.00611 | 0.00601 | 0.00104 | 6,511 |
| | | | 100 | 49.3 | 44.4 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00592 | 0.00612 | 0.00602 | 0.00104 | 6,491 |
| | COLUMN AVERAGE | | | 49.3 | 44.4 | 4.9 | 7.5 | 6.8 | 0.7 | 0.00591 | 0.00611 | 0.00601 | 0.00104 | 6,503 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 61.9 | 55.7 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00767 | 0.00789 | 0.00778 | 0.00135 | 6,310 |
| | | | 97 | 61.9 | 55.8 | 6.1 | 9.5 | 8.5 | 0.9 | 0.00768 | 0.00788 | 0.00778 | 0.00135 | 6,324 |
| | | | 98 | 61.8 | 55.6 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00767 | 0.00789 | 0.00778 | 0.00135 | 6,294 |
| | | | 99 | 61.9 | 55.7 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00768 | 0.00790 | 0.00779 | 0.00135 | 6,303 |
| | | | 100 | 62.0 | 55.9 | 6.1 | 9.5 | 8.5 | 0.9 | 0.00767 | 0.00789 | 0.00778 | 0.00135 | 6,322 |
| | COLUMN AVERAGE | | | 61.9 | 55.8 | 6.1 | 9.4 | 8.5 | 0.9 | 0.00767 | 0.00789 | 0.00778 | 0.00135 | 6,311 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 12 |

TESTED BY RLB DATE 08-06-2019

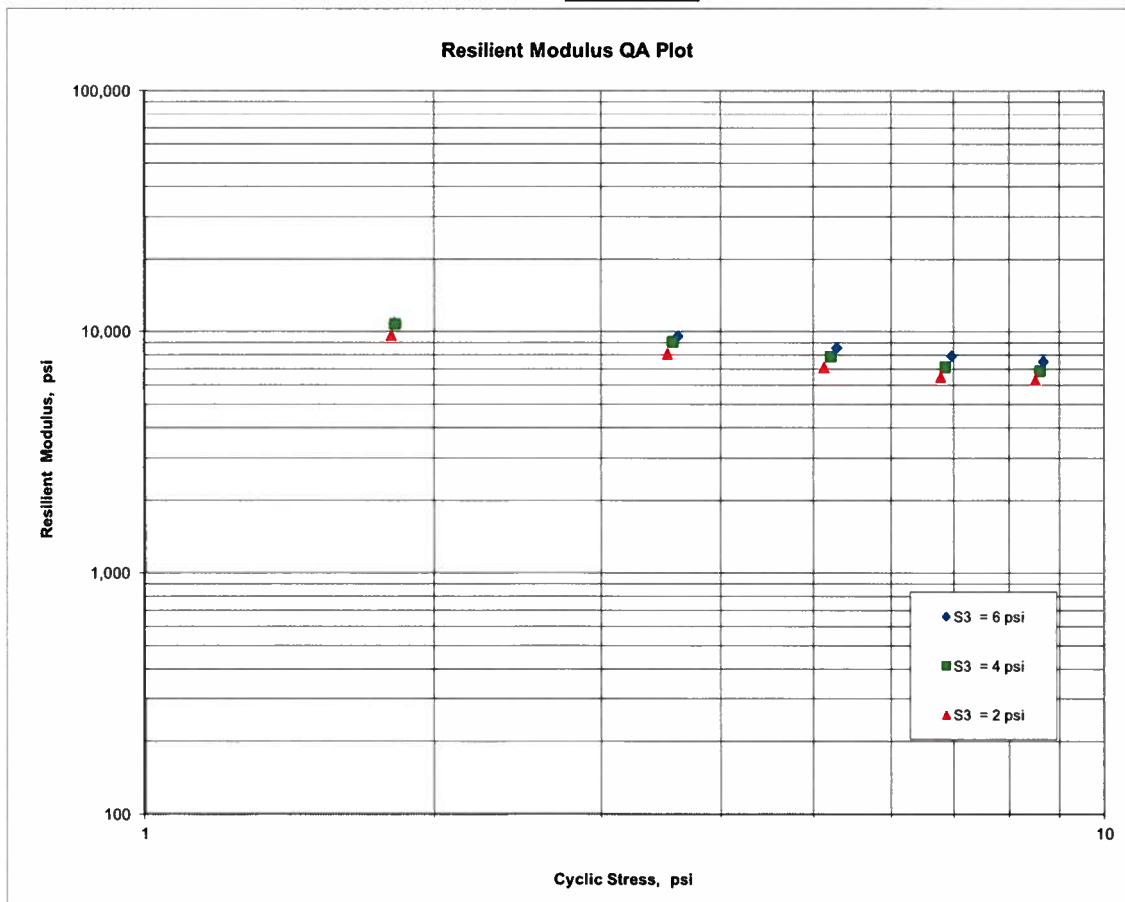
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P31 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 13% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-06-2019 |

$$M_R = K1 (S_C)^{K2} (S_3)^{K5}$$

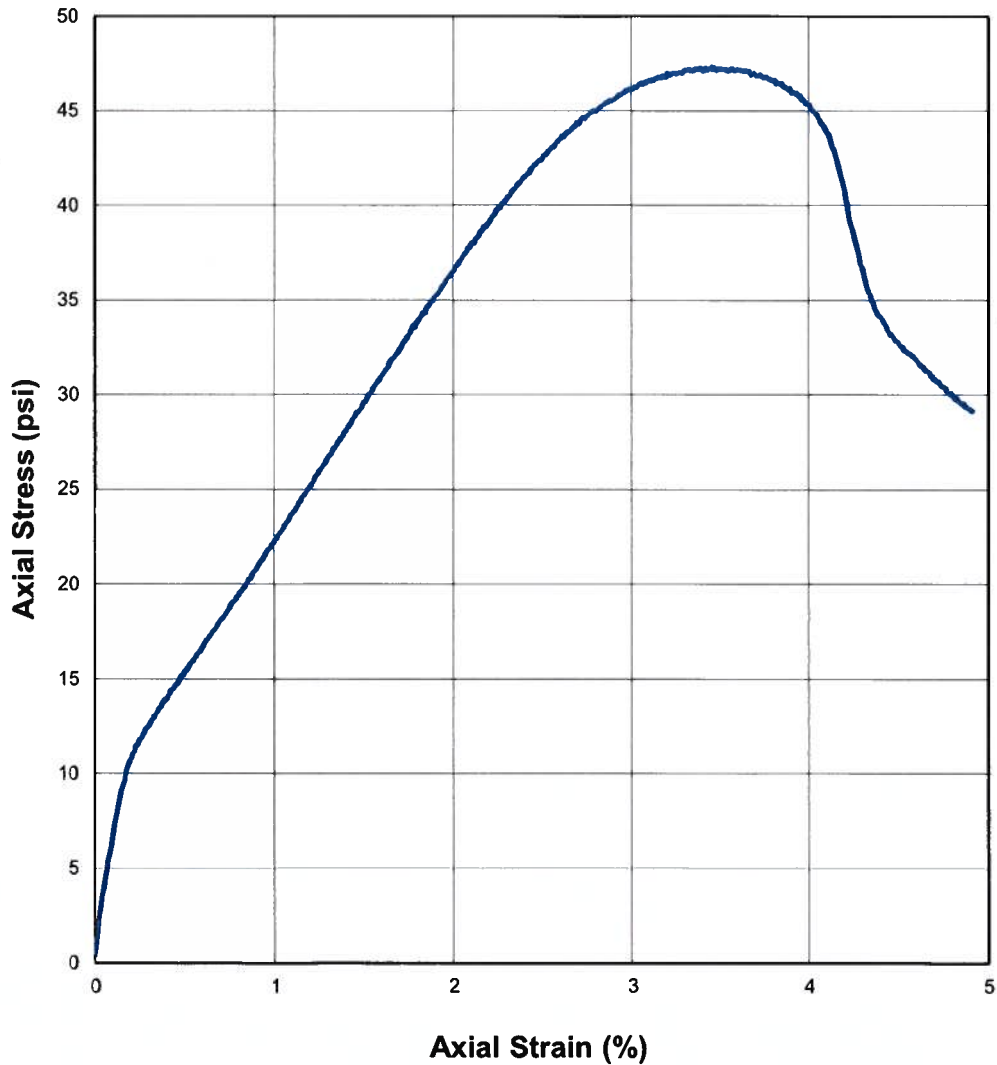
| | |
|------------------|----------|
| K1 = | 10,053 |
| K2 = | -0.27643 |
| K5 = | 0.16168 |
| R ² = | 0.99 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|--|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P31 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 13% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-06-2019 |





**AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)**

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 Project Next
Lawrenceville, Georgia PROJECT NO.: SME #1243-19-025
 DATE RECEIVED: 07-10-2019 QUANTITY (REPRESENTED): N.A.
 IDENTIFICATION MARKS: 19X-SOS-P34 SOURCE OF MATERIAL: 19X-SOS-P34

- | | | |
|-----|--|-------------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>P34</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.77</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, L_0 , inch | <u>5.8</u> |
| | INITIAL AREA, A_0 , in ² | <u>6.6</u> |
| | INITIAL VOLUME $A_0 L_0$, in ³ | <u>37.8</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1418.47</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1418.47</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | 8.9 8.5 |
| | MAX. DRY DENSITY, pcf | 124.5 129.6 |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>8.9</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>8.8</u> |
| | COMPACTION DRY DENSITY, γ_d , pcf | <u>131.2</u> |
| | TARGET DRY DENSITY, $\gamma_{d,t}$, pcf | <u>100</u> |
| | TARGET MOISTURE CONTENT, % | <u>8.9</u> |
| | COMPACTION LEVEL ACHIEVED | 97.6% 101.2% |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAxIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD X-SECTION AREA), psi | <u>71</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>07-18-2019</u> |

13. GENERAL REMARKS: Maximum Dry Density and Optimum Moisture Content were revised by the requesting agency after the testing was completed (NRR of S&ME 8/2/19)

TESTED BY RLB DATE 07-18-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SME #1243-19-025
 2. **PROJECT NAME:** I-495 Project Next
 3. **SOURCE OF MATERIAL:** 19X-SOS-P34
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 8.9% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 07-18-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00069 | 0.00070 | 0.00070 | 0.00012 | 15,079 |
| | | | 97 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00068 | 0.00071 | 0.00070 | 0.00012 | 15,094 |
| | | | 98 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00069 | 0.00071 | 0.00070 | 0.00012 | 15,150 |
| | | | 99 | 13.3 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00069 | 0.00071 | 0.00070 | 0.00012 | 15,014 |
| | | | 100 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00069 | 0.00070 | 0.00069 | 0.00012 | 15,215 |
| COLUMN AVERAGE | | | | 13.4 | 11.9 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00069 | 0.00071 | 0.00070 | 0.00012 | 15,110 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 76 |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P34

Material Source: 19X-SOS-P34

| | | | | | | | | | | | | | | |
|------------|-----|---------------|----------------|------|------|------|-----|-----|---------|---------|---------|---------|---------|---------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00147 | 0.00144 | 0.00025 | 14,492 |
| | | | 97 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00146 | 0.00144 | 0.00025 | 14,477 |
| | | | 98 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00146 | 0.00144 | 0.00025 | 14,495 |
| | | | 99 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00147 | 0.00144 | 0.00025 | 14,438 |
| | | | 100 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00146 | 0.00144 | 0.00025 | 14,457 |
| | | | COLUMN AVERAGE | | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00142 | 0.00146 | 0.00144 | 0.00025 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 24 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 39.0 | 35.2 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00230 | 0.00238 | 0.00234 | 0.00041 | 13,244 |
| | | | 97 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00230 | 0.00239 | 0.00234 | 0.00041 | 13,216 |
| | | | 98 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00238 | 0.00234 | 0.00041 | 13,239 |
| | | | 99 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00230 | 0.00238 | 0.00234 | 0.00041 | 13,245 |
| | | | 100 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00229 | 0.00239 | 0.00234 | 0.00041 | 13,236 |
| | | | COLUMN AVERAGE | | 39.0 | 35.2 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00230 | 0.00238 | 0.00234 | 0.00041 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 12 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00325 | 0.00338 | 0.00331 | 0.00057 | 12,379 |
| | | | 97 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00325 | 0.00337 | 0.00331 | 0.00057 | 12,394 |
| | | | 98 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00324 | 0.00338 | 0.00331 | 0.00057 | 12,382 |
| | | | 99 | 51.7 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00324 | 0.00338 | 0.00331 | 0.00057 | 12,398 |
| | | | 100 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00324 | 0.00338 | 0.00331 | 0.00057 | 12,381 |
| | | | COLUMN AVERAGE | | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00324 | 0.00338 | 0.00331 | 0.00057 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 9 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00424 | 0.00440 | 0.00432 | 0.00075 | 11,810 |
| | | | 97 | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00423 | 0.00441 | 0.00432 | 0.00075 | 11,801 |
| | | | 98 | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00423 | 0.00441 | 0.00432 | 0.00075 | 11,787 |
| | | | 99 | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00425 | 0.00441 | 0.00433 | 0.00075 | 11,784 |
| | | | 100 | 64.2 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00424 | 0.00440 | 0.00432 | 0.00075 | 11,793 |
| | | | COLUMN AVERAGE | | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00424 | 0.00441 | 0.00432 | 0.00075 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 11 | |

Report Form X1.1

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P34

Material Source: 19X-SOS-P34

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00075 | 0.00073 | 0.00013 | 14,511 |
| | | | 97 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00075 | 0.00073 | 0.00013 | 14,488 |
| | | | 98 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00070 | 0.00075 | 0.00073 | 0.00013 | 14,586 |
| | | | 99 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00070 | 0.00075 | 0.00073 | 0.00013 | 14,550 |
| | | | 100 | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00071 | 0.00075 | 0.00073 | 0.00013 | 14,500 |
| COLUMN AVERAGE | | | | 13.8 | 12.0 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00070 | 0.00075 | 0.00073 | 0.00013 | 14,527 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 40 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00148 | 0.00161 | 0.00154 | 0.00027 | 13,438 |
| | | | 97 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00148 | 0.00161 | 0.00154 | 0.00027 | 13,413 |
| | | | 98 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00148 | 0.00160 | 0.00154 | 0.00027 | 13,458 |
| | | | 99 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00149 | 0.00160 | 0.00154 | 0.00027 | 13,434 |
| | | | 100 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00149 | 0.00160 | 0.00154 | 0.00027 | 13,446 |
| COLUMN AVERAGE | | | | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00148 | 0.00160 | 0.00154 | 0.00027 | 13,438 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 17 | |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00241 | 0.00257 | 0.00249 | 0.00043 | 12,420 |
| | | | 97 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00242 | 0.00256 | 0.00249 | 0.00043 | 12,409 |
| | | | 98 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00241 | 0.00256 | 0.00248 | 0.00043 | 12,435 |
| | | | 99 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00242 | 0.00257 | 0.00249 | 0.00043 | 12,404 |
| | | | 100 | 38.8 | 35.0 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00241 | 0.00257 | 0.00249 | 0.00043 | 12,400 |
| COLUMN AVERAGE | | | | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00241 | 0.00257 | 0.00249 | 0.00043 | 12,414 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 14 | |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 51.4 | 46.3 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00345 | 0.00361 | 0.00353 | 0.00061 | 11,543 |
| | | | 97 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00346 | 0.00361 | 0.00353 | 0.00061 | 11,581 |
| | | | 98 | 51.4 | 46.3 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00346 | 0.00361 | 0.00353 | 0.00061 | 11,547 |
| | | | 99 | 51.4 | 46.3 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00346 | 0.00361 | 0.00353 | 0.00061 | 11,552 |
| | | | 100 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00345 | 0.00361 | 0.00353 | 0.00061 | 11,567 |
| COLUMN AVERAGE | | | | 51.4 | 46.3 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00345 | 0.00361 | 0.00353 | 0.00061 | 11,558 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 16 | |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P34

Material Source: 19X-SOS-P34

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.2 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00467 | 0.00458 | 0.00079 | 11,122 |
| | | | 97 | 64.3 | 57.9 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00467 | 0.00458 | 0.00079 | 11,146 |
| | | | 98 | 64.2 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00468 | 0.00458 | 0.00079 | 11,135 |
| | | | 99 | 64.1 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00467 | 0.00458 | 0.00079 | 11,118 |
| | | | 100 | 64.2 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00467 | 0.00458 | 0.00079 | 11,125 |
| COLUMN AVERAGE | | | | 64.2 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00448 | 0.00467 | 0.00458 | 0.00079 | 11,129 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.1 | 11.9 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00082 | 0.00080 | 0.00014 | 13,144 |
| | | | 97 | 14.1 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00077 | 0.00082 | 0.00079 | 0.00014 | 13,227 |
| | | | 98 | 14.1 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00081 | 0.00080 | 0.00014 | 13,187 |
| | | | 99 | 14.1 | 11.9 | 2.2 | 2.2 | 1.8 | 0.3 | 0.00078 | 0.00081 | 0.00079 | 0.00014 | 13,236 |
| | | | 100 | 14.1 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00081 | 0.00080 | 0.00014 | 13,213 |
| COLUMN AVERAGE | | | | 14.1 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00078 | 0.00082 | 0.00080 | 0.00014 | 13,202 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 37 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00178 | 0.00171 | 0.00030 | 12,128 |
| | | | 97 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00177 | 0.00171 | 0.00030 | 12,117 |
| | | | 98 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00178 | 0.00171 | 0.00030 | 12,104 |
| | | | 99 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00177 | 0.00171 | 0.00030 | 12,148 |
| | | | 100 | 25.9 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00178 | 0.00171 | 0.00030 | 12,065 |
| COLUMN AVERAGE | | | | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00164 | 0.00177 | 0.00171 | 0.00030 | 12,112 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 31 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.7 | 34.9 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00281 | 0.00273 | 0.00047 | 11,279 |
| | | | 97 | 38.7 | 35.0 | 3.7 | 5.9 | 5.3 | 0.6 | 0.00265 | 0.00280 | 0.00273 | 0.00047 | 11,298 |
| | | | 98 | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00280 | 0.00272 | 0.00047 | 11,277 |
| | | | 99 | 38.7 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00263 | 0.00282 | 0.00273 | 0.00047 | 11,290 |
| | | | 100 | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00282 | 0.00273 | 0.00047 | 11,271 |
| COLUMN AVERAGE | | | | 38.7 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00264 | 0.00281 | 0.00273 | 0.00047 | 11,283 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 11 |

Project Name: I-495 Project Next

Identification Marks: 19X-SOS-P34

Material Source: 19X-SOS-P34

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.2 | 46.2 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00373 | 0.00391 | 0.00382 | 0.00066 | 10,647 |
| | | | 97 | 51.2 | 46.1 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00373 | 0.00392 | 0.00382 | 0.00066 | 10,623 |
| | | | 98 | 51.3 | 46.2 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00374 | 0.00389 | 0.00382 | 0.00066 | 10,652 |
| | | | 99 | 51.2 | 46.2 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00373 | 0.00391 | 0.00382 | 0.00066 | 10,640 |
| | | | 100 | 51.2 | 46.1 | 5.0 | 7.8 | 7.0 | 0.8 | 0.00373 | 0.00391 | 0.00382 | 0.00066 | 10,634 |
| COLUMN AVERAGE | | | | 51.2 | 46.1 | 5.1 | 7.8 | 7.0 | 0.8 | 0.00374 | 0.00391 | 0.00382 | 0.00066 | 10,639 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 63.8 | 57.5 | 6.4 | 9.7 | 8.8 | 1.0 | 0.00483 | 0.00502 | 0.00492 | 0.00085 | 10,288 |
| | | | 97 | 63.9 | 57.6 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00483 | 0.00501 | 0.00492 | 0.00085 | 10,306 |
| | | | 98 | 63.9 | 57.6 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00483 | 0.00500 | 0.00491 | 0.00085 | 10,315 |
| | | | 99 | 63.9 | 57.5 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00483 | 0.00501 | 0.00492 | 0.00085 | 10,300 |
| | | | 100 | 63.9 | 57.5 | 6.3 | 9.7 | 8.8 | 1.0 | 0.00481 | 0.00503 | 0.00492 | 0.00085 | 10,297 |
| COLUMN AVERAGE | | | | 63.9 | 57.5 | 6.4 | 9.7 | 8.8 | 1.0 | 0.00483 | 0.00501 | 0.00492 | 0.00085 | 10,301 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 10 |

TESTED BY RLB DATE 07-18-2019

Boudreau Engineering, Inc.

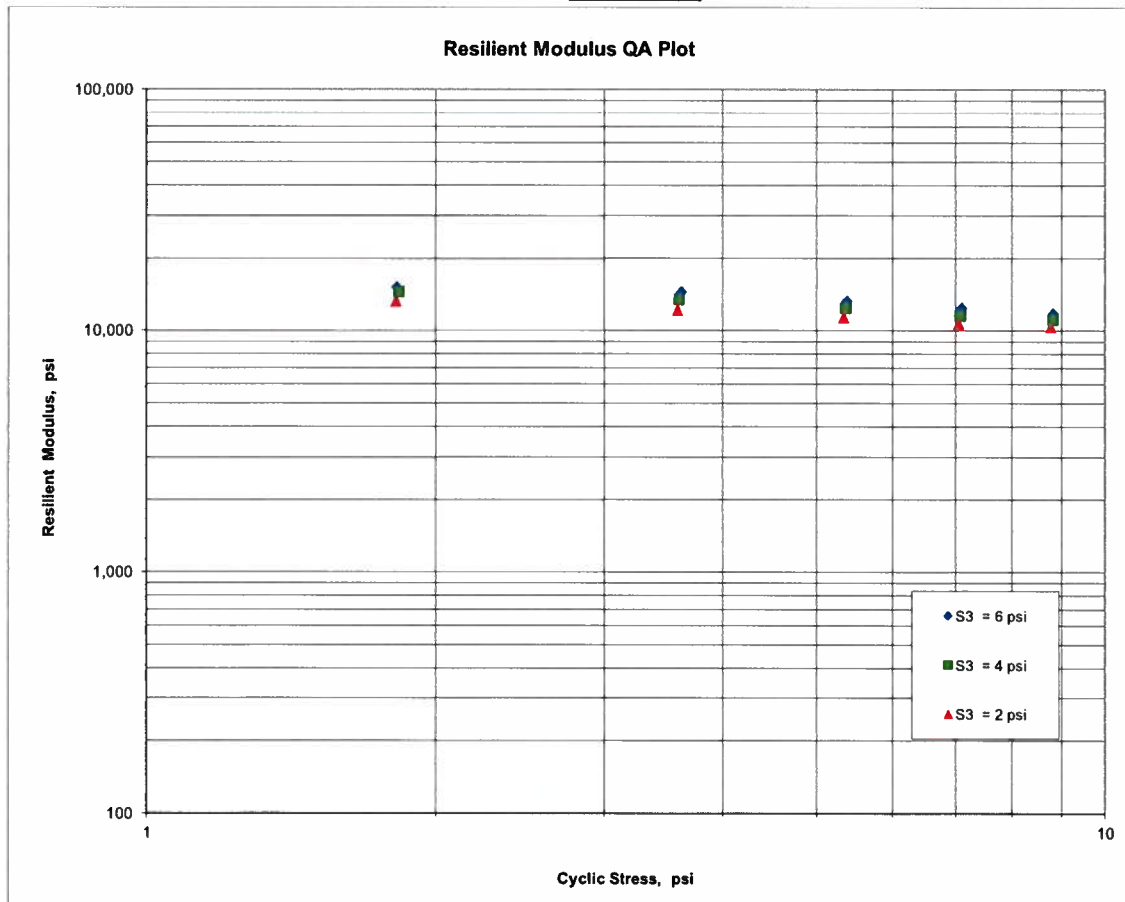
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|---|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P34 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 8.9% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-18-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

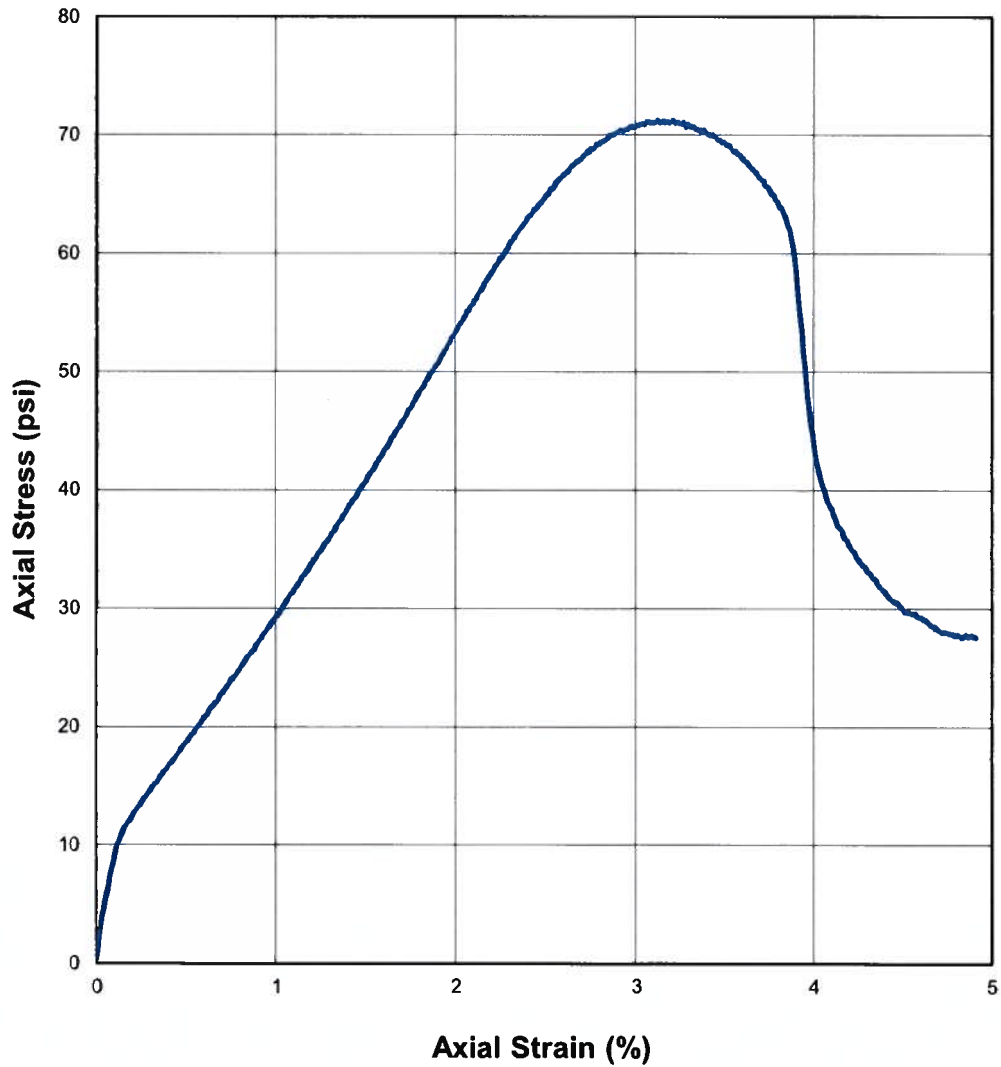
| | |
|------------------|----------|
| K1 = | 13,389 |
| K2 = | -0.16471 |
| K5 = | 0.13863 |
| R ² = | 0.97 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | SME #1243-19-025 |
| 2. PROJECT NAME: | I-495 Project Next |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P34 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 8.9% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 07-18-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-SOS-P40 SOURCE OF MATERIAL: 19X-SOS-P40

| | | | |
|-----|--|--|------------|
| 1. | SAMPLING DATE: | | N.R. |
| 2. | SAMPLE NUMBER: | | SOS-P40 |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | | 1 |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | | 2 |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | | N/A |
| 6. | TEST INFORMATION | | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | | Y |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | | N |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | | 15 |
| 7. | SPECIMEN INFO.: | | |
| | SPECIMEN DIAM., inch | | |
| | TOP | | 2.9 |
| | MIDDLE | | 2.9 |
| | BOTTOM | | 2.9 |
| | AVERAGE | | 2.9 |
| | MEMBRANE THICKNESS (1), inch | | 0.00 |
| | MEMBRANE THICKNESS (2), inch | | 0.00 |
| | NET DIAM., inch | | 2.9 |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | | 5.66 |
| | HEIGHT OF CAP AND BASE, inch | | 0.0 |
| | INITIAL LENGTH, L_o , inch | | 5.7 |
| | INITIAL AREA, A_o , in ² | | 6.5 |
| | INITIAL VOLUME $A_o L_o$, in ³ | | 37.0 |
| | INITIAL WEIGHT, grams (for tube samples) | | N/A |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | | 1353.25 |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | | 0.00 |
| | WEIGHT OF WET SOIL USED, grams | | 1353.25 |
| 9. | SOIL PROPERTIES.: | | |
| | For Remolded Samples: | | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | | N/A |
| | IN SITU WET DENSITY (NUCLEAR), pcf | | N/A |
| | or | | |
| | OPTIMUM MOISTURE CONTENT, % | | 11.6 |
| | MAX. DRY DENSITY, pcf | | 124.6 |
| | For Tube Samples: | | |
| | IN SITU MOISTURE CONTENT, % | | N/A |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | | N/A |
| | WET DENSITY, pcf | | N/A |
| | DRY DENSITY, pcf | | N/A |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | | |
| | COMPACTION MOISTURE CONTENT, % | | 11.6 |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | | 11.4 |
| | COMPACTION DRY DENSITY, γ_d , pcf | | 124.9 |
| | TARGET DRY DENSITY, % γ_d <u>100</u> TARGET MOISTURE CONTENT, % | | 11.6 |
| | COMPACTION LEVEL ACHIEVED | | 100.3% |
| 11. | QUICK SHEAR TEST | | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | | Y |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | | 63 |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | | Y |
| 12. | TEST DATE | | 08-06-2019 |
| 13. | GENERAL REMARKS: | | |

TESTED BY RLB DATE 08-06-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19X-SOS-P40
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 11.6% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-06-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | c _r | M _r |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00068 | 0.00071 | 0.00013 | 14,637 |
| | | | 97 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00073 | 0.00067 | 0.00070 | 0.00012 | 14,854 |
| | | | 98 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00074 | 0.00068 | 0.00071 | 0.00012 | 14,718 |
| | | | 99 | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00073 | 0.00068 | 0.00070 | 0.00012 | 14,767 |
| | | | 100 | 13.4 | 12.0 | 1.4 | 2.1 | 1.8 | 0.2 | 0.00075 | 0.00068 | 0.00071 | 0.00013 | 14,635 |
| COLUMN AVERAGE | | | | 13.4 | 12.0 | 1.4 | 2.0 | 1.8 | 0.2 | 0.00074 | 0.00068 | 0.00071 | 0.00012 | 14,722 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 92 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P40

Material Source: 19X-SOS-P40

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|---------|---------|---------|---------|---------|--------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 26.1 | 23.7 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00135 | 0.00141 | 0.00025 | 14,546 |
| | | | 97 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00136 | 0.00142 | 0.00025 | 14,419 |
| | | | 98 | 26.2 | 23.7 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00136 | 0.00142 | 0.00025 | 14,496 |
| | | | 99 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00135 | 0.00141 | 0.00025 | 14,503 |
| | | | 100 | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00135 | 0.00141 | 0.00025 | 14,488 |
| COLUMN AVERAGE | | | | 26.1 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00147 | 0.00136 | 0.00141 | 0.00025 | 14,490 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 46 | |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 38.9 | 35.1 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00219 | 0.00227 | 0.00040 | 13,410 |
| | | | 97 | 39.1 | 35.3 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00219 | 0.00228 | 0.00040 | 13,431 |
| | | | 98 | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00219 | 0.00227 | 0.00040 | 13,423 |
| | | | 99 | 38.9 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00218 | 0.00227 | 0.00040 | 13,413 |
| | | | 100 | 38.9 | 35.2 | 3.7 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00219 | 0.00228 | 0.00040 | 13,416 |
| COLUMN AVERAGE | | | | 39.0 | 35.2 | 3.8 | 6.0 | 5.4 | 0.6 | 0.00236 | 0.00219 | 0.00227 | 0.00040 | 13,419 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 | |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 51.6 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00333 | 0.00311 | 0.00322 | 0.00057 | 12,525 |
| | | | 97 | 51.6 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00335 | 0.00310 | 0.00322 | 0.00057 | 12,532 |
| | | | 98 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00334 | 0.00310 | 0.00322 | 0.00057 | 12,512 |
| | | | 99 | 51.6 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00335 | 0.00310 | 0.00323 | 0.00057 | 12,512 |
| | | | 100 | 51.7 | 46.6 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00335 | 0.00310 | 0.00322 | 0.00057 | 12,534 |
| COLUMN AVERAGE | | | | 51.6 | 46.6 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00334 | 0.00310 | 0.00322 | 0.00057 | 12,523 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 10 | |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 64.2 | 57.8 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00437 | 0.00408 | 0.00423 | 0.00075 | 11,857 |
| | | | 97 | 64.1 | 57.8 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00437 | 0.00408 | 0.00423 | 0.00075 | 11,849 |
| | | | 98 | 64.2 | 57.8 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00438 | 0.00408 | 0.00423 | 0.00075 | 11,855 |
| | | | 99 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00437 | 0.00408 | 0.00423 | 0.00075 | 11,876 |
| | | | 100 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00438 | 0.00408 | 0.00423 | 0.00075 | 11,871 |
| COLUMN AVERAGE | | | | 64.2 | 57.8 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00437 | 0.00408 | 0.00423 | 0.00075 | 11,862 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 | |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P40

Material Source: 19X-SOS-P40

| | | | | | | | | | | | | | | |
|----------------|-----|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00072 | 0.00077 | 0.00014 | 13,499 |
| | | | 97 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00082 | 0.00072 | 0.00077 | 0.00014 | 13,393 |
| | | | 98 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00073 | 0.00077 | 0.00014 | 13,446 |
| | | | 99 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00072 | 0.00077 | 0.00014 | 13,448 |
| | | | 100 | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00082 | 0.00073 | 0.00077 | 0.00014 | 13,405 |
| COLUMN AVERAGE | | | | 13.7 | 11.9 | 1.8 | 2.1 | 1.8 | 0.3 | 0.00081 | 0.00072 | 0.00077 | 0.00014 | 13,438 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 42 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00151 | 0.00158 | 0.00028 | 12,858 |
| | | | 97 | 26.0 | 23.6 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00151 | 0.00158 | 0.00028 | 12,939 |
| | | | 98 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00166 | 0.00151 | 0.00158 | 0.00028 | 12,859 |
| | | | 99 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00166 | 0.00152 | 0.00159 | 0.00028 | 12,846 |
| | | | 100 | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00151 | 0.00158 | 0.00028 | 12,929 |
| COLUMN AVERAGE | | | | 26.0 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00165 | 0.00151 | 0.00158 | 0.00028 | 12,886 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 44 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 38.9 | 35.1 | 3.7 | 6.0 | 5.4 | 0.6 | 0.00256 | 0.00237 | 0.00247 | 0.00044 | 12,355 |
| | | | 97 | 38.8 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00256 | 0.00237 | 0.00247 | 0.00044 | 12,319 |
| | | | 98 | 38.8 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00255 | 0.00238 | 0.00246 | 0.00043 | 12,326 |
| | | | 99 | 38.9 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00255 | 0.00237 | 0.00246 | 0.00043 | 12,369 |
| | | | 100 | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00255 | 0.00237 | 0.00246 | 0.00043 | 12,363 |
| COLUMN AVERAGE | | | | 38.8 | 35.1 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00255 | 0.00237 | 0.00246 | 0.00043 | 12,346 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 23 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 51.4 | 46.3 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00355 | 0.00331 | 0.00343 | 0.00061 | 11,692 |
| | | | 97 | 51.4 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00356 | 0.00332 | 0.00344 | 0.00061 | 11,687 |
| | | | 98 | 51.5 | 46.4 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00356 | 0.00331 | 0.00343 | 0.00061 | 11,718 |
| | | | 99 | 51.5 | 46.5 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00355 | 0.00332 | 0.00343 | 0.00061 | 11,728 |
| | | | 100 | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00355 | 0.00332 | 0.00343 | 0.00061 | 11,718 |
| COLUMN AVERAGE | | | | 51.5 | 46.4 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00355 | 0.00332 | 0.00344 | 0.00061 | 11,709 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 18 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P40

Material Source: 19X-SOS-P40

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|--------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 64.3 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00459 | 0.00430 | 0.00445 | 0.00079 | 11,286 |
| | | | 97 | 64.1 | 57.8 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00460 | 0.00430 | 0.00445 | 0.00079 | 11,258 |
| | | | 98 | 64.2 | 57.8 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00459 | 0.00430 | 0.00444 | 0.00078 | 11,277 |
| | | | 99 | 64.2 | 57.9 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00460 | 0.00430 | 0.00445 | 0.00079 | 11,284 |
| | | | 100 | 64.2 | 57.8 | 6.3 | 9.8 | 8.9 | 1.0 | 0.00460 | 0.00430 | 0.00445 | 0.00079 | 11,276 |
| COLUMN AVERAGE | | | | 64.2 | 57.8 | 6.4 | 9.8 | 8.9 | 1.0 | 0.00460 | 0.00430 | 0.00445 | 0.00079 | 11,276 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 11 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00092 | 0.00083 | 0.00088 | 0.00015 | 11,689 |
| | | | 97 | 14.0 | 11.9 | 2.1 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00083 | 0.00087 | 0.00015 | 11,886 |
| | | | 98 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00083 | 0.00087 | 0.00015 | 11,775 |
| | | | 99 | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00083 | 0.00087 | 0.00015 | 11,787 |
| | | | 100 | 14.0 | 11.9 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00083 | 0.00087 | 0.00015 | 11,804 |
| COLUMN AVERAGE | | | | 14.0 | 11.8 | 2.2 | 2.1 | 1.8 | 0.3 | 0.00091 | 0.00083 | 0.00087 | 0.00015 | 11,788 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 71 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 25.8 | 23.4 | 2.4 | 4.0 | 3.6 | 0.4 | 0.00187 | 0.00171 | 0.00179 | 0.00032 | 11,335 |
| | | | 97 | 25.9 | 23.5 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00186 | 0.00171 | 0.00178 | 0.00031 | 11,419 |
| | | | 98 | 25.8 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00186 | 0.00171 | 0.00179 | 0.00032 | 11,349 |
| | | | 99 | 25.8 | 23.3 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00186 | 0.00171 | 0.00179 | 0.00032 | 11,320 |
| | | | 100 | 25.8 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00187 | 0.00171 | 0.00179 | 0.00032 | 11,343 |
| COLUMN AVERAGE | | | | 25.8 | 23.4 | 2.5 | 4.0 | 3.6 | 0.4 | 0.00187 | 0.00171 | 0.00179 | 0.00032 | 11,353 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 38 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00284 | 0.00262 | 0.00273 | 0.00048 | 11,080 |
| | | | 97 | 38.6 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00284 | 0.00263 | 0.00273 | 0.00048 | 11,051 |
| | | | 98 | 38.7 | 35.0 | 3.8 | 5.9 | 5.4 | 0.6 | 0.00284 | 0.00262 | 0.00273 | 0.00048 | 11,089 |
| | | | 99 | 38.6 | 34.8 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00284 | 0.00263 | 0.00273 | 0.00048 | 11,047 |
| | | | 100 | 38.7 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00283 | 0.00262 | 0.00273 | 0.00048 | 11,090 |
| COLUMN AVERAGE | | | | 38.6 | 34.9 | 3.8 | 5.9 | 5.3 | 0.6 | 0.00284 | 0.00262 | 0.00273 | 0.00048 | 11,071 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 21 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-SOS-P40

Material Source: 19X-SOS-P40

| | | | | | | | | | | | | | | |
|-------------|-----|---------------|----------------|------|------|------|-----|-----|---------|---------|---------|---------|---------|---------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 51.3 | 46.2 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00361 | 0.00374 | 0.00066 | 10,716 |
| | | | 97 | 51.2 | 46.2 | 5.1 | 7.8 | 7.1 | 0.8 | 0.00387 | 0.00361 | 0.00374 | 0.00066 | 10,705 |
| | | | 98 | 51.3 | 46.3 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00361 | 0.00374 | 0.00066 | 10,718 |
| | | | 99 | 51.3 | 46.3 | 5.0 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00362 | 0.00374 | 0.00066 | 10,724 |
| | | | 100 | 51.3 | 46.2 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00362 | 0.00374 | 0.00066 | 10,699 |
| | | | COLUMN AVERAGE | | 51.3 | 46.2 | 5.1 | 7.9 | 7.1 | 0.8 | 0.00387 | 0.00361 | 0.00374 | 0.00066 |
| | | STANDARD DEV. | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00494 | 0.00463 | 0.00479 | 0.00085 | 10,446 |
| | | | 97 | 64.0 | 57.7 | 6.4 | 9.8 | 8.8 | 1.0 | 0.00493 | 0.00464 | 0.00479 | 0.00085 | 10,443 |
| | | | 98 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00494 | 0.00464 | 0.00479 | 0.00085 | 10,440 |
| | | | 99 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00494 | 0.00464 | 0.00479 | 0.00085 | 10,438 |
| | | | 100 | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00494 | 0.00464 | 0.00479 | 0.00085 | 10,448 |
| | | | COLUMN AVERAGE | | 64.0 | 57.7 | 6.3 | 9.8 | 8.8 | 1.0 | 0.00494 | 0.00464 | 0.00479 | 0.00085 |
| | | STANDARD DEV. | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 4 | |

TESTED BY RLB DATE 08-06-2019

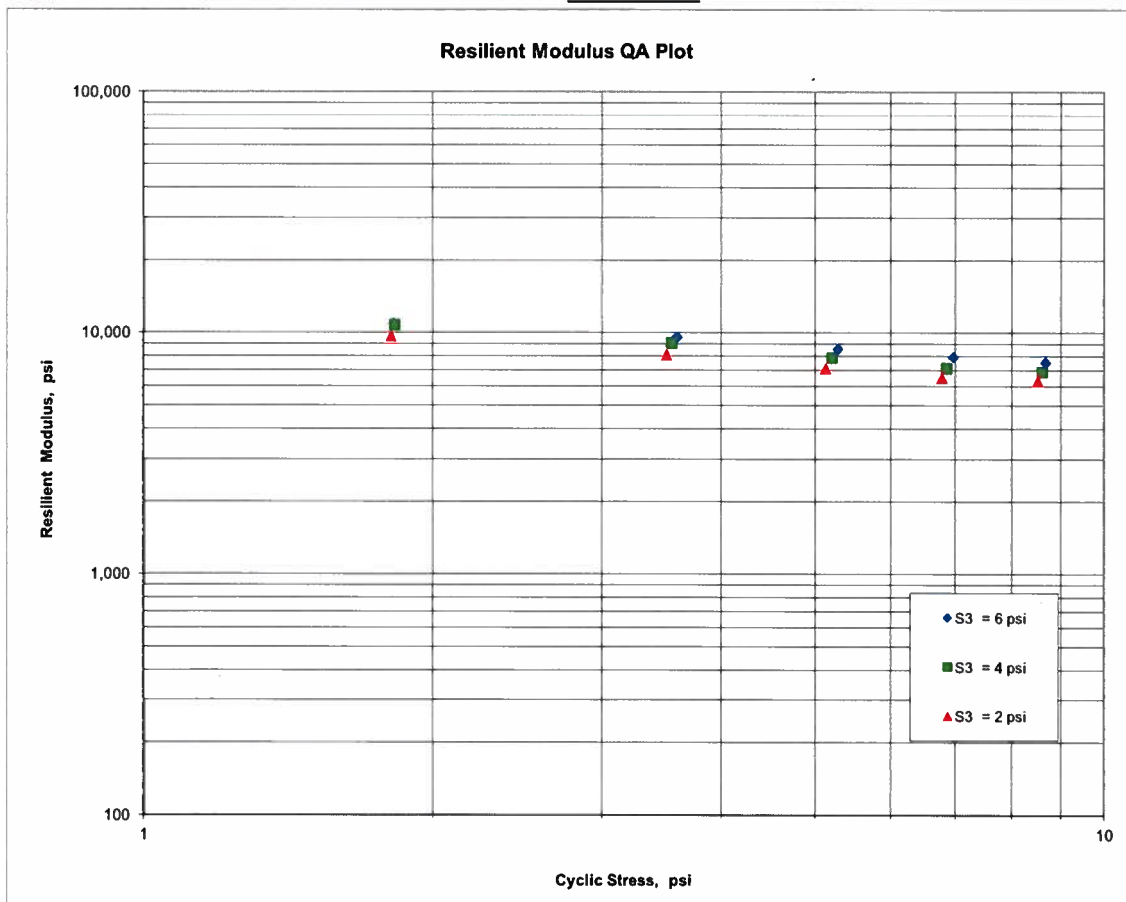
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P40 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 11.6% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-06-2019 |

$$M_R = K1 (S_C)^{K2} (S_3)^{K5}$$

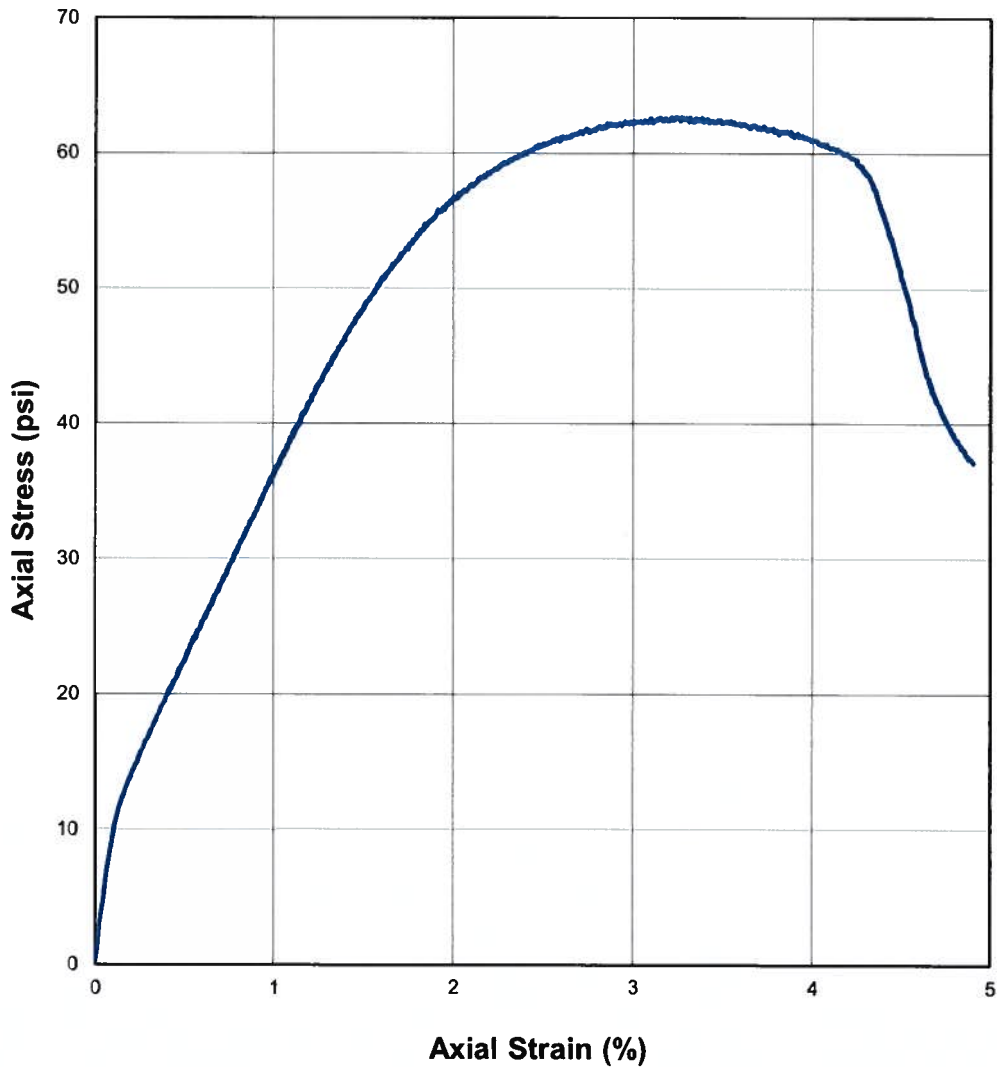
| | |
|------------------|----------|
| K1 = | 10,053 |
| K2 = | -0.27643 |
| K5 = | 0.16168 |
| R ² = | 0.99 |



AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-SOS-P40 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 11.6% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-06-2019 |





AASHTO T 307-99
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials
(RECOMPACTED / THINWALL TUBE SAMPLES)

LABORATORY: Boudreau Engineering, Inc. PROJECT NAME: I-495 NEXT Express Lanes
Lawrenceville, Georgia PROJECT NO.: SaLUT #19-0012
DATE RECEIVED: 07-29-2019 QUANTITY (REPRESENTED): N.A.
IDENTIFICATION MARKS: 19X-S-RW37 SOURCE OF MATERIAL: 19X-S-RW37

| | | |
|-----|---|-------------------|
| 1. | SAMPLING DATE: | <u>N.R.</u> |
| 2. | SAMPLE NUMBER: | <u>S-RW37</u> |
| 3. | LAYER TYPE (1 - Subgrade, 2 - Base/Subbase) | <u>1</u> |
| 4. | MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 5. | APPROX. DISTANCE FROM TOP OF SUBGRADE TO SAMPLE, ft (for tube samples) | <u>N/A</u> |
| 6. | TEST INFORMATION | |
| | PRECONDITIONING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - GREATER THAN 5% PERM. STRAIN? (Y = YES OR N = NO) | <u>N</u> |
| | TESTING - NUMBER OF LOAD SEQUENCES COMPLETED (0 - 15) | <u>15</u> |
| 7. | SPECIMEN INFO.: | |
| | SPECIMEN DIAM., inch | |
| | TOP | <u>2.9</u> |
| | MIDDLE | <u>2.9</u> |
| | BOTTOM | <u>2.9</u> |
| | AVERAGE | <u>2.9</u> |
| | MEMBRANE THICKNESS (1), inch | <u>0.00</u> |
| | MEMBRANE THICKNESS (2), inch | <u>0.00</u> |
| | NET DIAM., inch | <u>2.9</u> |
| | HEIGHT OF SPECIMEN, CAP AND BASE, inch | <u>5.81</u> |
| | HEIGHT OF CAP AND BASE, inch | <u>0.0</u> |
| | INITIAL LENGTH, L_o , inch | <u>5.8</u> |
| | INITIAL AREA, A_o , in ² | <u>6.6</u> |
| | INITIAL VOLUME $A_o L_o$, in ³ | <u>38.1</u> |
| | INITIAL WEIGHT, grams (for tube samples) | <u>N/A</u> |
| 8. | SOIL SPECIMEN WEIGHT (for remolded samples): | |
| | INITIAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>1248.36</u> |
| | FINAL WEIGHT OF CONTAINER AND WET SOIL, grams | <u>0.00</u> |
| | WEIGHT OF WET SOIL USED, grams | <u>1248.36</u> |
| 9. | SOIL PROPERTIES.: | |
| | For Remolded Samples: | |
| | IN SITU MOISTURE CONTENT (NUCLEAR), % | <u>N/A</u> |
| | IN SITU WET DENSITY (NUCLEAR), pcf | <u>N/A</u> |
| | or | |
| | OPTIMUM MOISTURE CONTENT, % | <u>12.5</u> |
| | MAX. DRY DENSITY, pcf | <u>113.9</u> |
| | For Tube Samples: | |
| | IN SITU MOISTURE CONTENT, % | <u>N/A</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>N/A</u> |
| | WET DENSITY, pcf | <u>N/A</u> |
| | DRY DENSITY, pcf | <u>N/A</u> |
| 10. | SPECIMEN PROPERTIES (for remolded samples): | |
| | COMPACTION MOISTURE CONTENT, % | <u>12.5</u> |
| | MOISTURE CONTENT AFTER RESILIENT MODULUS TESTING, % | <u>12.3</u> |
| | COMPACTION DRY DENSITY, γ_d , pcf | <u>111.0</u> |
| | TARGET DRY DENSITY, $\% \gamma_d$ <u>100</u> TARGET MOISTURE CONTENT, % | <u>12.5</u> |
| | COMPACTION LEVEL ACHIEVED | <u>97.5%</u> |
| 11. | QUICK SHEAR TEST | |
| | STRESS - STRAIN PLOT ATTACHED (Y = YES, N = NO) | <u>Y</u> |
| | TRIAXIAL SHEAR MAXIMUM STRENGTH (MAX. LOAD/X-SECTION AREA), psi | <u>33</u> |
| | SPECIMEN FAIL DURING TRIAXIAL SHEAR? (Y = YES, N = NO) | <u>Y</u> |
| 12. | TEST DATE | <u>08-06-2019</u> |
| 13. | GENERAL REMARKS: | |

TESTED BY RLB DATE 08-06-2019



AASHTO T307-99 REPORT FORM X1.1
Resilient Modulus of Subgrade Soils and Untreated Base/Subbase Materials

1. **PROJECT NO(S):** SaLUT #19-0012
 2. **PROJECT NAME:** I-495 NEXT Express Lanes
 3. **SOURCE OF MATERIAL:** 19X-S-RW37
 4. **REMOLDING TARGETS:** 100% Maximum Dry Density at 12.5% Moisture Content
 5. **LAYER TYPE (1 - subgrade, 2 - base/subbase)** 1
 6. **MATERIAL TYPE (Type 1 or Type 2)** 2
 7. **TEST DATE** 08-06-2019
 8. **RESILIENT MODULUS TESTING**

LABORATORY: Boudreau Engineering, Inc.
Lawrenceville, Georgia

| COLUMN # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------|----------------------------------|---------------------------------------|----------------|---|----------------------------------|--------------------------------------|--|---------------------------------------|--|-----------------------------------|-----------------------------------|--|---------------------|----------------------|
| PARAMETER | Chamber Confining Pressure | Nominal Maximum Axial Stress | Cycle No. | Actual Applied Max. Axial Load | Actual Applied Cyclic Load | Actual Applied Contact Load | Actual Applied Max. Axial Stress | Actual Applied Cyclic Stress | Actual Applied Contact Stress | Recov. Def. LVDT #1 Reading | Recov. Def. LVDT #2 Reading | Average Recov Def. LVDT 1 and 2 | Resilient Strain | Resilient Modulus |
| DESIGNATION | S ₃ | S _{cyclic} | c ₁ | P _{max} | P _{cyclic} | P _{contact} | S _{max} | S _{cyclic} | S _{contact} | H ₁ | H ₂ | H _{avg} | ε _i | M _i |
| UNIT | psi | psi | --- | lbs | lbs | lbs | psi | psi | psi | in | in | in | in/in | psi |
| PRECISION | | | | | | | | | | | | | | |
| SEQUENCE 1 | 6.0 | 2.0 | 96 | 12.8 | 11.5 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00121 | 0.00121 | 0.00121 | 0.00021 | 8,404 |
| | | | 97 | 12.8 | 11.5 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00121 | 0.00122 | 0.00121 | 0.00021 | 8,376 |
| | | | 98 | 12.8 | 11.5 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00122 | 0.00122 | 0.00122 | 0.00021 | 8,347 |
| | | | 99 | 12.8 | 11.5 | 1.3 | 2.0 | 1.7 | 0.2 | 0.00122 | 0.00122 | 0.00122 | 0.00021 | 8,314 |
| | | | 100 | 12.8 | 11.5 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00121 | 0.00122 | 0.00122 | 0.00021 | 8,371 |
| COLUMN AVERAGE | | | | 12.8 | 11.5 | 1.3 | 2.0 | 1.8 | 0.2 | 0.00121 | 0.00122 | 0.00122 | 0.00021 | 8,362 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00000 | 0.00000 | 0.00000 | 34 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-S-RW37

Material Source: 19X-S-RW37

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 2 | 6.0 | 4.0 | 96 | 24.8 | 22.5 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00275 | 0.00277 | 0.00276 | 0.00048 | 7,200 |
| | | | 97 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00275 | 0.00276 | 0.00275 | 0.00047 | 7,201 |
| | | | 98 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00276 | 0.00276 | 0.00276 | 0.00048 | 7,202 |
| | | | 99 | 24.8 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00275 | 0.00277 | 0.00276 | 0.00048 | 7,192 |
| | | | 100 | 24.9 | 22.5 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00277 | 0.00275 | 0.00276 | 0.00048 | 7,217 |
| COLUMN AVERAGE | | | | 24.9 | 22.4 | 2.4 | 3.8 | 3.4 | 0.4 | 0.00275 | 0.00276 | 0.00276 | 0.00048 | 7,202 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 9 |
| SEQUENCE 3 | 6.0 | 6.0 | 96 | 36.4 | 32.7 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00446 | 0.00445 | 0.00445 | 0.00077 | 6,499 |
| | | | 97 | 36.3 | 32.6 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00445 | 0.00445 | 0.00445 | 0.00077 | 6,483 |
| | | | 98 | 36.3 | 32.6 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00444 | 0.00445 | 0.00444 | 0.00077 | 6,503 |
| | | | 99 | 36.4 | 32.7 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00445 | 0.00446 | 0.00445 | 0.00077 | 6,497 |
| | | | 100 | 36.3 | 32.7 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00445 | 0.00445 | 0.00445 | 0.00077 | 6,498 |
| COLUMN AVERAGE | | | | 36.3 | 32.7 | 3.7 | 5.5 | 5.0 | 0.6 | 0.00445 | 0.00445 | 0.00445 | 0.00077 | 6,496 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 8 |
| SEQUENCE 4 | 6.0 | 8.0 | 96 | 48.1 | 43.2 | 4.9 | 7.3 | 6.6 | 0.7 | 0.00625 | 0.00626 | 0.00625 | 0.00108 | 6,118 |
| | | | 97 | 48.2 | 43.3 | 4.9 | 7.4 | 6.6 | 0.8 | 0.00625 | 0.00624 | 0.00625 | 0.00108 | 6,134 |
| | | | 98 | 48.1 | 43.2 | 4.9 | 7.3 | 6.6 | 0.7 | 0.00625 | 0.00625 | 0.00625 | 0.00108 | 6,123 |
| | | | 99 | 48.2 | 43.2 | 4.9 | 7.3 | 6.6 | 0.8 | 0.00625 | 0.00624 | 0.00625 | 0.00108 | 6,121 |
| | | | 100 | 48.2 | 43.3 | 4.9 | 7.3 | 6.6 | 0.7 | 0.00625 | 0.00624 | 0.00625 | 0.00108 | 6,130 |
| COLUMN AVERAGE | | | | 48.2 | 43.3 | 4.9 | 7.3 | 6.6 | 0.8 | 0.00625 | 0.00625 | 0.00625 | 0.00108 | 6,125 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 6 |
| SEQUENCE 5 | 6.0 | 10.0 | 96 | 60.2 | 54.1 | 6.1 | 9.2 | 8.2 | 0.9 | 0.00807 | 0.00807 | 0.00807 | 0.00139 | 5,935 |
| | | | 97 | 60.4 | 54.2 | 6.2 | 9.2 | 8.3 | 0.9 | 0.00807 | 0.00807 | 0.00807 | 0.00139 | 5,943 |
| | | | 98 | 60.2 | 54.1 | 6.1 | 9.2 | 8.3 | 0.9 | 0.00807 | 0.00808 | 0.00807 | 0.00139 | 5,933 |
| | | | 99 | 60.2 | 54.1 | 6.2 | 9.2 | 8.2 | 0.9 | 0.00807 | 0.00808 | 0.00807 | 0.00139 | 5,929 |
| | | | 100 | 60.3 | 54.1 | 6.2 | 9.2 | 8.2 | 0.9 | 0.00808 | 0.00807 | 0.00808 | 0.00139 | 5,930 |
| COLUMN AVERAGE | | | | 60.3 | 54.1 | 6.1 | 9.2 | 8.3 | 0.9 | 0.00807 | 0.00807 | 0.00807 | 0.00139 | 5,934 |
| STANDARD DEV. | | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 6 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-S-RW37

Material Source: 19X-S-RW37

| | | | | | | | | | | | | | | |
|------------|----------------|-----|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 6 | 4.0 | 2.0 | 96 | 13.1 | 11.4 | 1.7 | 2.0 | 1.7 | 0.3 | 0.00126 | 0.00127 | 0.00126 | 0.00022 | 7,985 |
| | | | 97 | 13.2 | 11.4 | 1.7 | 2.0 | 1.7 | 0.3 | 0.00126 | 0.00127 | 0.00126 | 0.00022 | 8,026 |
| | | | 98 | 13.1 | 11.4 | 1.7 | 2.0 | 1.7 | 0.3 | 0.00126 | 0.00127 | 0.00126 | 0.00022 | 7,960 |
| | | | 99 | 13.1 | 11.4 | 1.7 | 2.0 | 1.7 | 0.3 | 0.00126 | 0.00126 | 0.00126 | 0.00022 | 7,967 |
| | | | 100 | 13.2 | 11.5 | 1.7 | 2.0 | 1.8 | 0.3 | 0.00126 | 0.00127 | 0.00126 | 0.00022 | 8,040 |
| | COLUMN AVERAGE | | | 13.2 | 11.4 | 1.7 | 2.0 | 1.7 | 0.3 | 0.00126 | 0.00127 | 0.00126 | 0.00022 | 7,996 |
| | STANDARD DEV. | | | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 36 |
| SEQUENCE 7 | 4.0 | 4.0 | 96 | 24.2 | 21.8 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00296 | 0.00297 | 0.00297 | 0.00051 | 6,491 |
| | | | 97 | 24.1 | 21.6 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00297 | 0.00298 | 0.00297 | 0.00051 | 6,448 |
| | | | 98 | 24.1 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00296 | 0.00298 | 0.00297 | 0.00051 | 6,469 |
| | | | 99 | 24.1 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00296 | 0.00297 | 0.00296 | 0.00051 | 6,490 |
| | | | 100 | 24.1 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00296 | 0.00298 | 0.00297 | 0.00051 | 6,473 |
| | COLUMN AVERAGE | | | 24.1 | 21.7 | 2.4 | 3.7 | 3.3 | 0.4 | 0.00296 | 0.00298 | 0.00297 | 0.00051 | 6,474 |
| | STANDARD DEV. | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 |
| SEQUENCE 8 | 4.0 | 6.0 | 96 | 35.2 | 31.6 | 3.6 | 5.4 | 4.8 | 0.6 | 0.00493 | 0.00496 | 0.00495 | 0.00085 | 5,653 |
| | | | 97 | 35.3 | 31.6 | 3.7 | 5.4 | 4.8 | 0.6 | 0.00494 | 0.00496 | 0.00495 | 0.00085 | 5,651 |
| | | | 98 | 35.4 | 31.7 | 3.6 | 5.4 | 4.8 | 0.6 | 0.00494 | 0.00495 | 0.00495 | 0.00085 | 5,672 |
| | | | 99 | 35.3 | 31.6 | 3.6 | 5.4 | 4.8 | 0.6 | 0.00494 | 0.00496 | 0.00495 | 0.00085 | 5,657 |
| | | | 100 | 35.2 | 31.5 | 3.7 | 5.4 | 4.8 | 0.6 | 0.00494 | 0.00496 | 0.00495 | 0.00085 | 5,636 |
| | COLUMN AVERAGE | | | 35.3 | 31.6 | 3.6 | 5.4 | 4.8 | 0.6 | 0.00494 | 0.00496 | 0.00495 | 0.00085 | 5,654 |
| | STANDARD DEV. | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 13 |
| SEQUENCE 9 | 4.0 | 8.0 | 96 | 46.7 | 41.9 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00708 | 0.00707 | 0.00708 | 0.00122 | 5,234 |
| | | | 97 | 46.8 | 41.9 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00708 | 0.00707 | 0.00707 | 0.00122 | 5,245 |
| | | | 98 | 46.8 | 42.0 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00707 | 0.00709 | 0.00708 | 0.00122 | 5,249 |
| | | | 99 | 46.8 | 41.9 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00707 | 0.00708 | 0.00708 | 0.00122 | 5,245 |
| | | | 100 | 46.8 | 41.9 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00708 | 0.00707 | 0.00708 | 0.00122 | 5,238 |
| | COLUMN AVERAGE | | | 46.8 | 41.9 | 4.9 | 7.1 | 6.4 | 0.7 | 0.00708 | 0.00708 | 0.00708 | 0.00122 | 5,242 |
| | STANDARD DEV. | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 6 |

Project Name: I-495 NEXT Express Lanes

Identification Marks: 19X-S-RW37

Material Source: 19X-S-RW37

| | | | | | | | | | | | | | | |
|----------------|-----|------|-----|------|------|-----|-----|-----|-----|---------|---------|---------|---------|-------|
| SEQUENCE 10 | 4.0 | 10.0 | 96 | 58.9 | 52.8 | 6.1 | 9.0 | 8.0 | 0.9 | 0.00907 | 0.00905 | 0.00906 | 0.00156 | 5,155 |
| | | | 97 | 58.9 | 52.8 | 6.1 | 9.0 | 8.0 | 0.9 | 0.00906 | 0.00906 | 0.00906 | 0.00156 | 5,153 |
| | | | 98 | 59.0 | 52.9 | 6.1 | 9.0 | 8.1 | 0.9 | 0.00908 | 0.00906 | 0.00907 | 0.00156 | 5,163 |
| | | | 99 | 58.9 | 52.8 | 6.1 | 9.0 | 8.0 | 0.9 | 0.00907 | 0.00907 | 0.00907 | 0.00156 | 5,150 |
| | | | 100 | 58.9 | 52.8 | 6.1 | 9.0 | 8.1 | 0.9 | 0.00906 | 0.00907 | 0.00907 | 0.00156 | 5,157 |
| COLUMN AVERAGE | | | | 58.9 | 52.8 | 6.1 | 9.0 | 8.1 | 0.9 | 0.00907 | 0.00906 | 0.00906 | 0.00156 | 5,156 |
| STANDARD DEV. | | | | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 5 |
| SEQUENCE 11 | 2.0 | 2.0 | 96 | 13.2 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00143 | 0.00145 | 0.00144 | 0.00025 | 6,767 |
| | | | 97 | 13.2 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00144 | 0.00145 | 0.00144 | 0.00025 | 6,767 |
| | | | 98 | 13.1 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00144 | 0.00144 | 0.00144 | 0.00025 | 6,773 |
| | | | 99 | 13.1 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00144 | 0.00145 | 0.00144 | 0.00025 | 6,761 |
| | | | 100 | 13.2 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00144 | 0.00145 | 0.00145 | 0.00025 | 6,748 |
| COLUMN AVERAGE | | | | 13.1 | 11.0 | 2.1 | 2.0 | 1.7 | 0.3 | 0.00144 | 0.00145 | 0.00144 | 0.00025 | 6,763 |
| STANDARD DEV. | | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 10 |
| SEQUENCE 12 | 2.0 | 4.0 | 96 | 23.2 | 20.8 | 2.4 | 3.5 | 3.2 | 0.4 | 0.00338 | 0.00339 | 0.00339 | 0.00058 | 5,442 |
| | | | 97 | 23.1 | 20.8 | 2.4 | 3.5 | 3.2 | 0.4 | 0.00338 | 0.00340 | 0.00339 | 0.00058 | 5,428 |
| | | | 98 | 23.3 | 20.9 | 2.4 | 3.6 | 3.2 | 0.4 | 0.00339 | 0.00340 | 0.00339 | 0.00058 | 5,451 |
| | | | 99 | 23.1 | 20.7 | 2.4 | 3.5 | 3.2 | 0.4 | 0.00338 | 0.00340 | 0.00339 | 0.00058 | 5,405 |
| | | | 100 | 23.2 | 20.8 | 2.4 | 3.5 | 3.2 | 0.4 | 0.00338 | 0.00340 | 0.00339 | 0.00058 | 5,420 |
| COLUMN AVERAGE | | | | 23.2 | 20.8 | 2.4 | 3.5 | 3.2 | 0.4 | 0.00338 | 0.00340 | 0.00339 | 0.00058 | 5,429 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 18 |
| SEQUENCE 13 | 2.0 | 6.0 | 96 | 34.0 | 30.4 | 3.6 | 5.2 | 4.6 | 0.5 | 0.00564 | 0.00566 | 0.00565 | 0.00097 | 4,765 |
| | | | 97 | 34.0 | 30.4 | 3.6 | 5.2 | 4.6 | 0.5 | 0.00564 | 0.00567 | 0.00566 | 0.00097 | 4,755 |
| | | | 98 | 33.9 | 30.4 | 3.6 | 5.2 | 4.6 | 0.5 | 0.00565 | 0.00566 | 0.00565 | 0.00097 | 4,757 |
| | | | 99 | 33.8 | 30.2 | 3.6 | 5.2 | 4.6 | 0.6 | 0.00565 | 0.00565 | 0.00565 | 0.00097 | 4,732 |
| | | | 100 | 34.0 | 30.4 | 3.6 | 5.2 | 4.6 | 0.5 | 0.00565 | 0.00566 | 0.00565 | 0.00097 | 4,765 |
| COLUMN AVERAGE | | | | 34.0 | 30.4 | 3.6 | 5.2 | 4.6 | 0.5 | 0.00564 | 0.00566 | 0.00565 | 0.00097 | 4,755 |
| STANDARD DEV. | | | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00001 | 0.00000 | 0.00000 | 14 |

| Project Name: I-495 NEXT Express Lanes | | | Identification Marks: 19X-S-RW37 | | | | | | Material Source: 19X-S-RW37 | | | | | |
|--|----------------|------|----------------------------------|------|------|-----|-----|---------|-----------------------------|---------|---------|---------|---------|-------|
| SEQUENCE 14 | 2.0 | 8.0 | 96 | 45.2 | 40.4 | 4.8 | 6.9 | 6.2 | 0.7 | 0.00805 | 0.00804 | 0.00804 | 0.00139 | 4,445 |
| | | | 97 | 45.1 | 40.3 | 4.8 | 6.9 | 6.1 | 0.7 | 0.00805 | 0.00804 | 0.00805 | 0.00139 | 4,432 |
| | | | 98 | 45.3 | 40.5 | 4.8 | 6.9 | 6.2 | 0.7 | 0.00805 | 0.00805 | 0.00805 | 0.00139 | 4,453 |
| | | | 99 | 45.3 | 40.4 | 4.8 | 6.9 | 6.2 | 0.7 | 0.00805 | 0.00805 | 0.00805 | 0.00139 | 4,447 |
| | | | 100 | 45.2 | 40.4 | 4.8 | 6.9 | 6.2 | 0.7 | 0.00804 | 0.00805 | 0.00804 | 0.00139 | 4,441 |
| | COLUMN AVERAGE | | 45.2 | 40.4 | 4.8 | 6.9 | 6.2 | 0.7 | 0.00805 | 0.00804 | 0.00805 | 0.00139 | 4,444 | |
| STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 8 | | |
| SEQUENCE 15 | 2.0 | 10.0 | 96 | 57.1 | 51.0 | 6.1 | 8.7 | 7.8 | 0.9 | 0.01022 | 0.01021 | 0.01021 | 0.00176 | 4,423 |
| | | | 97 | 57.0 | 50.9 | 6.1 | 8.7 | 7.8 | 0.9 | 0.01020 | 0.01021 | 0.01021 | 0.00176 | 4,410 |
| | | | 98 | 56.9 | 50.9 | 6.0 | 8.7 | 7.8 | 0.9 | 0.01020 | 0.01021 | 0.01020 | 0.00176 | 4,410 |
| | | | 99 | 56.9 | 50.8 | 6.1 | 8.7 | 7.7 | 0.9 | 0.01020 | 0.01020 | 0.01020 | 0.00176 | 4,408 |
| | | | 100 | 56.9 | 50.9 | 6.0 | 8.7 | 7.8 | 0.9 | 0.01020 | 0.01022 | 0.01021 | 0.00176 | 4,410 |
| | COLUMN AVERAGE | | 57.0 | 50.9 | 6.1 | 8.7 | 7.8 | 0.9 | 0.01020 | 0.01021 | 0.01021 | 0.00176 | 4,412 | |
| STANDARD DEV. | | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00001 | 0.00001 | 0.00000 | 0.00000 | 6 | | |

TESTED BY RLB DATE 08-06-2019

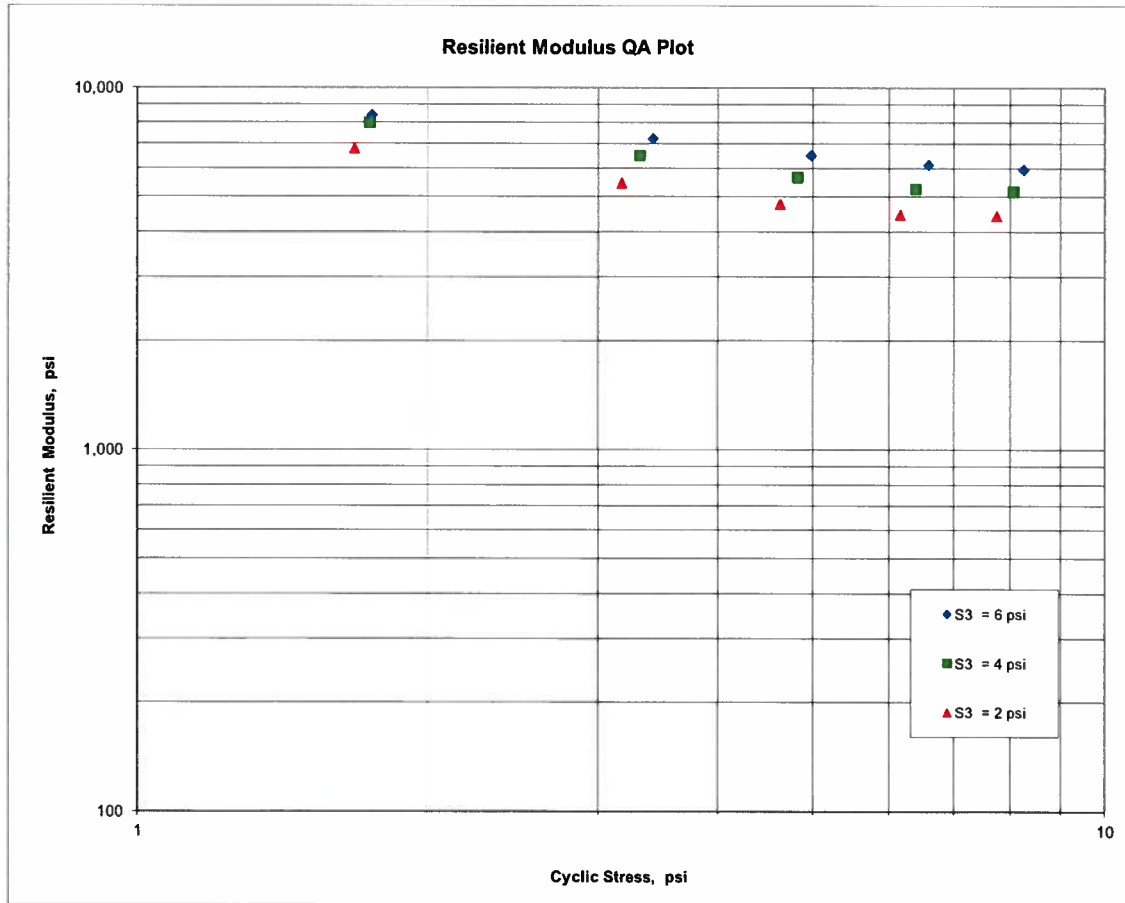
AASHTO T307-99

FIGURE 1 - Logarithmic Plot of Resilient Modulus (M_R) vs Cyclic Stress (S_C)

| | |
|---|--|
| 1. PROJECT NO(S): | SaLUT #19-0012 |
| 2. PROJECT NAME: | I-495 NEXT Express Lanes |
| 3. SOURCE OF MATERIAL: | 19X-S-RW37 |
| 4. REMOLDING TARGETS: | 100% Maximum Dry Density at 12.5% Moisture Content |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | 1 |
| 6. MATERIAL TYPE (Type 1 or Type 2) | 2 |
| 7. TEST DATE | 08-06-2019 |

$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

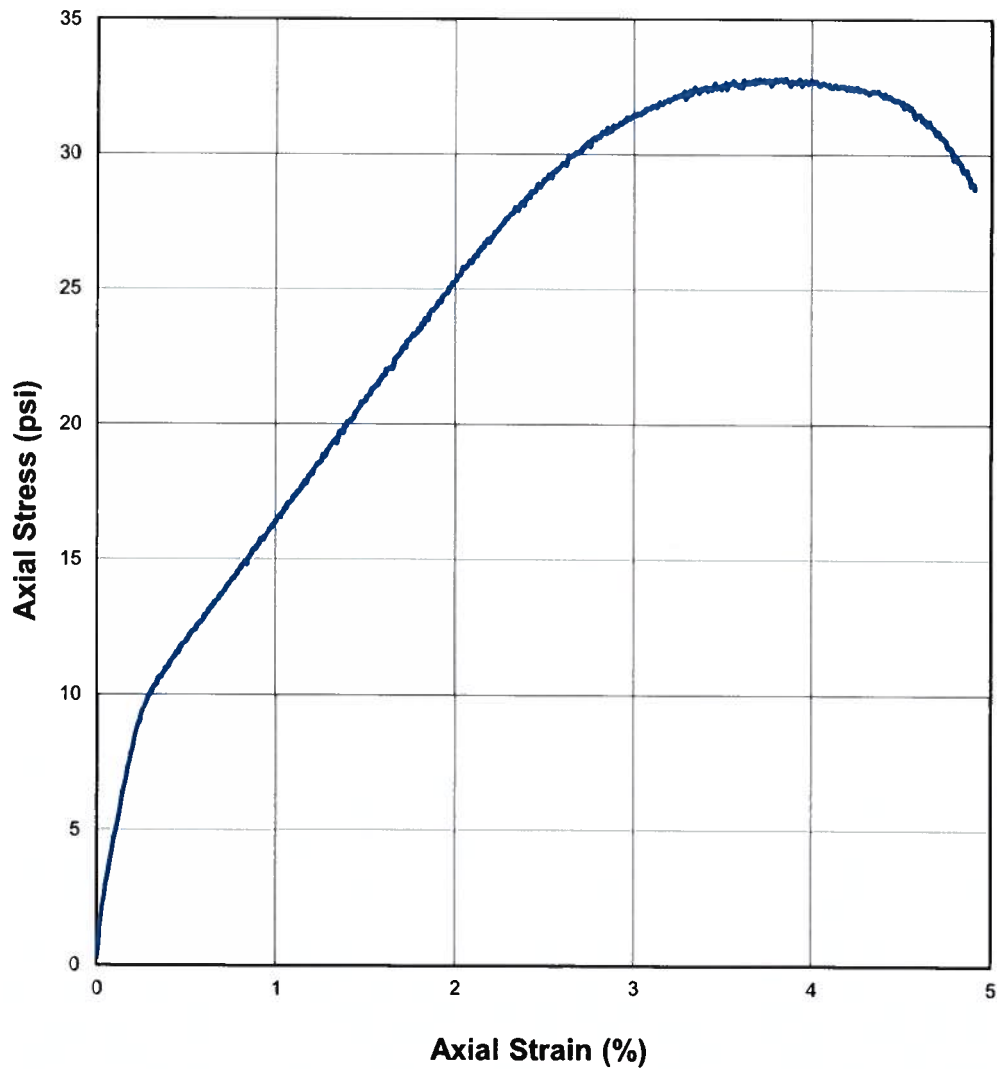
K1 = 6,183
 K2 = -0.27331
 K5 = 0.27320
 R² = 0.98



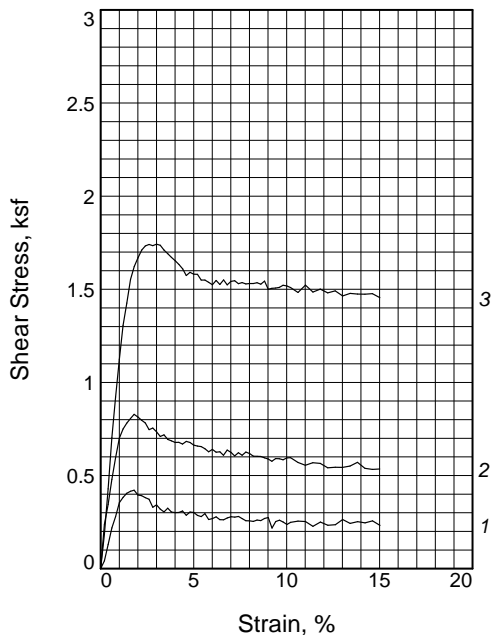
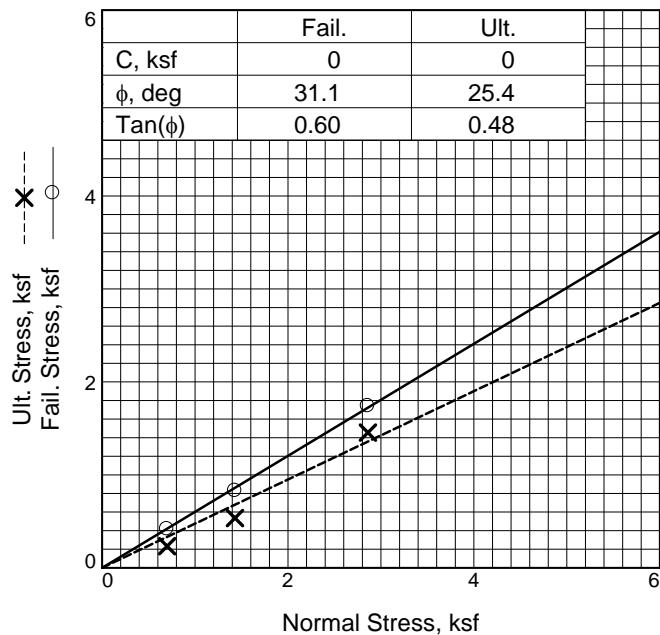
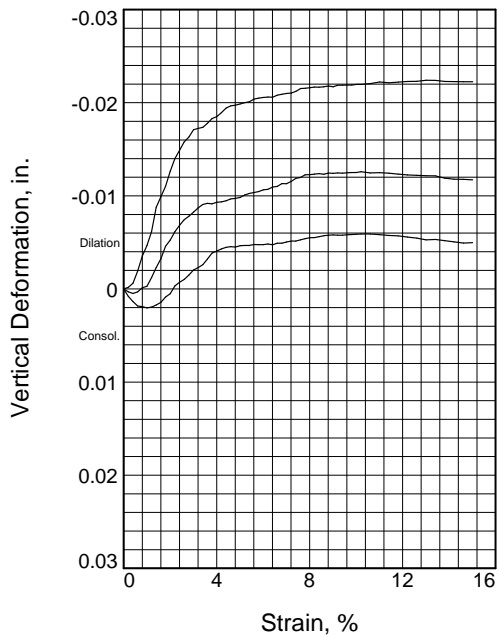
AASHTO T307-99

FIGURE 2 - Quick Shear Stress vs Strain

| | |
|---|---|
| 1. PROJECT NO(S): | <u>SaLUT #19-0012</u> |
| 2. PROJECT NAME: | <u>I-495 NEXT Express Lanes</u> |
| 3. SOURCE OF MATERIAL: | <u>19X-S-RW37</u> |
| 4. REMOLDING TARGETS: | <u>100% Maximum Dry Density at 12.5% Moisture Content</u> |
| 5. LAYER TYPE (1 - subgrade, 2 - base/subbase) | <u>1</u> |
| 6. MATERIAL TYPE (Type 1 or Type 2) | <u>2</u> |
| 7. TEST DATE | <u>08-06-2019</u> |



C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



| Sample No. | 1 | 2 | 3 |
|---------------------|--------|--------|--------|
| Initial | | | |
| Water Content, % | 15.1 | 15.5 | 15.3 |
| Dry Density, pcf | 113.6 | 113.3 | 113.5 |
| Saturation, % | 84.2 | 85.9 | 85.5 |
| Void Ratio | 0.4844 | 0.4879 | 0.4849 |
| Diameter, in. | 2.499 | 2.500 | 2.499 |
| Height, in. | 1.201 | 1.200 | 1.204 |
| At Test | | | |
| Water Content, % | 22.1 | 21.1 | 20.5 |
| Dry Density, pcf | 115.7 | 115.7 | 118.7 |
| Saturation, % | 130.7 | 124.7 | 131.4 |
| Void Ratio | 0.4572 | 0.4568 | 0.4201 |
| Diameter, in. | 2.499 | 2.500 | 2.499 |
| Height, in. | 1.179 | 1.175 | 1.151 |
| Normal Stress, ksf | 0.70 | 1.43 | 2.86 |
| Fail. Stress, ksf | 0.42 | 0.83 | 1.74 |
| Strain, % | 1.6 | 1.8 | 2.6 |
| Ult. Stress, ksf | 0.23 | 0.54 | 1.45 |
| Strain, % | 15.0 | 15.0 | 15.0 |
| Strain rate, %/min. | 0.13 | 0.13 | 0.13 |

Sample Type: Remolded
Description: SANDY SILT (ML) / A-4
LL= 35 PL= 27 PI= 8
Assumed Specific Gravity= 2.7
Remarks: Remolded to approx. 100% MDD at OMC. ASTM D3080.

Client: HDR Engineering Inc.
Project: I-495 Between McLean and Dulles
Location: 19X-SOS-P36
Depth: 0 - 3 ft
Proj. No.: 1243-19-025 **Date Sampled:**

DIRECT SHEAR TEST REPORT
 S & ME, INC.
 Louisville, TN

Figure 1

DIRECT SHEAR TEST

8/28/2019

Date:
Client: HDR Engineering Inc.
Project: I-495 Between McLean and Dulles
Project No.: 1243-19-025
Location: 19X-SOS-P36
Depth: 0 - 3 ft
Description: SANDY SILT (ML) / A-4
Remarks: Remolded to approx. 100% MDD at OMC. ASTM D3080.
Type of Sample: Remolded
Assumed Specific Gravity=2.7 **LL=**35 **PL=**27 **PI=**8

Parameters for Specimen No. 1

| Specimen Parameter | Initial | Consolidated | Final |
|---|---------|--------------|---------|
| Moisture content: Moist soil+tare, gms. | 121.120 | | 271.630 |
| Moisture content: Dry soil+tare, gms. | 108.140 | | 233.420 |
| Moisture content: Tare, gms. | 22.200 | | 60.800 |
| Moisture, % | 15.1 | 22.1 | 22.1 |
| Moist specimen weight, gms. | 202.00 | | |
| Diameter, in. | 2.499 | 2.499 | |
| Area, in. ² | 4.904 | 4.904 | |
| Height, in. | 1.201 | 1.179 | |
| Net decrease in height, in. | | 0.022 | |
| Wet density, pcf | 130.7 | 141.3 | |
| Dry density, pcf | 113.6 | 115.7 | |
| Void ratio | 0.4844 | 0.4572 | |
| Saturation, % | 84.2 | 130.7 | |

Test Readings for Specimen No. 1

Normal stress = 0.7 ksf
Strain rate, %/min. = 0.13
Fail. Stress = 0.42 ksf at reading no. 8
Ult. Stress = 0.23 ksf at reading no. 63

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|-----|--------------------------|-----------|-----------|----------|------------------|------------------------|
| 0 | 0.0000 | -0.039 | 0.0 | 0.0 | 0.00 | -0.0205 |
| 1 | 0.0050 | 1.388 | 1.4 | 0.2 | 0.04 | -0.0203 |
| 2 | 0.0100 | 4.359 | 4.4 | 0.4 | 0.13 | -0.0199 |
| 3 | 0.0150 | 7.408 | 7.4 | 0.6 | 0.22 | -0.0186 |
| 4 | 0.0200 | 9.487 | 9.5 | 0.8 | 0.28 | -0.0170 |
| 5 | 0.0250 | 12.009 | 12.0 | 1.0 | 0.35 | -0.0158 |
| 6 | 0.0300 | 12.983 | 13.0 | 1.2 | 0.38 | -0.0144 |
| 7 | 0.0350 | 13.752 | 13.8 | 1.4 | 0.40 | -0.0117 |
| 8 | 0.0400 | 14.121 | 14.2 | 1.6 | 0.42 | -0.0106 |
| 9 | 0.0450 | 14.307 | 14.3 | 1.8 | 0.42 | -0.0095 |
| 10 | 0.0500 | 13.419 | 13.5 | 2.0 | 0.40 | -0.0079 |
| 11 | 0.0550 | 13.308 | 13.3 | 2.2 | 0.39 | -0.0065 |
| 12 | 0.0600 | 12.931 | 13.0 | 2.4 | 0.38 | -0.0056 |
| 13 | 0.0650 | 12.649 | 12.7 | 2.6 | 0.37 | -0.0047 |

Test Readings for Specimen No. 1

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|------------|---|----------------------|----------------------|---------------------|---------------------------------|---------------------------------------|
| 14 | 0.0700 | 11.182 | 11.2 | 2.8 | 0.33 | -0.0042 |
| 15 | 0.0750 | 11.618 | 11.7 | 3.0 | 0.34 | -0.0034 |
| 16 | 0.0800 | 10.854 | 10.9 | 3.2 | 0.32 | -0.0033 |
| 17 | 0.0850 | 10.342 | 10.4 | 3.4 | 0.30 | -0.0032 |
| 18 | 0.0900 | 11.021 | 11.1 | 3.6 | 0.32 | -0.0027 |
| 19 | 0.0950 | 10.308 | 10.3 | 3.8 | 0.30 | -0.0022 |
| 20 | 0.1000 | 10.199 | 10.2 | 4.0 | 0.30 | -0.0020 |
| 21 | 0.1050 | 10.236 | 10.3 | 4.2 | 0.30 | -0.0016 |
| 22 | 0.1100 | 10.500 | 10.5 | 4.4 | 0.31 | -0.0011 |
| 23 | 0.1151 | 9.715 | 9.8 | 4.6 | 0.29 | -0.0009 |
| 24 | 0.1201 | 10.319 | 10.4 | 4.8 | 0.30 | -0.0008 |
| 25 | 0.1251 | 10.228 | 10.3 | 5.0 | 0.30 | -0.0006 |
| 26 | 0.1301 | 9.693 | 9.7 | 5.2 | 0.29 | -0.0005 |
| 27 | 0.1351 | 9.486 | 9.5 | 5.4 | 0.28 | -0.0004 |
| 28 | 0.1401 | 10.021 | 10.1 | 5.6 | 0.30 | -0.0001 |
| 29 | 0.1451 | 8.945 | 9.0 | 5.8 | 0.26 | 0.0000 |
| 30 | 0.1501 | 9.110 | 9.1 | 6.0 | 0.27 | 0.0000 |
| 31 | 0.1551 | 9.435 | 9.5 | 6.2 | 0.28 | 0.0001 |
| 32 | 0.1601 | 8.922 | 9.0 | 6.4 | 0.26 | 0.0001 |
| 33 | 0.1651 | 8.889 | 8.9 | 6.6 | 0.26 | 0.0003 |
| 34 | 0.1701 | 9.229 | 9.3 | 6.8 | 0.27 | 0.0004 |
| 35 | 0.1751 | 9.448 | 9.5 | 7.0 | 0.28 | 0.0005 |
| 36 | 0.1801 | 9.371 | 9.4 | 7.2 | 0.28 | 0.0005 |
| 37 | 0.1852 | 9.491 | 9.5 | 7.4 | 0.28 | 0.0007 |
| 38 | 0.1901 | 9.118 | 9.2 | 7.6 | 0.27 | 0.0010 |
| 39 | 0.1952 | 8.732 | 8.8 | 7.8 | 0.26 | 0.0010 |
| 40 | 0.2001 | 8.707 | 8.7 | 8.0 | 0.26 | 0.0011 |
| 41 | 0.2052 | 8.603 | 8.6 | 8.2 | 0.25 | 0.0012 |
| 42 | 0.2102 | 8.833 | 8.9 | 8.4 | 0.26 | 0.0012 |
| 43 | 0.2152 | 8.756 | 8.8 | 8.6 | 0.26 | 0.0012 |
| 44 | 0.2202 | 9.142 | 9.2 | 8.8 | 0.27 | 0.0013 |
| 45 | 0.2252 | 9.305 | 9.3 | 9.0 | 0.27 | 0.0012 |
| 46 | 0.2302 | 7.384 | 7.4 | 9.2 | 0.22 | 0.0014 |
| 47 | 0.2352 | 8.574 | 8.6 | 9.4 | 0.25 | 0.0014 |
| 48 | 0.2402 | 8.809 | 8.8 | 9.6 | 0.26 | 0.0014 |
| 49 | 0.2452 | 8.489 | 8.5 | 9.8 | 0.25 | 0.0014 |
| 50 | 0.2502 | 8.030 | 8.1 | 10.0 | 0.24 | 0.0015 |
| 51 | 0.2552 | 8.422 | 8.5 | 10.2 | 0.25 | 0.0015 |
| 52 | 0.2652 | 8.660 | 8.7 | 10.6 | 0.26 | 0.0015 |
| 53 | 0.2752 | 8.565 | 8.6 | 11.0 | 0.25 | 0.0017 |
| 54 | 0.2852 | 7.709 | 7.7 | 11.4 | 0.23 | 0.0016 |
| 55 | 0.2952 | 8.473 | 8.5 | 11.8 | 0.25 | 0.0017 |
| 56 | 0.3052 | 7.896 | 7.9 | 12.2 | 0.23 | 0.0018 |
| 57 | 0.3152 | 7.996 | 8.0 | 12.6 | 0.24 | 0.0018 |
| 58 | 0.3253 | 8.952 | 9.0 | 13.0 | 0.26 | 0.0019 |
| 59 | 0.3353 | 8.240 | 8.3 | 13.4 | 0.24 | 0.0019 |
| 60 | 0.3453 | 8.546 | 8.6 | 13.8 | 0.25 | 0.0018 |

Test Readings for Specimen No. 1

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|-----|--------------------------|-----------|-----------|----------|------------------|------------------------|
| 61 | 0.3552 | 8.340 | 8.4 | 14.2 | 0.25 | 0.0018 |
| 62 | 0.3653 | 8.692 | 8.7 | 14.6 | 0.26 | 0.0017 |
| 63 | 0.3753 | 7.880 | 7.9 | 15.0 | 0.23 | 0.0017 |

Parameters for Specimen No. 2

| Specimen Parameter | Initial | Consolidated | Final |
|---|---------|--------------|---------|
| Moisture content: Moist soil+tare, gms. | 310.310 | | 272.840 |
| Moisture content: Dry soil+tare, gms. | 279.770 | | 235.990 |
| Moisture content: Tare, gms. | 83.020 | | 61.310 |
| Moisture, % | 15.5 | 21.1 | 21.1 |
| Moist specimen weight, gms. | 202.40 | | |
| Diameter, in. | 2.500 | 2.500 | |
| Area, in. ² | 4.909 | 4.909 | |
| Height, in. | 1.200 | 1.175 | |
| Net decrease in height, in. | | 0.025 | |
| Wet density, pcf | 130.9 | 140.1 | |
| Dry density, pcf | 113.3 | 115.7 | |
| Void ratio | 0.4879 | 0.4568 | |
| Saturation, % | 85.9 | 124.7 | |

Test Readings for Specimen No. 2

Normal stress = 1.43 ksf

Strain rate, %/min. = 0.13

Fail. Stress = 0.83 ksf at reading no. 9

Ult. Stress = 0.54 ksf at reading no. 63

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|-----|--------------------------|-----------|-----------|----------|------------------|------------------------|
| 0 | 0.0000 | 1.325 | 0.0 | 0.0 | 0.00 | -0.0567 |
| 1 | 0.0050 | 9.432 | 8.1 | 0.2 | 0.24 | -0.0571 |
| 2 | 0.0100 | 13.068 | 11.7 | 0.4 | 0.34 | -0.0572 |
| 3 | 0.0150 | 17.668 | 16.3 | 0.6 | 0.48 | -0.0571 |
| 4 | 0.0200 | 21.645 | 20.3 | 0.8 | 0.60 | -0.0566 |
| 5 | 0.0250 | 25.207 | 23.9 | 1.0 | 0.70 | -0.0565 |
| 6 | 0.0300 | 26.879 | 25.6 | 1.2 | 0.75 | -0.0555 |
| 7 | 0.0350 | 27.962 | 26.6 | 1.4 | 0.78 | -0.0544 |
| 8 | 0.0400 | 28.804 | 27.5 | 1.6 | 0.81 | -0.0535 |
| 9 | 0.0450 | 29.578 | 28.3 | 1.8 | 0.83 | -0.0522 |
| 10 | 0.0500 | 29.075 | 27.8 | 2.0 | 0.81 | -0.0515 |
| 11 | 0.0550 | 28.488 | 27.2 | 2.2 | 0.80 | -0.0506 |
| 12 | 0.0601 | 27.978 | 26.7 | 2.4 | 0.78 | -0.0499 |
| 13 | 0.0650 | 26.755 | 25.4 | 2.6 | 0.75 | -0.0493 |
| 14 | 0.0700 | 27.046 | 25.7 | 2.8 | 0.75 | -0.0489 |
| 15 | 0.0751 | 26.381 | 25.1 | 3.0 | 0.74 | -0.0485 |
| 16 | 0.0801 | 25.508 | 24.2 | 3.2 | 0.71 | -0.0480 |
| 17 | 0.0851 | 25.823 | 24.5 | 3.4 | 0.72 | -0.0477 |
| 18 | 0.0901 | 24.982 | 23.7 | 3.6 | 0.69 | -0.0475 |
| 19 | 0.0951 | 24.724 | 23.4 | 3.8 | 0.69 | -0.0476 |
| 20 | 0.1001 | 24.413 | 23.1 | 4.0 | 0.68 | -0.0474 |

Test Readings for Specimen No. 2

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|------------|---|----------------------|----------------------|---------------------|---------------------------------|---------------------------------------|
| 21 | 0.1051 | 24.437 | 23.1 | 4.2 | 0.68 | -0.0474 |
| 22 | 0.1101 | 24.121 | 22.8 | 4.4 | 0.67 | -0.0473 |
| 23 | 0.1151 | 24.623 | 23.3 | 4.6 | 0.68 | -0.0471 |
| 24 | 0.1201 | 24.418 | 23.1 | 4.8 | 0.68 | -0.0470 |
| 25 | 0.1251 | 23.940 | 22.6 | 5.0 | 0.66 | -0.0469 |
| 26 | 0.1301 | 23.753 | 22.4 | 5.2 | 0.66 | -0.0467 |
| 27 | 0.1351 | 23.667 | 22.3 | 5.4 | 0.66 | -0.0465 |
| 28 | 0.1401 | 23.267 | 21.9 | 5.6 | 0.64 | -0.0464 |
| 29 | 0.1451 | 22.722 | 21.4 | 5.8 | 0.63 | -0.0463 |
| 30 | 0.1501 | 23.157 | 21.8 | 6.0 | 0.64 | -0.0461 |
| 31 | 0.1551 | 22.637 | 21.3 | 6.2 | 0.63 | -0.0460 |
| 32 | 0.1601 | 22.701 | 21.4 | 6.4 | 0.63 | -0.0458 |
| 33 | 0.1652 | 22.086 | 20.8 | 6.6 | 0.61 | -0.0457 |
| 34 | 0.1701 | 23.033 | 21.7 | 6.8 | 0.64 | -0.0454 |
| 35 | 0.1751 | 22.627 | 21.3 | 7.0 | 0.62 | -0.0454 |
| 36 | 0.1801 | 21.962 | 20.6 | 7.2 | 0.61 | -0.0452 |
| 37 | 0.1851 | 22.530 | 21.2 | 7.4 | 0.62 | -0.0449 |
| 38 | 0.1901 | 22.081 | 20.8 | 7.6 | 0.61 | -0.0448 |
| 39 | 0.1952 | 22.669 | 21.3 | 7.8 | 0.63 | -0.0445 |
| 40 | 0.2002 | 22.397 | 21.1 | 8.0 | 0.62 | -0.0445 |
| 41 | 0.2052 | 21.909 | 20.6 | 8.2 | 0.60 | -0.0444 |
| 42 | 0.2102 | 21.871 | 20.5 | 8.4 | 0.60 | -0.0443 |
| 43 | 0.2152 | 21.853 | 20.5 | 8.6 | 0.60 | -0.0444 |
| 44 | 0.2202 | 21.604 | 20.3 | 8.8 | 0.59 | -0.0443 |
| 45 | 0.2252 | 21.398 | 20.1 | 9.0 | 0.59 | -0.0443 |
| 46 | 0.2302 | 20.974 | 19.6 | 9.2 | 0.58 | -0.0443 |
| 47 | 0.2352 | 21.460 | 20.1 | 9.4 | 0.59 | -0.0443 |
| 48 | 0.2402 | 21.451 | 20.1 | 9.6 | 0.59 | -0.0443 |
| 49 | 0.2452 | 21.256 | 19.9 | 9.8 | 0.58 | -0.0442 |
| 50 | 0.2502 | 21.600 | 20.3 | 10.0 | 0.59 | -0.0442 |
| 51 | 0.2552 | 21.633 | 20.3 | 10.2 | 0.60 | -0.0442 |
| 52 | 0.2652 | 20.759 | 19.4 | 10.6 | 0.57 | -0.0443 |
| 53 | 0.2752 | 20.258 | 18.9 | 11.0 | 0.56 | -0.0443 |
| 54 | 0.2852 | 20.716 | 19.4 | 11.4 | 0.57 | -0.0443 |
| 55 | 0.2952 | 20.587 | 19.3 | 11.8 | 0.57 | -0.0444 |
| 56 | 0.3053 | 19.793 | 18.5 | 12.2 | 0.54 | -0.0445 |
| 57 | 0.3153 | 19.885 | 18.6 | 12.6 | 0.54 | -0.0445 |
| 58 | 0.3253 | 19.852 | 18.5 | 13.0 | 0.54 | -0.0446 |
| 59 | 0.3353 | 20.095 | 18.8 | 13.4 | 0.55 | -0.0446 |
| 60 | 0.3453 | 20.778 | 19.5 | 13.8 | 0.57 | -0.0448 |
| 61 | 0.3553 | 19.699 | 18.4 | 14.2 | 0.54 | -0.0450 |
| 62 | 0.3653 | 19.482 | 18.2 | 14.6 | 0.53 | -0.0450 |
| 63 | 0.3753 | 19.570 | 18.2 | 15.0 | 0.54 | -0.0450 |

Parameters for Specimen No. 3

| Specimen Parameter | Initial | Consolidated | Final |
|---|---------|--------------|---------|
| Moisture content: Moist soil+tare, gms. | 133.230 | | 250.740 |
| Moisture content: Dry soil+tare, gms. | 116.620 | | 214.990 |
| Moisture content: Tare, gms. | 8.400 | | 40.200 |
| Moisture, % | 15.3 | 20.5 | 20.5 |
| Moist specimen weight, gms. | 203.00 | | |
| Diameter, in. | 2.499 | 2.499 | |
| Area, in. ² | 4.906 | 4.906 | |
| Height, in. | 1.204 | 1.151 | |
| Net decrease in height, in. | | 0.052 | |
| Wet density, pcf | 130.9 | 143.0 | |
| Dry density, pcf | 113.5 | 118.7 | |
| Void ratio | 0.4849 | 0.4201 | |
| Saturation, % | 85.5 | 131.4 | |

Test Readings for Specimen No. 3

Normal stress = 2.86 ksf

Strain rate, %/min. = 0.13

Fail. Stress = 1.74 ksf at reading no. 13

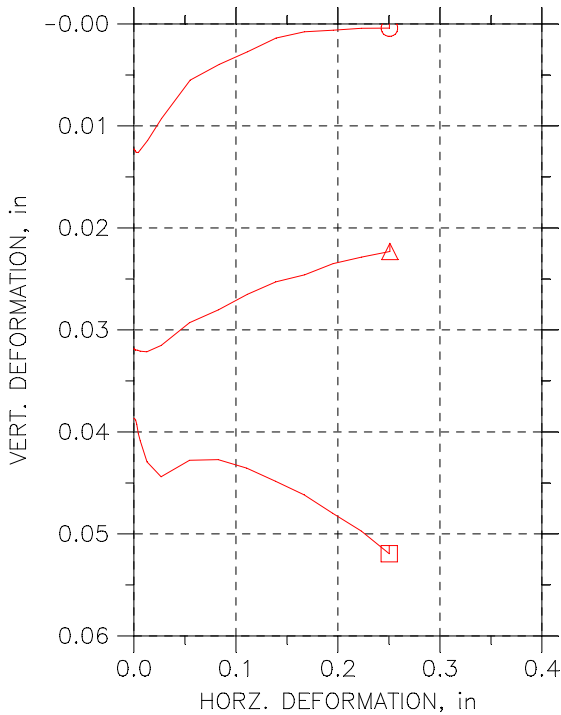
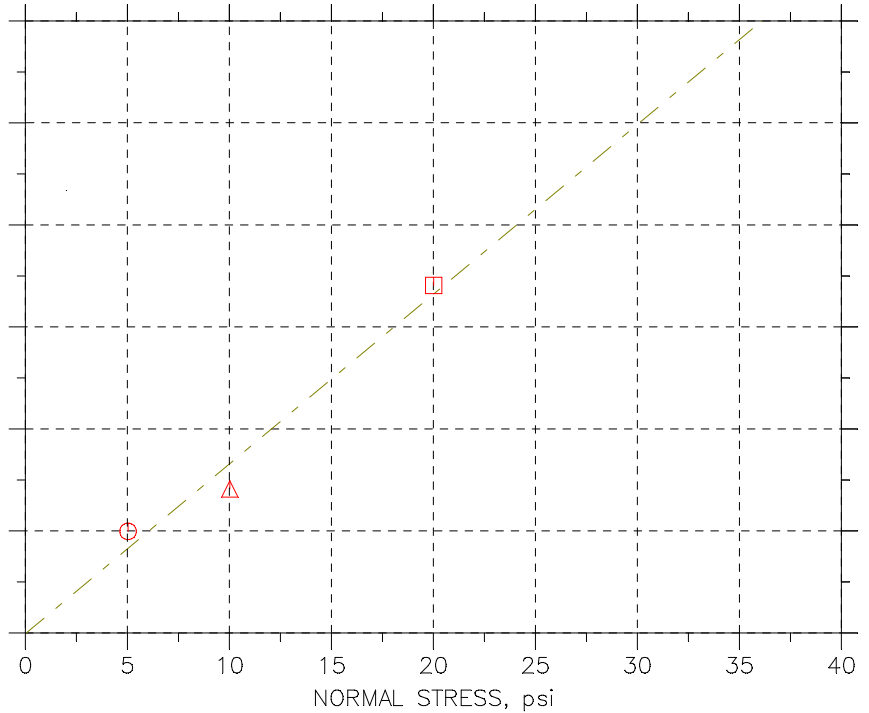
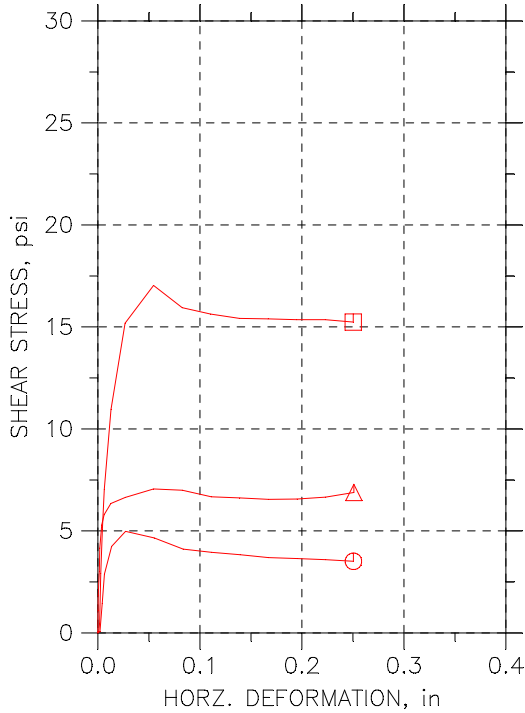
Ult. Stress = 1.45 ksf at reading no. 63

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|-----|--------------------------|-----------|-----------|----------|------------------|------------------------|
| 0 | 0.0000 | -0.828 | 0.0 | 0.0 | 0.00 | -0.2978 |
| 1 | 0.0050 | 5.444 | 6.3 | 0.2 | 0.18 | -0.2986 |
| 2 | 0.0100 | 13.766 | 14.6 | 0.4 | 0.43 | -0.2992 |
| 3 | 0.0150 | 23.125 | 24.0 | 0.6 | 0.70 | -0.2997 |
| 4 | 0.0200 | 30.581 | 31.4 | 0.8 | 0.92 | -0.2997 |
| 5 | 0.0250 | 37.418 | 38.2 | 1.0 | 1.12 | -0.2999 |
| 6 | 0.0300 | 43.664 | 44.5 | 1.2 | 1.31 | -0.2998 |
| 7 | 0.0350 | 47.749 | 48.6 | 1.4 | 1.43 | -0.2996 |
| 8 | 0.0400 | 52.089 | 52.9 | 1.6 | 1.55 | -0.2993 |
| 9 | 0.0450 | 54.451 | 55.3 | 1.8 | 1.62 | -0.2987 |
| 10 | 0.0500 | 56.042 | 56.9 | 2.0 | 1.67 | -0.2984 |
| 11 | 0.0551 | 57.465 | 58.3 | 2.2 | 1.71 | -0.2975 |
| 12 | 0.0601 | 58.220 | 59.0 | 2.4 | 1.73 | -0.2971 |
| 13 | 0.0651 | 58.488 | 59.3 | 2.6 | 1.74 | -0.2968 |
| 14 | 0.0701 | 58.263 | 59.1 | 2.8 | 1.73 | -0.2963 |
| 15 | 0.0751 | 58.525 | 59.4 | 3.0 | 1.74 | -0.2958 |
| 16 | 0.0801 | 58.339 | 59.2 | 3.2 | 1.74 | -0.2956 |
| 17 | 0.0851 | 57.456 | 58.3 | 3.4 | 1.71 | -0.2952 |
| 18 | 0.0901 | 56.796 | 57.6 | 3.6 | 1.69 | -0.2946 |
| 19 | 0.0951 | 56.103 | 56.9 | 3.8 | 1.67 | -0.2940 |
| 20 | 0.1001 | 55.512 | 56.3 | 4.0 | 1.65 | -0.2938 |
| 21 | 0.1051 | 54.823 | 55.7 | 4.2 | 1.63 | -0.2935 |
| 22 | 0.1101 | 54.022 | 54.8 | 4.4 | 1.61 | -0.2934 |
| 23 | 0.1151 | 52.797 | 53.6 | 4.6 | 1.57 | -0.2933 |
| 24 | 0.1201 | 53.371 | 54.2 | 4.8 | 1.59 | -0.2933 |
| 25 | 0.1251 | 53.028 | 53.9 | 5.0 | 1.58 | -0.2932 |
| 26 | 0.1301 | 53.003 | 53.8 | 5.2 | 1.58 | -0.2932 |
| 27 | 0.1351 | 51.967 | 52.8 | 5.4 | 1.55 | -0.2932 |

Test Readings for Specimen No. 3

| No. | Horizontal Def. Dial in. | Load Dial | Load lbs. | Strain % | Shear Stress ksf | Vertical Def. Dial in. |
|------------|---|----------------------|----------------------|---------------------|---------------------------------|---------------------------------------|
| 28 | 0.1401 | 51.958 | 52.8 | 5.6 | 1.55 | -0.2931 |
| 29 | 0.1451 | 51.555 | 52.4 | 5.8 | 1.54 | -0.2931 |
| 30 | 0.1501 | 51.112 | 51.9 | 6.0 | 1.52 | -0.2931 |
| 31 | 0.1551 | 51.900 | 52.7 | 6.2 | 1.55 | -0.2930 |
| 32 | 0.1601 | 51.154 | 52.0 | 6.4 | 1.53 | -0.2931 |
| 33 | 0.1651 | 51.999 | 52.8 | 6.6 | 1.55 | -0.2929 |
| 34 | 0.1701 | 51.079 | 51.9 | 6.8 | 1.52 | -0.2929 |
| 35 | 0.1751 | 51.719 | 52.5 | 7.0 | 1.54 | -0.2928 |
| 36 | 0.1802 | 51.832 | 52.7 | 7.2 | 1.55 | -0.2927 |
| 37 | 0.1851 | 51.308 | 52.1 | 7.4 | 1.53 | -0.2927 |
| 38 | 0.1902 | 51.507 | 52.3 | 7.6 | 1.54 | -0.2926 |
| 39 | 0.1952 | 51.270 | 52.1 | 7.8 | 1.53 | -0.2924 |
| 40 | 0.2002 | 51.335 | 52.2 | 8.0 | 1.53 | -0.2923 |
| 41 | 0.2052 | 51.325 | 52.2 | 8.2 | 1.53 | -0.2923 |
| 42 | 0.2102 | 51.485 | 52.3 | 8.4 | 1.54 | -0.2922 |
| 43 | 0.2152 | 51.206 | 52.0 | 8.6 | 1.53 | -0.2921 |
| 44 | 0.2202 | 51.767 | 52.6 | 8.8 | 1.54 | -0.2921 |
| 45 | 0.2252 | 50.290 | 51.1 | 9.0 | 1.50 | -0.2920 |
| 46 | 0.2302 | 50.452 | 51.3 | 9.2 | 1.51 | -0.2921 |
| 47 | 0.2352 | 50.514 | 51.3 | 9.4 | 1.51 | -0.2921 |
| 48 | 0.2402 | 50.624 | 51.5 | 9.6 | 1.51 | -0.2920 |
| 49 | 0.2452 | 51.007 | 51.8 | 9.8 | 1.52 | -0.2920 |
| 50 | 0.2502 | 50.897 | 51.7 | 10.0 | 1.52 | -0.2920 |
| 51 | 0.2552 | 50.591 | 51.4 | 10.2 | 1.51 | -0.2919 |
| 52 | 0.2652 | 49.693 | 50.5 | 10.6 | 1.48 | -0.2920 |
| 53 | 0.2752 | 51.049 | 51.9 | 11.0 | 1.52 | -0.2920 |
| 54 | 0.2852 | 49.770 | 50.6 | 11.4 | 1.49 | -0.2921 |
| 55 | 0.2952 | 50.300 | 51.1 | 11.8 | 1.50 | -0.2921 |
| 56 | 0.3052 | 49.622 | 50.4 | 12.2 | 1.48 | -0.2923 |
| 57 | 0.3152 | 49.983 | 50.8 | 12.6 | 1.49 | -0.2924 |
| 58 | 0.3252 | 49.061 | 49.9 | 13.0 | 1.46 | -0.2926 |
| 59 | 0.3352 | 49.525 | 50.4 | 13.4 | 1.48 | -0.2925 |
| 60 | 0.3453 | 49.401 | 50.2 | 13.8 | 1.47 | -0.2927 |
| 61 | 0.3553 | 49.377 | 50.2 | 14.2 | 1.47 | -0.2928 |
| 62 | 0.3653 | 49.482 | 50.3 | 14.6 | 1.48 | -0.2929 |
| 63 | 0.3753 | 48.742 | 49.6 | 15.0 | 1.45 | -0.2929 |

DIRECT SHEAR TEST REPORT



| Symbol | ⊙ | △ | □ | |
|----------------------------|-----------------------|----------|----------|---------|
| Test No. | 1 | 2 | 3 | |
| Sample No. | 1 | 2 | 3 | |
| Shape | Circular | Circular | Circular | |
| Initial | Dimension, in | 2.487 | 2.487 | 2.487 |
| | Area, in ² | 4.8578 | 4.8578 | 4.8578 |
| | Height, in | 1.003 | 1.003 | 1.003 |
| | Water Content, % | 18.67 | 16.96 | 17.11 |
| | Dry Density, pcf | 103.18 | 106.02 | 105.22 |
| | Saturation, % | 76.51 | 74.45 | 73.67 |
| | Void Ratio | 0.67603 | 0.63104 | 0.64352 |
| Consol. Height, in | 0.98769 | 0.97344 | 0.9644 | |
| Consol. Void Ratio | 0.65044 | 0.58297 | 0.58028 | |
| Final | Water Content, % | 27.24 | 26.82 | 25.96 |
| | Dry Density, pcf | 103.22 | 108.43 | 110.96 |
| | Saturation, % | 100.0 | 100.0 | 100.0 |
| | Void Ratio | 0.67534 | 0.59475 | 0.55842 |
| Normal Stress, psi | 5.0289 | 10.024 | 20.015 | |
| Max. Shear Stress, psi | 4.9787 | 7.0532 | 17.033 | |
| Ult. Shear Stress, psi | 3.5098 | 6.885 | 15.239 | |
| Time to Failure, min | 2.0038 | 4.0037 | 4.0036 | |
| Disp. Rate, in/min | 0.03 | 0.03 | 0.03 | |
| Estimated Specific Gravity | 2.77 | 2.77 | 2.77 | |
| Liquid Limit | 48 | 48 | 48 | |
| Plastic Limit | 27 | 27 | 27 | |
| Plasticity Index | 21 | 21 | 21 | |

| | |
|-----------------------------------|--|
| Project: I-495 Next Express Lanes | |
| Location: | |
| Project No.: 17267-0 | |
| Boring No.: 19X-S0S-P33 | |
| Sample Type: Remolded | |

Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)

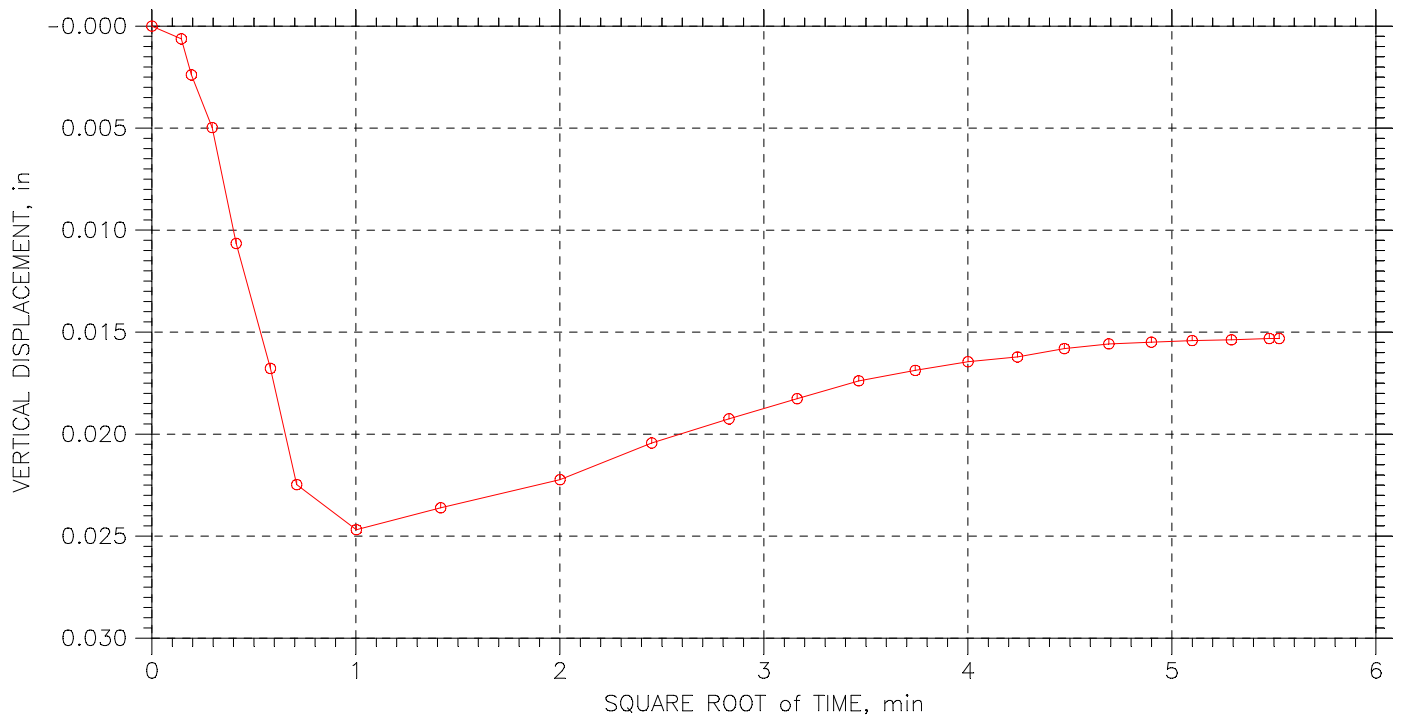
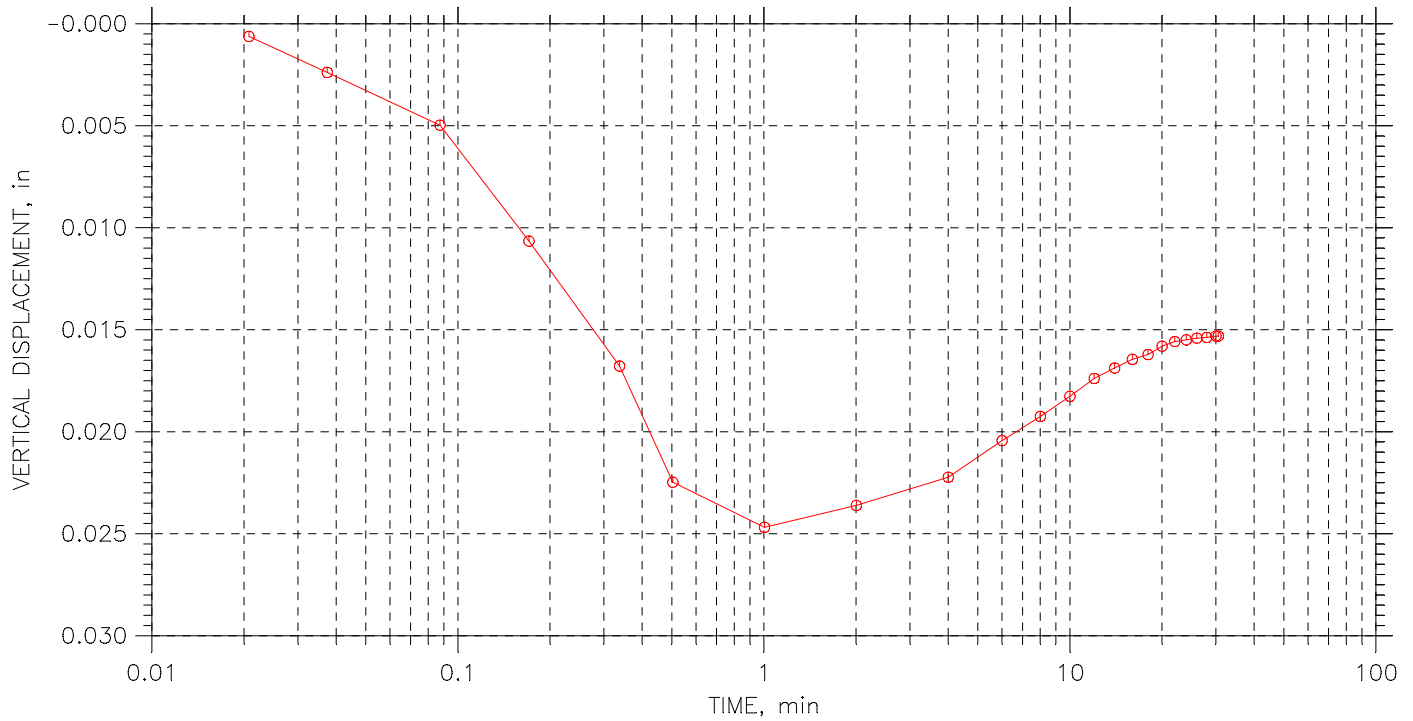
Remarks: J. Taylor; The Robert B. Balter Company; AASHTO Test Method: T-236; Apparatus ID: Geocomp ShearTrac

DIRECT SHEAR TEST CONSOLIDATION DATA

TIME CURVES

Step: 1 of 1

Stress: 5 psi



| | | |
|--|-----------------------|-----------------------|
| Project: I-495 Next Express Lanes | Location: | Project No.: 17267-0 |
| Boring No.: 19X-SOS-P33 | Tested By: C.Witter | Checked By: J. Taylor |
| Sample No.: 1 | Test Date: 09-23-2019 | Depth: 5.0'-10.0' |
| Test No.: 1 | Sample Type: Remolded | Elevation: |
| Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL) | | |
| Remarks: | | |
| File: C:\Users\jtaylor\Desktop\09-20-2019 - DS - 19X-SOSBulk 5.0' - 10.0' 5.0 PSI .dat | | |

DIRECT SHEAR TEST CONSOLIDATION DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 1
 Test No.: 1

Location:
 Tested By: C.Witter
 Test Date: 09-23-2019
 Sample Type: Remolded

Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Load Increment: 1 of 1
 Applied Stress: 5 psi

| | Elapsed Time min | Sq.Rt. of Time min | Displacement in |
|----|------------------------|--------------------------|--------------------|
| 1 | 0.00 | 0.00 | 0 |
| 2 | 0.02 | 0.14 | 0.0006257 |
| 3 | 0.04 | 0.19 | 0.002388 |
| 4 | 0.09 | 0.30 | 0.004973 |
| 5 | 0.17 | 0.41 | 0.01065 |
| 6 | 0.34 | 0.58 | 0.01678 |
| 7 | 0.50 | 0.71 | 0.02248 |
| 8 | 1.00 | 1.00 | 0.02468 |
| 9 | 2.00 | 1.42 | 0.02361 |
| 10 | 4.00 | 2.00 | 0.02223 |
| 11 | 6.00 | 2.45 | 0.02043 |
| 12 | 8.00 | 2.83 | 0.01925 |
| 13 | 10.00 | 3.16 | 0.01826 |
| 14 | 12.00 | 3.46 | 0.01739 |
| 15 | 14.00 | 3.74 | 0.01688 |
| 16 | 16.00 | 4.00 | 0.01645 |
| 17 | 18.00 | 4.24 | 0.01622 |
| 18 | 20.00 | 4.47 | 0.01581 |
| 19 | 22.00 | 4.69 | 0.01558 |
| 20 | 24.00 | 4.90 | 0.01549 |
| 21 | 26.00 | 5.10 | 0.01541 |
| 22 | 28.00 | 5.29 | 0.01538 |
| 23 | 30.00 | 5.48 | 0.01531 |
| 24 | 30.54 | 5.53 | 0.01531 |

DIRECT SHEAR TEST DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 1
 Test No.: 1

Location:
 Tested By: C.Witter
 Test Date: 09-23-2019
 Sample Type: Remolded

Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Step: 1 of 1

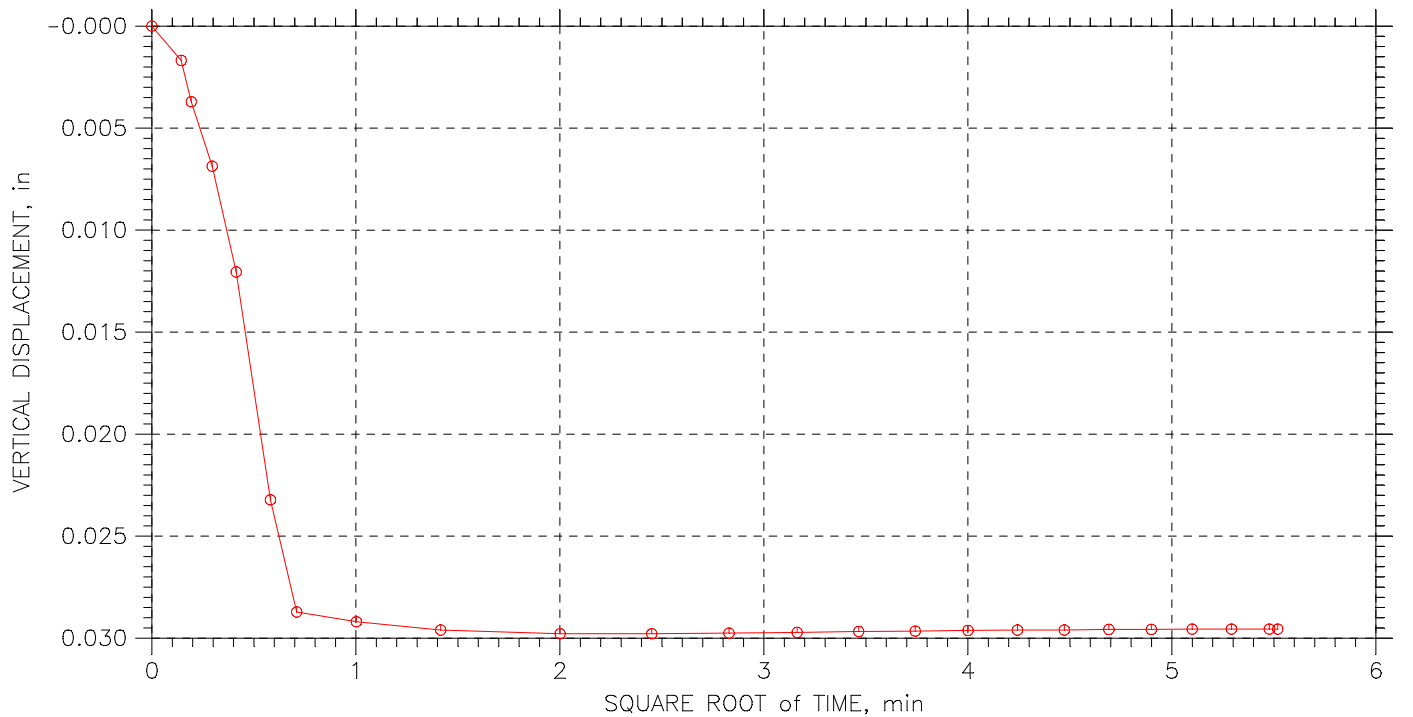
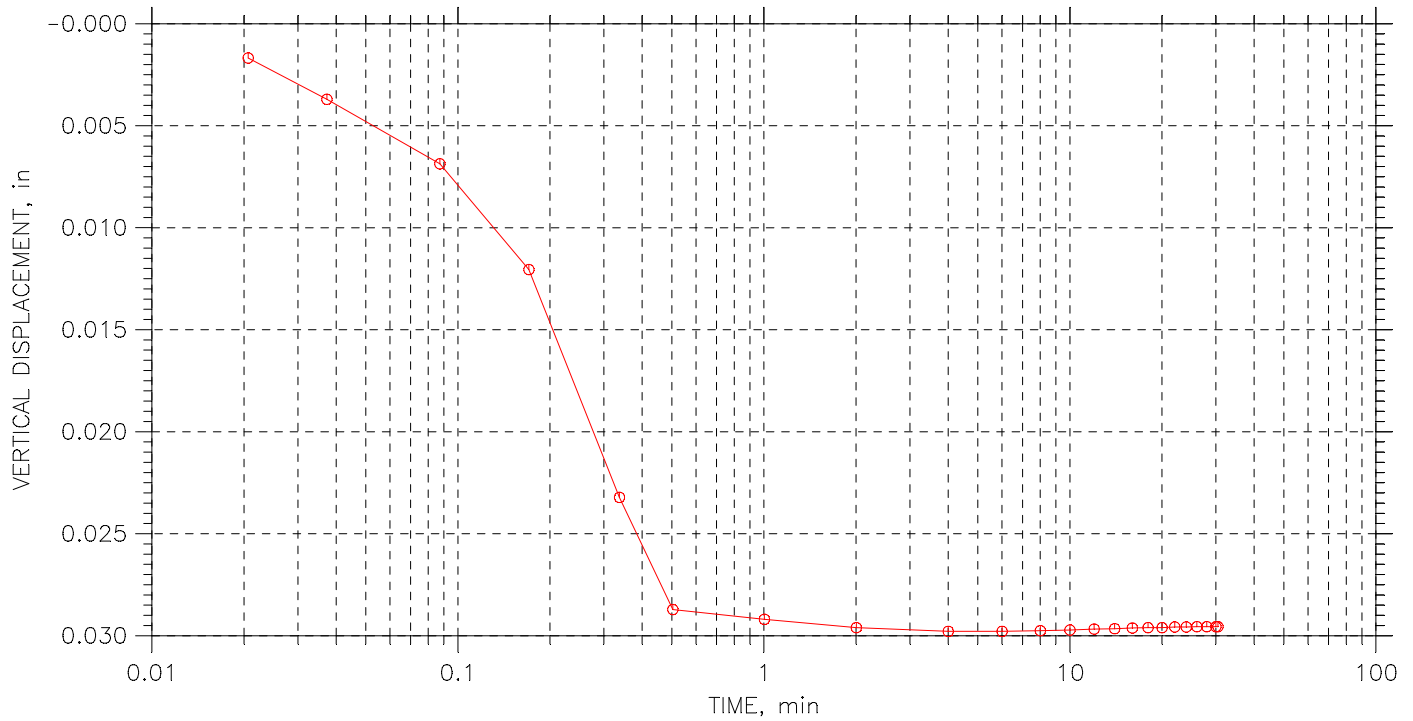
| | Elapsed Time min | Vertical Stress psi | Vertical Displacement in | Horizontal Stress psi | Horizontal Displacement in | Cumulative Displacement in |
|----|------------------------|---------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------------|
| 1 | 0.00 | 5.007 | 0.01227 | 0 | 0 | 0 |
| 2 | 0.02 | 4.817 | 0.01227 | 0.04485 | 9.601e-005 | 9.601e-005 |
| 3 | 0.04 | 4.839 | 0.01228 | 0.04485 | 0.0004321 | 0.0004321 |
| 4 | 0.09 | 4.984 | 0.01243 | 0.05607 | 0.001056 | 0.001056 |
| 5 | 0.17 | 4.973 | 0.01256 | 0.06728 | 0.002064 | 0.002064 |
| 6 | 0.34 | 5.029 | 0.01261 | 1.435 | 0.004225 | 0.004225 |
| 7 | 0.50 | 5.029 | 0.01233 | 2.882 | 0.006433 | 0.006433 |
| 8 | 1.00 | 5.085 | 0.01143 | 4.239 | 0.01339 | 0.01339 |
| 9 | 2.00 | 5.029 | 0.00927 | 4.979 | 0.02712 | 0.02712 |
| 10 | 4.00 | 5.04 | 0.005516 | 4.654 | 0.05521 | 0.05521 |
| 11 | 6.00 | 5.029 | 0.003968 | 4.104 | 0.08363 | 0.08363 |
| 12 | 8.00 | 5.007 | 0.002733 | 3.947 | 0.1113 | 0.1113 |
| 13 | 10.00 | 5.018 | 0.001383 | 3.835 | 0.1395 | 0.1395 |
| 14 | 12.00 | 5.007 | 0.0007739 | 3.689 | 0.1672 | 0.1672 |
| 15 | 14.00 | 5.007 | 0.0006093 | 3.644 | 0.1954 | 0.1954 |
| 16 | 16.00 | 4.984 | 0.0004281 | 3.588 | 0.2233 | 0.2233 |
| 17 | 17.94 | 4.984 | 0.0004117 | 3.51 | 0.2505 | 0.2505 |

DIRECT SHEAR TEST CONSOLIDATION DATA

TIME CURVES

Step: 1 of 1

Stress: 10 psi



| | | |
|---|-----------------------|-----------------------|
| Project: I-495 Next Express Lanes | Location: | Project No.: 17267-0 |
| Boring No.: 19X-SOS-P33 | Tested By: C.Witter | Checked By: J. Taylor |
| Sample No.: 2 | Test Date: 09-23-2019 | Depth: 5.0'-10.0' |
| Test No.: 2 | Sample Type: Remolded | Elevation: |
| Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL) | | |
| Remarks: | | |
| File: C:\Users\jtaylor\Desktop\09-20-2019 - DS - 19X-SOSBulk 5.0' - 10.0' 10.0 PSI .dat | | |

DIRECT SHEAR TEST CONSOLIDATION DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 2
 Test No.: 2

Location:
 Tested By: C.Witter
 Test Date: 09-23-2019
 Sample Type: Remolded

Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Load Increment: 1 of 1
 Applied Stress: 10 psi

| | Elapsed Time min | Sq.Rt. of Time min | Displacement in |
|----|------------------------|--------------------------|--------------------|
| 1 | 0.00 | 0.00 | 0 |
| 2 | 0.02 | 0.14 | 0.00168 |
| 3 | 0.04 | 0.19 | 0.003705 |
| 4 | 0.09 | 0.30 | 0.006866 |
| 5 | 0.17 | 0.41 | 0.01205 |
| 6 | 0.34 | 0.58 | 0.02322 |
| 7 | 0.50 | 0.71 | 0.02872 |
| 8 | 1.00 | 1.00 | 0.02919 |
| 9 | 2.00 | 1.42 | 0.02961 |
| 10 | 4.00 | 2.00 | 0.02979 |
| 11 | 6.00 | 2.45 | 0.02979 |
| 12 | 8.00 | 2.83 | 0.02975 |
| 13 | 10.00 | 3.16 | 0.02972 |
| 14 | 12.00 | 3.46 | 0.02967 |
| 15 | 14.00 | 3.74 | 0.02966 |
| 16 | 16.00 | 4.00 | 0.02962 |
| 17 | 18.00 | 4.24 | 0.02961 |
| 18 | 20.00 | 4.47 | 0.02961 |
| 19 | 22.00 | 4.69 | 0.02957 |
| 20 | 24.00 | 4.90 | 0.02957 |
| 21 | 26.00 | 5.10 | 0.02956 |
| 22 | 28.00 | 5.29 | 0.02956 |
| 23 | 30.00 | 5.48 | 0.02956 |
| 24 | 30.46 | 5.52 | 0.02956 |

DIRECT SHEAR TEST DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 2
 Test No.: 2

Location:
 Tested By: C.Witter
 Test Date: 09-23-2019
 Sample Type: Remolded

Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Step: 1 of 1

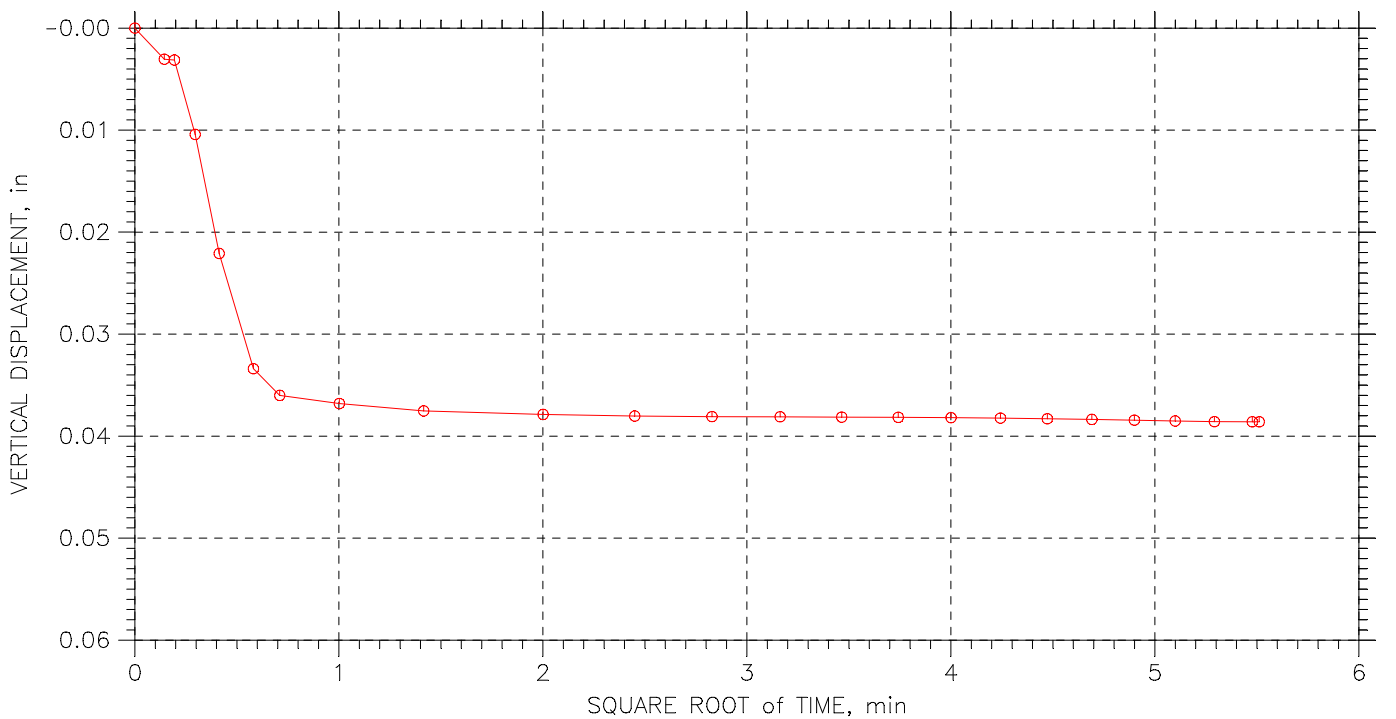
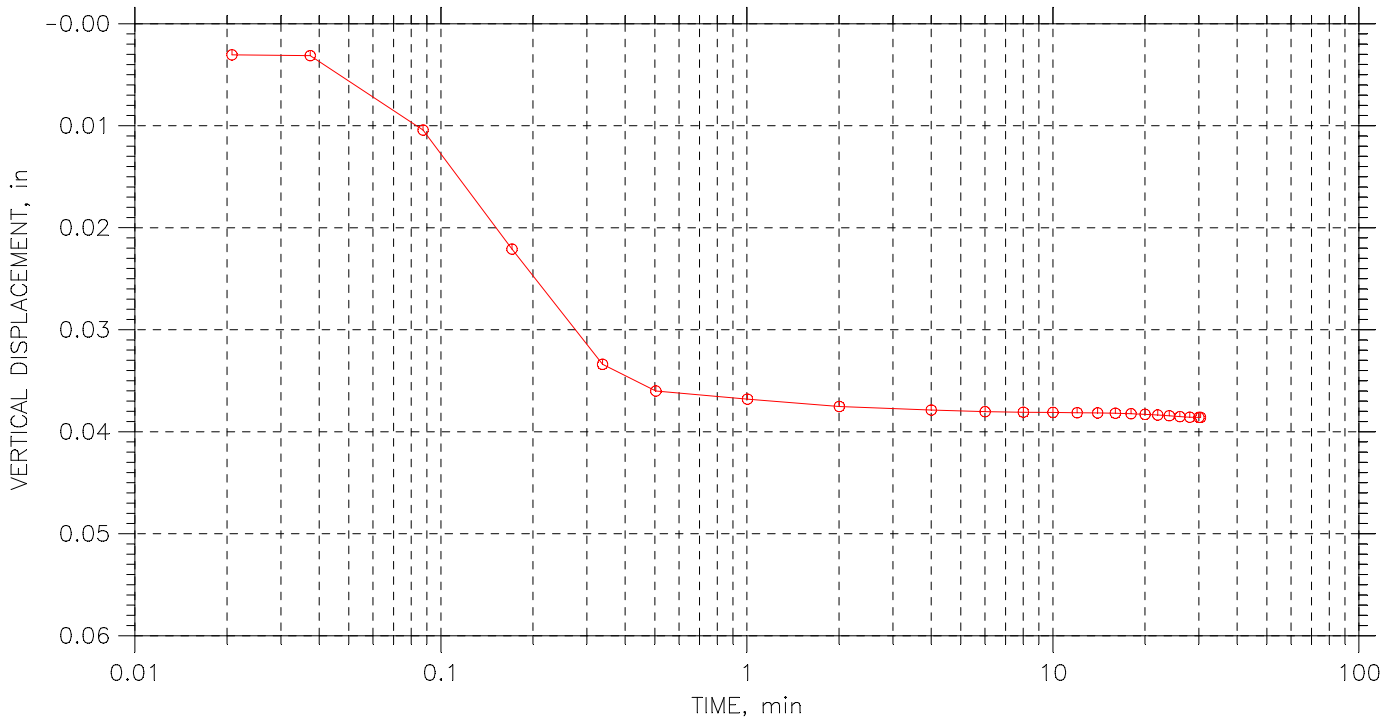
| | Elapsed Time min | Vertical Stress psi | Vertical Displacement in | Horizontal Stress psi | Horizontal Displacement in | Cumulative Displacement in |
|----|------------------------|---------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------------|
| 1 | 0.00 | 9.991 | 0.03188 | -0.01121 | 0 | 0 |
| 2 | 0.02 | 9.946 | 0.03186 | 1.121 | 9.601e-005 | 9.601e-005 |
| 3 | 0.04 | 9.879 | 0.03186 | 1.839 | 0.00024 | 0.00024 |
| 4 | 0.09 | 9.969 | 0.03196 | 3.016 | 0.001296 | 0.001296 |
| 5 | 0.17 | 9.98 | 0.03198 | 4.16 | 0.001776 | 0.001776 |
| 6 | 0.34 | 9.969 | 0.03199 | 5.293 | 0.003697 | 0.003697 |
| 7 | 0.50 | 9.969 | 0.03208 | 5.797 | 0.006001 | 0.006001 |
| 8 | 1.00 | 10.01 | 0.03214 | 6.347 | 0.01263 | 0.01263 |
| 9 | 2.00 | 10.01 | 0.03152 | 6.638 | 0.02684 | 0.02684 |
| 10 | 4.00 | 10.02 | 0.02929 | 7.053 | 0.05458 | 0.05458 |
| 11 | 6.00 | 10.02 | 0.02804 | 6.997 | 0.08276 | 0.08276 |
| 12 | 8.00 | 10.07 | 0.02651 | 6.672 | 0.1112 | 0.1112 |
| 13 | 10.00 | 10 | 0.02529 | 6.616 | 0.139 | 0.139 |
| 14 | 12.00 | 10 | 0.0246 | 6.549 | 0.1673 | 0.1673 |
| 15 | 14.00 | 10.01 | 0.0235 | 6.56 | 0.1952 | 0.1952 |
| 16 | 16.00 | 10 | 0.02286 | 6.661 | 0.2233 | 0.2233 |
| 17 | 17.99 | 10 | 0.02231 | 6.885 | 0.251 | 0.251 |

DIRECT SHEAR TEST CONSOLIDATION DATA

TIME CURVES

Step: 1 of 1

Stress: 20 psi



| | | |
|---|-----------------------|-----------------------|
| Project: I-495 Next Express Lanes | Location: | Project No.: 17267-0 |
| Boring No.: 19X-SOS-P33 | Tested By: C.Witter | Checked By: J. Taylor |
| Sample No.: 3 | Test Date: 09-24-2019 | Depth: 5.0'-10.0' |
| Test No.: 3 | Sample Type: Remolded | Elevation: |
| Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL) | | |
| Remarks: | | |
| File: C:\Users\jtaylor\Desktop\09-24-2019 - DS - 19X-SOSBulk 5.0' - 10.0' 20.0 PSI .dat | | |

DIRECT SHEAR TEST CONSOLIDATION DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 3
 Test No.: 3

Location:
 Tested By: C.Witter
 Test Date: 09-24-2019
 Sample Type: Remolded

Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Load Increment: 1 of 1
 Applied Stress: 20 psi

| | Elapsed Time min | Sq.Rt. of Time min | Displacement in |
|----|------------------------|--------------------------|--------------------|
| 1 | 0.00 | 0.00 | 0 |
| 2 | 0.02 | 0.14 | 0.003046 |
| 3 | 0.04 | 0.19 | 0.003129 |
| 4 | 0.09 | 0.30 | 0.01042 |
| 5 | 0.17 | 0.41 | 0.0221 |
| 6 | 0.34 | 0.58 | 0.03339 |
| 7 | 0.50 | 0.71 | 0.03601 |
| 8 | 1.00 | 1.00 | 0.0368 |
| 9 | 2.00 | 1.42 | 0.03753 |
| 10 | 4.00 | 2.00 | 0.03787 |
| 11 | 6.00 | 2.45 | 0.03804 |
| 12 | 8.00 | 2.83 | 0.03809 |
| 13 | 10.00 | 3.16 | 0.0381 |
| 14 | 12.00 | 3.46 | 0.03814 |
| 15 | 14.00 | 3.74 | 0.03815 |
| 16 | 16.00 | 4.00 | 0.03819 |
| 17 | 18.00 | 4.24 | 0.03823 |
| 18 | 20.00 | 4.47 | 0.0383 |
| 19 | 22.00 | 4.69 | 0.03837 |
| 20 | 24.00 | 4.90 | 0.03843 |
| 21 | 26.00 | 5.10 | 0.03851 |
| 22 | 28.00 | 5.29 | 0.03858 |
| 23 | 30.00 | 5.48 | 0.0386 |
| 24 | 30.38 | 5.51 | 0.0386 |

DIRECT SHEAR TEST DATA

Project: I-495 Next Express Lanes
 Boring No.: 19X-SOS-P33
 Sample No.: 3
 Test No.: 3

Location:
 Tested By: C.Witter
 Test Date: 09-24-2019
 Sample Type: Remolded

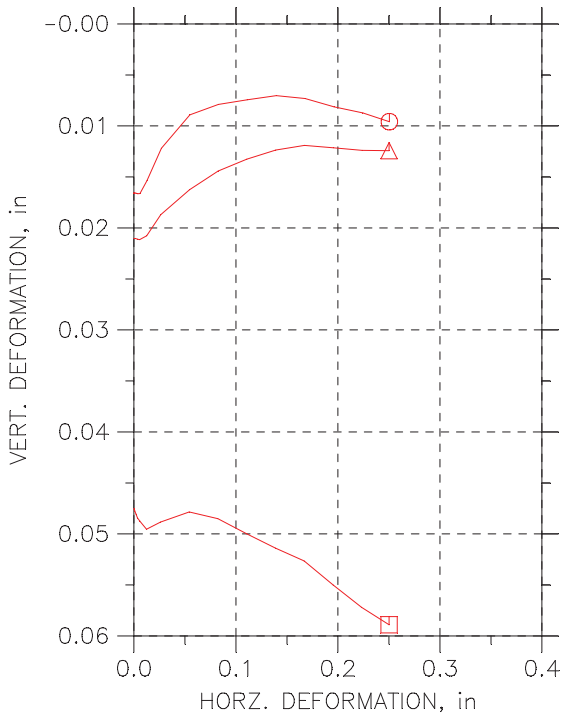
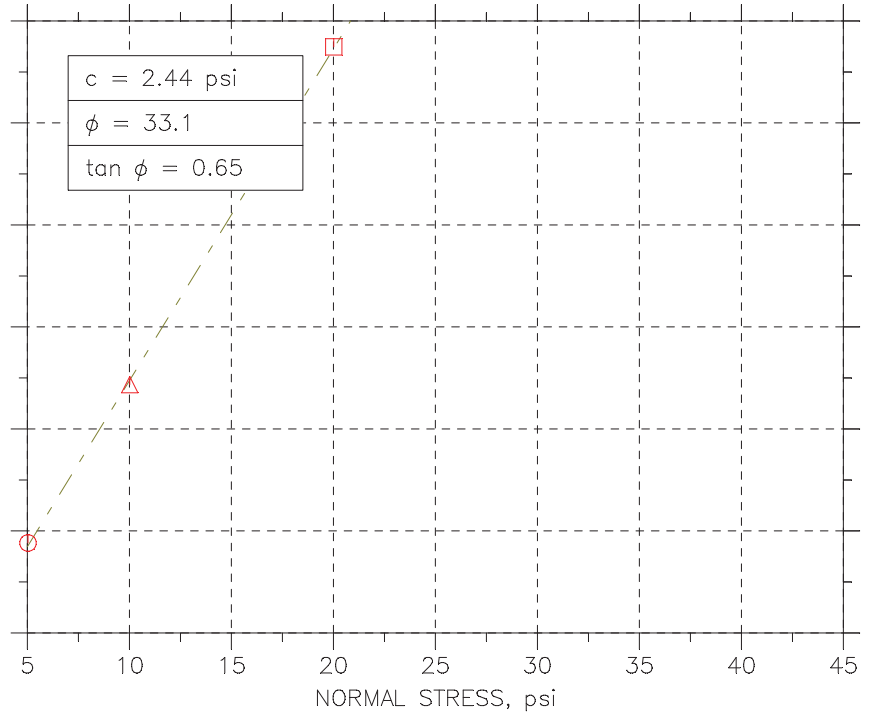
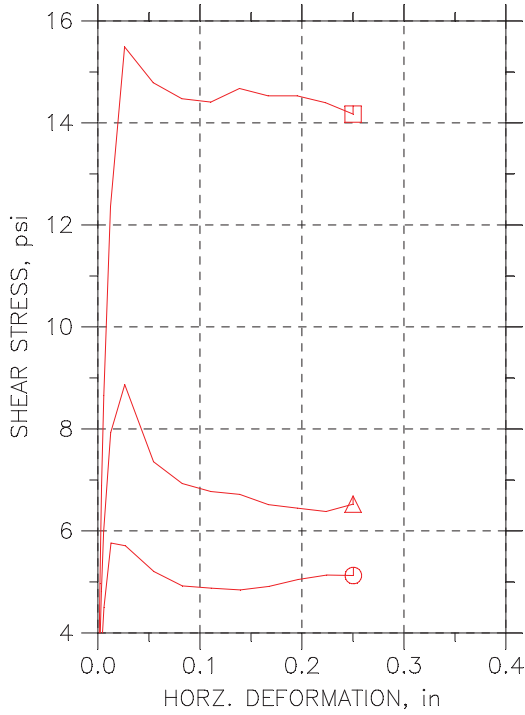
Project No.: 17267-0
 Checked By: J. Taylor
 Depth: 5.0'-10.0'
 Elevation:

Soil Description: USCS Classification: Reddish Brown SANDY LEAN CLAY (CL)
 Remarks:

Step: 1 of 1

| | Elapsed Time min | Vertical Stress psi | Vertical Displacement in | Horizontal Stress psi | Horizontal Displacement in | Cumulative Displacement in |
|----|------------------------|---------------------------|--------------------------------|-----------------------------|----------------------------------|----------------------------------|
| 1 | 0.00 | 19.99 | 0.03868 | 0 | 0 | 0 |
| 2 | 0.02 | 19.89 | 0.03868 | 0.05607 | 0.000192 | 0.000192 |
| 3 | 0.04 | 19.89 | 0.03871 | 0.05607 | 0.0007201 | 0.0007201 |
| 4 | 0.09 | 19.93 | 0.03883 | 0.4822 | 0.00168 | 0.00168 |
| 5 | 0.17 | 19.98 | 0.03926 | 2.915 | 0.002832 | 0.002832 |
| 6 | 0.34 | 19.97 | 0.04018 | 5.057 | 0.004321 | 0.004321 |
| 7 | 0.50 | 19.74 | 0.04089 | 7.031 | 0.006289 | 0.006289 |
| 8 | 1.00 | 19.97 | 0.04294 | 10.96 | 0.01277 | 0.01277 |
| 9 | 2.00 | 19.98 | 0.04439 | 15.18 | 0.0266 | 0.0266 |
| 10 | 4.00 | 20.02 | 0.04278 | 17.03 | 0.05454 | 0.05454 |
| 11 | 6.00 | 19.98 | 0.04271 | 15.95 | 0.08262 | 0.08262 |
| 12 | 8.00 | 19.98 | 0.04355 | 15.63 | 0.1106 | 0.1106 |
| 13 | 10.00 | 19.98 | 0.04484 | 15.42 | 0.1388 | 0.1388 |
| 14 | 12.00 | 19.97 | 0.04617 | 15.4 | 0.1669 | 0.1669 |
| 15 | 14.00 | 19.98 | 0.04797 | 15.35 | 0.1948 | 0.1948 |
| 16 | 16.00 | 19.95 | 0.04971 | 15.35 | 0.2228 | 0.2228 |
| 17 | 17.96 | 19.97 | 0.05193 | 15.24 | 0.2503 | 0.2503 |

DIRECT SHEAR TEST REPORT

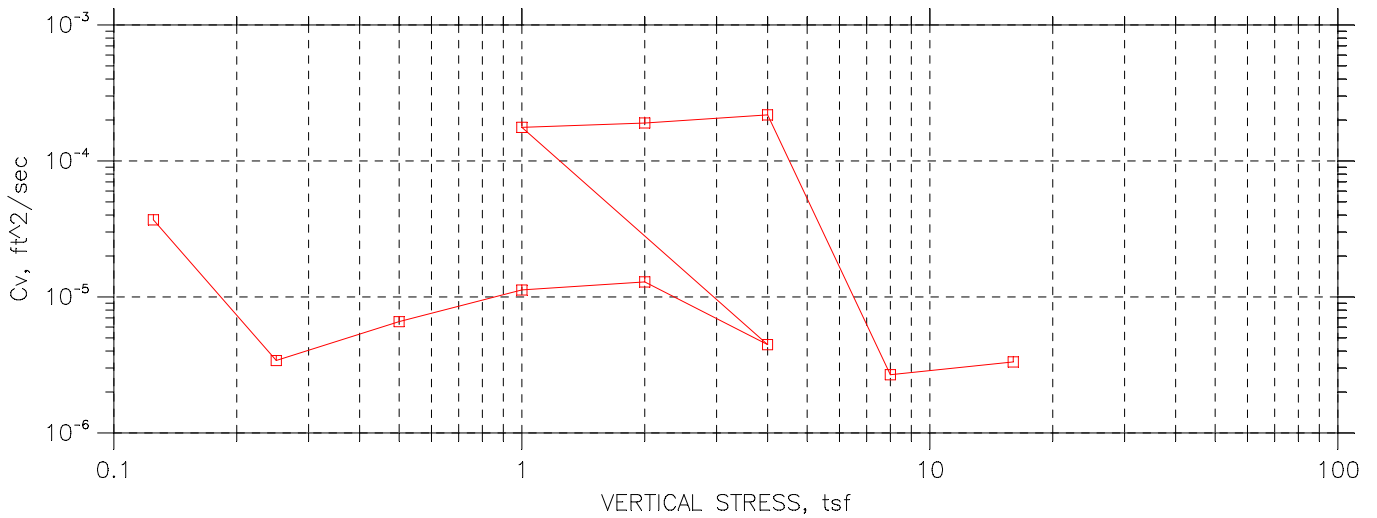
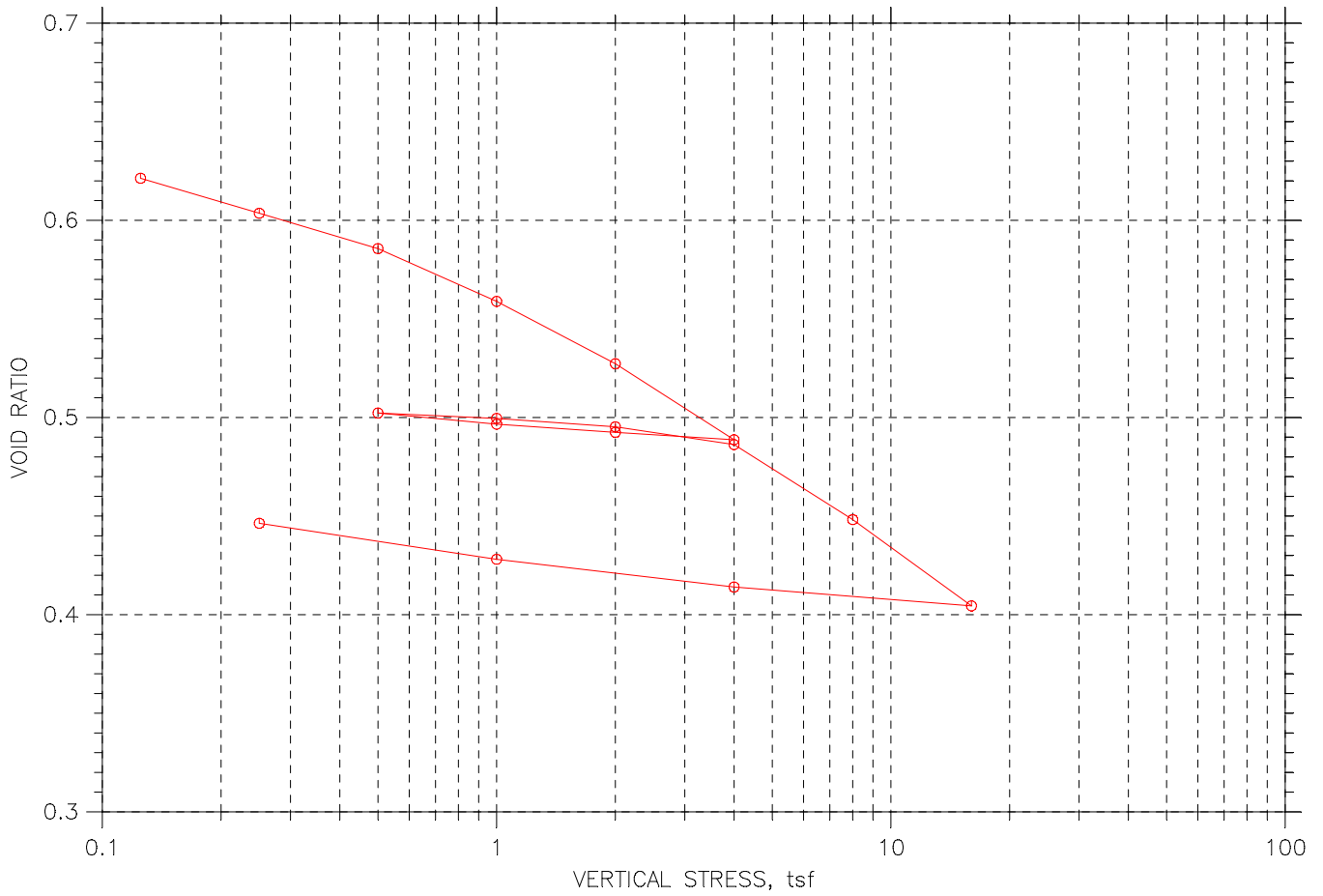



| Symbol | ⊙ | △ | □ | |
|----------------------------|-----------------------|----------|----------|---------|
| Test No. | 1 | 2 | 3 | |
| Sample No. | Bulk | Bulk | Bulk | |
| Shape | Circular | Circular | Circular | |
| Initial | Dimension, in | 2.487 | 2.487 | 2.491 |
| | Area, in ² | 4.8578 | 4.8578 | 4.8735 |
| | Height, in | 1.012 | 1.002 | 1.001 |
| | Water Content, % | 18.16 | 18.36 | 19.35 |
| | Dry Density, pcf | 108.19 | 109.19 | 108.05 |
| | Saturation, % | 84.09 | 87.14 | 89.26 |
| | Void Ratio | 0.5984 | 0.58374 | 0.60045 |
| Consol. Height, in | 0.99565 | 0.98109 | 0.9543 | |
| Consol. Void Ratio | 0.57258 | 0.55069 | 0.52579 | |
| Final | Water Content, % | 21.40 | 21.70 | 20.25 |
| | Dry Density, pcf | 109.22 | 110.56 | 114.8 |
| | Saturation, % | 100.0 | 100.0 | 100.0 |
| | Void Ratio | 0.58327 | 0.56409 | 0.50628 |
| Normal Stress, psi | 5.0289 | 10.013 | 20.018 | |
| Max. Shear Stress, psi | 5.7637 | 8.8698 | 15.492 | |
| Ult. Shear Stress, psi | 5.1245 | 6.5262 | 14.173 | |
| Time to Failure, min | 1.004 | 2.004 | 2.0039 | |
| Disp. Rate, in/min | 0.03 | 0.03 | 0.03 | |
| Estimated Specific Gravity | 2.77 | 2.77 | 2.77 | |
| Liquid Limit | --- | --- | --- | |
| Plastic Limit | --- | --- | --- | |
| Plasticity Index | --- | --- | --- | |

| | |
|--|--|
| Project: I-495 NEXT Express Lanes | |
| Location: Fairfax County, VA | |
| Project No.: 17267-0 | |
| Boring No.: 19X-S-RW28 | |
| Sample Type: Remolded | |
| Description: USCS Classification: Brown SANDY LEAN CLAY (CL) | |
| Remarks: | |

CONSOLIDATION TEST DATA

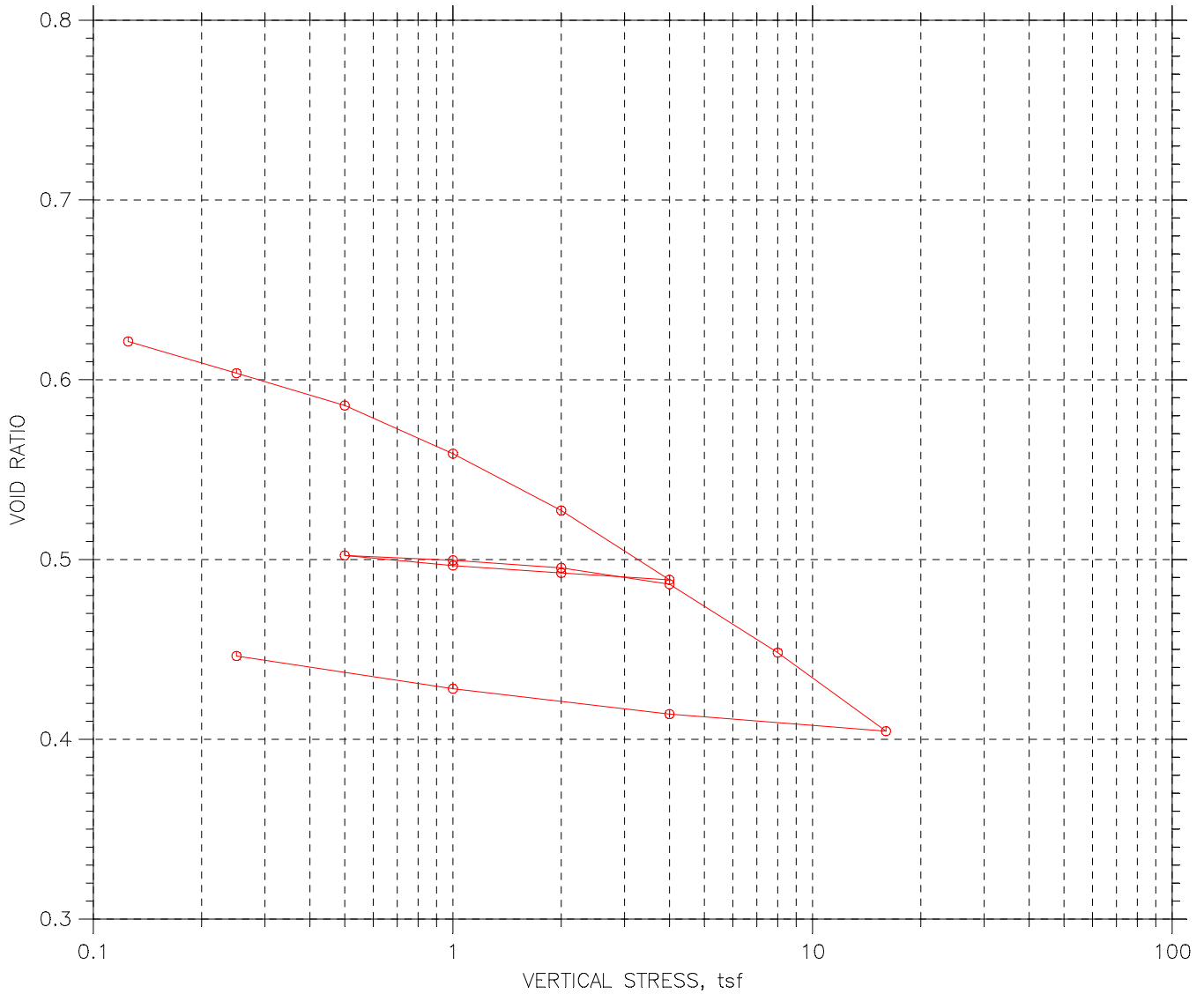
SUMMARY REPORT




| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |

CONSOLIDATION TEST DATA

SUMMARY REPORT



| | | | | Before Test | After Test |
|-------------------------------------|------------------|----------------------|----------|-------------|------------|
| Overburden Pressure: 1.03 tsf | | Water Content, % | | 18.68 | 12.88 |
| Preconsolidation Pressure: 0.55 tsf | | Dry Unit Weight, pcf | | 108.6 | 124.6 |
| Compression Index: 0.11 | | Saturation, % | | 81.84 | 83.30 |
| Diameter: 2.496 in | Height: 0.791 in | Void Ratio | | 0.66 | 0.45 |
| LL: 41 | PL: 14 | PI: 27 | GS: 2.89 | | |

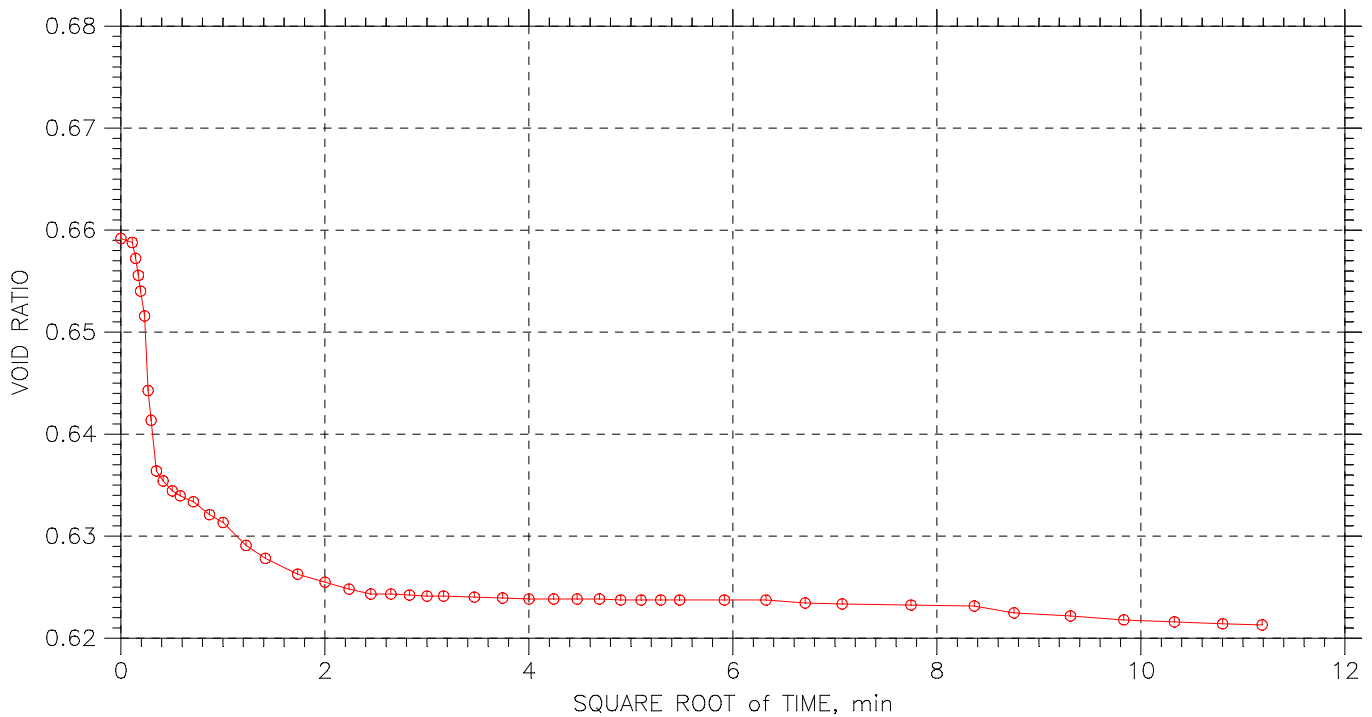
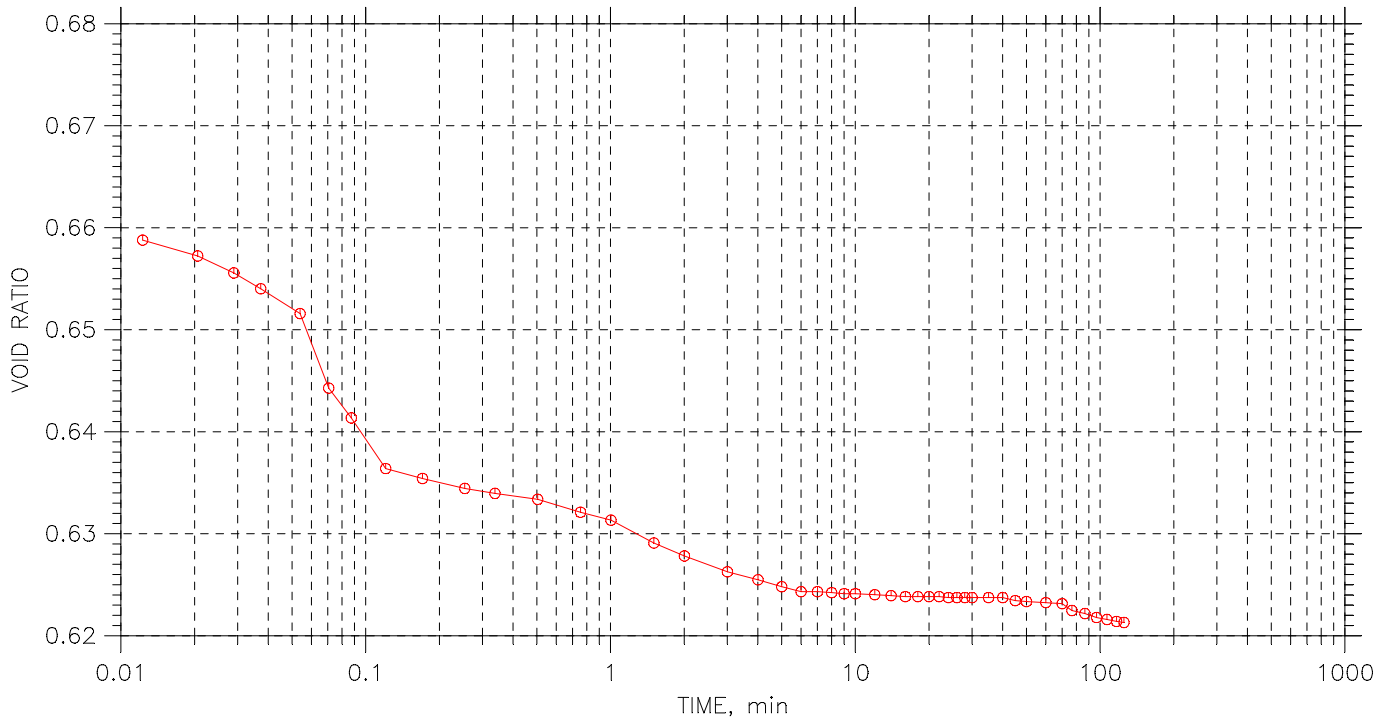
| | | | | |
|--|--|------------------------------|----------------------|--|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 | |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO | |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' | |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- | |
| | Description: SILT with SAND | | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 17

Stress: 0.125 tsf



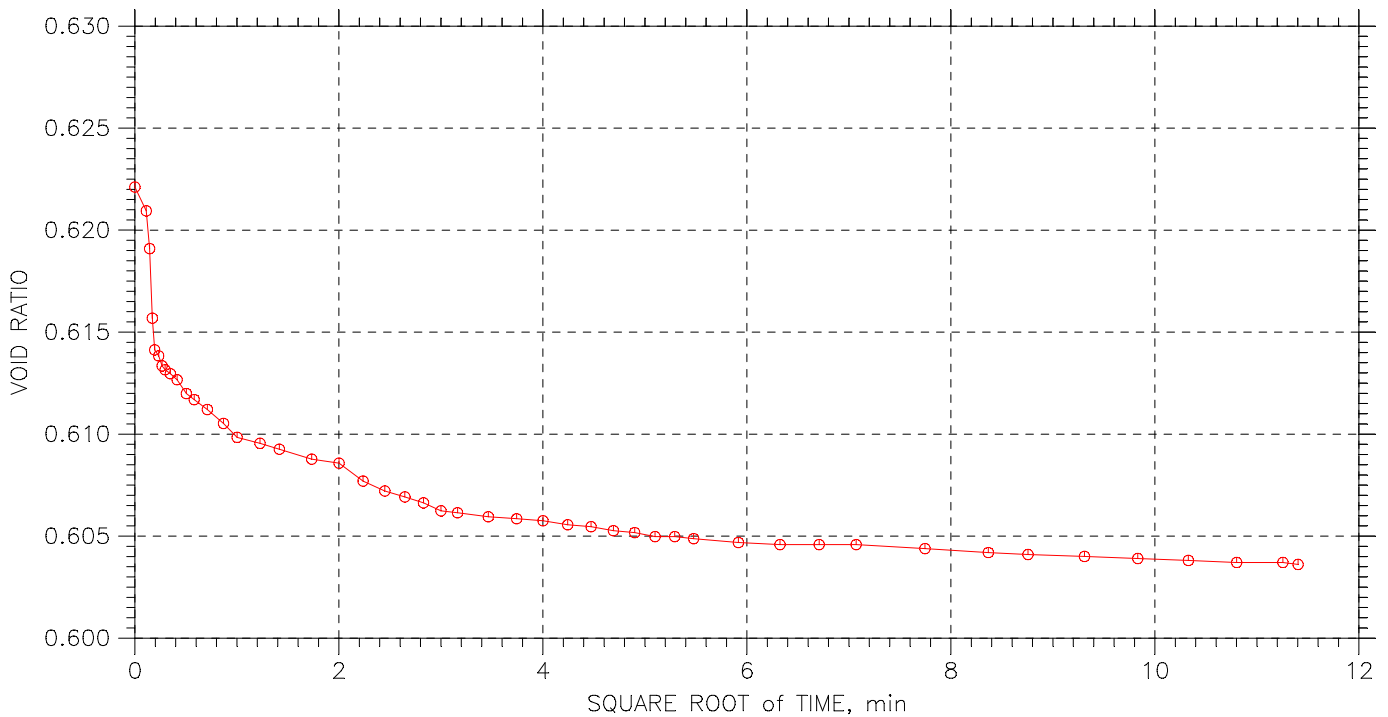
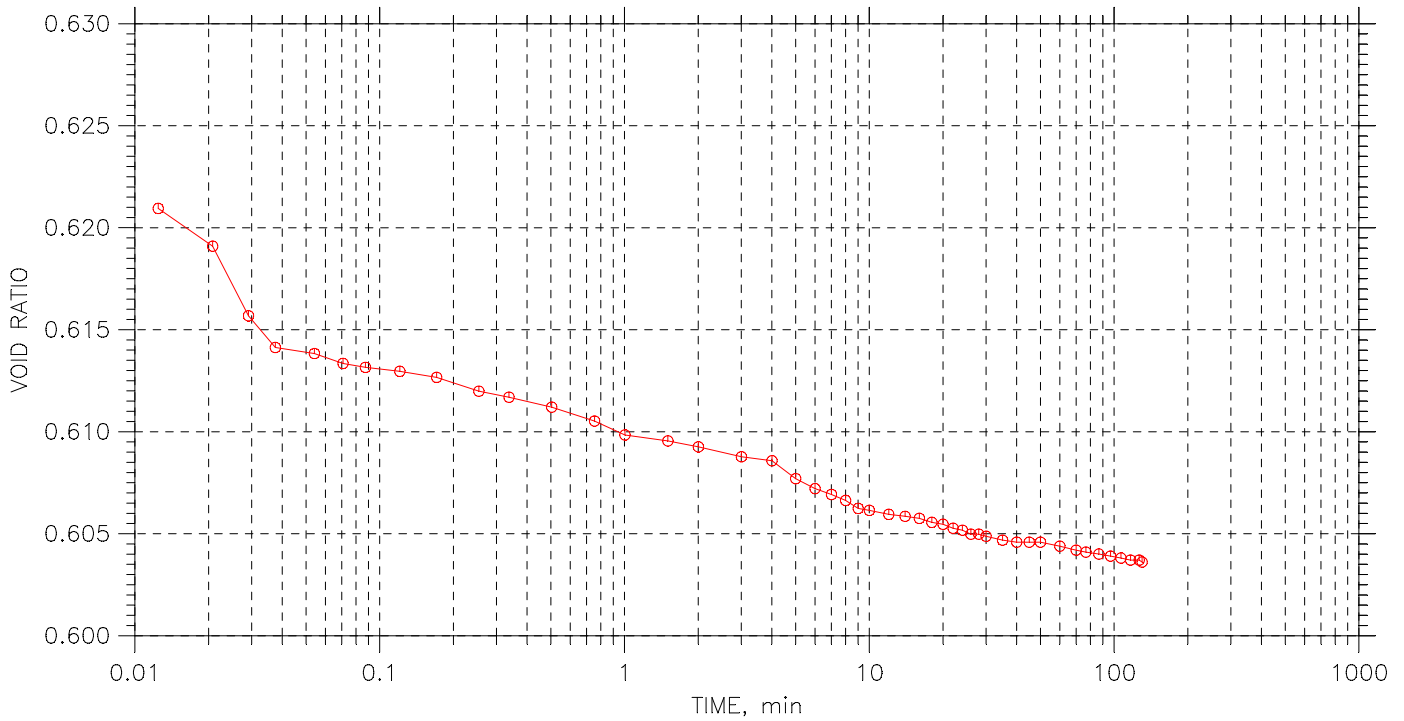
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 17

Stress: 0.25 tsf



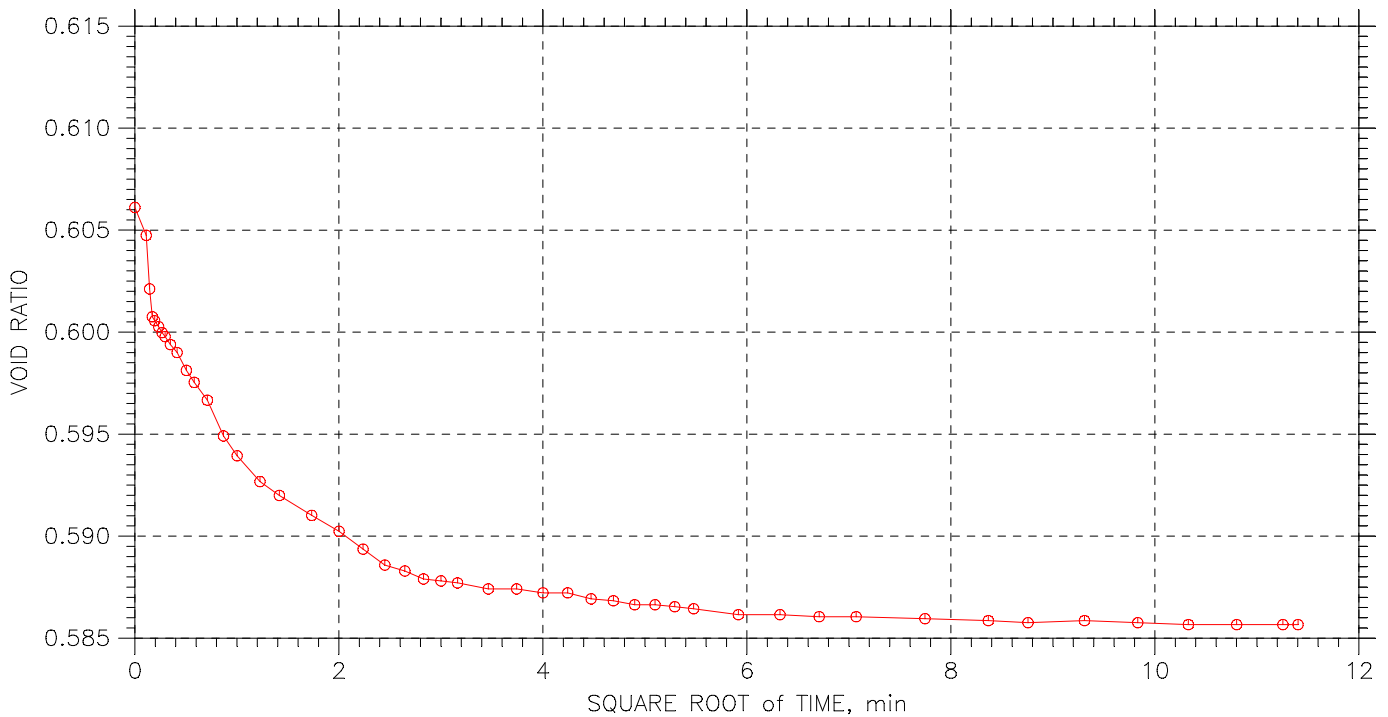
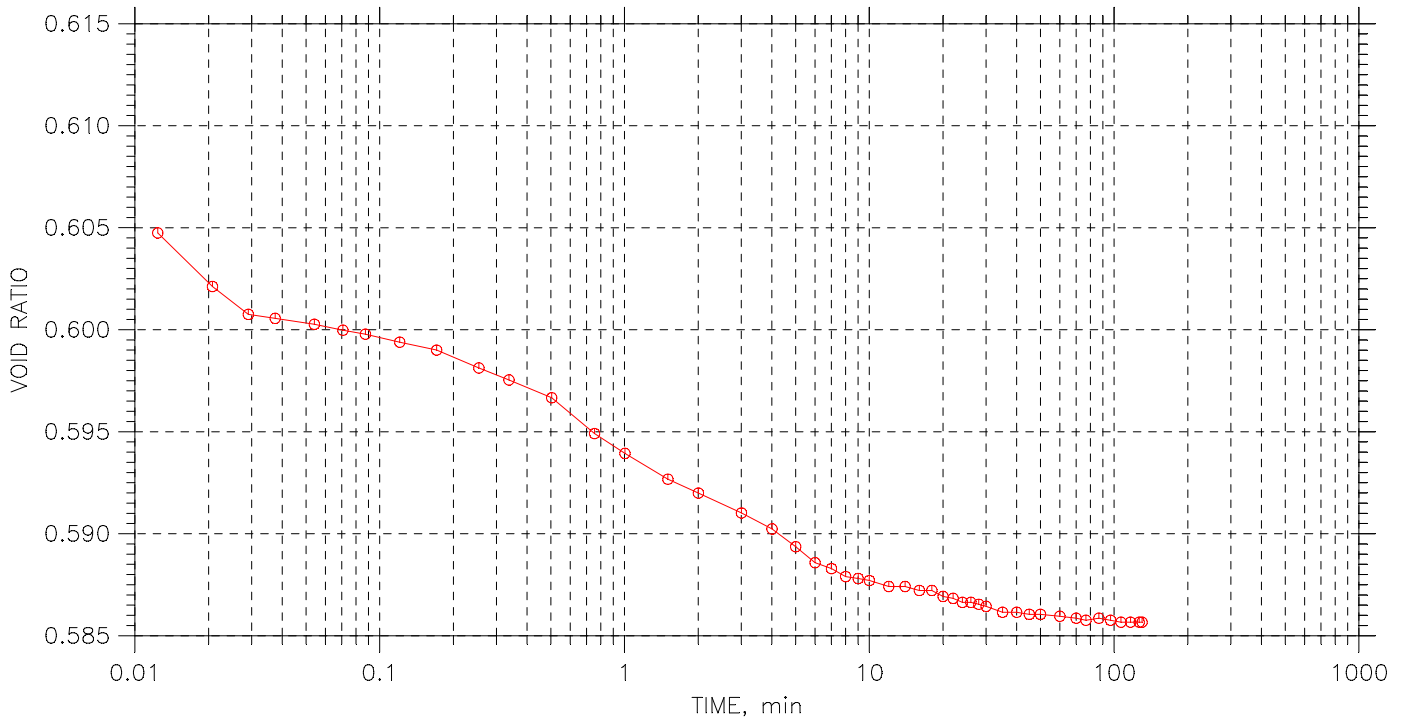
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 17

Stress: 0.5 tsf



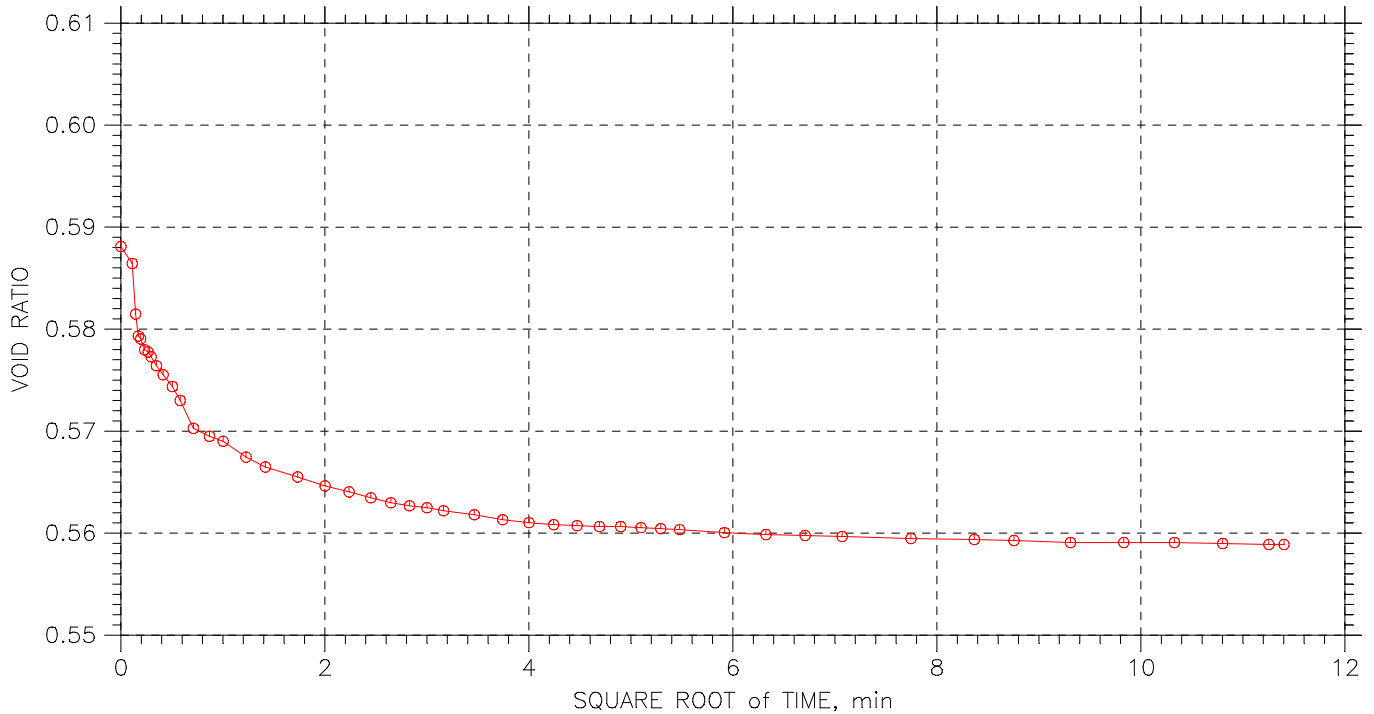
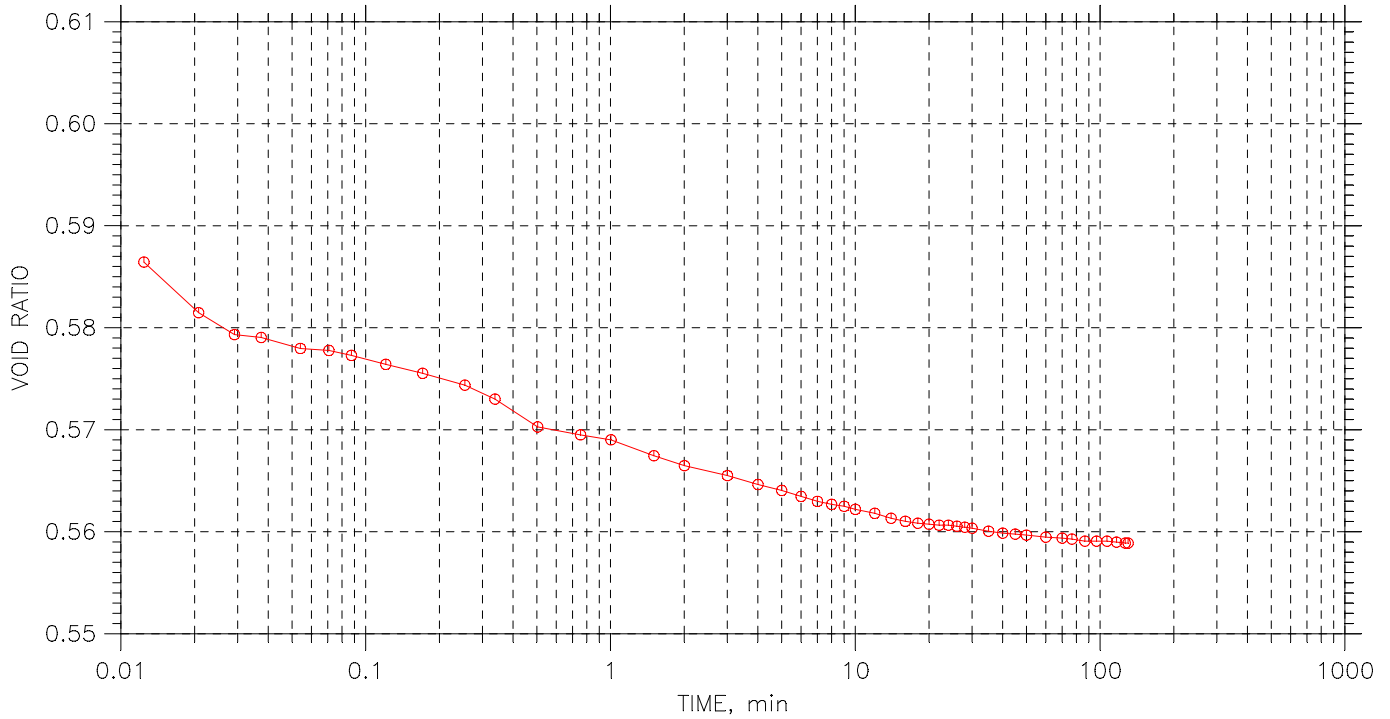
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|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 17

Stress: 1. tsf



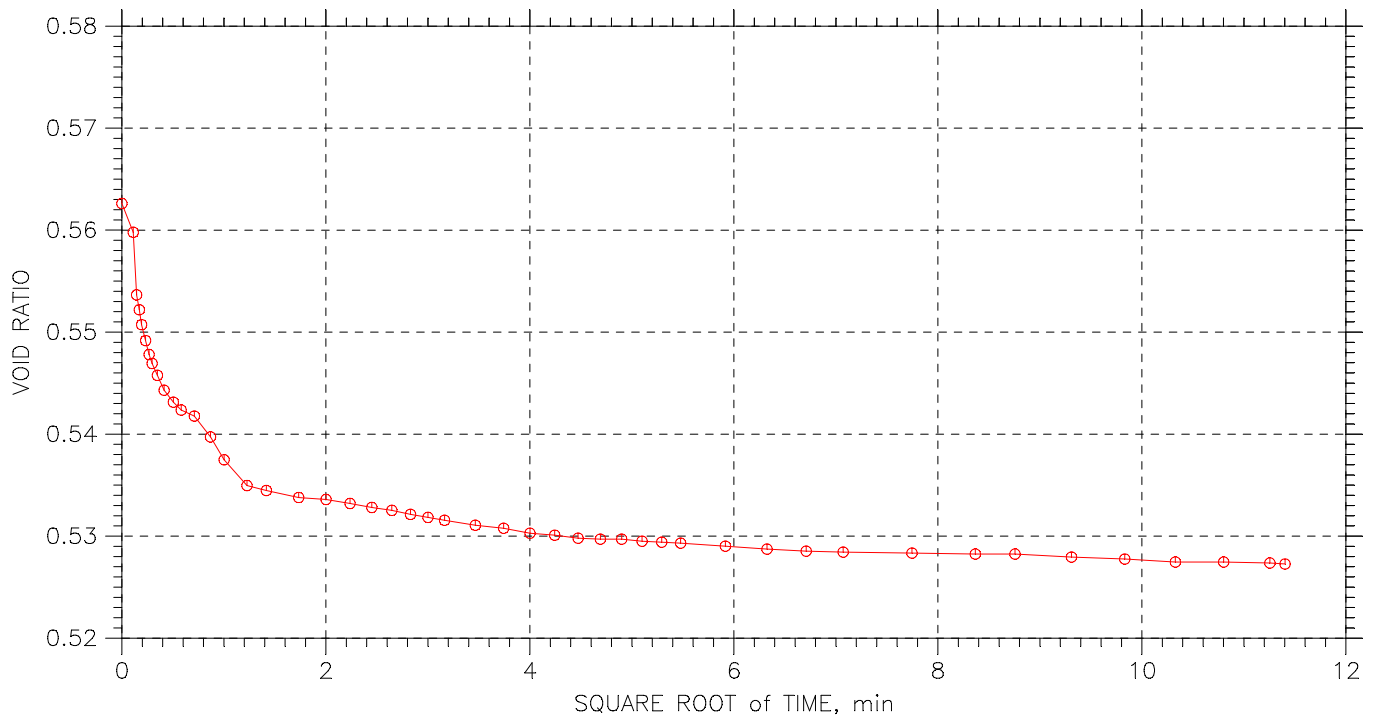
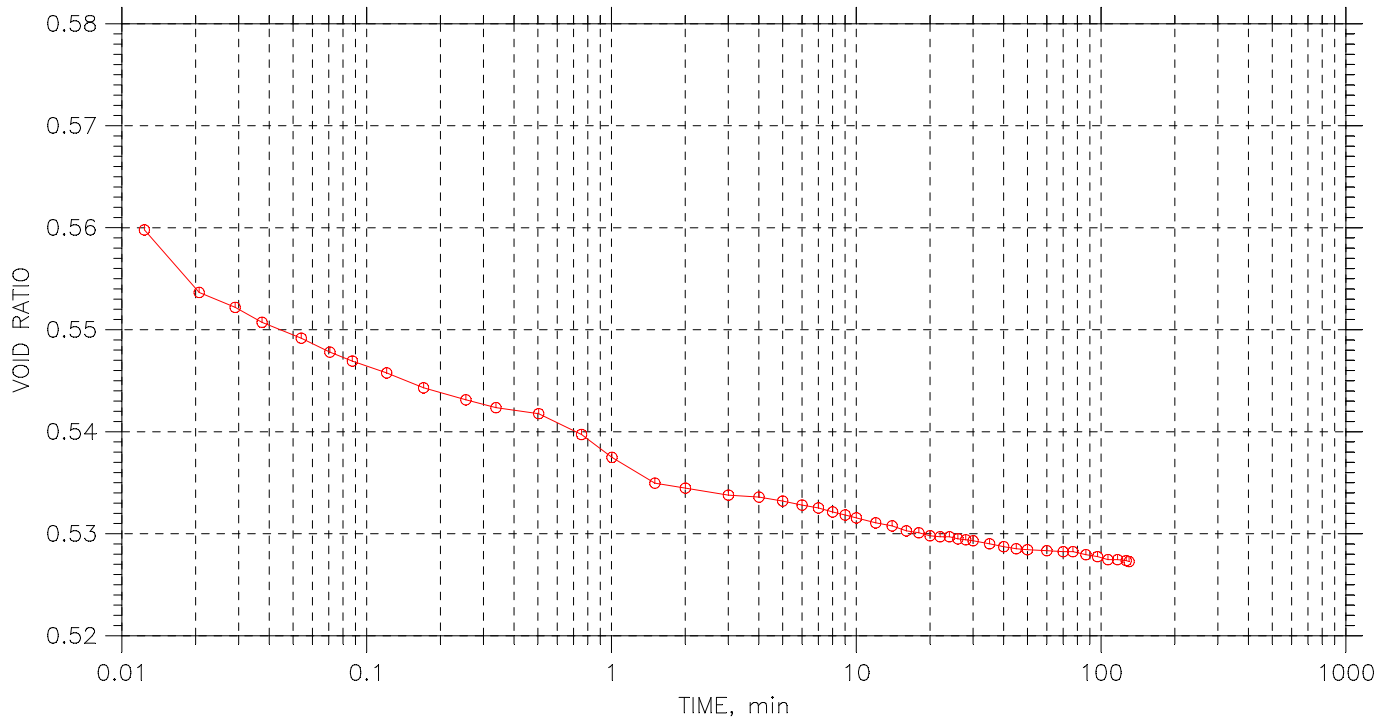
| | | |
|--|------------------------------|----------------------|
| Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| Description: SILT with SAND | | |
| Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 17

Stress: 2. tsf



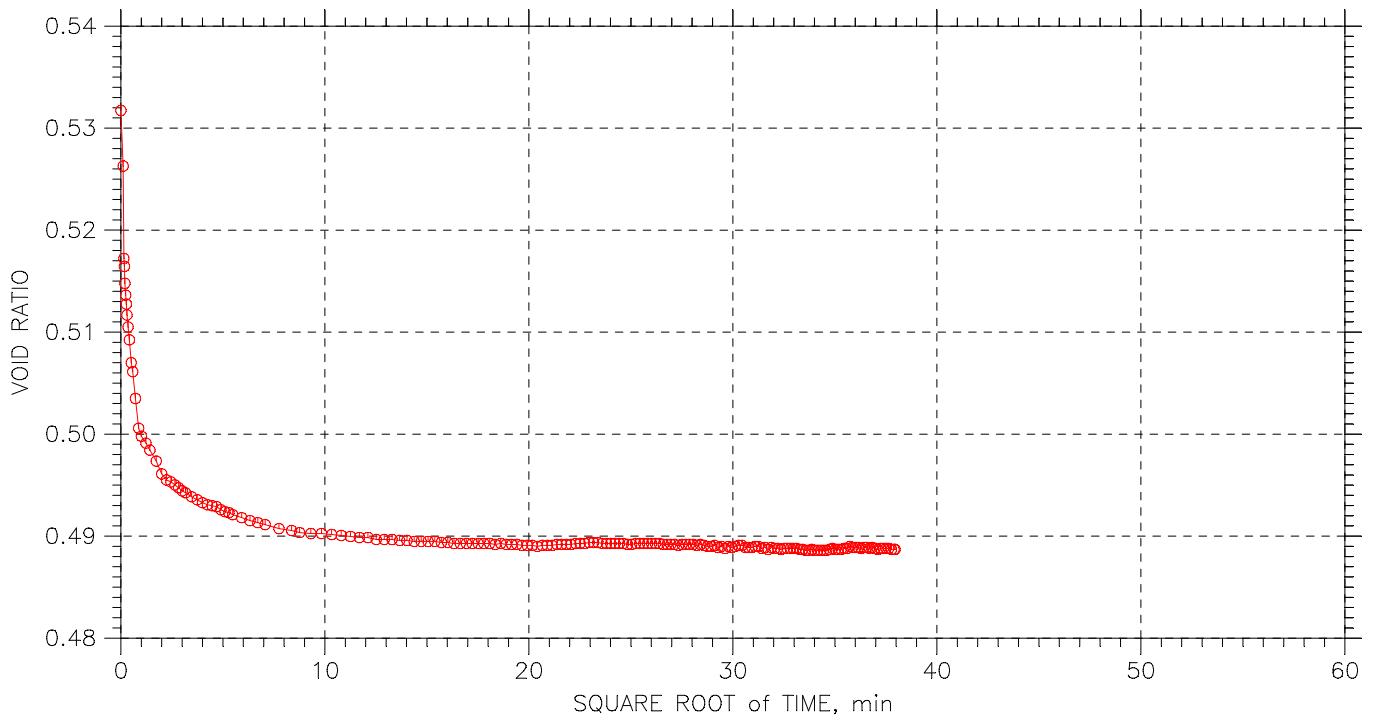
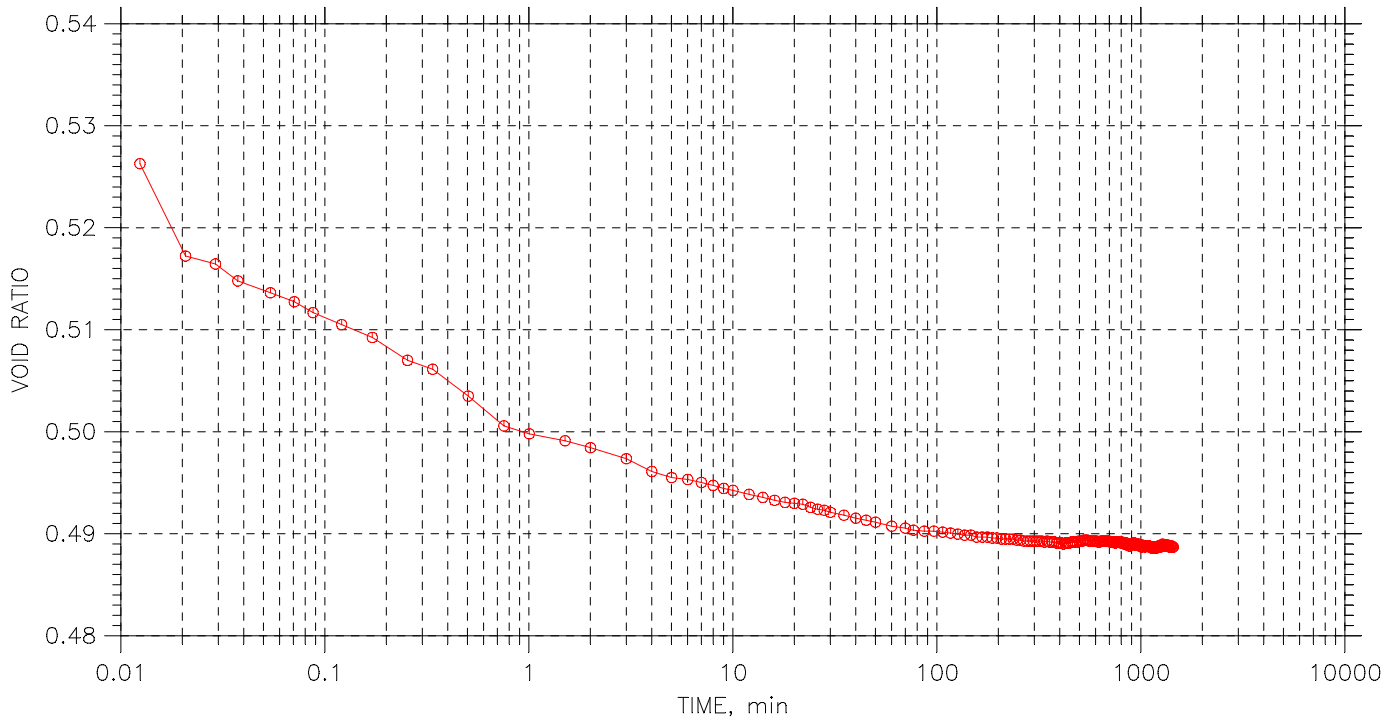
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 17

Stress: 4. tsf



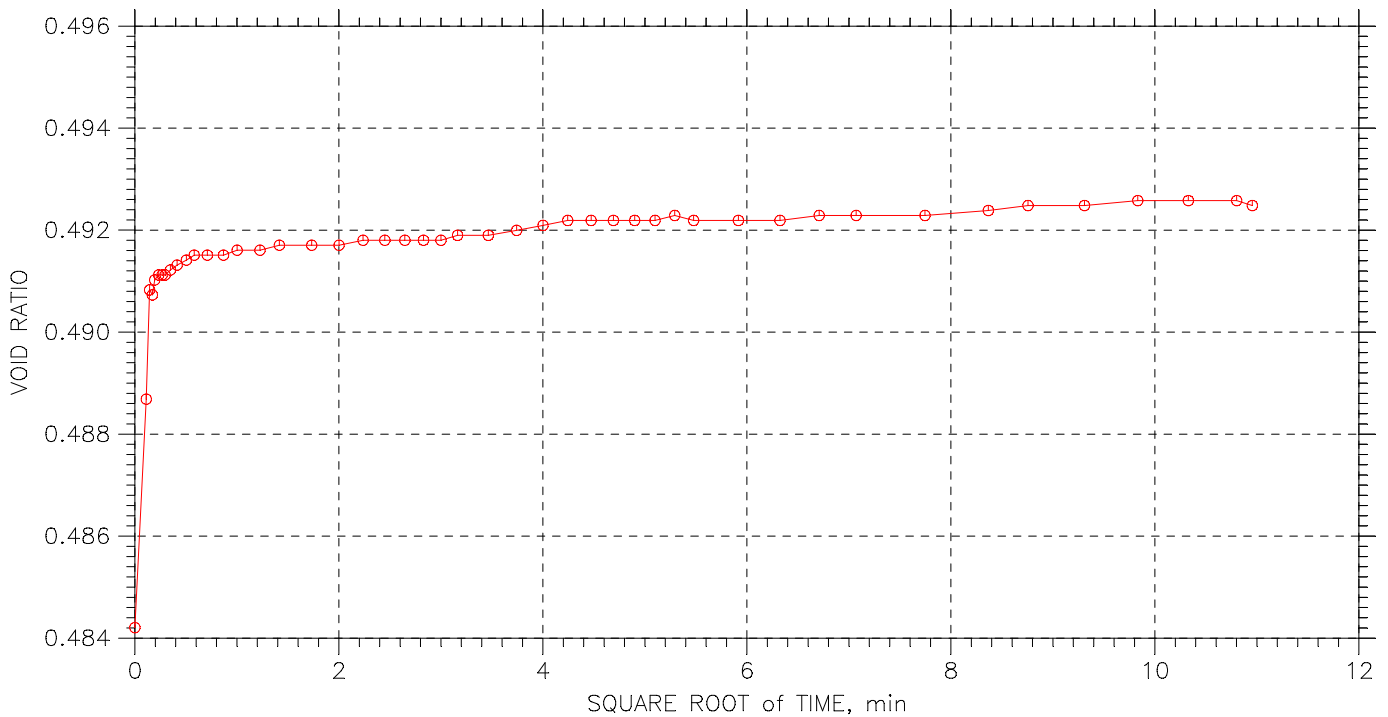
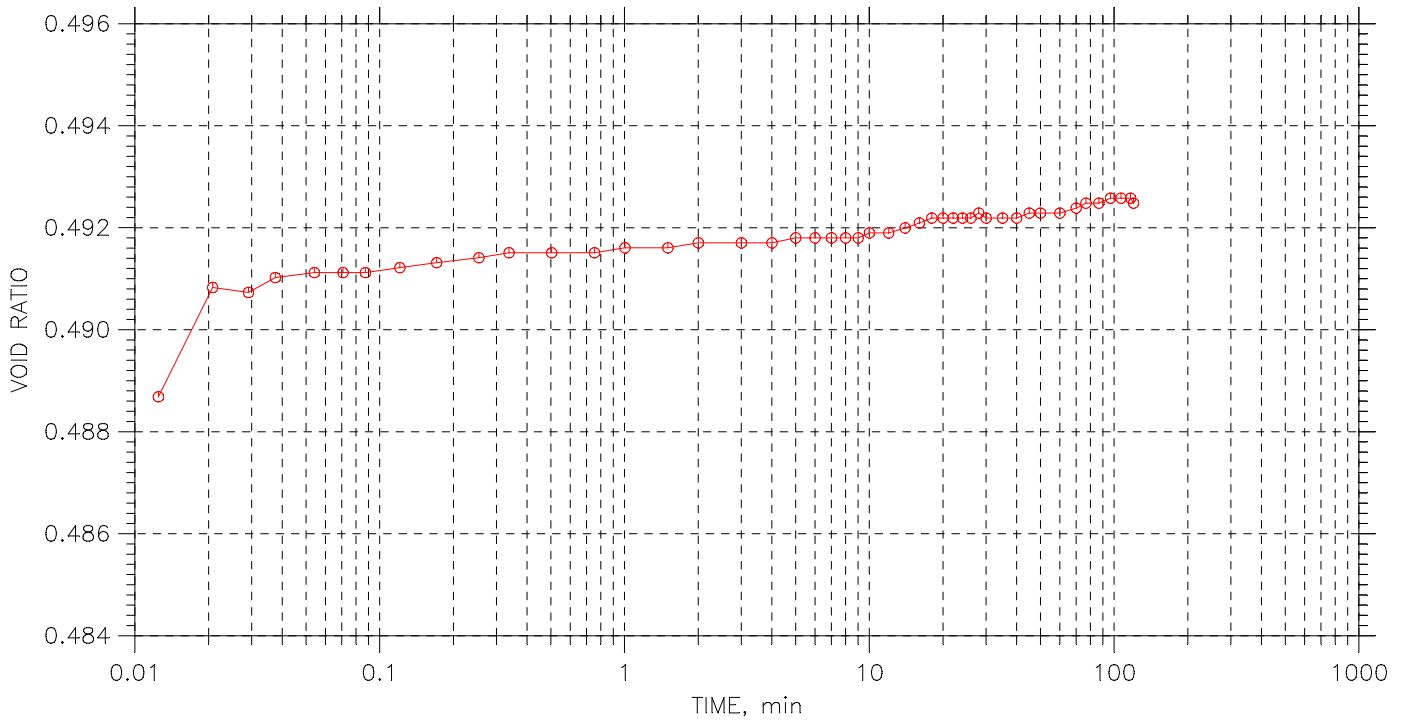
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|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 17

Stress: 2. tsf



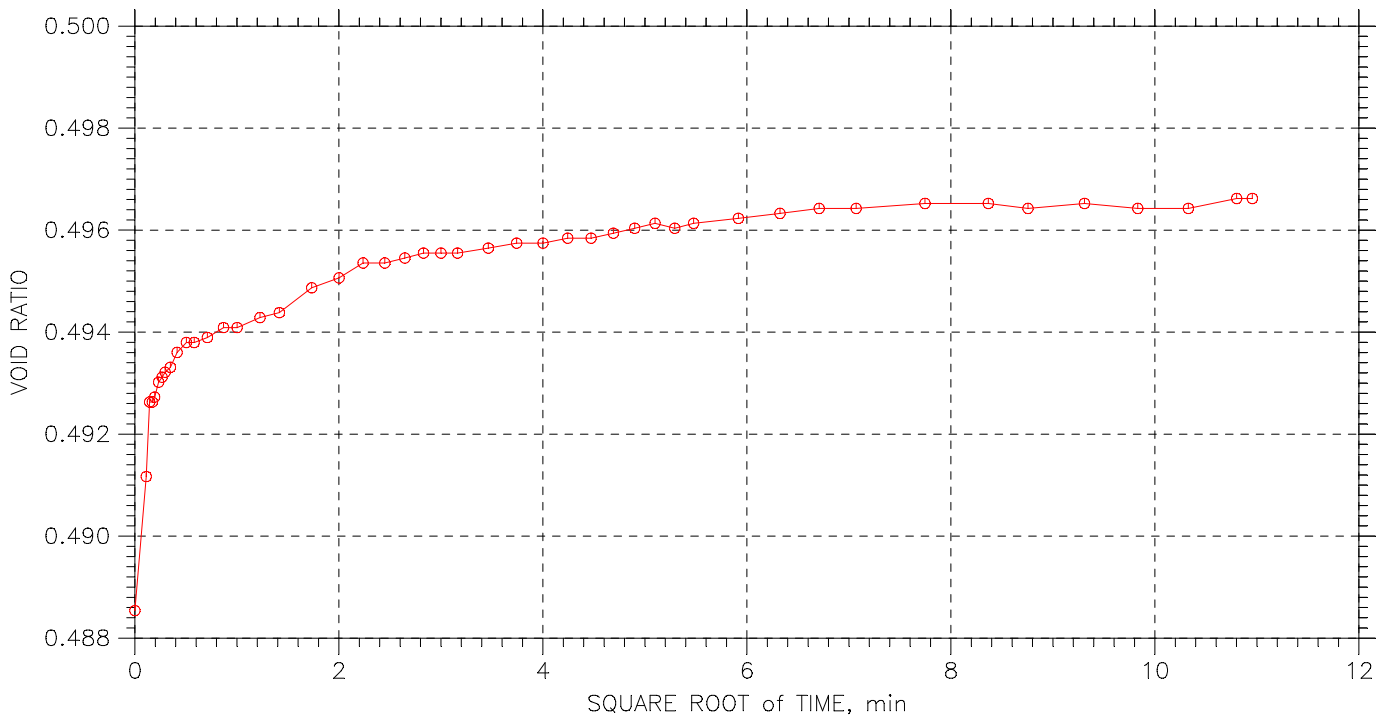
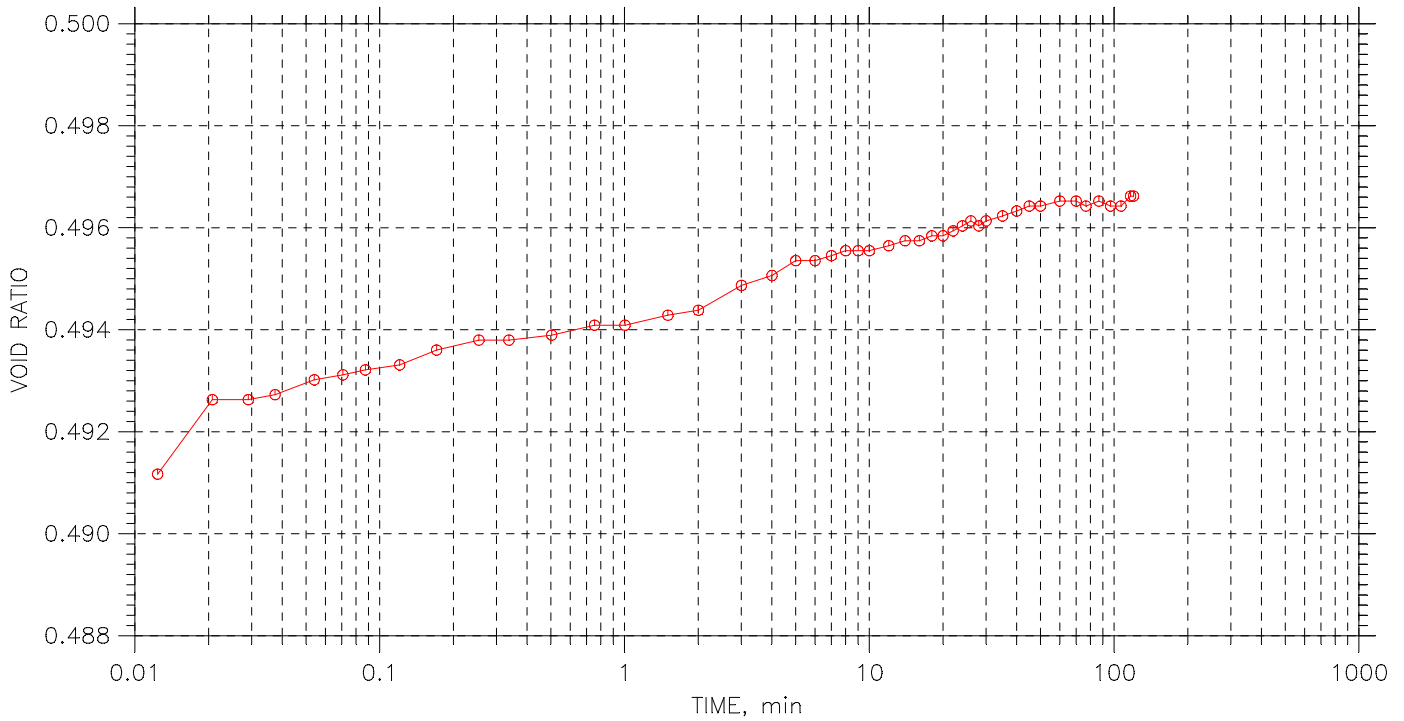
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 17

Stress: 1. tsf



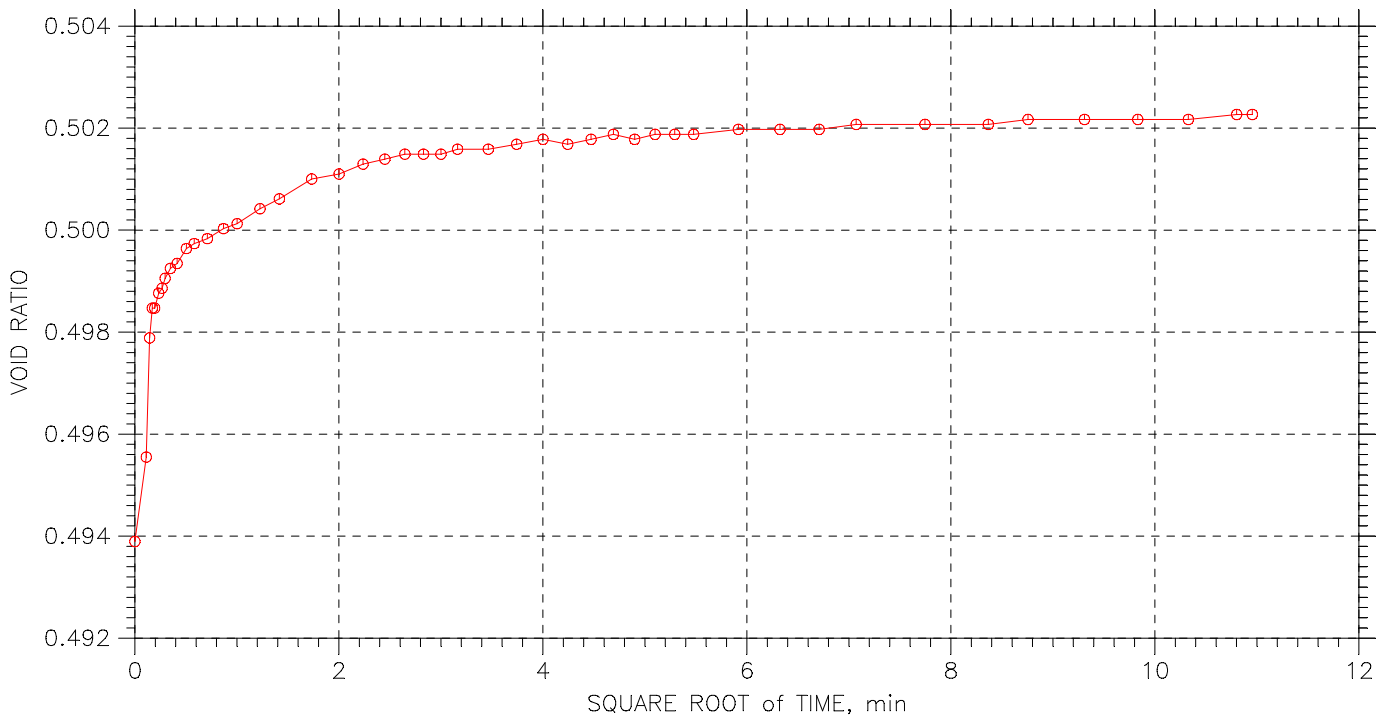
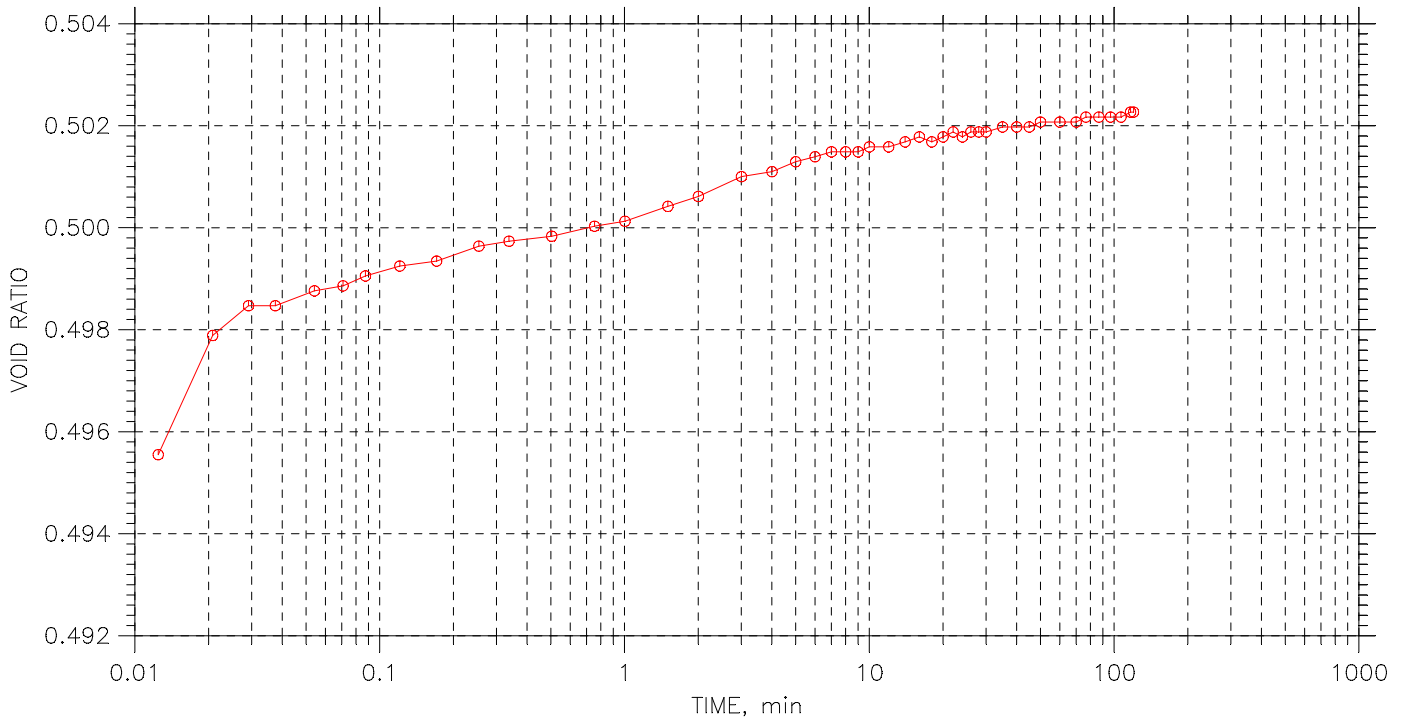
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 17

Stress: 0.5 tsf



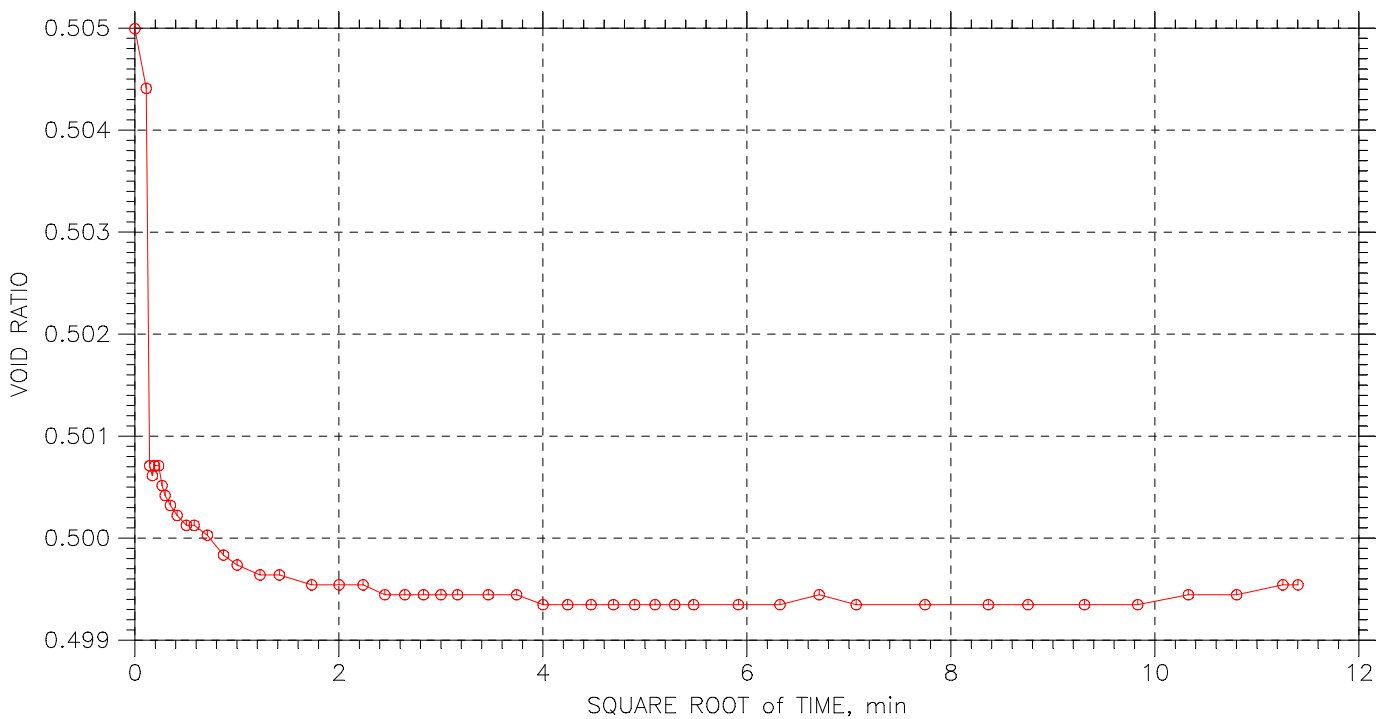
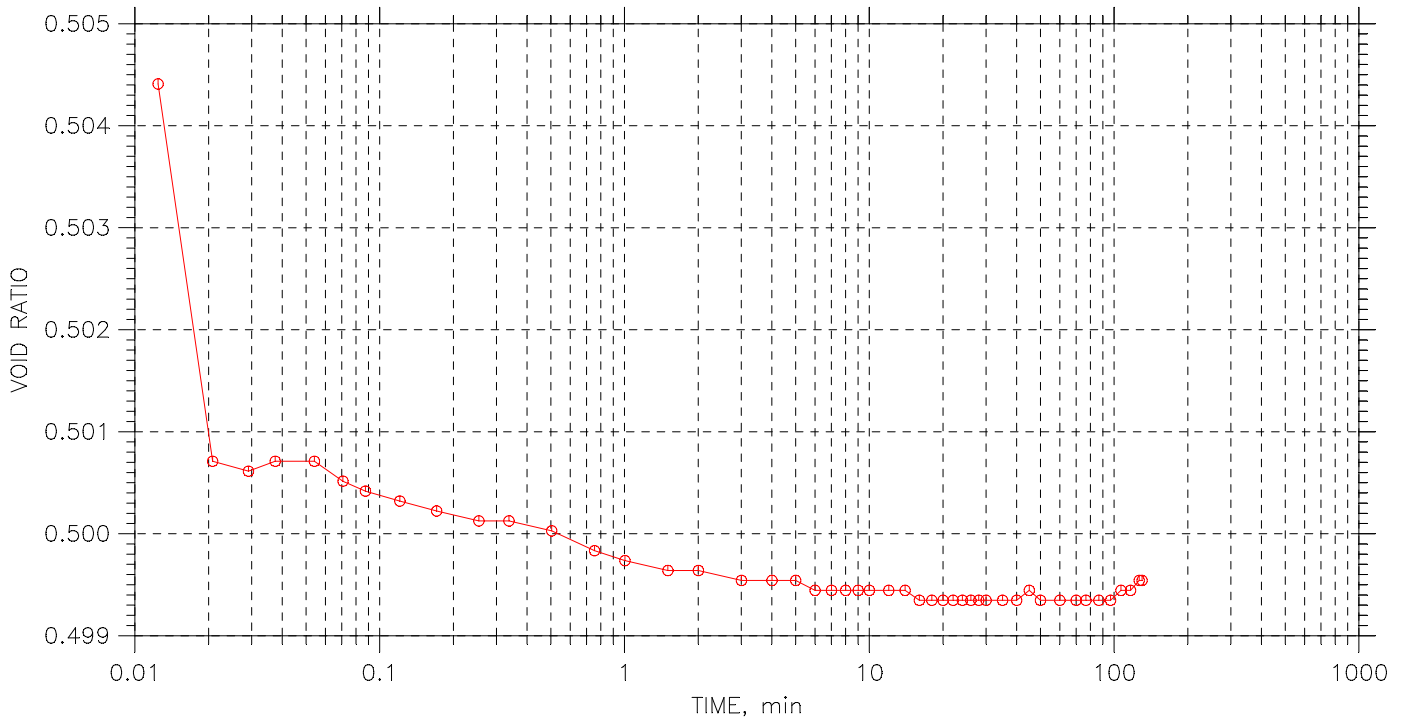
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 17

Stress: 1. tsf



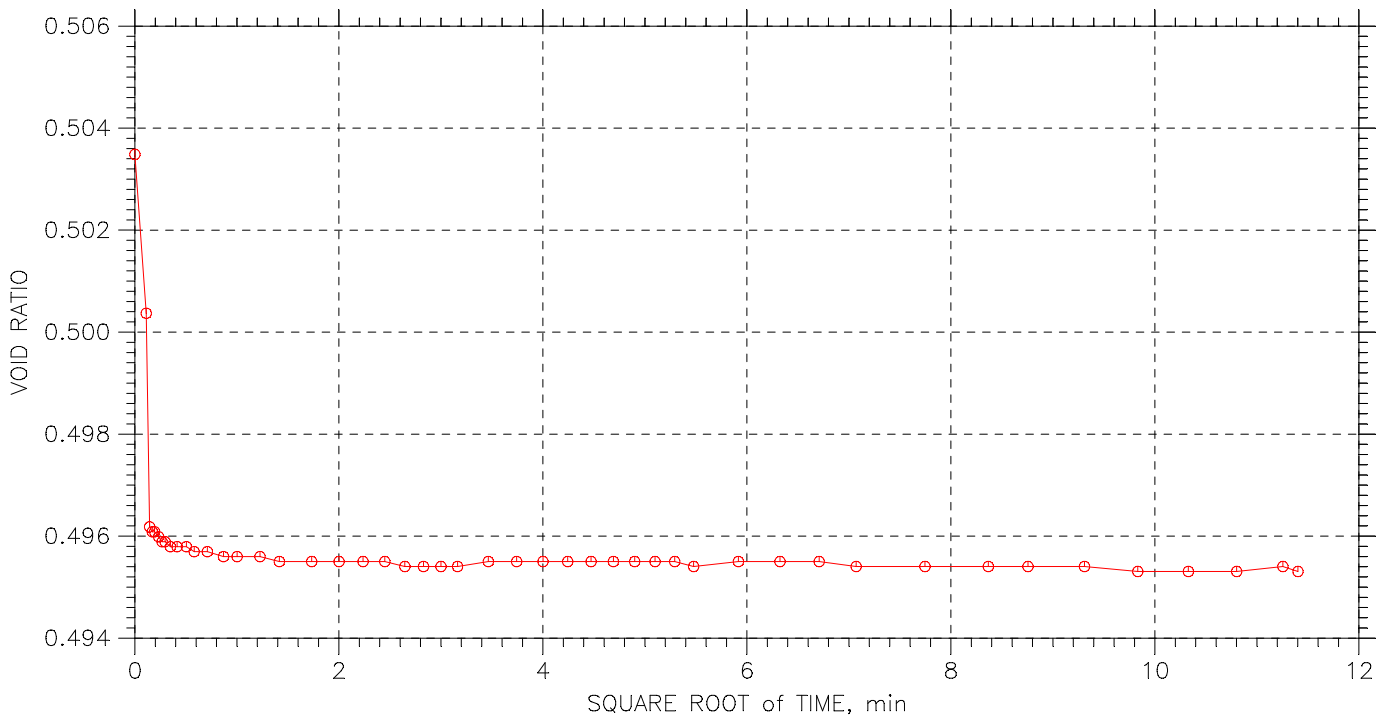
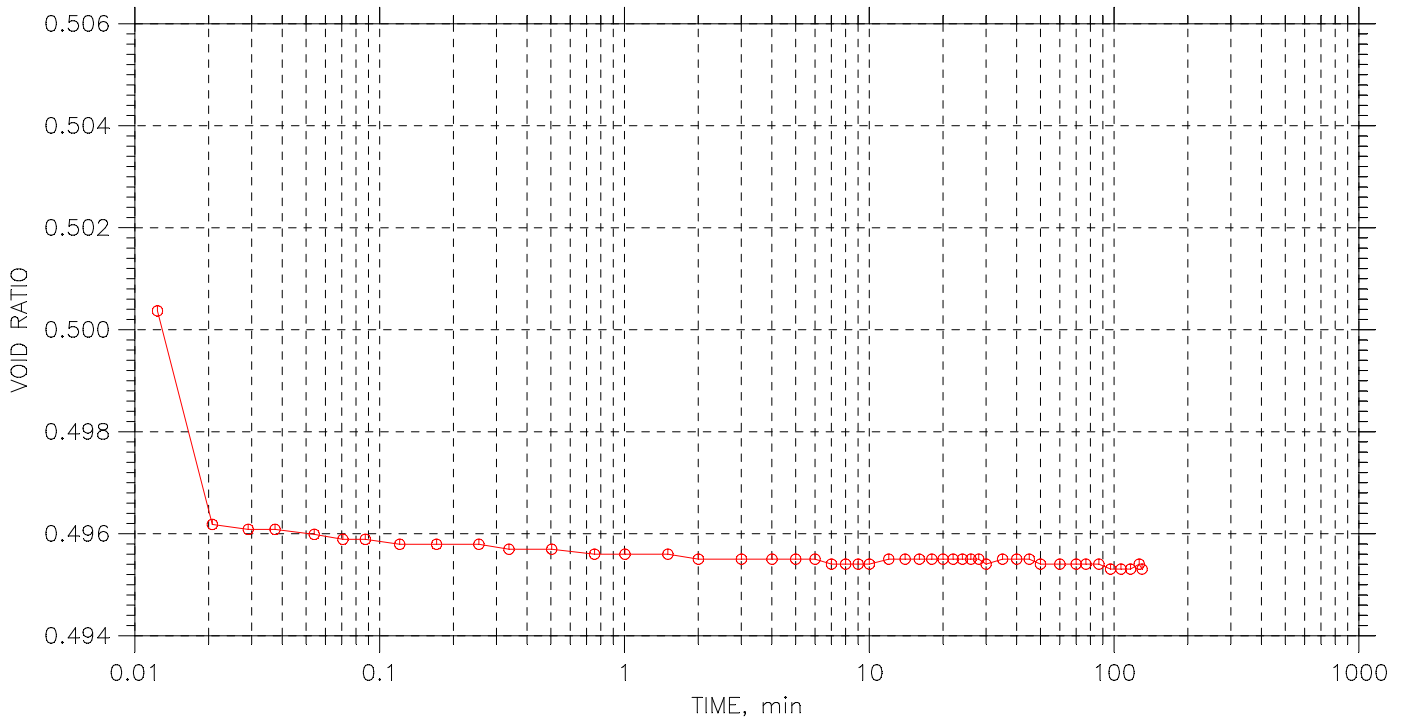
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 17

Stress: 2. tsf



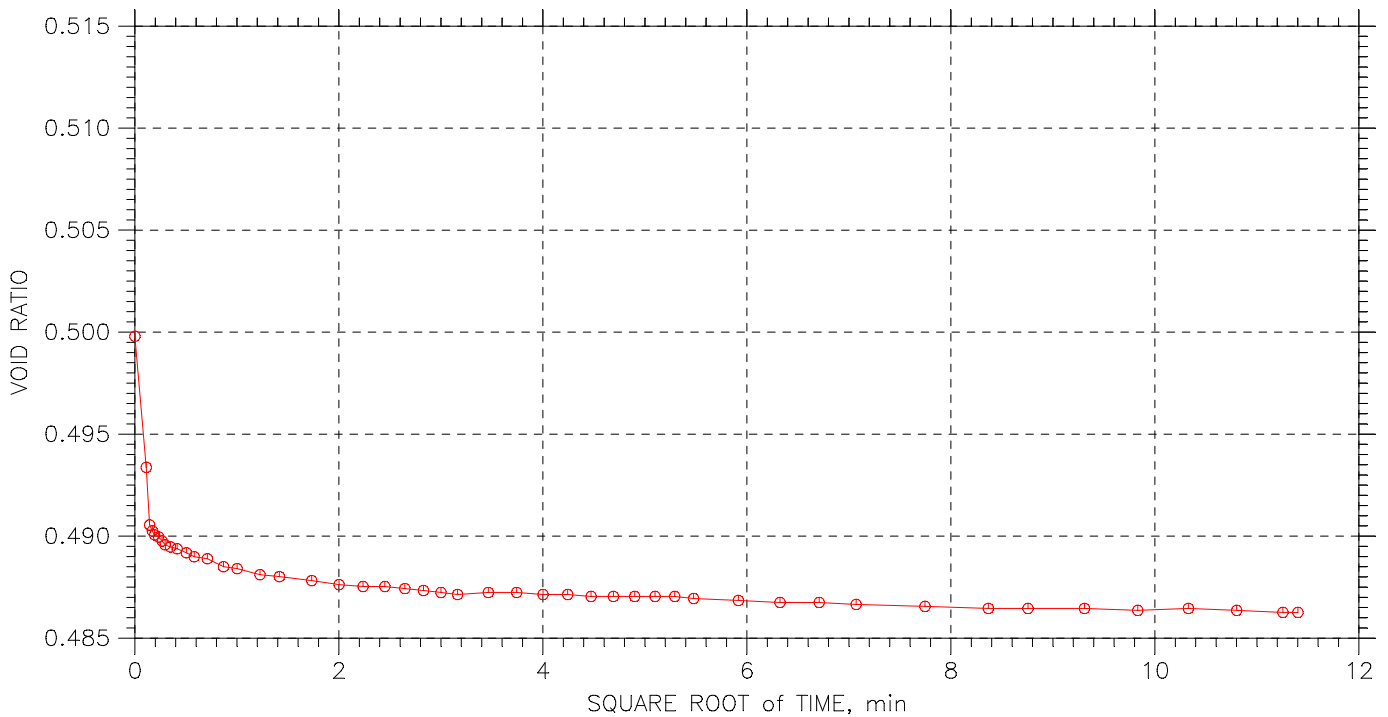
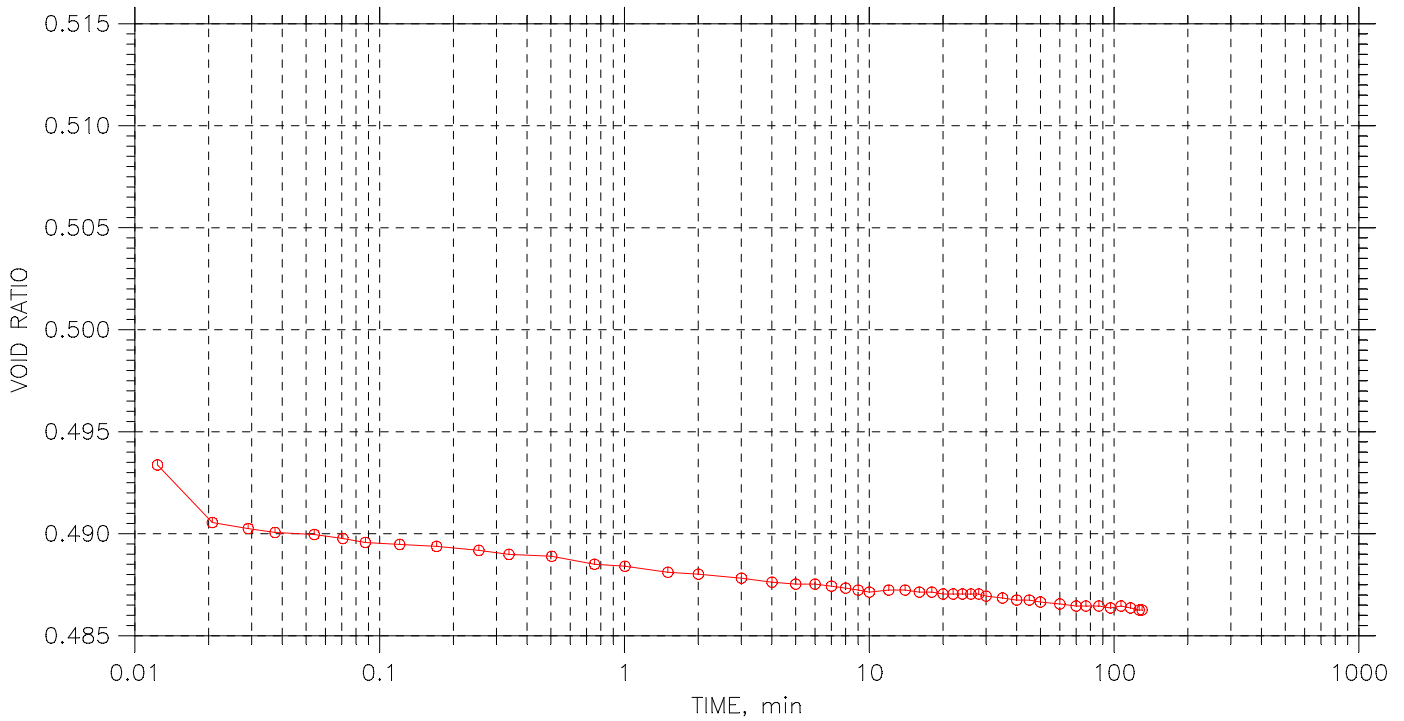
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 17

Stress: 4. tsf



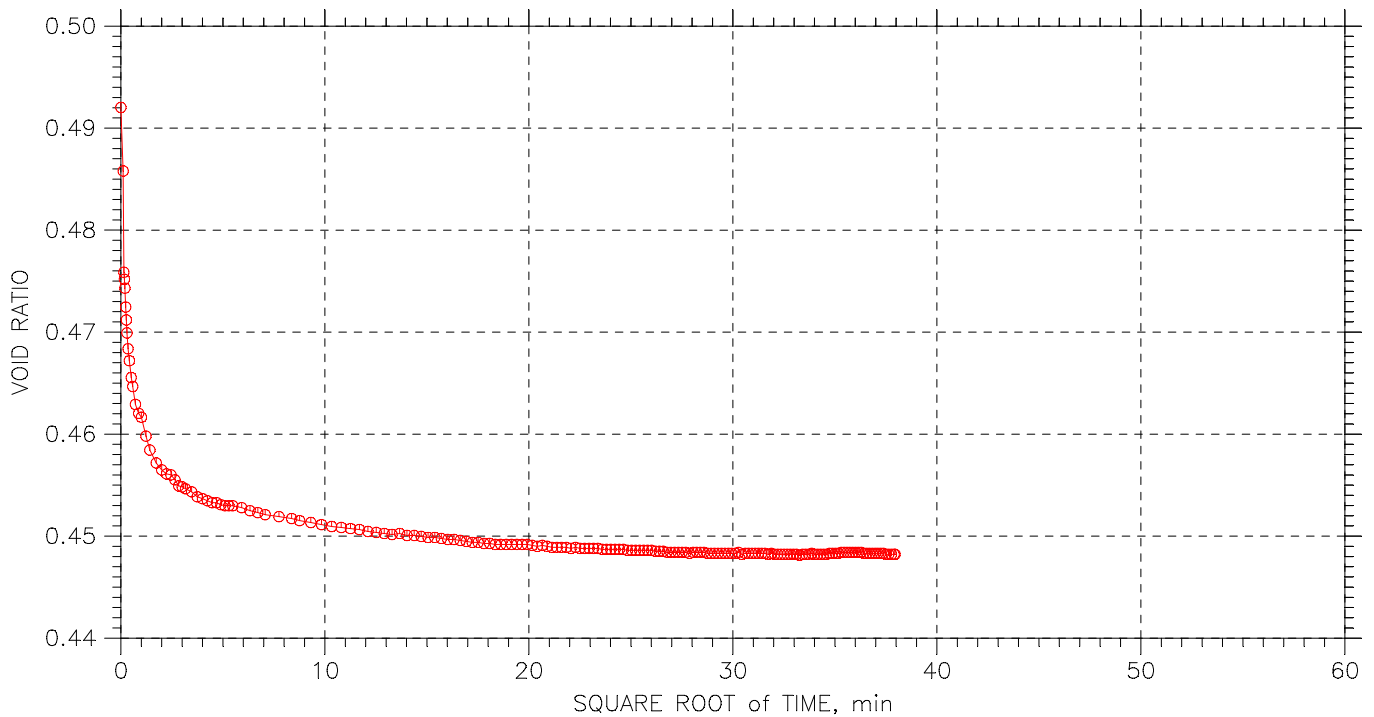
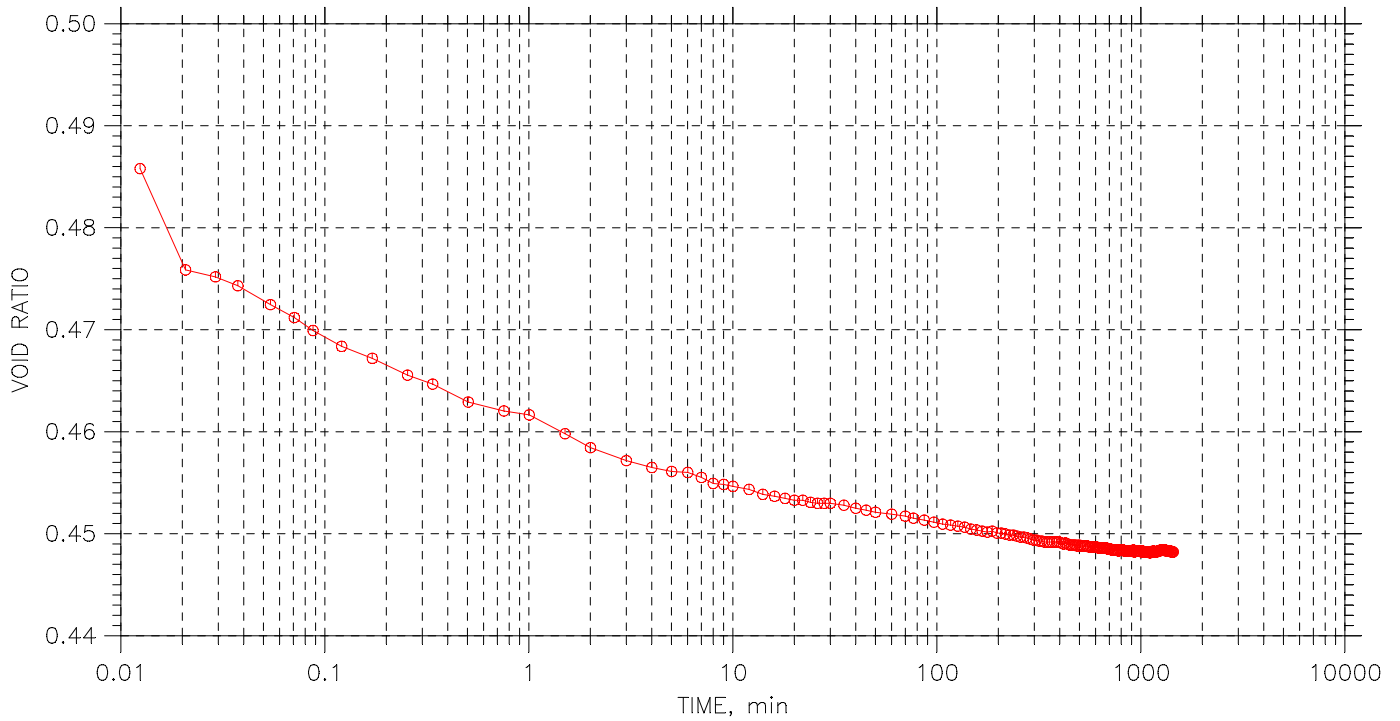
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 17

Stress: 8. tsf



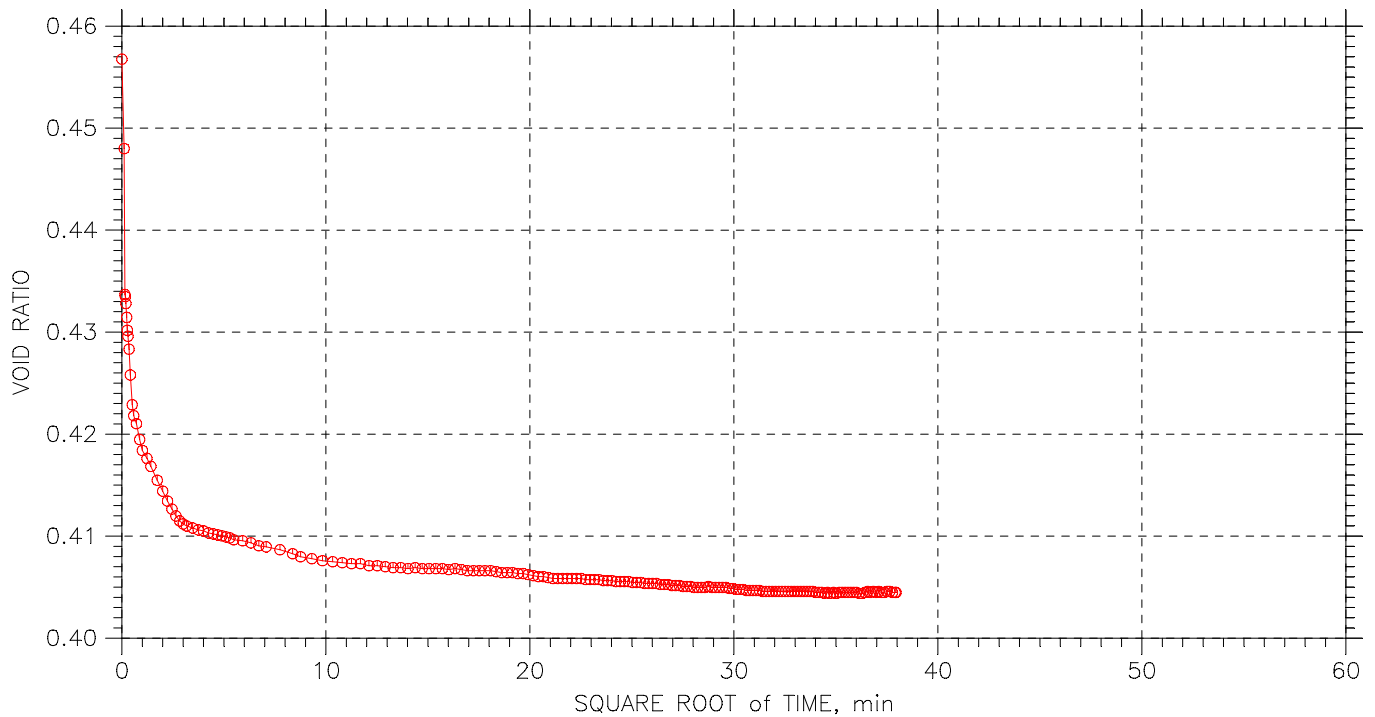
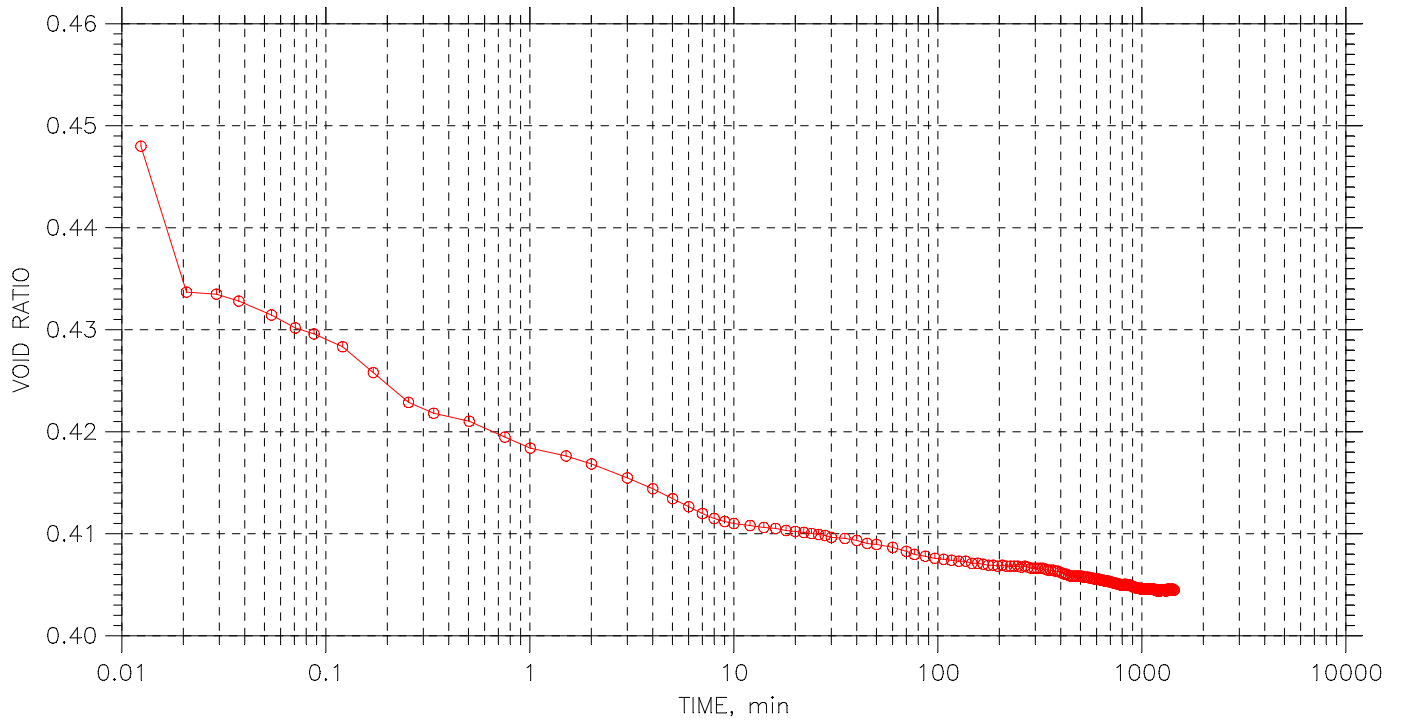
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 17

Stress: 16. tsf



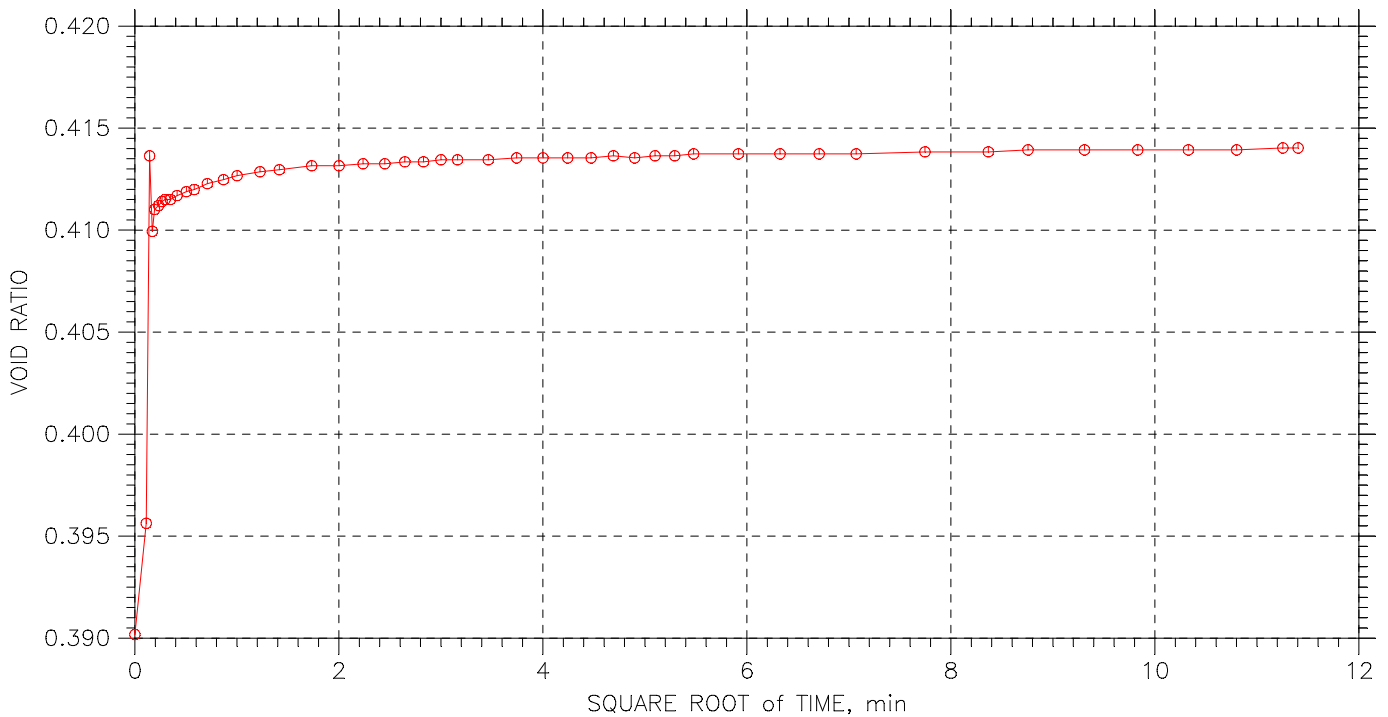
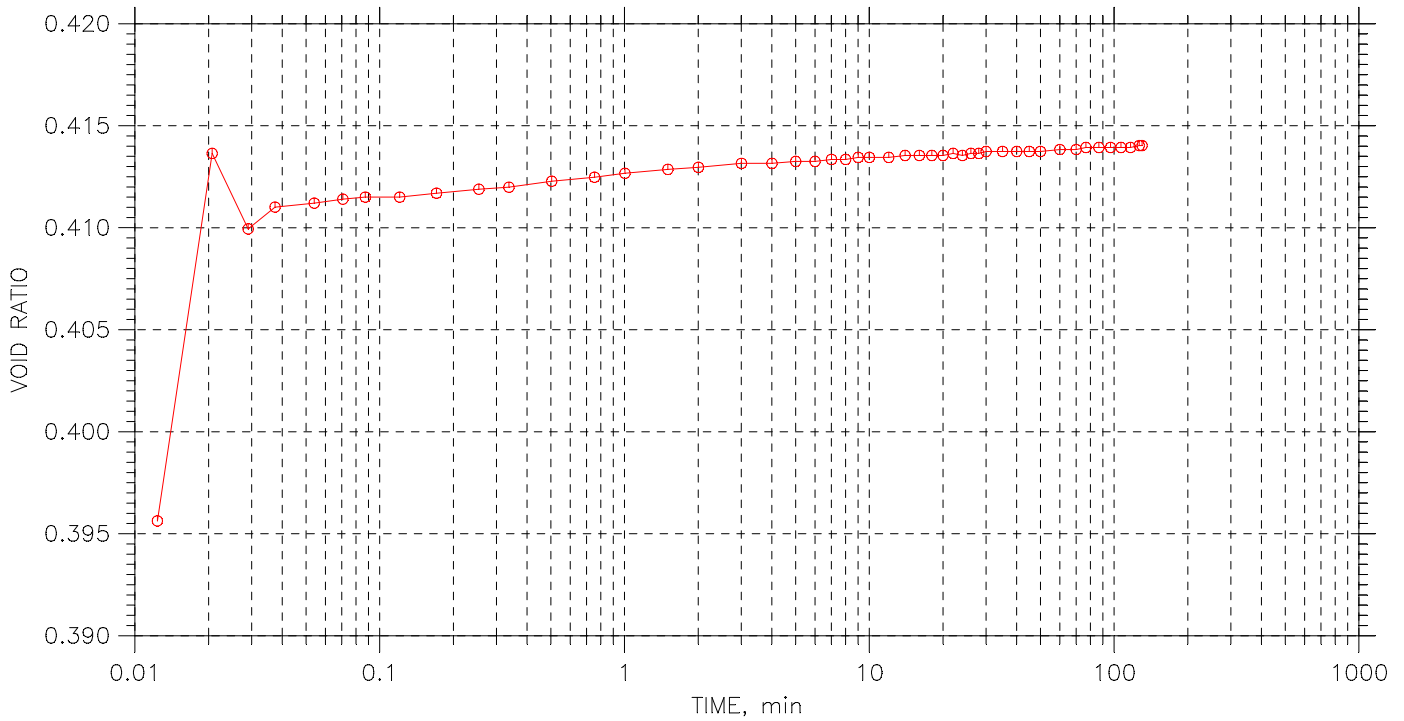
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 15 of 17

Stress: 4. tsf



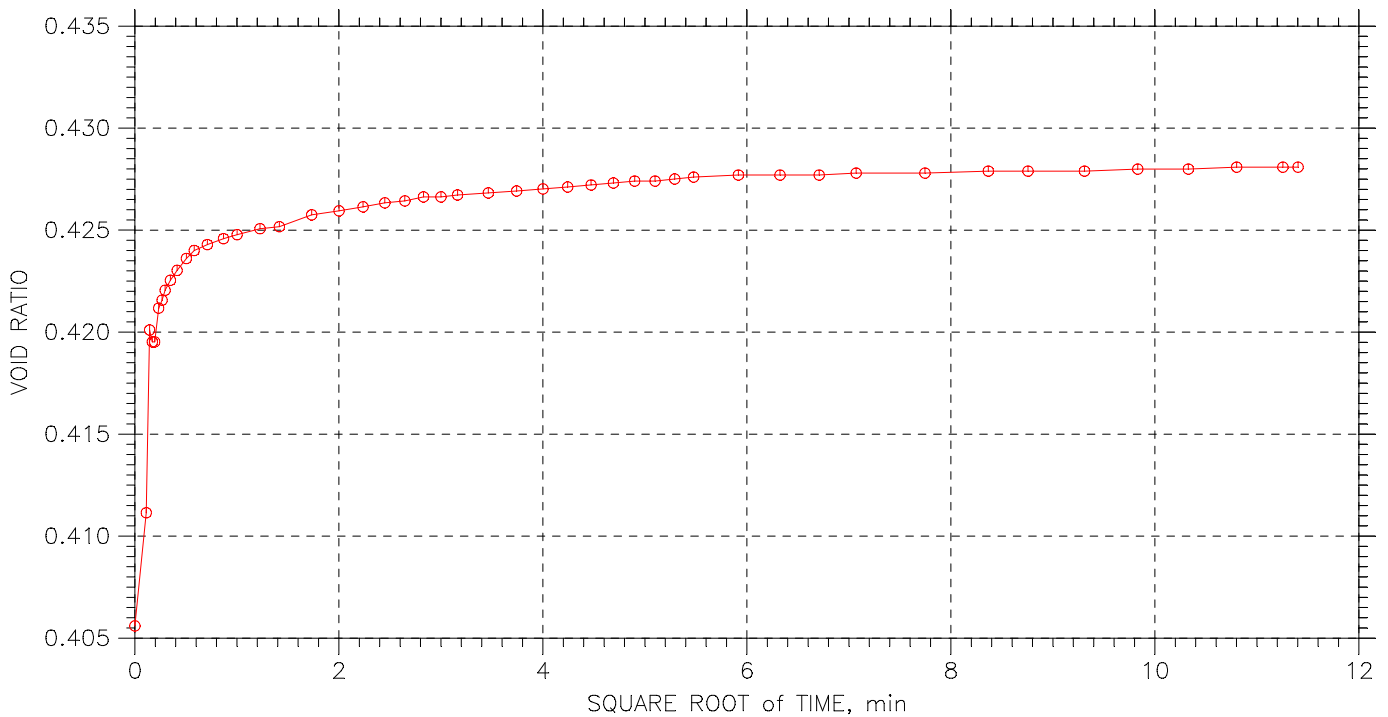
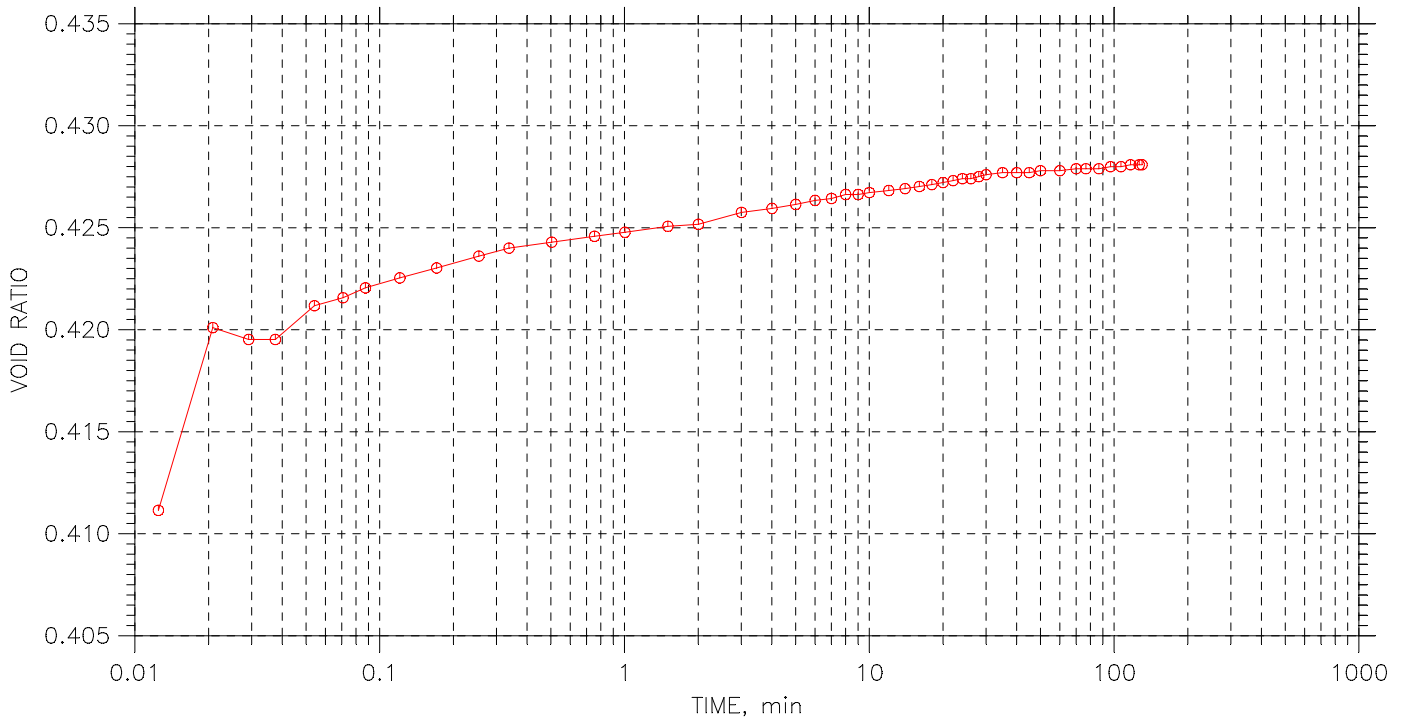
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 16 of 17

Stress: 1. tsf



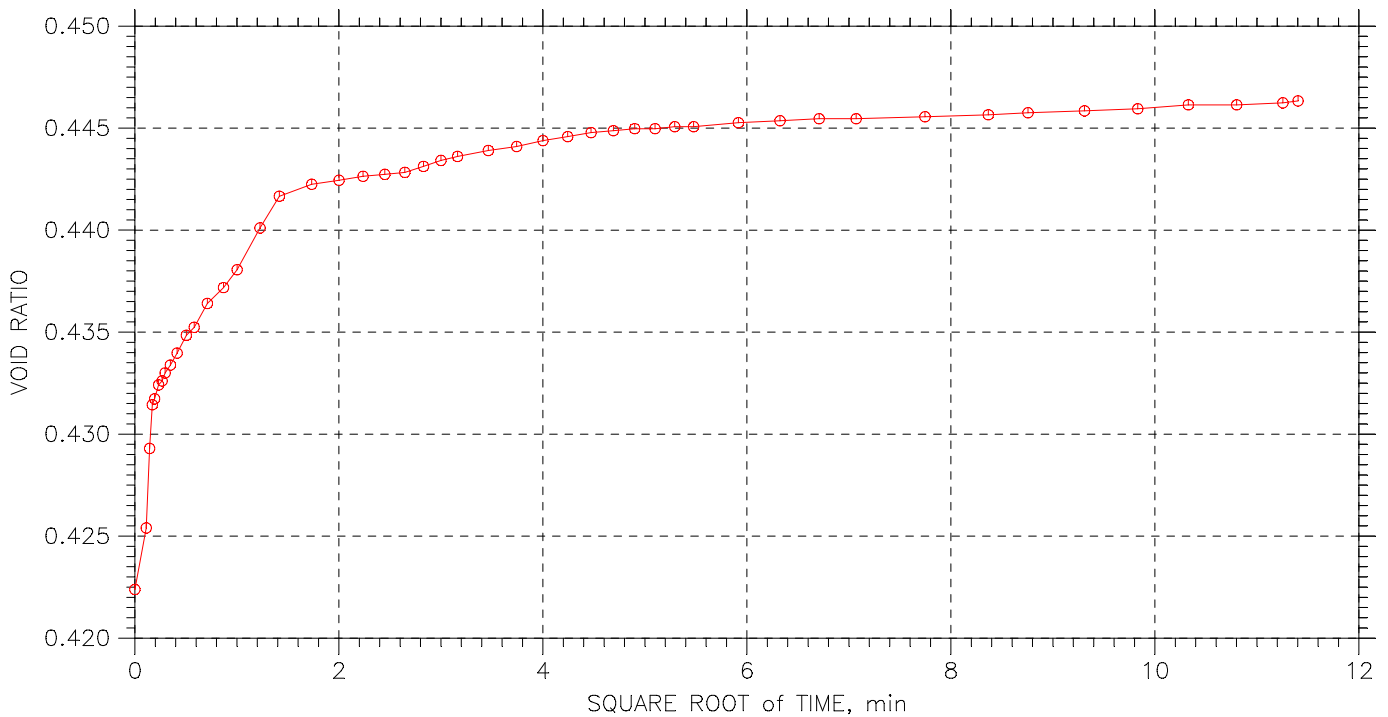
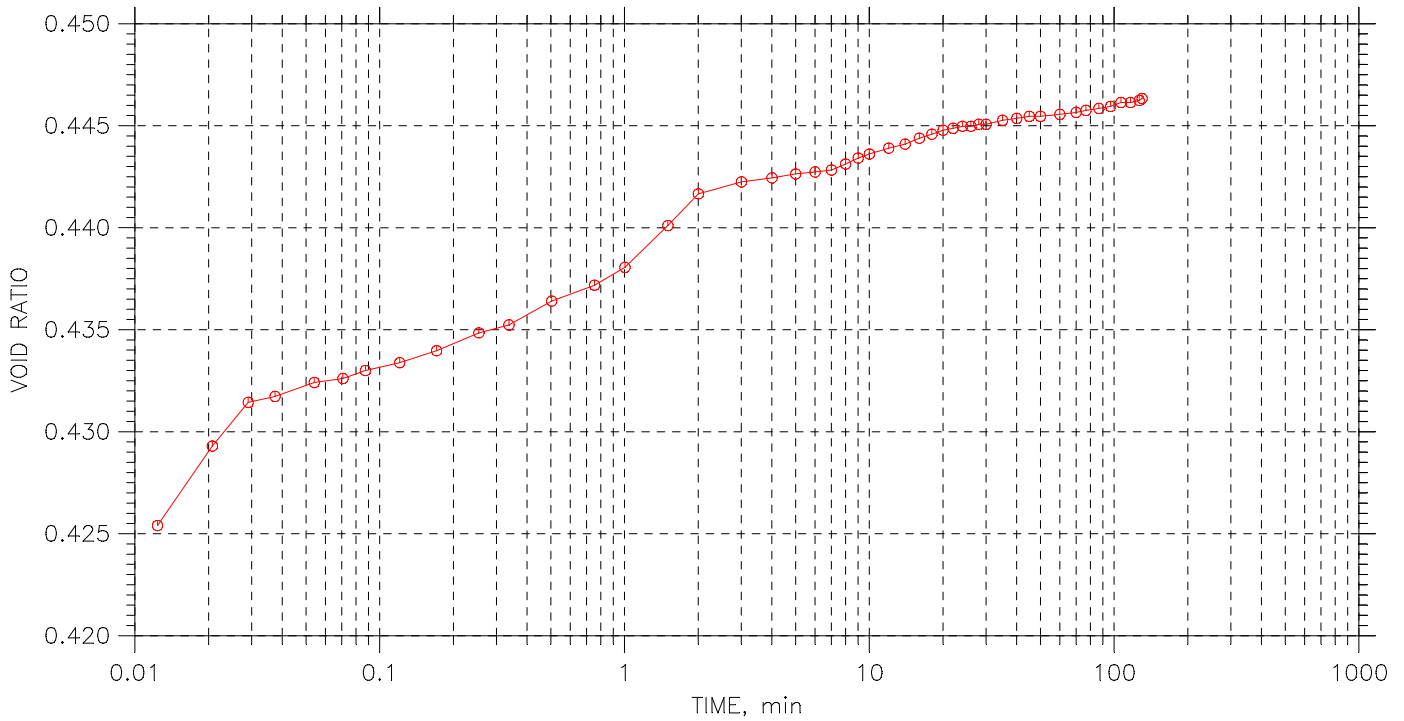
| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 17 of 17

Stress: 0.25 tsf



| | | | |
|--|--|------------------------------|----------------------|
|  | Project: I-495 NEXT Express Lanes | Location: Fairfax County, VA | Project No.: 1521-01 |
| | Boring No.: 19X-N-RW04 | Tested By: SK | Checked By: JO |
| | Sample No.: 1 | Test Date: 10/15/2019 | Depth: 15'-17' |
| | Test No.: 1 | Sample Type: Shelby Tube | Elevation: --- |
| | Description: SILT with SAND | | |
| | Remarks: AASHTO T216, with specified loads increment and time sequence | | |
| | | | |



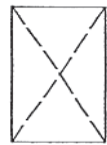
ROCK COMPRESSIVE STRENGTH TEST RESULTS (ASTM D7012 Method C)

I-495 Next Express Lanes
 E2CR Project No. 19515-03
 Client : TLB

| BORING # | SAMPLE #/DEPTH | Dimensions | | | | Compressive Load (lb) | Compressive Strength before correction (psi) | L / D | Correction factor | Compressive Strength after correction (psi) | Type of Fracture* |
|--------------|-------------------|------------------|----------------------------|------------------------------|--------------|-----------------------|--|-------|-------------------|---|-------------------|
| | | Diameter, D (in) | Length Before Capping (in) | Length After Capping, L (in) | Area (sq in) | | | | | | |
| 19-X-BR-10 | R-2 (66.5'-66.8') | 1.981 | 3.926 | 3.926 | 3.08 | 22,350 | 6,580 | 2.0 | 1.00 | 6,580 | D |
| 19-GWP-BR-22 | R-1 (52.7'-53.0') | 1.971 | 3.988 | 3.988 | 3.05 | 9,390 | 3,080 | 2.0 | 1.00 | 3,080 | D/E |
| 19-GWP-RW-13 | R-3 (65.5'-65.8') | 1.975 | 3.937 | 3.937 | 3.06 | 26,710 | 8,720 | 2.0 | 1.00 | 8,720 | D |
| 19-LOD-BR-15 | R-4 (66.8'-67.1') | 1.969 | 3.914 | 3.914 | 3.04 | 24,040 | 7,900 | 2.0 | 1.00 | 7,900 | E |
| 19-XBR-09 | R-2 (24.8'-25.1') | 1.984 | 3.956 | 3.956 | 3.09 | 22,960 | 7,430 | 2.0 | 1.00 | 7,430 | D |

NOTE: Rock not prepared in accordance with ASTM D4543

* Sketches of types of Fracture



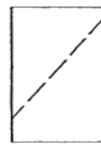
Cone (a)



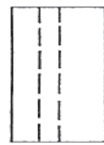
Cone and Split (b)



Cone and Shear (c)



Shear (d)



Columnar (e)

**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: NEXT 495 Express Lanes
Project Number: 1243-19-025

Report Date: September 16, 2019
Reviewed By: John B. Pearson

Revised Report
10/21/2019
N. Randy Rainwater

| Boring No. | Sample No. | Depth (ft) | Dimensions, in. | | Shape (See Key) | Area (in ²) | Unit Weight (lbs/ft ³) | Loading Rate (psi/sec) | Maximum Load (lbs) | Strength (psi) | Moisture (%) |
|-------------|------------|-------------|-----------------|----------|-----------------|-------------------------|------------------------------------|------------------------|--------------------|----------------|--------------|
| | | | Length | Diameter | | | | | | | |
| 19DTR-BR02 | R-3 | 57.5 - 57.9 | 4.46 | 1.99 | A | 3.11 | 168.1 | 65 | 10,756 | 3,459 | 0.4 |
| 19DTR-BR04a | R-1 | 55.0 - 55.5 | 4.34 | 1.99 | A | 3.11 | 159.5 | 63 | 3,517 | 1,131 | 0.4 |
| 19DTR-BR01 | R-1 | 40.6 - 41.2 | 4.35 | 1.99 | A | 3.11 | 165.4 | 68 | 9,049 | 2,910 | 0.6 |

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543-08^{e1} may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08^{e1} *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08^{e1} for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

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**PREPARING ROCK CORE AS CYLINDRICAL TEST SPECIMENS AND VERIFYING
CONFORMANCE TO DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

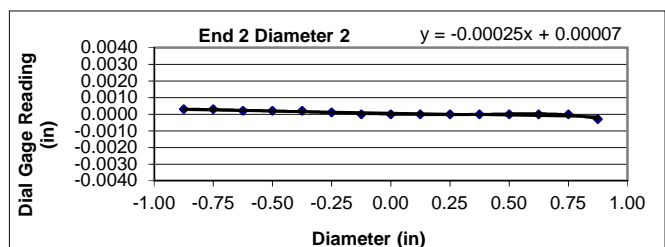
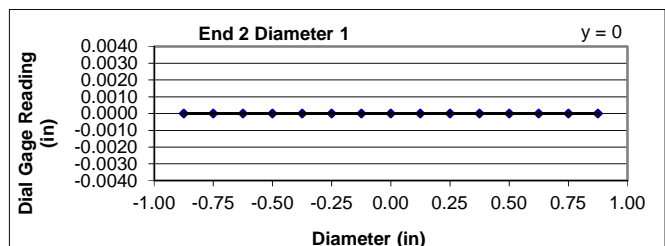
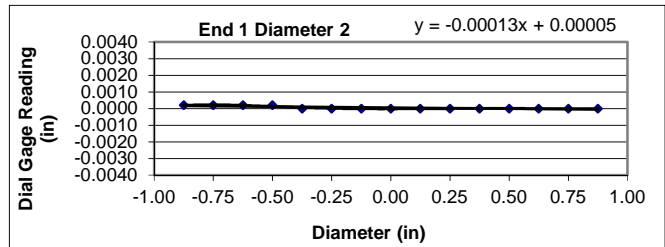
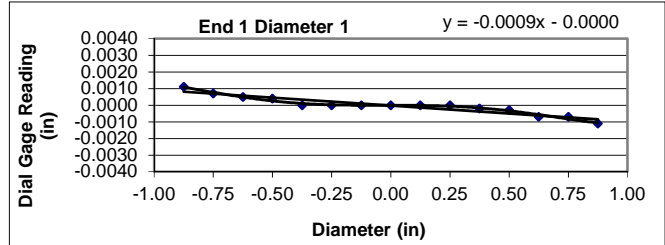
| | | |
|--|----------------------------------|----------------------------------|
| Project: NEXT 495 Express Lanes | Diameter (in): 1.99 | Date: 9/11/2019 |
| Project No.: 1243-19-025 | Length (in): 4.46 | Tested by: Tori Igoe |
| Boring Id: 19DTR-BR02 | Unit Weight (pcf): 168.1 | Reviewed by: John Pearson |
| Sample No.: R-3 | Moisture Content (%): 0.4 | |
| Depth (ft): 57.5 - 57.9 | | |

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

| Position | End 1 | End 1(90) | End 2 | End 2(90) |
|----------|---------|-----------|--------|-----------|
| - 7/8 | 0.0011 | 0.0002 | 0.0000 | 0.0003 |
| - 6/8 | 0.0007 | 0.0002 | 0.0000 | 0.0003 |
| - 5/8 | 0.0005 | 0.0002 | 0.0000 | 0.0002 |
| - 4/8 | 0.0004 | 0.0002 | 0.0000 | 0.0002 |
| - 3/8 | 0.0000 | 0.0000 | 0.0000 | 0.0002 |
| - 2/8 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| - 1/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3/8 | -0.0002 | 0.0000 | 0.0000 | 0.0000 |
| 4/8 | -0.0003 | 0.0000 | 0.0000 | 0.0000 |
| 5/8 | -0.0007 | 0.0000 | 0.0000 | 0.0000 |
| 6/8 | -0.0007 | 0.0000 | 0.0000 | 0.0000 |
| 7/8 | -0.0011 | 0.0000 | 0.0000 | -0.0003 |



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

| | | |
|--------|-------------------------|--------------|
| End 1: | Slope of Best Fit Line: | -0.00095 |
| | Angle of Best Fit Line: | -0.05435 |
| End 2: | Slope of Best Fit Line: | 0.00000 |
| | Angle of Best Fit Line: | 0.00000 |
| | Max Angular Difference: | -0.05 |

Parallelism Diameter 2

| | | |
|--------|-------------------------|-------------|
| End 1: | Slope of Best Fit Line: | -0.00013 |
| | Angle of Best Fit Line: | -0.00720 |
| End 2: | Slope of Best Fit Line: | -0.00025 |
| | Angle of Best Fit Line: | -0.01408 |
| | Max Angular Difference: | 0.01 |

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

| | Difference b/w max & min | Divide by Diameter | Meets Tolerance |
|--------------|-----------------------------|-----------------------|--------------------|
| End 1 Diam 1 | 0.0022 | 0.0011 | YES |
| End 1 Diam 2 | 0.0002 | 0.0001 | YES |
| End 2 Diam 1 | 0.0000 | 0.0000 | YES |
| End 2 Diam 2 | 0.0006 | 0.0003 | YES |

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORE AS CYLINDRICAL TEST SPECIMENS AND VERIFYING
CONFORMANCE TO DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

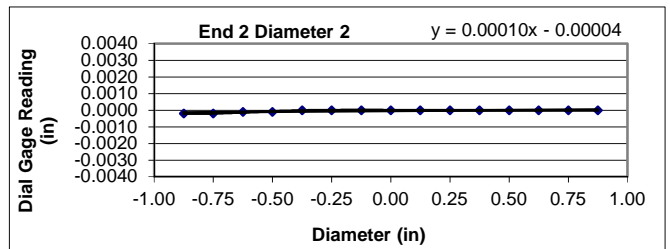
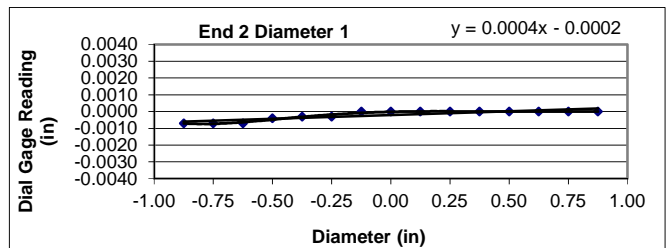
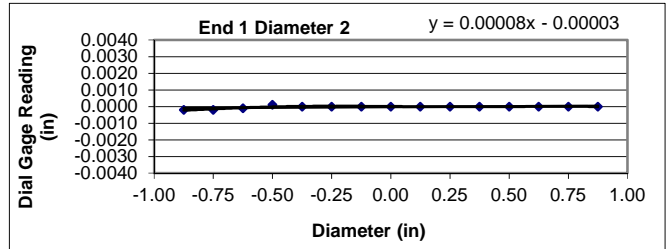
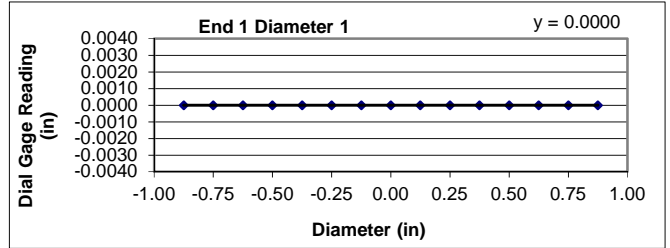
| | | |
|--|----------------------------------|----------------------------------|
| Project: NEXT 495 Express Lanes | Diameter (in): 1.99 | Date: 9/11/2019 |
| Project No.: 1243-19-025 | Length (in): 4.34 | Tested by: Tori Igoe |
| Boring Id: 19DTR-BR04a | Unit Weight (pcf): 159.5 | Reviewed by: John Pearson |
| Sample No.: R-1 | Moisture Content (%): 0.4 | |
| Depth (ft): 55.0 - 55.5 | | |

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

| Position | End 1 | End 1(90) | End 2 | End 2(90) |
|----------|--------|-----------|---------|-----------|
| - 7/8 | 0.0000 | -0.0002 | -0.0007 | -0.0002 |
| - 6/8 | 0.0000 | -0.0002 | -0.0007 | -0.0002 |
| - 5/8 | 0.0000 | -0.0001 | -0.0007 | -0.0001 |
| - 4/8 | 0.0000 | 0.0001 | -0.0004 | -0.0001 |
| - 3/8 | 0.0000 | 0.0000 | -0.0003 | 0.0000 |
| - 2/8 | 0.0000 | 0.0000 | -0.0003 | 0.0000 |
| - 1/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 5/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 6/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 7/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

| | | |
|--------|-------------------------|--------------|
| End 1: | Slope of Best Fit Line: | 0.00000 |
| | Angle of Best Fit Line: | 0.00000 |
| End 2: | Slope of Best Fit Line: | 0.00045 |
| | Angle of Best Fit Line: | 0.02570 |
| | Max Angular Difference: | -0.03 |

Parallelism Diameter 2

| | | |
|--------|-------------------------|-------------|
| End 1: | Slope of Best Fit Line: | 0.00008 |
| | Angle of Best Fit Line: | 0.00442 |
| End 2: | Slope of Best Fit Line: | 0.00010 |
| | Angle of Best Fit Line: | 0.00573 |
| | Max Angular Difference: | 0.00 |

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

| | Difference b/w max & min | Divide by Diameter | Meets Tolerance |
|--------------|-----------------------------|-----------------------|--------------------|
| End 1 Diam 1 | 0.0000 | 0.0000 | YES |
| End 1 Diam 2 | 0.0003 | 0.0002 | YES |
| End 2 Diam 1 | 0.0007 | 0.0004 | YES |
| End 2 Diam 2 | 0.0002 | 0.0001 | YES |

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORE AS CYLINDRICAL TEST SPECIMENS AND VERIFYING
CONFORMANCE TO DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

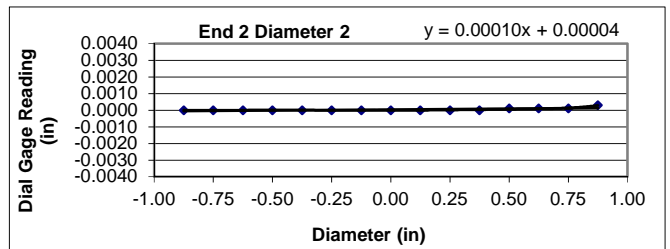
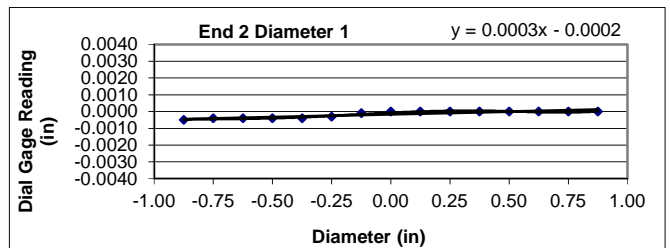
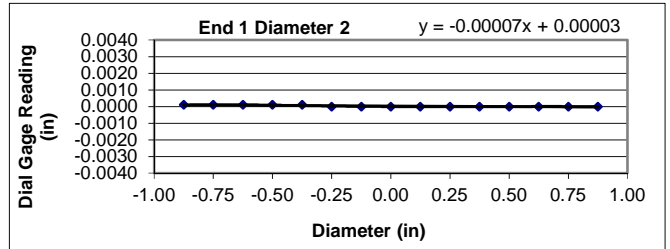
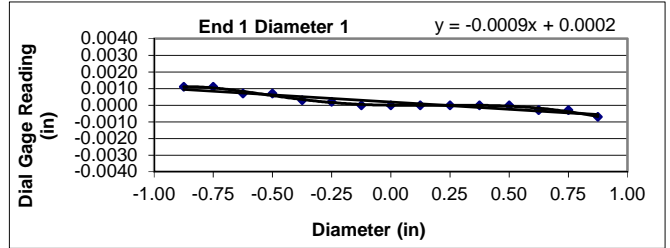
| | | |
|--|----------------------------------|----------------------------------|
| Project: NEXT 495 Express Lanes | Diameter (in): 1.99 | Date: 9/11/2019 |
| Project No.: 1243-19-025 | Length (in): 4.35 | Tested by: Tori Igoe |
| Boring Id: 19DTR-BR01 | Unit Weight (pcf): 165.4 | Reviewed by: John Pearson |
| Sample No.: R-1 | Moisture Content (%): 0.6 | |
| Depth (ft): 40.6 - 41.2 | | |

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

| Position | End 1 | End 1(90) | End 2 | End 2(90) |
|----------|---------|-----------|---------|-----------|
| - 7/8 | 0.0011 | 0.0001 | -0.0005 | 0.0000 |
| - 6/8 | 0.0011 | 0.0001 | -0.0004 | 0.0000 |
| - 5/8 | 0.0007 | 0.0001 | -0.0004 | 0.0000 |
| - 4/8 | 0.0007 | 0.0001 | -0.0004 | 0.0000 |
| - 3/8 | 0.0003 | 0.0001 | -0.0004 | 0.0000 |
| - 2/8 | 0.0002 | 0.0000 | -0.0003 | 0.0000 |
| - 1/8 | 0.0000 | 0.0000 | -0.0001 | 0.0000 |
| 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3/8 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4/8 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| 5/8 | -0.0003 | 0.0000 | 0.0000 | 0.0001 |
| 6/8 | -0.0003 | 0.0000 | 0.0000 | 0.0001 |
| 7/8 | -0.0007 | 0.0000 | 0.0000 | 0.0003 |



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

| | | |
|--------|-------------------------|--------------|
| End 1: | Slope of Best Fit Line: | -0.00086 |
| | Angle of Best Fit Line: | -0.04927 |
| End 2: | Slope of Best Fit Line: | 0.00033 |
| | Angle of Best Fit Line: | 0.01866 |
| | Max Angular Difference: | -0.07 |

Parallelism Diameter 2

| | | |
|--------|-------------------------|--------------|
| End 1: | Slope of Best Fit Line: | -0.00007 |
| | Angle of Best Fit Line: | -0.00409 |
| End 2: | Slope of Best Fit Line: | 0.00010 |
| | Angle of Best Fit Line: | 0.00589 |
| | Max Angular Difference: | -0.01 |

Parallelism Tolerance Met? YES


Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

| | Difference b/w max & min | Divide by Diameter | Meets Tolerance |
|--------------|-----------------------------|-----------------------|--------------------|
| End 1 Diam 1 | 0.0018 | 0.0009 | YES |
| End 1 Diam 2 | 0.0001 | 0.0001 | YES |
| End 2 Diam 1 | 0.0005 | 0.0003 | YES |
| End 2 Diam 2 | 0.0003 | 0.0002 | YES |

Perpendicularity Tolerance Met? YES

| | | |
|----------|-------------------------------|--|
| | | Date: 9/12/2019 |
| | | Photographer: Tori Igoe |
| 1 | Location / Orientation | 19DTR-BR02, R-3 (57.5' – 57.9') |
| | Remarks | Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C) |

| | | |
|----------|-------------------------------|--|
| | | Date: 9/12/2019 |
| | | Photographer: Tori Igoe |
| 2 | Location / Orientation | 19DTR-BR04a, R-1 (55.0' – 55.5') |
| | Remarks | Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C) |

| | | |
|--|-------------------------------|--|
|  | | Date: 9/12/2019 |
| | | Photographer: Tori Igoe |
| 3 | Location / Orientation | 19DTR-BR01, R-1 (40.6' – 41.2') |
| | Remarks | Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C) |



PROJECT NEXT

APPENDIX E

PAVEMENT DESIGN CALCULATIONS

Table 1 – Summary of Preliminary Traffic Parameters for Pavement Design

Table 2 – Summary of Recommended Minimum Pavement Sections

AASHTOWare Pavement ME Designs

I-495 NB/SB GP Lanes

Dulles Toll Road Interchange Ramps

Old Dominion Drive

Georgetown Pike

George Washington Memorial Parkway Ramps

Secondary Pavement Design Calculations

Live Oak Drive

Asphalt Concrete Overlay Calculations

I-495 Mainline NB/SB

I-495 Express Lanes NB/SB

Table 1 – Summary of Preliminary Traffic Parameters for Pavement Design

| Parameter | I-495 GP Lanes NB/SB ¹ | I-495 Express Lanes NB/SB ¹ | DTR Ramps ¹ | Old Dominion Drive ^{1,3} | Georgetown Pike ¹ | Georgetown Pike Ramps ¹ | George Washington Memorial PW ¹ | George Washington Memorial PW Ramps ¹ | Live Oak Drive ² | Reference |
|--------------------------------|------------------------------------|--|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|--|--|--------------------------------|--|
| Design life | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 20 | VDOT MOI VI |
| Functional Classification | Interstate | Interstate | Interstate Ramp | High Volume Secondary | Divided Primary | Interstate Ramp | Divided Primary | Interstate Ramp | Secondary | VDOT ME User Manual pg 12 |
| Level of Reliability | 95 | 95 | 95 | 80 | 90 | 95 | 90 | 95 | 80 | VDOT ME User Manual pg 12 |
| ADT – Opening Year (2025) | 212,400 | 33,000 | 33,300 (Calculated from ADT 2018) | 9,578 (Calculated from ADT 2018) | 23,842 (Calculated from ADT 2018) | 12,900 (Calculated from ADT 2018) | 60,900 | 32,000 (Calculated from ADT 2018) | 550 (Calculated from ADT 2018) | ADT (2025) I-495 GP and Express Lanes NB/SB – Provided by Transurban ADT (2025) – George Washington memorial PW provided by Kimley Horn ADT (2018) – VDOT Database |
| ADT –Year (2045) | 244,100 | 43,200 | 34,000 | 12,200 | 30,000 | 10,400 | 66,900 | 19,700 | -- | ADT (2025) I-495 GP and Express Lanes NB/SB – Provided by Transurban ADT (2025) – George Washington memorial PW provided by Kimley Horn ADT (2018) – VDOT Database |
| Year Open to Traffic | 2025 | 2025 | 2025 | 2025 | 2025 | 2025 | 2025 | 2025 | 2025 | provided by Kimley Horn |
| Growth rate | 1 | 1.5 | 1 | 1.5 | 1.5 | 0 | 1 | 0 | 1.5 | Calculated from ADTs |
| % Trucks | 9.2 | 5.9 | 4 | 3 | 4 | 4 | 1 | 1 | -- | ADT (2025) I-495 GP and Express Lanes NB/SB – Provided by Transurban ADT (2025) – George Washington memorial PW provided by Kimley Horn ADT (2018) – VDOT Database |
| Number of Lanes Each Direction | >4 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | Typical Sections 7-31-2019 and KMZ 8-6-2019 |
| Lane Distribution | 60 | 90 | 90 | 100 | 90 | 90 | 90 | 100 | 100 | VDOT ME User Manual pg 14 |
| Directional Distribution | 56 | 56 | 100 | 71 | 57 | 100 | 53 | 100 | -- | provided by Kimley Horn |
| Operational Speed | 55 (Posted) 60 (Used in Design) | 55 (Posted) 60 (Used in Design) | 60 (Used in Design) | 40 (Posted) 50 (Used in Design) | 35 (Posted) 50 (Used in Design) | 50 (Used in Design) | 50 (Used in Design) | 50 (Used in Design) | -- | https://www.virginiaroads.org/datasets/vdot-speed-limits-map |
| AASHTO Subgrade Soil Type | A-6 | A-6 | A-6 | A-6 | A-6 | A-6 | A-6 | A-6 | A-6 | Predominant subgrade type |
| CBR | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | Table 5-11 of AASHTOWare Pavement ME User Manual |

Notes: ¹ Pavement design performed using AASHTOWare Pavement ME version 2.2.6 software.

² Pavement design performed using VDOT’s Pavement Design Guide for Subdivision and Secondary Roads (2018).

³ Pavement design performed using MEPDG considering the high volume secondary road, ADT (2025)~10,000.

Table 2 – Summary of Recommended Minimum Pavement Sections

| I-495 NB/SB GP Lanes (High-Side Widening Section Option) | | | |
|---|---|------------------|--------------|
| Layer | Material | Thickness | Notes |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. | |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 13.0 in. | |
| 4-Cement Treated Aggregate (CTA) base | Cement Treated Aggregate Base Material, Type I, Size 21B | 10.0 in. | |
| I-495 NB/SB GP Lanes (Low-Side Widening Section Option) | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. | |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 13.0 in. | |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B | 10.0 in. | |
| Dulles Toll Road Interchange Ramps to I-495 NB Express Lanes (High-Side Widening Section Option) | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. | (a) |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 12.0 in. | |
| 4-Cement Treated Aggregate (CTA) base | Cement Treated Aggregate Base Material, Type I, Size 21B | 6.0 in. | |
| Dulles Toll Road Interchange Ramps to I-495 NB Express Lanes (Low-Side Widening Section Option) | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SMA-9.5 | 1.5 in. | (a) |
| 2-Intermediate | Asphalt Concrete, Type SMA-12.5 | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0D | 12.0 in. | |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 14.0 in. | |
| Old Dominion Drive | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. | |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0A | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 6.5 in. | (a) |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. | (a) |

| Georgetown Pike and adjoining Ramps, George Washington Memorial Parkway and adjoining Ramps | | | |
|--|---|------------------|-----|
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SM-9.5D | 1.5 in. | |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0D | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 6.5 in. | |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. | (a) |
| Balls Hill Road | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. | (b) |
| 2-Base | Asphalt Concrete, Type BM-25.0A | 8.5 in. | |
| 3-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. | |
| Live Oak Drive | | | |
| Layer | Material | Thickness | |
| 1-Surface | Asphalt Concrete, Type SM-9.5A | 1.5 in. | |
| 2-Intermediate | Asphalt Concrete, Type IM-19.0A | 2.0 in. | |
| 3-Base | Asphalt Concrete, Type BM-25.0A | 3.0 in. | |
| 4-Subbase | Aggregate Base Material, Type I, Size 21B extended through the shoulder to daylight | 12.0 in. | (a) |

Notes: (a) Increased to match the existing pavement section as recommended by VDOT.

(b) No pavement design performed. Pavement section recommended by VDOT.

MEPDG Output Reports

Proposed Pavement Sections for I-495 NB/SB Widening



I-495 NB & SB_Flexible Design_CBR of 5 Fill



File Name: C:\Users\kheiter\Desktop\MEPDG-NEXT Updates\I-495 NB and SB\Proposed Widening\CBR of 5 Fill\NO CTA\I-495 NB & SB_Flexible Design_CBR of 5 Fill.dgpx

Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 13.0 |
| NonStabilized | VDOT Avg 21A-21B | 10.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 19,541 |
| 2040 (15 years) | 38,602,800 |
| 2055 (30 years) | 83,419,400 |

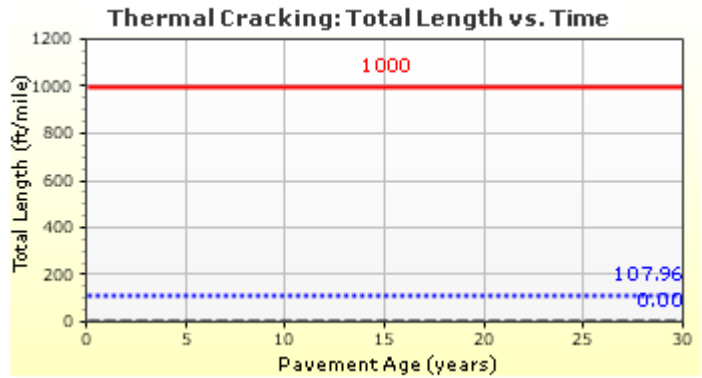
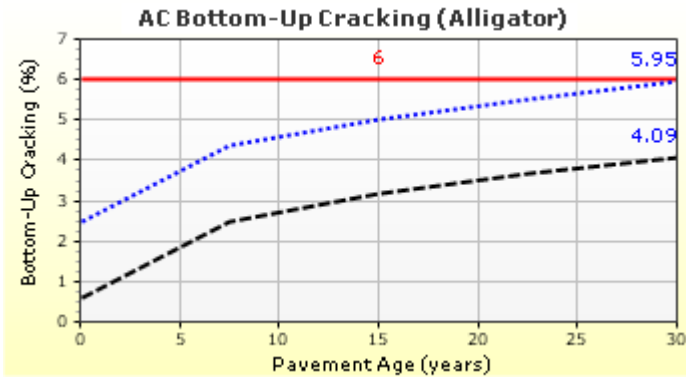
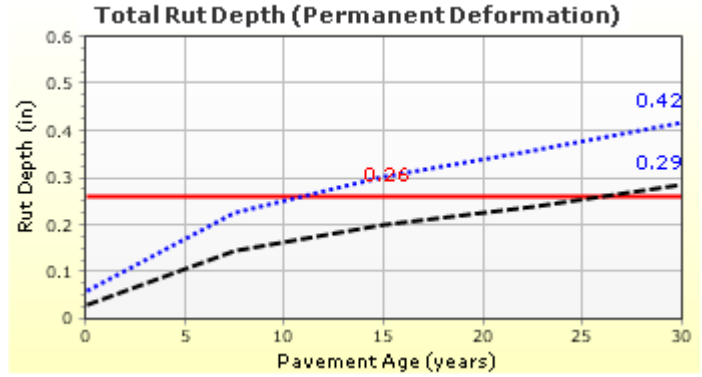
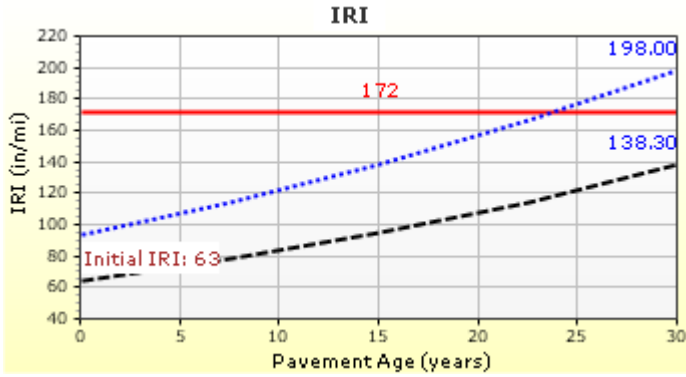
Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 198.04 | 95.00 | 82.31 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.42 | 95.00 | 38.02 | Fail ** |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.95 | 95.00 | 95.45 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 107.96 | 95.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 329.81 | 95.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.38 | 95.00 | 51.97 | Fail |

Note: ** Per Section 4.1 of ME User Manual, last paragraph, "Some designs with extreme high traffic volume may not meet the rutting distress criteria at year 15. In such situations, users may need to look carefully into their design. If increasing thickness does not improve the rutting and if bottom-up fatigue criteria meets the specified threshold criteria, users may need to look rutting at the end of design period. The design is assumed to be sufficient when the total permanent deformation at end of design life is below 0.5 inches".

Distress Charts

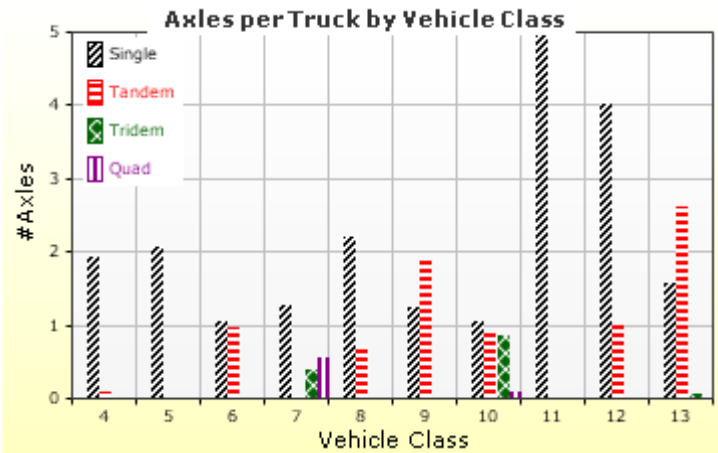
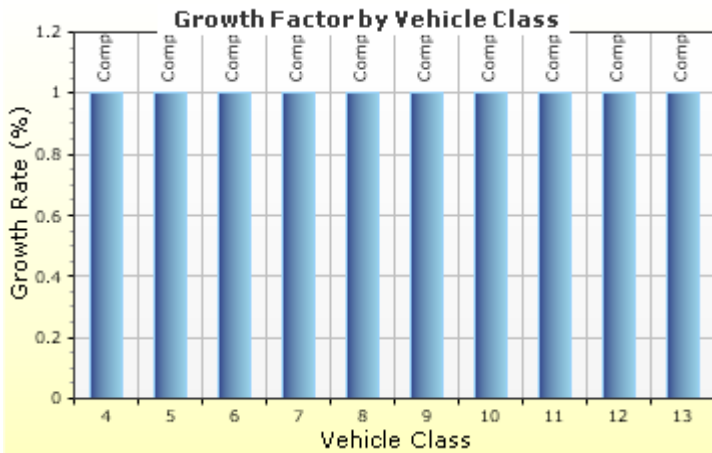
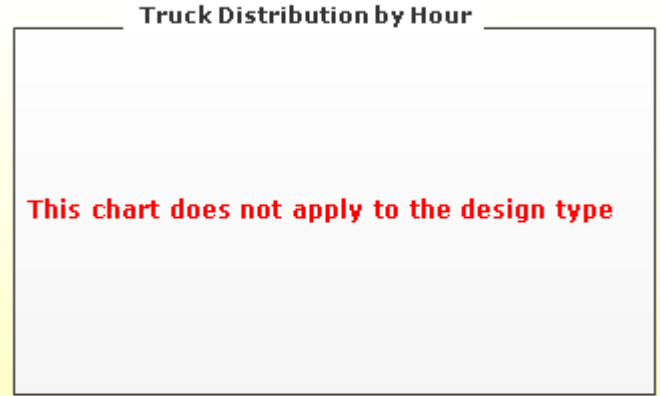
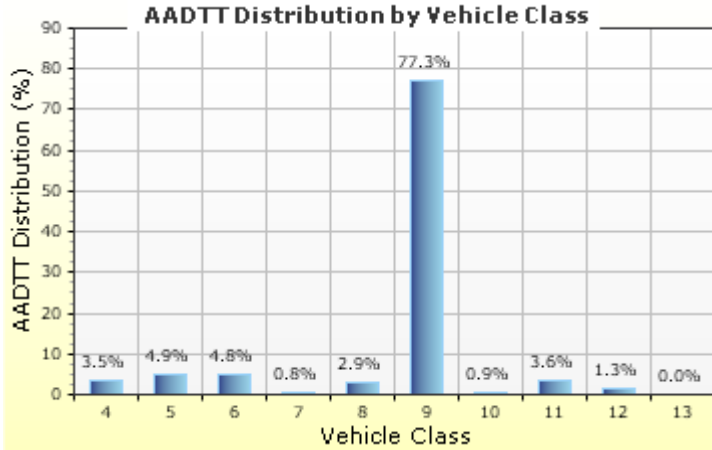


Traffic Inputs

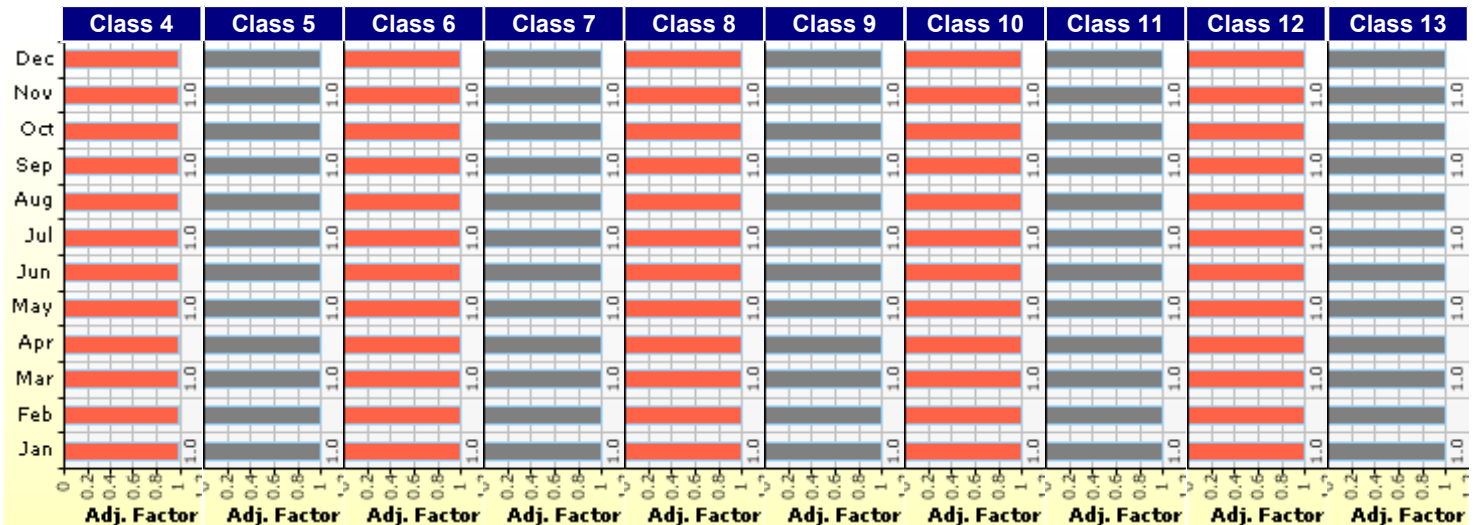
Graphical Representation of Traffic Inputs

Initial two-way AADTT: **19,541**
 Number of lanes in design direction: **4**

Percent of trucks in design direction (%): **56.0**
 Percent of trucks in design lane (%): **60.0**
 Operational speed (mph): **60.0**



Traffic Volume Monthly Adjustment Factors





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Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1% | Compound |
| Class 5 | 4.92% | 1% | Compound |
| Class 6 | 4.75% | 1% | Compound |
| Class 7 | 0.82% | 1% | Compound |
| Class 8 | 2.89% | 1% | Compound |
| Class 9 | 77.29% | 1% | Compound |
| Class 10 | 0.92% | 1% | Compound |
| Class 11 | 3.58% | 1% | Compound |
| Class 12 | 1.32% | 1% | Compound |
| Class 13 | 0.01% | 1% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

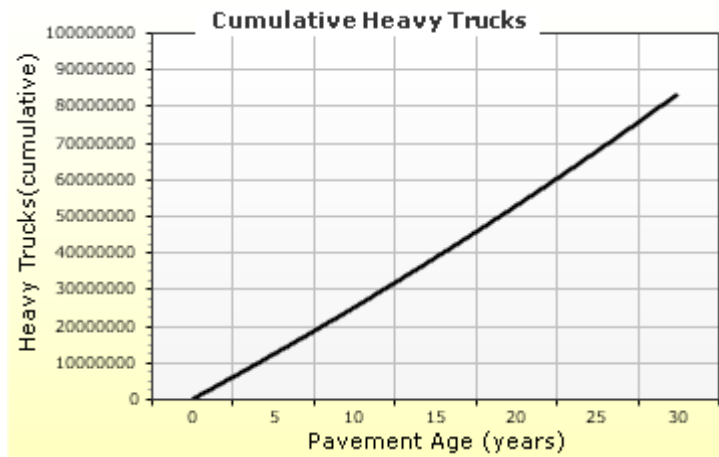
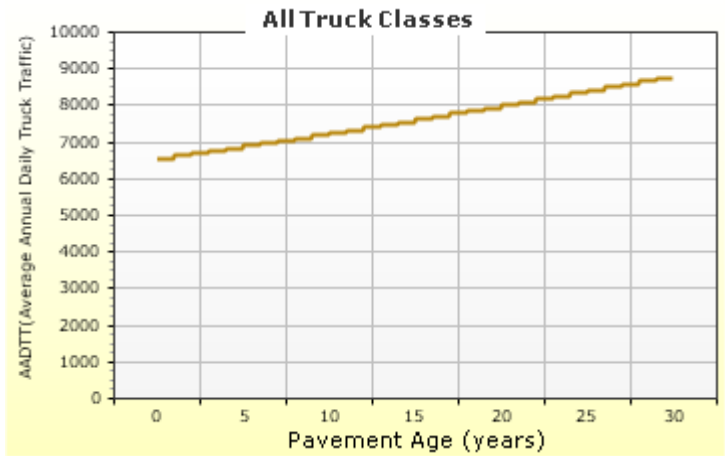
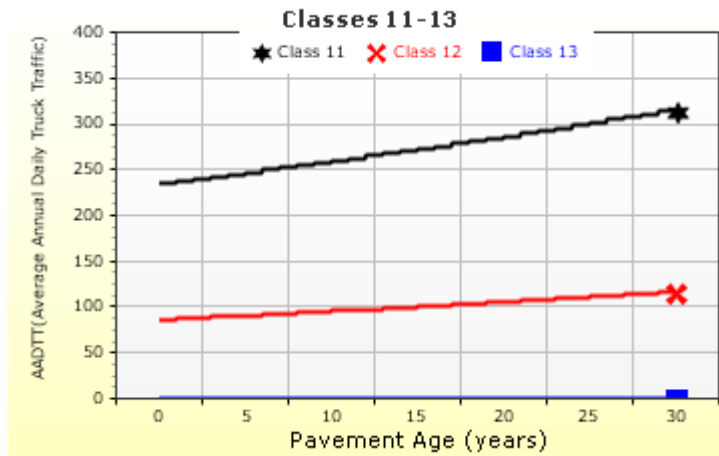
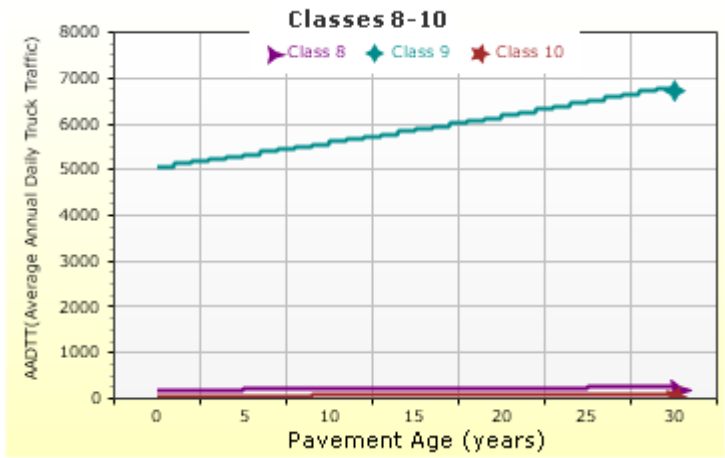
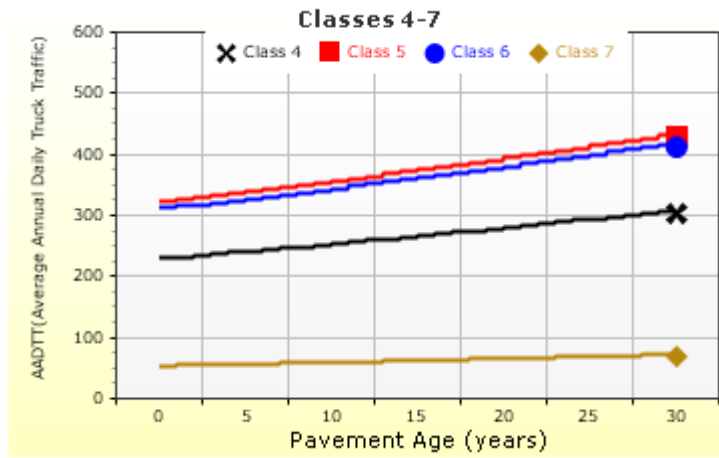
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



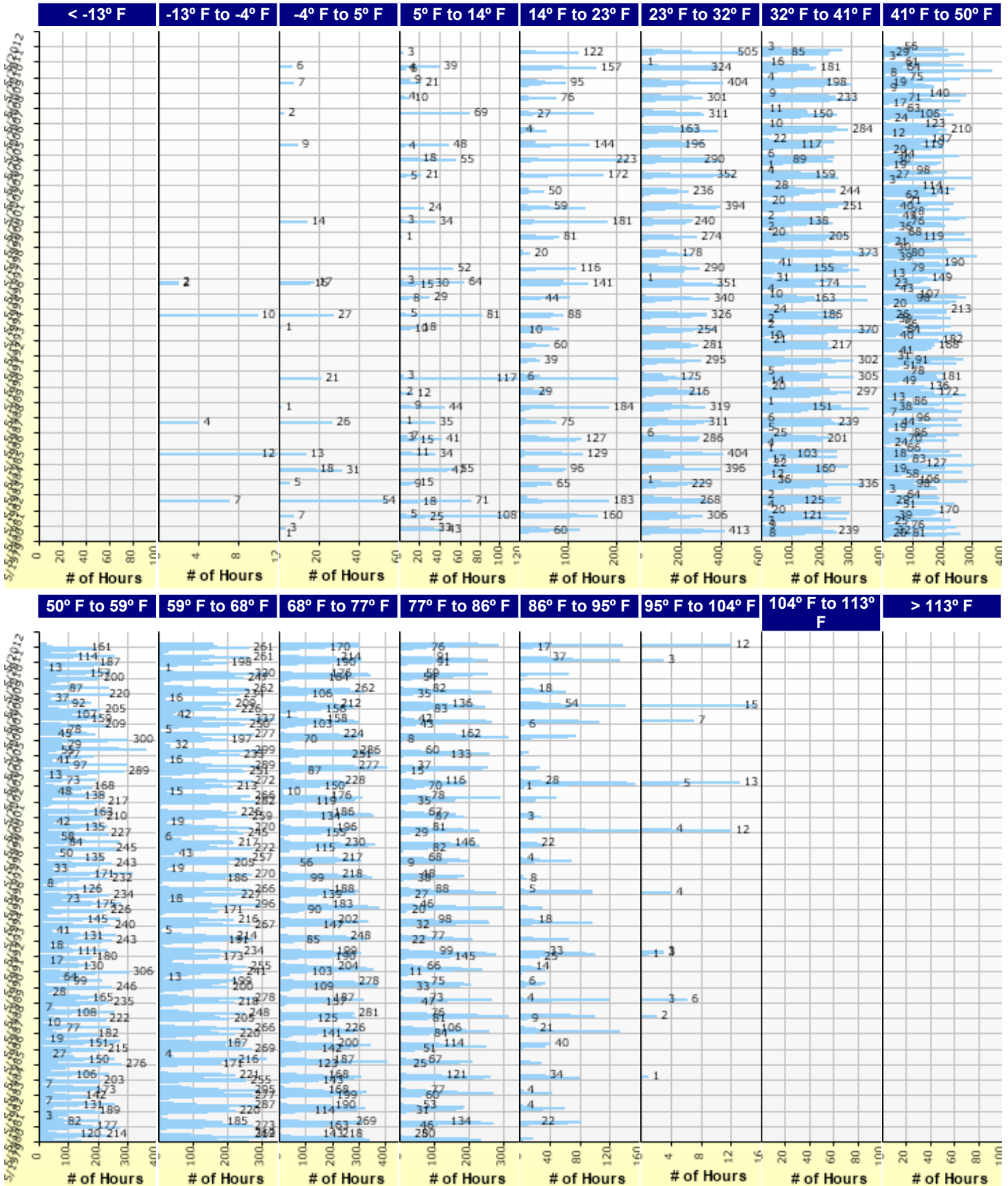


I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Hourly Air Temperature Distribution by Month:





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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

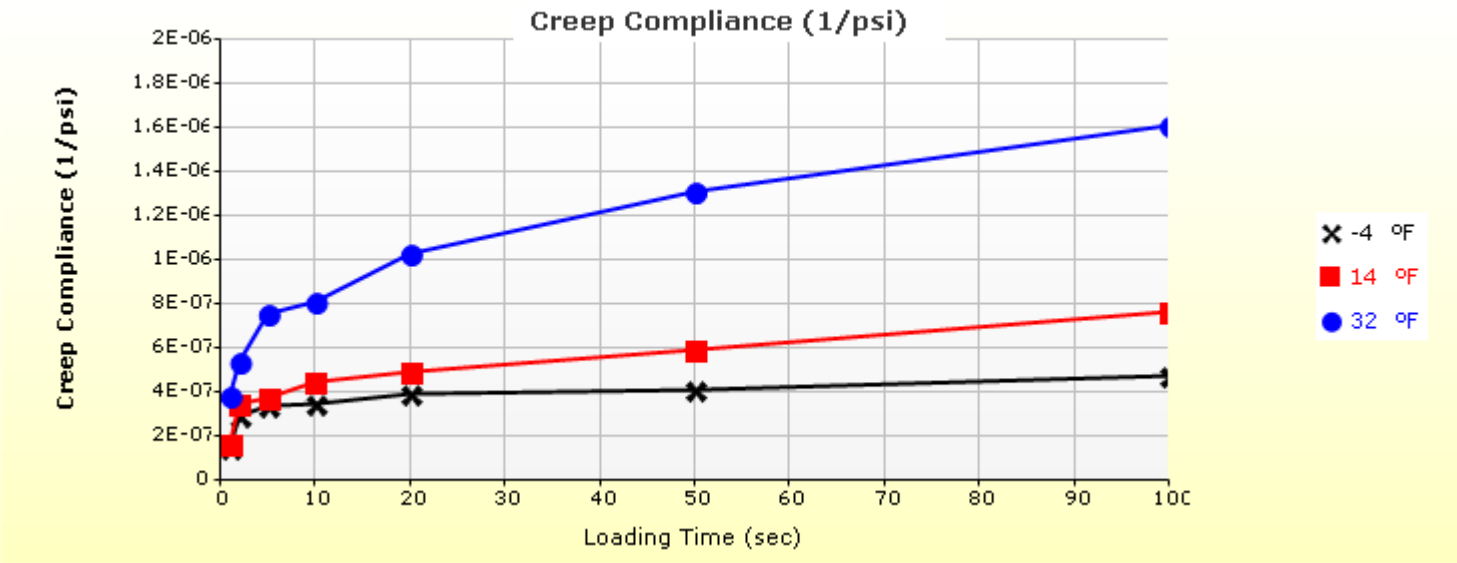
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

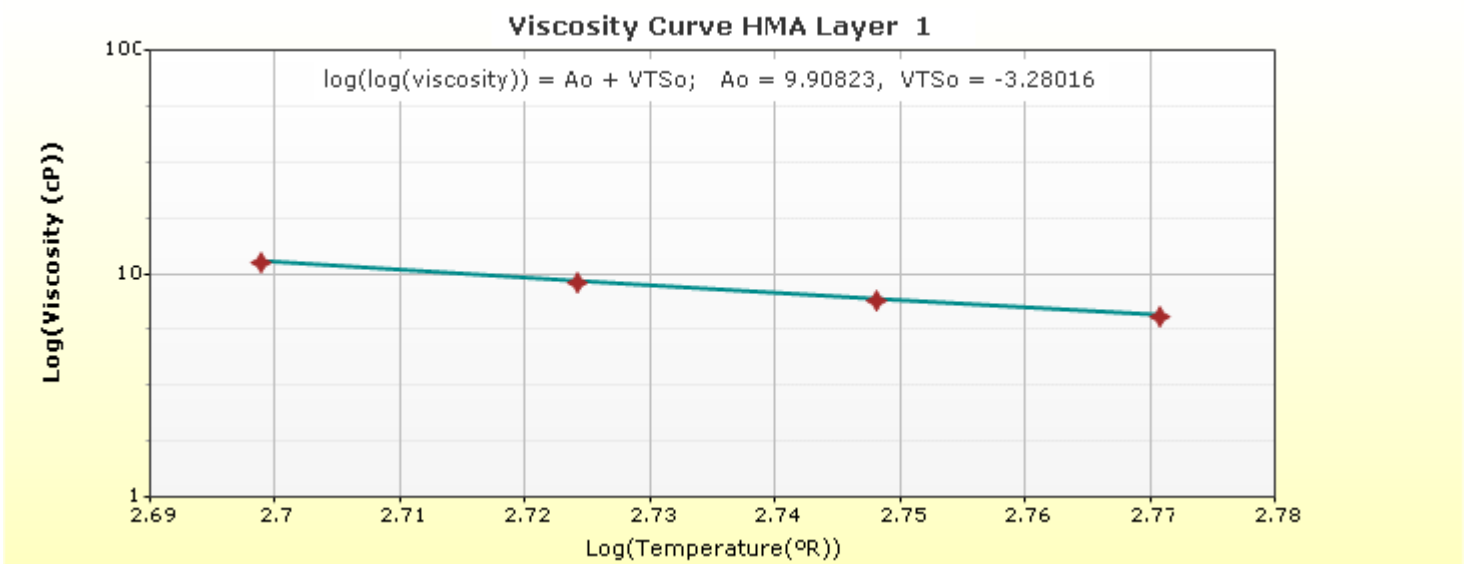
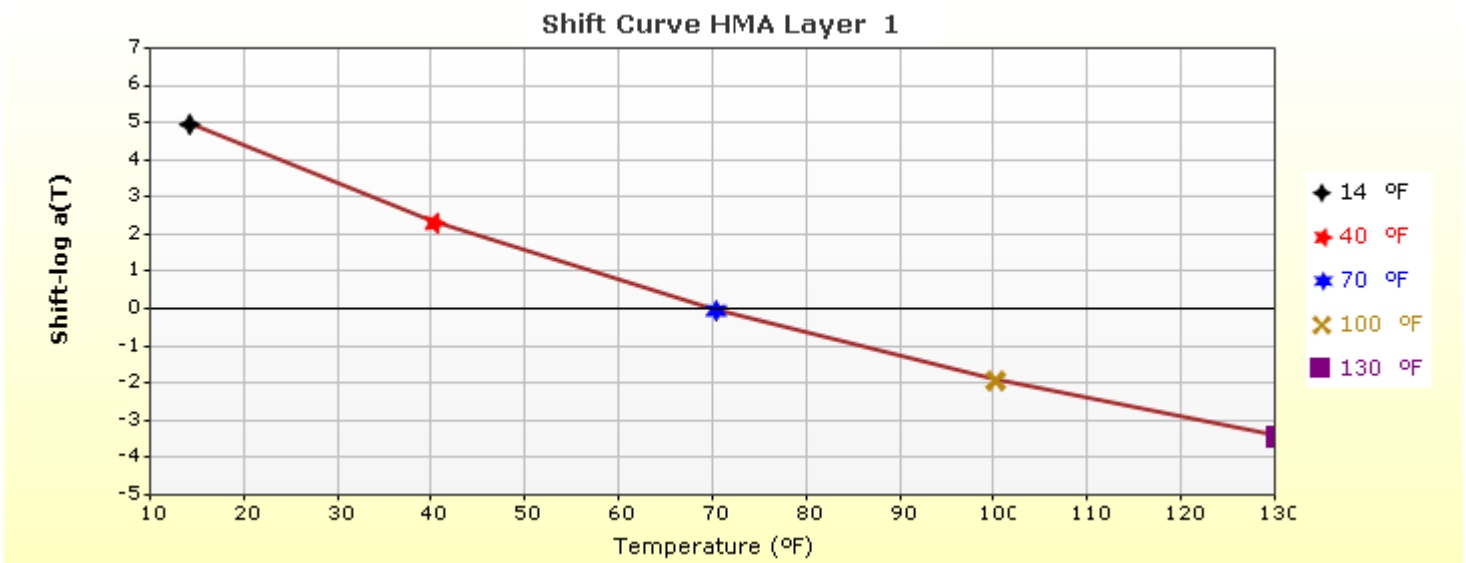
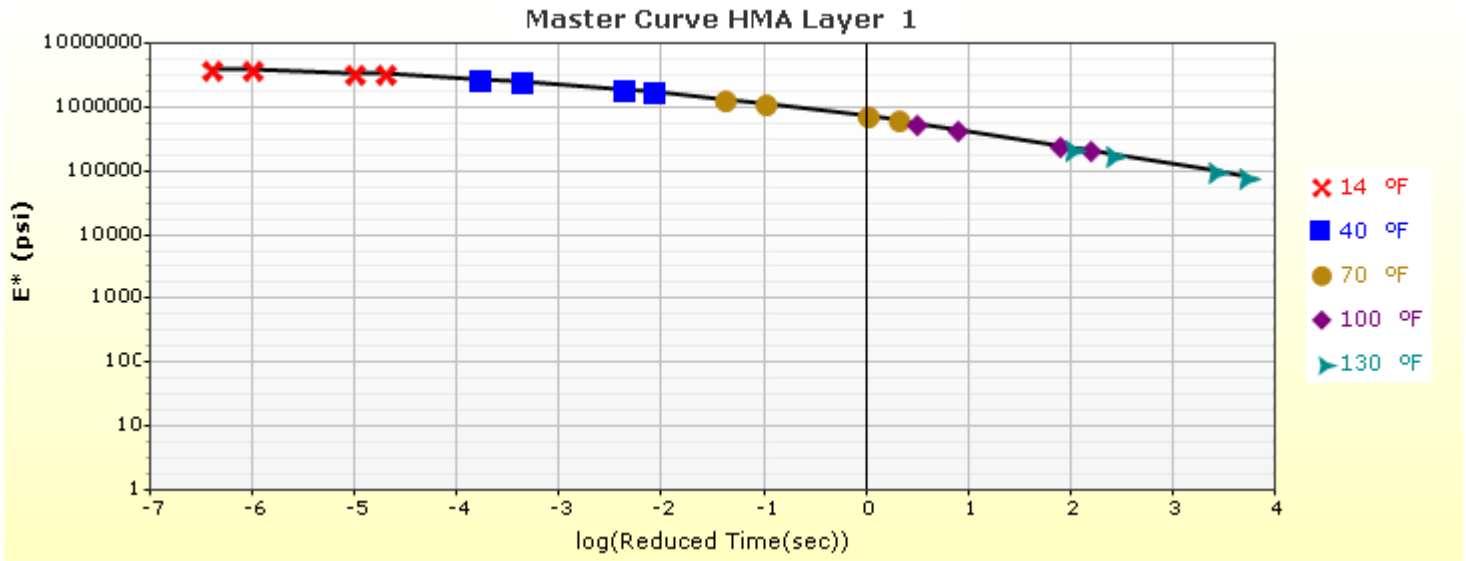
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

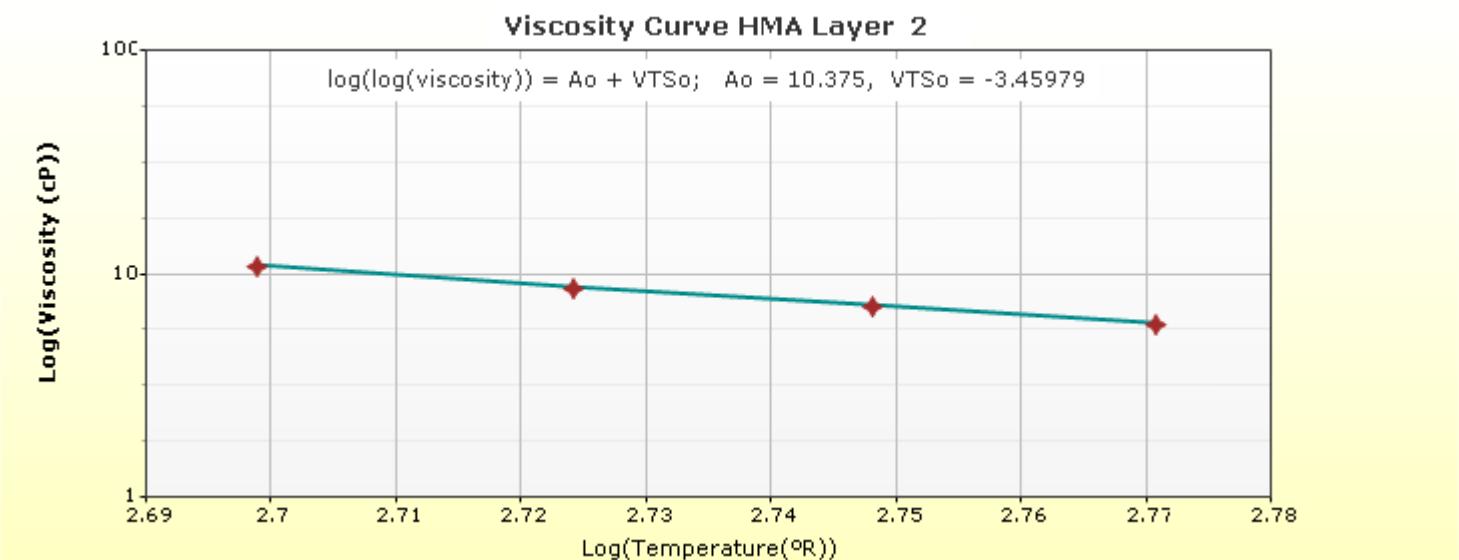
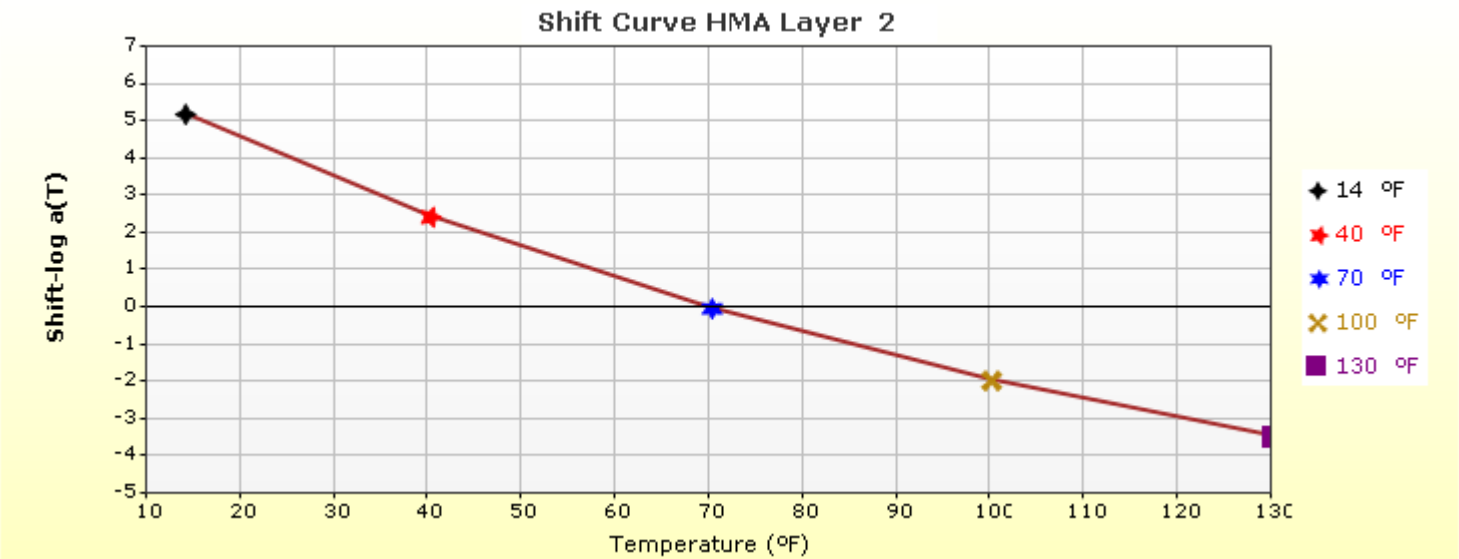
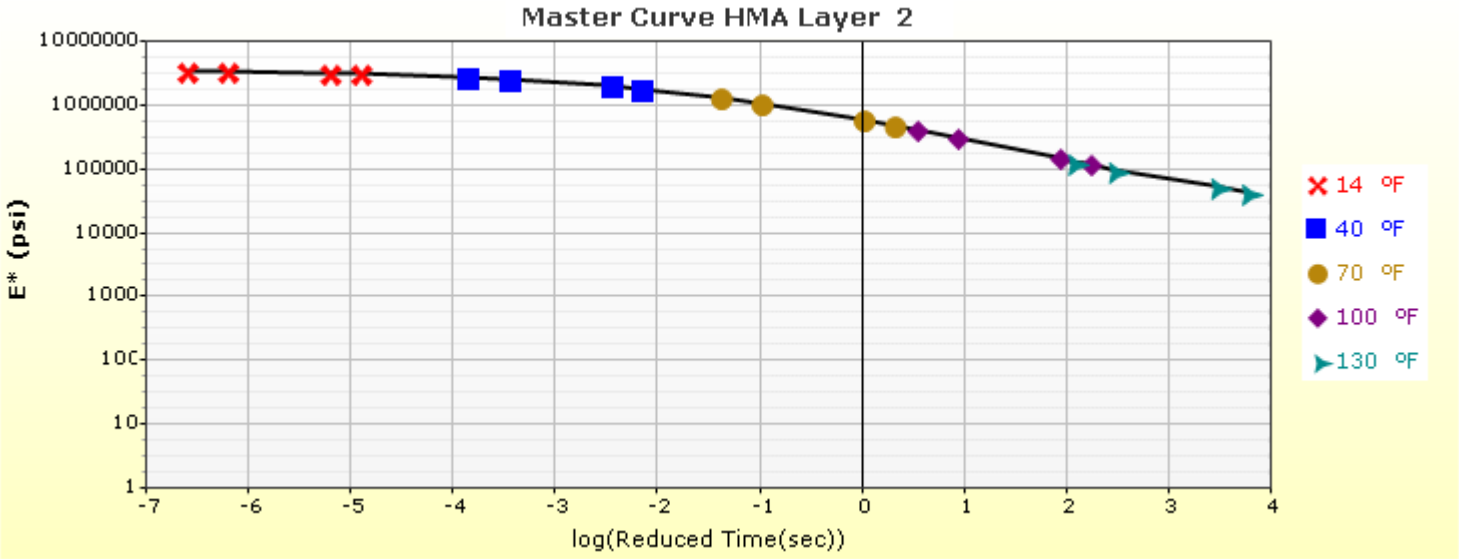
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



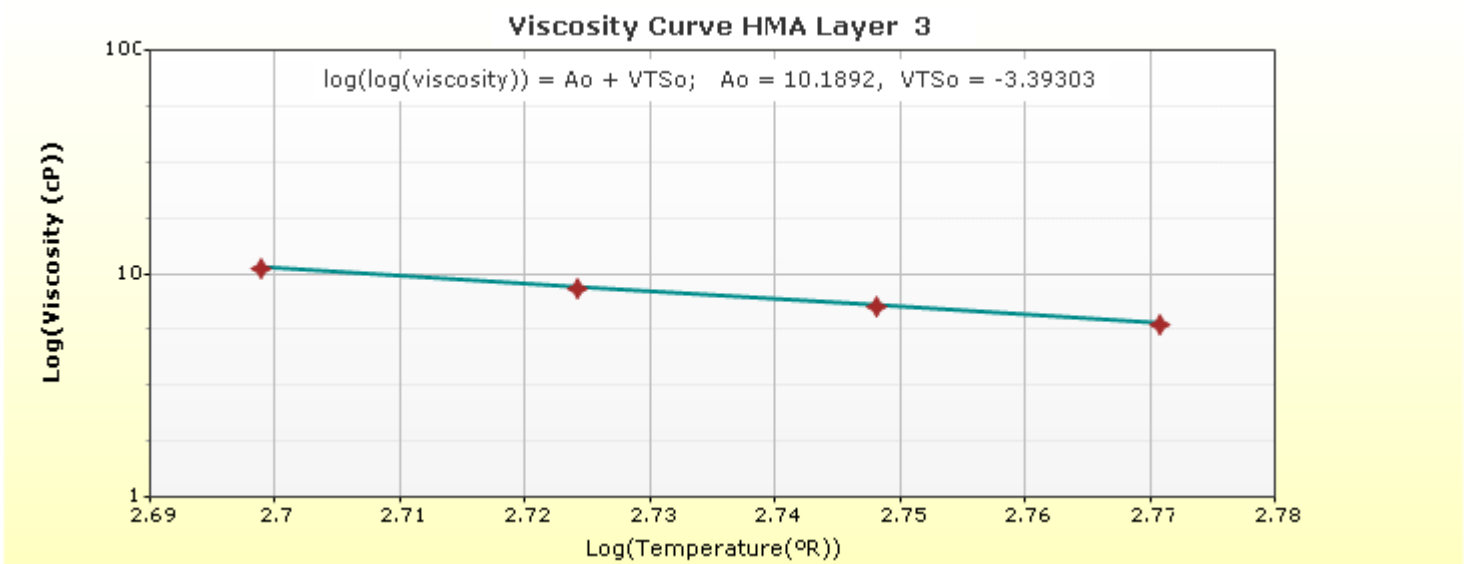
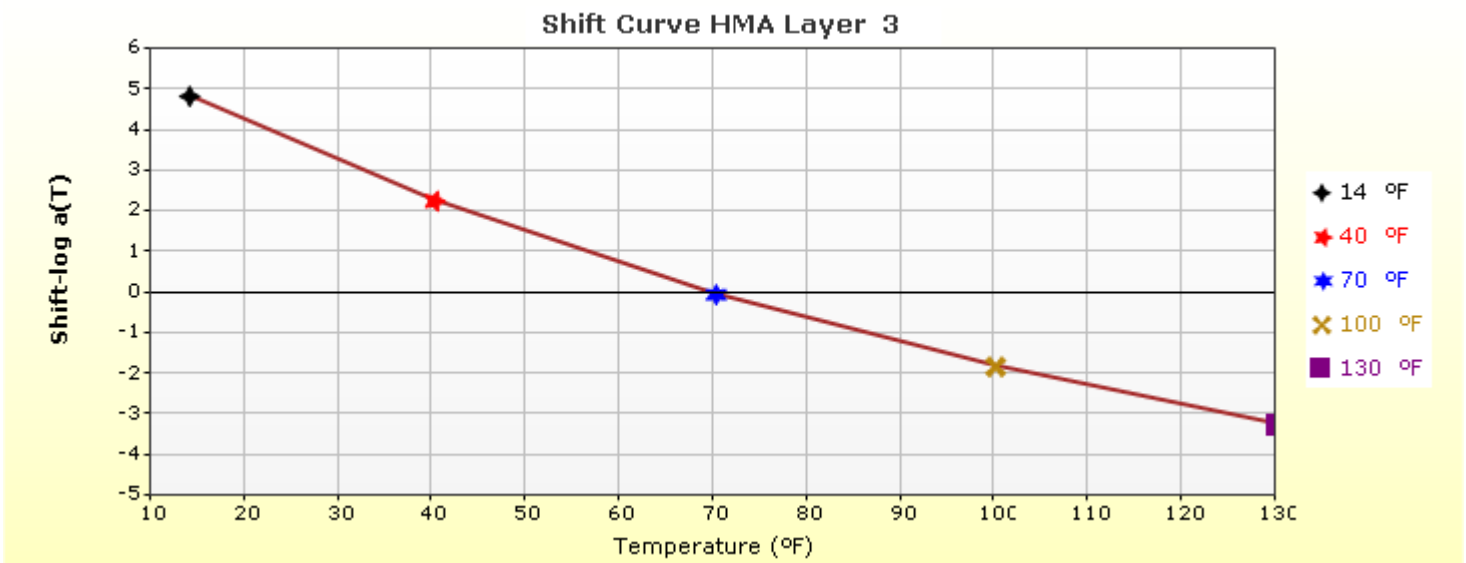
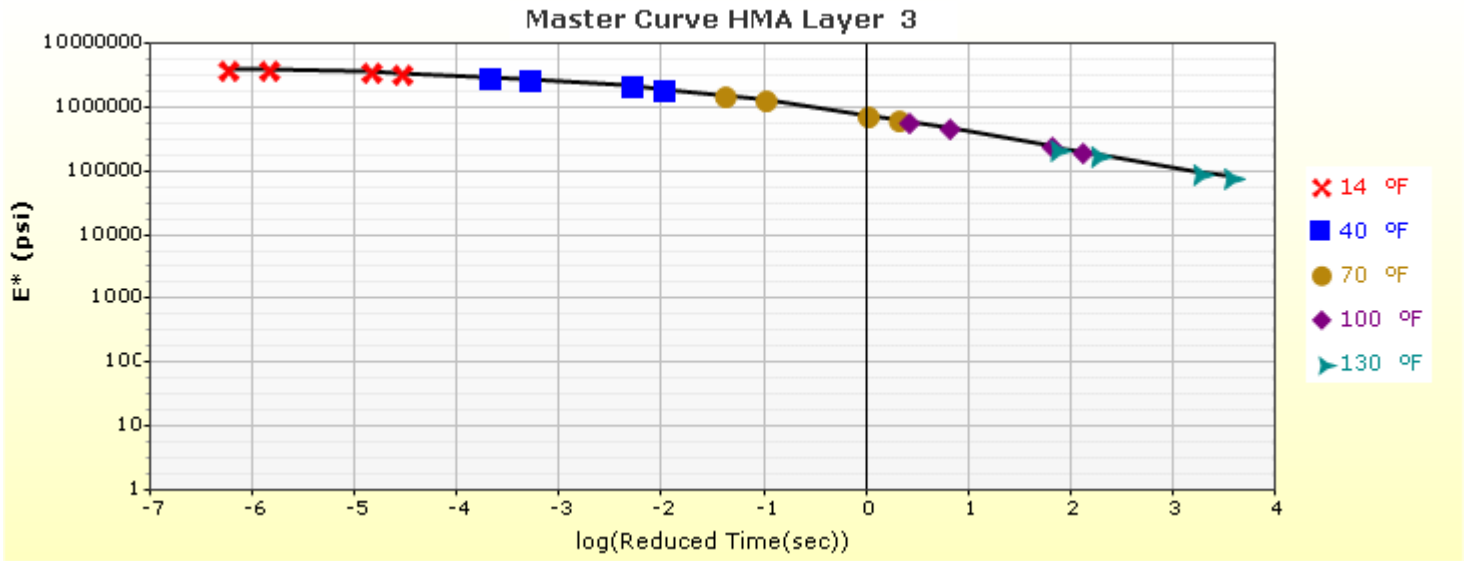
HMA Layer 1: Layer 1 Flexible : VDOT SM



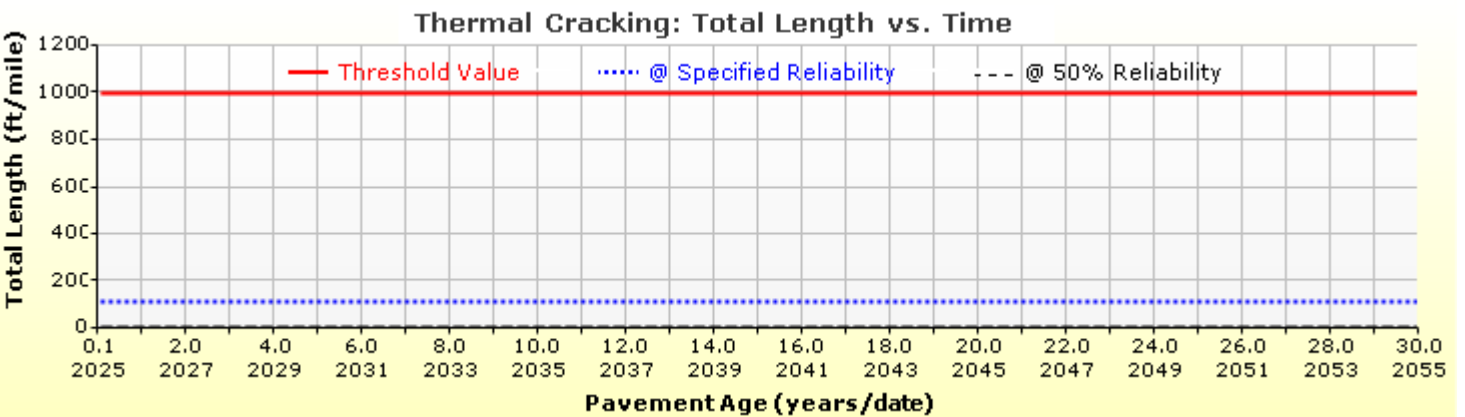
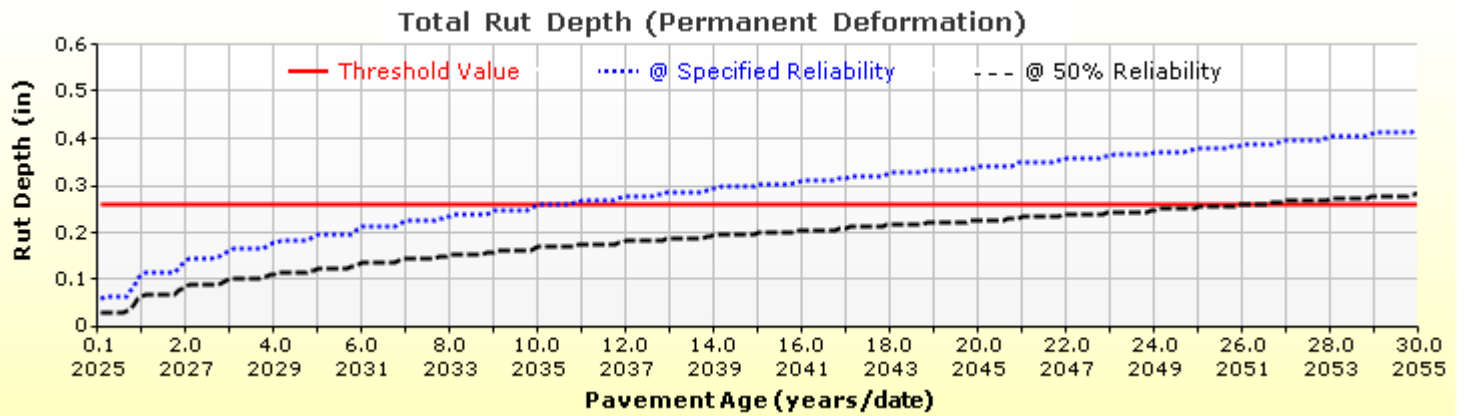
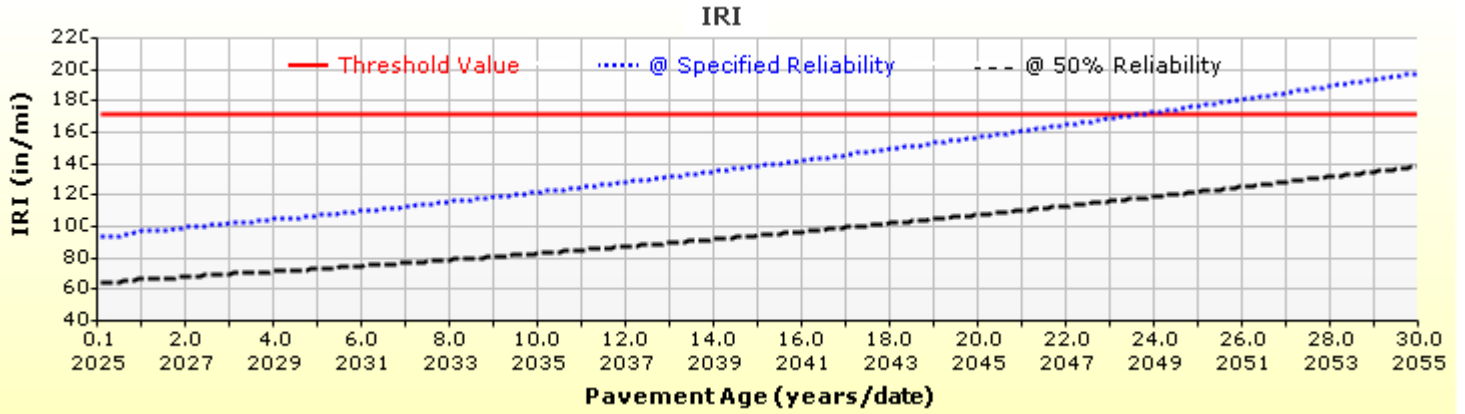
HMA Layer 2: Layer 2 Flexible : VDOT IM

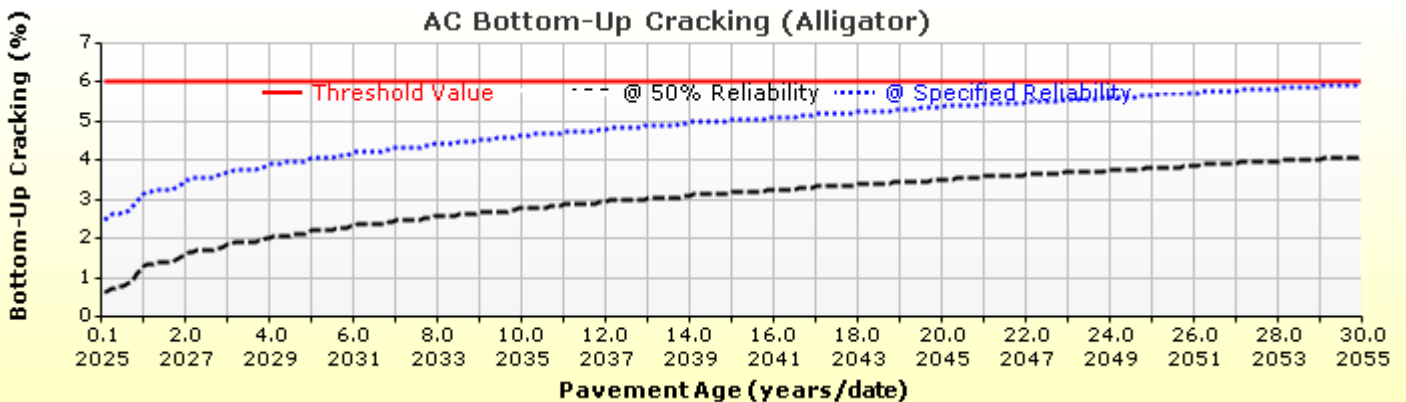
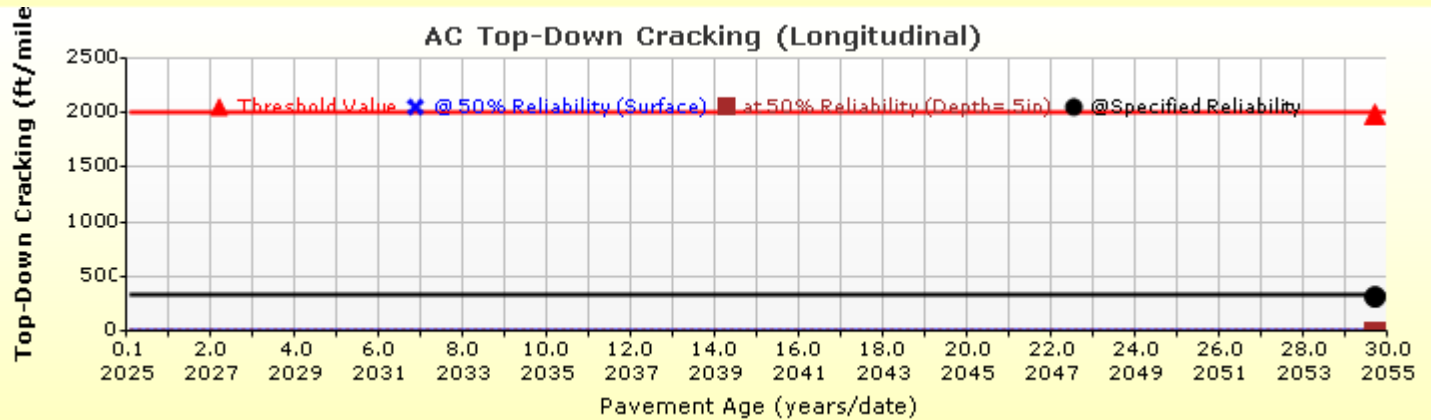
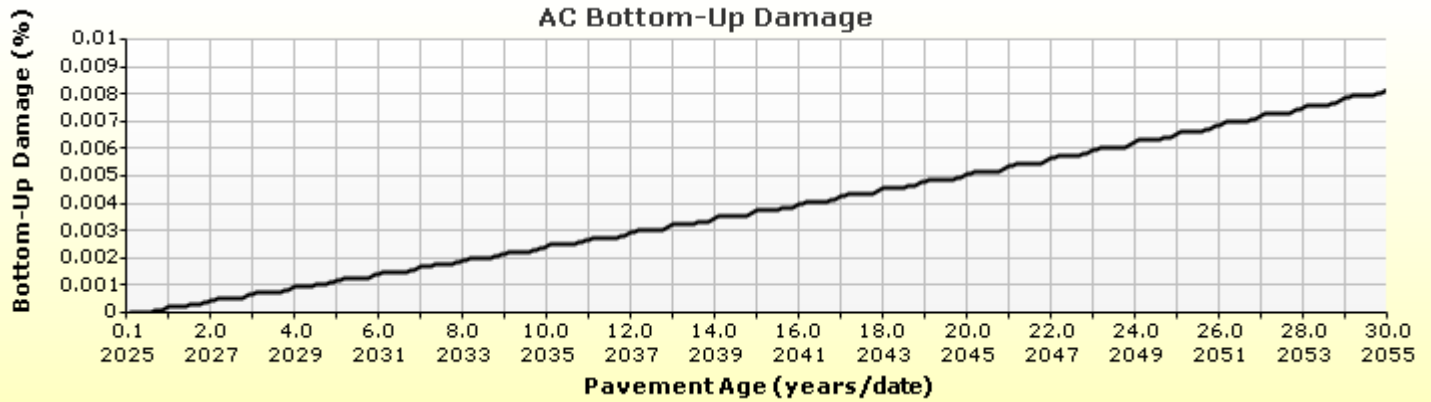
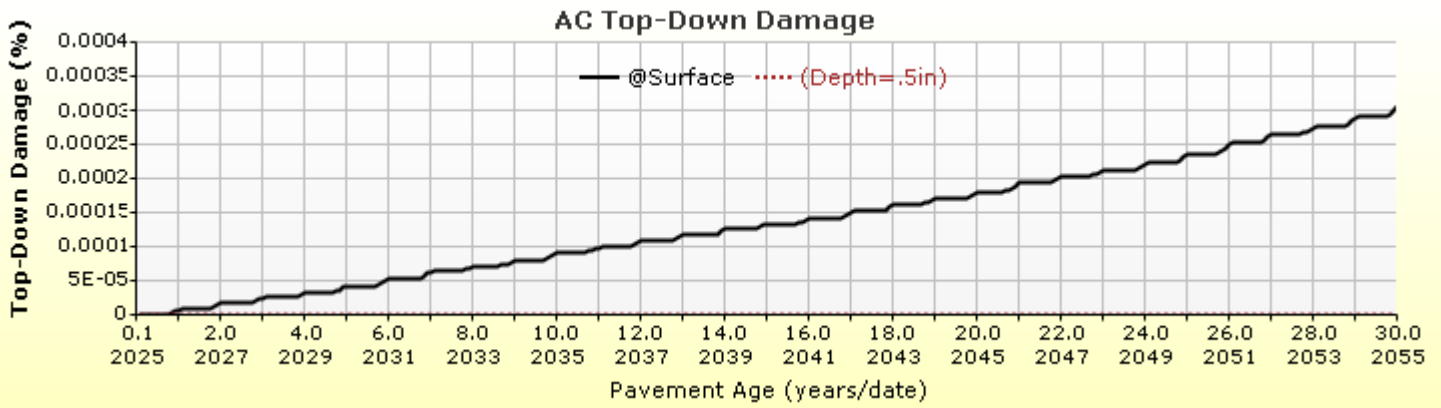


HMA Layer 3: Layer 3 Flexible : VDOT BM



Analysis Output Charts





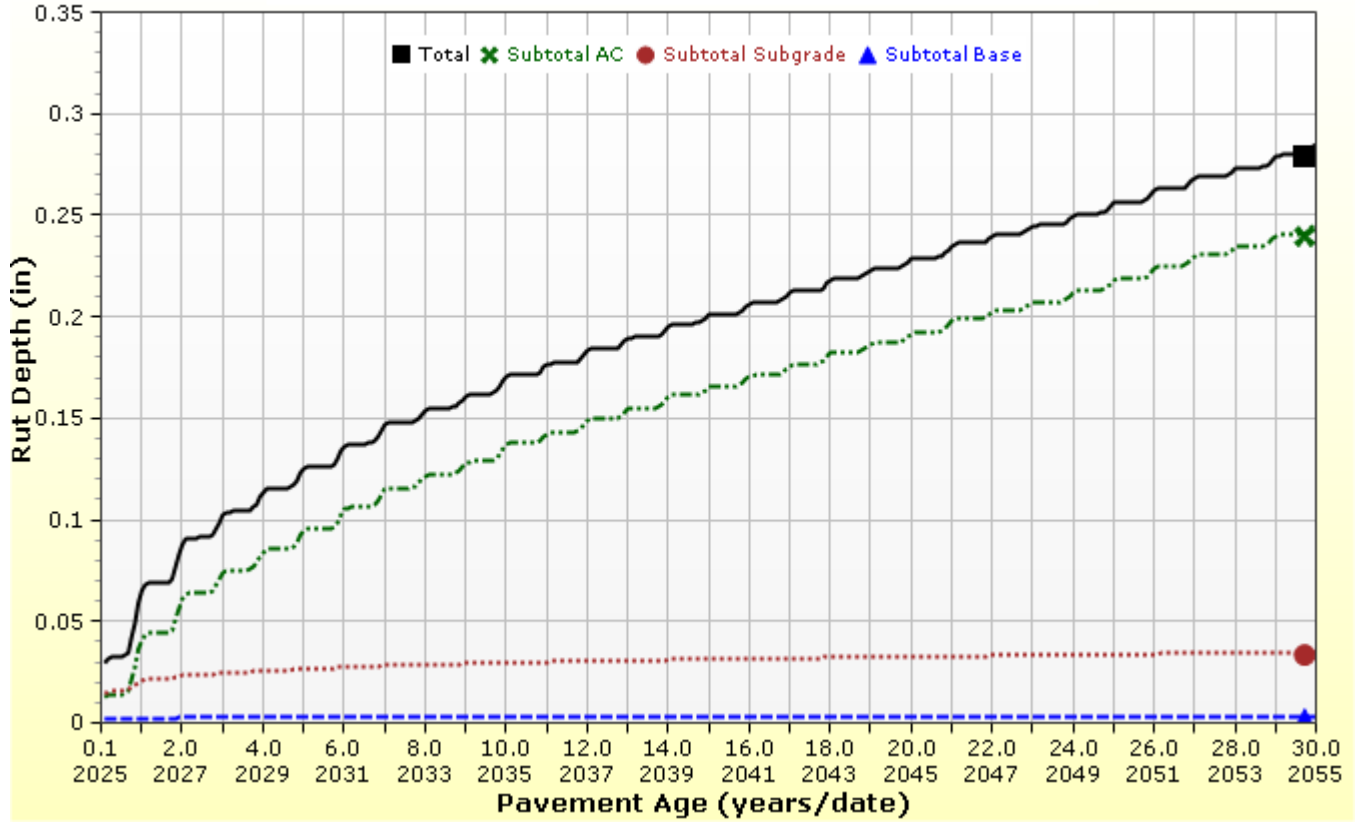


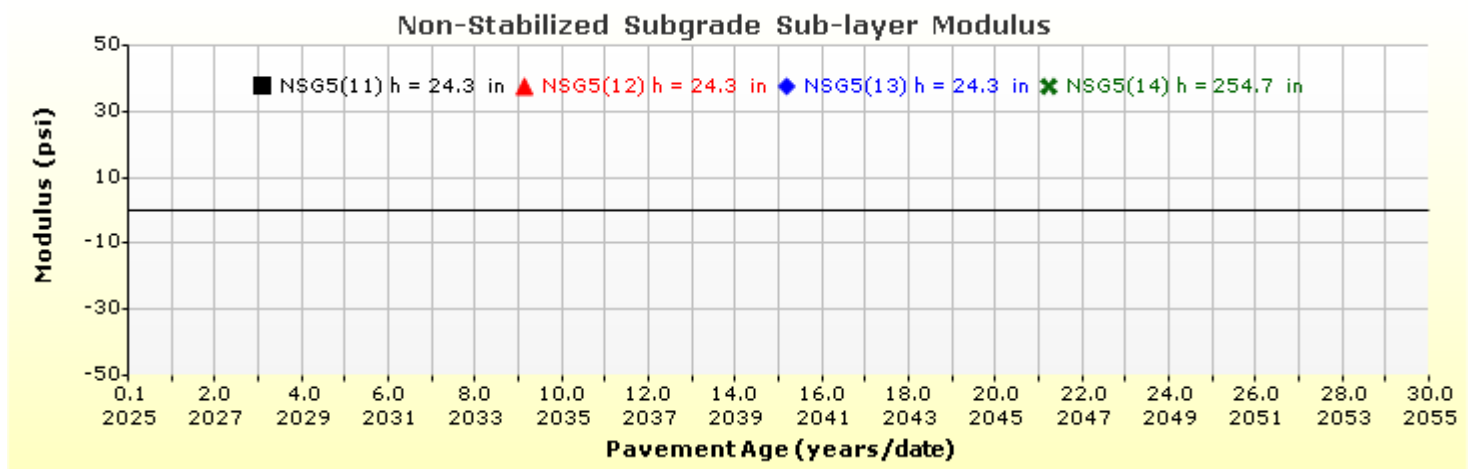
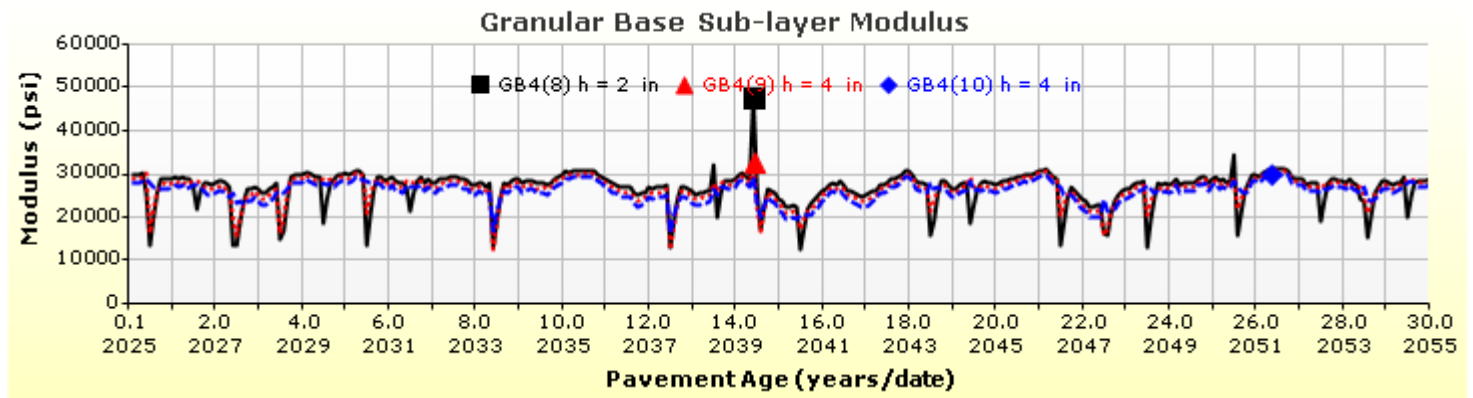
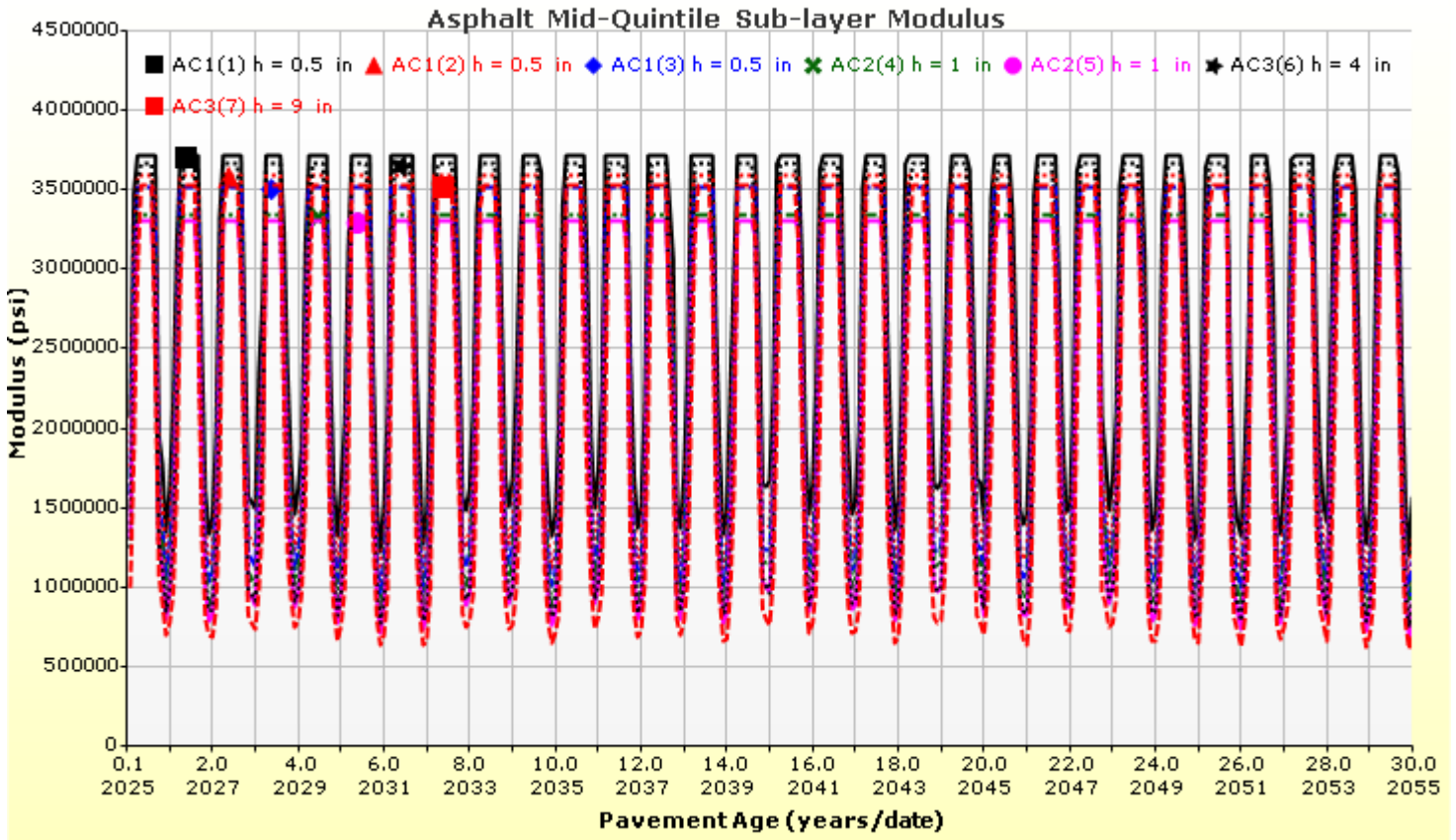
I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Rutting (Permanent Deformation) at 50% Reliability







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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 13.0 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 10.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 21000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



I-495 NB & SB_Flexible Design_CBR of 5 Fill



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Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

| AC Fatigue | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ | k1: 0.007566 |
| $C = 10^M$ | k2: 3.9492 |
| $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

| AC Rutting | |
|--|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$ $C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$ <p style="margin-top: 10px;"><i>Where:</i> H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

| Thermal Fracture | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma} \right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

| CSM Fatigue | |
|---|--|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}} \right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) |
| k1: 1 | k2: 1 Bc1: 0.75 Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |



I-495 NB & SB Flexible Design_with CTA_CBR of 5 Fill



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Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|---------------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 13.0 |
| NonStabilized | VDOT CTA as non-stabilize layer | 10.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 19,541 |
| 2040 (15 years) | 38,602,800 |
| 2055 (30 years) | 83,419,400 |

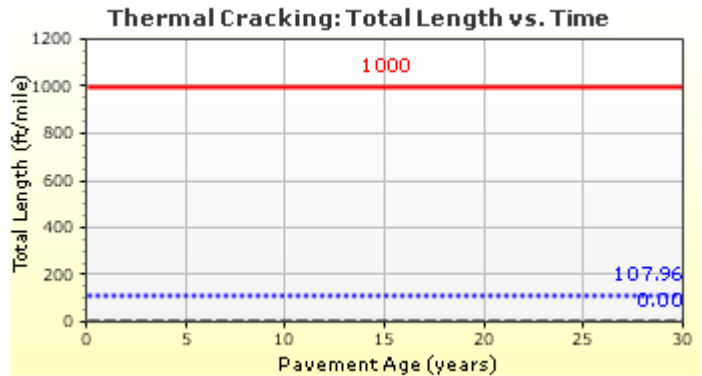
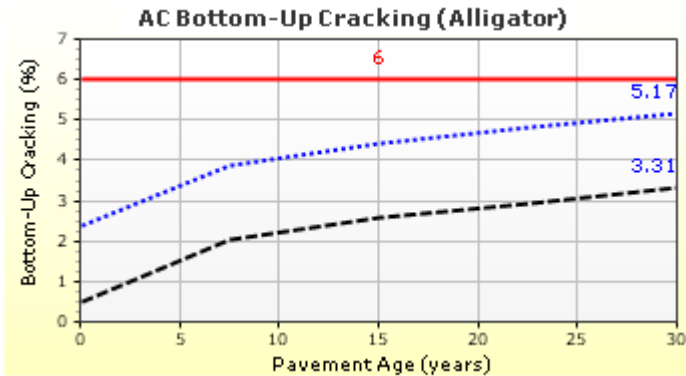
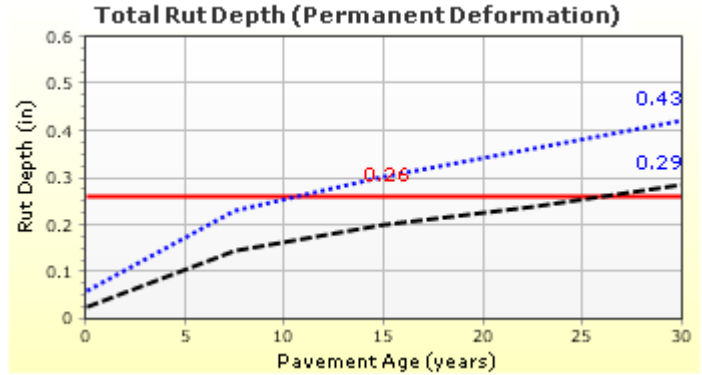
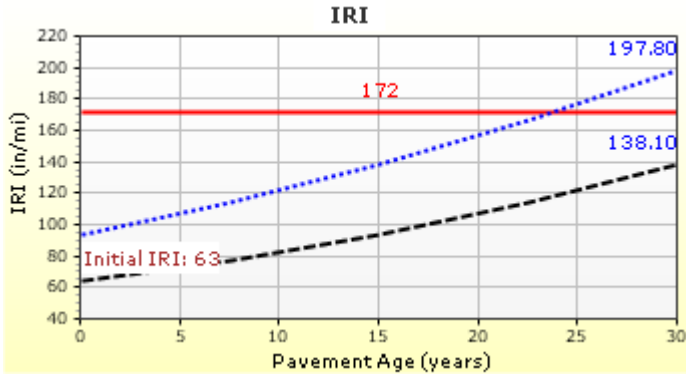
Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 197.76 | 95.00 | 82.49 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.43 | 95.00 | 37.08 | Fail ** |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.17 | 95.00 | 99.14 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 107.96 | 95.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 330.68 | 95.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.38 | 95.00 | 49.21 | Fail |

Note: ** Per Section 4.1 of ME User Manual, last paragraph, "Some designs with extreme high traffic volume may not meet the rutting distress criteria at year 15. In such situations, users may need to look carefully into their design. If increasing thickness does not improve the rutting and if bottom-up fatigue criteria meets the specified threshold criteria, users may need to look rutting at the end of design period. The design is assumed to be sufficient when the total permanent deformation at end of design life is below 0.5 inches".

Distress Charts

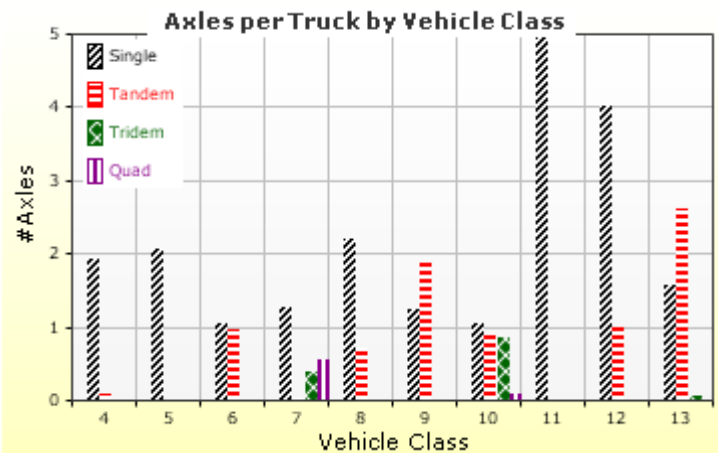
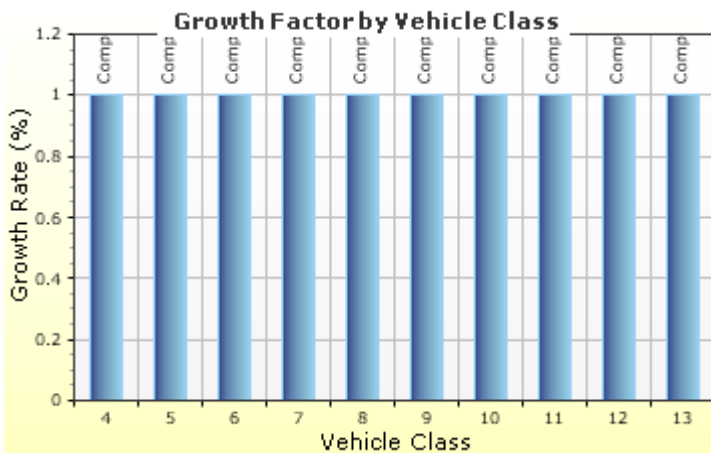
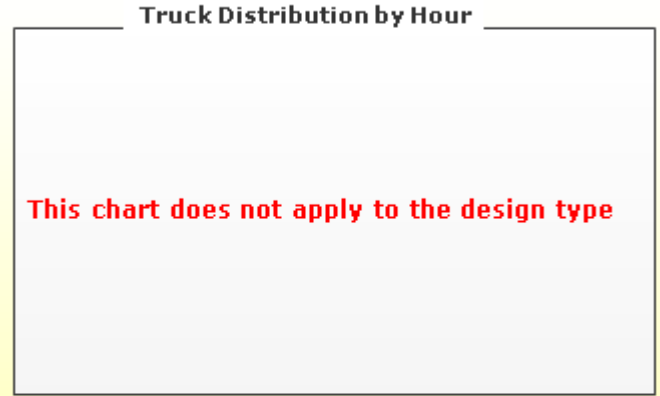
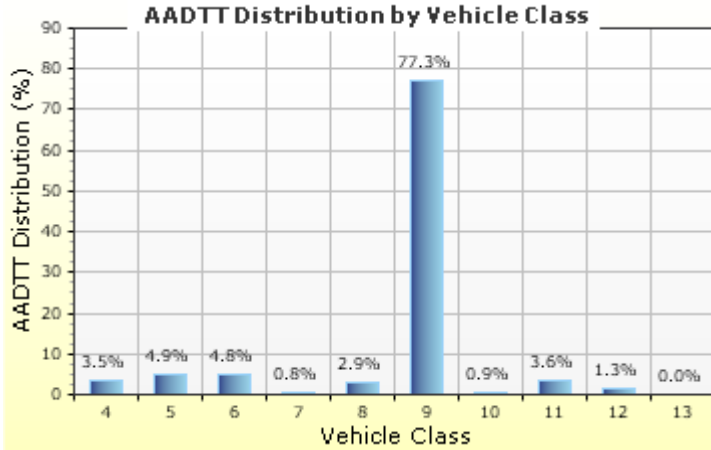


Traffic Inputs

Graphical Representation of Traffic Inputs

Initial two-way AADTT: **19,541**
 Number of lanes in design direction: **4**

Percent of trucks in design direction (%): **56.0**
 Percent of trucks in design lane (%): **60.0**
 Operational speed (mph): **60.0**



Traffic Volume Monthly Adjustment Factors



Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1% | Compound |
| Class 5 | 4.92% | 1% | Compound |
| Class 6 | 4.75% | 1% | Compound |
| Class 7 | 0.82% | 1% | Compound |
| Class 8 | 2.89% | 1% | Compound |
| Class 9 | 77.29% | 1% | Compound |
| Class 10 | 0.92% | 1% | Compound |
| Class 11 | 3.58% | 1% | Compound |
| Class 12 | 1.32% | 1% | Compound |
| Class 13 | 0.01% | 1% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

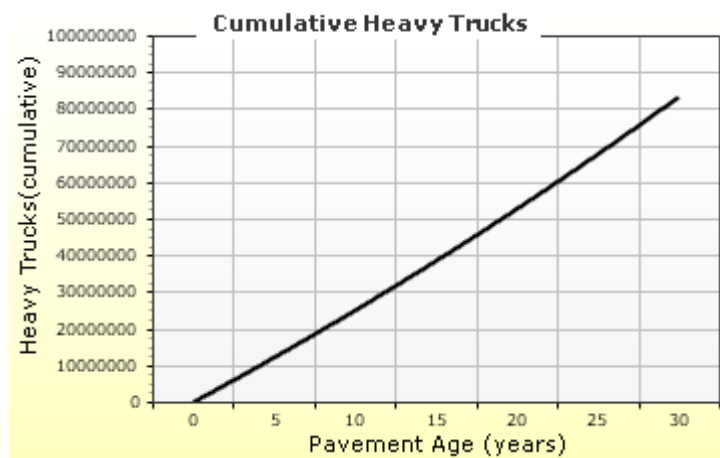
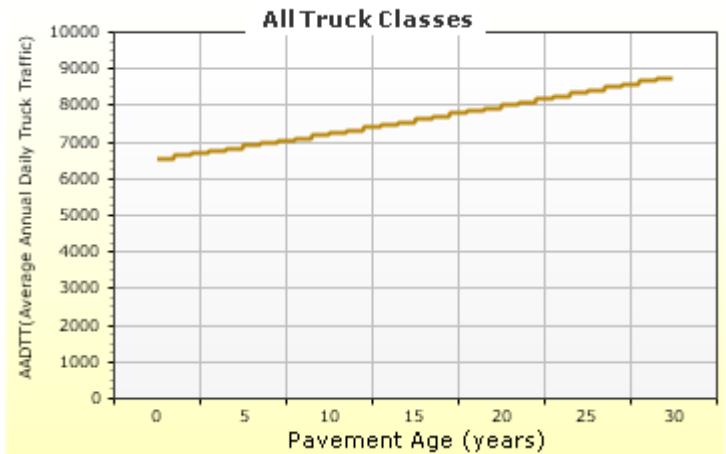
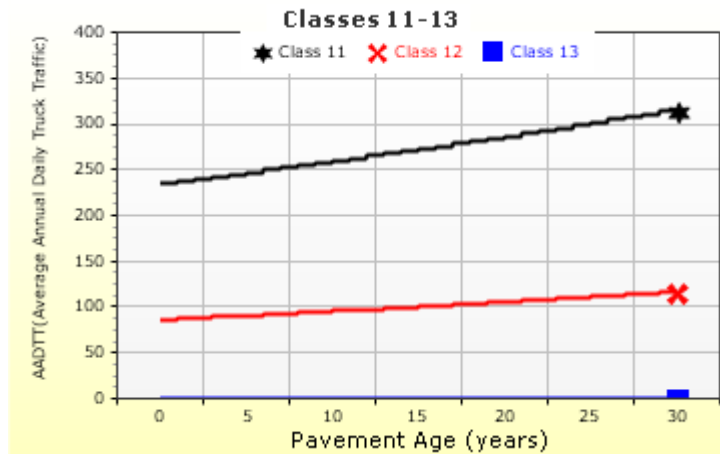
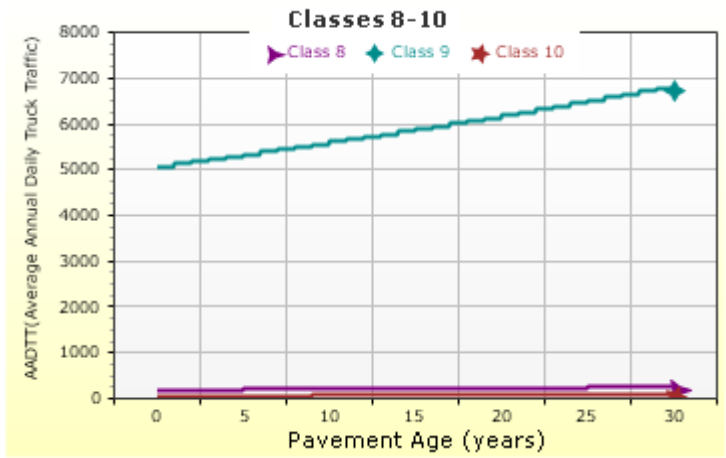
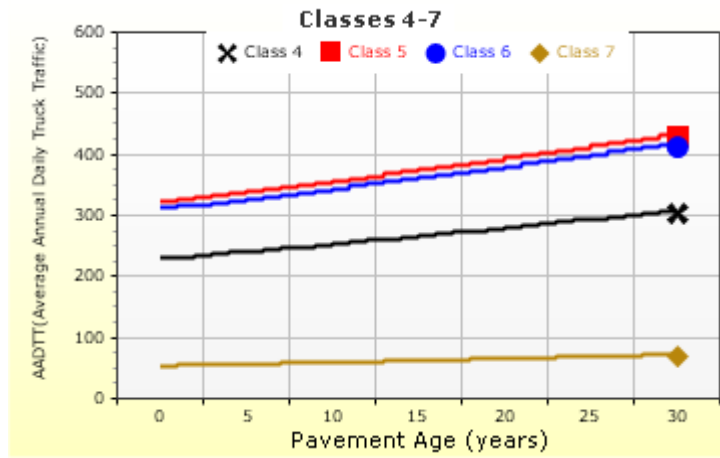
Wheelbase does not apply

Number of Axles per Truck

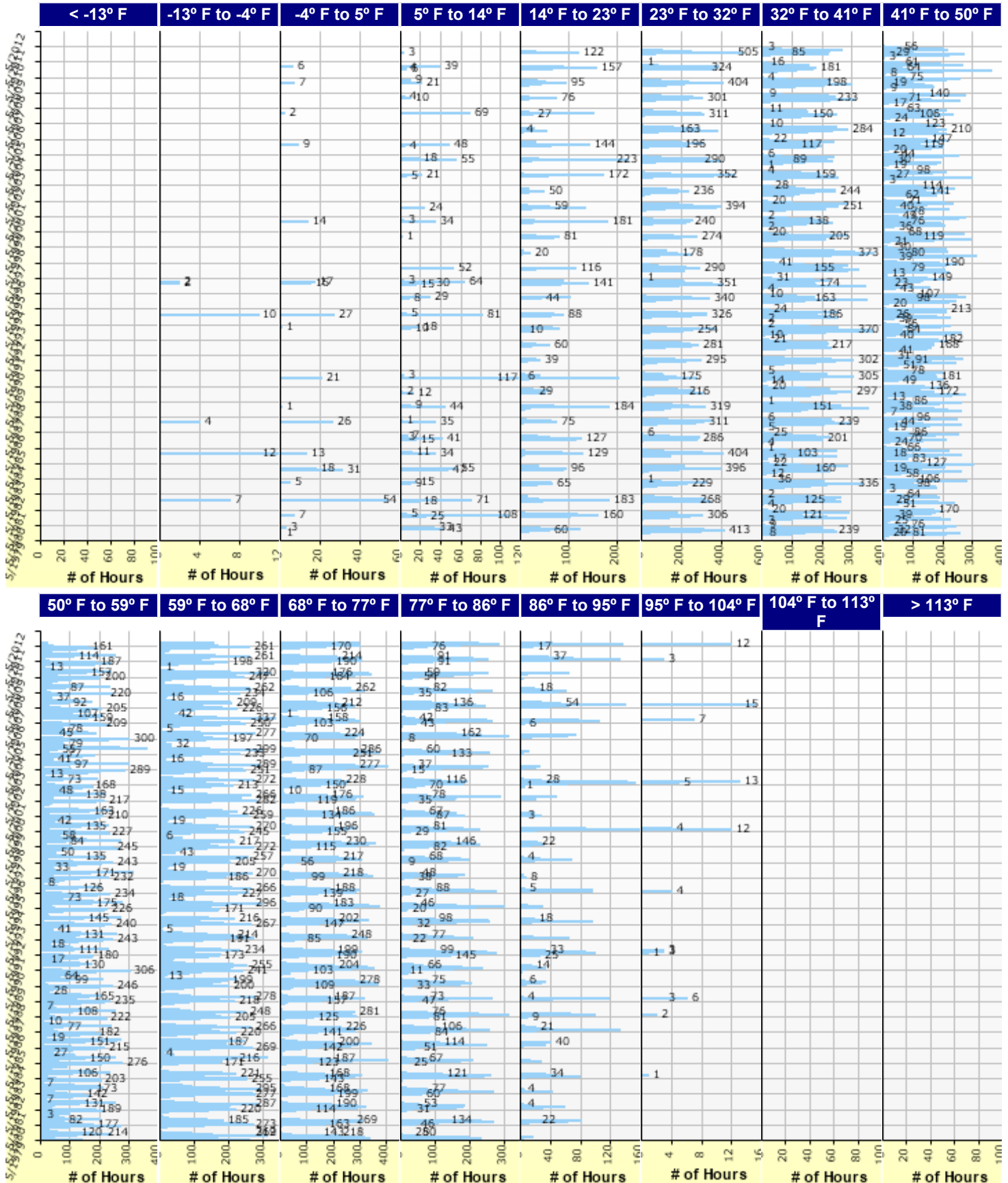
| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



Hourly Air Temperature Distribution by Month:



Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

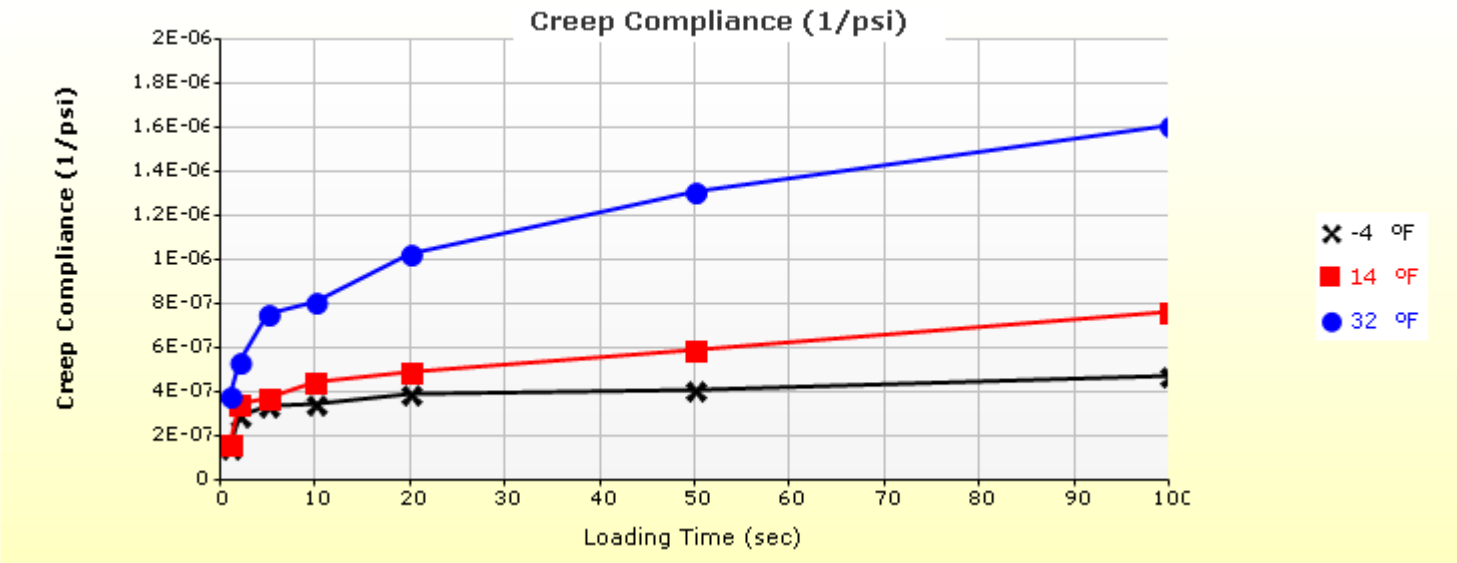
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|---|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT CTA as non-stabilize layer | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

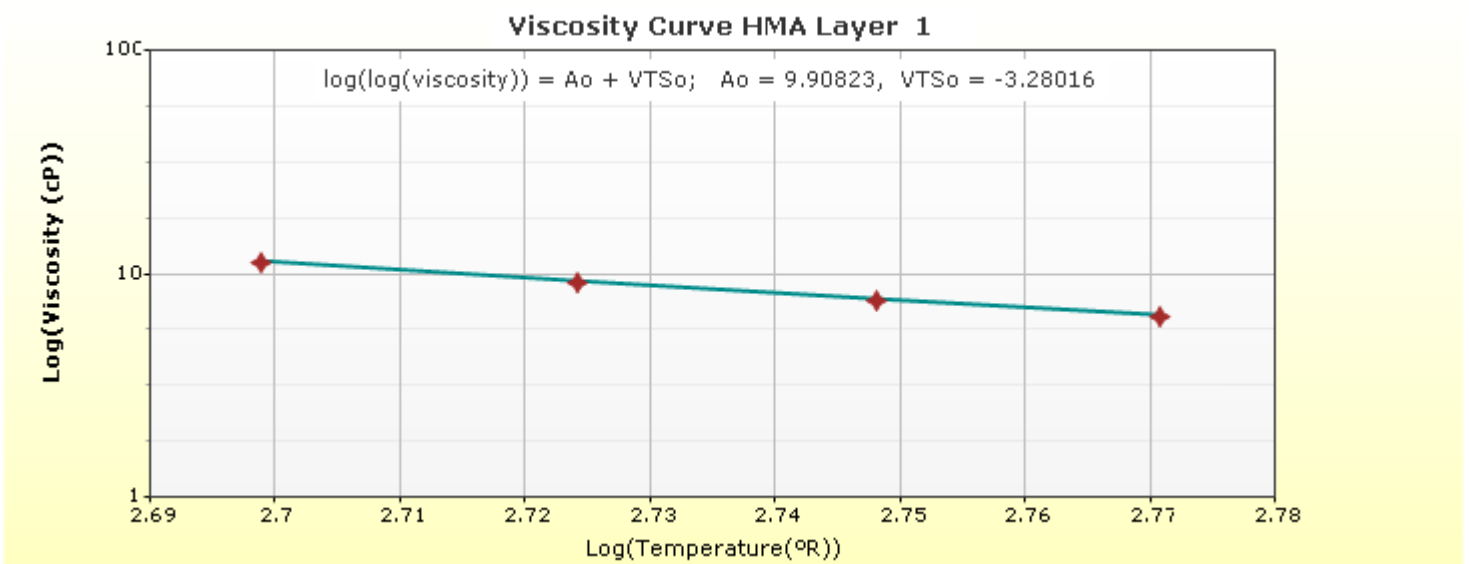
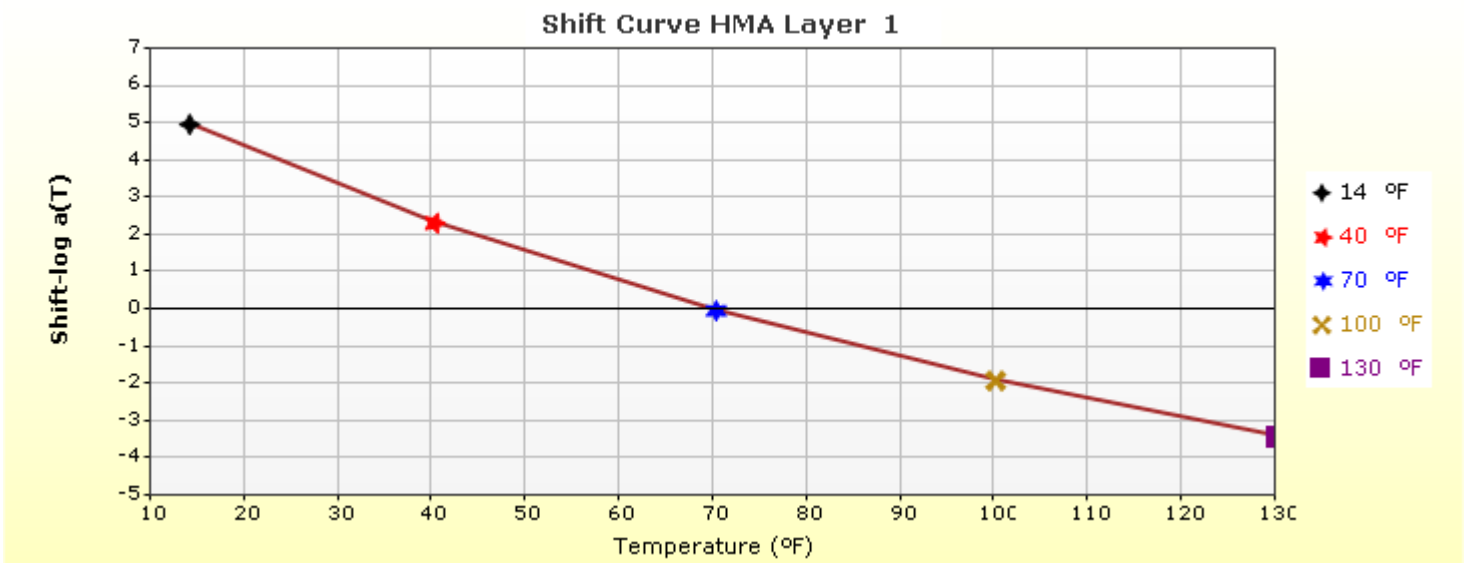
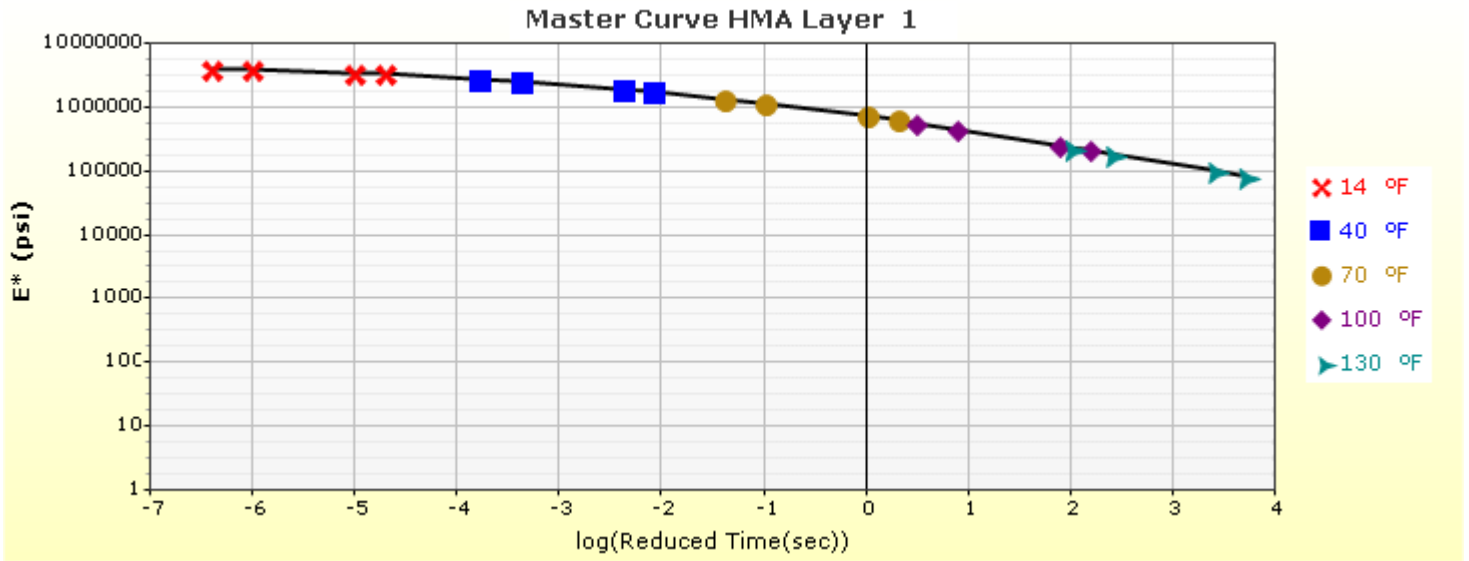
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

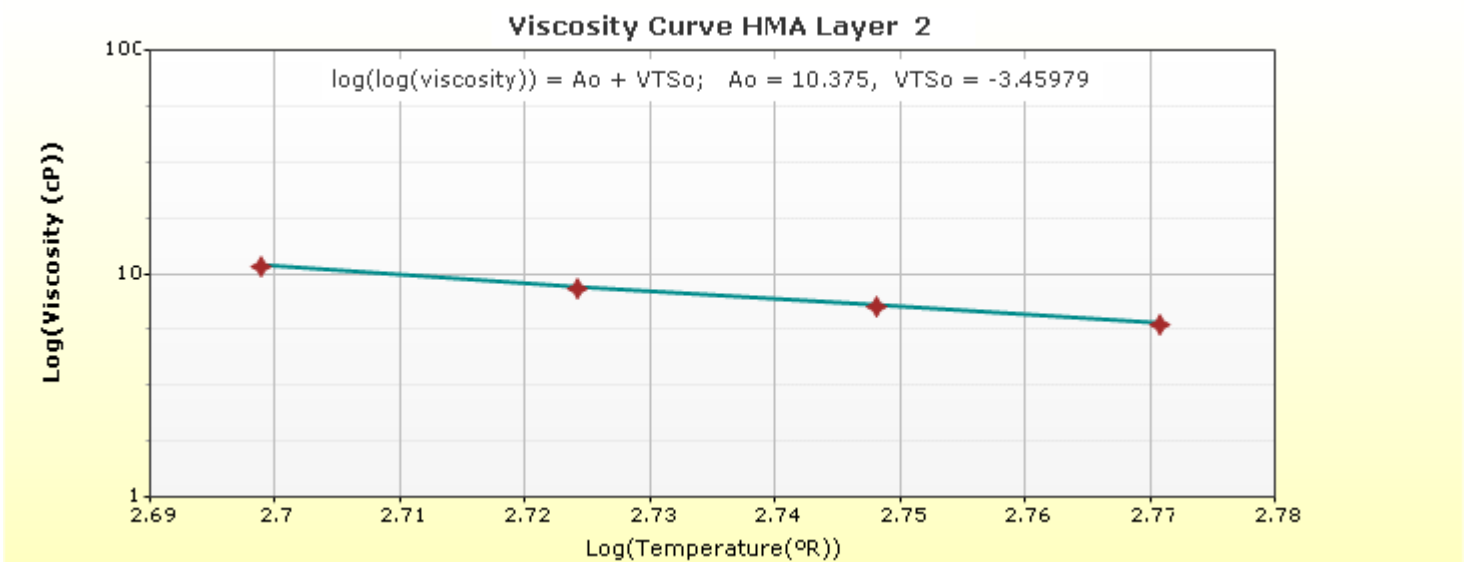
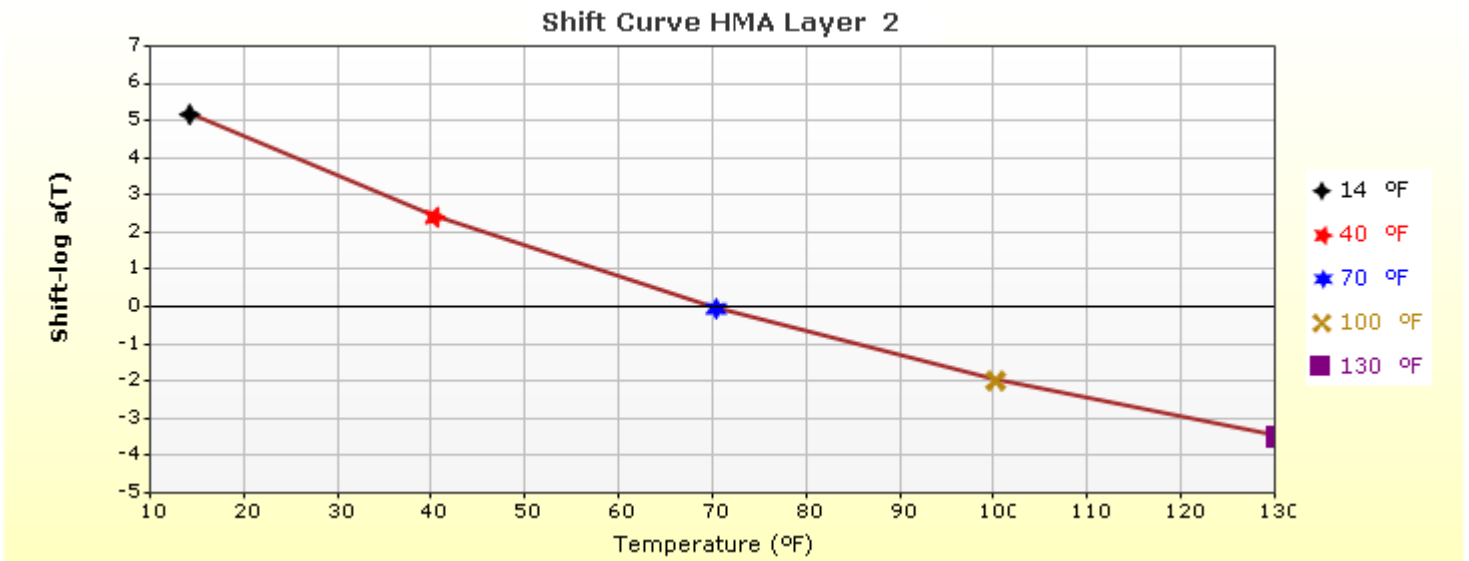
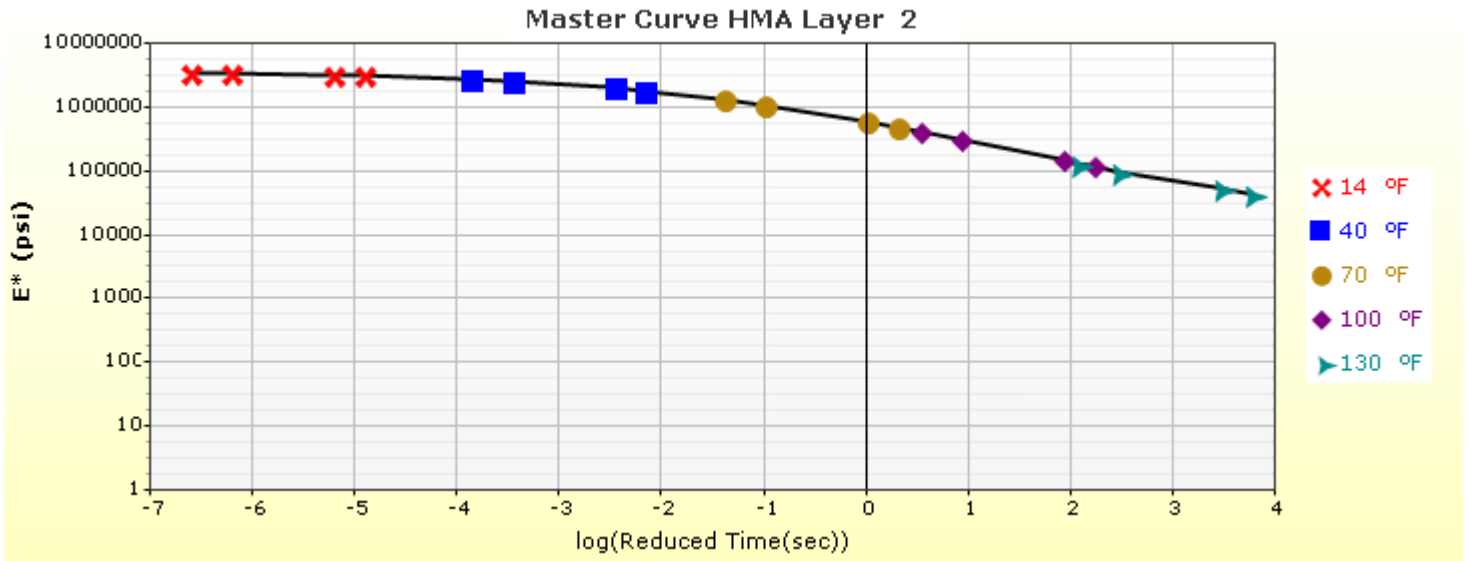
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



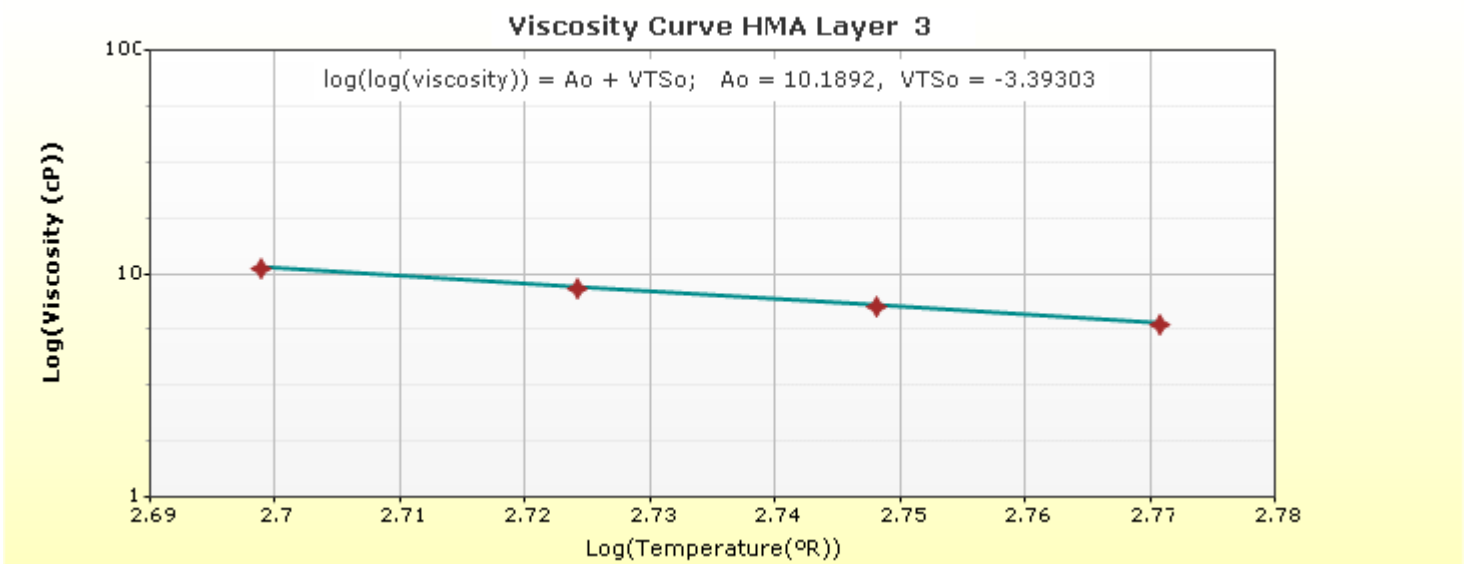
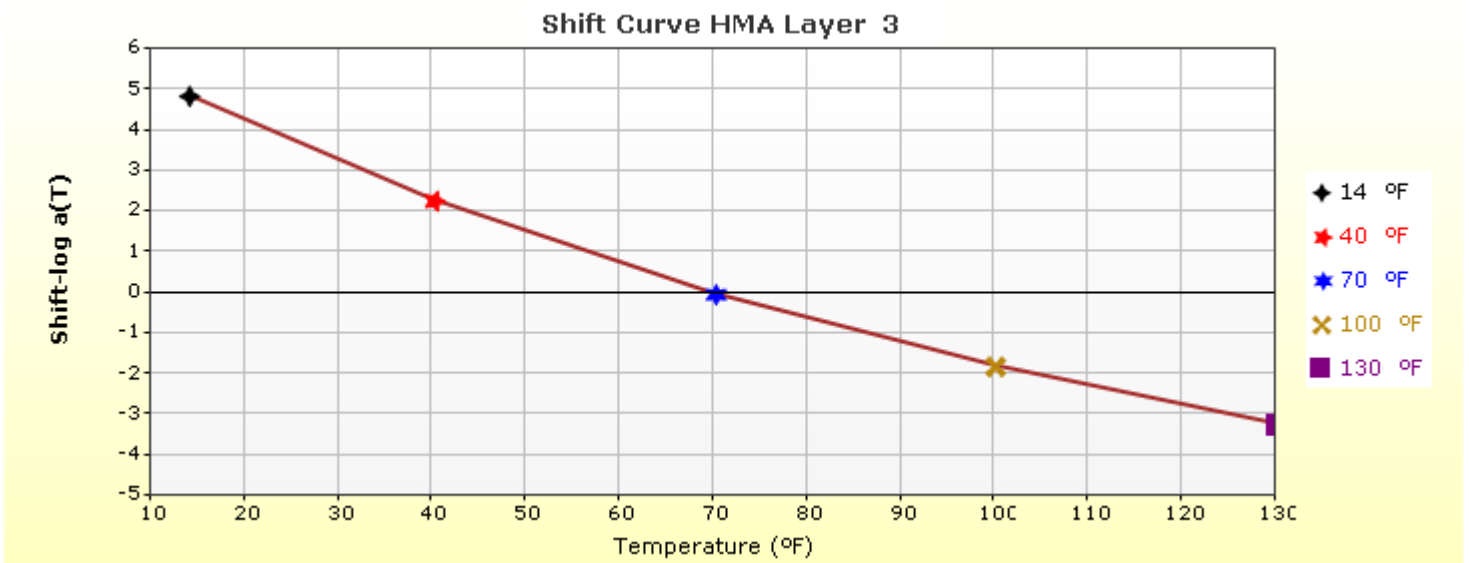
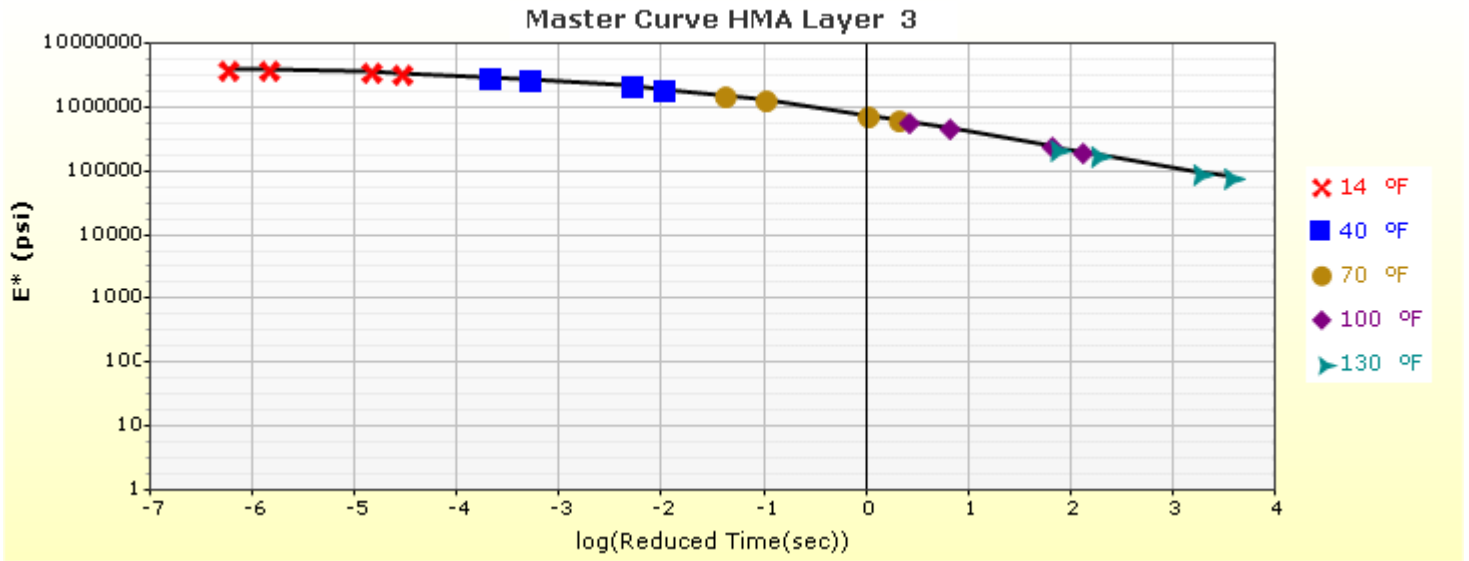
HMA Layer 1: Layer 1 Flexible : VDOT SM



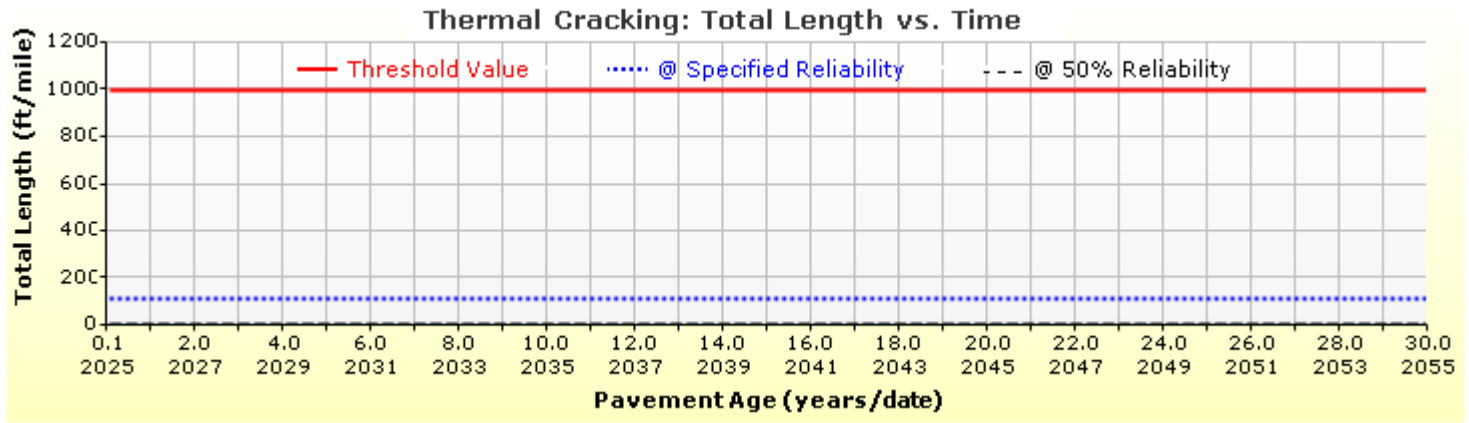
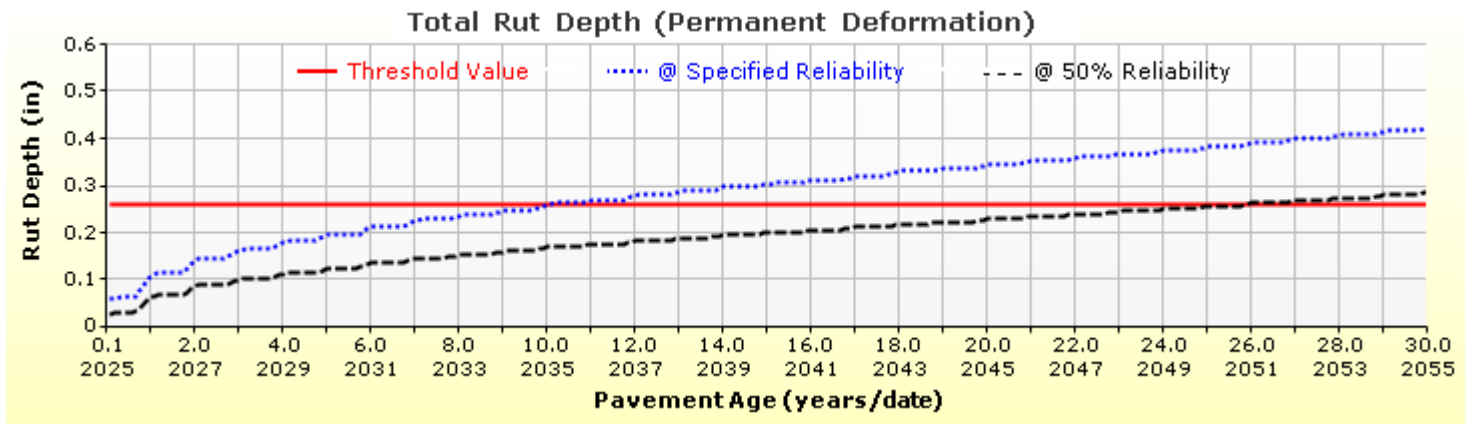
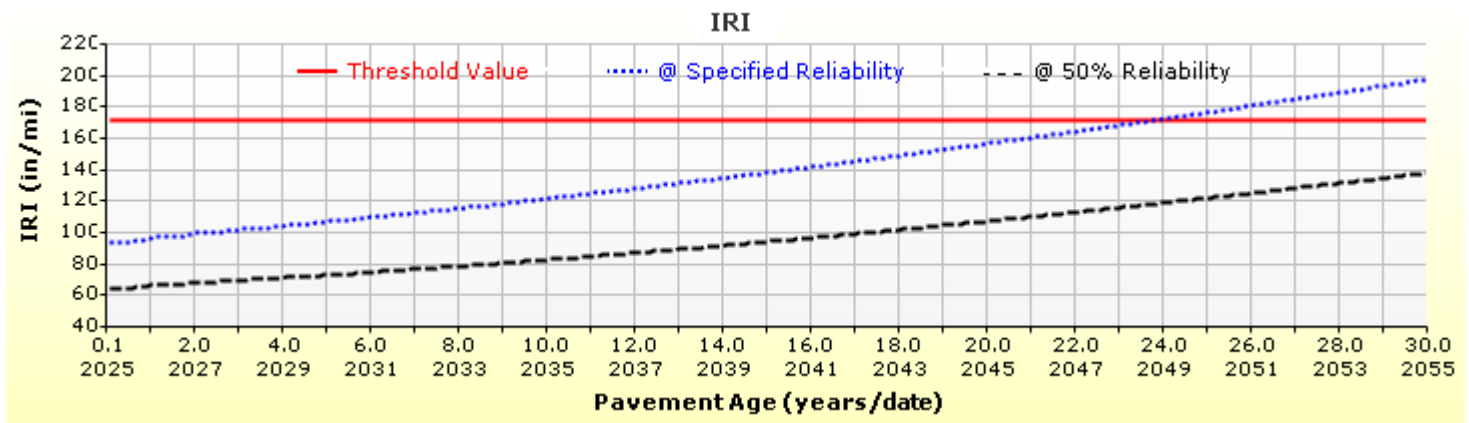
HMA Layer 2: Layer 2 Flexible : VDOT IM

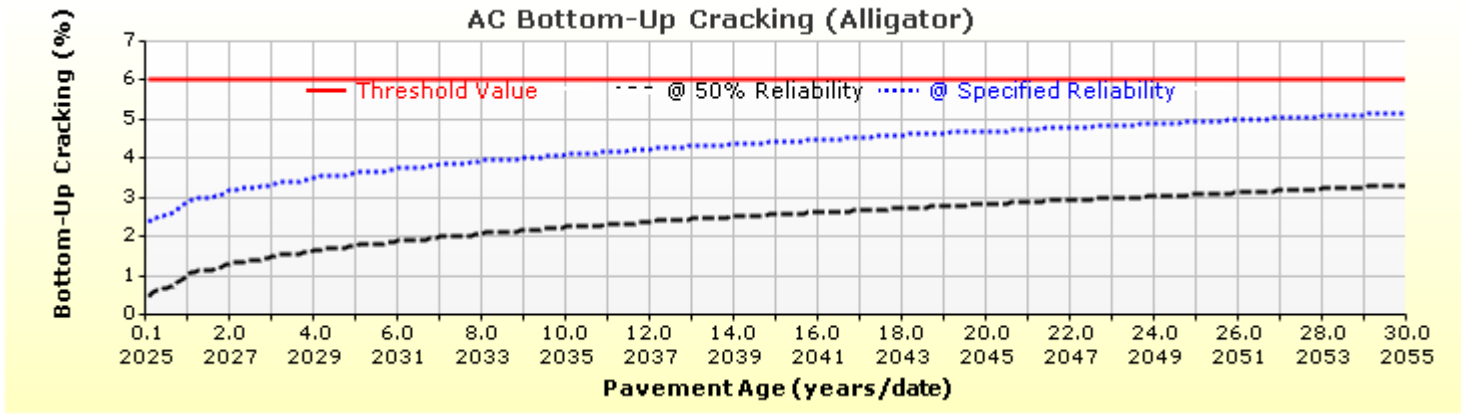
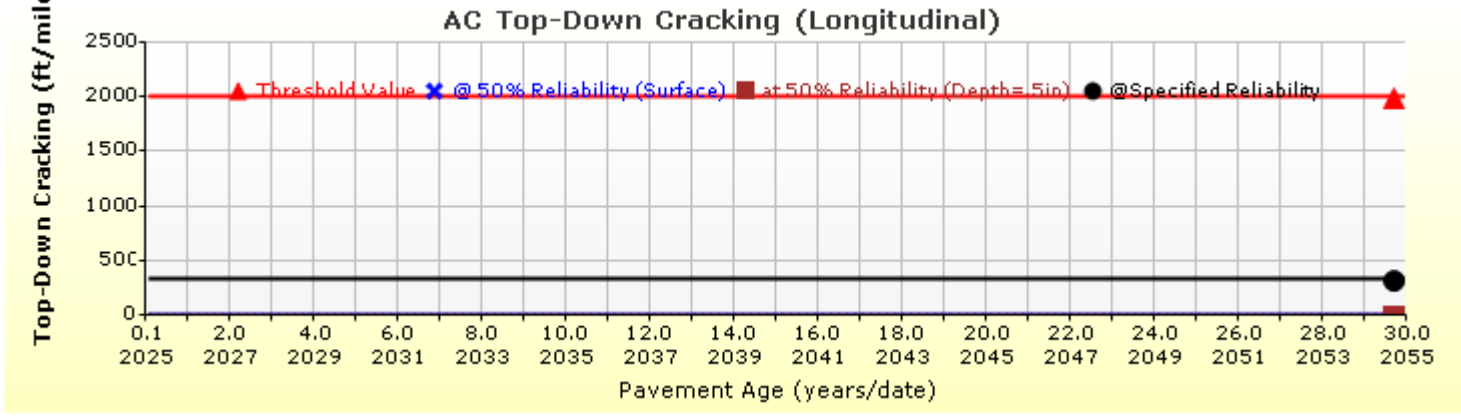
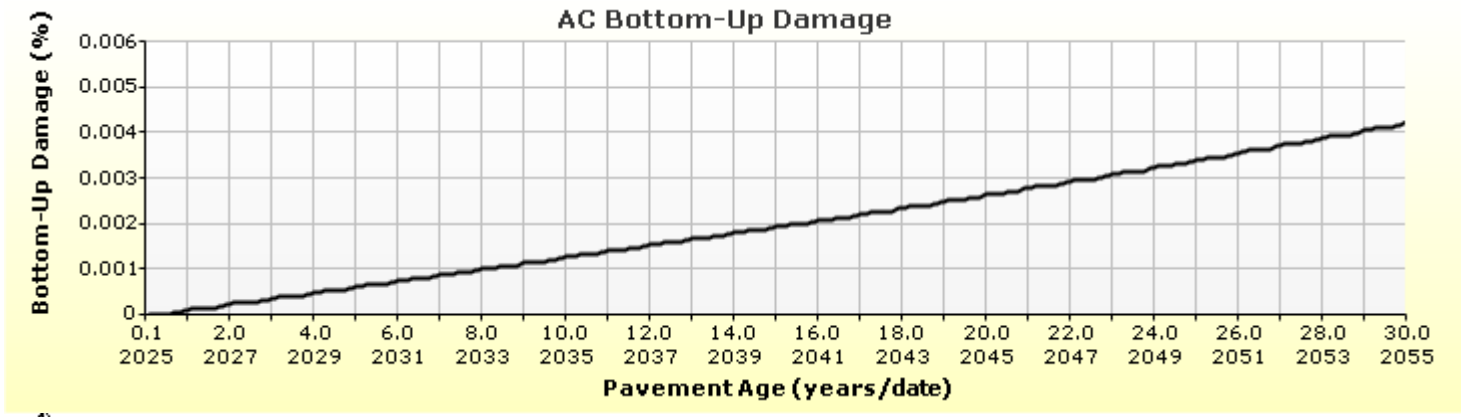
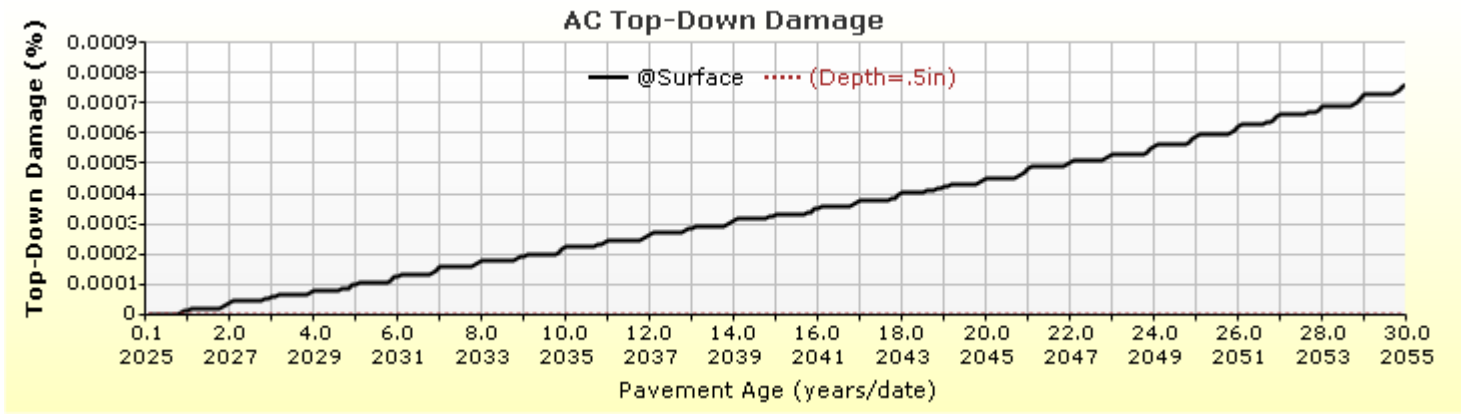


HMA Layer 3: Layer 3 Flexible : VDOT BM

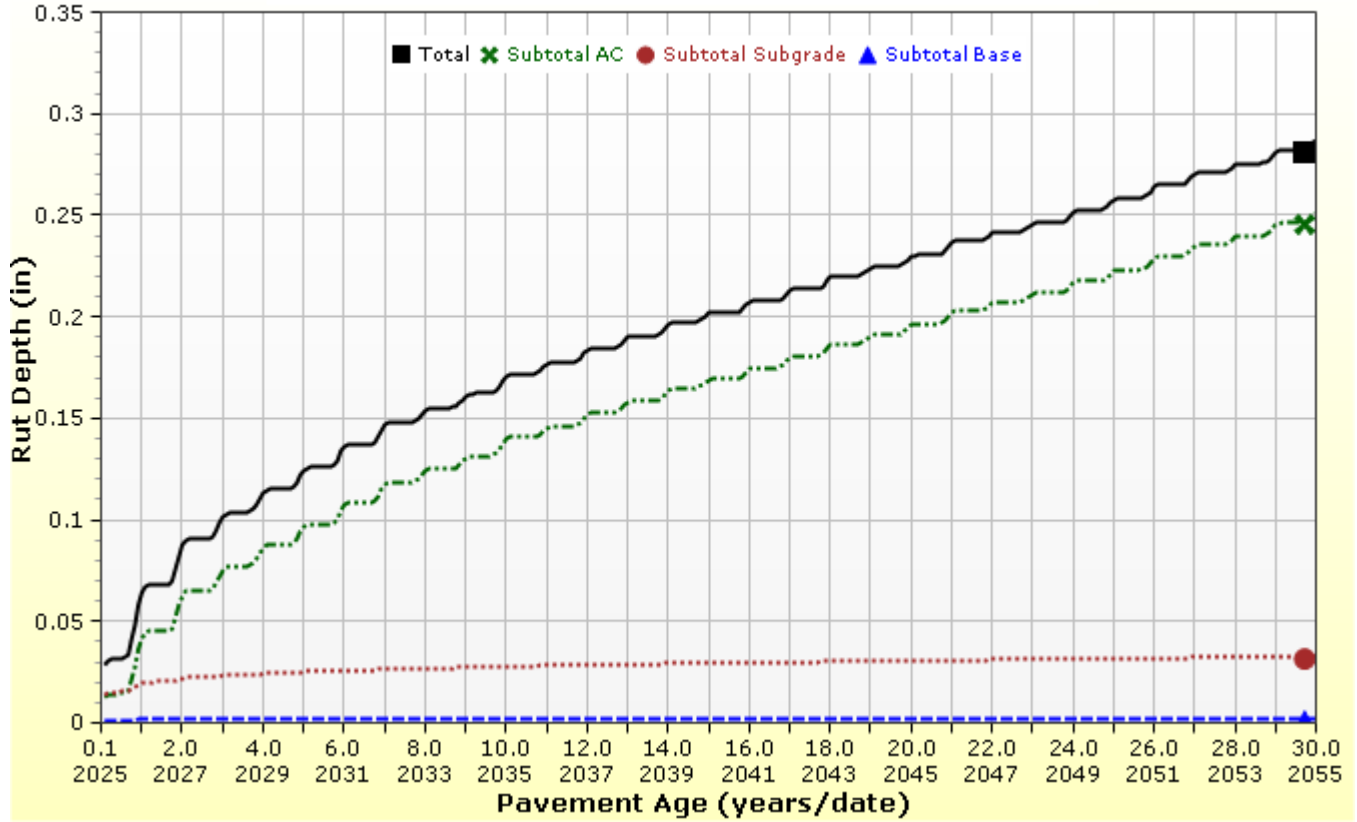


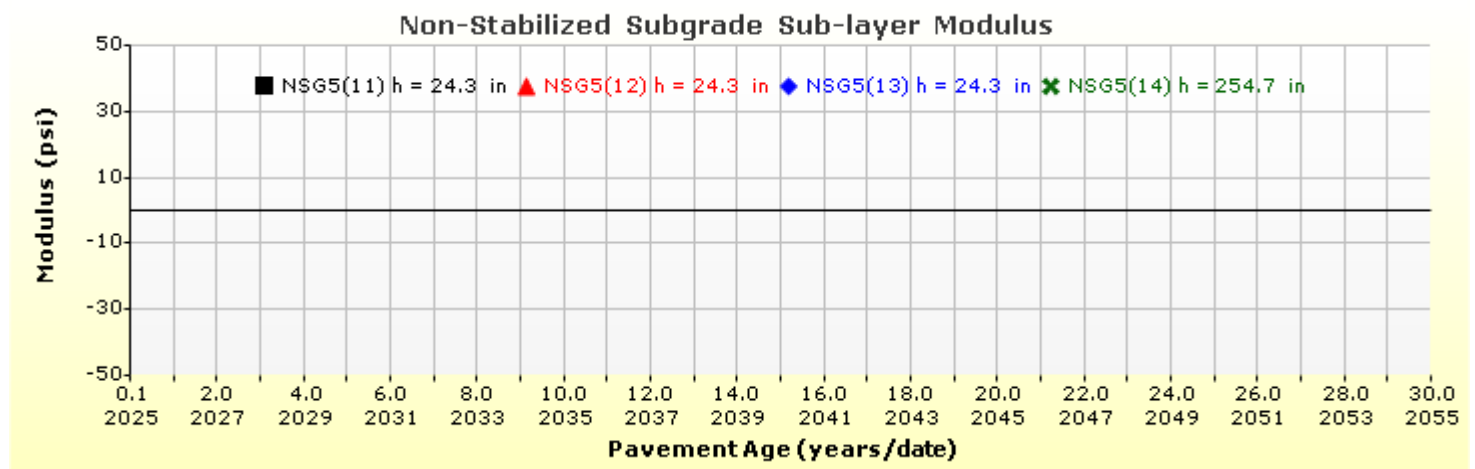
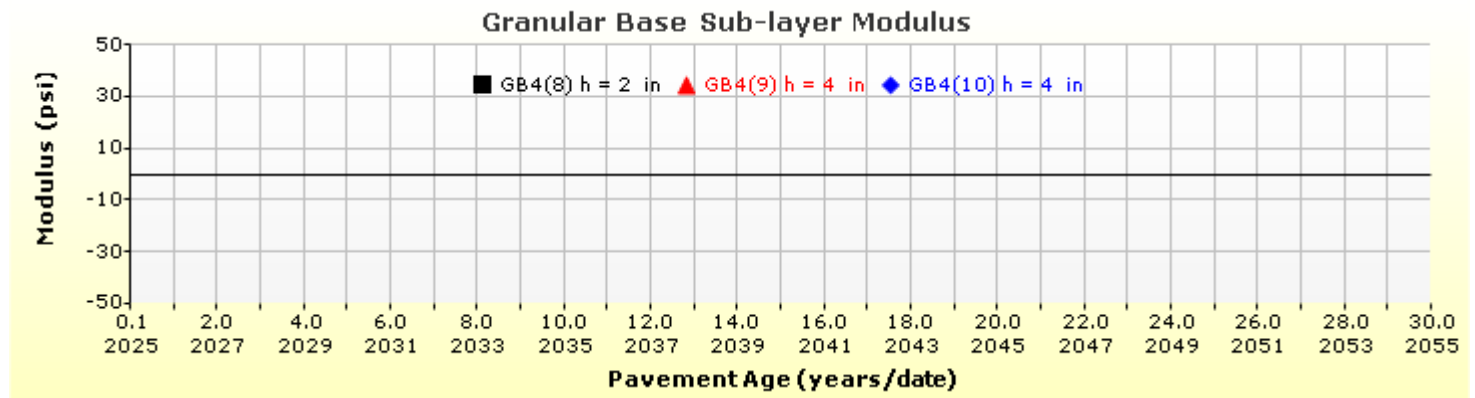
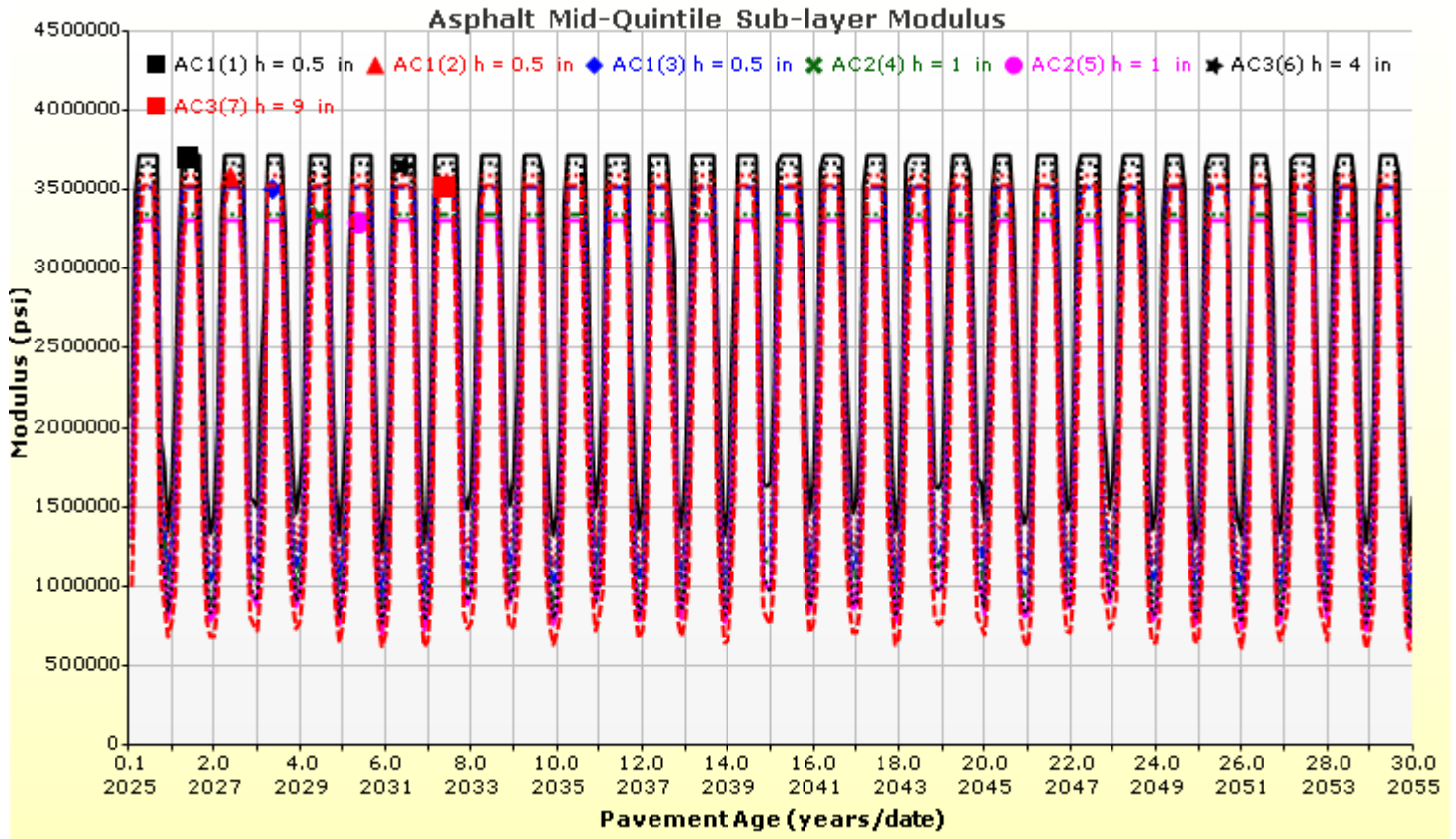
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability





Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 13.0 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Layer 4 Non-stabilized Base : VDOT CTA as non-stabilize layer

Unbound

| | |
|--|------|
| Layer thickness (in) | 10.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 80000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT CTA as non-stabilize layer |
| Description of object | CTA modeled as high quality aggregate |
| Author | GM |
| Date Created | 8/31/2017 12:00:00 AM |
| Approver | |
| Date approved | 8/31/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 150 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |

Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|--------|
| 4300.0 |
|--------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

| AC Fatigue | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ | k1: 0.007566 |
| $C = 10^M$ | k2: 3.9492 |
| $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

| AC Rutting | |
|--|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_a^2 + 2.4868 * H_a - 17.342$ $C_2 = 0.0172 * H_a^2 - 1.7331 * H_a + 27.428$ <p style="margin-top: 10px;"><i>Where:</i> H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

| Thermal Fracture | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma} \right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

| CSM Fatigue | |
|---|--|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}} \right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) |
| k1: 1 | k2: 1 |
| | Bc1: 0.75 |
| | Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |

MEPDG Output Reports

Proposed Pavement Section for DTR Interchange Ramps



Flexible Design_Dulles Toll Rd_CBR of 5

File Name: C:\Users\sbhusal\Desktop\Project NEXT\Flexible Design_Dulles Toll Rd_CBR of 5.dgpx



Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 12.0 |
| NonStabilized | VDOT Avg 21A-21B | 6.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

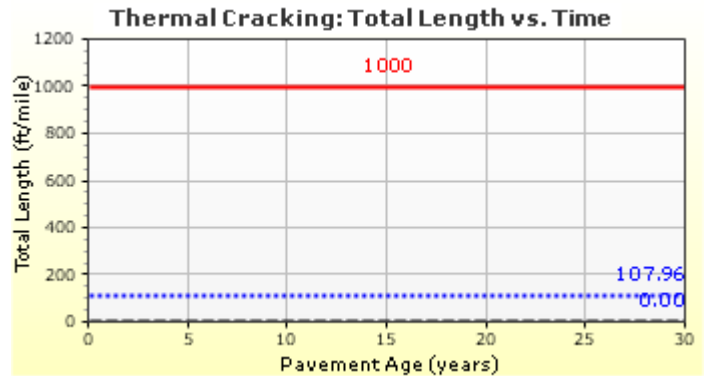
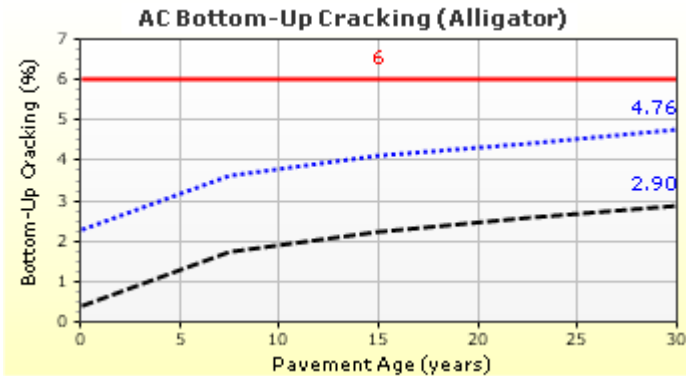
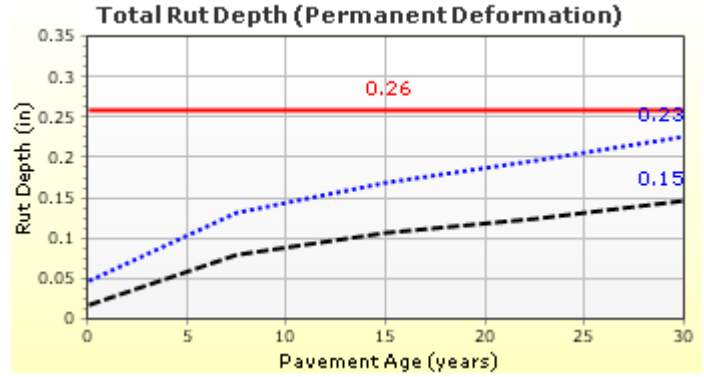
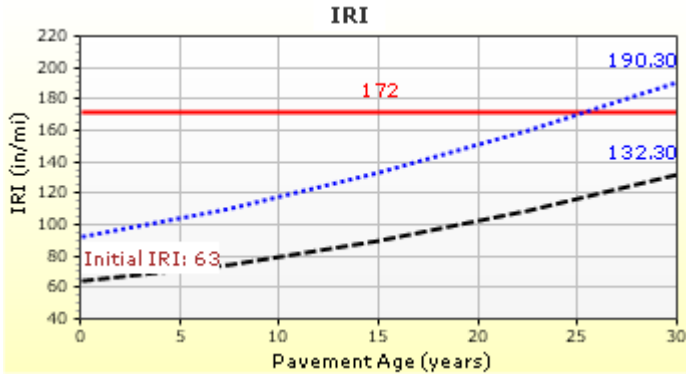
| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 1,500 |
| 2040 (15 years) | 7,937,180 |
| 2055 (30 years) | 17,152,000 |

Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 190.27 | 95.00 | 86.99 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.23 | 95.00 | 98.99 | Pass |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 4.76 | 95.00 | 99.70 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 107.96 | 95.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 329.23 | 95.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.18 | 95.00 | 99.93 | Pass |

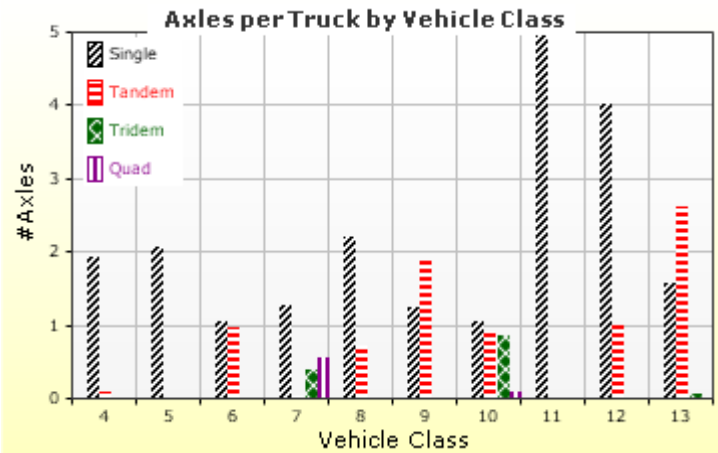
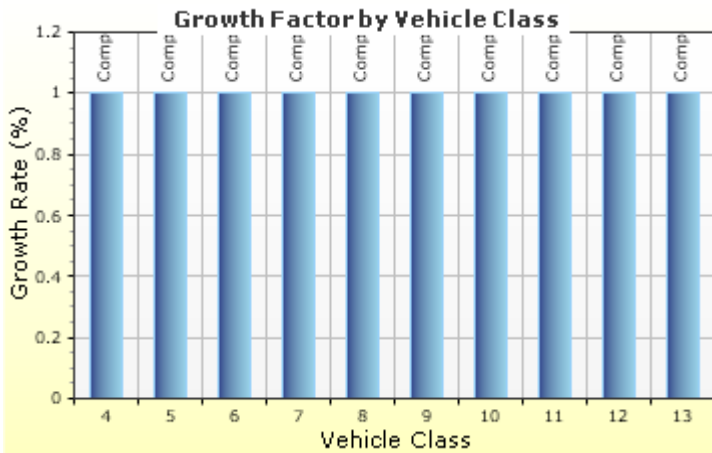
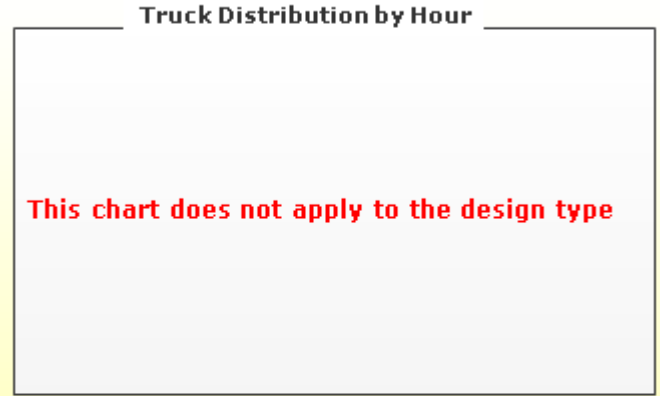
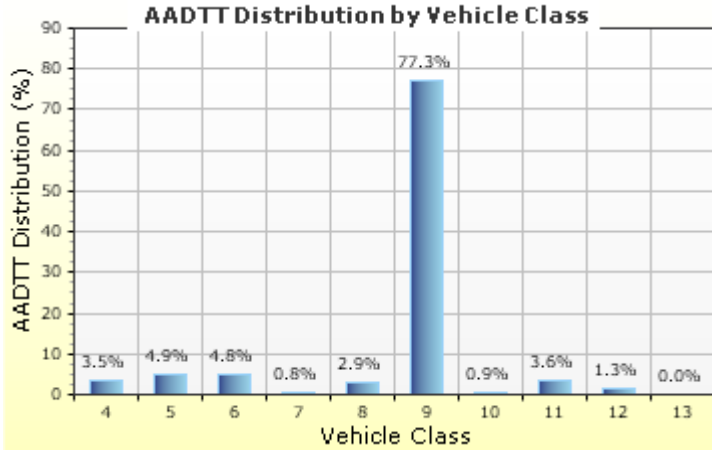
Distress Charts



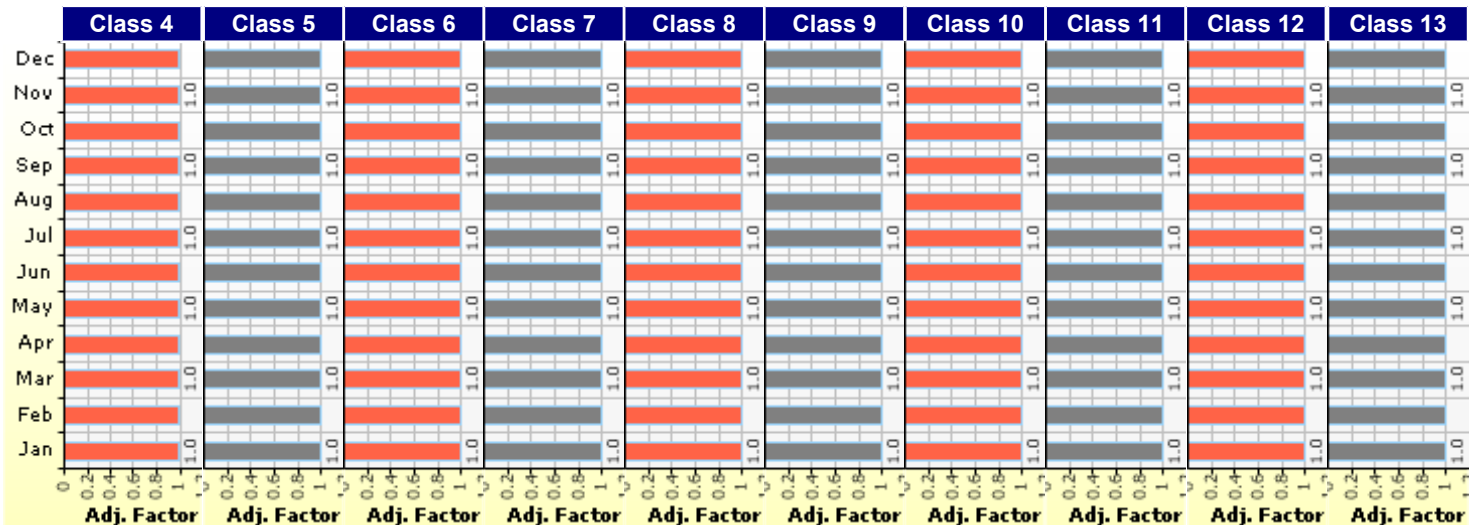
Traffic Inputs

Graphical Representation of Traffic Inputs

| | | | |
|--------------------------------------|-------|--|-------|
| Initial two-way AADTT: | 1,500 | Percent of trucks in design direction (%): | 100.0 |
| Number of lanes in design direction: | 2 | Percent of trucks in design lane (%): | 90.0 |
| | | Operational speed (mph): | 60.0 |



Traffic Volume Monthly Adjustment Factors





Flexible Design_Dulles Toll Rd_CBR of 5

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Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1% | Compound |
| Class 5 | 4.92% | 1% | Compound |
| Class 6 | 4.75% | 1% | Compound |
| Class 7 | 0.82% | 1% | Compound |
| Class 8 | 2.89% | 1% | Compound |
| Class 9 | 77.29% | 1% | Compound |
| Class 10 | 0.92% | 1% | Compound |
| Class 11 | 3.58% | 1% | Compound |
| Class 12 | 1.32% | 1% | Compound |
| Class 13 | 0.01% | 1% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

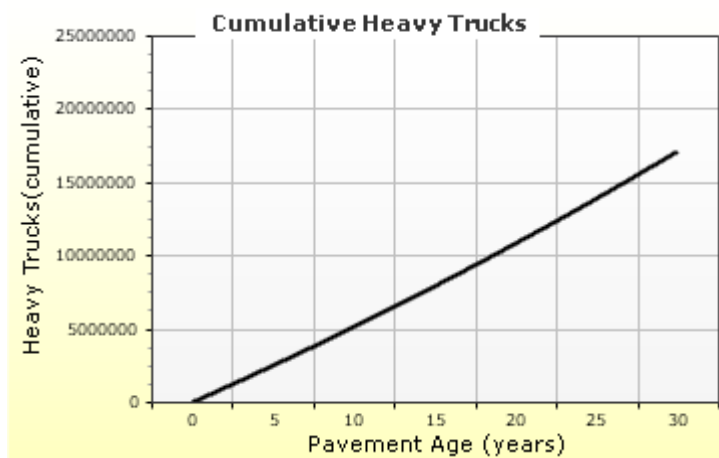
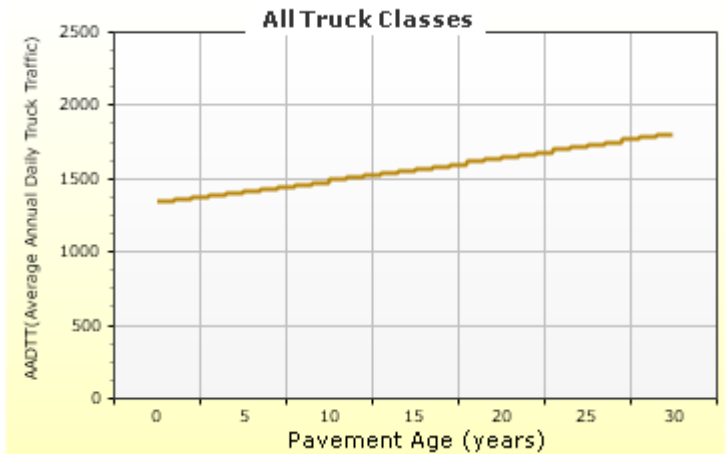
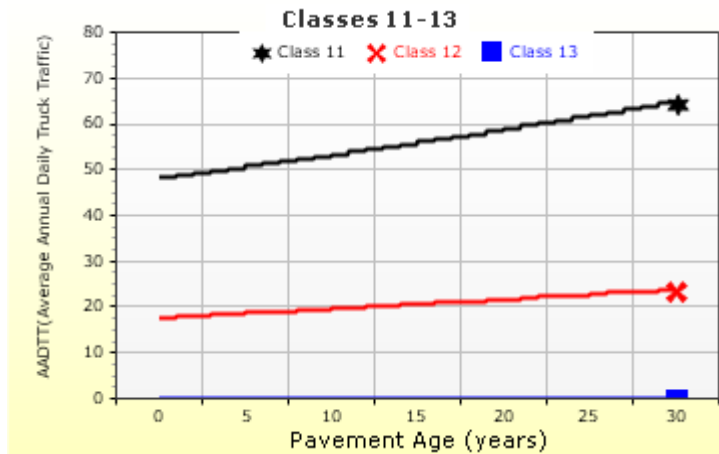
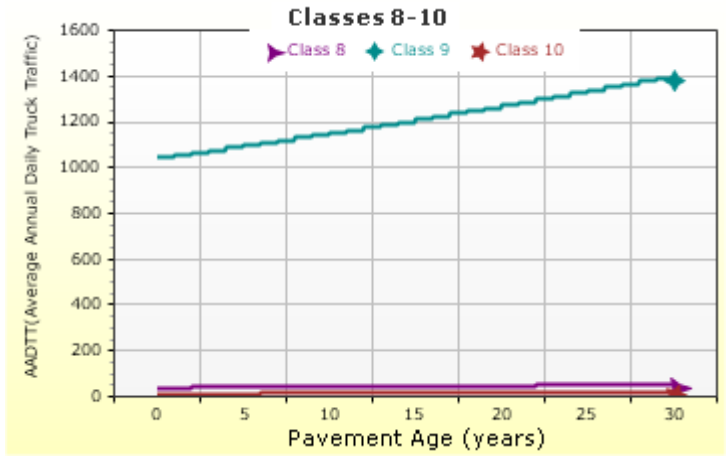
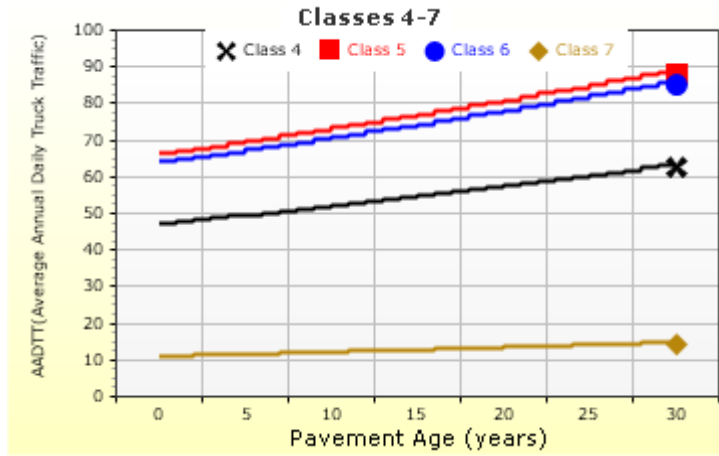
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



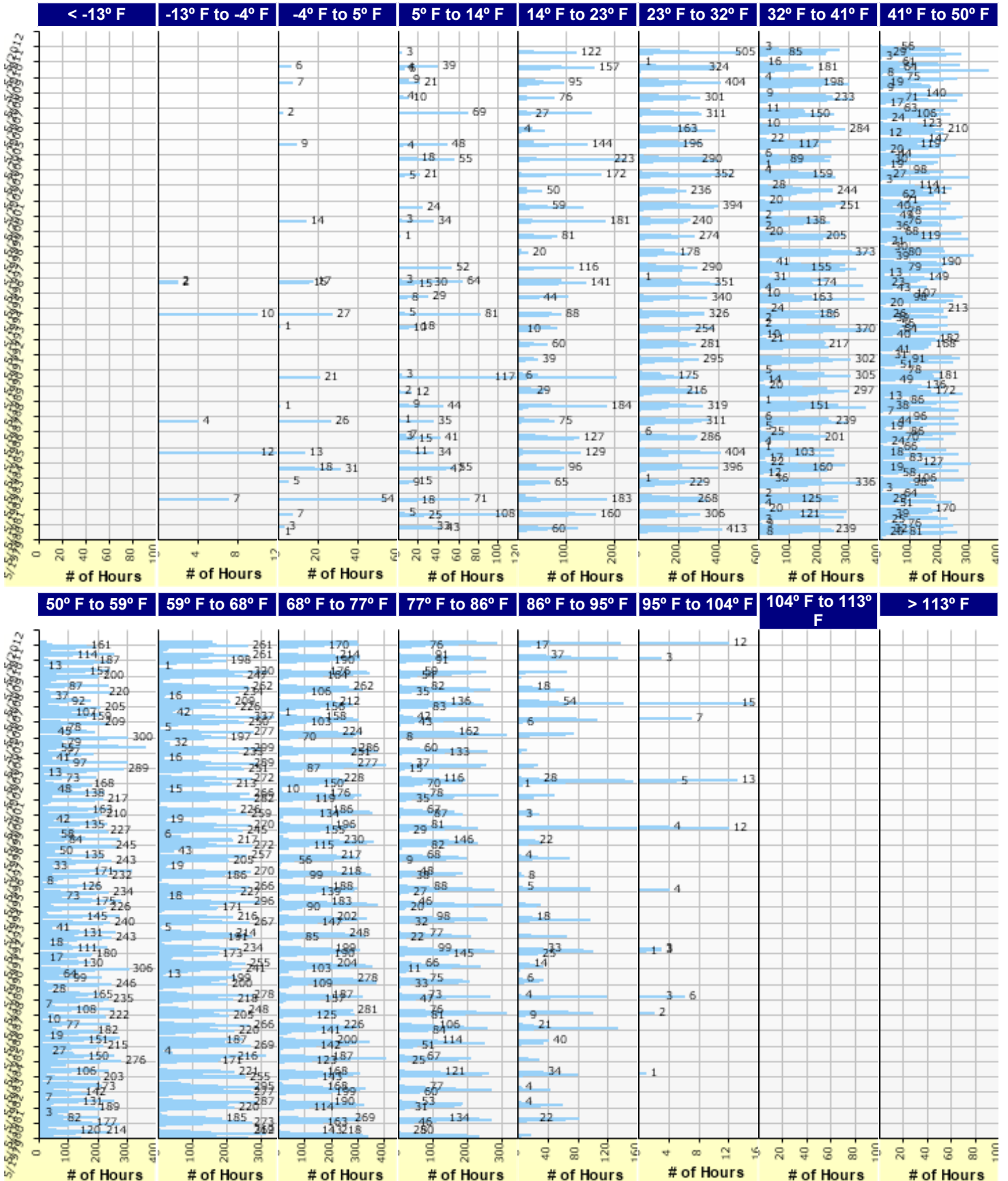


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Hourly Air Temperature Distribution by Month:





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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

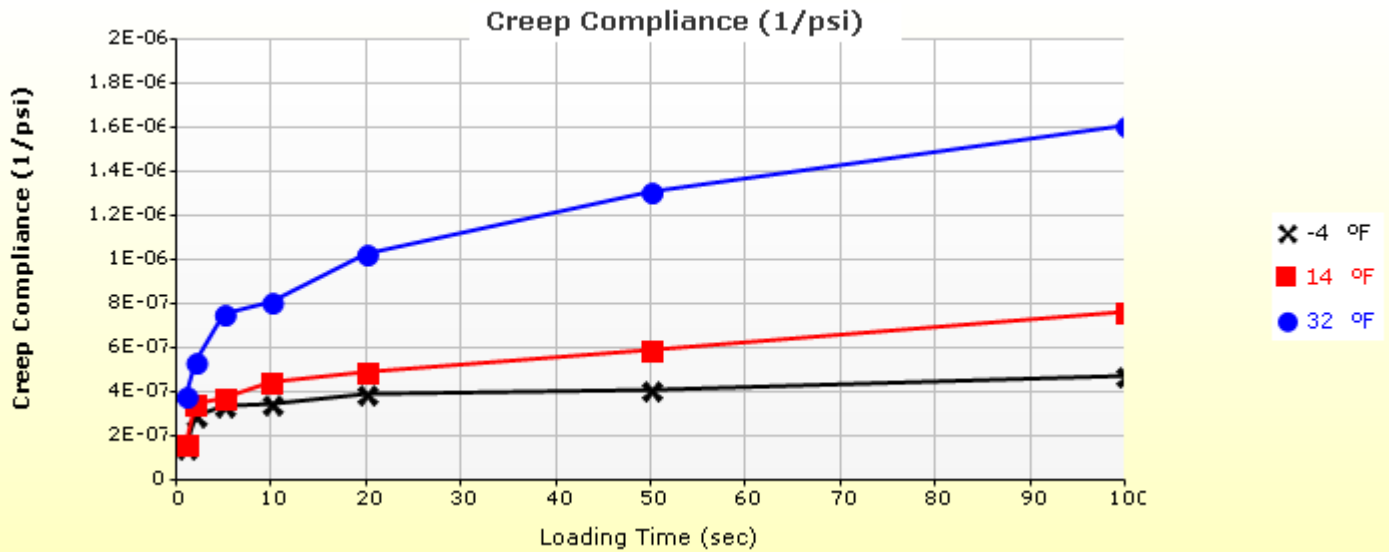
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

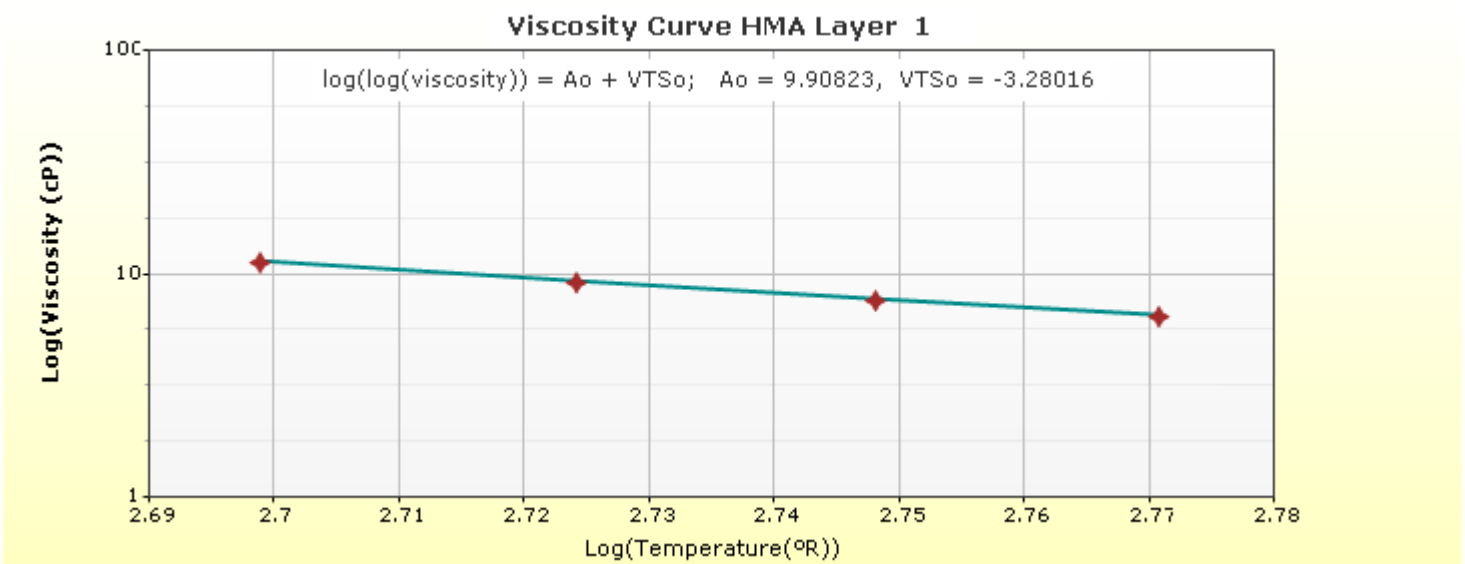
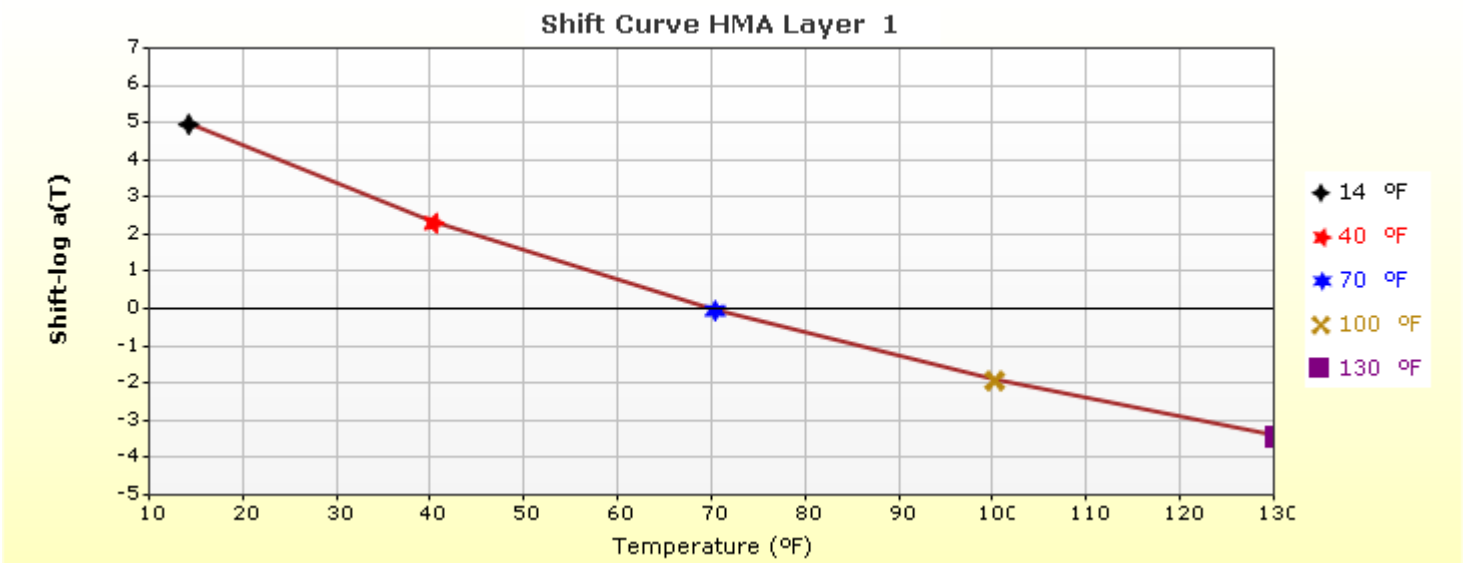
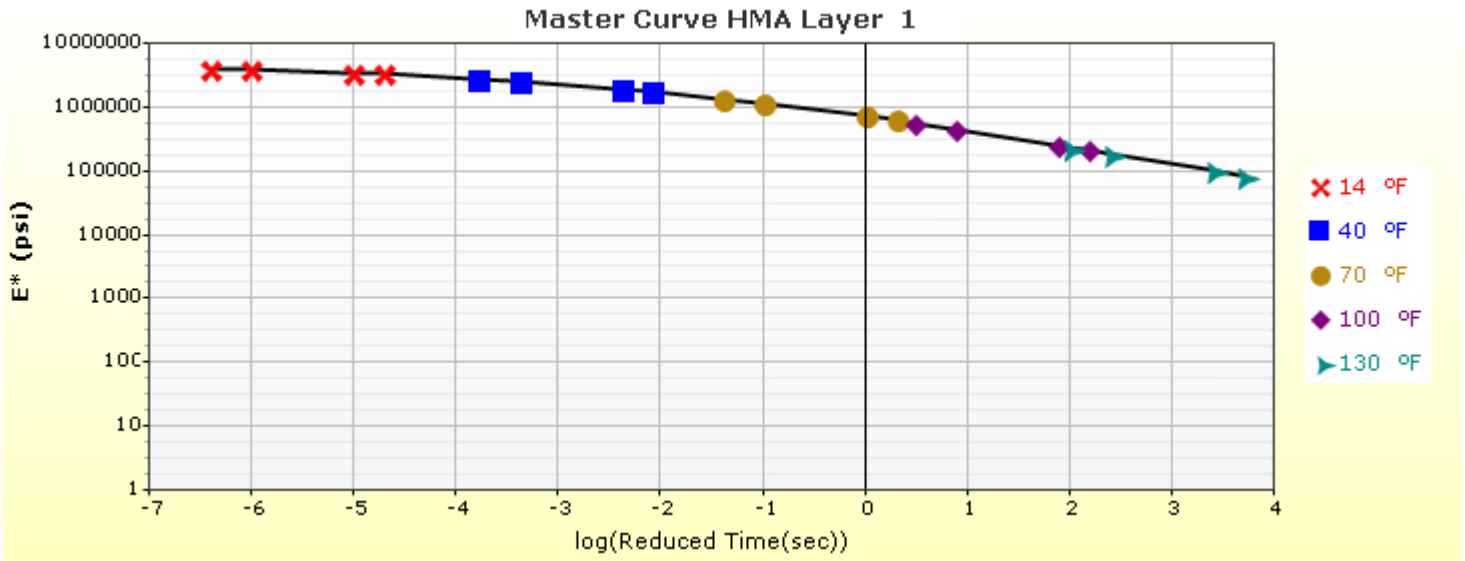
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

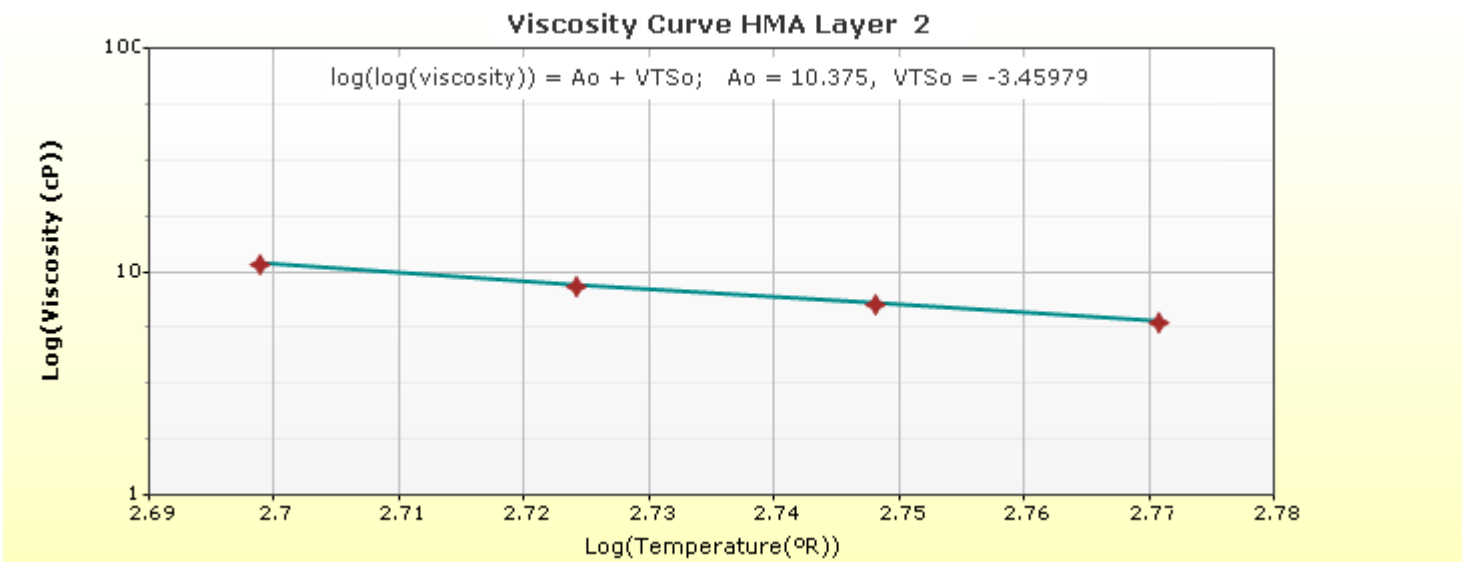
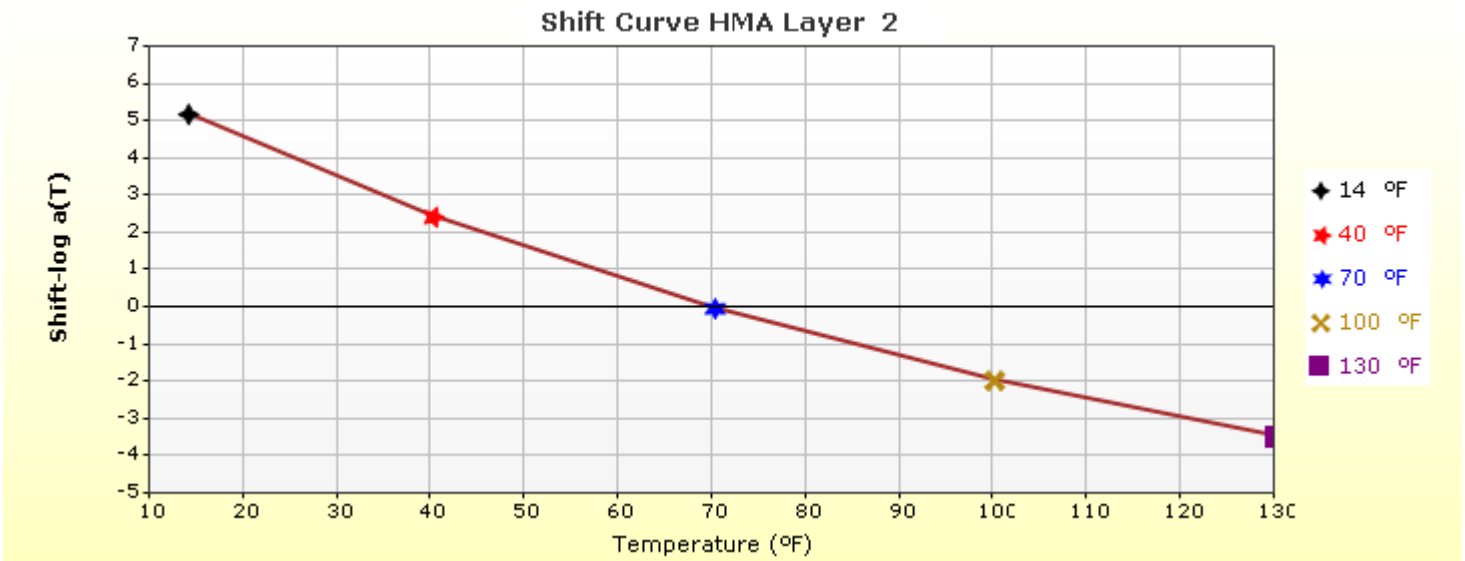
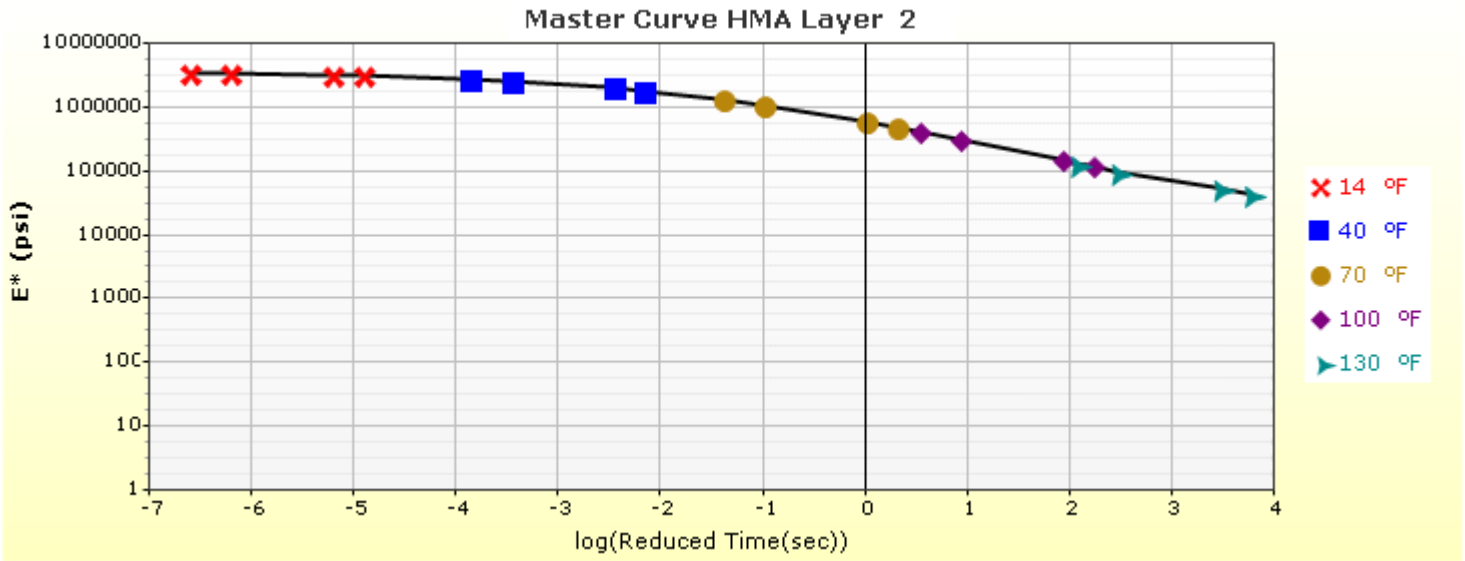
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



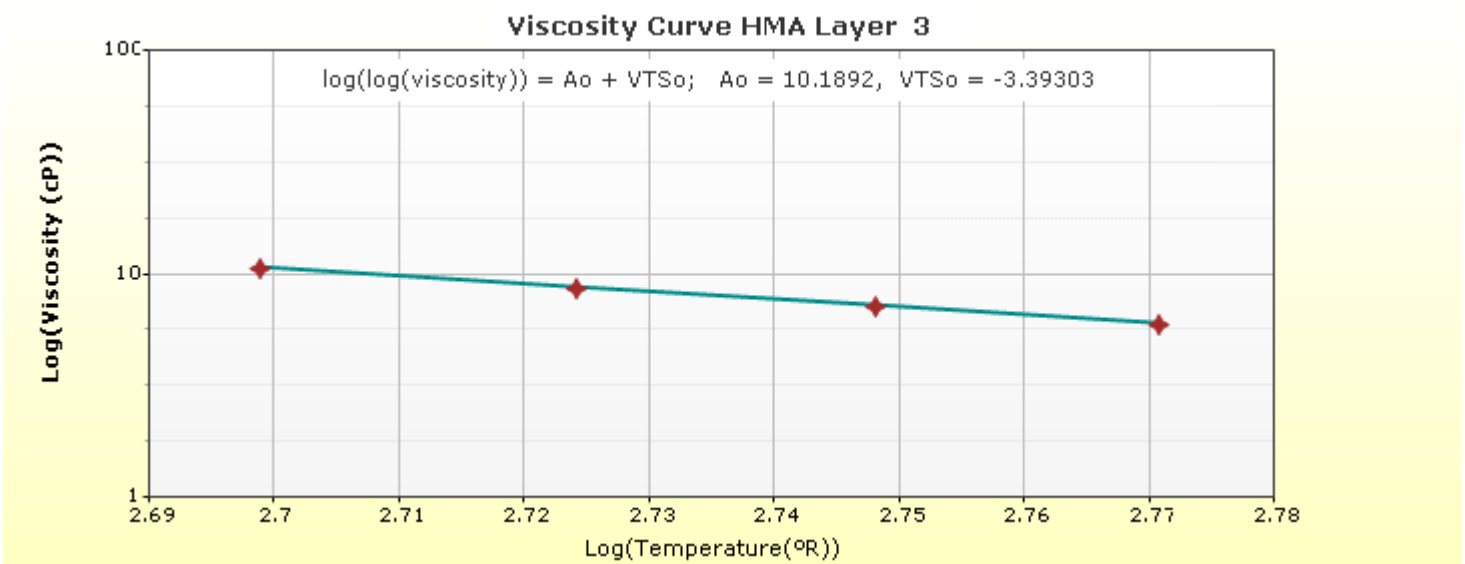
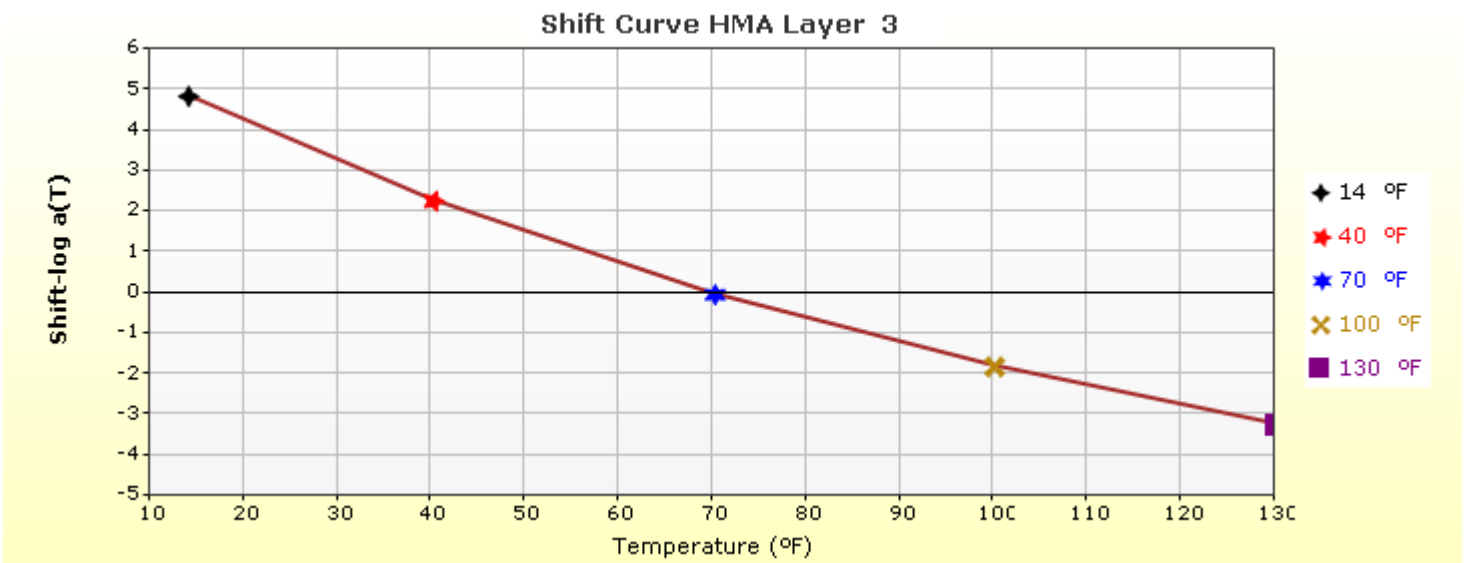
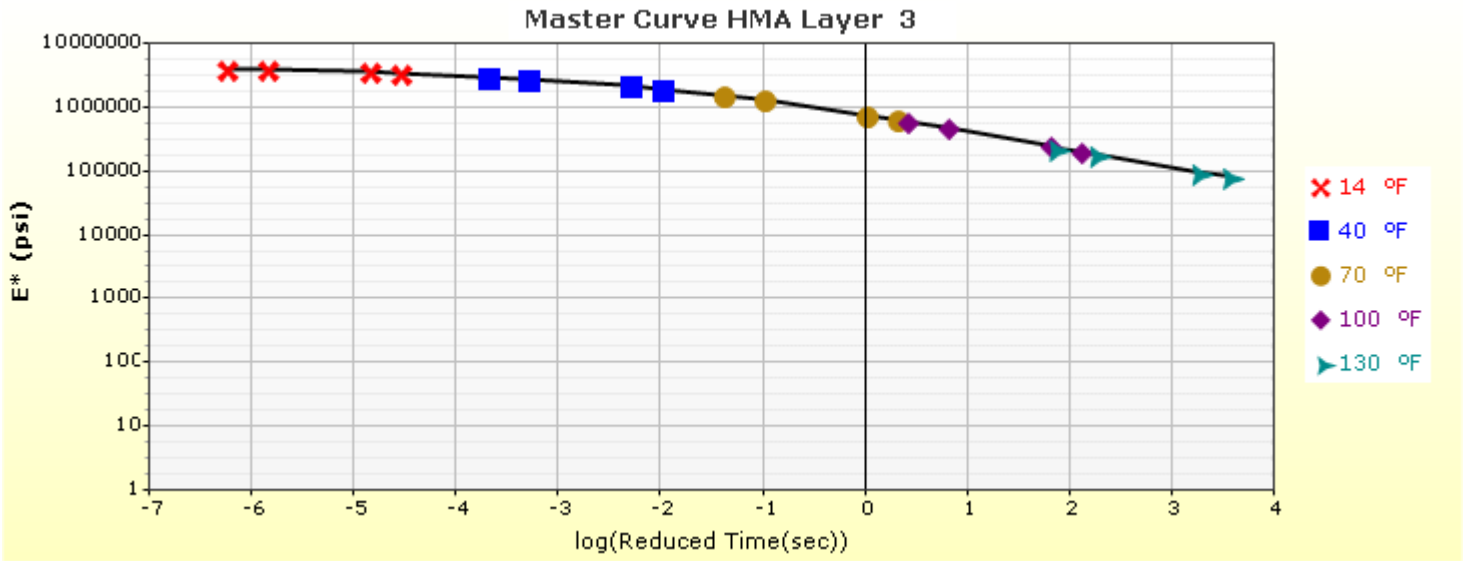
HMA Layer 1: Layer 1 Flexible : VDOT SM



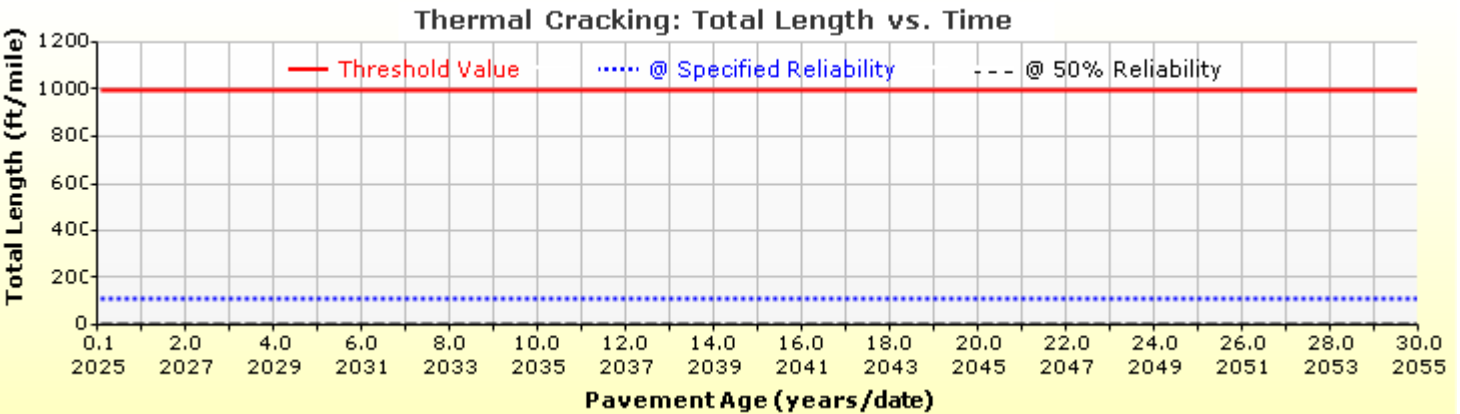
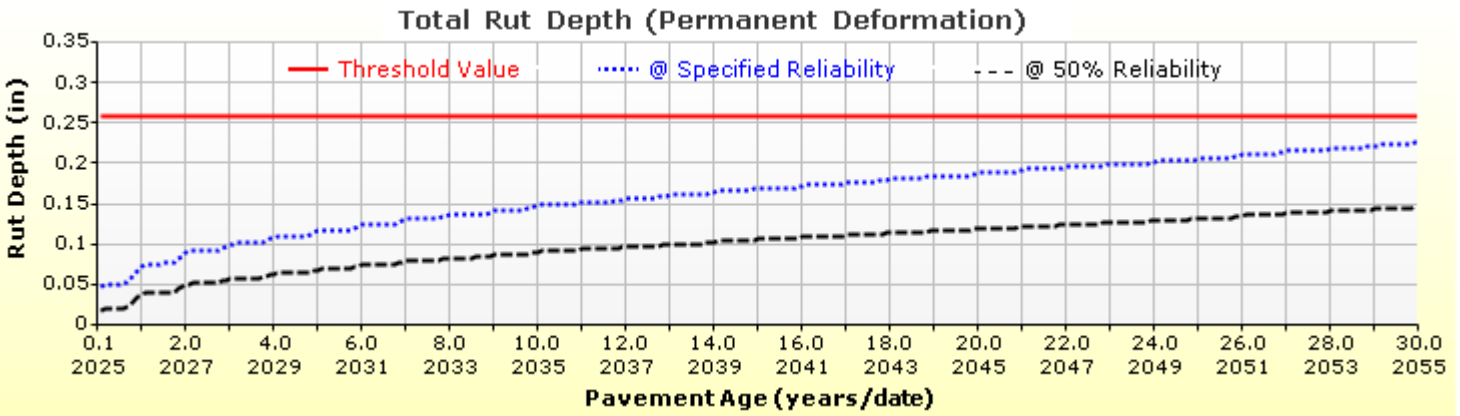
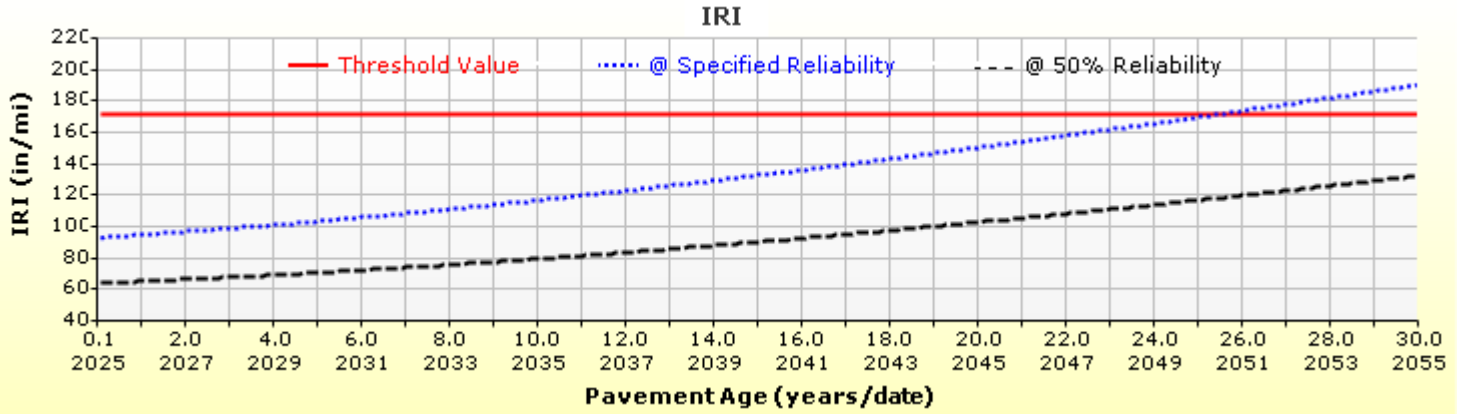
HMA Layer 2: Layer 2 Flexible : VDOT IM

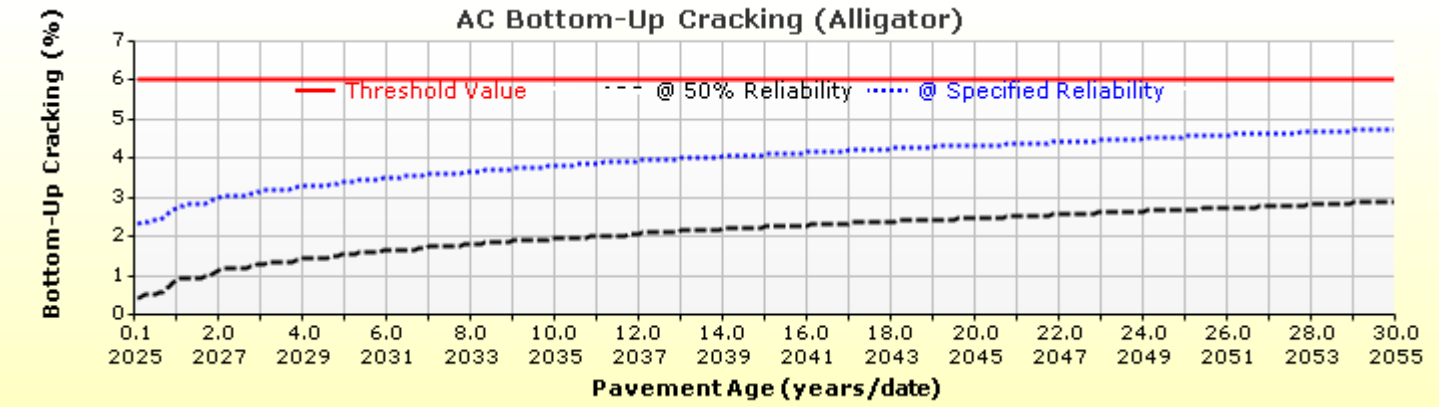
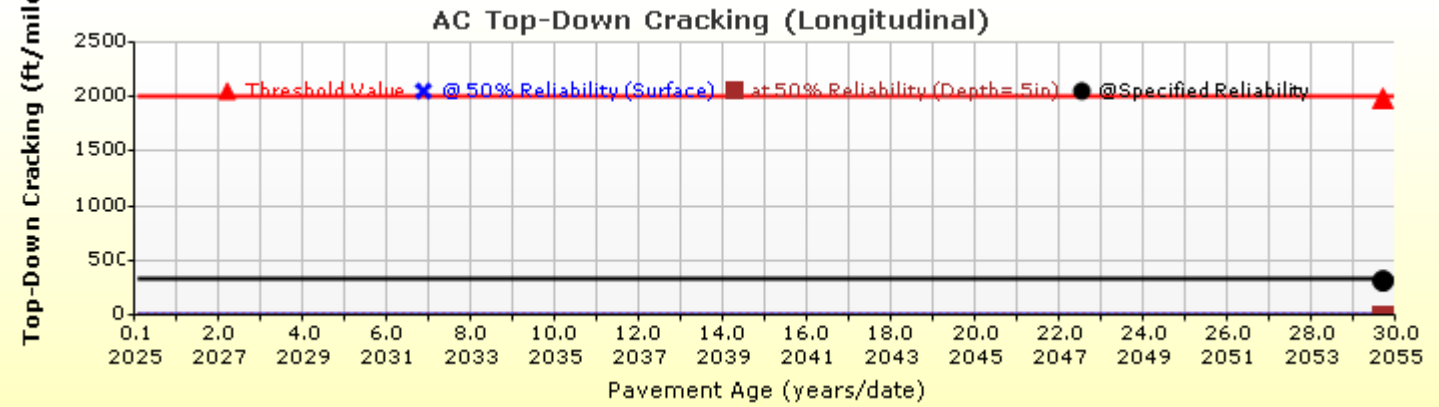
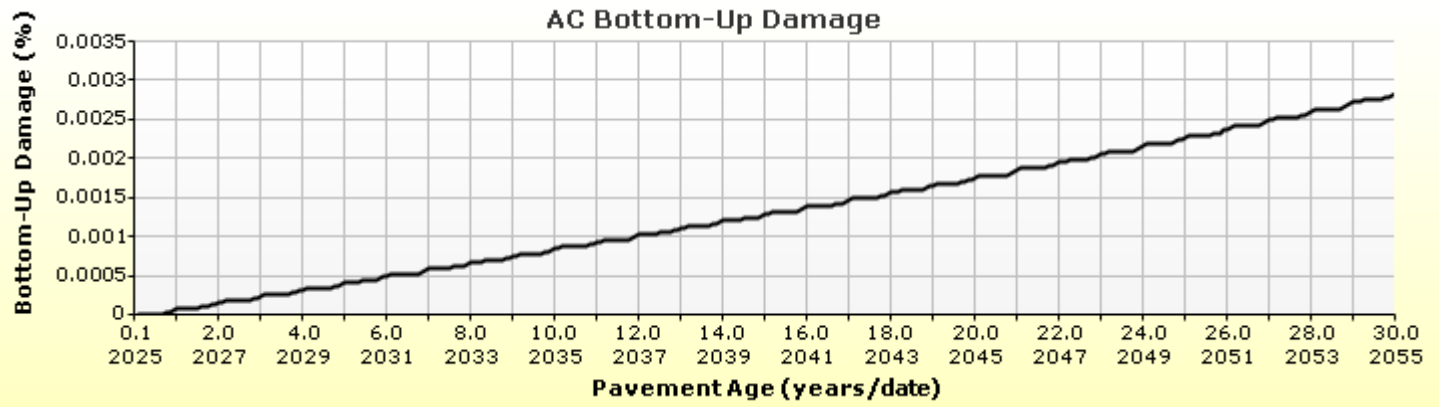
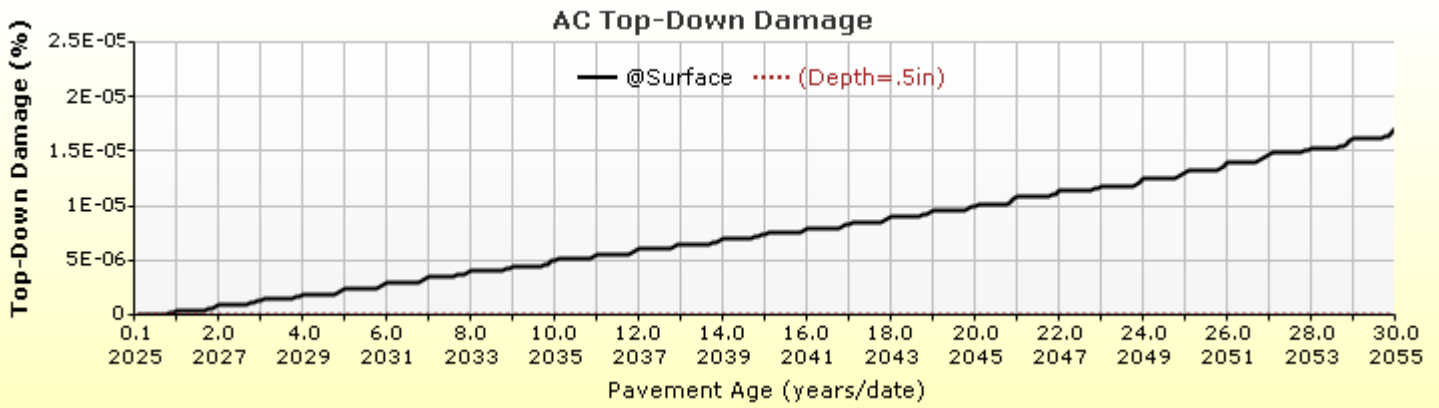


HMA Layer 3: Layer 3 Flexible : VDOT BM

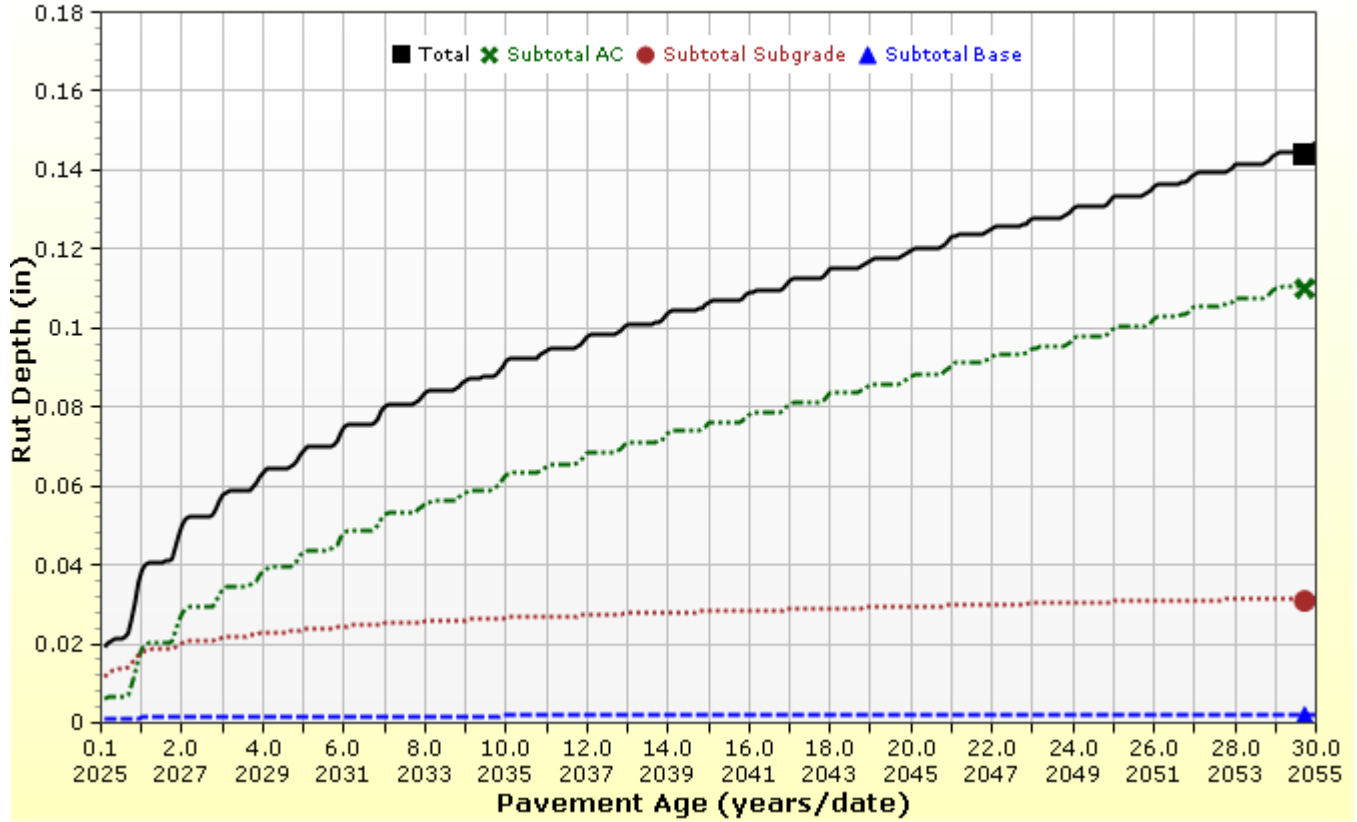


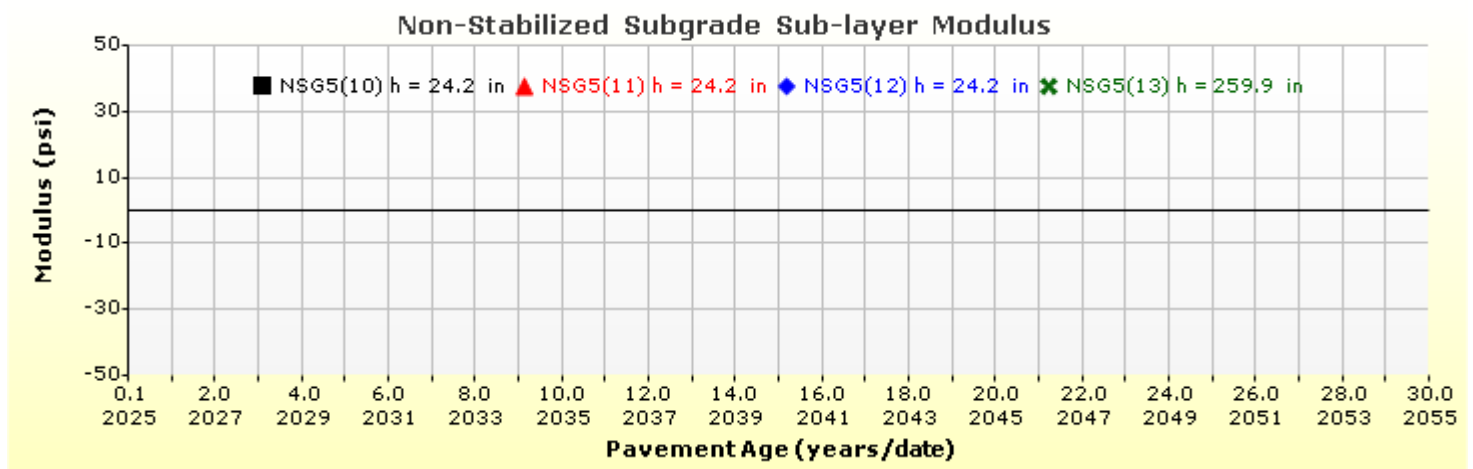
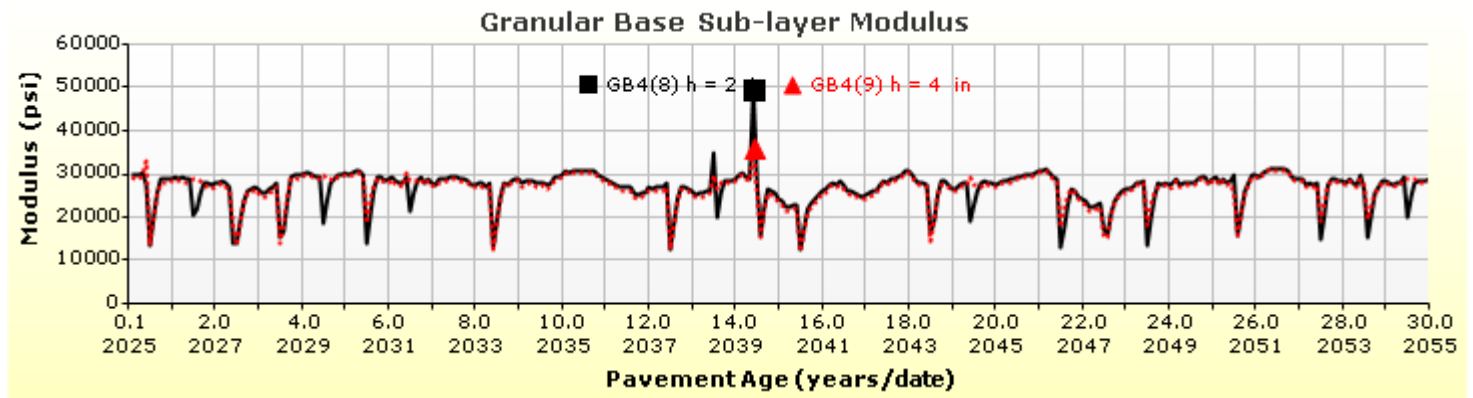
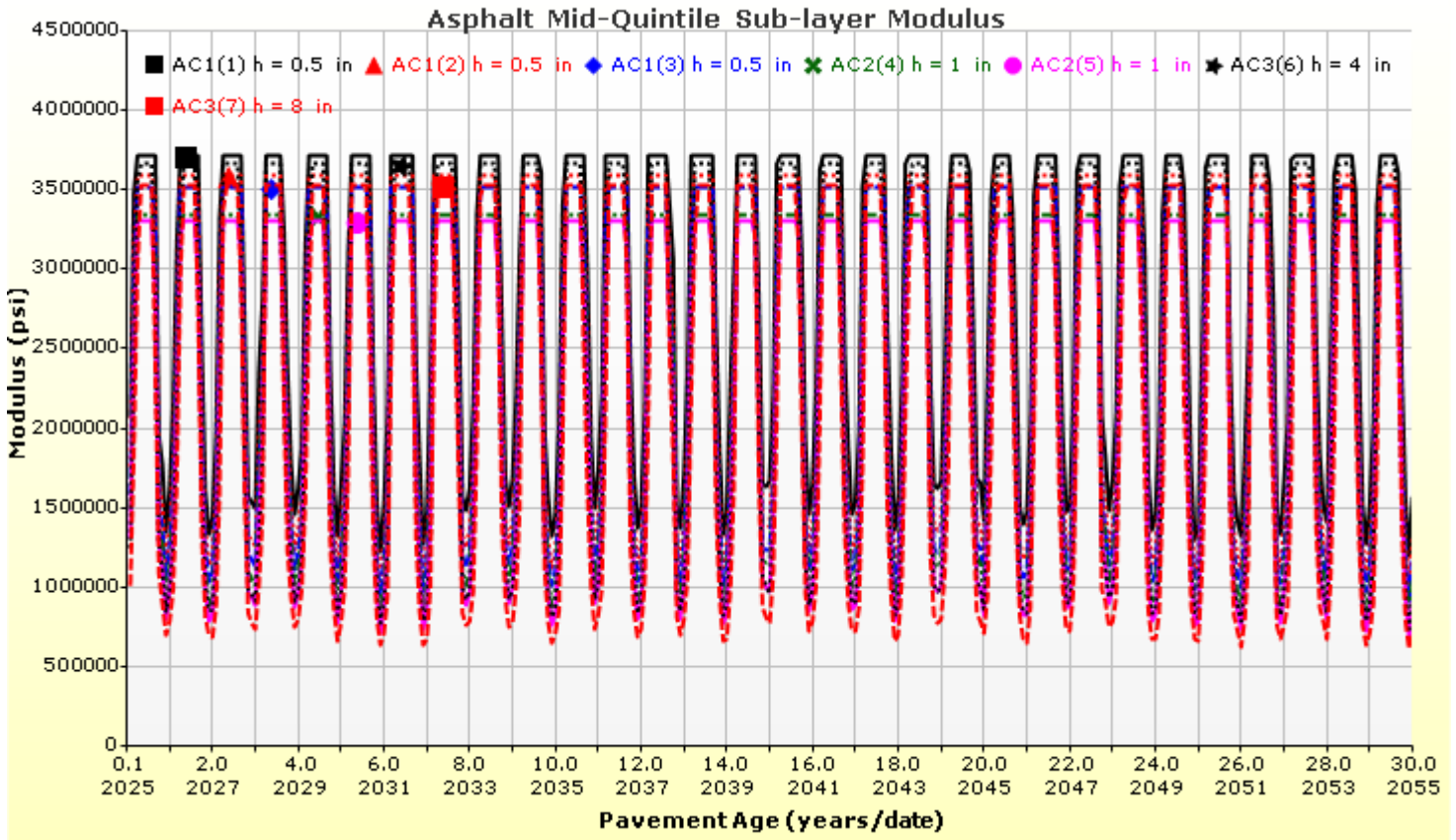
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability







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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 12.0 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 6.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 21000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



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File Name: C:\Users\sbhusal\Desktop\Project NEXT\Flexible Design_Dulles Toll Rd_CBR of 5.dgpx



Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ | k1: 0.007566 |
| $C = 10^M$ | k2: 3.9492 |
| $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|--|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$ $C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$ <p><i>Where:</i> H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma} \right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|---------|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}} \right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |

MEPDG Output Reports

Proposed Pavement Section for Old Dominion Drive



Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 4.5 |
| NonStabilized | VDOT Avg 21A-21B | 6.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 287 |
| 2040 (15 years) | 1,241,600 |
| 2055 (30 years) | 2,793,890 |

Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 163.03 | 80.00 | 86.33 | Pass |
| Permanent deformation - total pavement (in) | 0.26 | 0.19 | 80.00 | 99.00 | Pass |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.91 | 80.00 | 82.13 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 55.73 | 80.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 171.35 | 80.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.13 | 80.00 | 99.99 | Pass |

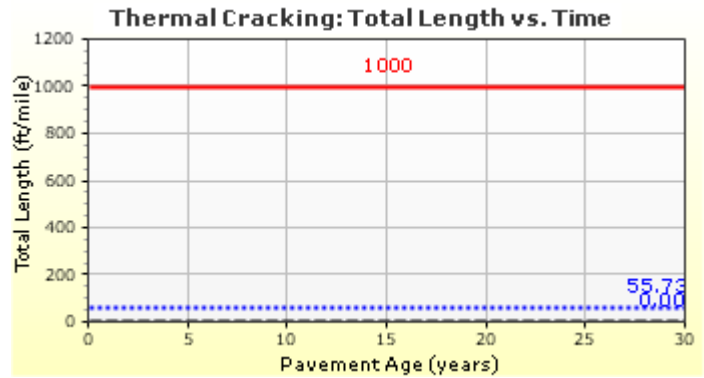
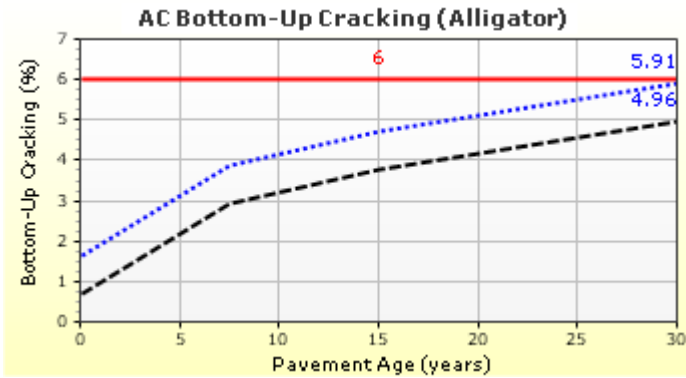
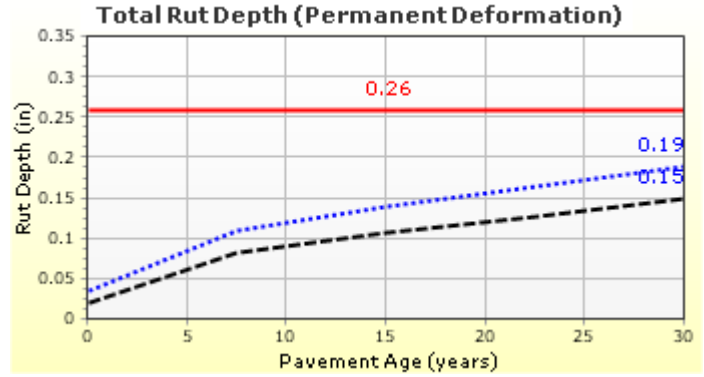
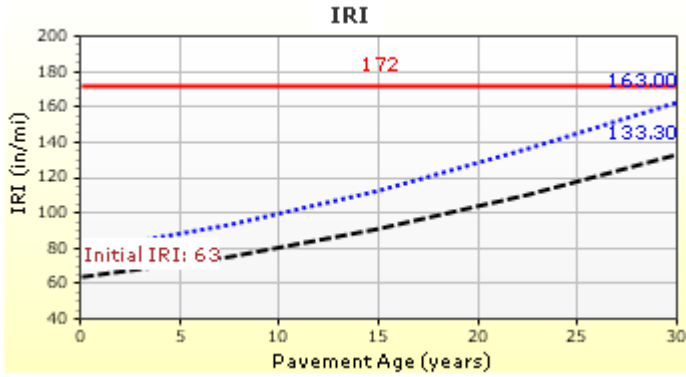


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Distress Charts





Flexible Design_Old Dominion Drive_CBR of 5 Fill

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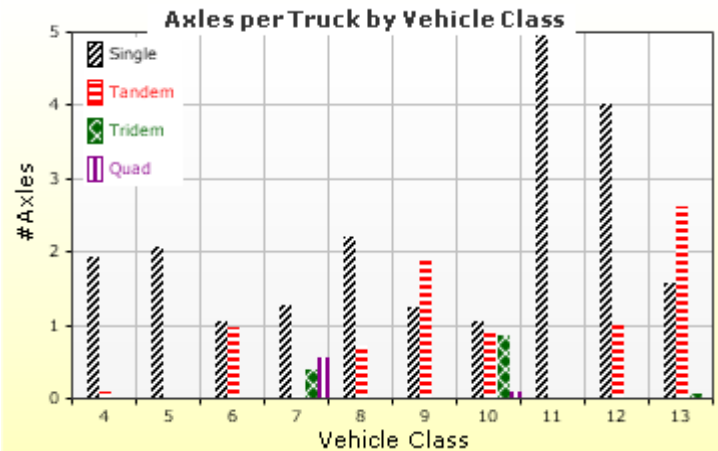
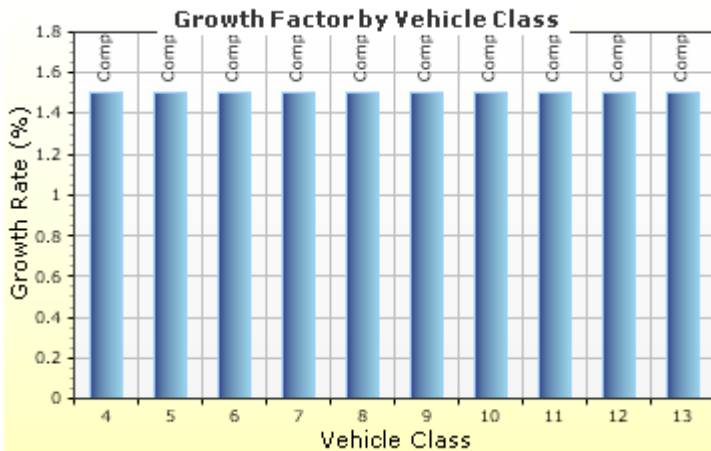
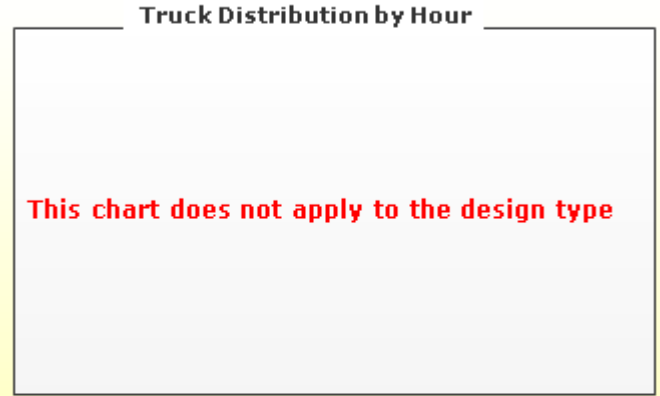
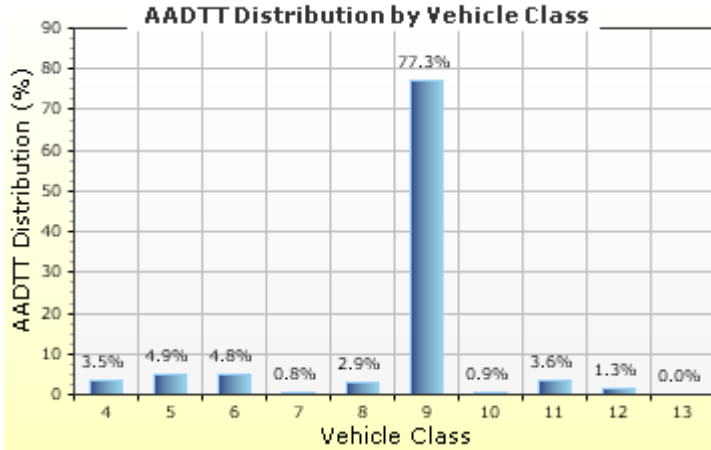


Traffic Inputs

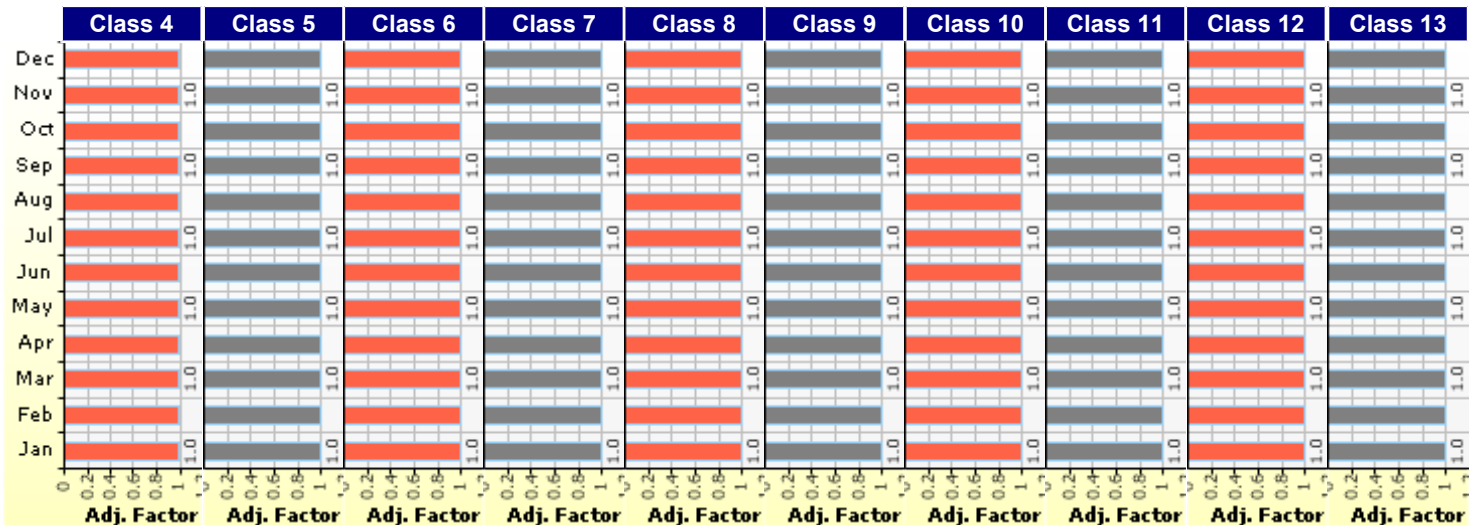
Graphical Representation of Traffic Inputs

Initial two-way AADTT: 287
 Number of lanes in design direction: 1

Percent of trucks in design direction (%): 71.0
 Percent of trucks in design lane (%): 100.0
 Operational speed (mph): 50.0



Traffic Volume Monthly Adjustment Factors





Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors

Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1.5% | Compound |
| Class 5 | 4.92% | 1.5% | Compound |
| Class 6 | 4.75% | 1.5% | Compound |
| Class 7 | 0.82% | 1.5% | Compound |
| Class 8 | 2.89% | 1.5% | Compound |
| Class 9 | 77.29% | 1.5% | Compound |
| Class 10 | 0.92% | 1.5% | Compound |
| Class 11 | 3.58% | 1.5% | Compound |
| Class 12 | 1.32% | 1.5% | Compound |
| Class 13 | 0.01% | 1.5% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |



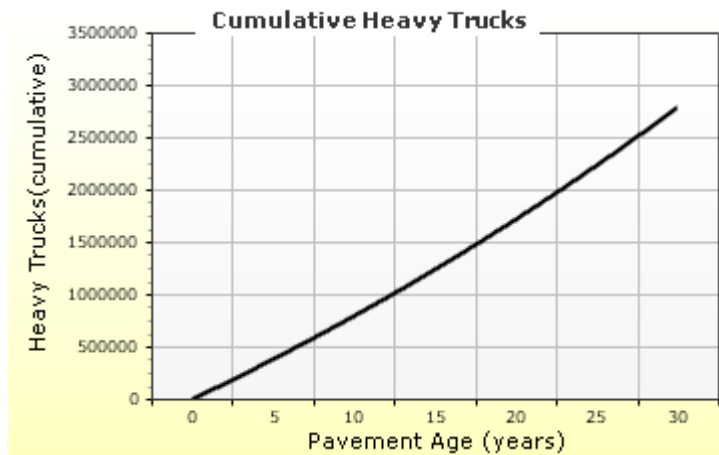
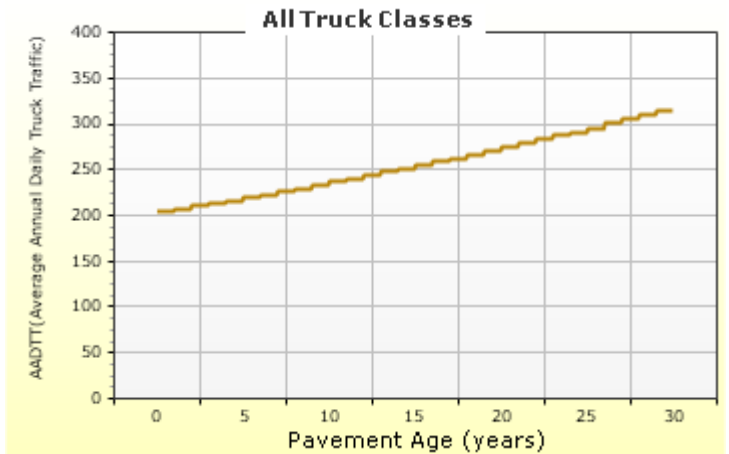
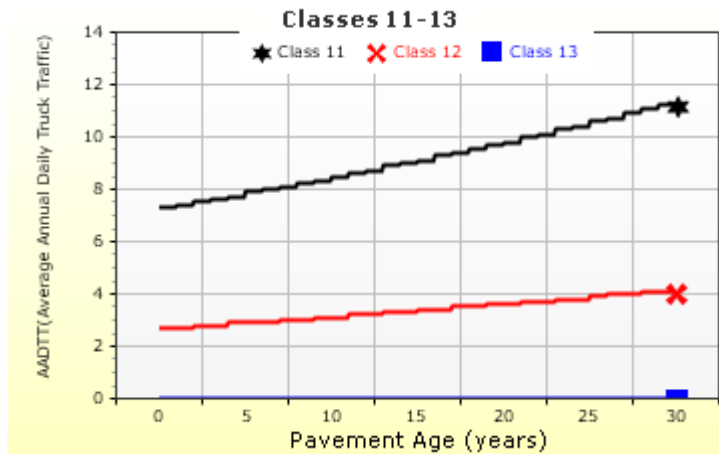
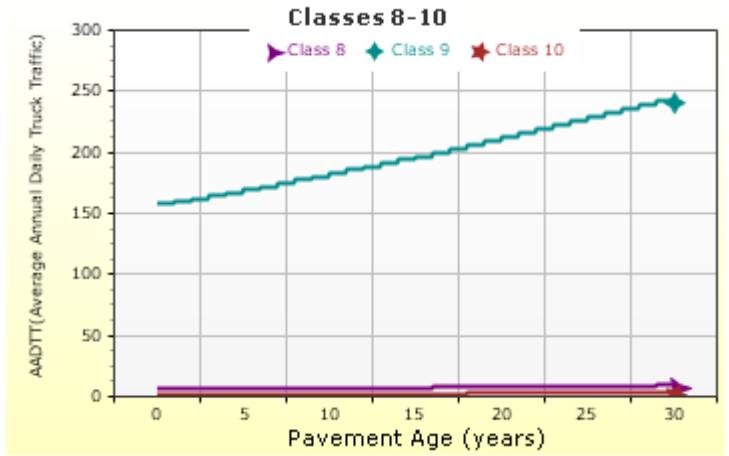
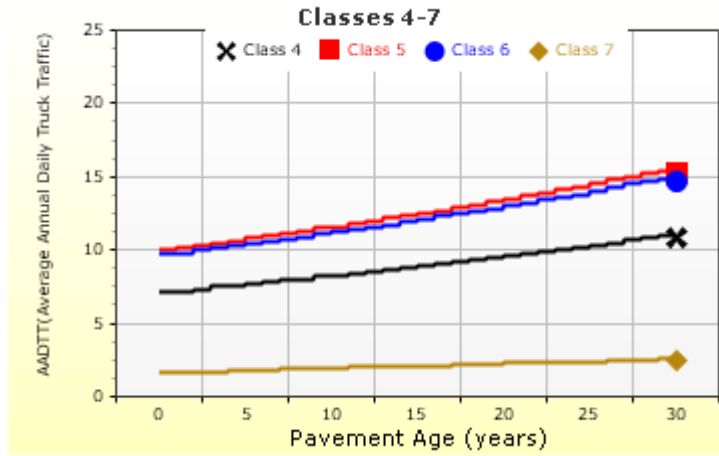
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AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



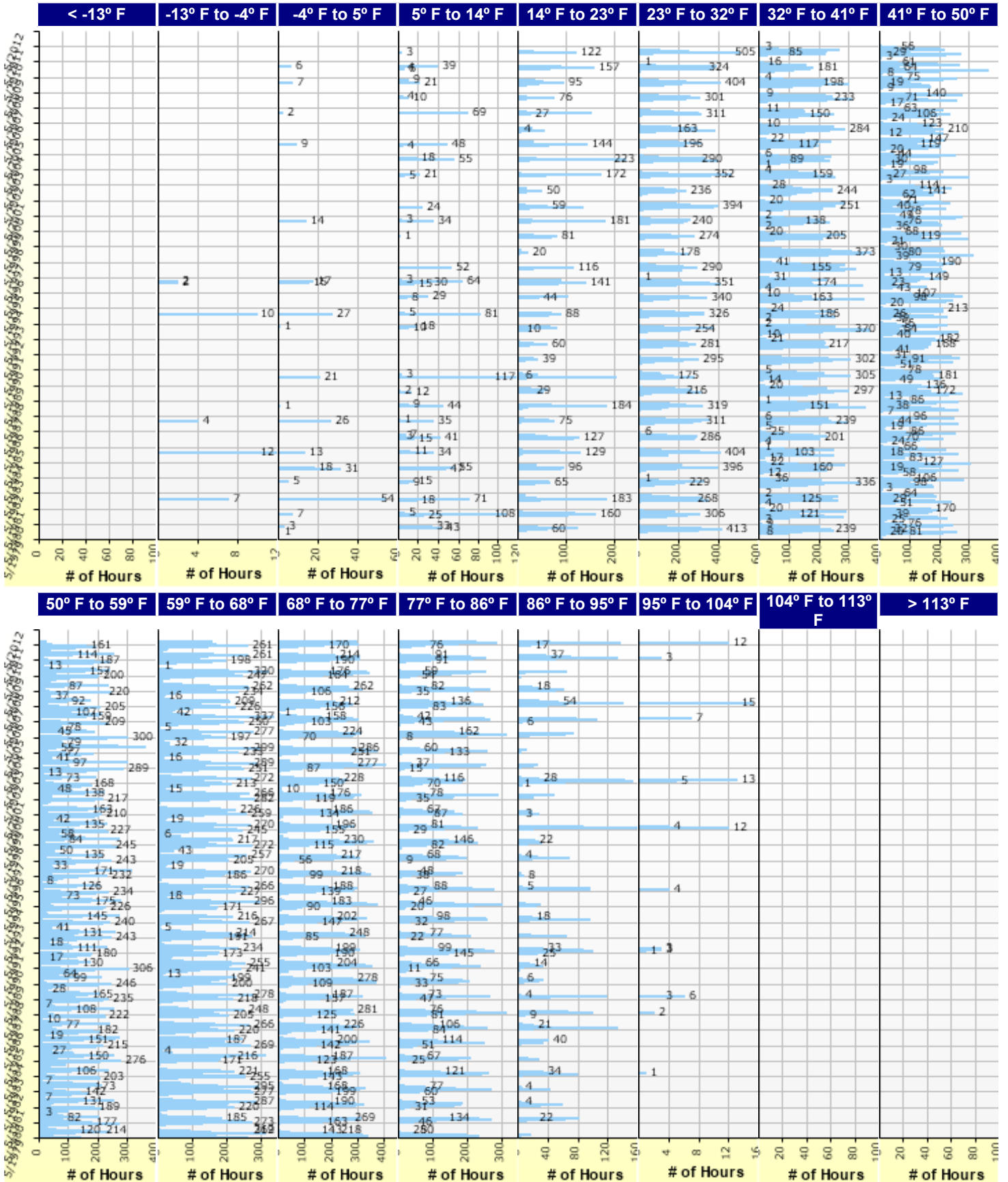


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Hourly Air Temperature Distribution by Month:





Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

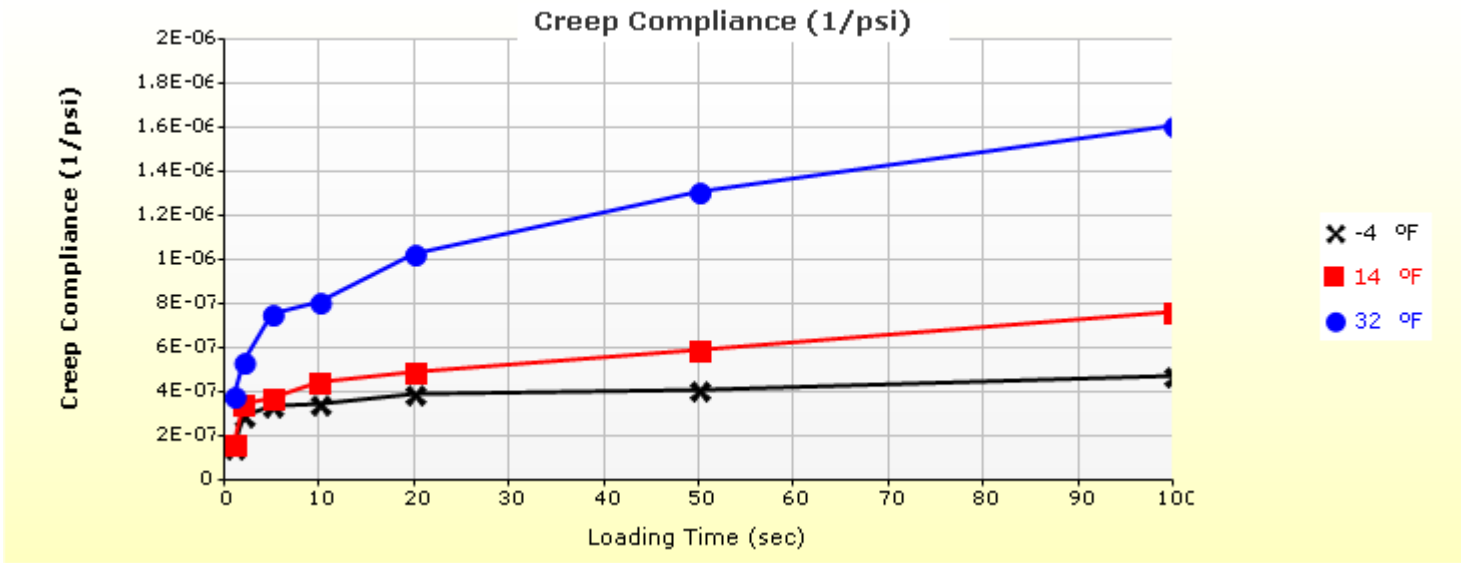
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

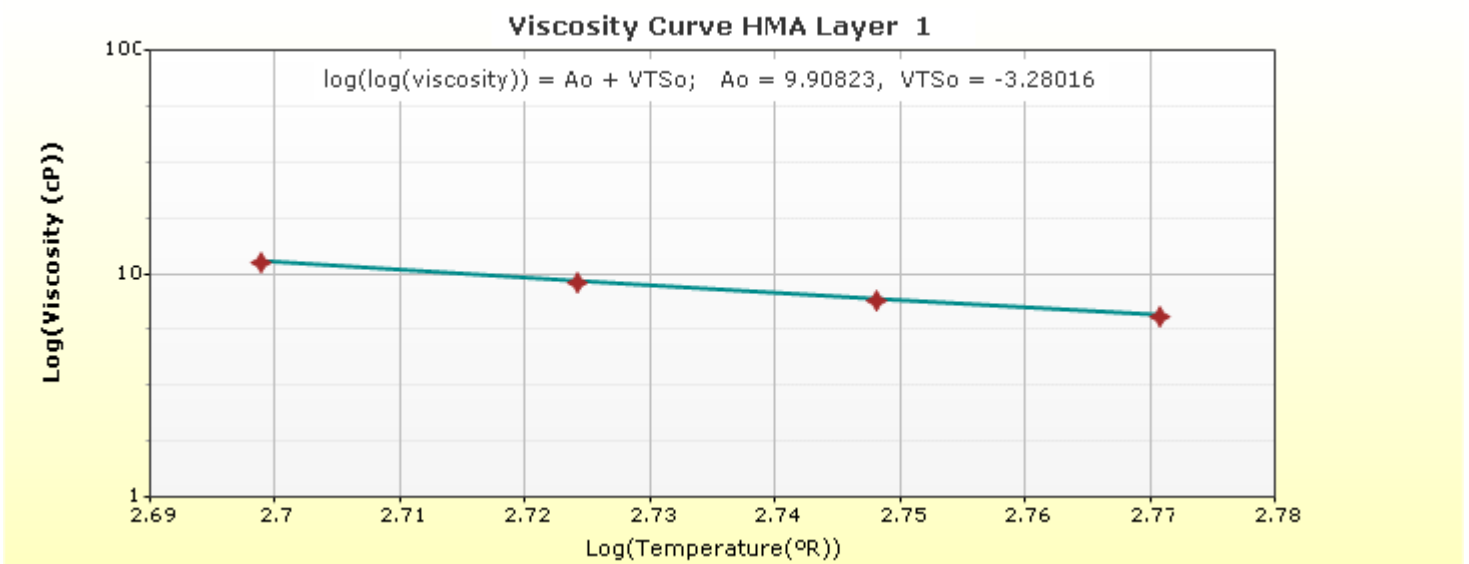
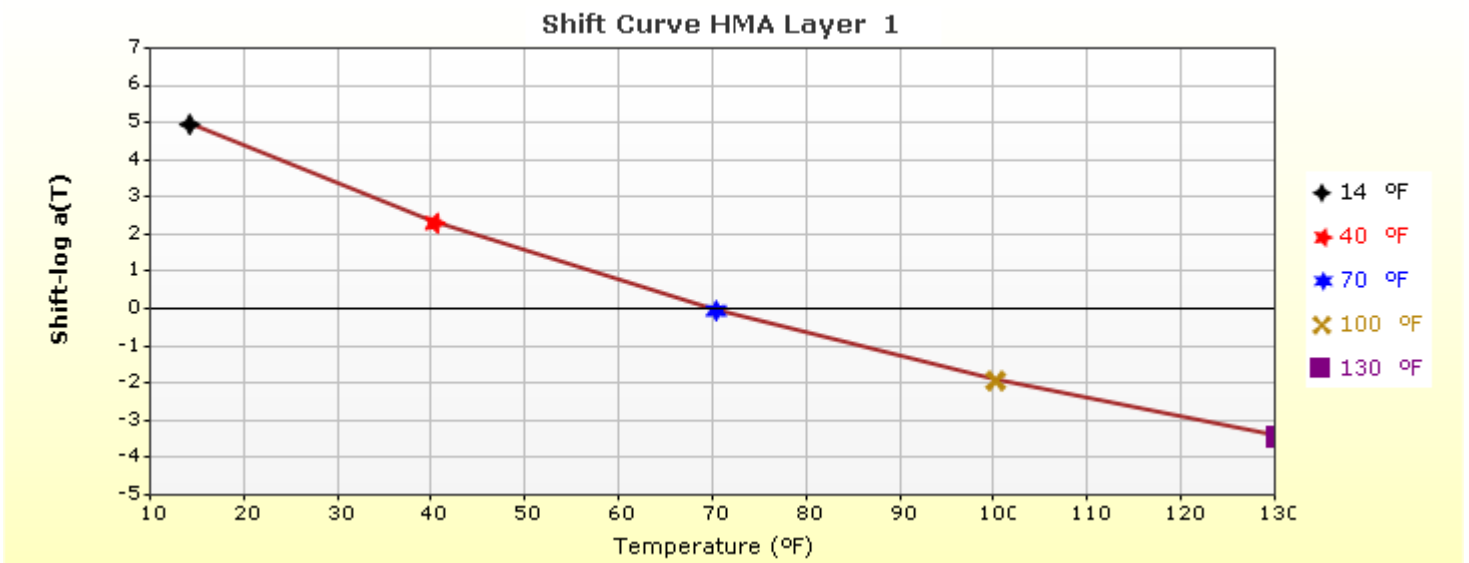
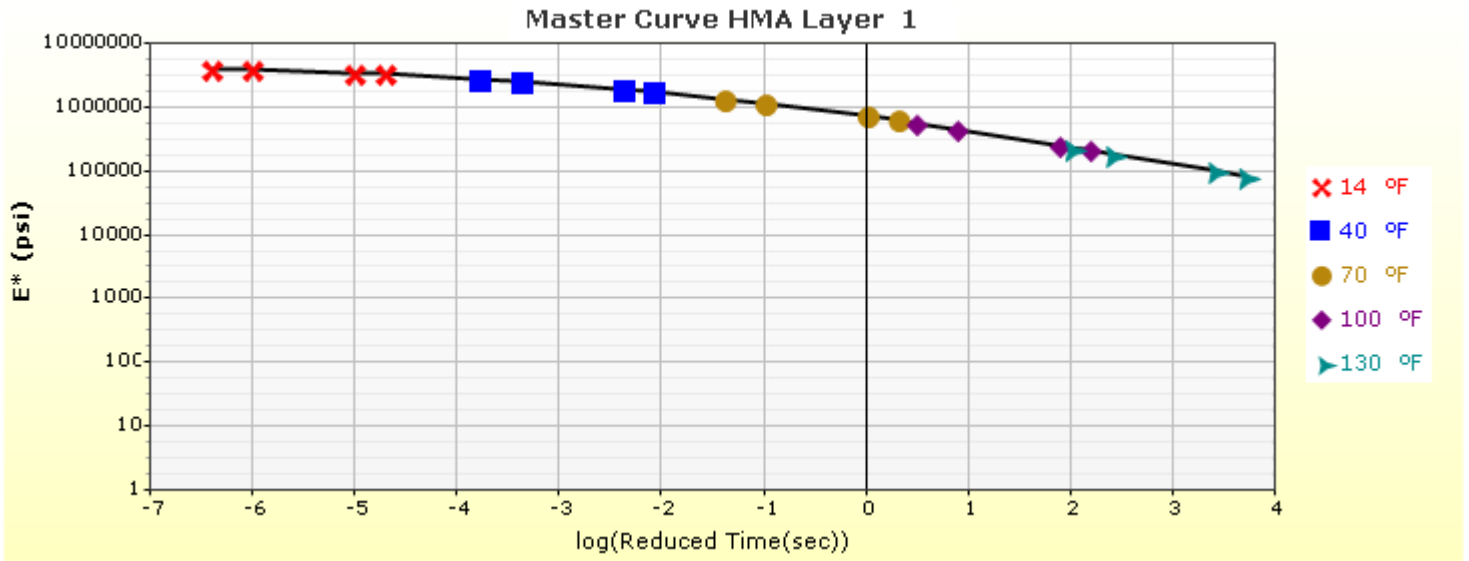
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

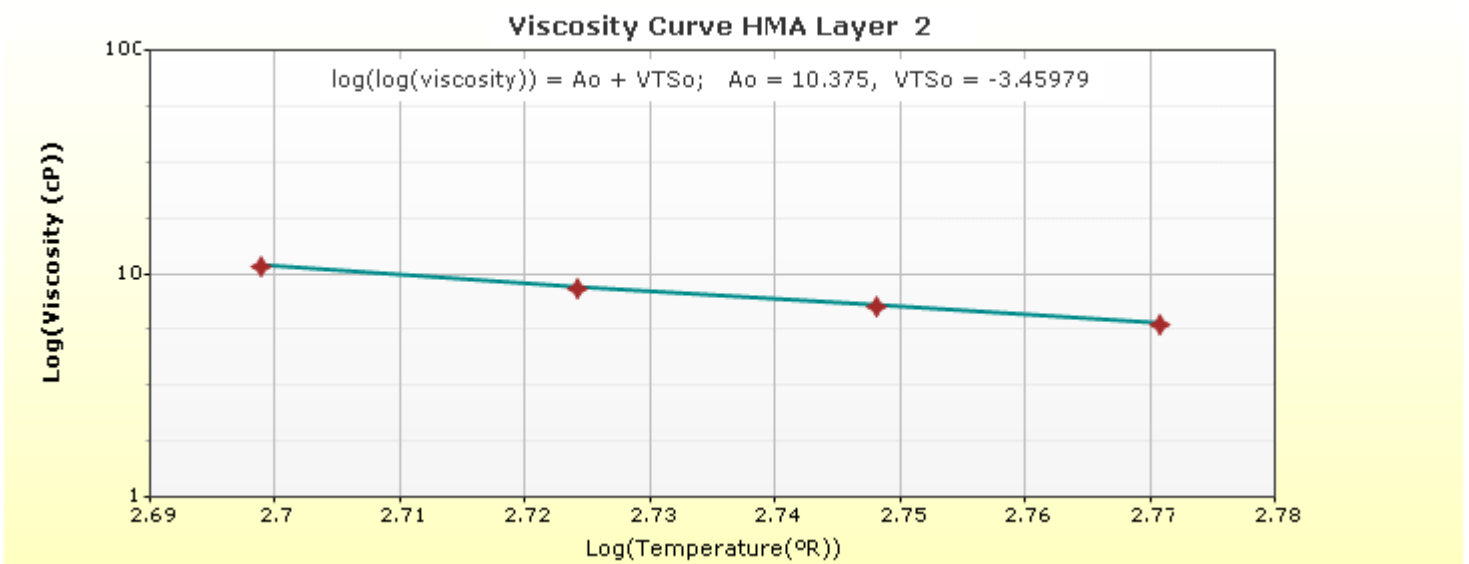
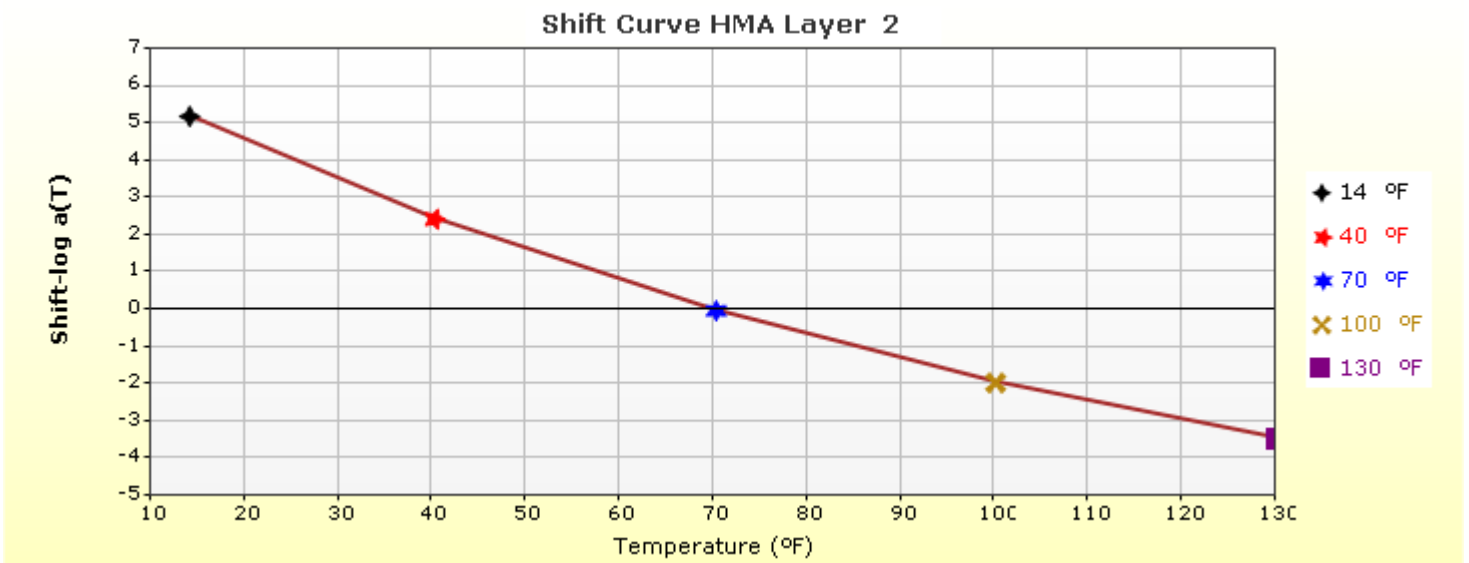
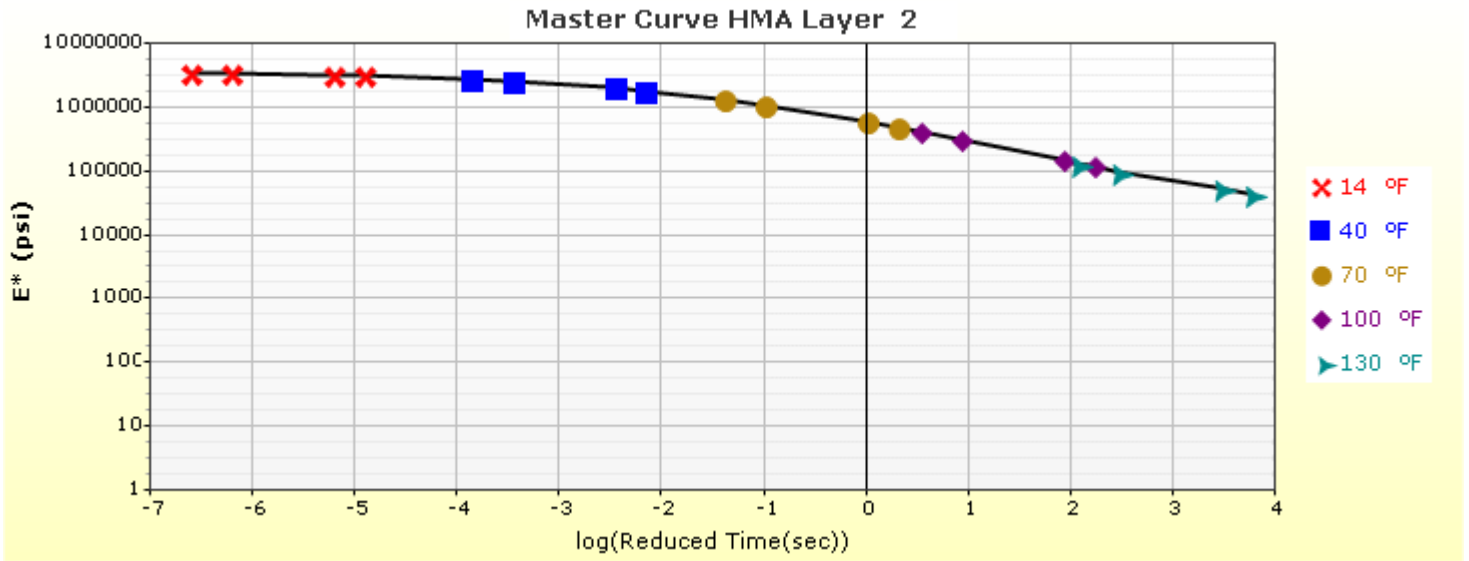
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



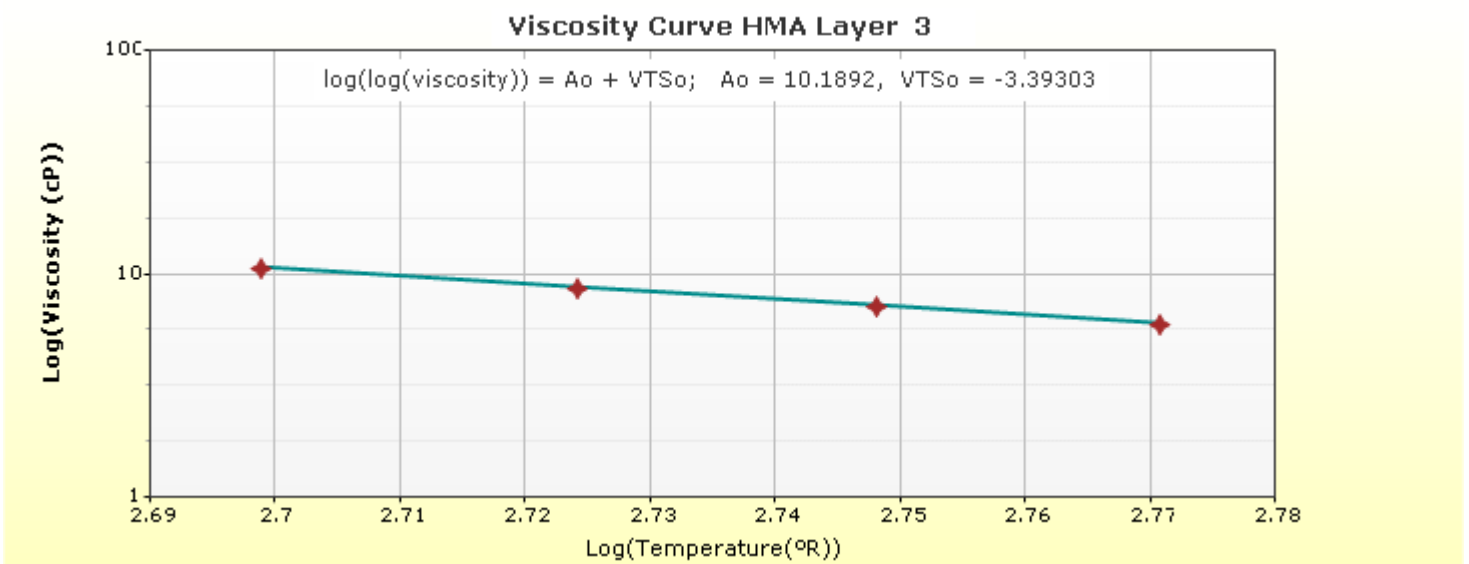
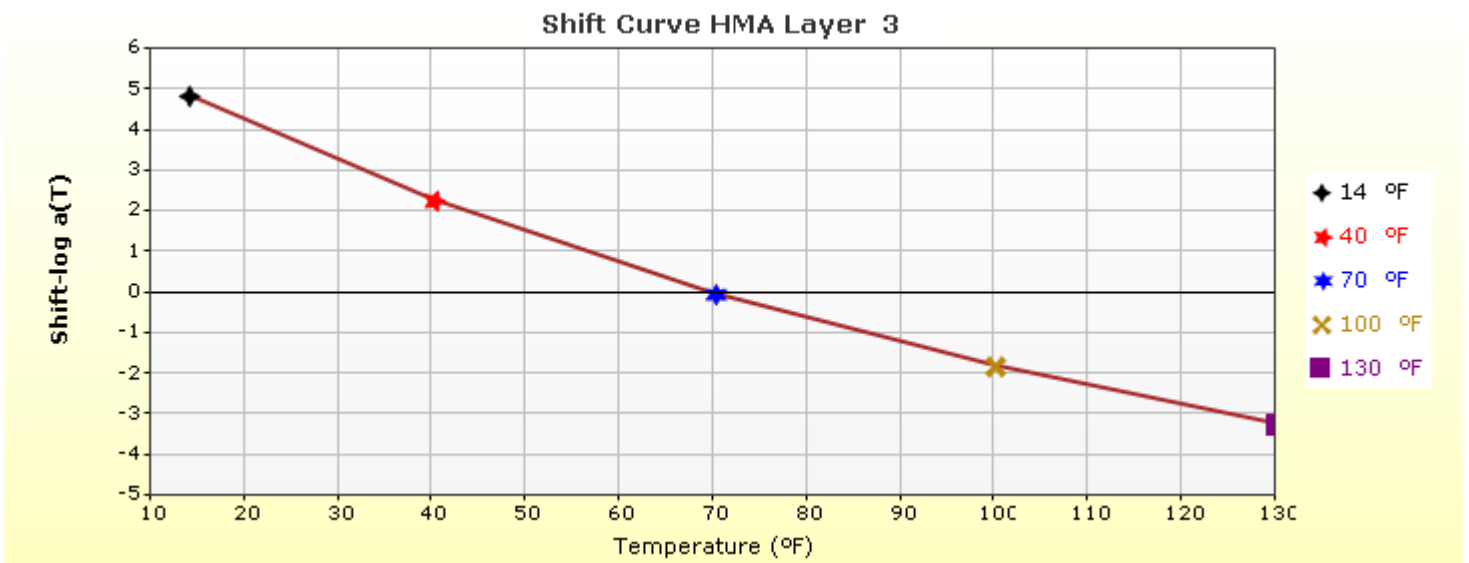
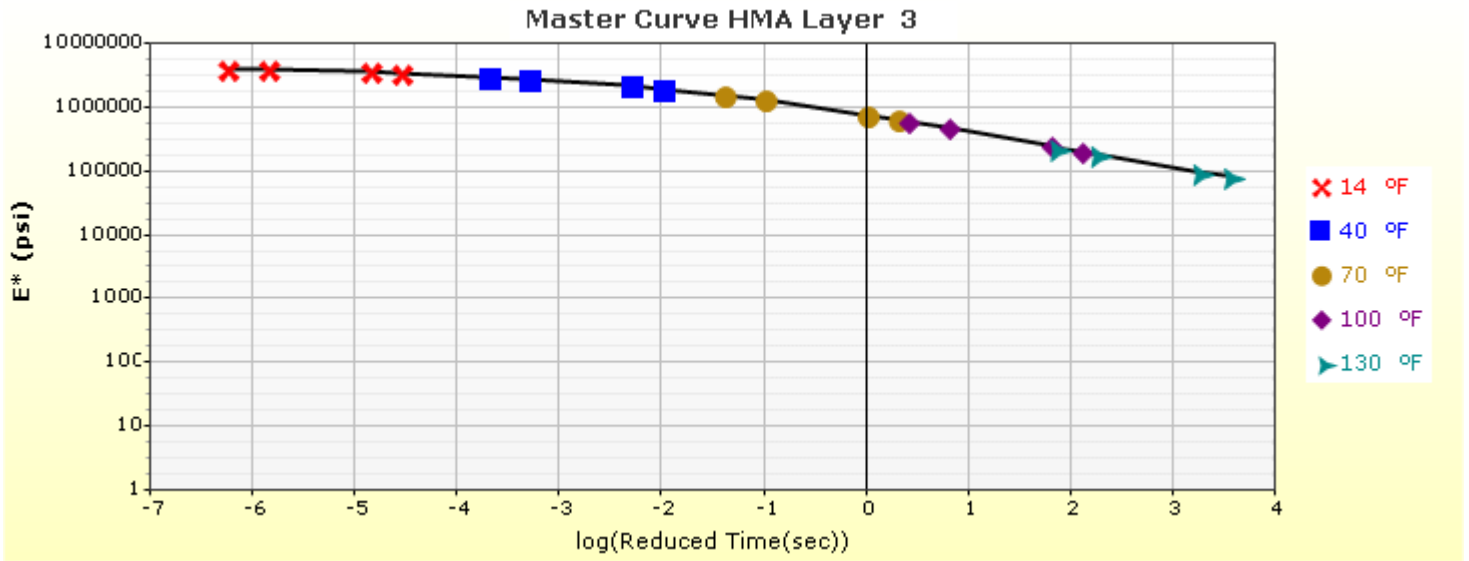
HMA Layer 1: Layer 1 Flexible : VDOT SM



HMA Layer 2: Layer 2 Flexible : VDOT IM



HMA Layer 3: Layer 3 Flexible : VDOT BM



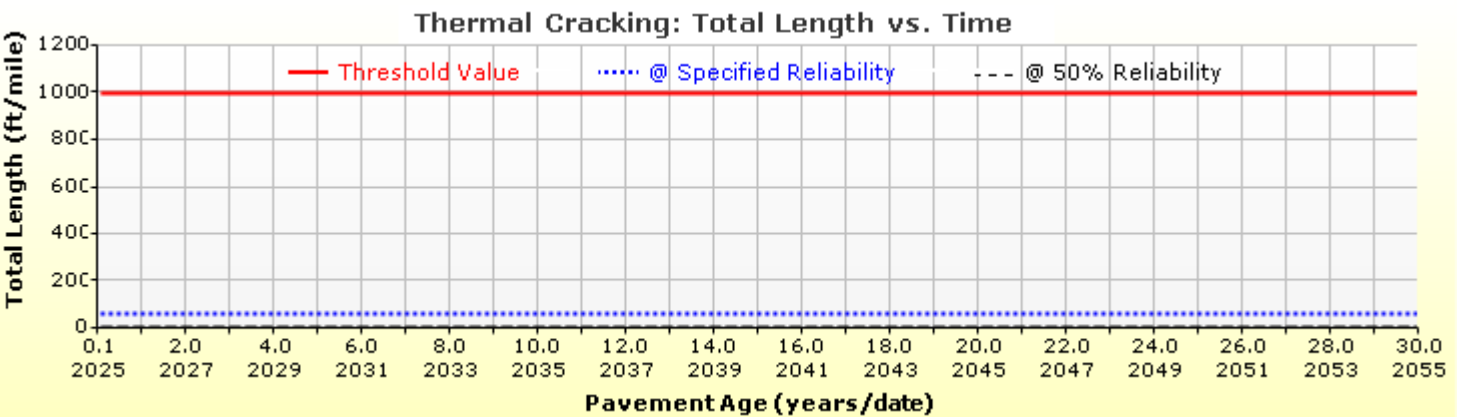
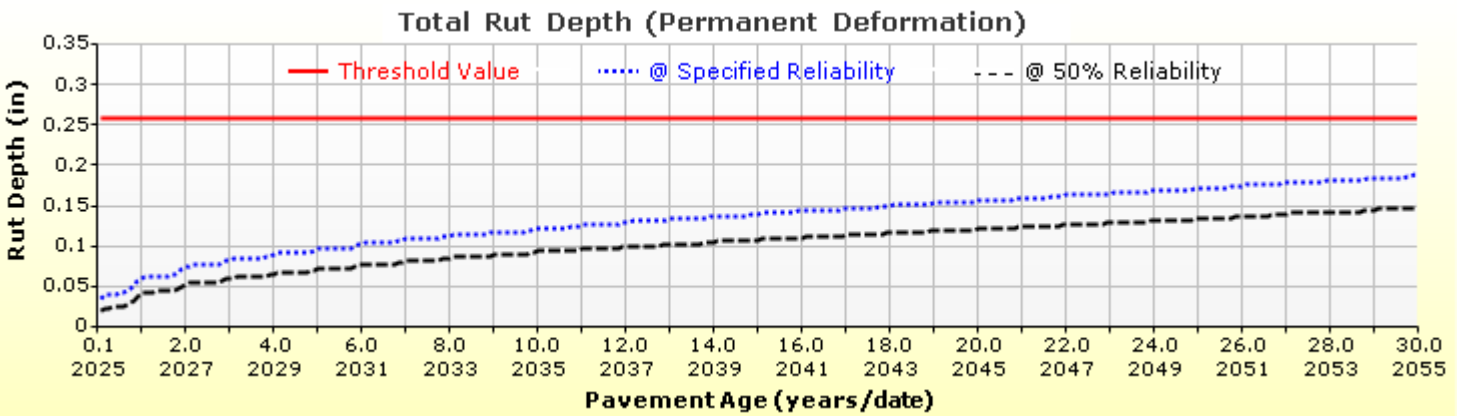
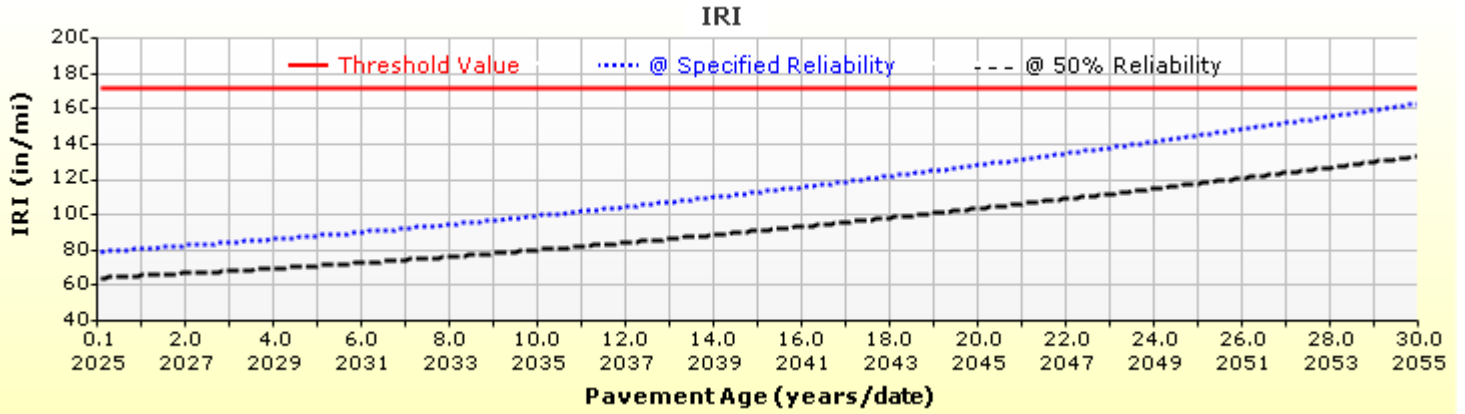


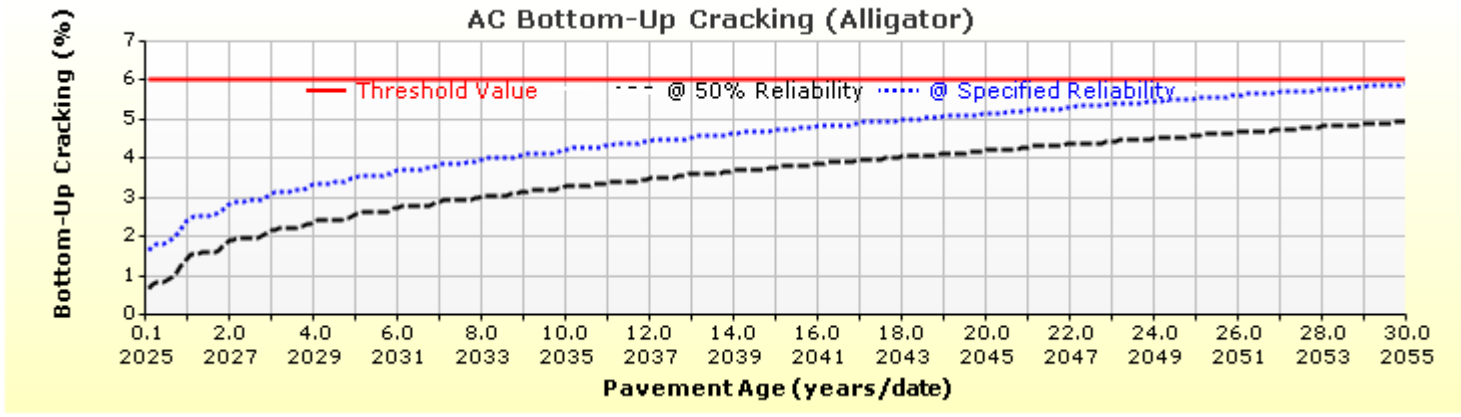
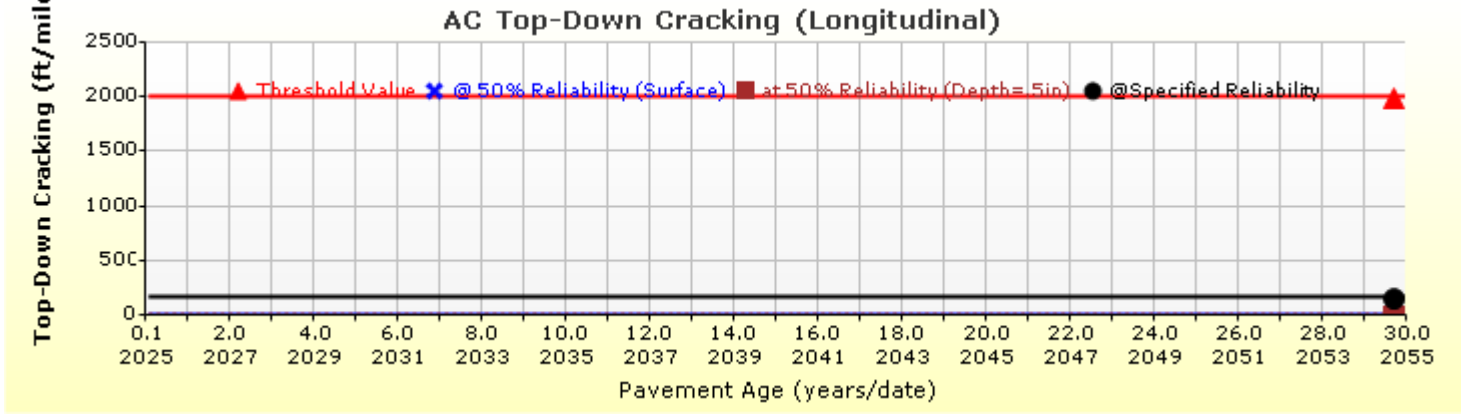
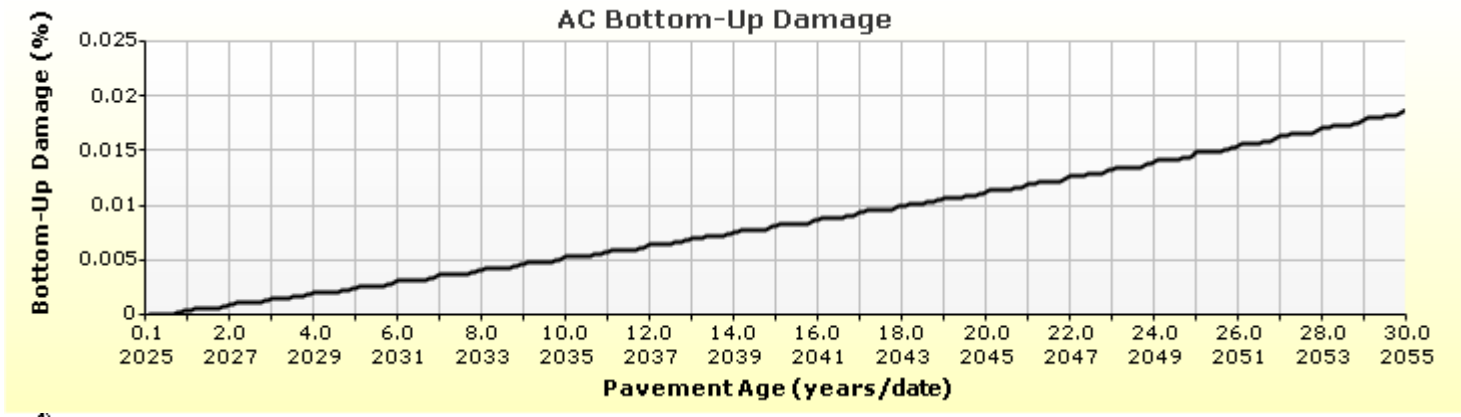
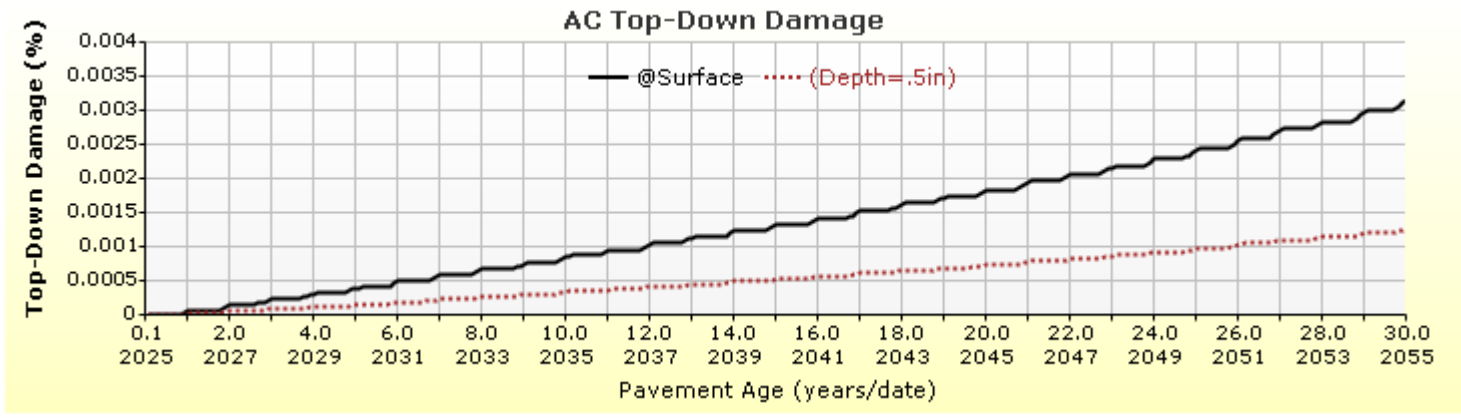
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Analysis Output Charts





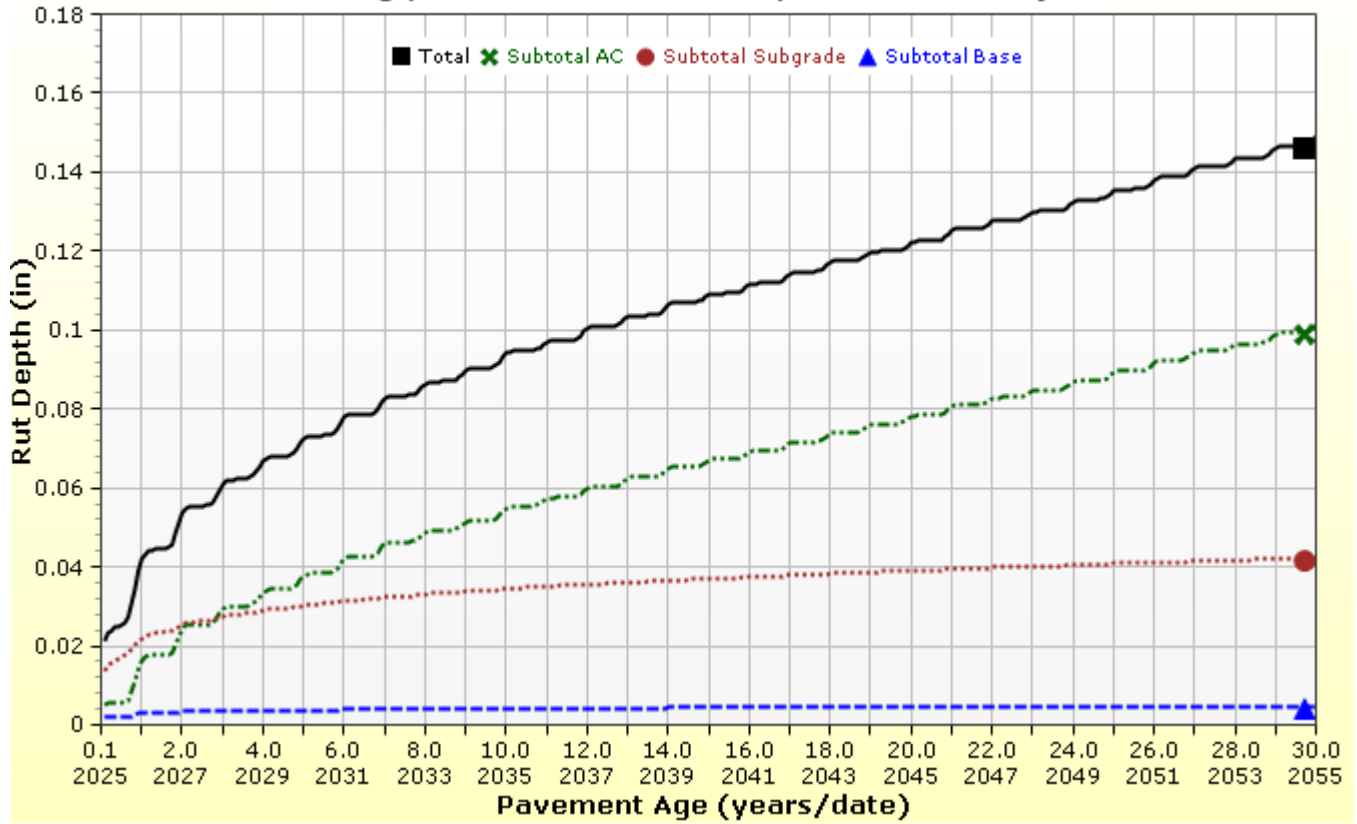


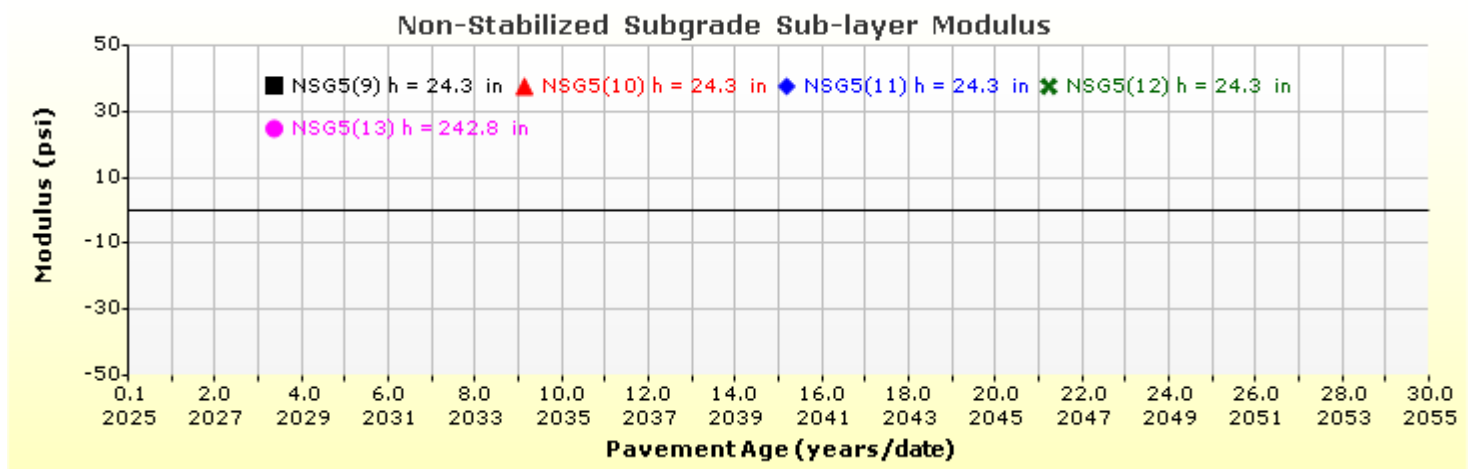
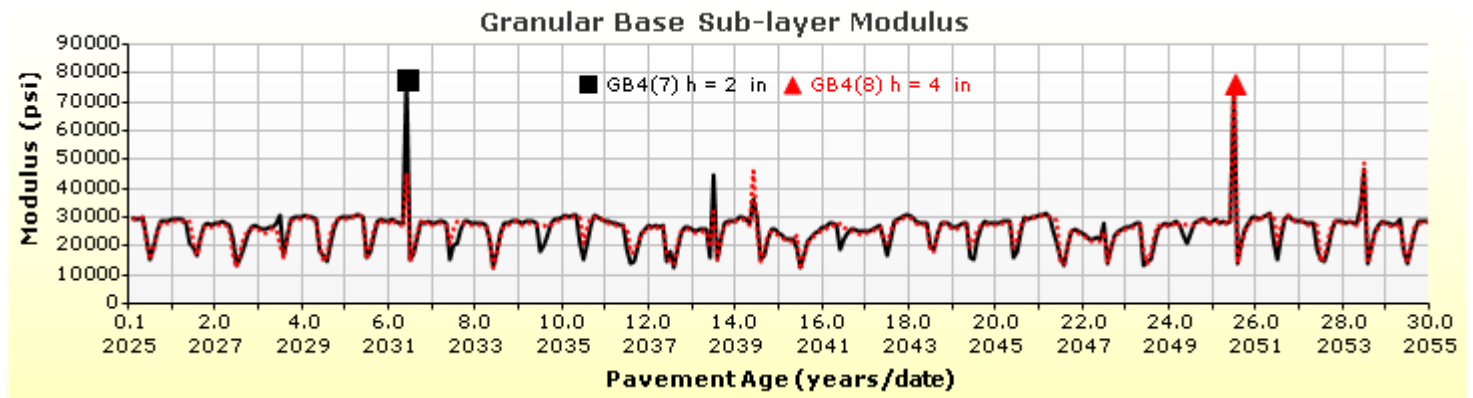
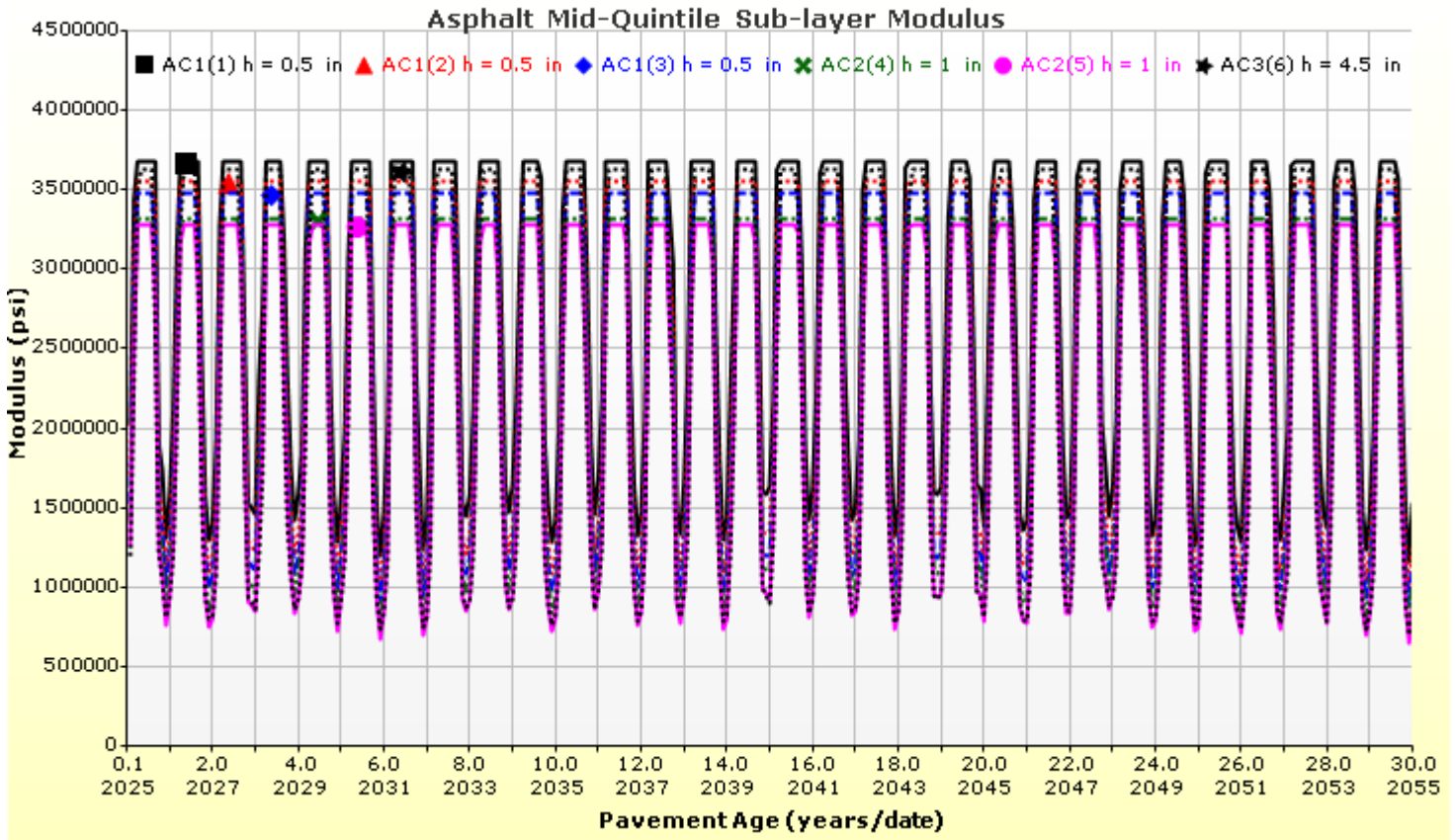
Flexible Design_Old Dominion Drive_CBR of 5 Fill

File Name: C:\Users\sbhusal\Desktop\Project NEXT\Old Dominion Drive\Flexible Design_Old Dominion Drive_CBR of 5 Fill.dgpx



Rutting (Permanent Deformation) at 50% Reliability







Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 4.5 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Old Dominion Drive_CBR of 5 Fill

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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 6.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

21000.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



Flexible Design_Old Dominion Drive_CBR of 5 Fill

File Name: C:\Users\sbusal\Desktop\Project NEXT\Old Dominion Drive\Flexible Design_Old Dominion Drive_CBR of 5 Fill.dgpx



Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ | k1: 0.007566 |
| $C = 10^M$ | k2: 3.9492 |
| $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|--|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$ $C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$ <p><i>Where:</i> H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|--|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma} \right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m^n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = regression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavements C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|----------|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}} \right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2: 1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |

MEPDG Output Reports

Proposed Pavement Section for Georgetown Pike and Ramps



Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

File Name: C:\Users\sbusal\Desktop\Project NEXT\Flexible Design_Georgetown Pike Ramps_CBR 5 Fill.dgpx



Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 6.5 |
| NonStabilized | VDOT Avg 21A-21B | 12.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 600 |
| 2040 (15 years) | 2,958,530 |
| 2055 (30 years) | 5,917,050 |

Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 192.45 | 95.00 | 85.75 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.27 | 95.00 | 92.66 | Fail ** |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.74 | 95.00 | 96.97 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 107.96 | 95.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 329.65 | 95.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.22 | 95.00 | 98.87 | Pass |

Note: **Satisfies Pavement Deformation Criteria of 0.26 inches for 15-year period per Table 4-2 of Pavement ME User Manual.

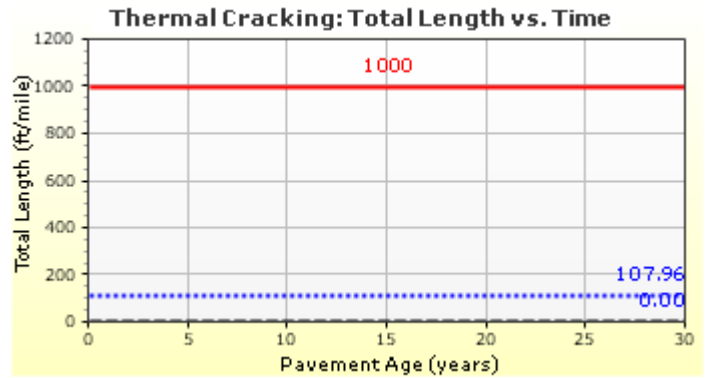
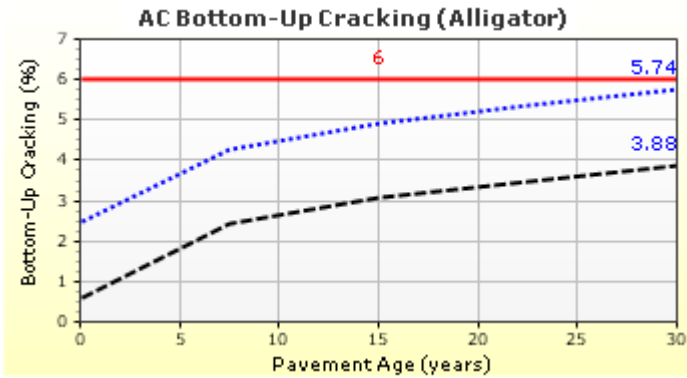
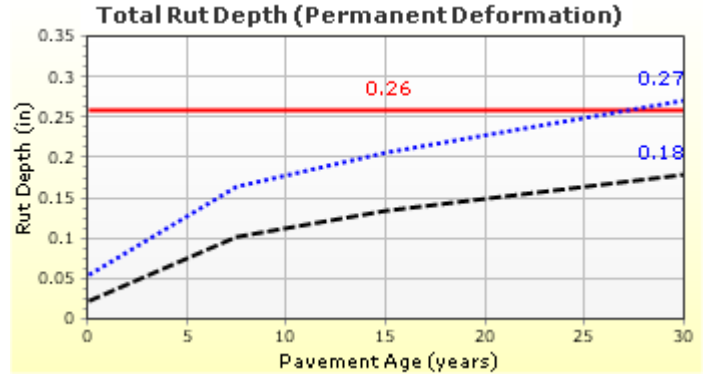
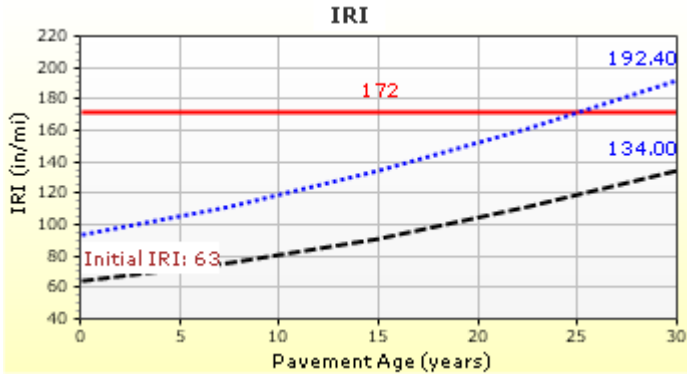


Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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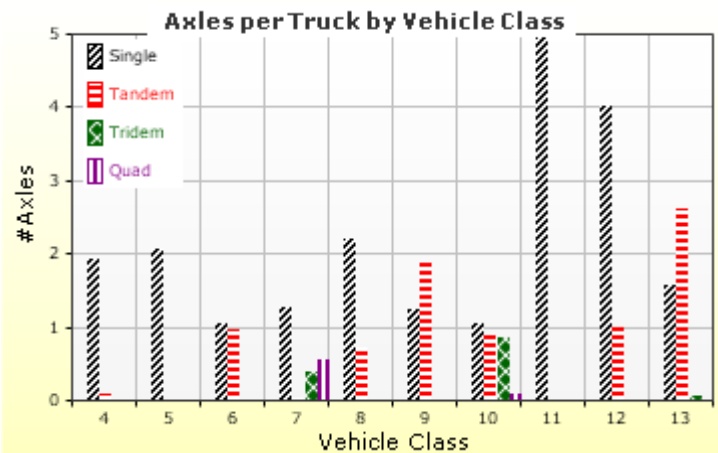
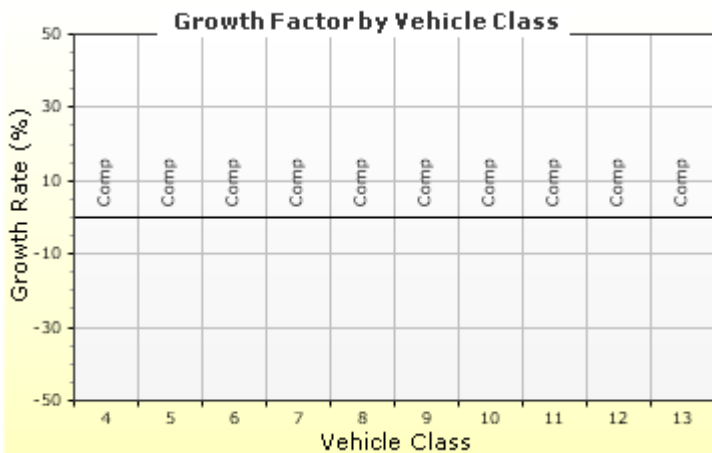
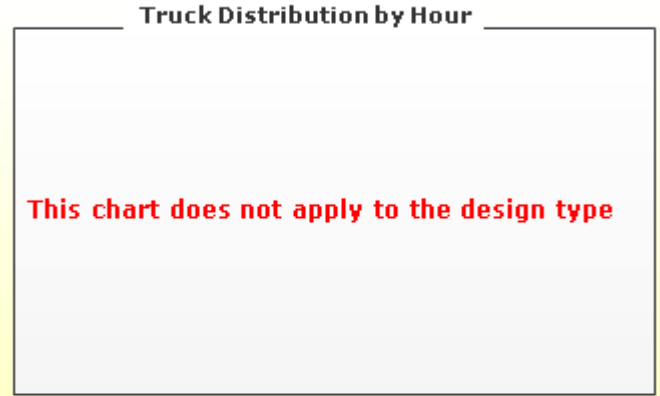
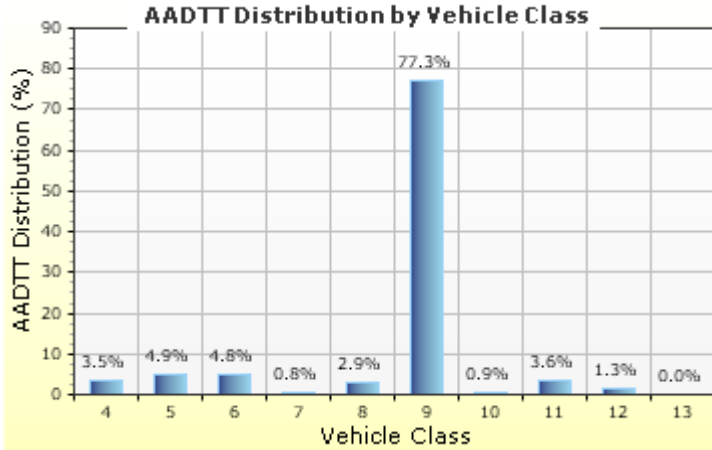
Distress Charts



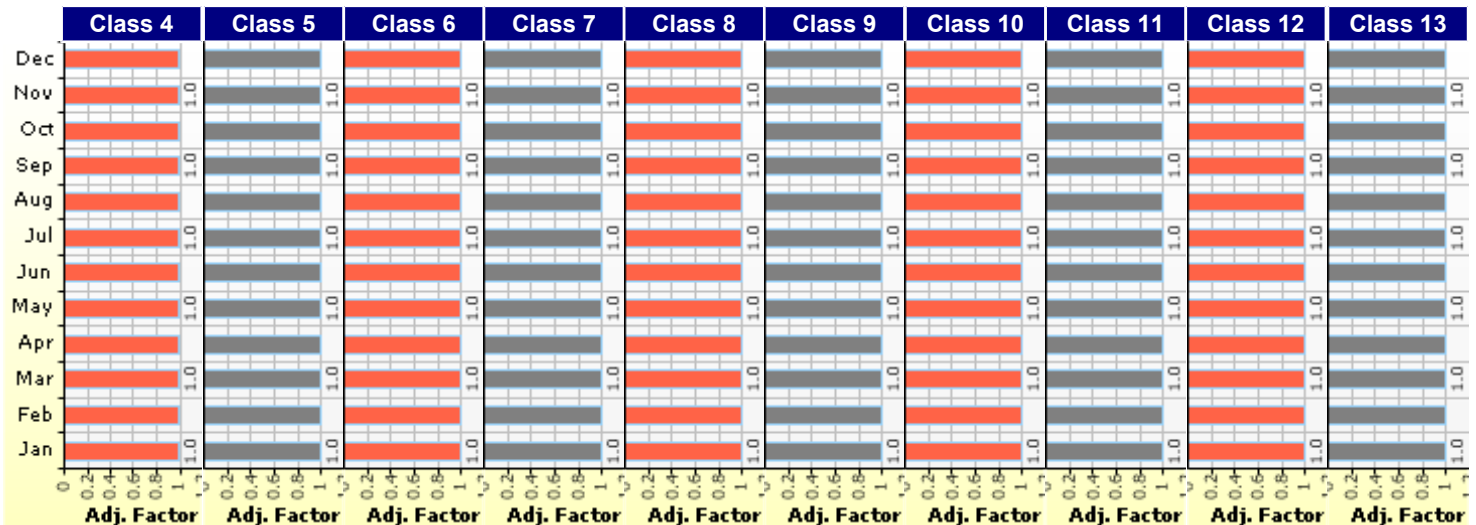
Traffic Inputs

Graphical Representation of Traffic Inputs

Initial two-way AADTT: **600** Percent of trucks in design direction (%): **100.0**
 Number of lanes in design direction: **2** Percent of trucks in design lane (%): **90.0**
 Operational speed (mph): **50.0**



Traffic Volume Monthly Adjustment Factors



Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 0% | Compound |
| Class 5 | 4.92% | 0% | Compound |
| Class 6 | 4.75% | 0% | Compound |
| Class 7 | 0.82% | 0% | Compound |
| Class 8 | 2.89% | 0% | Compound |
| Class 9 | 77.29% | 0% | Compound |
| Class 10 | 0.92% | 0% | Compound |
| Class 11 | 3.58% | 0% | Compound |
| Class 12 | 1.32% | 0% | Compound |
| Class 13 | 0.01% | 0% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

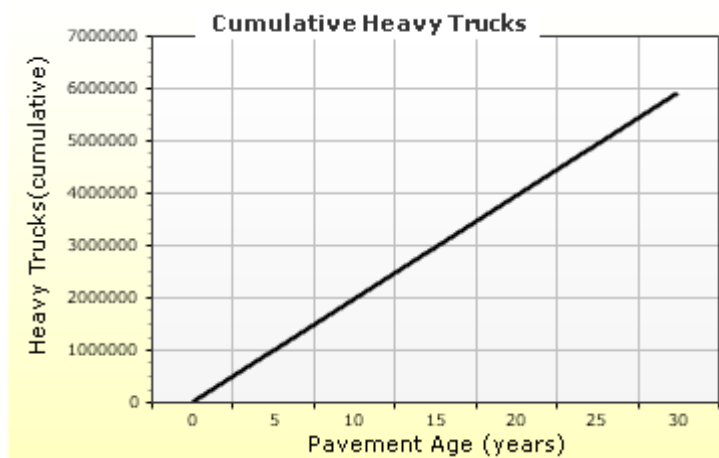
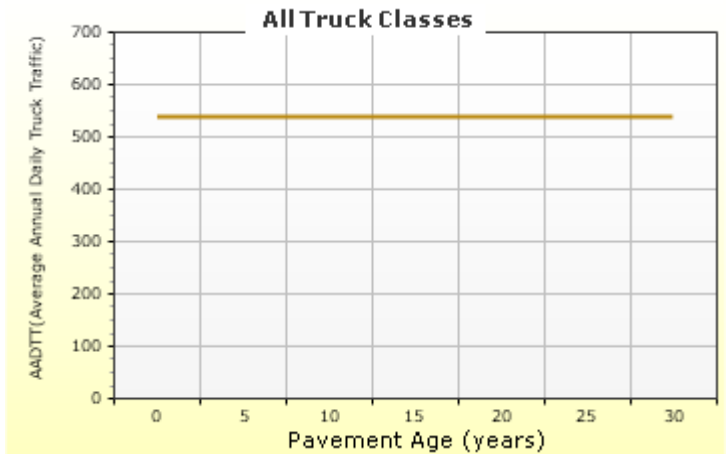
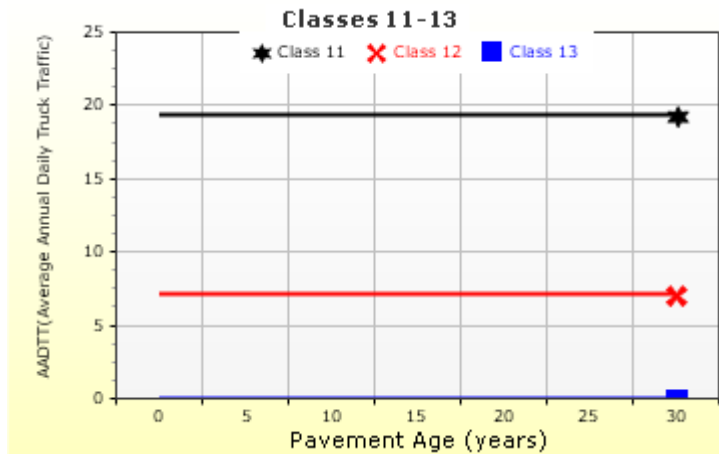
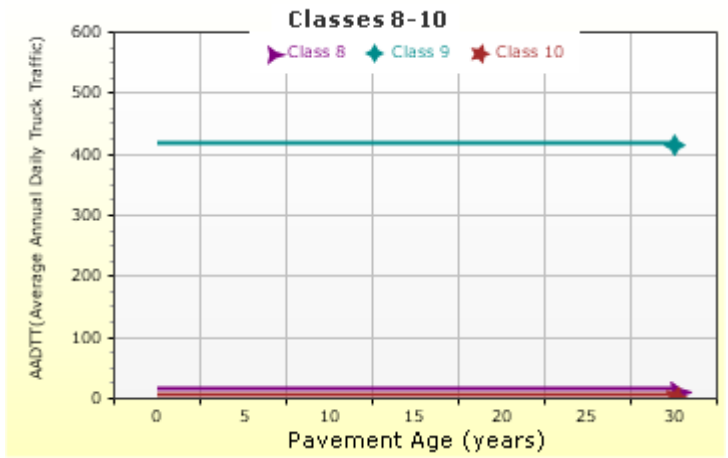
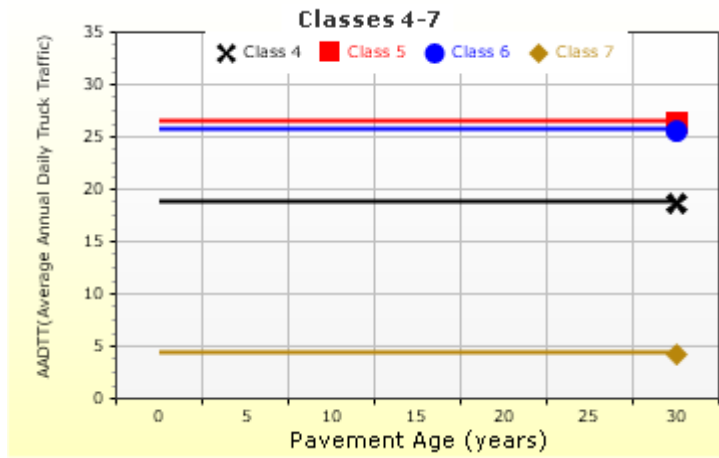
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



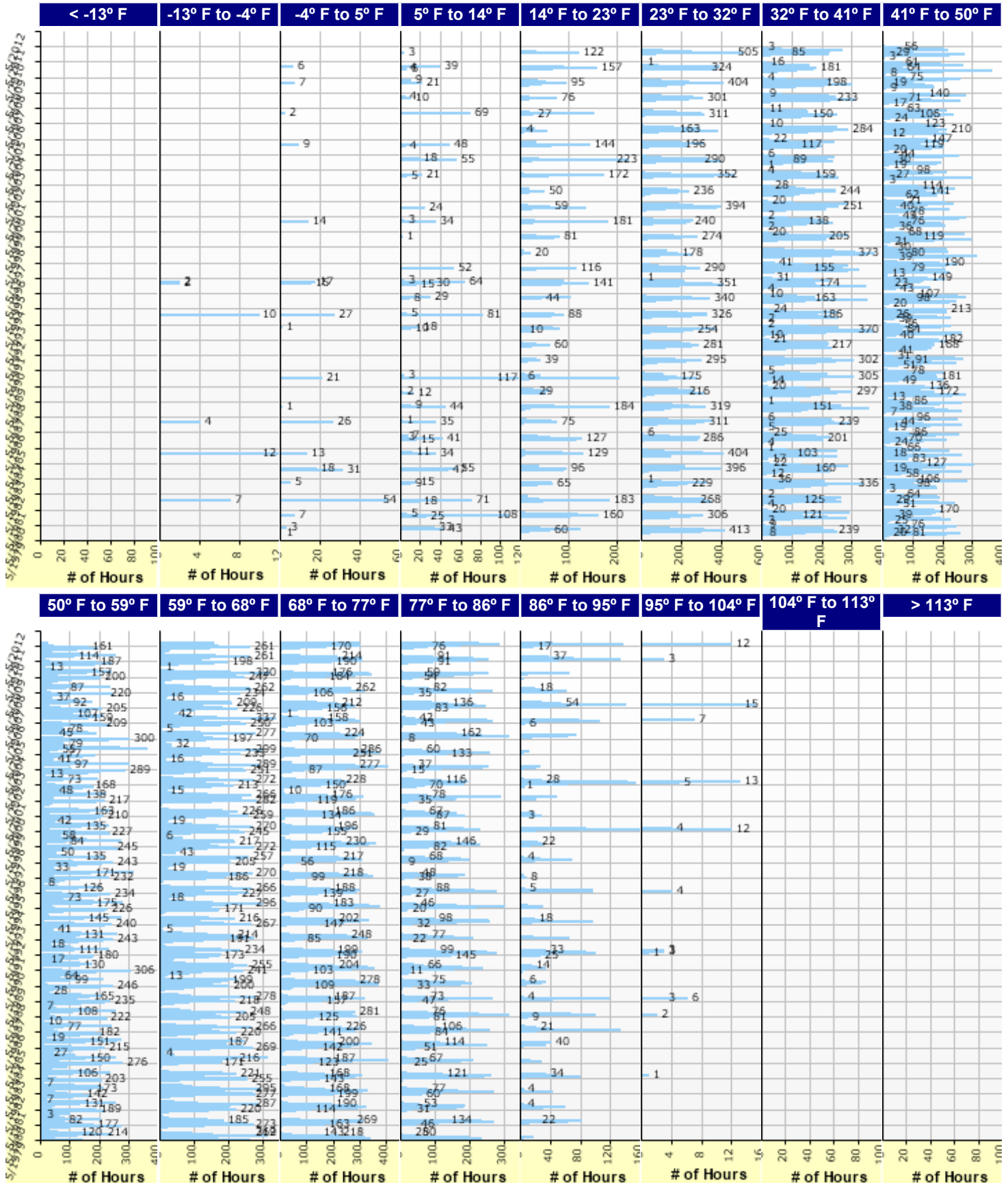


Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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Hourly Air Temperature Distribution by Month:





Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

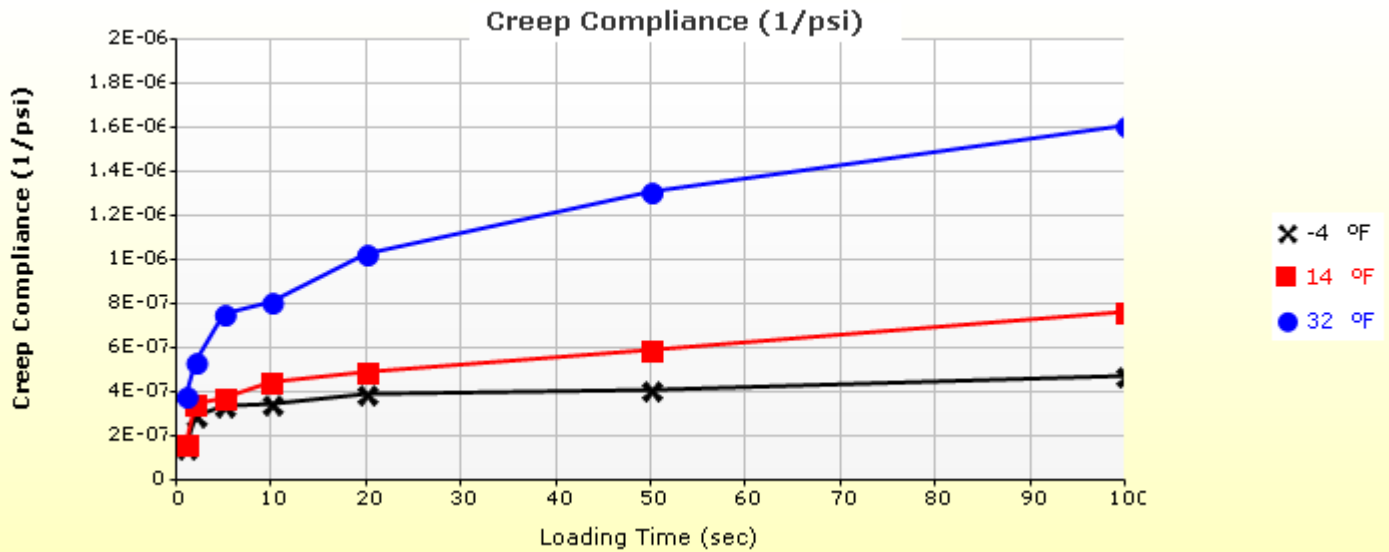
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

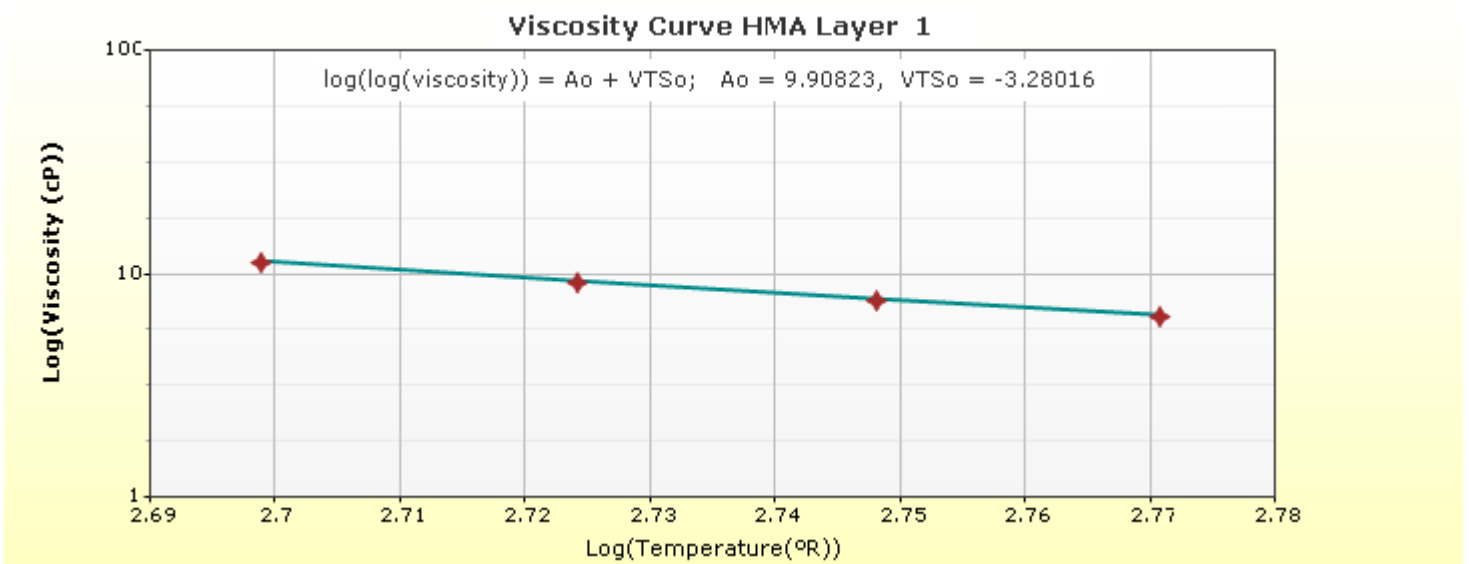
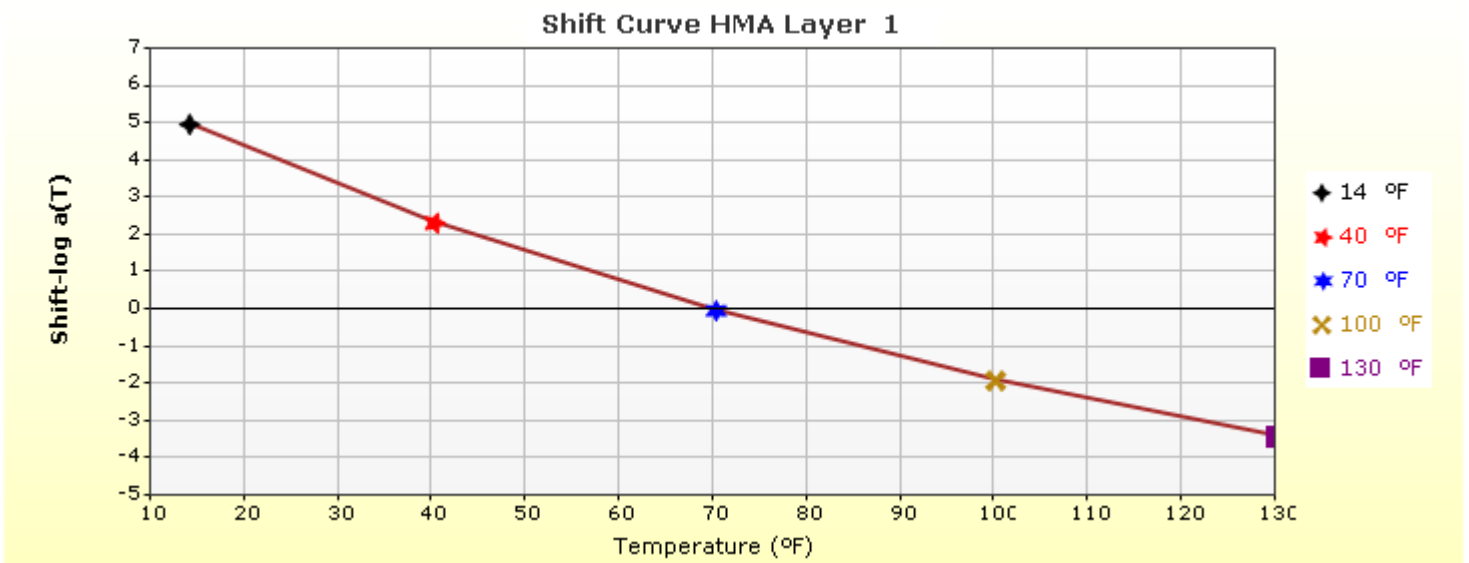
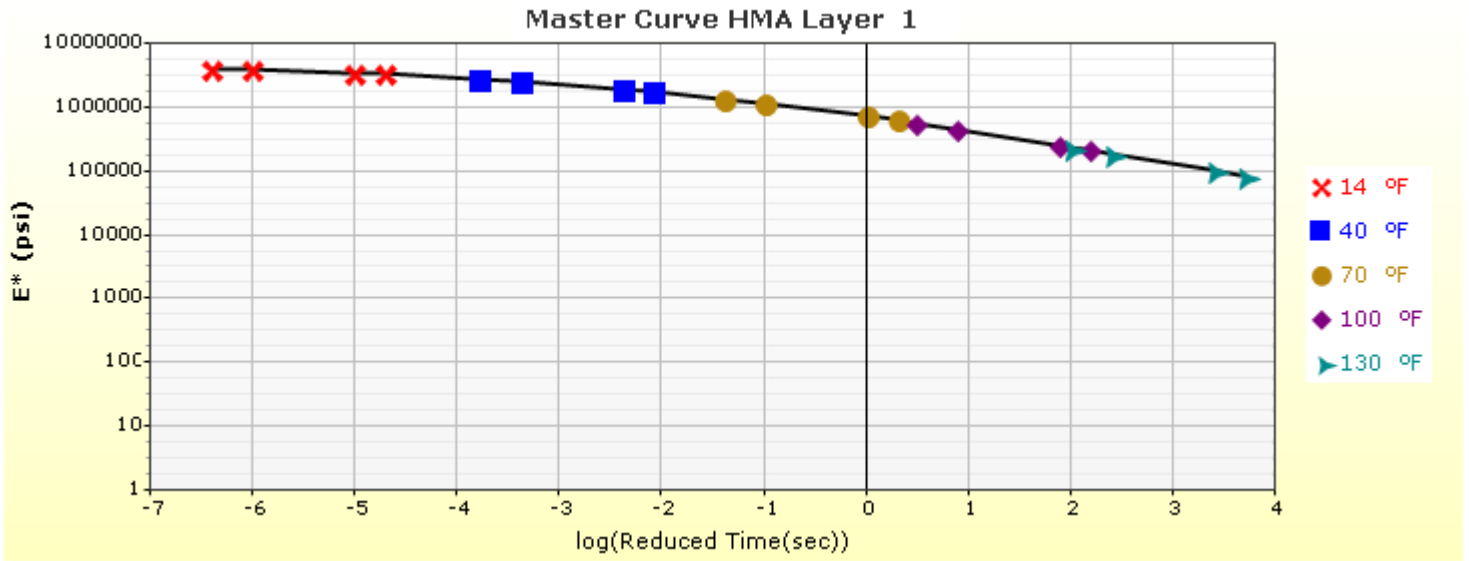
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

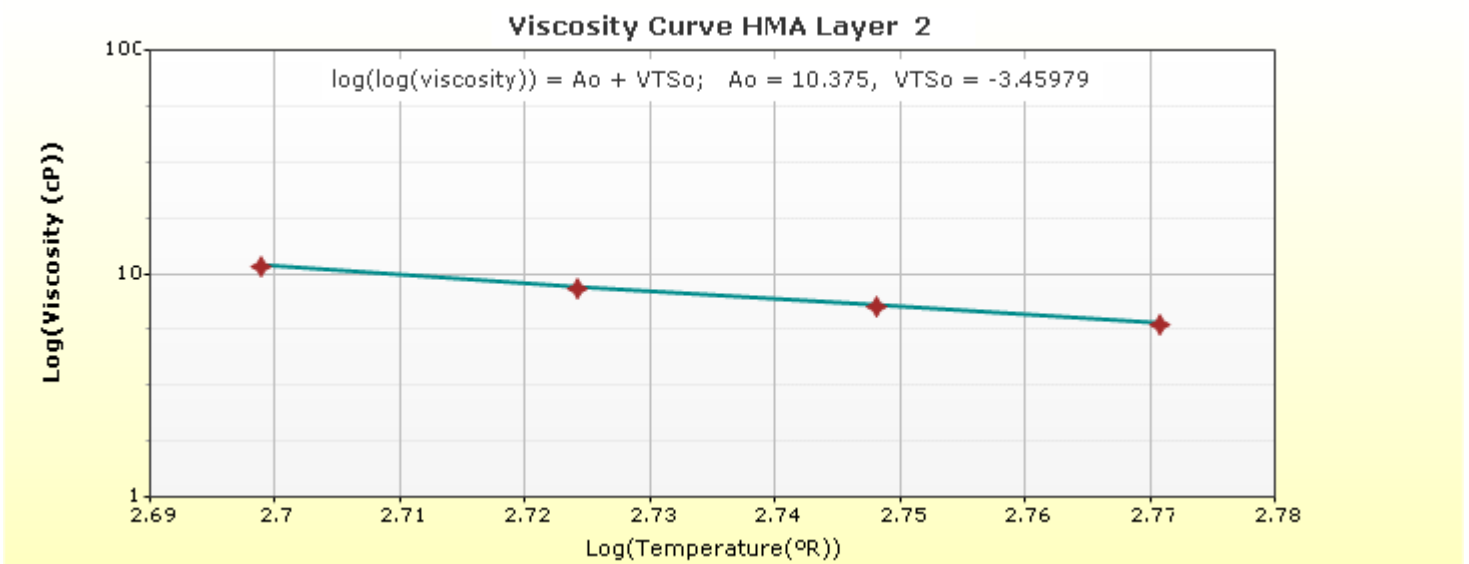
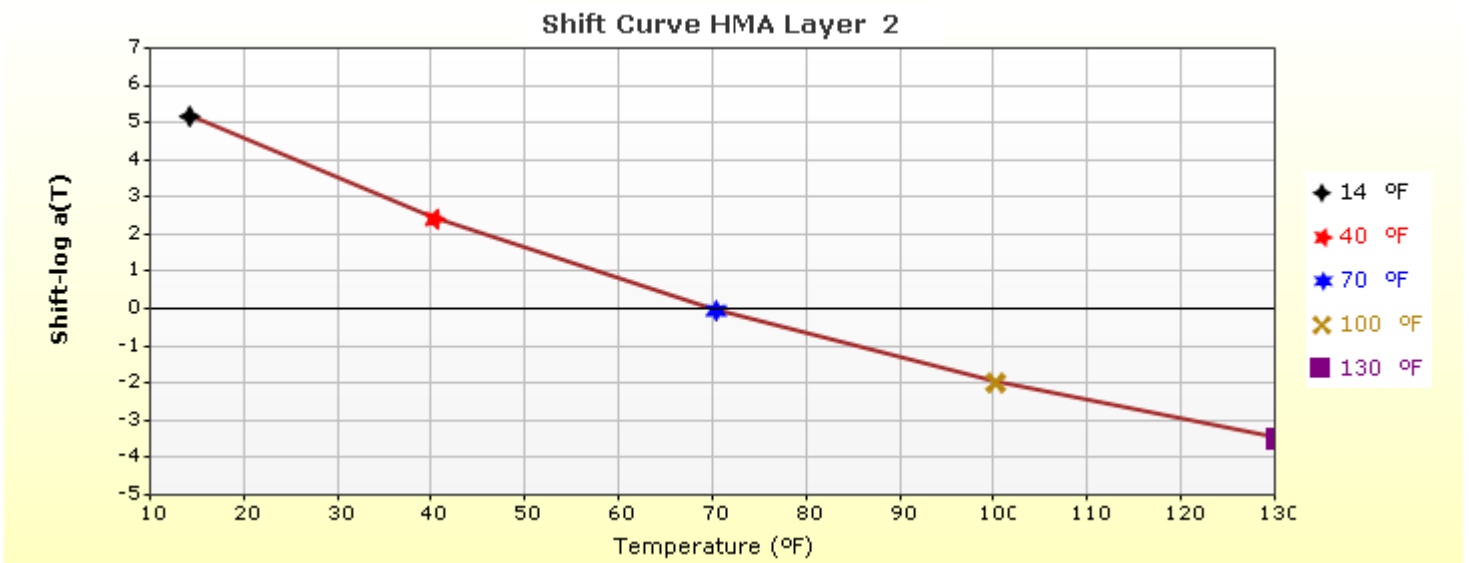
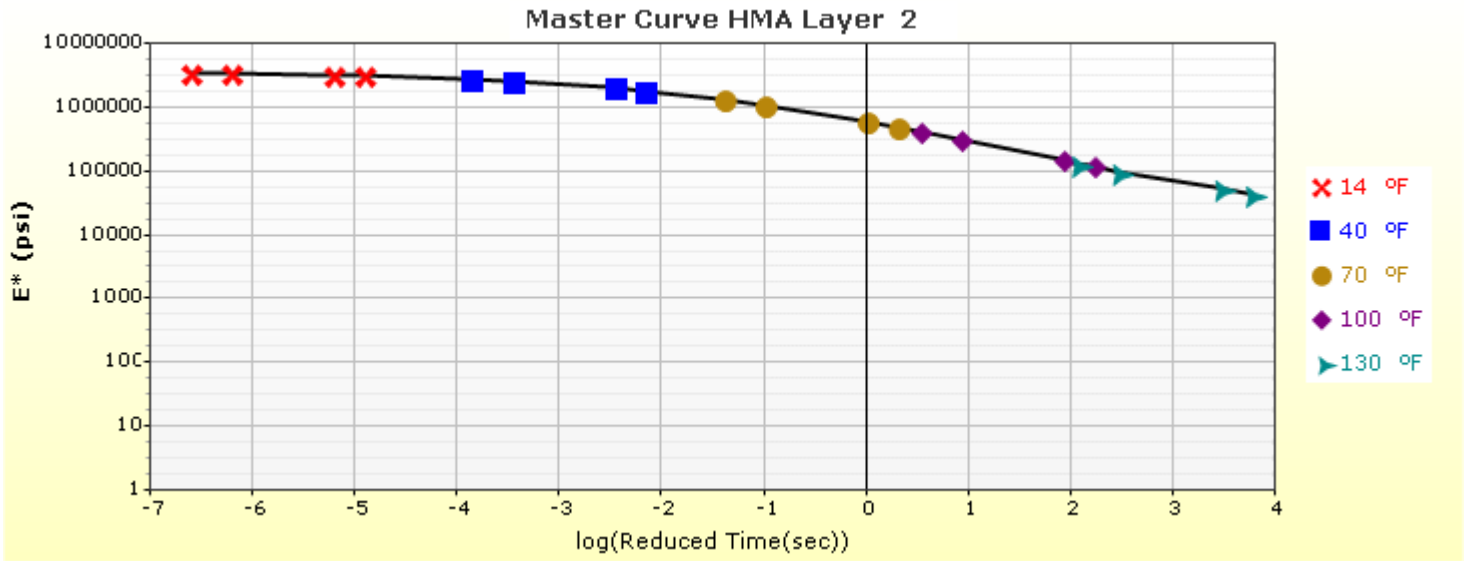
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



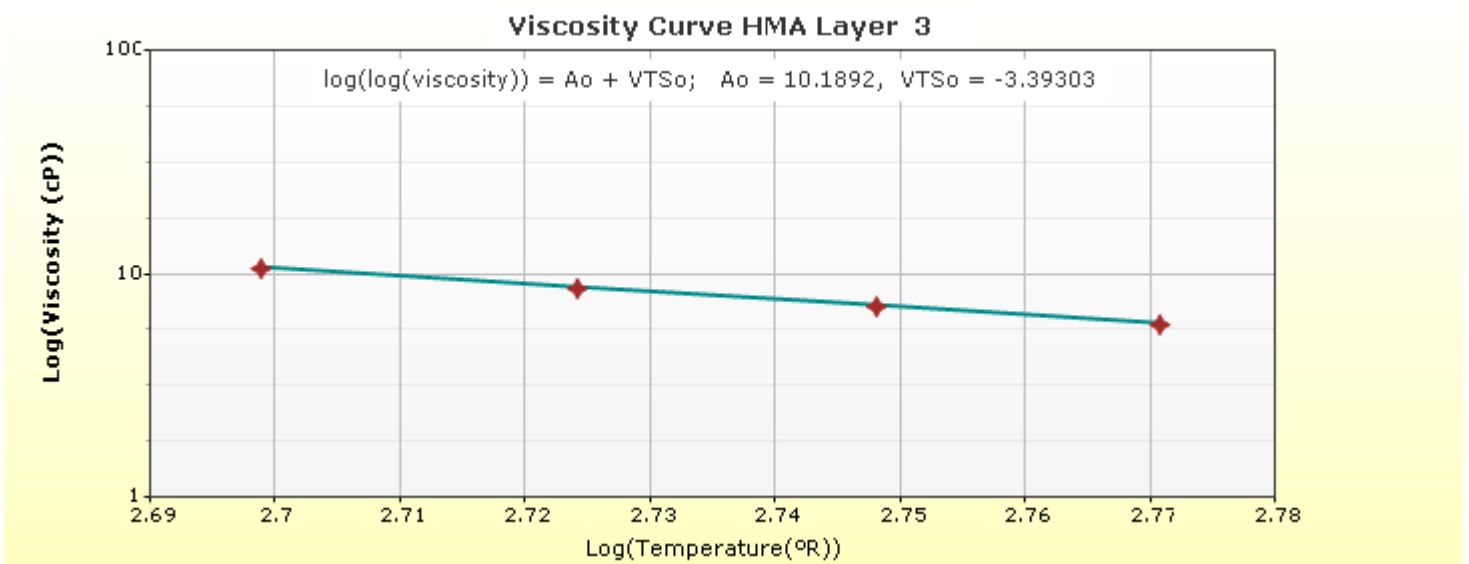
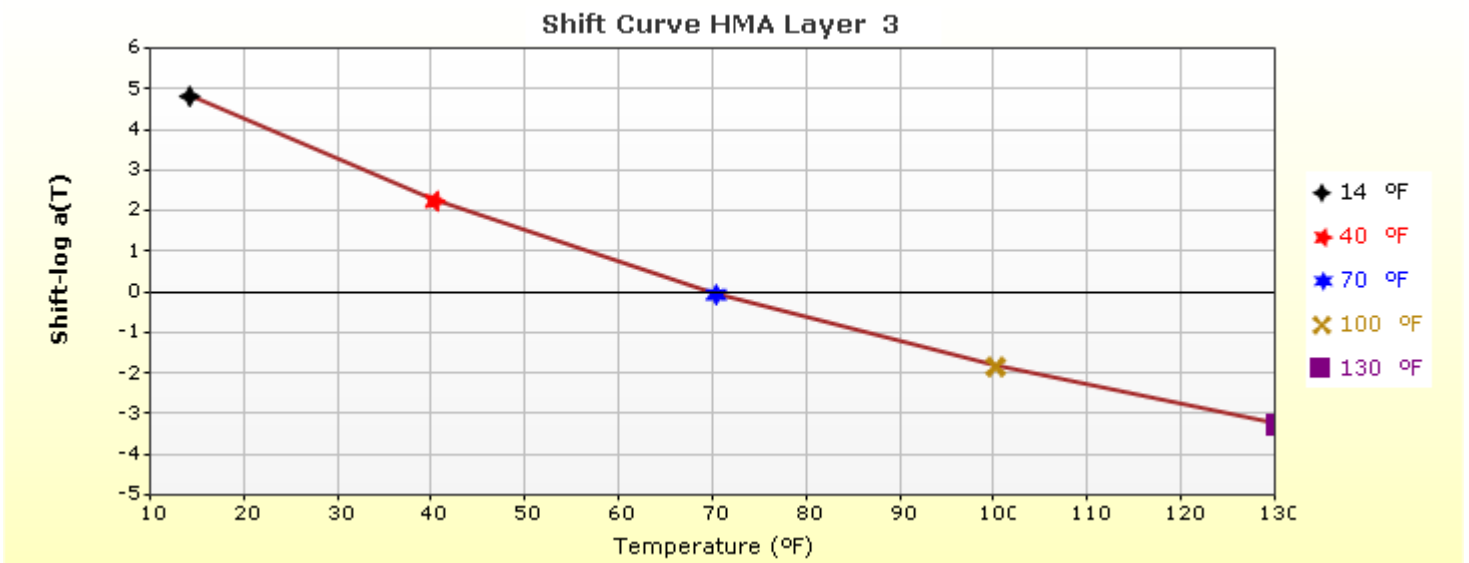
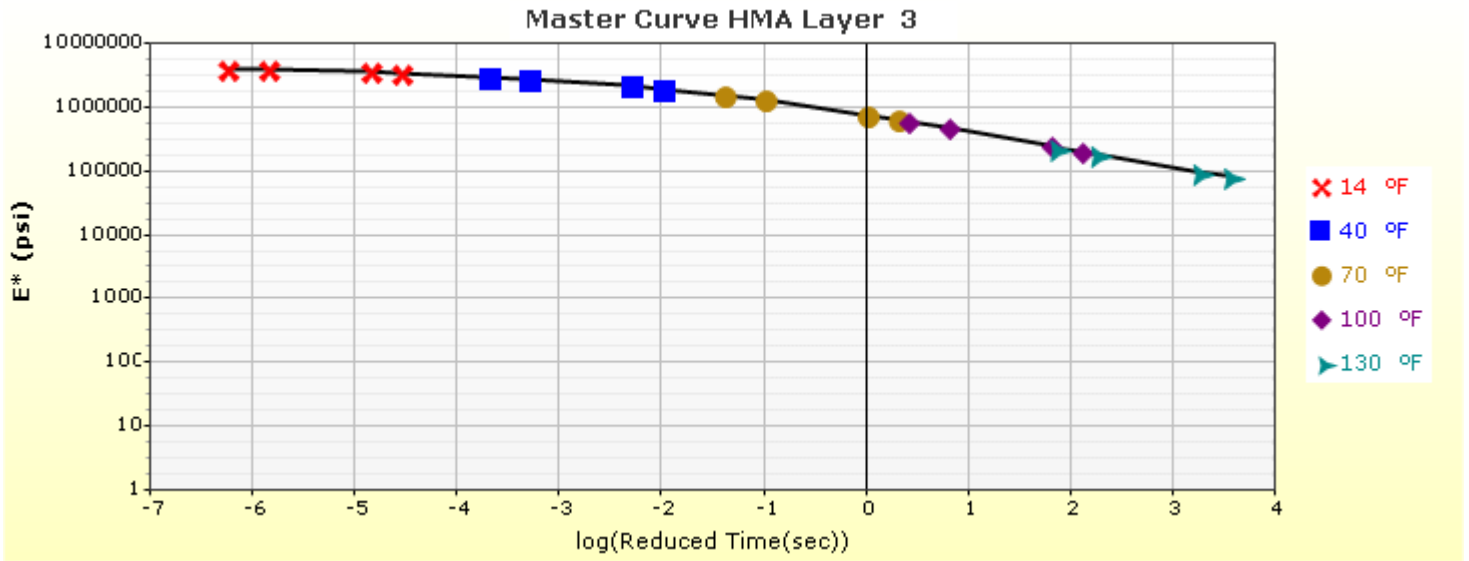
HMA Layer 1: Layer 1 Flexible : VDOT SM



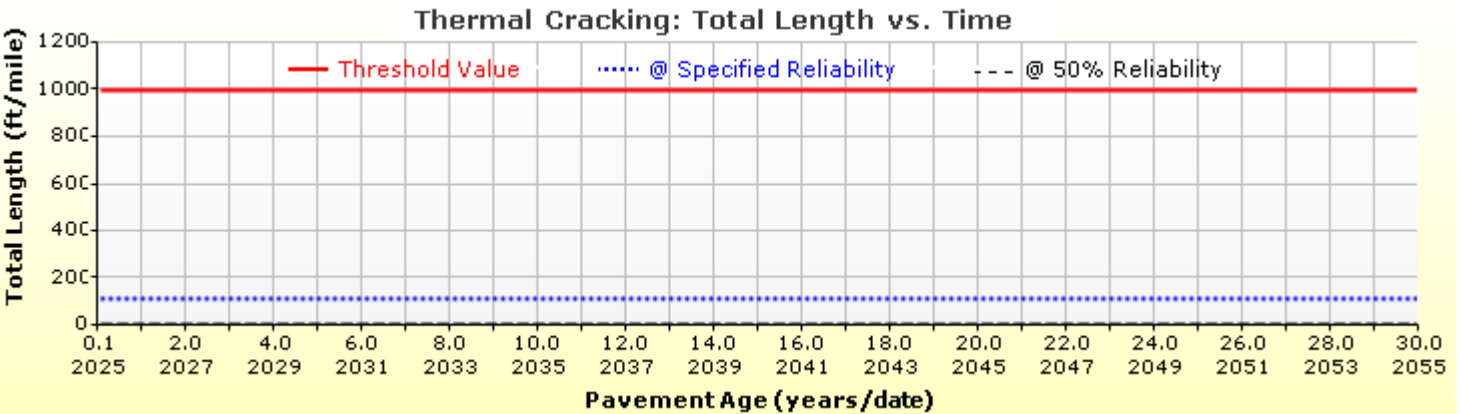
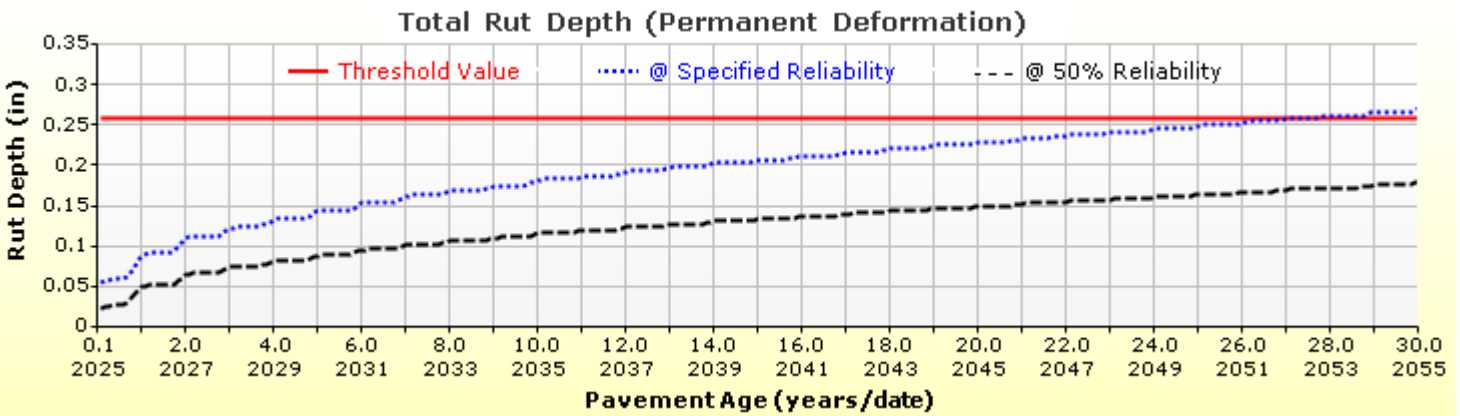
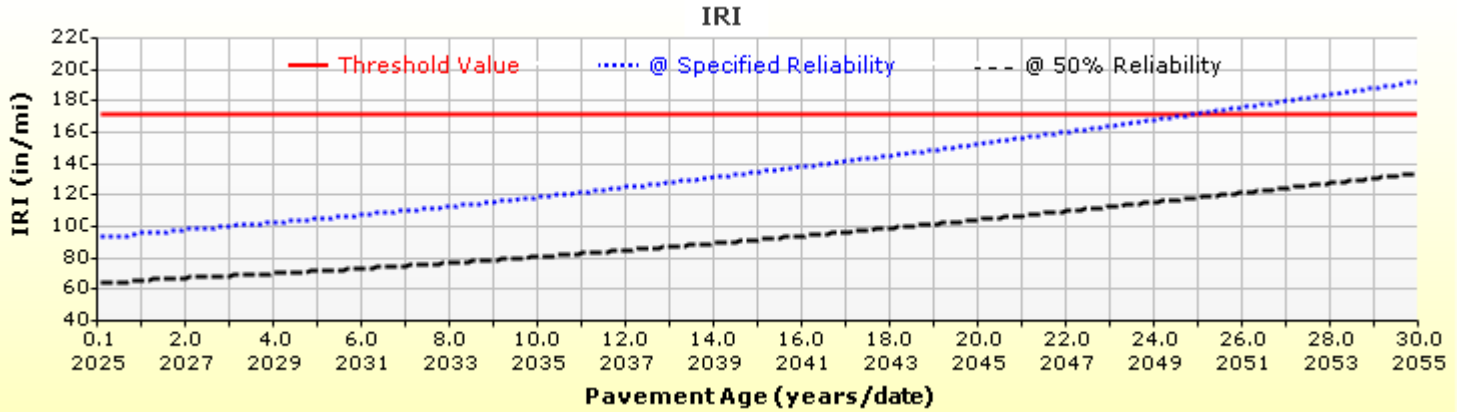
HMA Layer 2: Layer 2 Flexible : VDOT IM

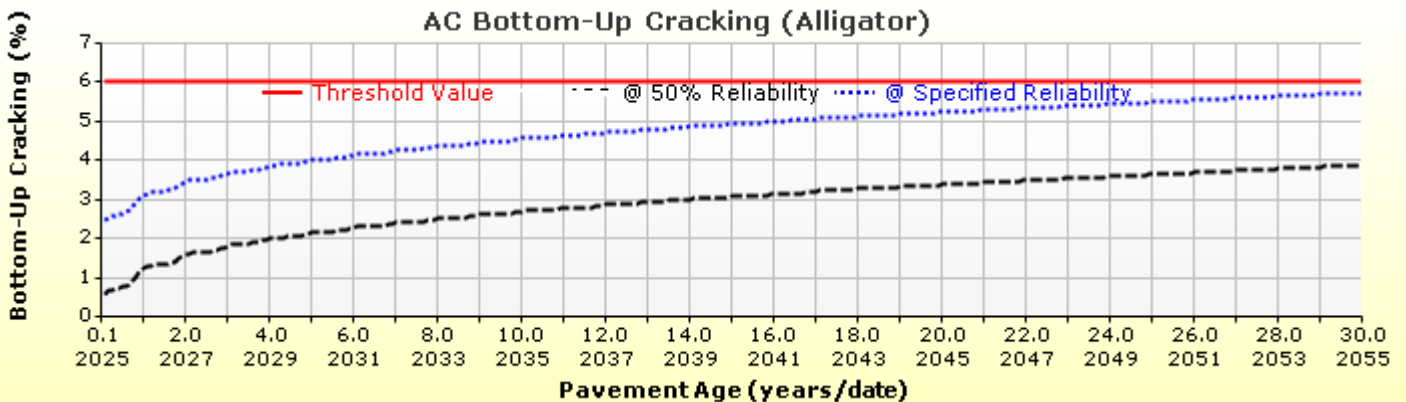
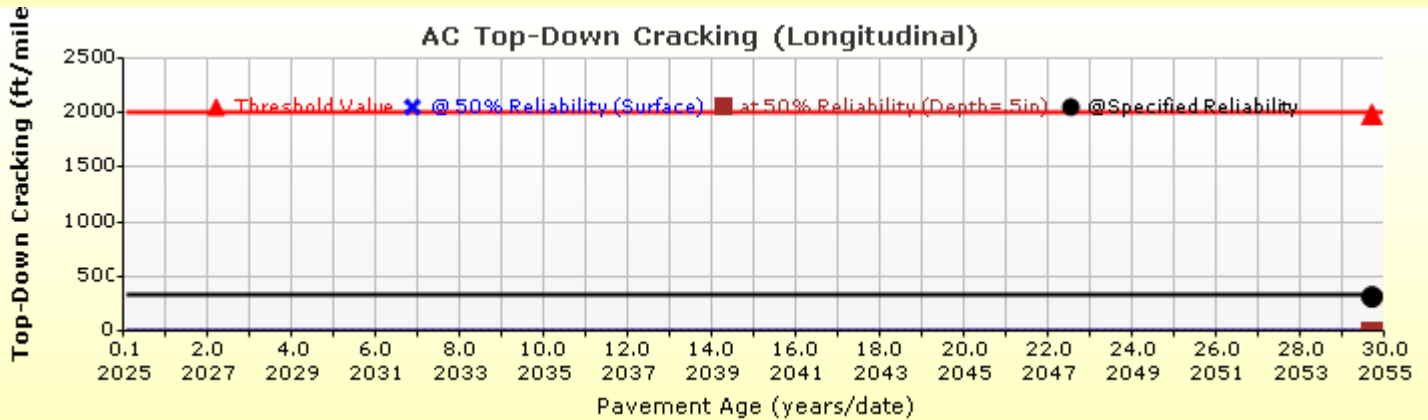
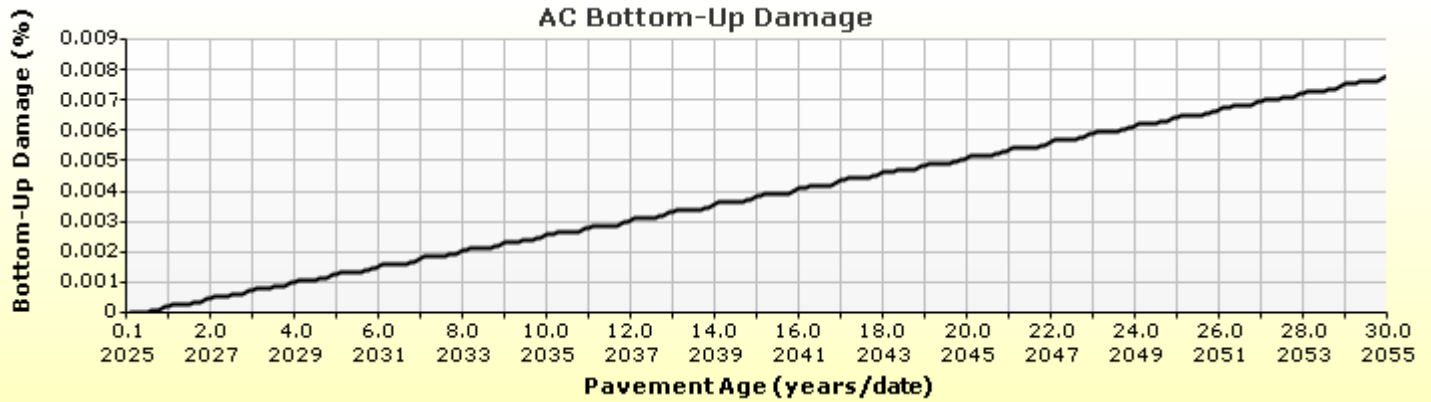
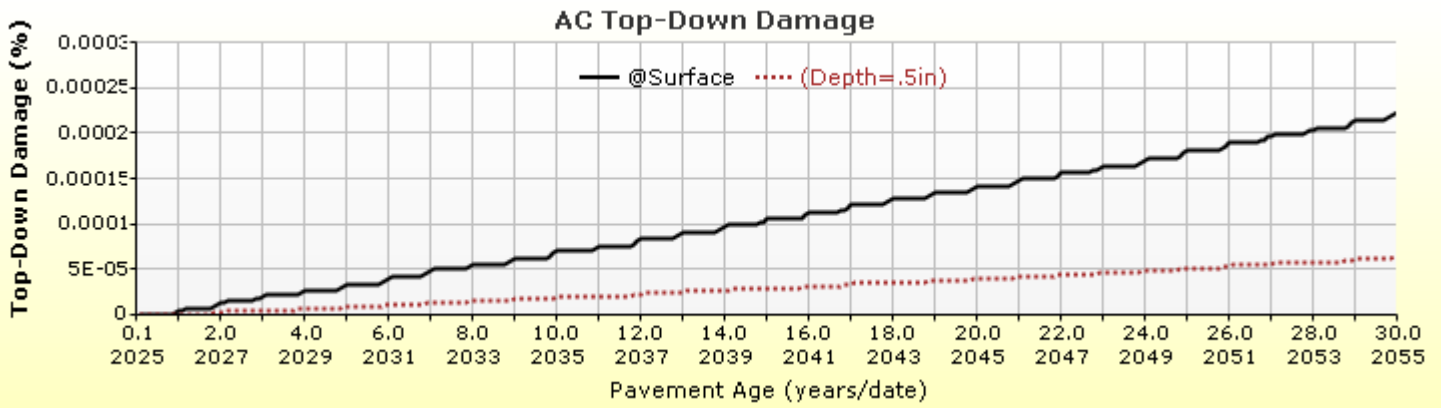


HMA Layer 3: Layer 3 Flexible : VDOT BM

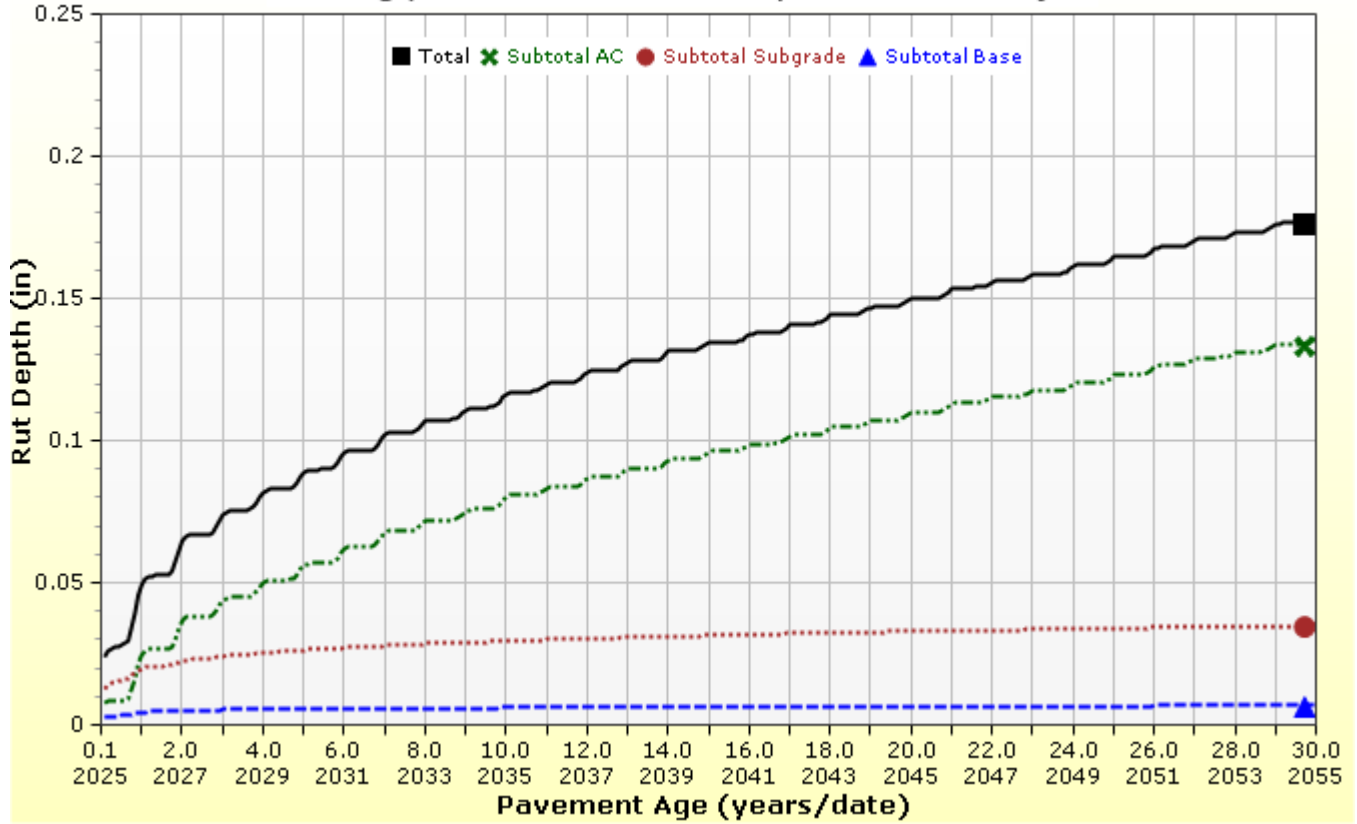


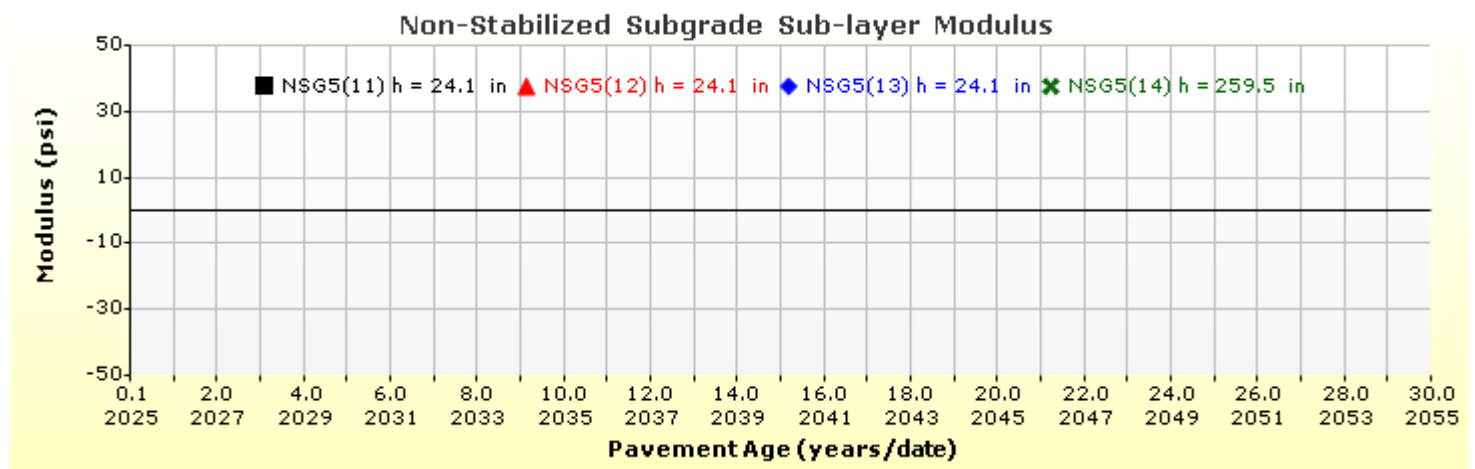
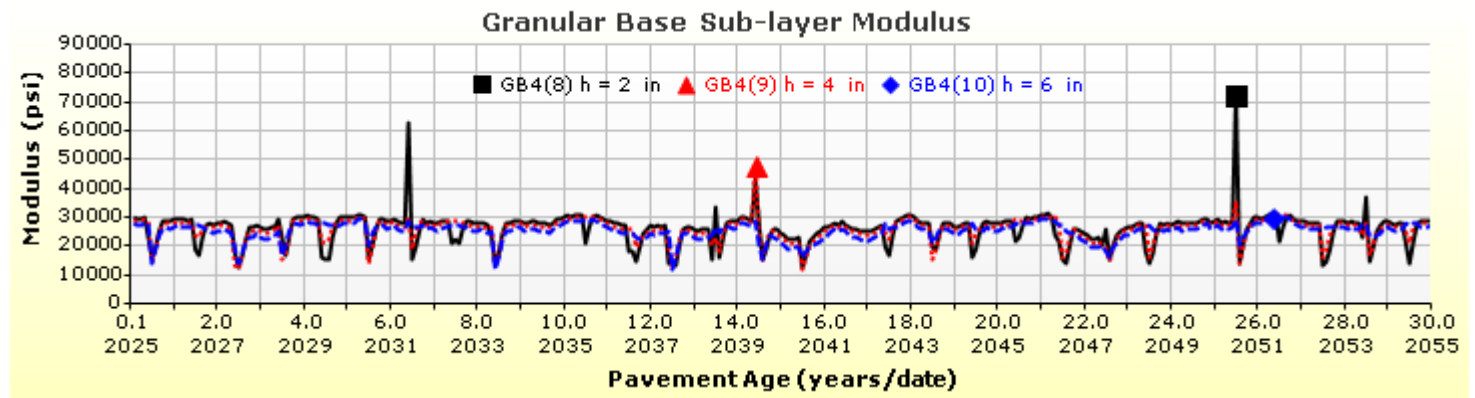
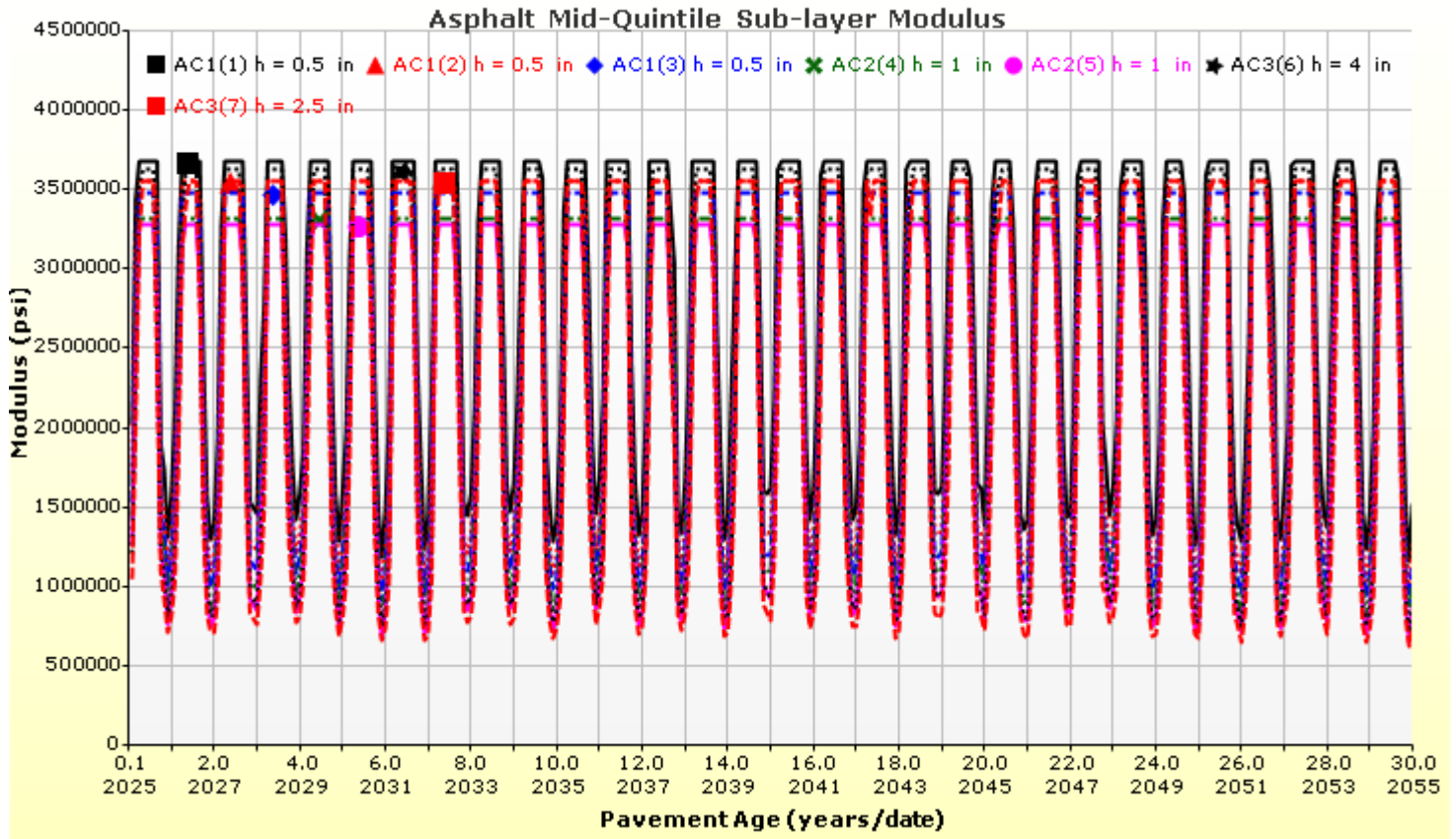
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability







Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 6.5 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 12.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 21000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



Flexible Design_Georgetown Pike Ramps_CBR 5 Fill

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Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ $C = 10^M$ $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k1: 0.007566 |
| | k2: 3.9492 |
| | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|---|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$ $C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$ <p>Where: H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|--|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma}\right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = regression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavements C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|----------|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}}\right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2: 1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | <i>δ_a = permanent deformation for the layer</i> <i>N = number of repetitions</i> <i>ε_v = average vertical strain(in/in)</i> <i>$\varepsilon_0, \beta, \rho$ = material properties</i> <i>ε_r = resilient strain(in/in)</i> | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |



Flexible Design_Georgetown Pike_CBR 5 Fill

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Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 6.5 |
| NonStabilized | VDOT Avg 21A-21B | 12.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 954 |
| 2040 (15 years) | 2,982,000 |
| 2055 (30 years) | 6,710,190 |

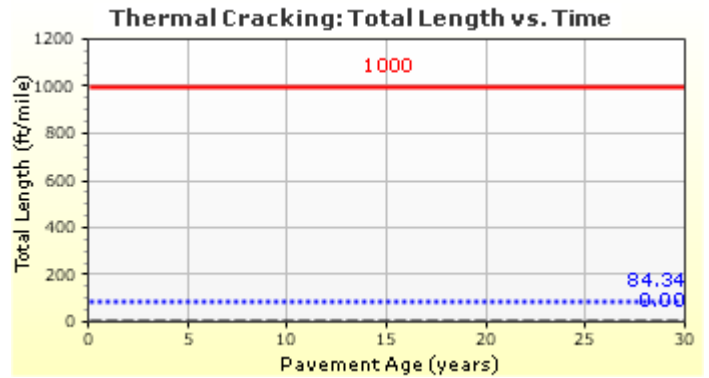
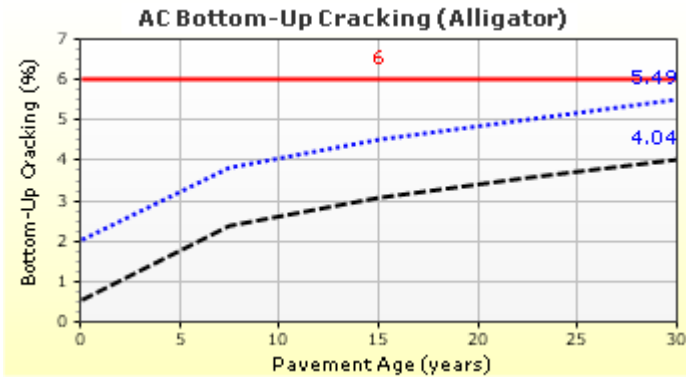
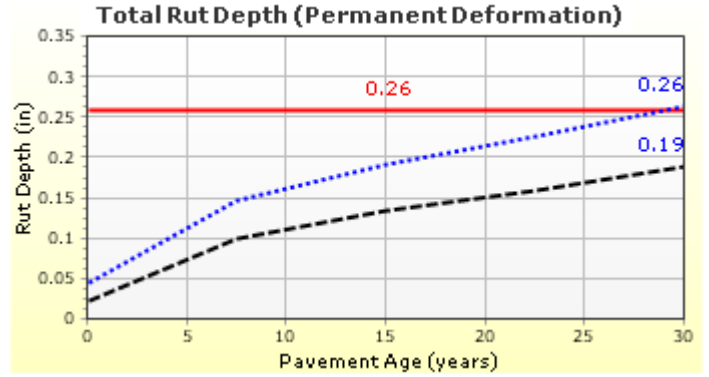
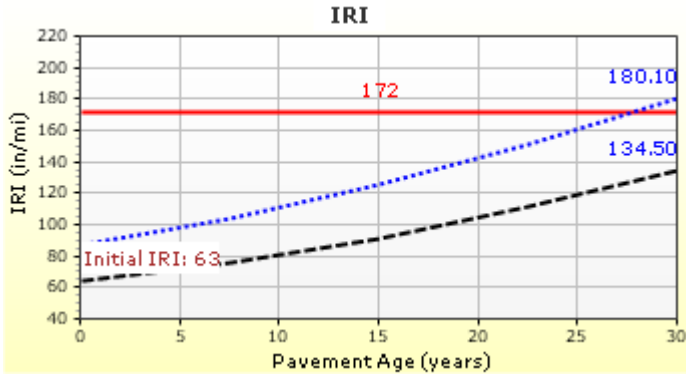
Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 180.11 | 90.00 | 85.40 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.26 | 90.00 | 88.86 | Fail ** |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.49 | 90.00 | 95.86 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 84.34 | 90.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 256.89 | 90.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.21 | 90.00 | 97.68 | Pass |

Note: **Satisfies Pavement Deformation Criteria of 0.26 inches for 15-year period per Table 4-2 of Pavement ME User Manual.

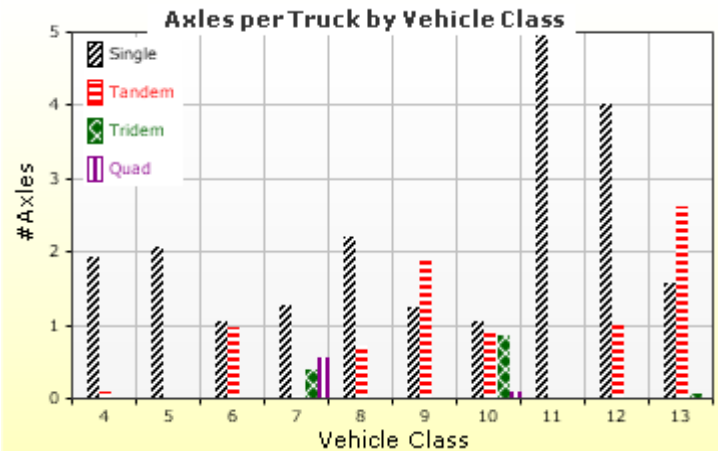
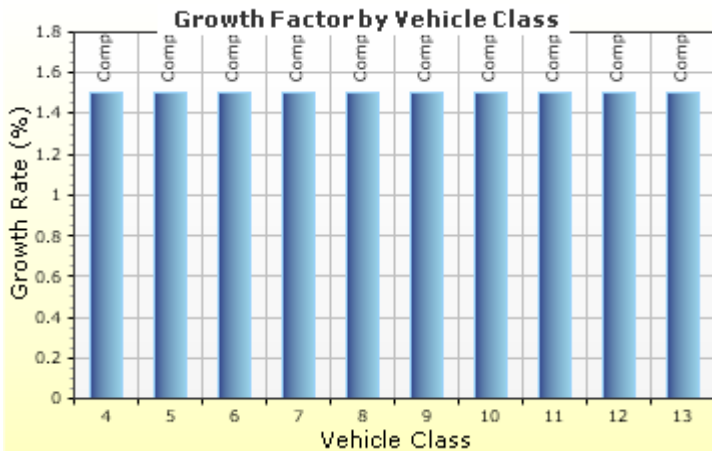
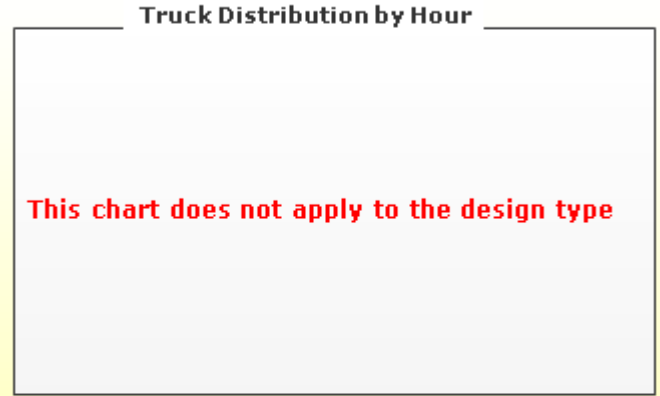
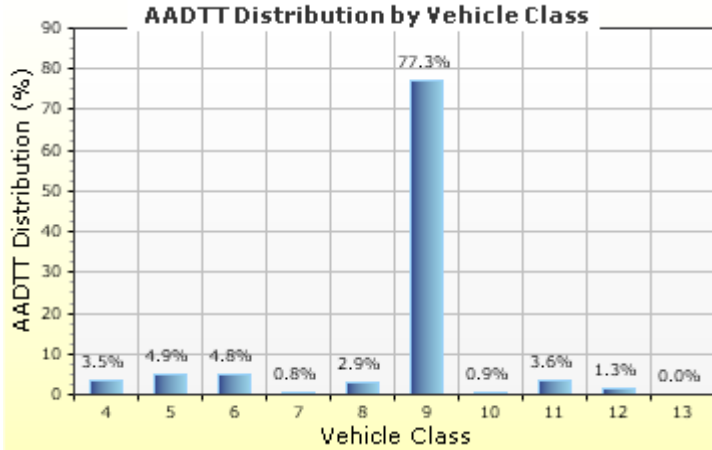
Distress Charts



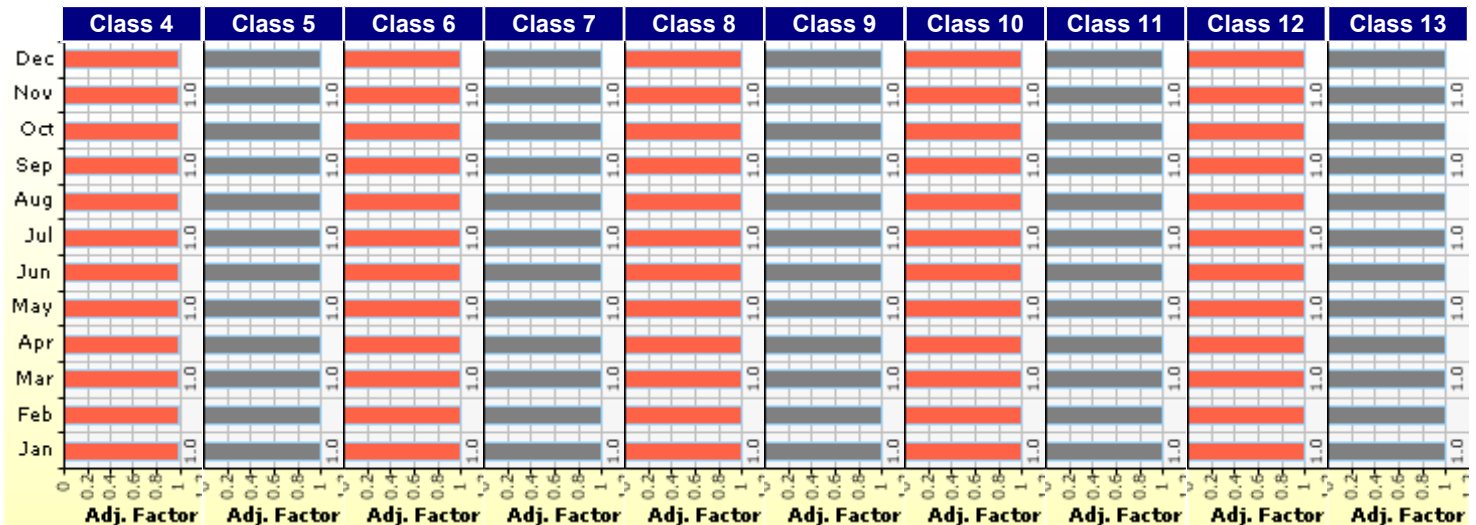
Traffic Inputs

Graphical Representation of Traffic Inputs

| | | | |
|--------------------------------------|-----|--|------|
| Initial two-way AADTT: | 954 | Percent of trucks in design direction (%): | 57.0 |
| Number of lanes in design direction: | 2 | Percent of trucks in design lane (%): | 90.0 |
| | | Operational speed (mph): | 50.0 |



Traffic Volume Monthly Adjustment Factors





Flexible Design_Georgetown Pike_CBR 5 Fill

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Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors

Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1.5% | Compound |
| Class 5 | 4.92% | 1.5% | Compound |
| Class 6 | 4.75% | 1.5% | Compound |
| Class 7 | 0.82% | 1.5% | Compound |
| Class 8 | 2.89% | 1.5% | Compound |
| Class 9 | 77.29% | 1.5% | Compound |
| Class 10 | 0.92% | 1.5% | Compound |
| Class 11 | 3.58% | 1.5% | Compound |
| Class 12 | 1.32% | 1.5% | Compound |
| Class 13 | 0.01% | 1.5% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

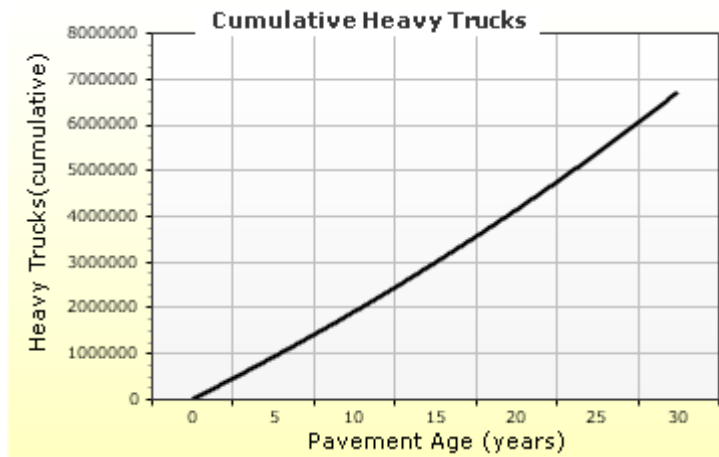
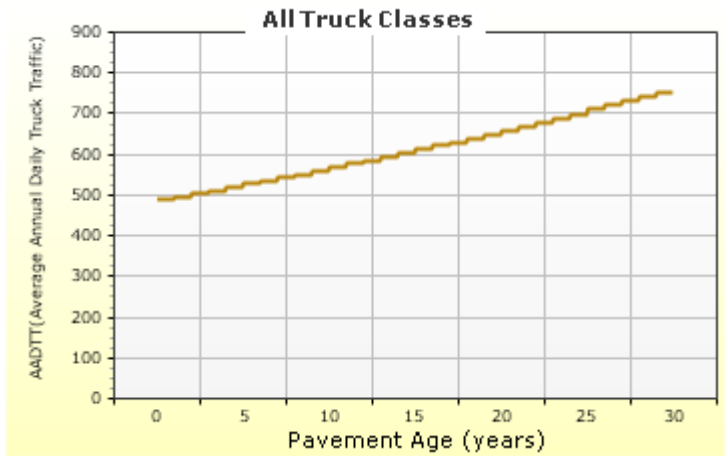
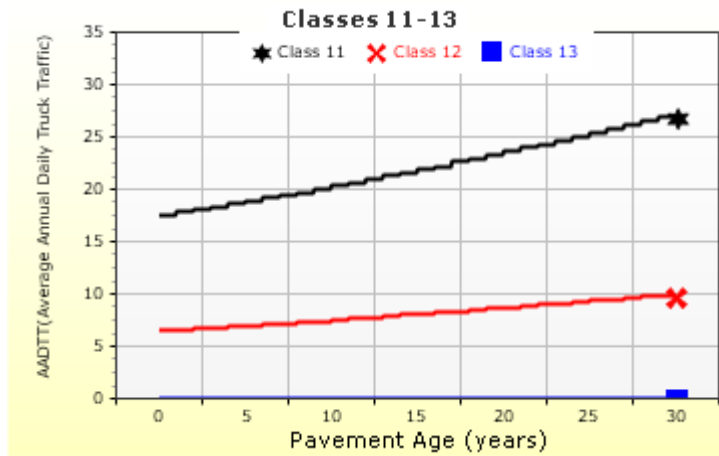
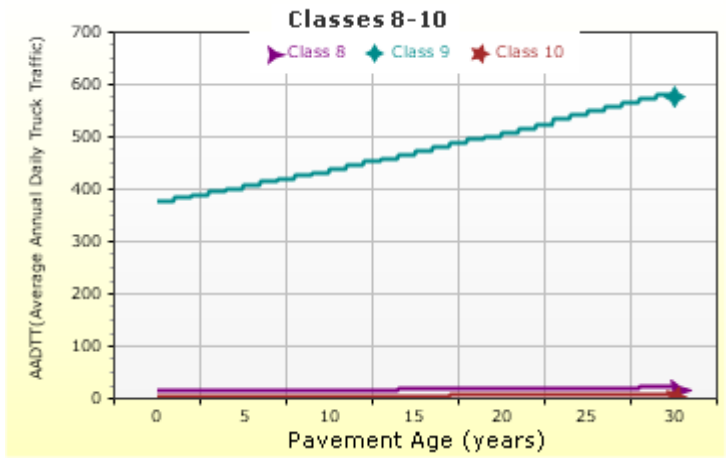
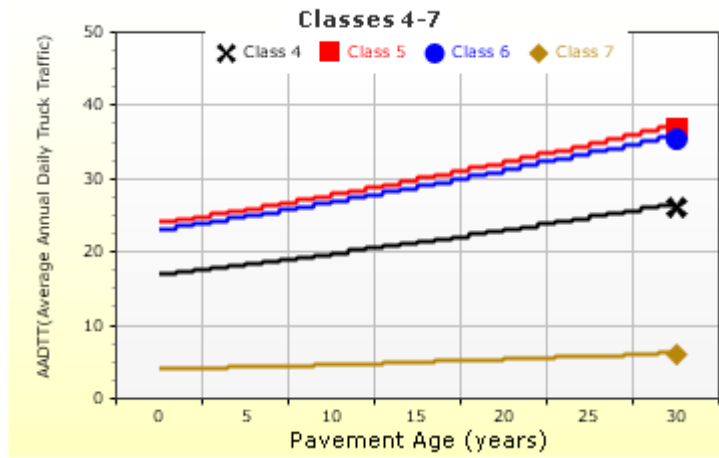
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced





Flexible Design_Georgetown Pike_CBR 5 Fill

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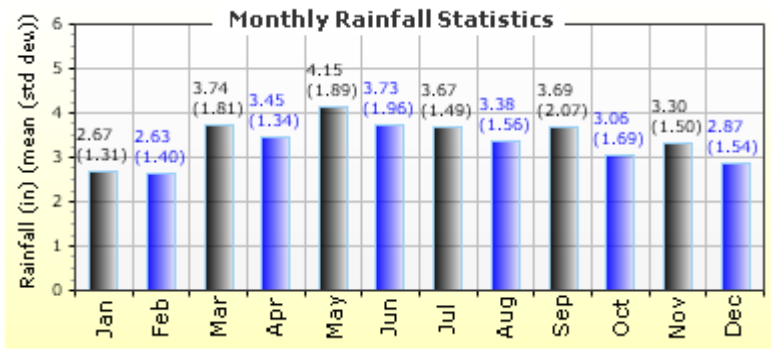
Climate Inputs

Climate Data Sources:

Climate Station Cities: Location (lat lon elevation(ft))
 WASHINGTON, DC 38.93500 -77.44800 290

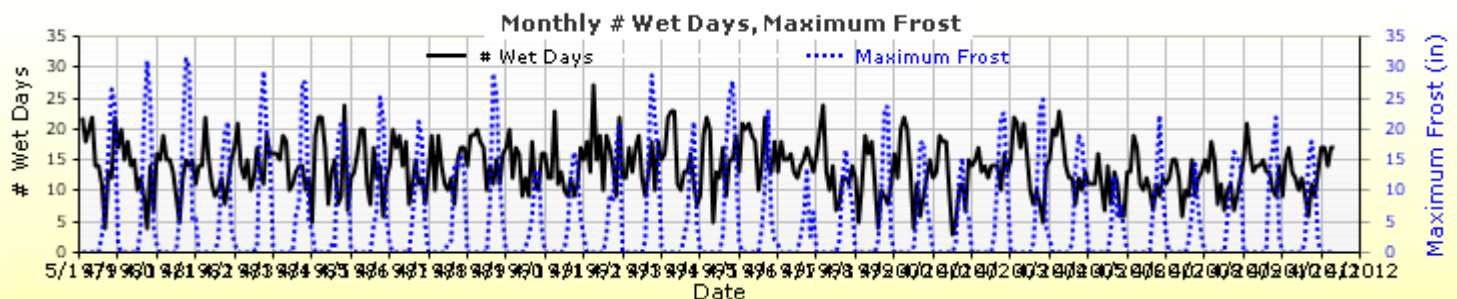
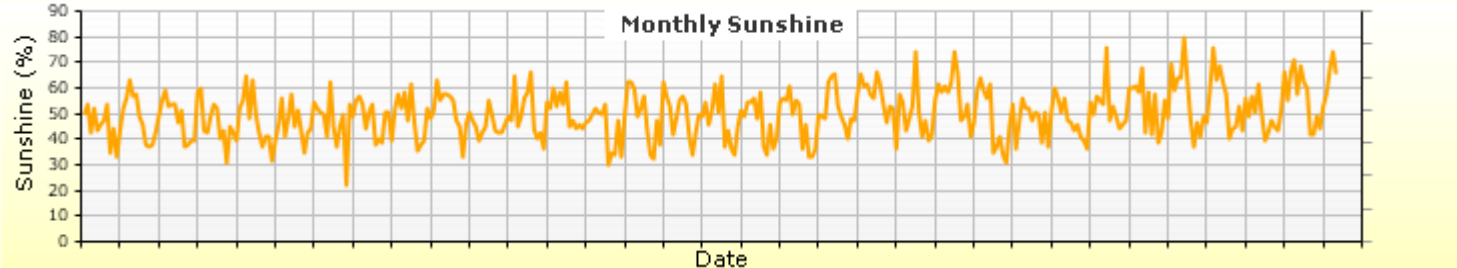
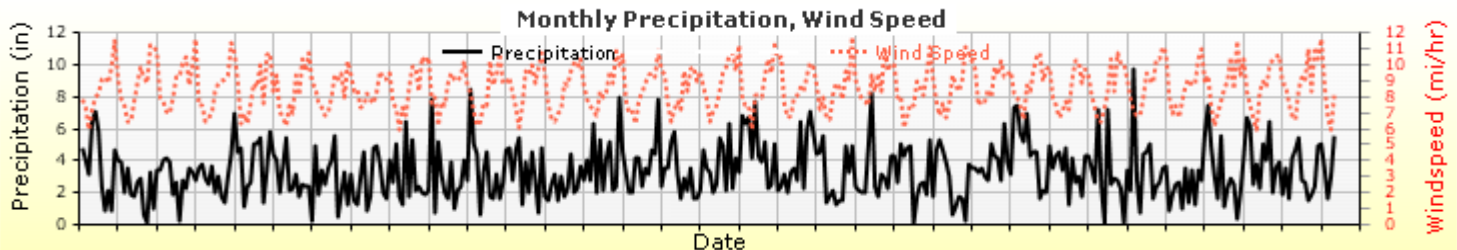
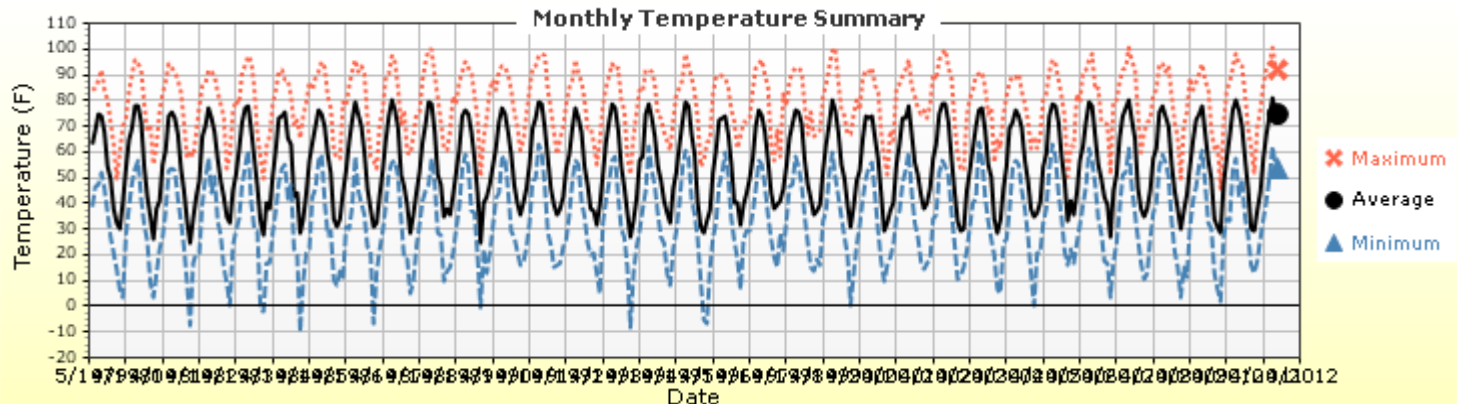
Annual Statistics:

Mean annual air temperature (°F) 55.16
 Mean annual precipitation (in) 40.52
 Freezing index (°F - days) 235.06
 Average annual number of freeze/thaw cycles: 62.05



Water table depth (ft) 10.00

Monthly Climate Summary:





Flexible Design_Georgetown Pike_CBR 5 Fill

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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

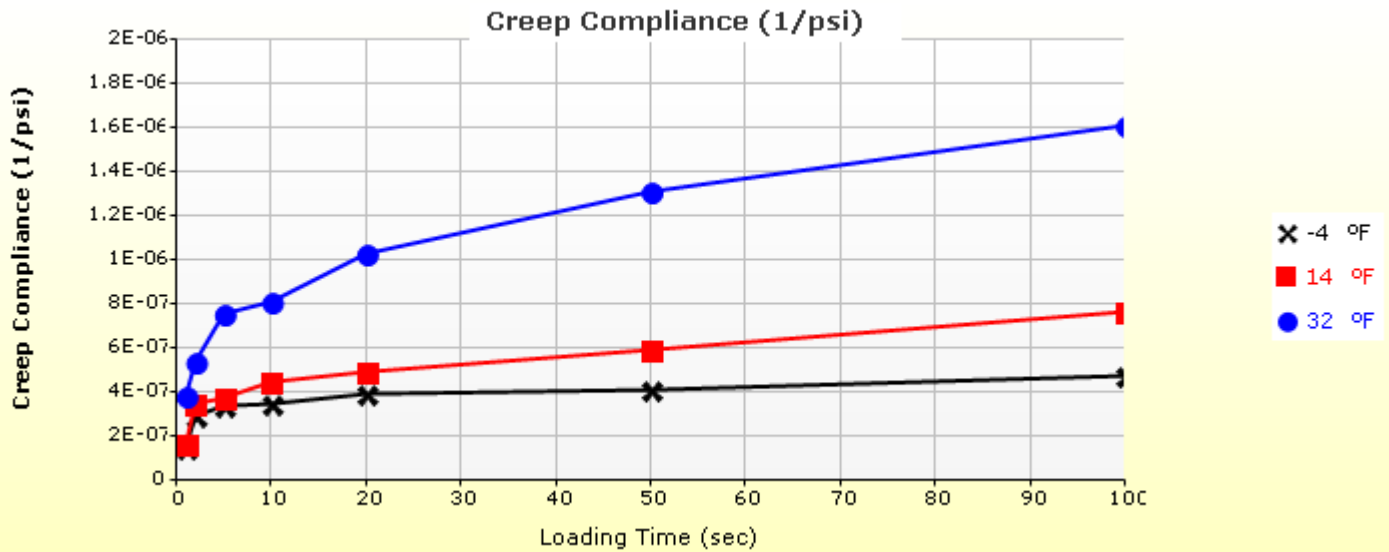
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

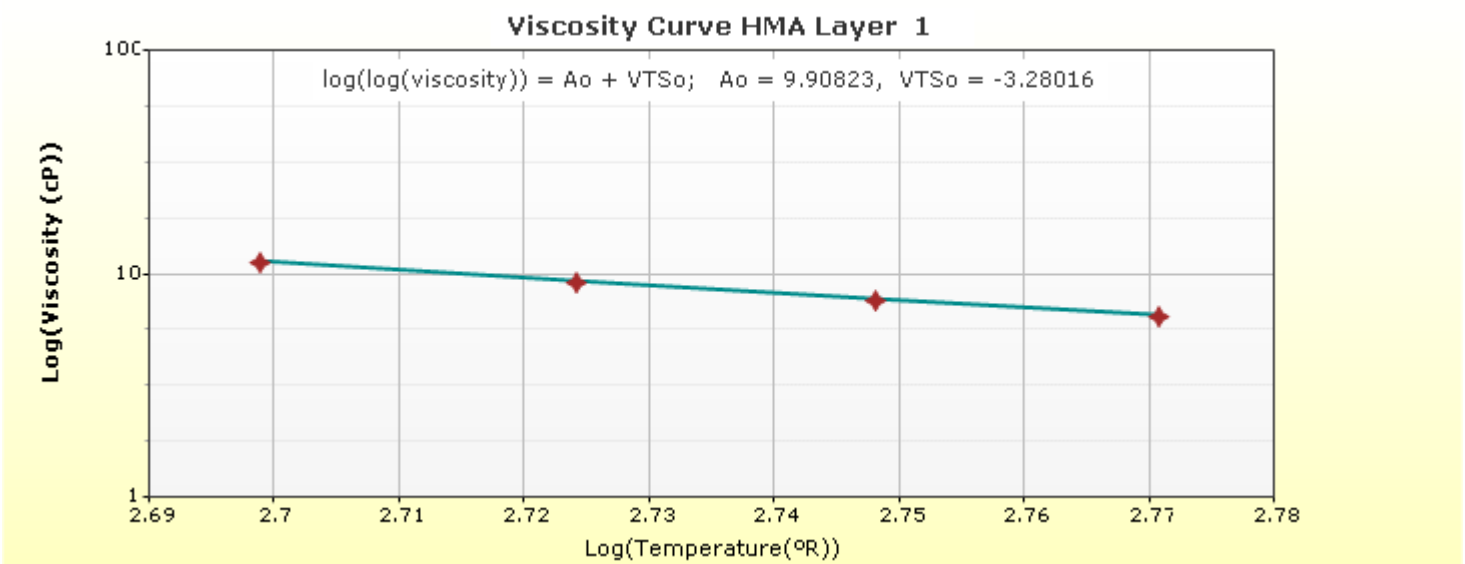
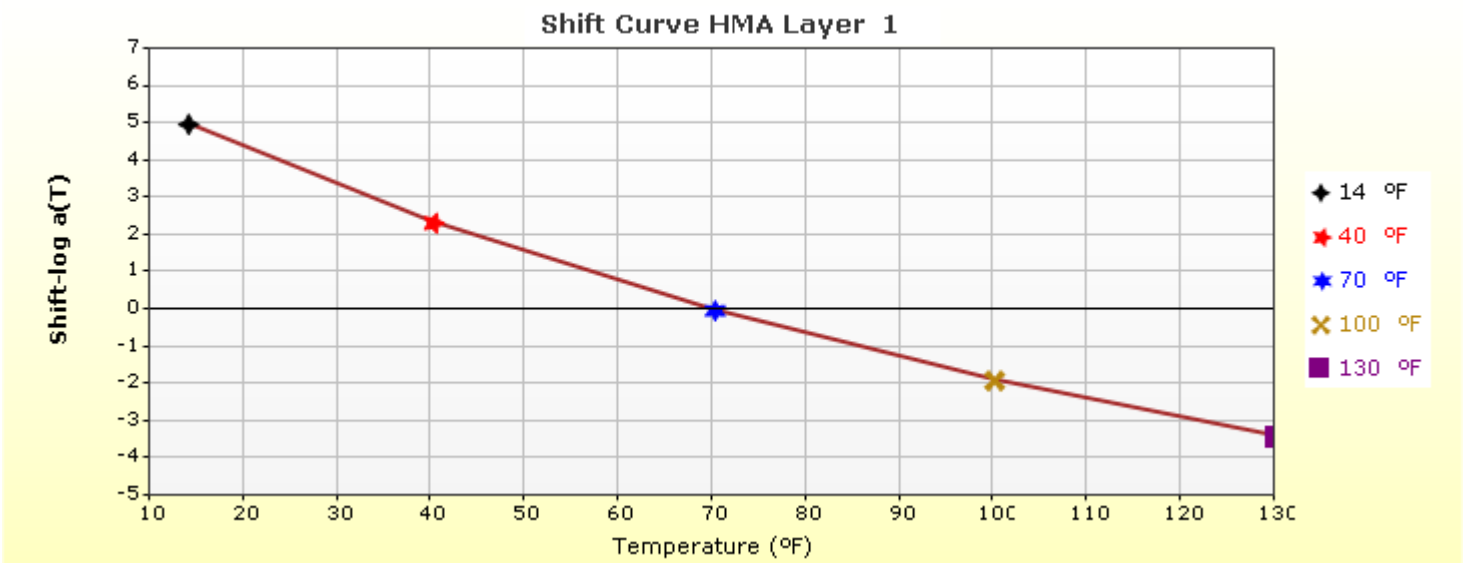
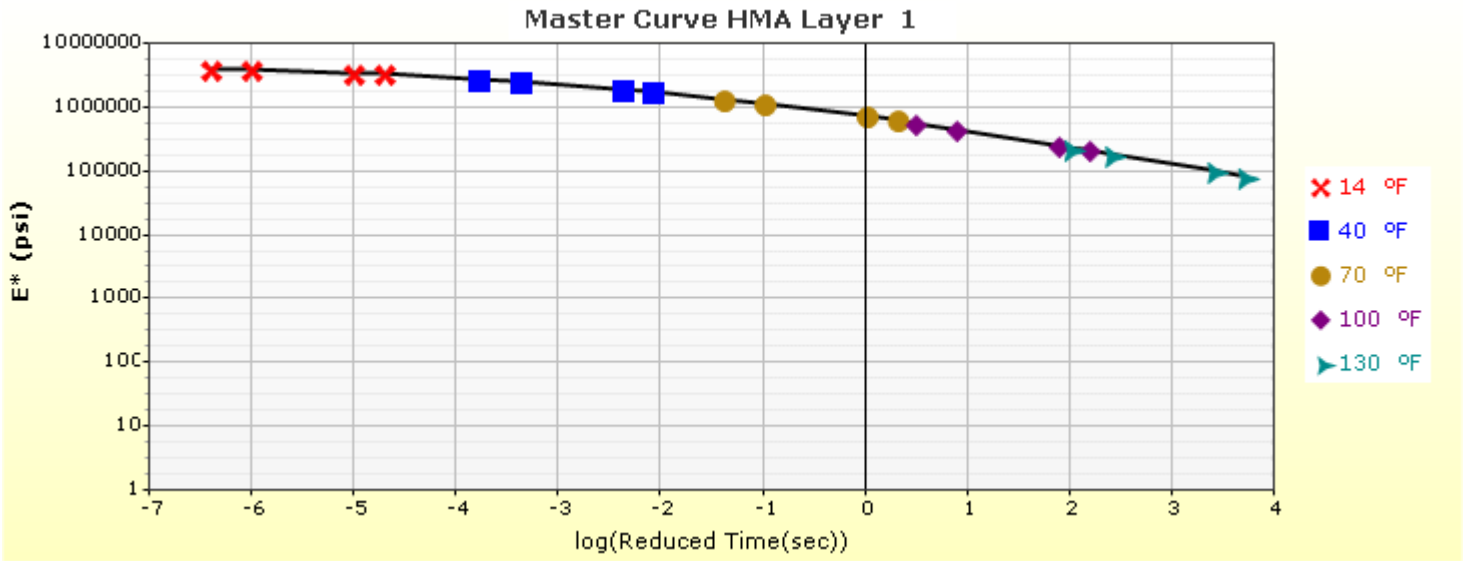
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

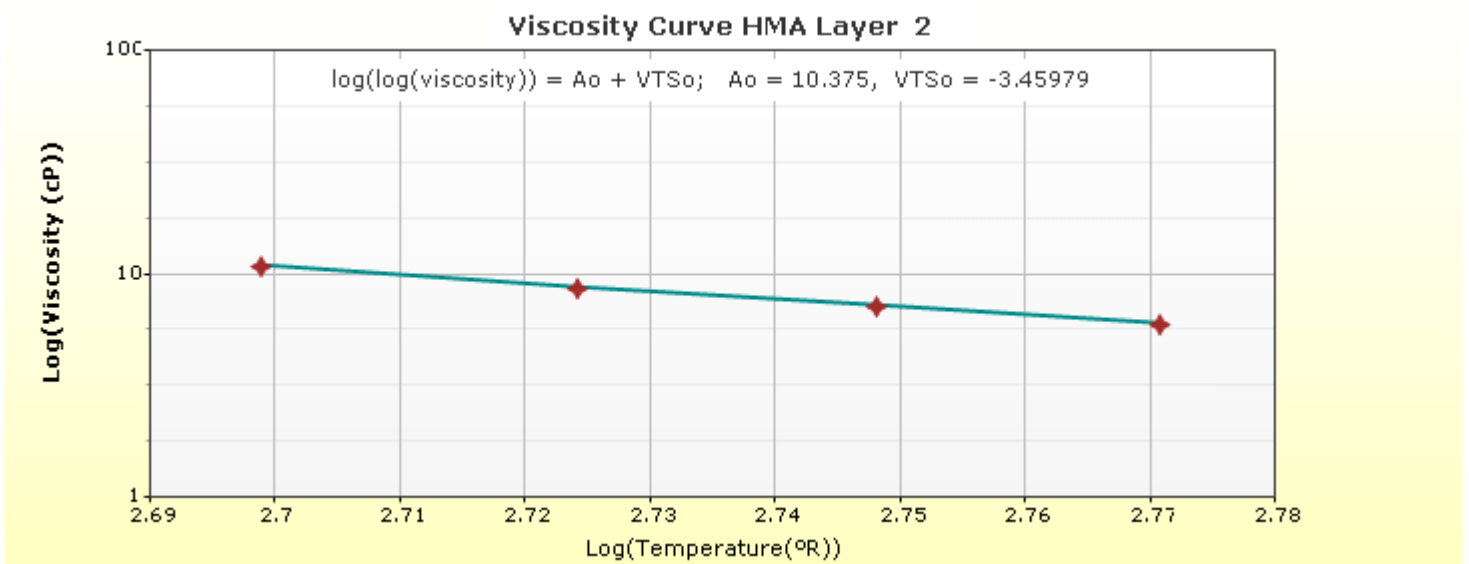
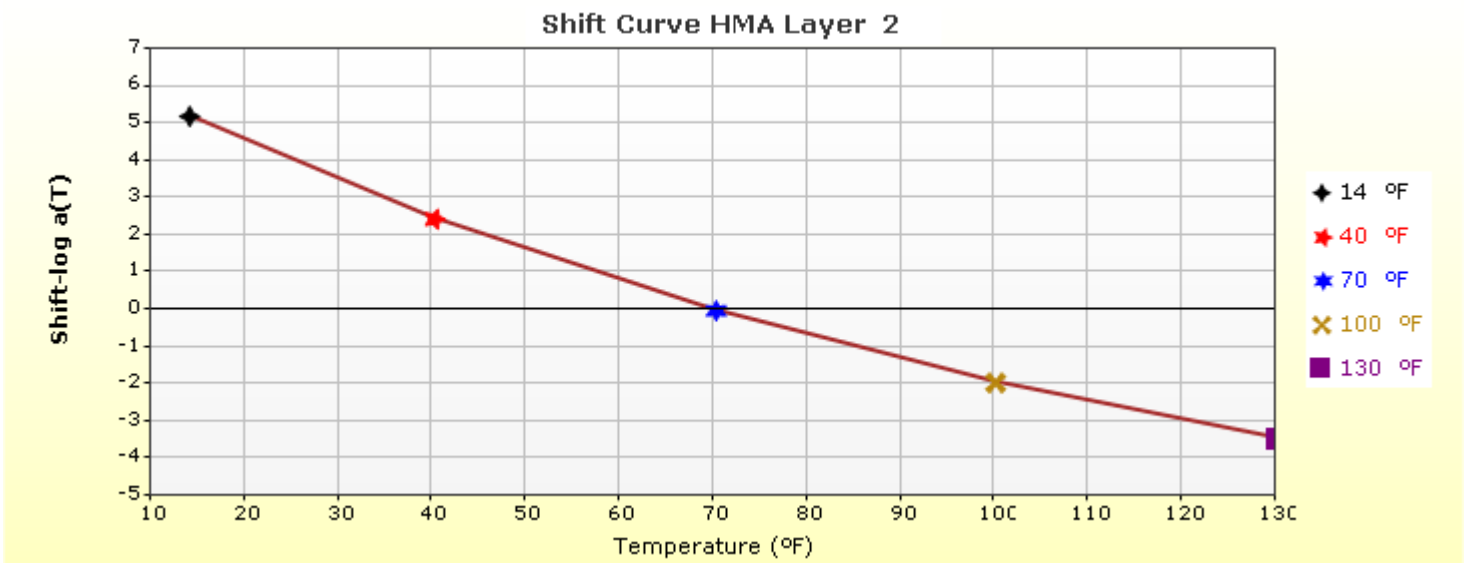
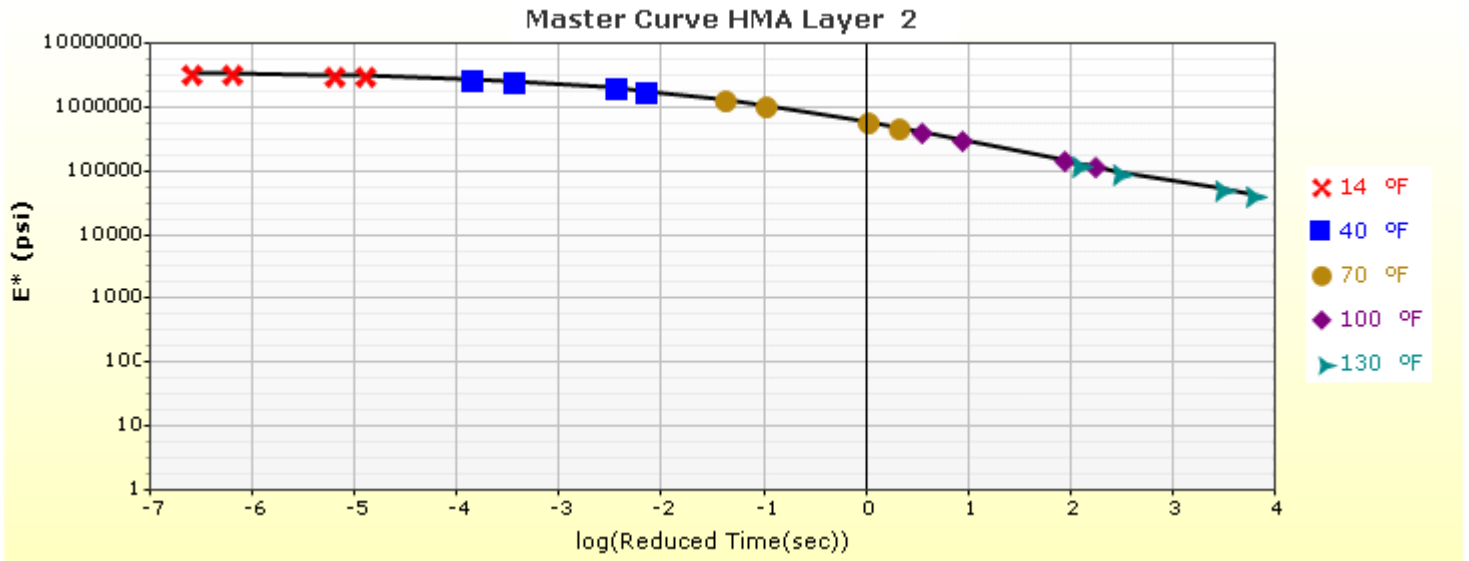
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



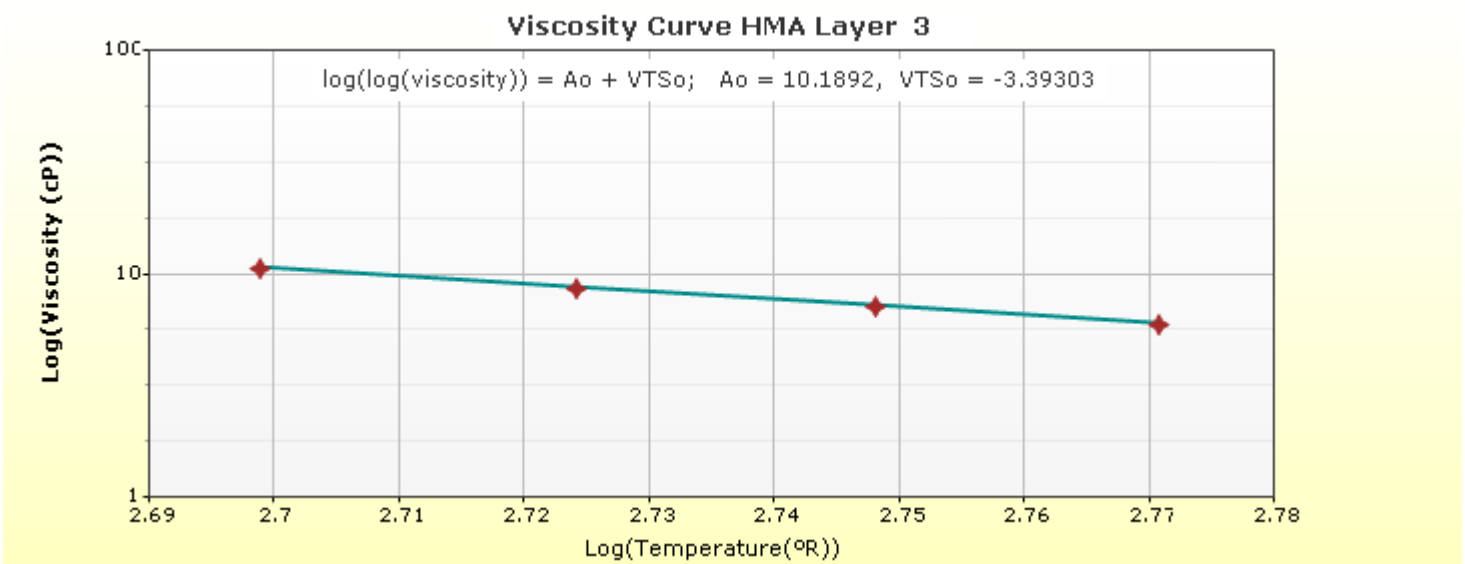
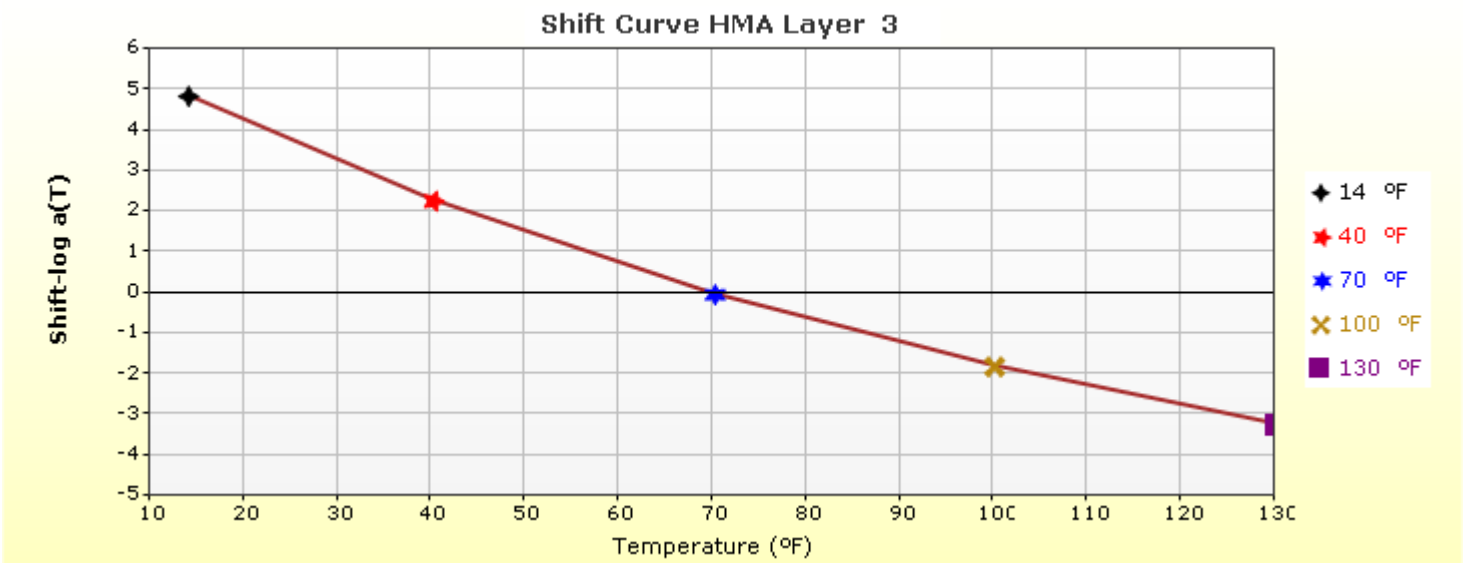
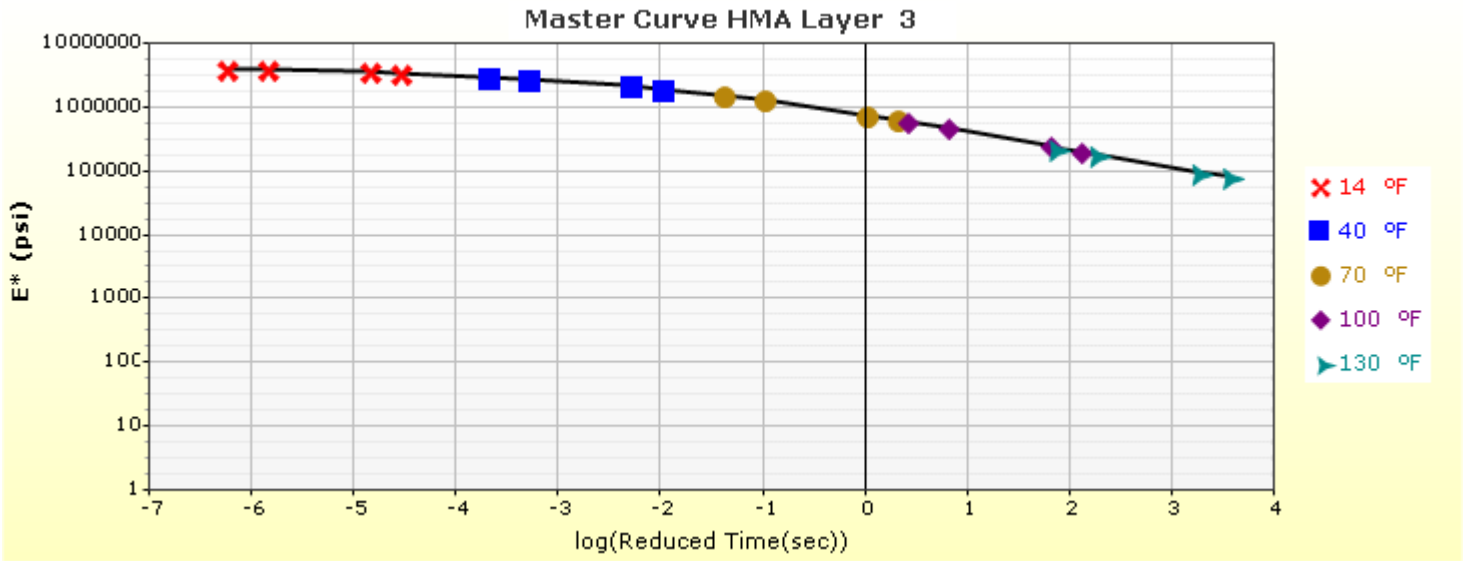
HMA Layer 1: Layer 1 Flexible : VDOT SM



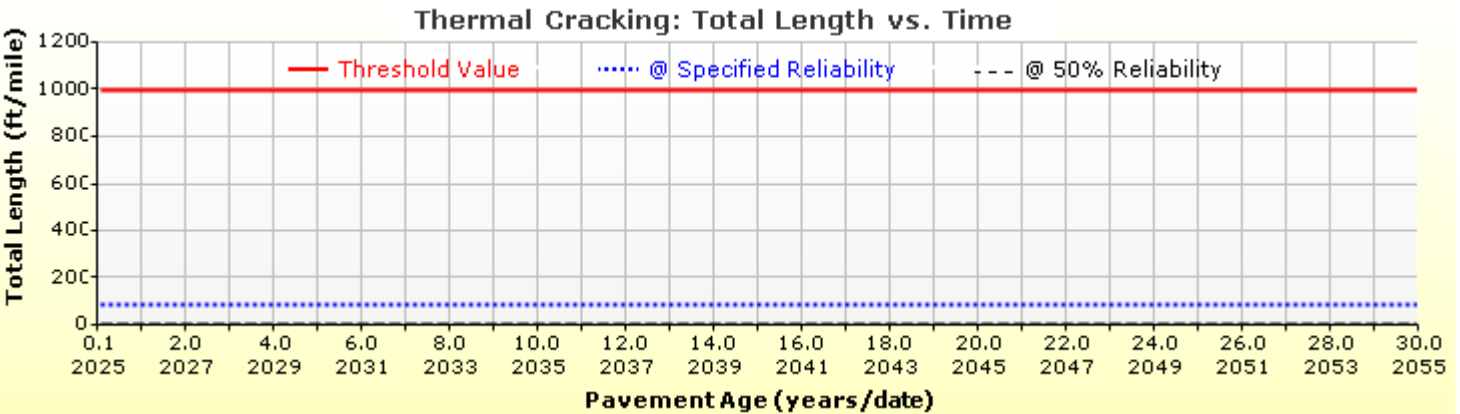
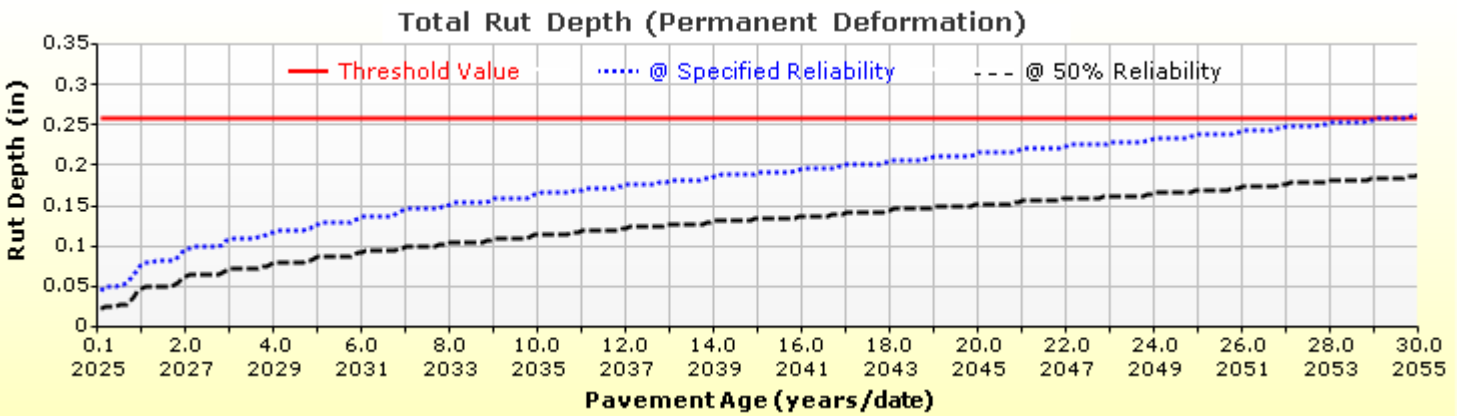
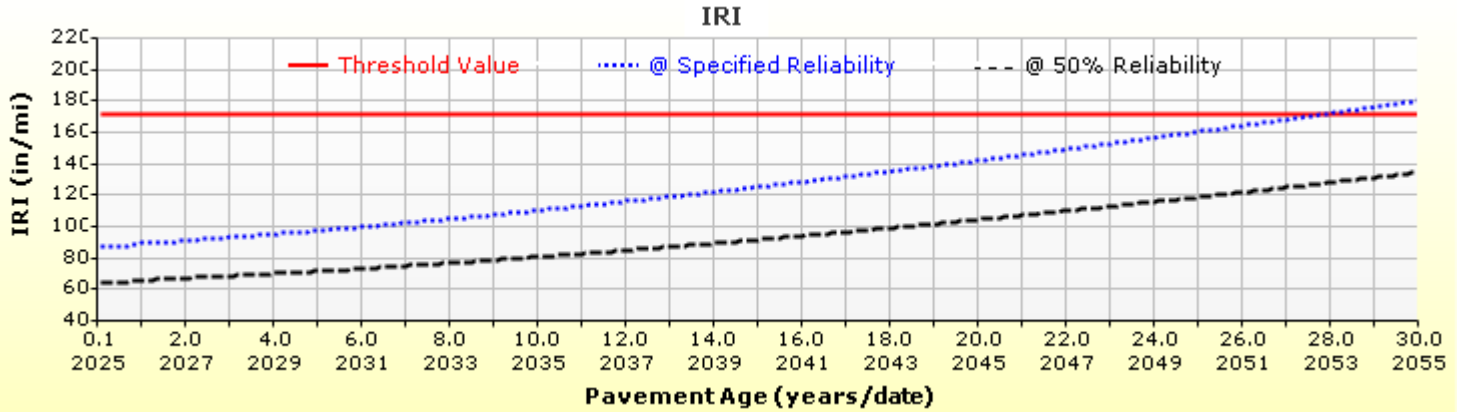
HMA Layer 2: Layer 2 Flexible : VDOT IM

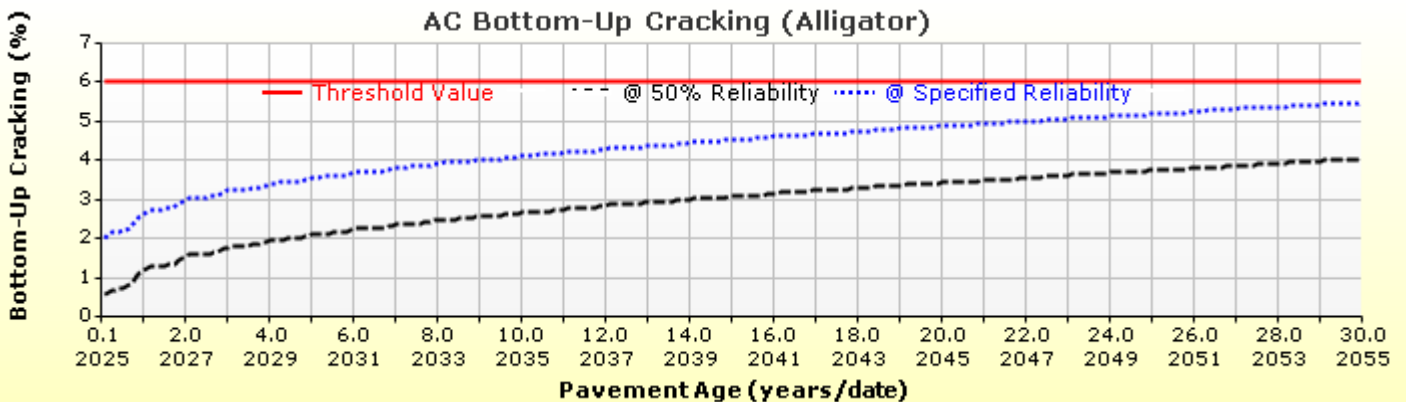
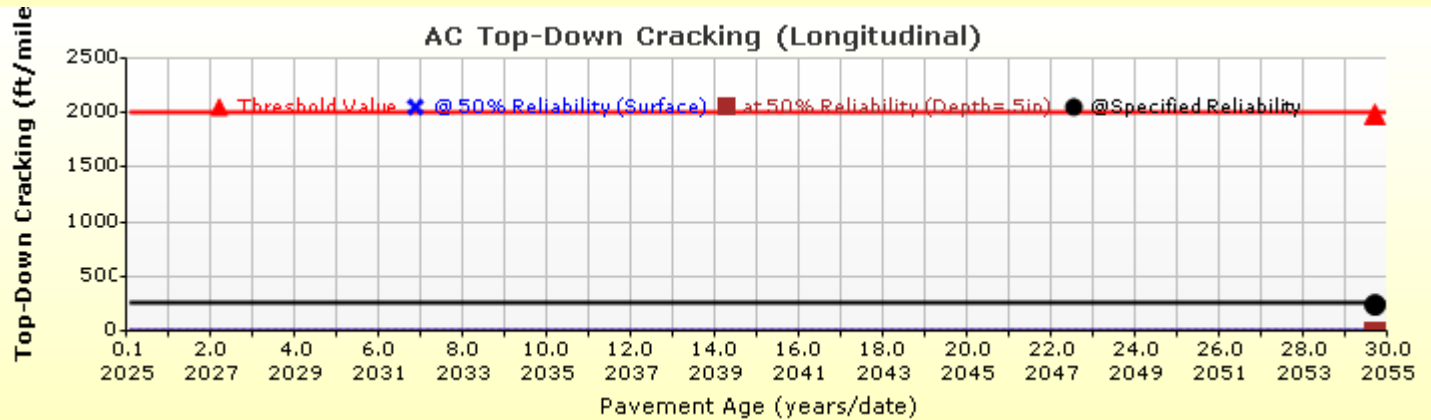
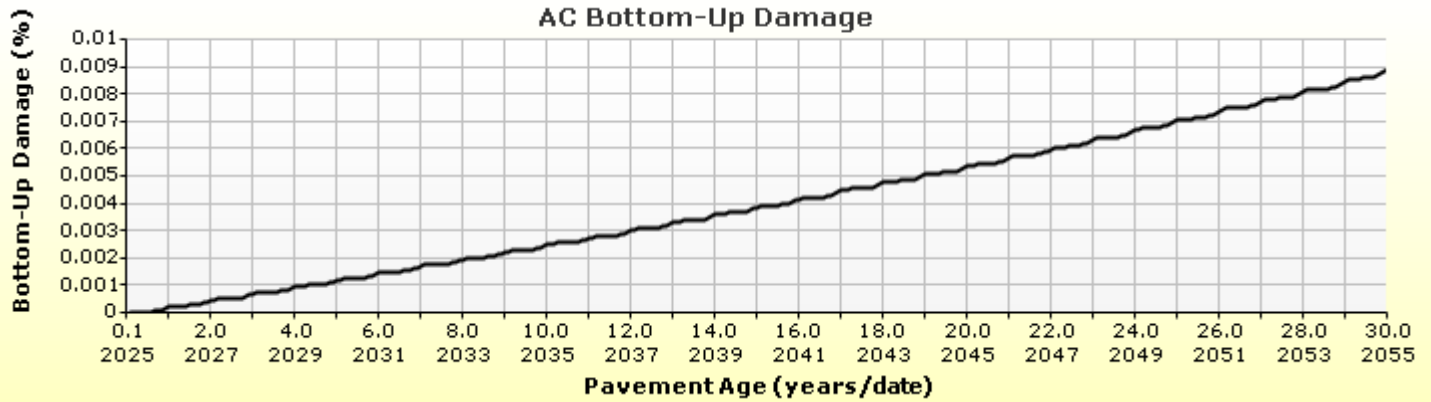
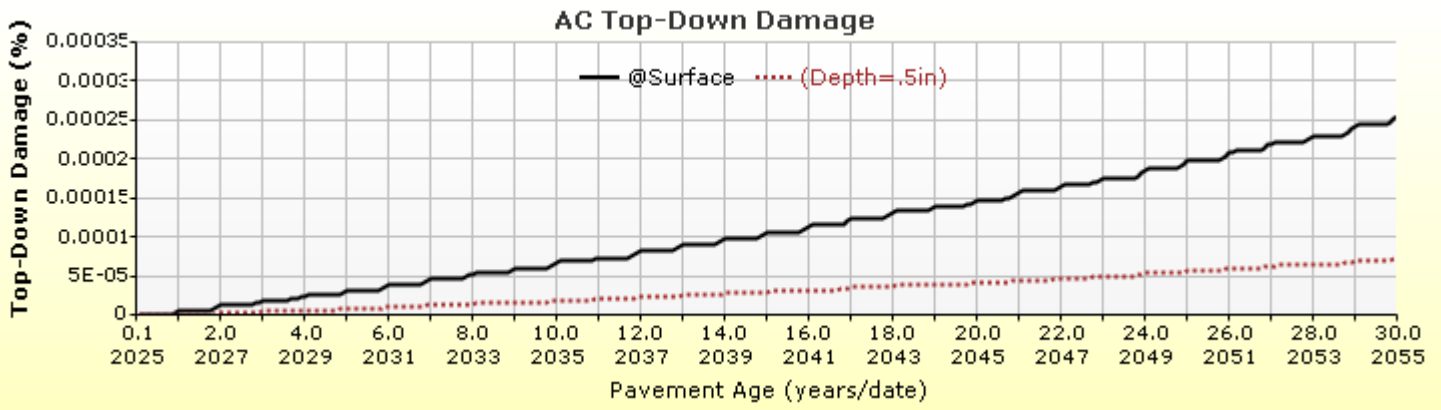


HMA Layer 3: Layer 3 Flexible : VDOT BM

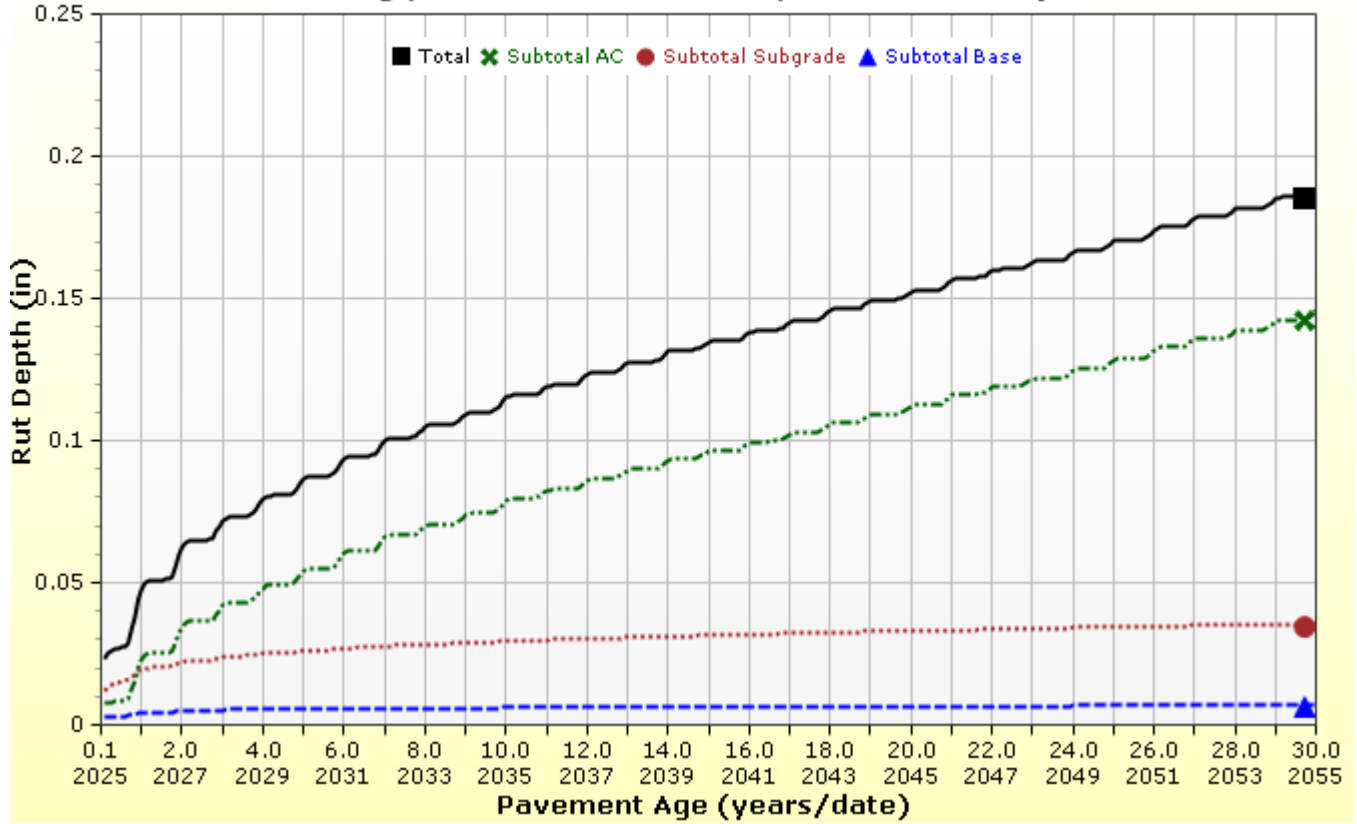


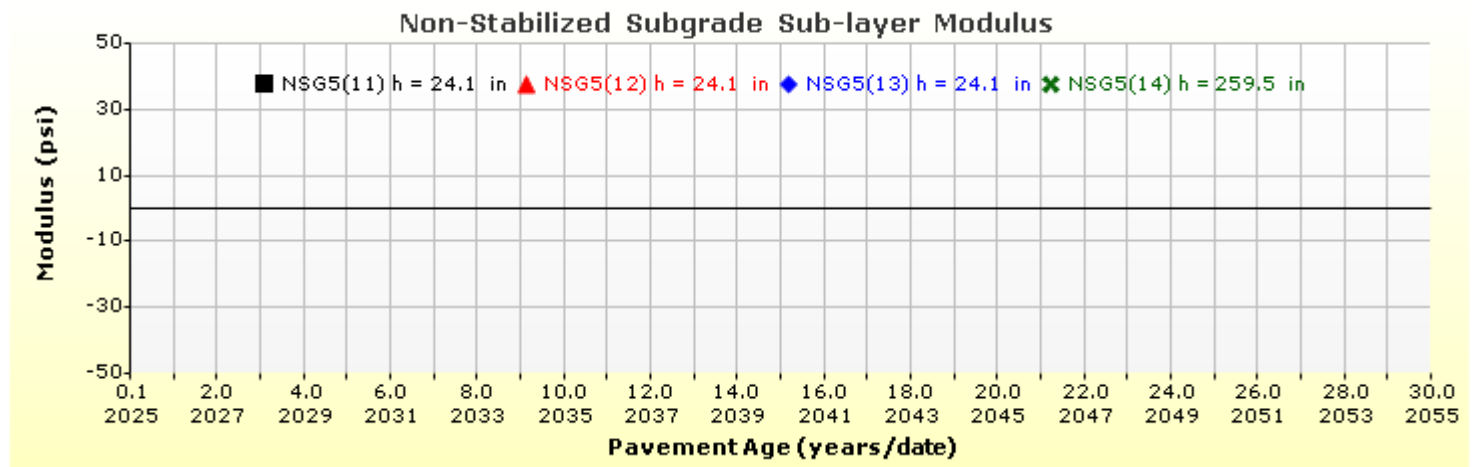
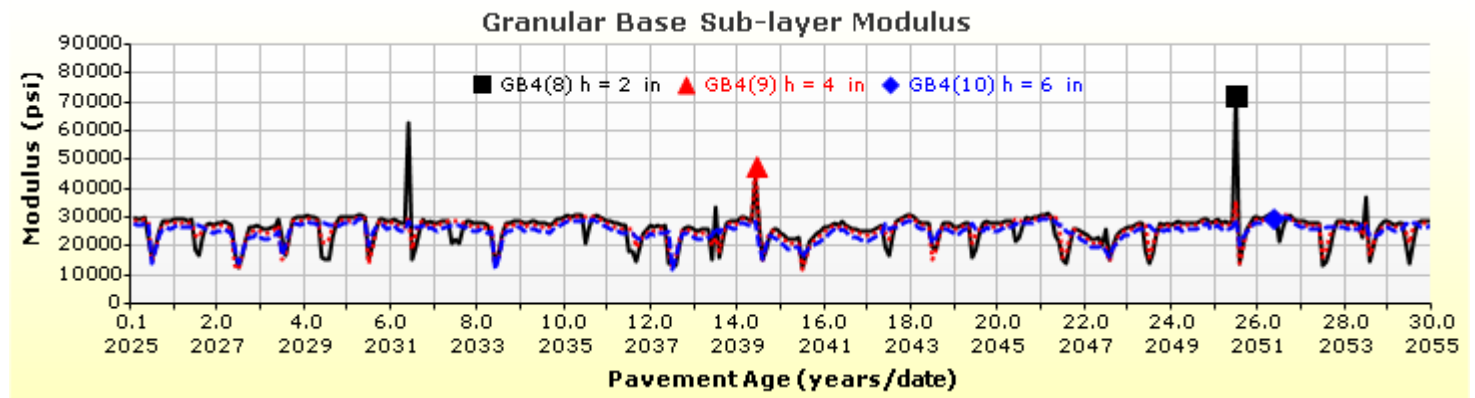
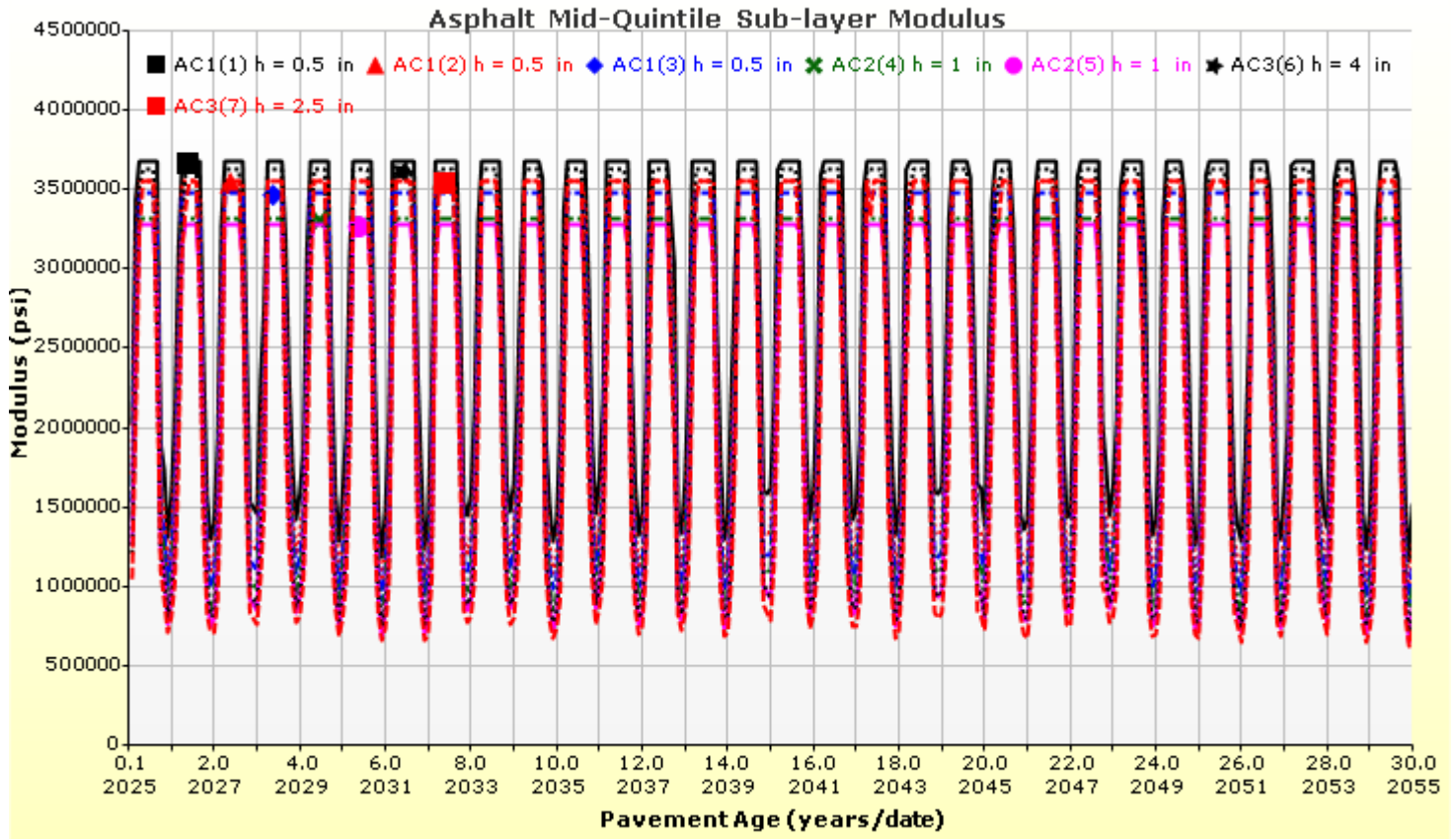
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability







Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Georgetown Pike_CBR 5 Fill

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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Georgetown Pike_CBR 5 Fill

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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 6.5 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_Georgetown Pike_CBR 5 Fill

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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 12.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 21000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



Flexible Design_Georgetown Pike_CBR 5 Fill

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Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ $C = 10^M$ $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k1: 0.007566 |
| | k2: 3.9492 |
| | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|---|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3} B_{r3}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$ $C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$ <p>Where: H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma}\right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|---------|
| $N_f = 10 \left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}}\right)$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |

MEPDG Output Reports

Proposed Pavement Section for George Washington Memorial Parkway and Ramps



Flexible Design_GWMP Ramps_CBR 5

File Name: C:\Users\sbhusal\Desktop\Project NEXT\Flexible Design_GWMP Ramps_CBR 5.dgpx



Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 6.5 |
| NonStabilized | VDOT Avg 21A-21B | 12.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

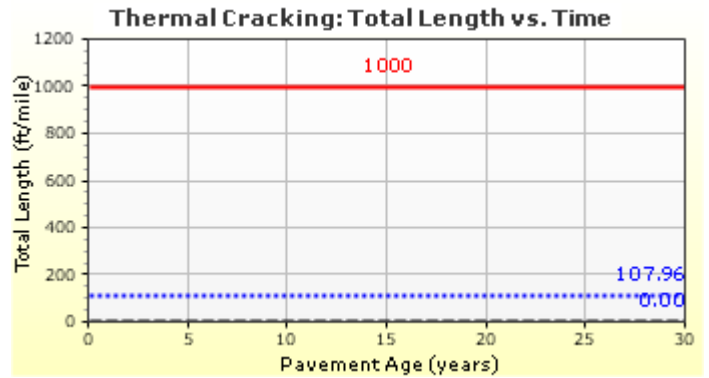
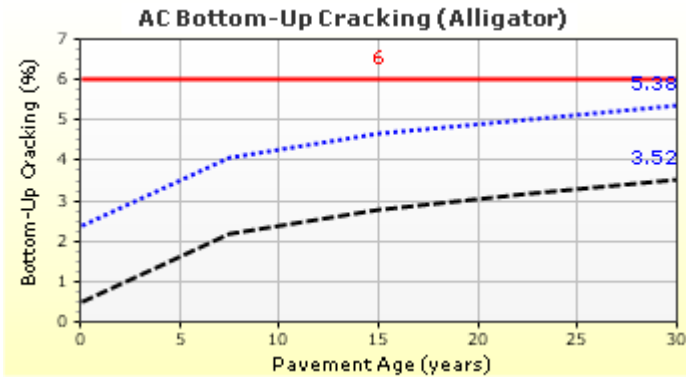
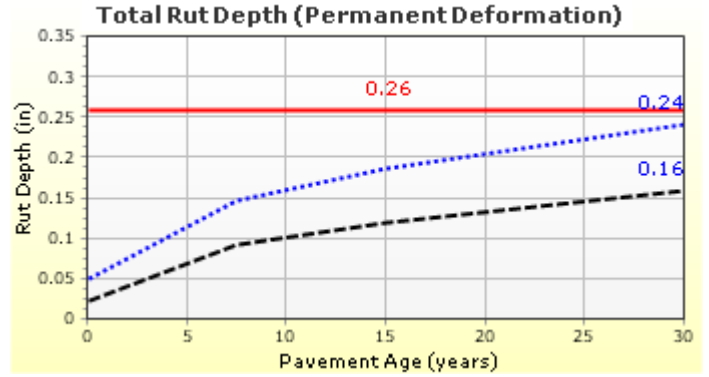
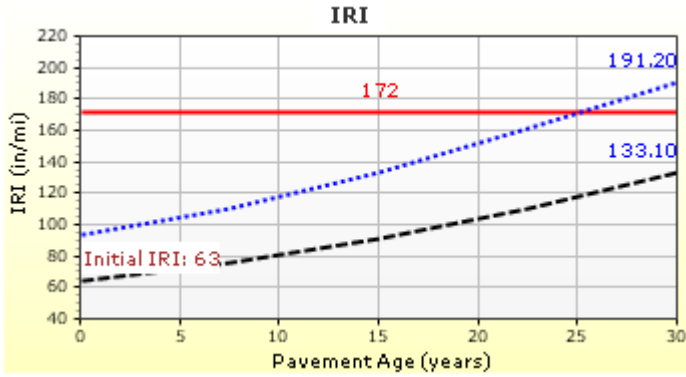
| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 400 |
| 2040 (15 years) | 2,191,500 |
| 2055 (30 years) | 4,383,000 |

Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 191.23 | 95.00 | 86.45 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.24 | 95.00 | 97.66 | Pass |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 5.38 | 95.00 | 98.59 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 107.96 | 95.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 329.53 | 95.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.19 | 95.00 | 99.85 | Pass |

Distress Charts

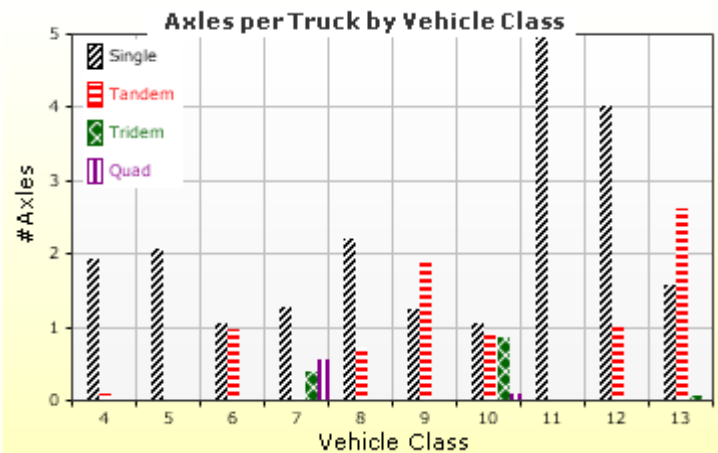
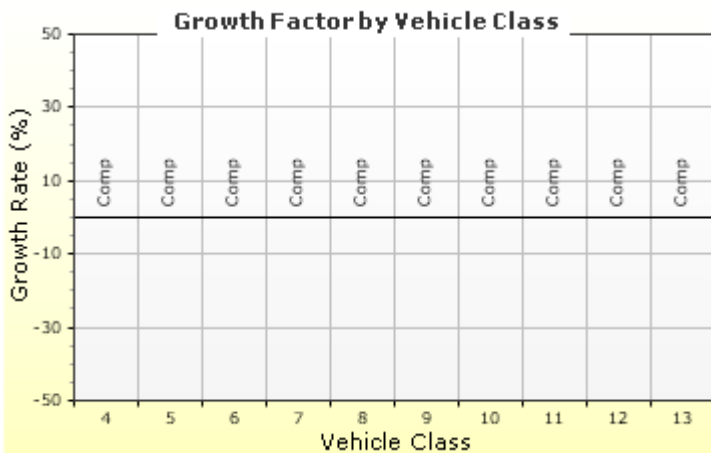
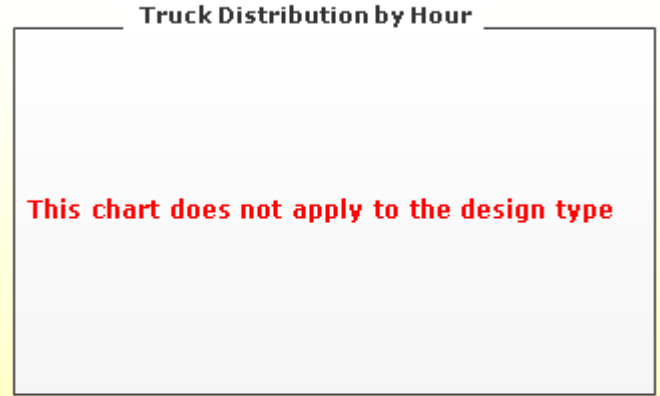
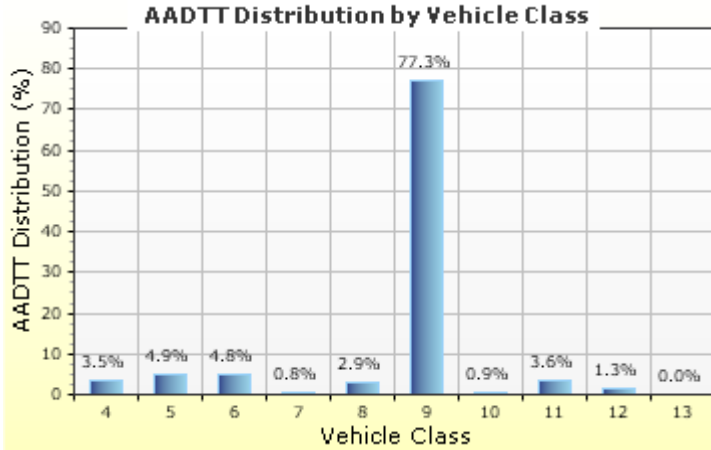


Traffic Inputs

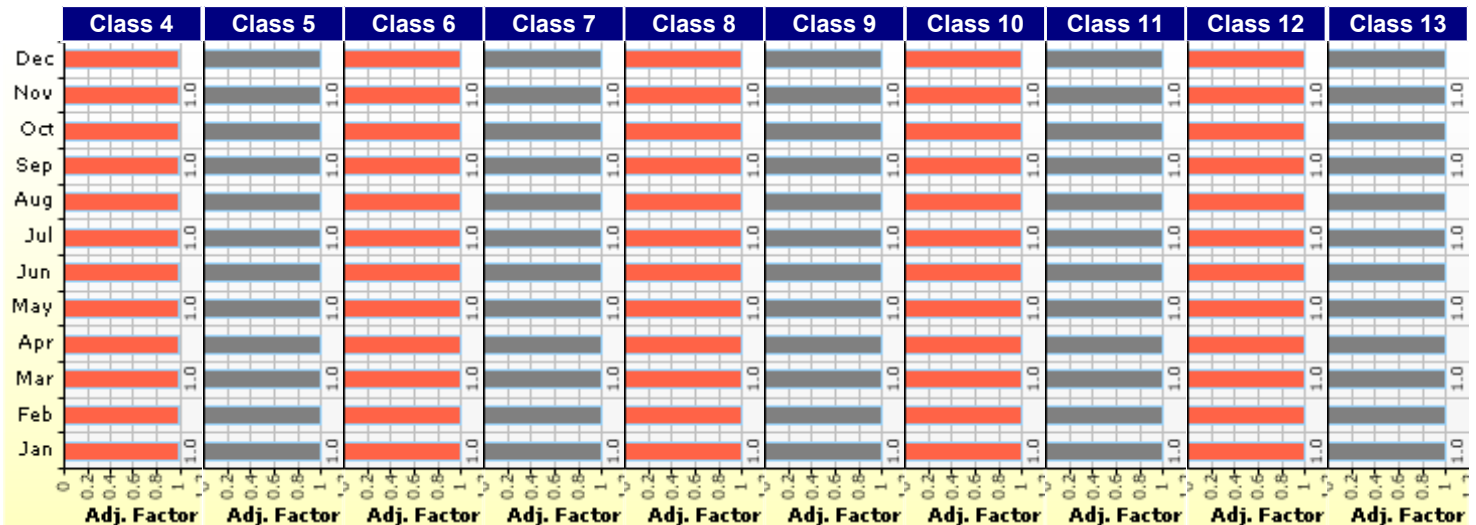
Graphical Representation of Traffic Inputs

Initial two-way AADTT: 400
 Number of lanes in design direction: 1

Percent of trucks in design direction (%): 100.0
 Percent of trucks in design lane (%): 100.0
 Operational speed (mph): 50.0



Traffic Volume Monthly Adjustment Factors





Flexible Design_GWMP Ramps_CBR 5

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Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors

Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 0% | Compound |
| Class 5 | 4.92% | 0% | Compound |
| Class 6 | 4.75% | 0% | Compound |
| Class 7 | 0.82% | 0% | Compound |
| Class 8 | 2.89% | 0% | Compound |
| Class 9 | 77.29% | 0% | Compound |
| Class 10 | 0.92% | 0% | Compound |
| Class 11 | 3.58% | 0% | Compound |
| Class 12 | 1.32% | 0% | Compound |
| Class 13 | 0.01% | 0% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

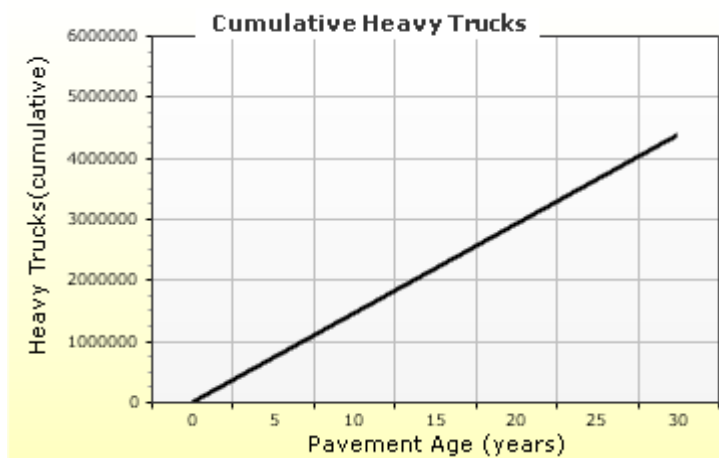
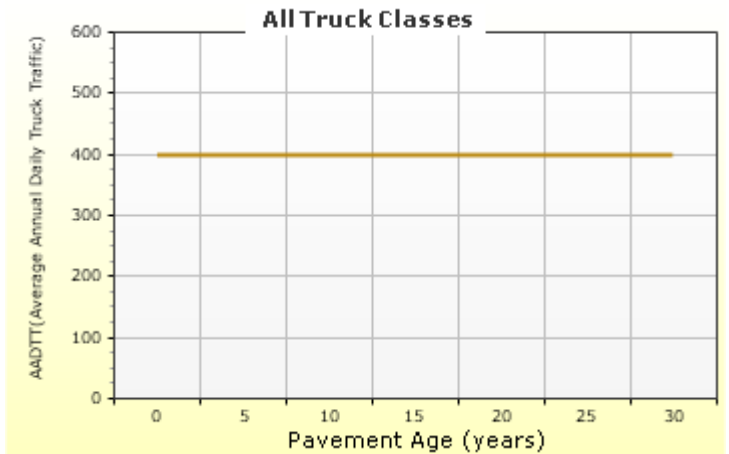
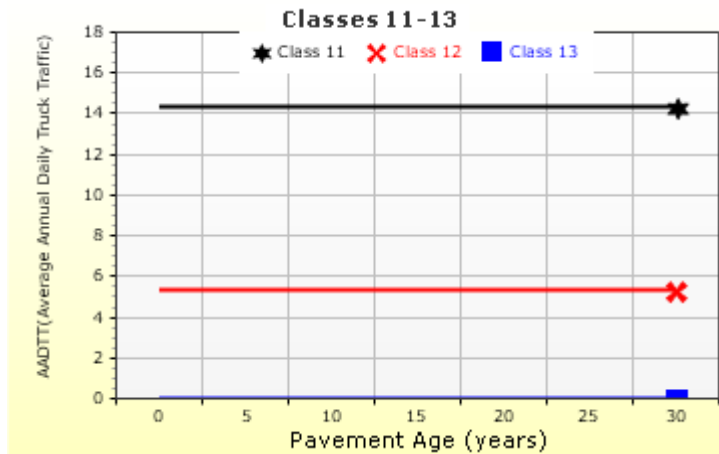
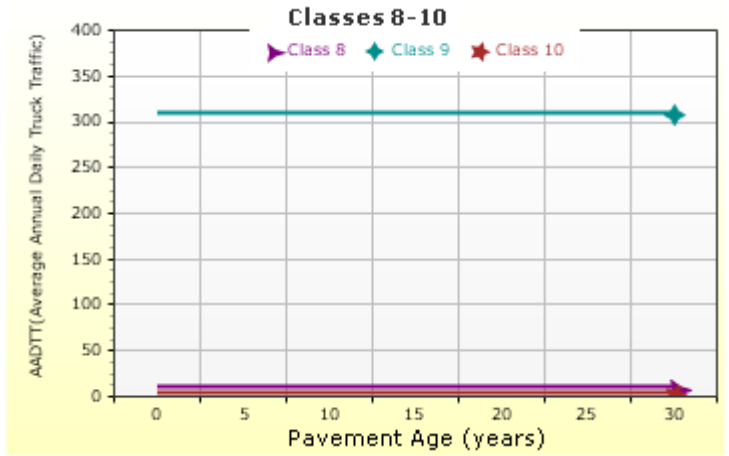
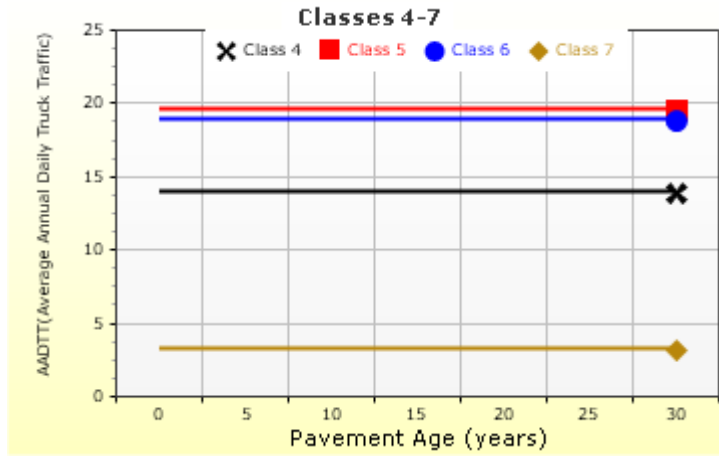
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



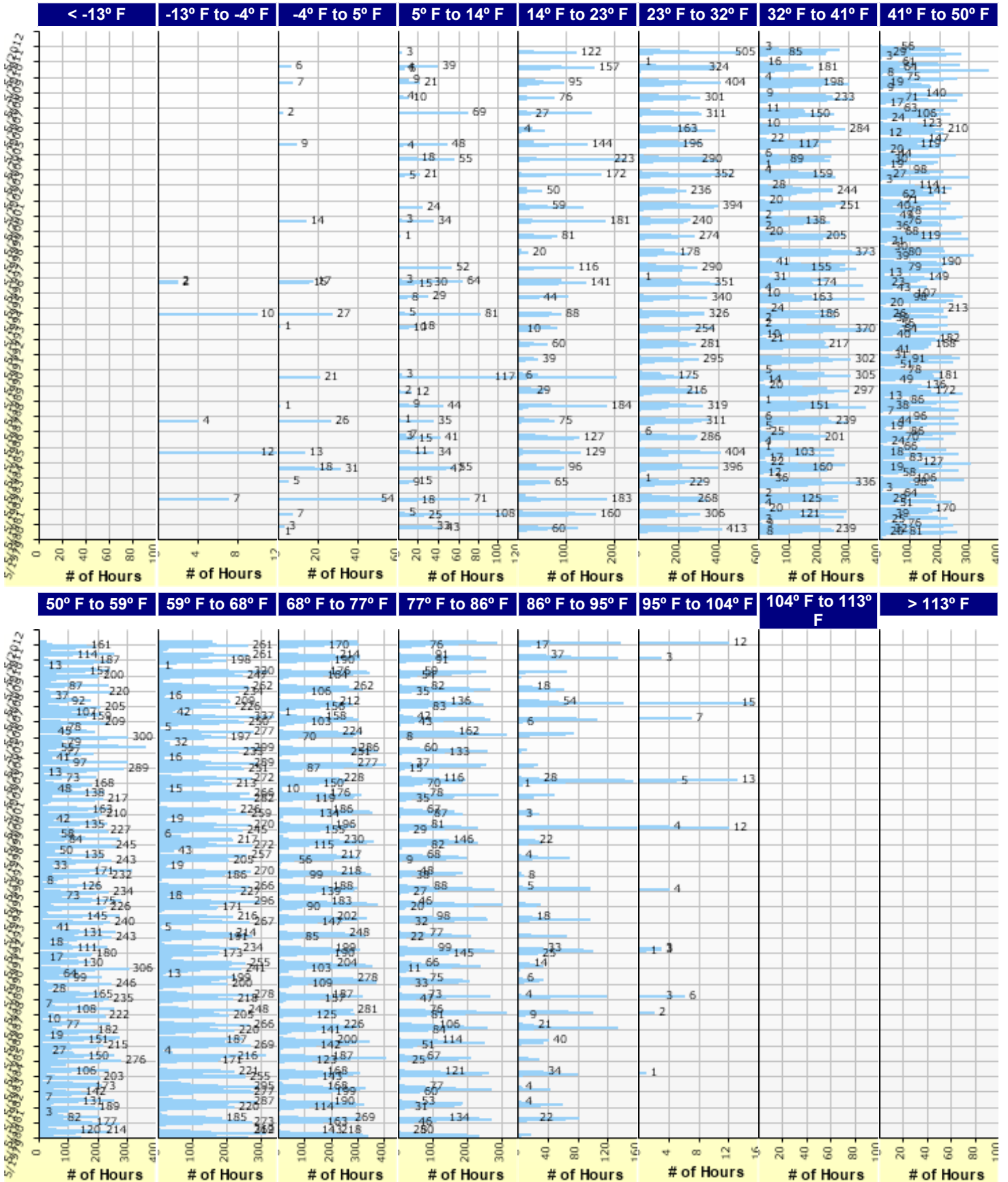


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Hourly Air Temperature Distribution by Month:





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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

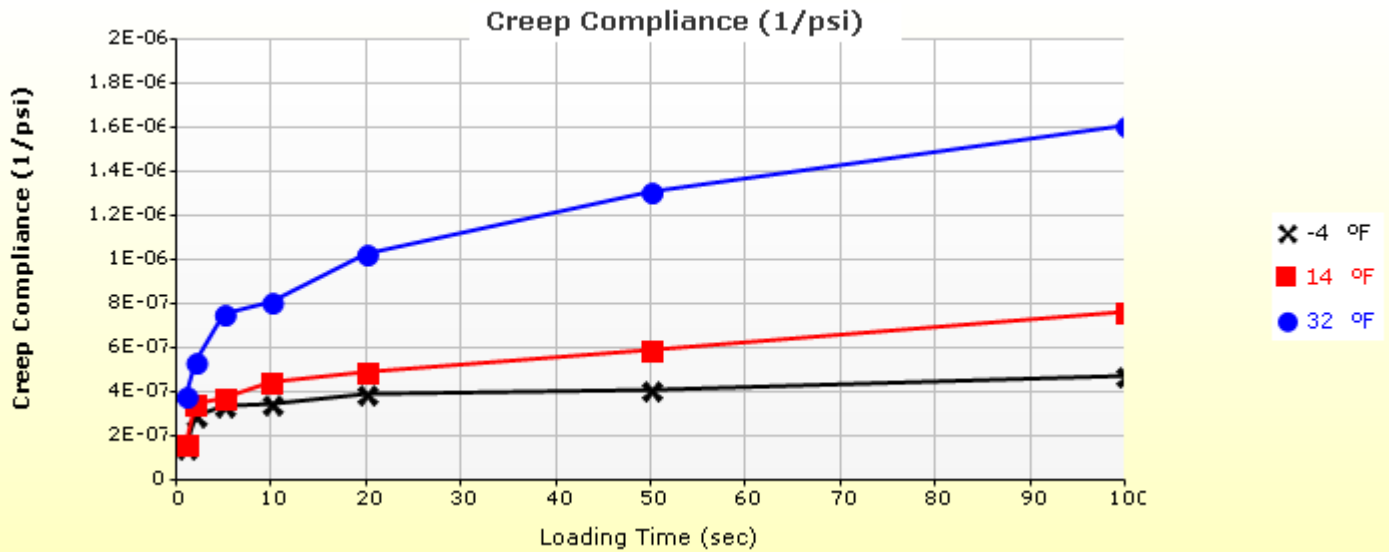
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

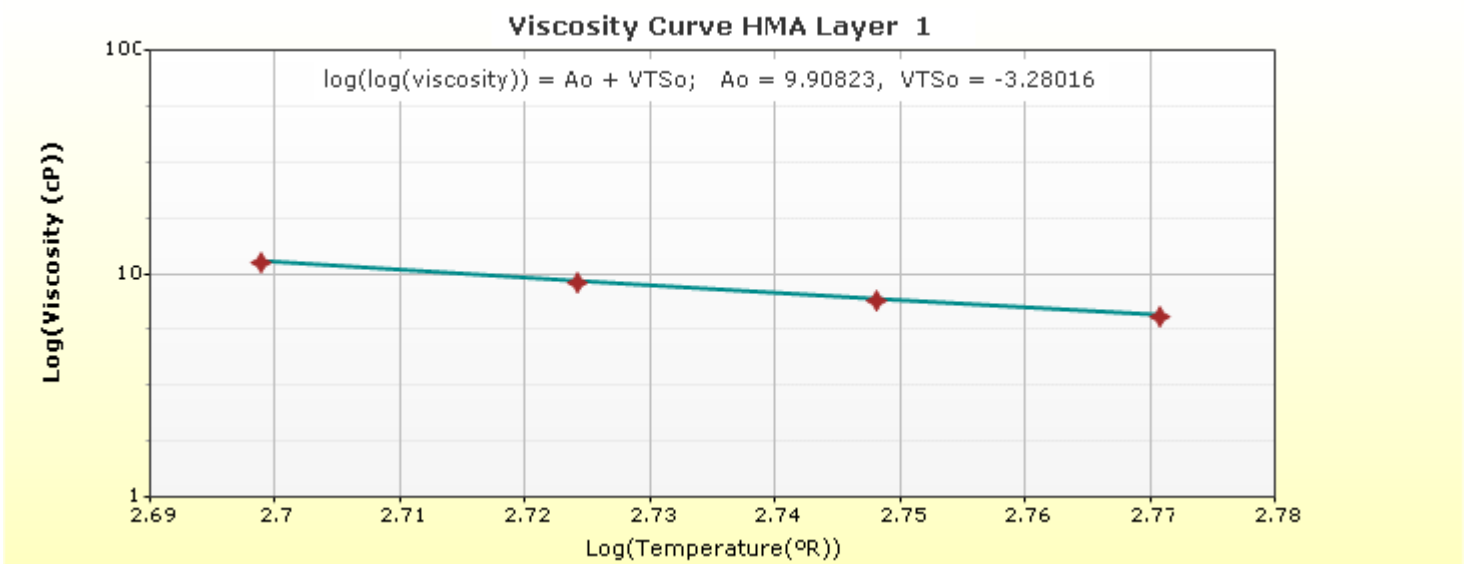
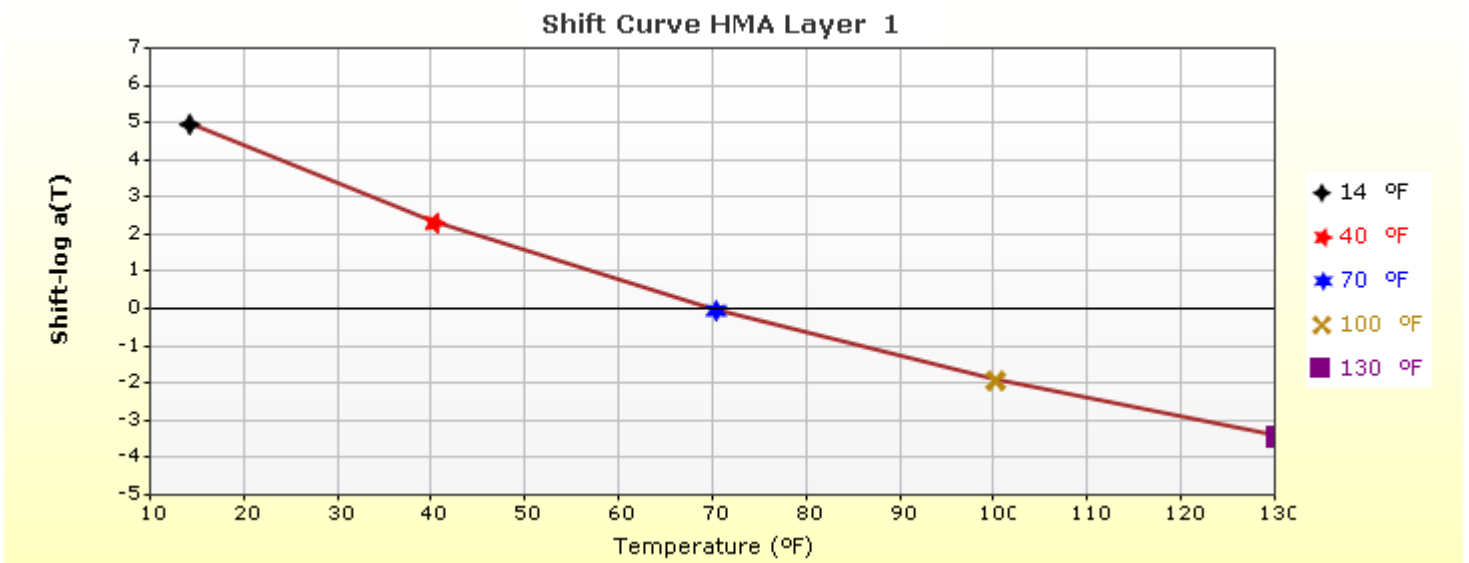
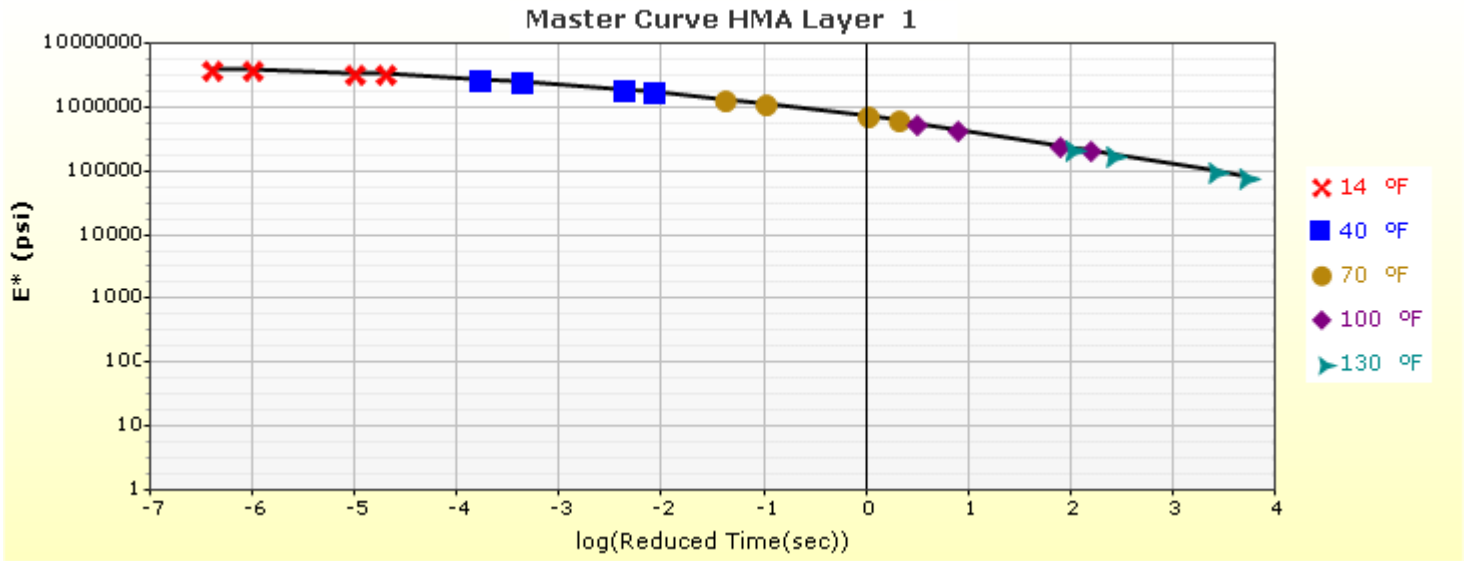
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

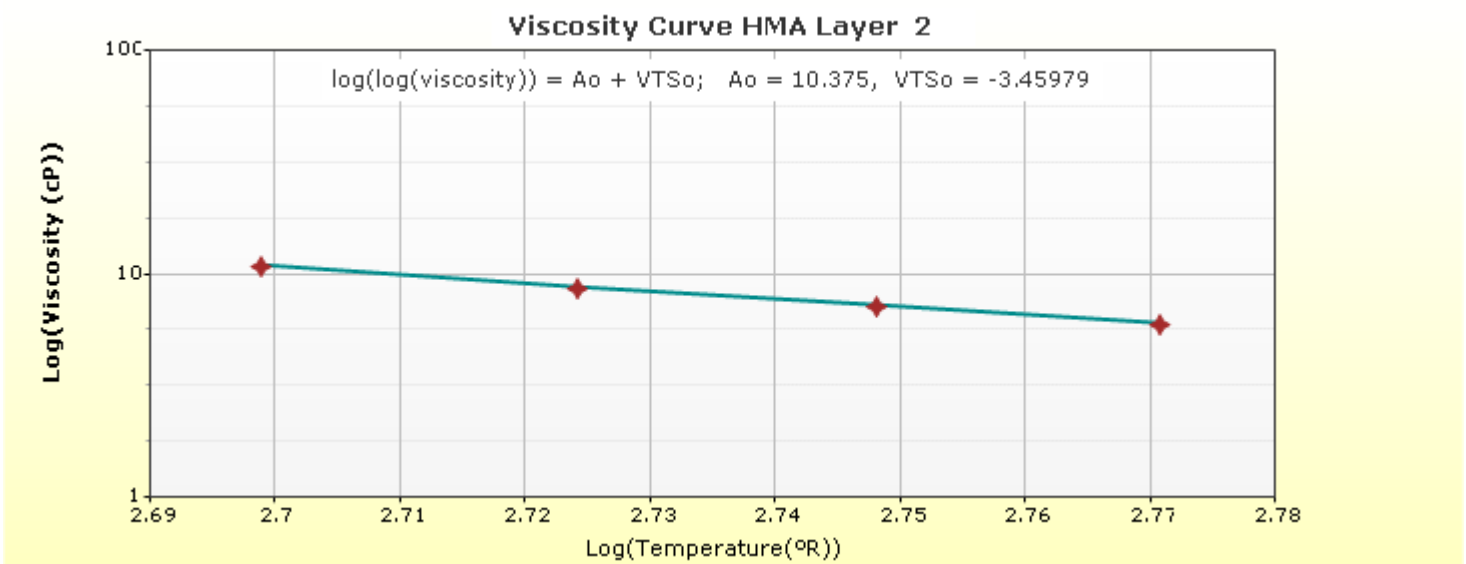
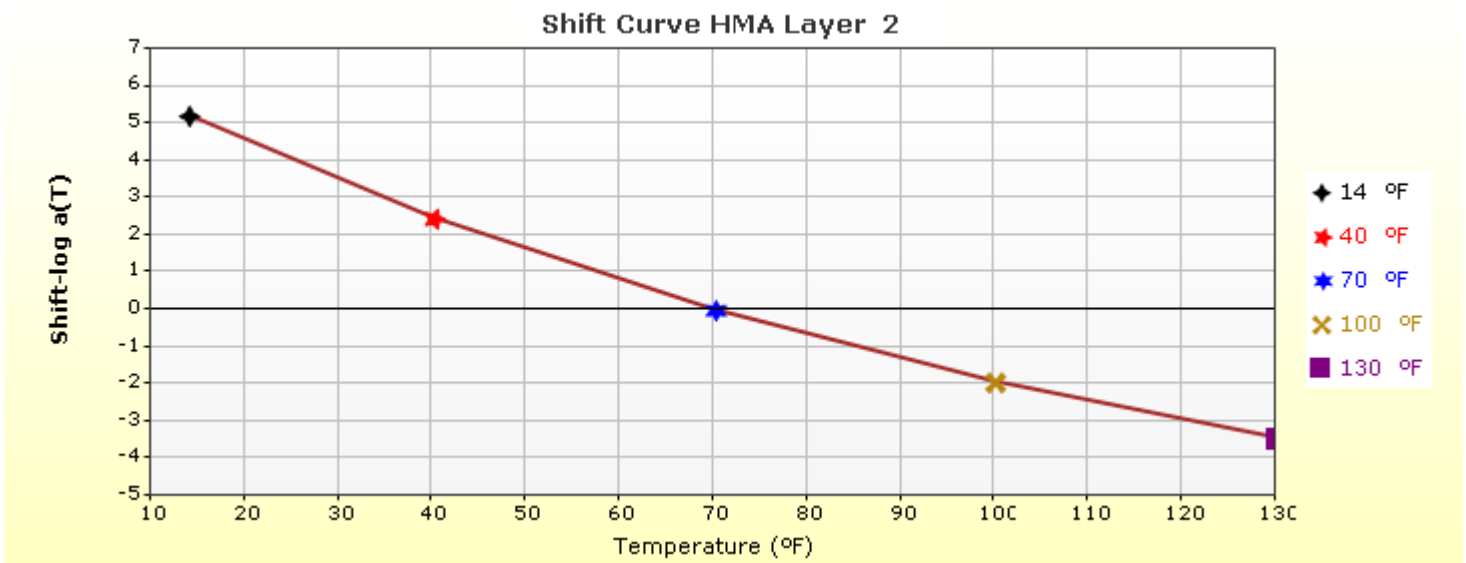
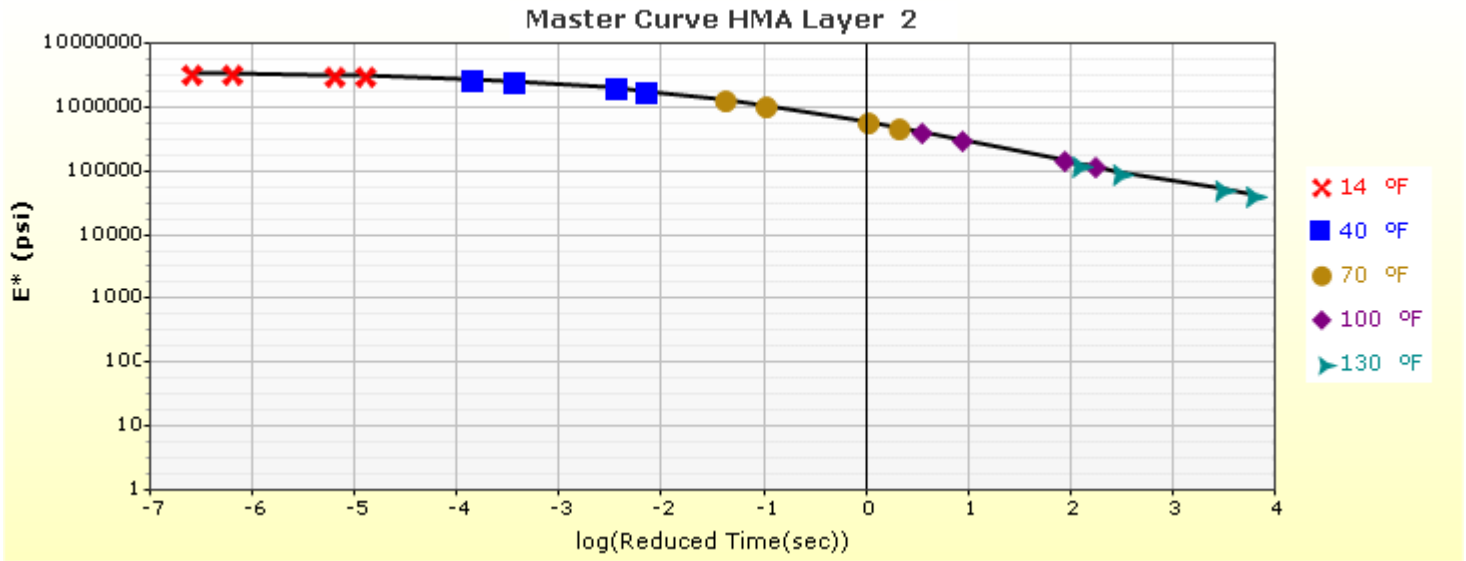
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



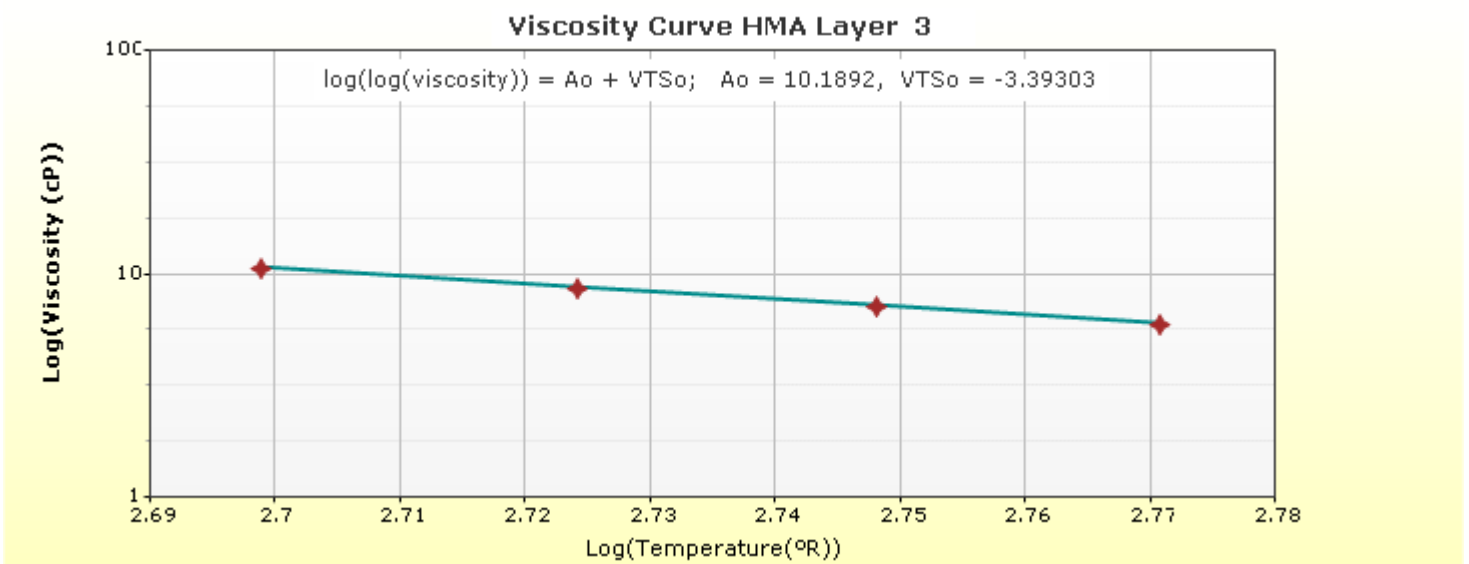
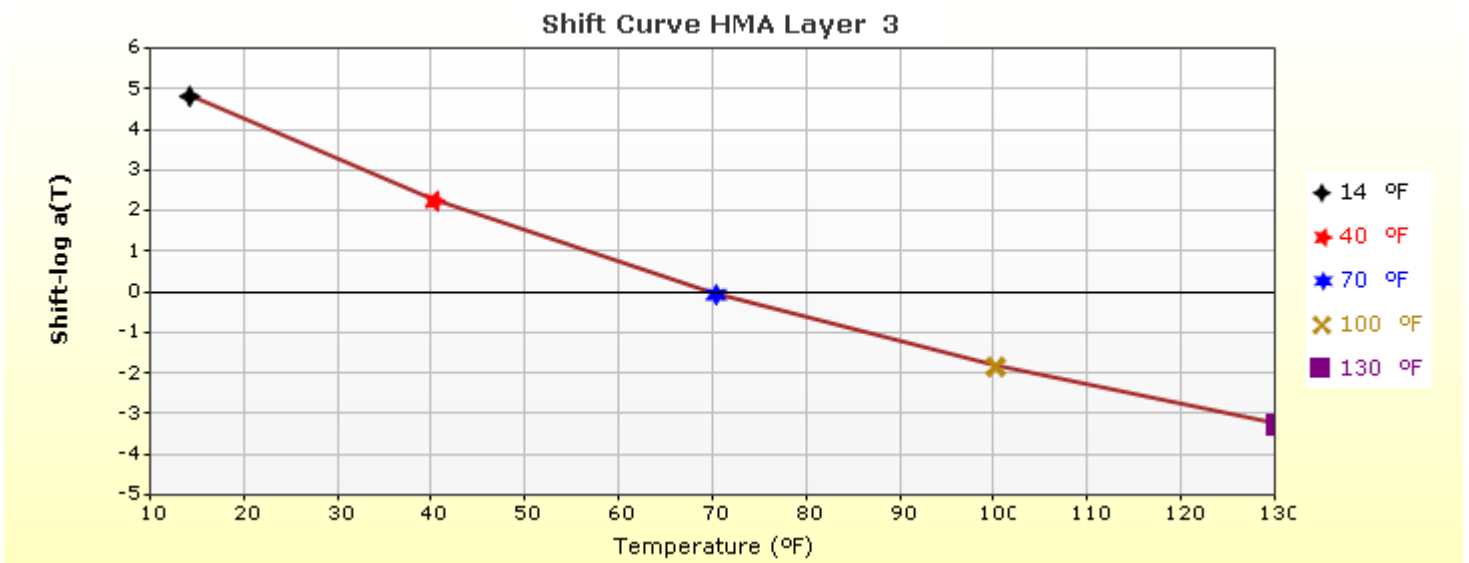
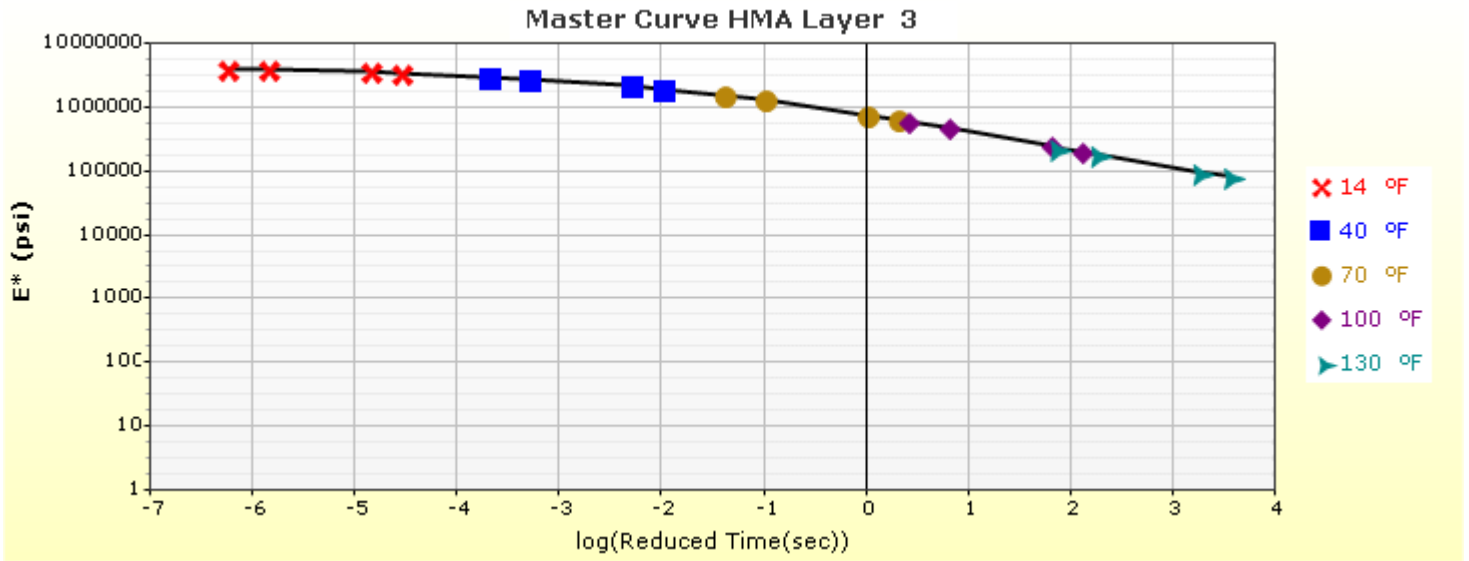
HMA Layer 1: Layer 1 Flexible : VDOT SM



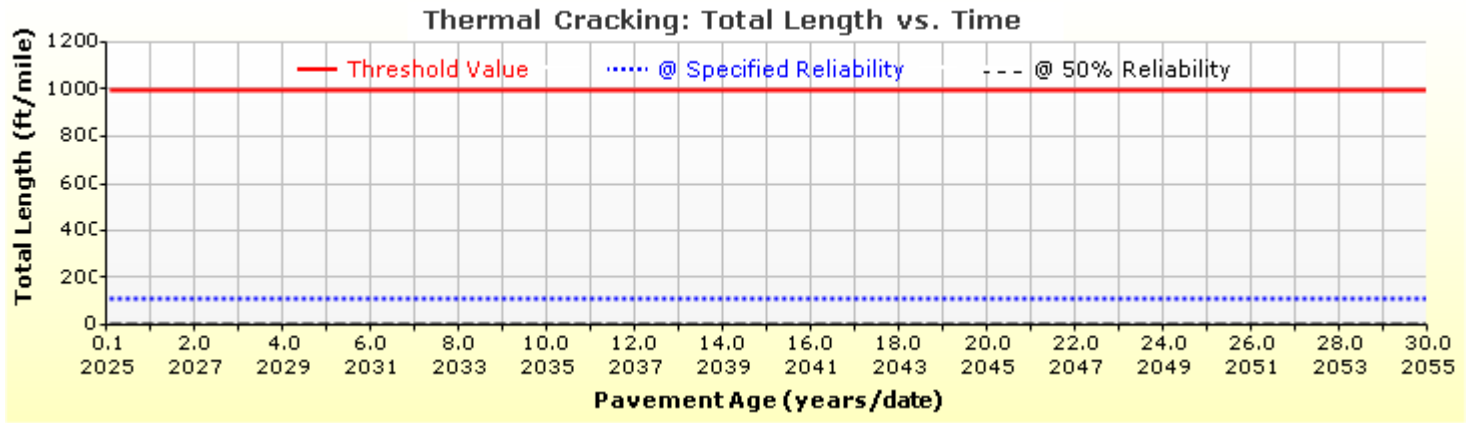
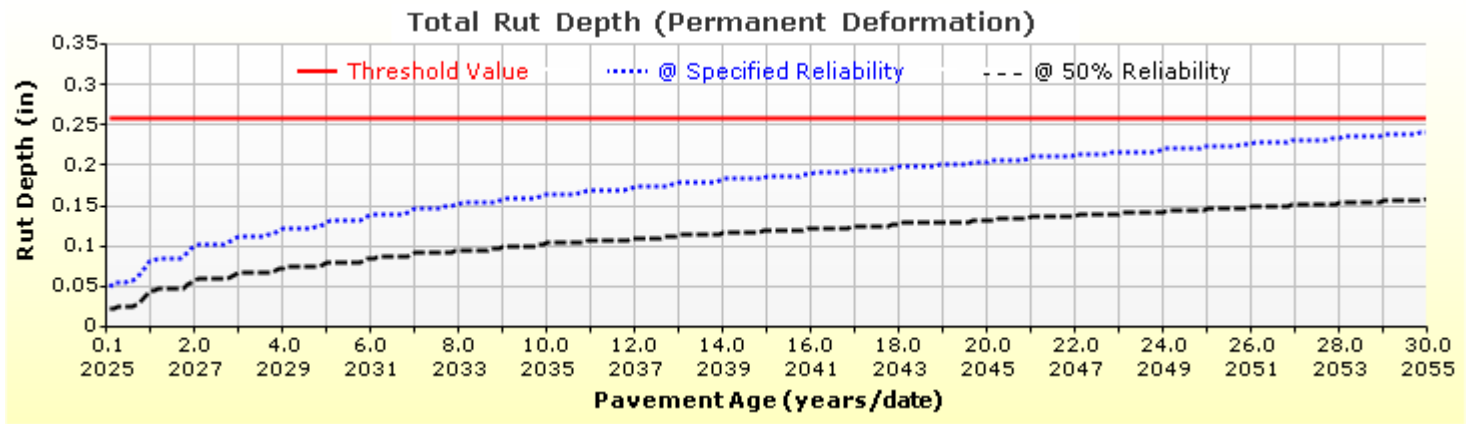
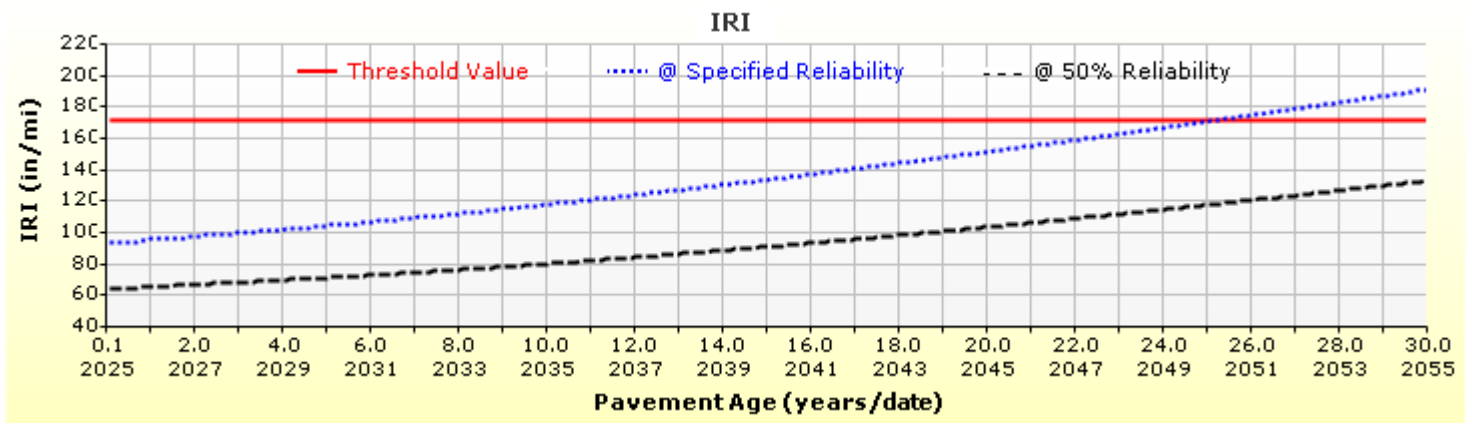
HMA Layer 2: Layer 2 Flexible : VDOT IM

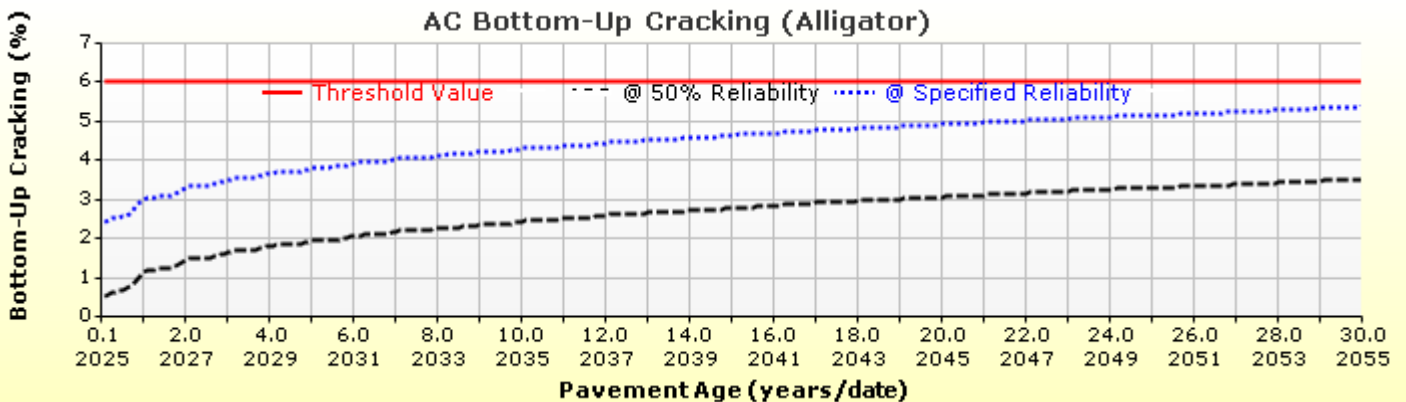
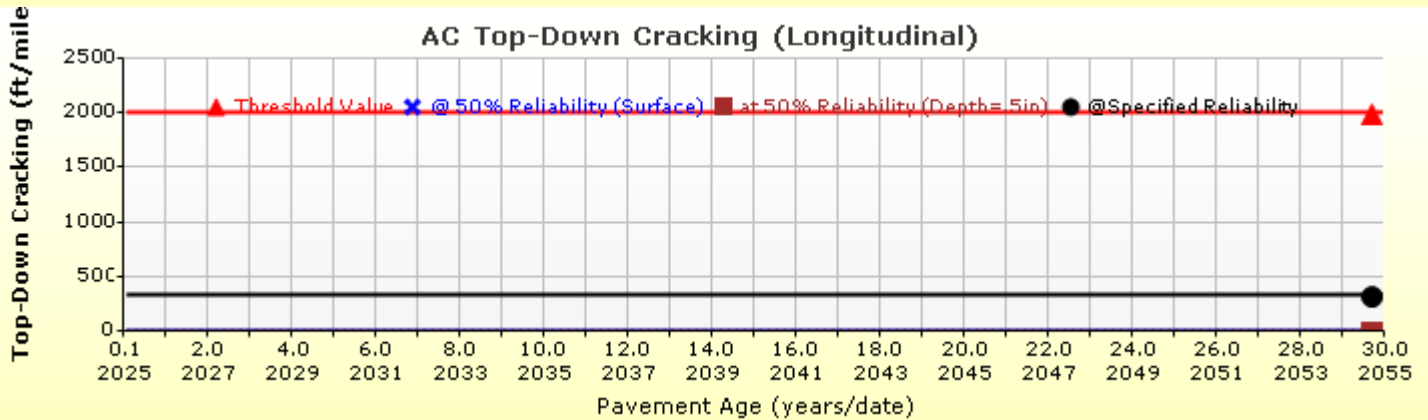
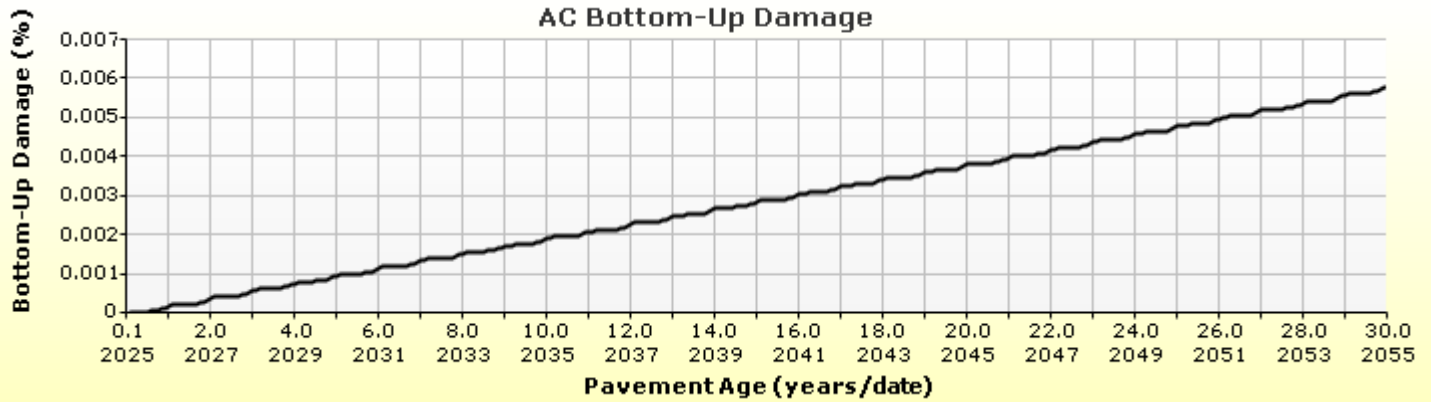
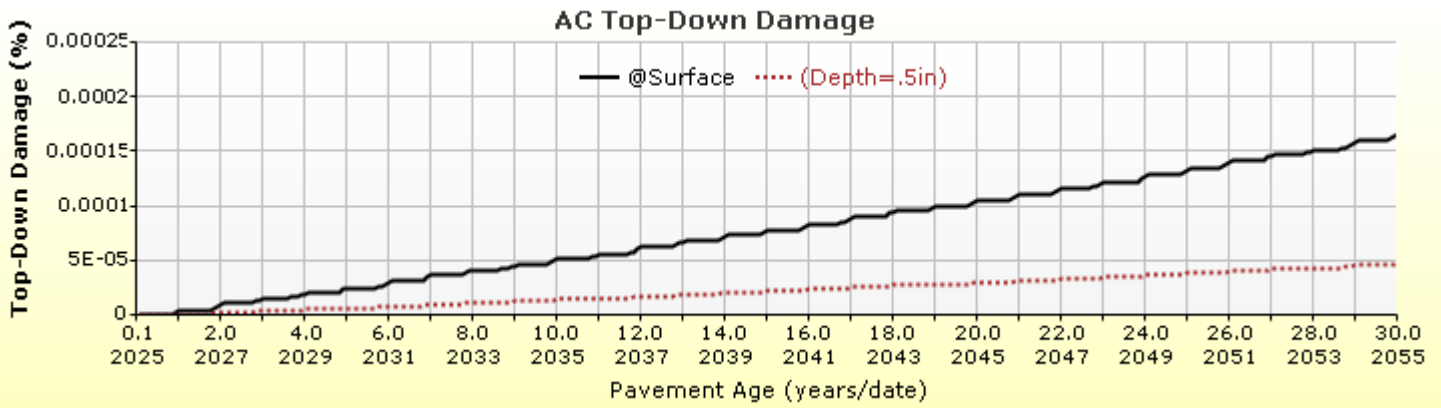


HMA Layer 3: Layer 3 Flexible : VDOT BM

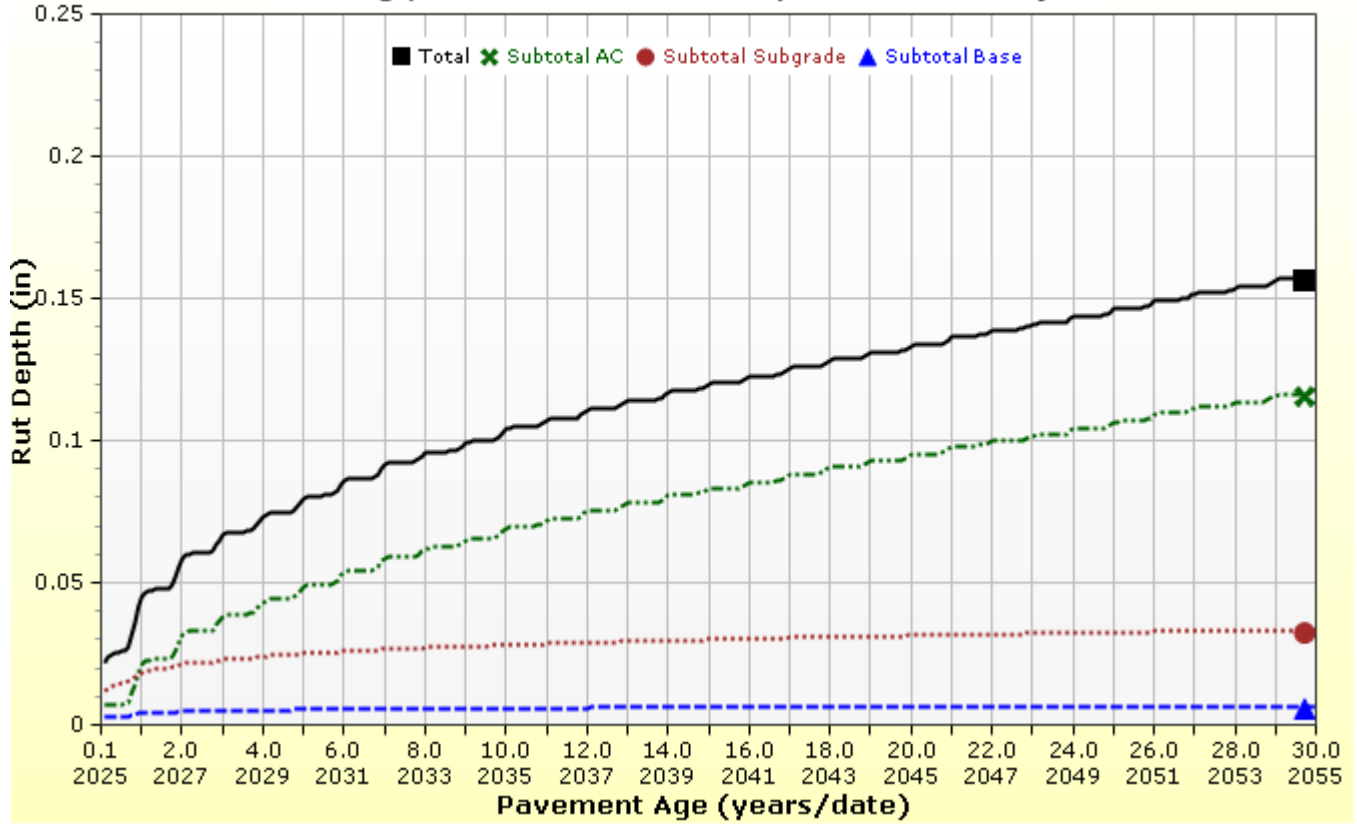


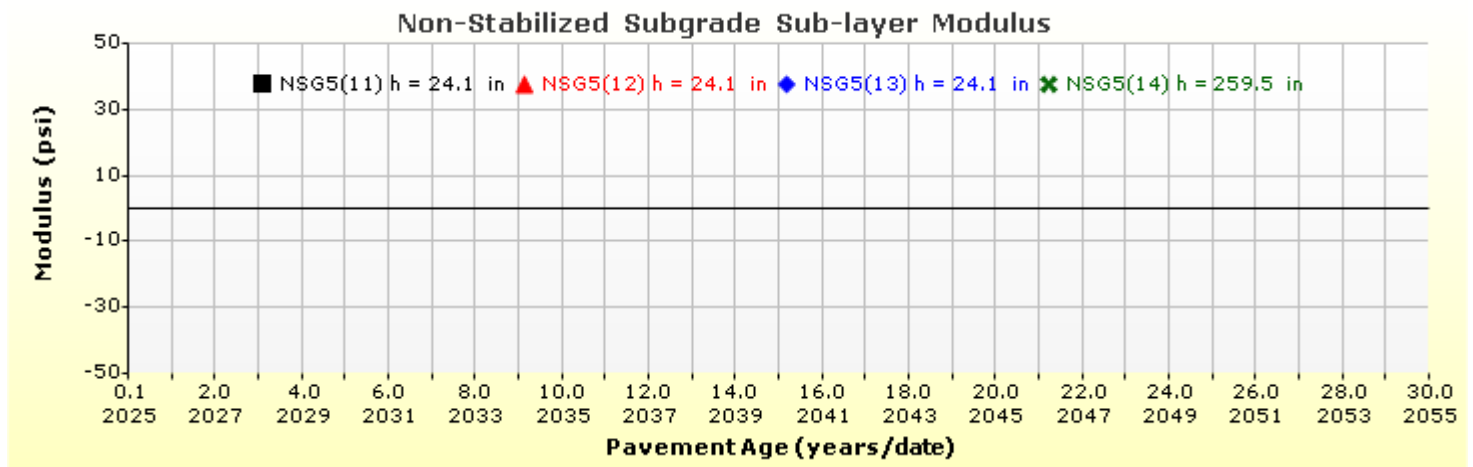
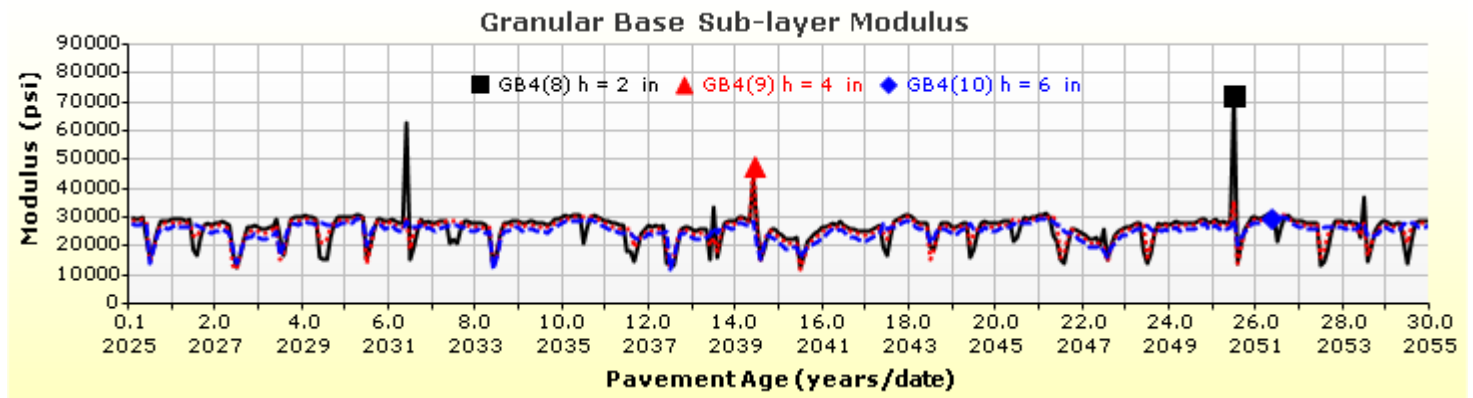
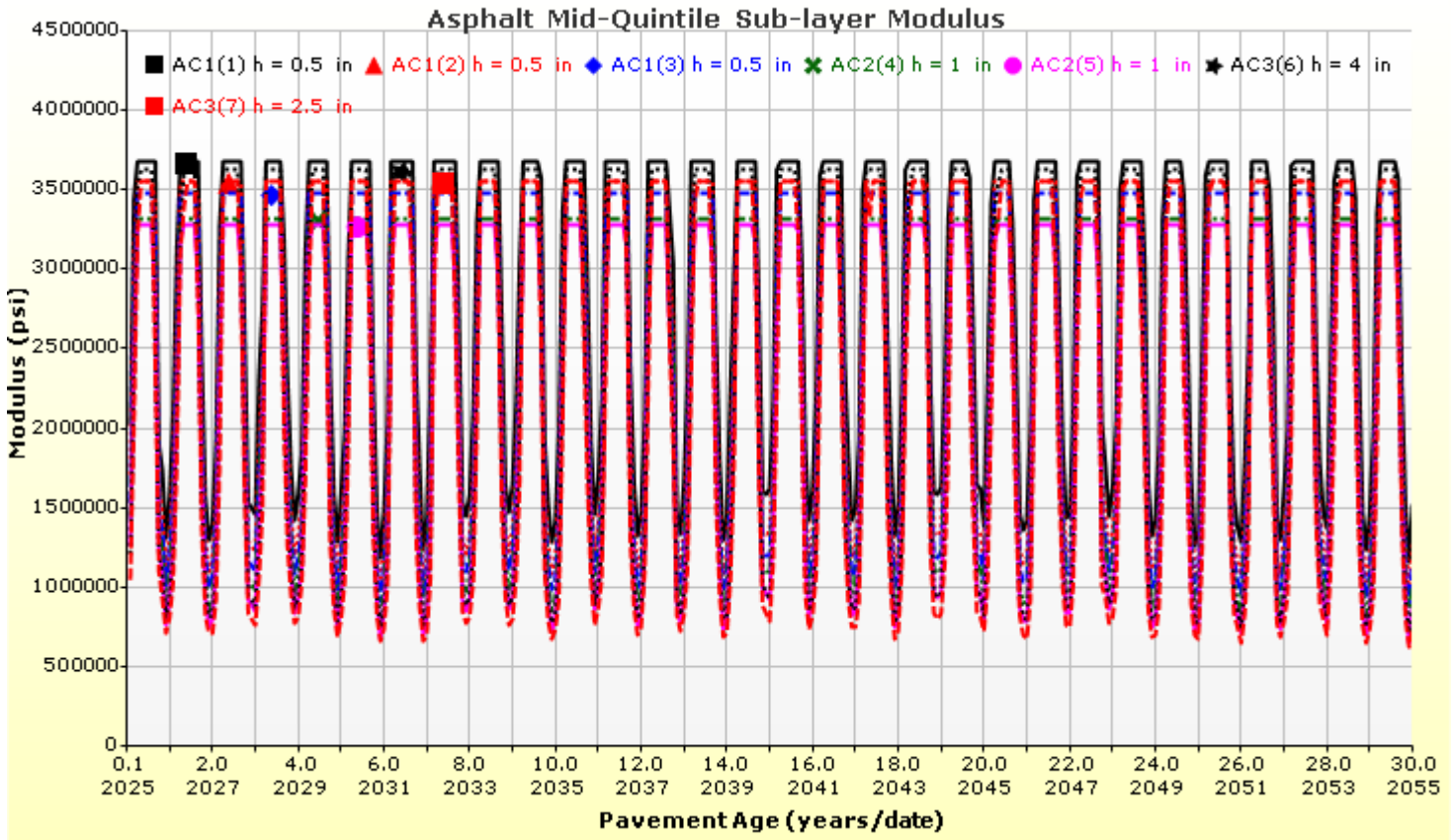
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability







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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 6.5 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

Unbound

| | |
|--|------|
| Layer thickness (in) | 12.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

| |
|---------|
| 21000.0 |
|---------|

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



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Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ $C = 10^M$ $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k1: 0.007566 |
| | k2: 3.9492 |
| | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|---|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_a^2 + 2.4868 * H_a - 17.342$ $C_2 = 0.0172 * H_a^2 - 1.7331 * H_a + 27.428$ <p>Where: H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma}\right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|---------|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}}\right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | | | | |
|---|---------|-------|----------|---|-----------|----------|
| AC Top Down Cracking | | | | AC Bottom Up Cracking | | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ | | |
| | | | | $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ | | |
| | | | | $C'_1 = -2 * C'_2$ | | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 | c1: 0.319 | c2: 0.319 | c3: 6000 |
| AC Cracking Top Standard Deviation | | | | AC Cracking Bottom Standard Deviation | | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |



Flexible Design_GWMP_CBR 5

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Design Inputs

Design Life: 30 years Base construction: May, 2023 Climate Data: 38.935, -77.448
 Design Type: Flexible Pavement Pavement construction: June, 2024 Sources (Lat/Lon)
 Traffic opening: September, 2025

Design Structure

| Layer type | Material Type | Thickness (in) |
|---------------|--------------------------|----------------|
| Flexible | VDOT SM | 1.5 |
| Flexible | VDOT IM | 2.0 |
| Flexible | VDOT BM | 6.5 |
| NonStabilized | VDOT Avg 21A-21B | 12.0 |
| Subgrade | VDOT CBR 5 Fill Material | Semi-infinite |

Volumetric at Construction:

| | |
|------------------------------|------|
| Effective binder content (%) | 12.1 |
| Air voids (%) | 6.7 |

Traffic

| Age (year) | Heavy Trucks (cumulative) |
|-----------------|---------------------------|
| 2025 (initial) | 609 |
| 2040 (15 years) | 1,707,920 |
| 2055 (30 years) | 3,690,770 |

Design Outputs

Distress Prediction Summary

| Distress Type | Distress @ Specified Reliability | | Reliability (%) | | Criterion Satisfied? |
|---|----------------------------------|-----------|-----------------|----------|----------------------|
| | Target | Predicted | Target | Achieved | |
| Terminal IRI (in/mile) | 172.00 | 177.60 | 90.00 | 86.92 | Fail |
| Permanent deformation - total pavement (in) | 0.26 | 0.21 | 90.00 | 99.21 | Pass |
| AC bottom-up fatigue cracking (% lane area) | 6.00 | 4.73 | 90.00 | 99.20 | Pass |
| AC thermal cracking (ft/mile) | 1000.00 | 84.34 | 90.00 | 100.00 | Pass |
| AC top-down fatigue cracking (ft/mile) | 2000.00 | 256.68 | 90.00 | 100.00 | Pass |
| Permanent deformation - AC only (in) | 0.25 | 0.16 | 90.00 | 99.98 | Pass |

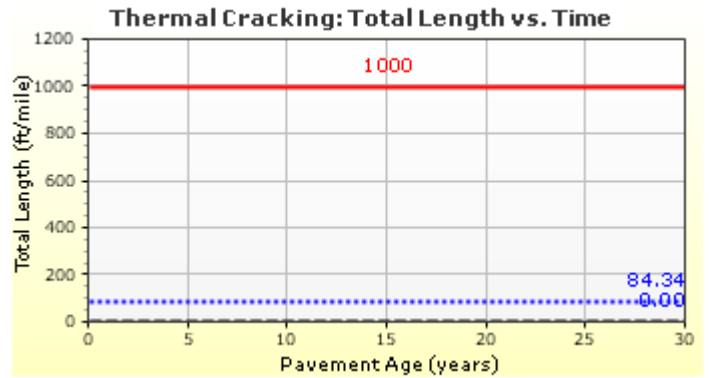
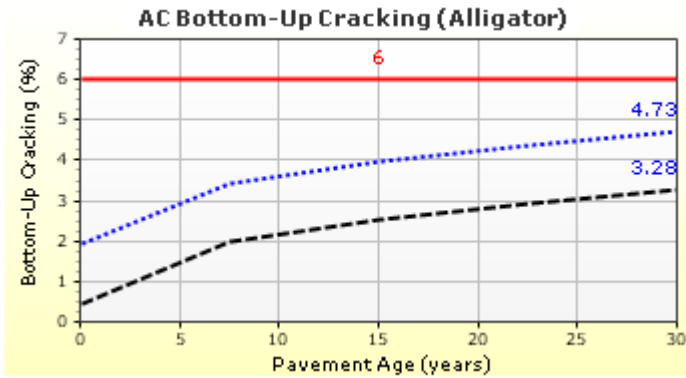
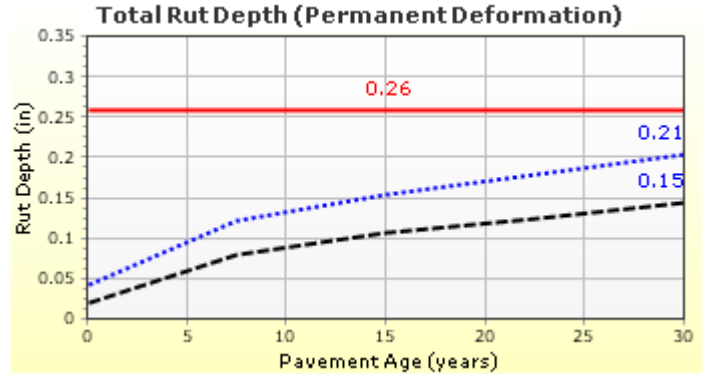
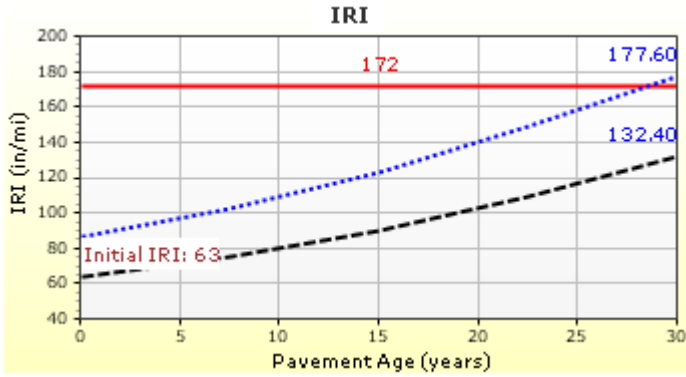


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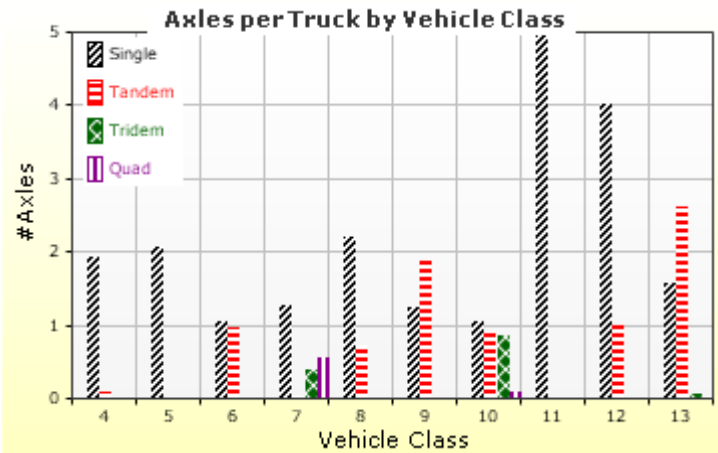
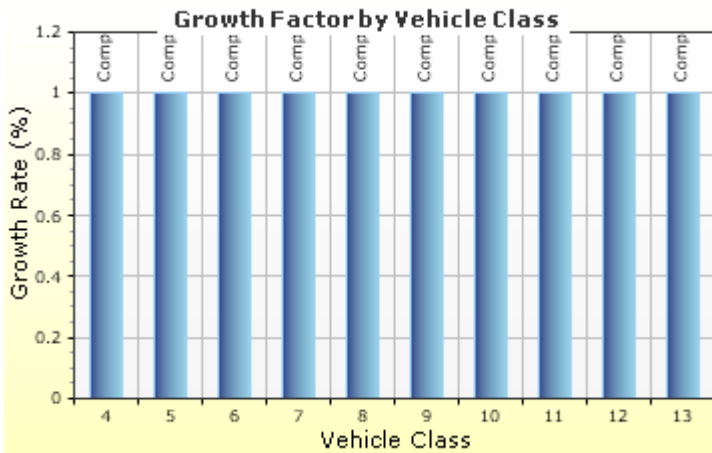
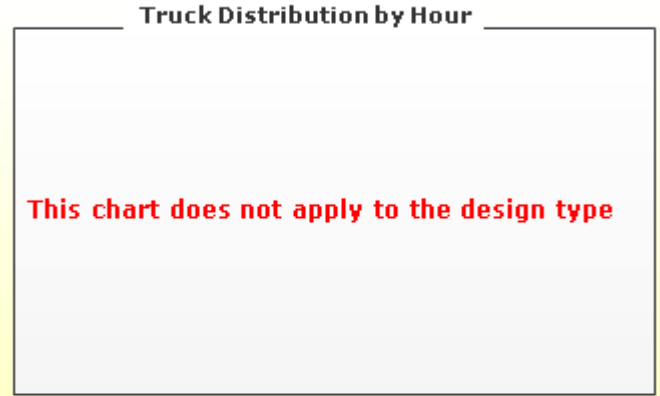
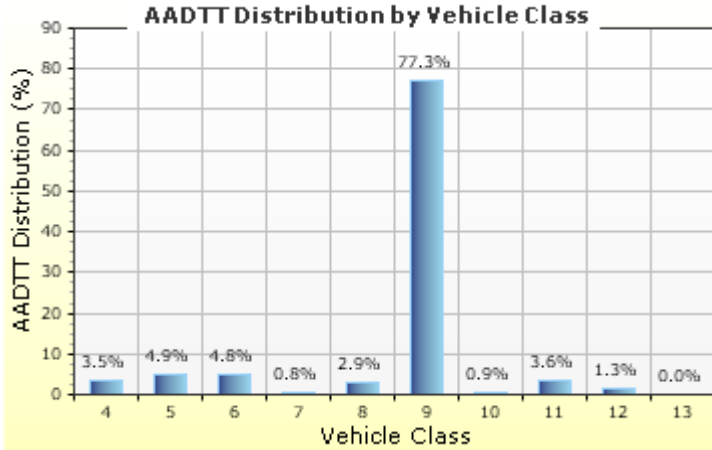
Distress Charts



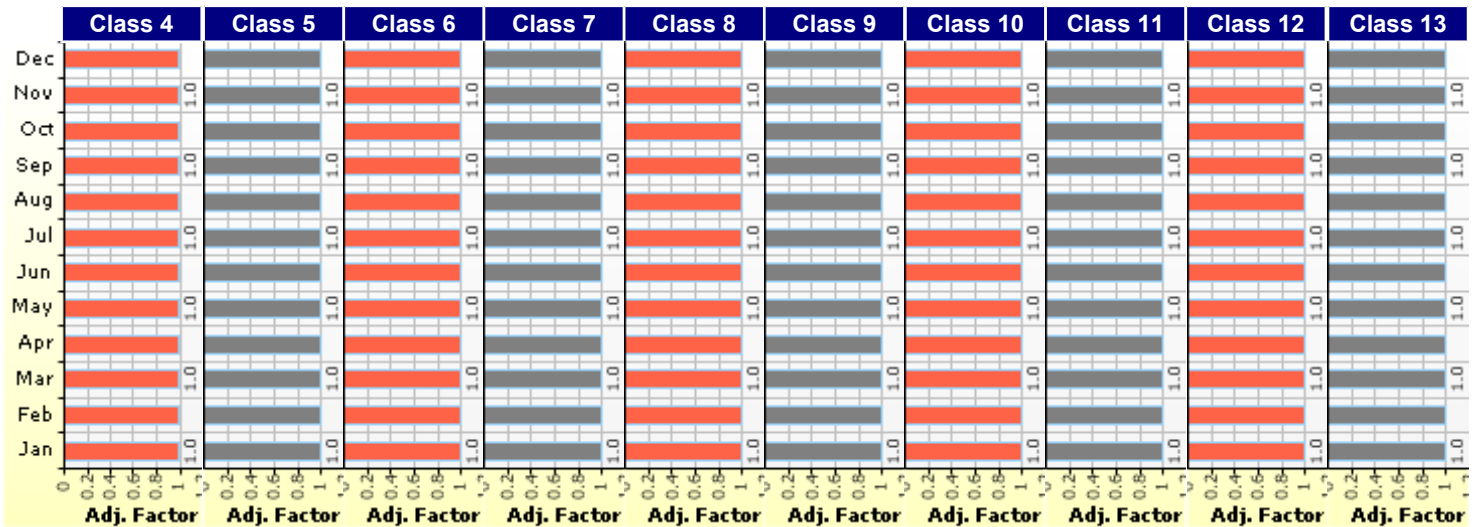
Traffic Inputs

Graphical Representation of Traffic Inputs

| | | | |
|--------------------------------------|-----|--|------|
| Initial two-way AADTT: | 609 | Percent of trucks in design direction (%): | 53.0 |
| Number of lanes in design direction: | 2 | Percent of trucks in design lane (%): | 90.0 |
| | | Operational speed (mph): | 60.0 |



Traffic Volume Monthly Adjustment Factors



Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors Level 3: Default MAF

| Month | Vehicle Class | | | | | | | | | |
|-----------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| January | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| February | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| March | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| April | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| May | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| June | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| July | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| August | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| September | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| October | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| November | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| December | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Distributions by Vehicle Class

| Vehicle Class | AADTT Distribution (%) (Level 3) | Growth Factor | |
|---------------|----------------------------------|---------------|----------|
| | | Rate (%) | Function |
| Class 4 | 3.5% | 1% | Compound |
| Class 5 | 4.92% | 1% | Compound |
| Class 6 | 4.75% | 1% | Compound |
| Class 7 | 0.82% | 1% | Compound |
| Class 8 | 2.89% | 1% | Compound |
| Class 9 | 77.29% | 1% | Compound |
| Class 10 | 0.92% | 1% | Compound |
| Class 11 | 3.58% | 1% | Compound |
| Class 12 | 1.32% | 1% | Compound |
| Class 13 | 0.01% | 1% | Compound |

Truck Distribution by Hour does not apply

Axle Configuration

| Traffic Wander | |
|--|------|
| Mean wheel location (in) | 18.0 |
| Traffic wander standard deviation (in) | 10.0 |
| Design lane width (ft) | 12.0 |

| Axle Configuration | |
|-------------------------|-------|
| Average axle width (ft) | 8.5 |
| Dual tire spacing (in) | 12.0 |
| Tire pressure (psi) | 120.0 |

| Average Axle Spacing | |
|--------------------------|------|
| Tandem axle spacing (in) | 51.6 |
| Tridem axle spacing (in) | 49.2 |
| Quad axle spacing (in) | 49.2 |

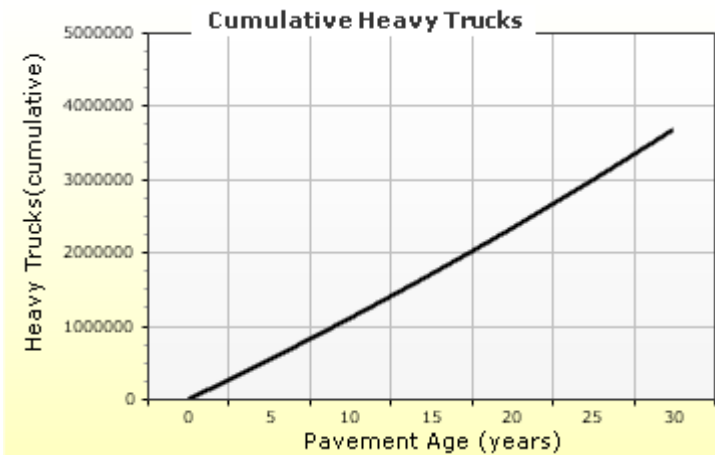
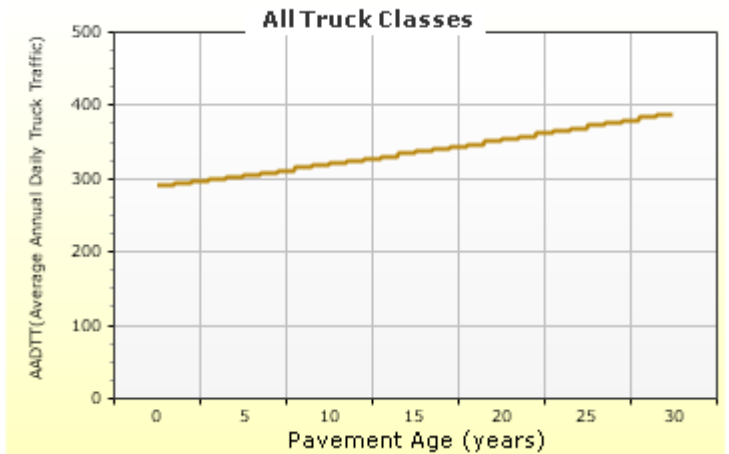
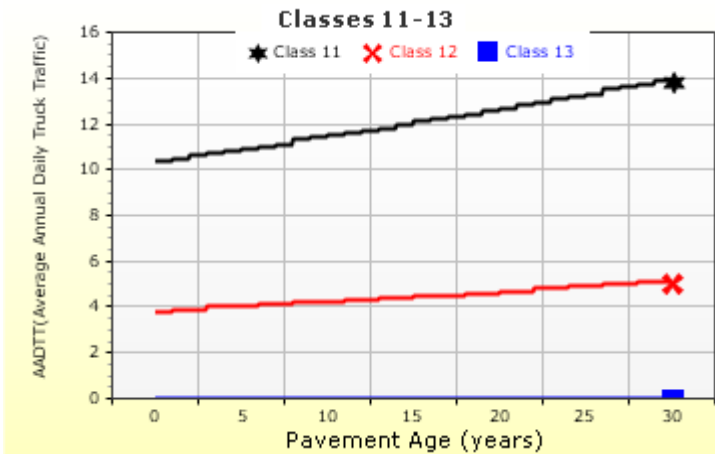
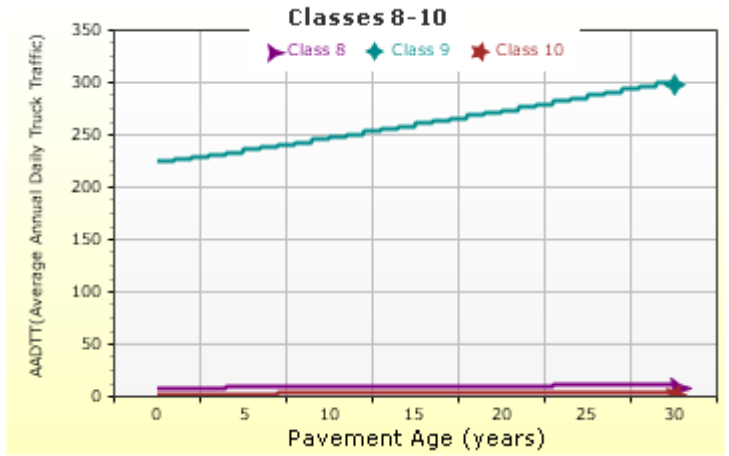
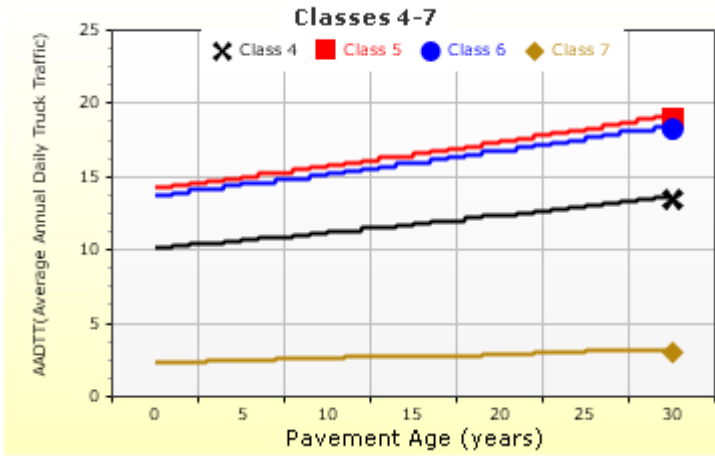
Wheelbase does not apply

Number of Axles per Truck

| Vehicle Class | Single Axle | Tandem Axle | Tridem Axle | Quad Axle |
|---------------|-------------|-------------|-------------|-----------|
| Class 4 | 1.91 | 0.09 | 0 | 0 |
| Class 5 | 2.05 | 0 | 0 | 0 |
| Class 6 | 1.05 | 0.97 | 0 | 0 |
| Class 7 | 1.25 | 0.04 | 0.41 | 0.55 |
| Class 8 | 2.21 | 0.72 | 0 | 0 |
| Class 9 | 1.23 | 1.87 | 0 | 0 |
| Class 10 | 1.05 | 0.92 | 0.87 | 0.1 |
| Class 11 | 5 | 0 | 0 | 0 |
| Class 12 | 4 | 1 | 0 | 0 |
| Class 13 | 1.57 | 2.61 | 0.07 | 0 |

AADTT (Average Annual Daily Truck Traffic) Growth

* Traffic cap is not enforced



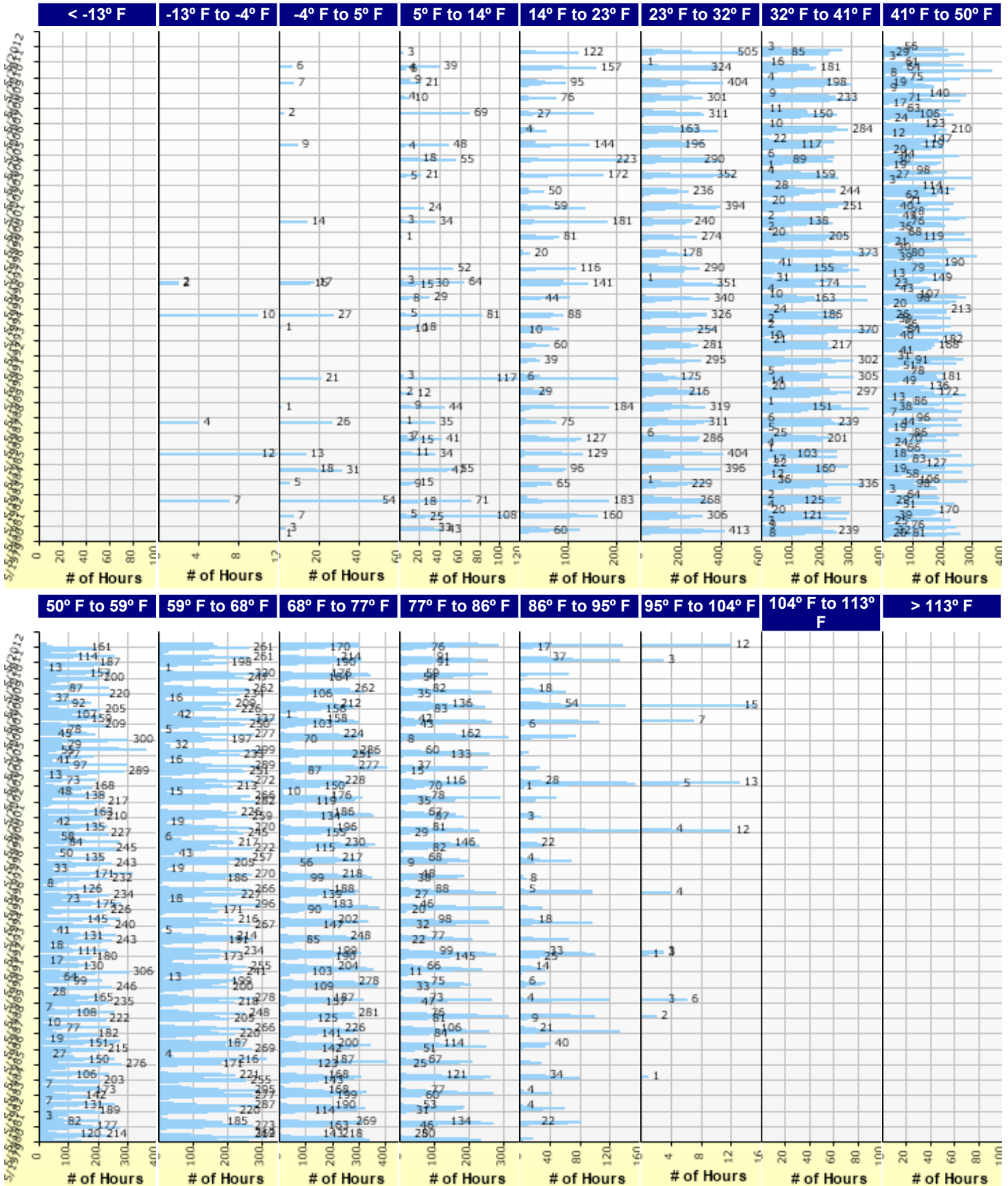


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Hourly Air Temperature Distribution by Month:





Flexible Design_GWMP_CBR 5

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Design Properties

HMA Design Properties

| | |
|---|-------|
| Use Multilayer Rutting Model | False |
| Using G* based model (not nationally calibrated) | False |
| Is NCHRP 1-37A HMA Rutting Model Coefficients | True |
| Endurance Limit | - |
| Use Reflective Cracking | True |

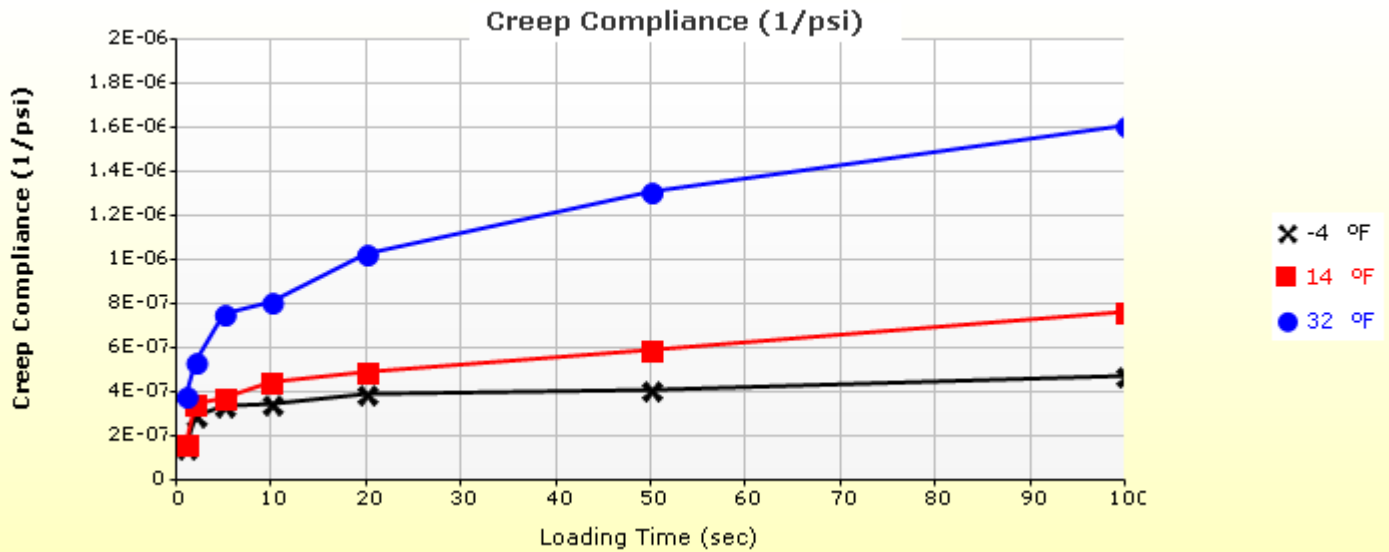
| | |
|-----------------------------------|------|
| Structure - ICM Properties | |
| AC surface shortwave absorptivity | 0.85 |

| Layer Name | Layer Type | Interface Friction |
|--|-------------------------|--------------------|
| Layer 1 Flexible : VDOT SM | Flexible (1) | 1.00 |
| Layer 2 Flexible : VDOT IM | Flexible (1) | 1.00 |
| Layer 3 Flexible : VDOT BM | Flexible (1) | 1.00 |
| Layer 4 Non-stabilized Base : VDOT Avg 21A-21B | Non-stabilized Base (4) | 1.00 |
| Layer 5 Subgrade : VDOT CBR 5 Fill Material | Subgrade (5) | - |

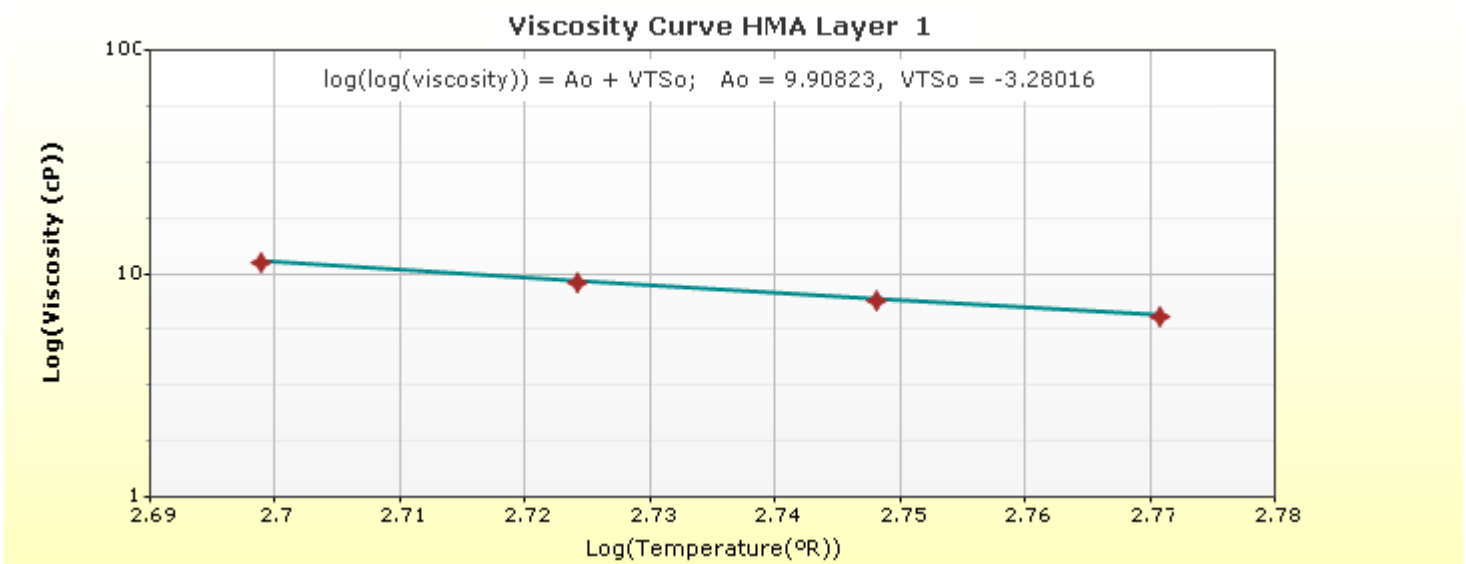
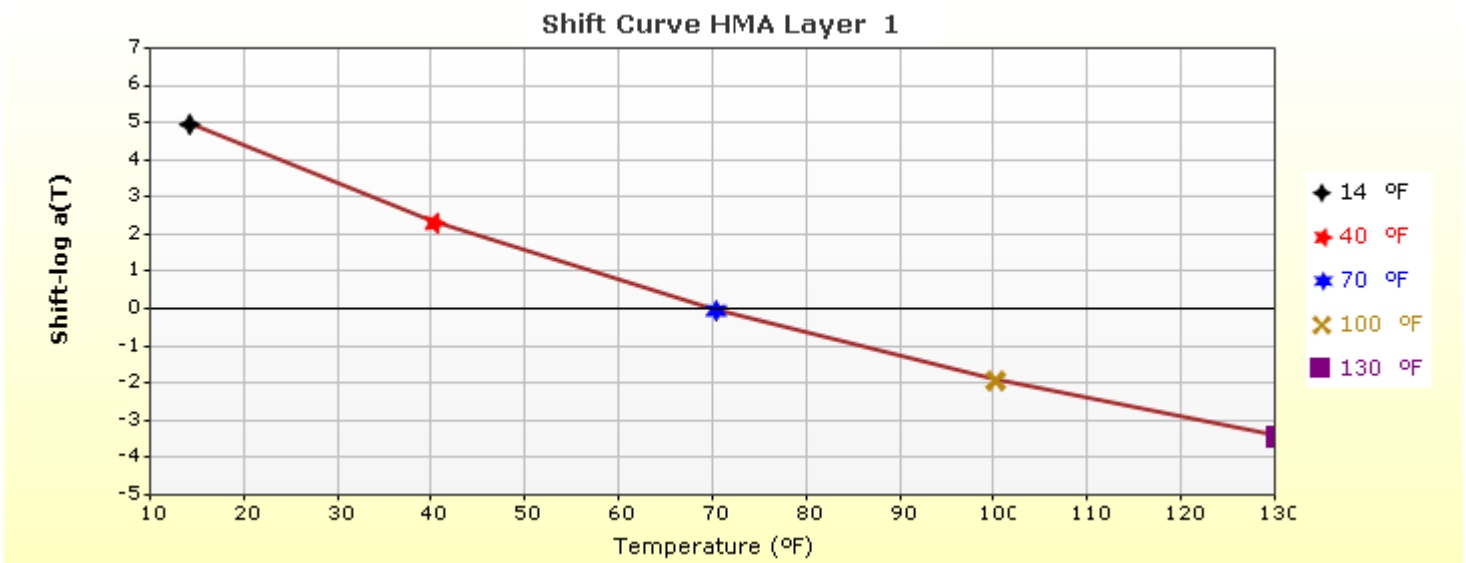
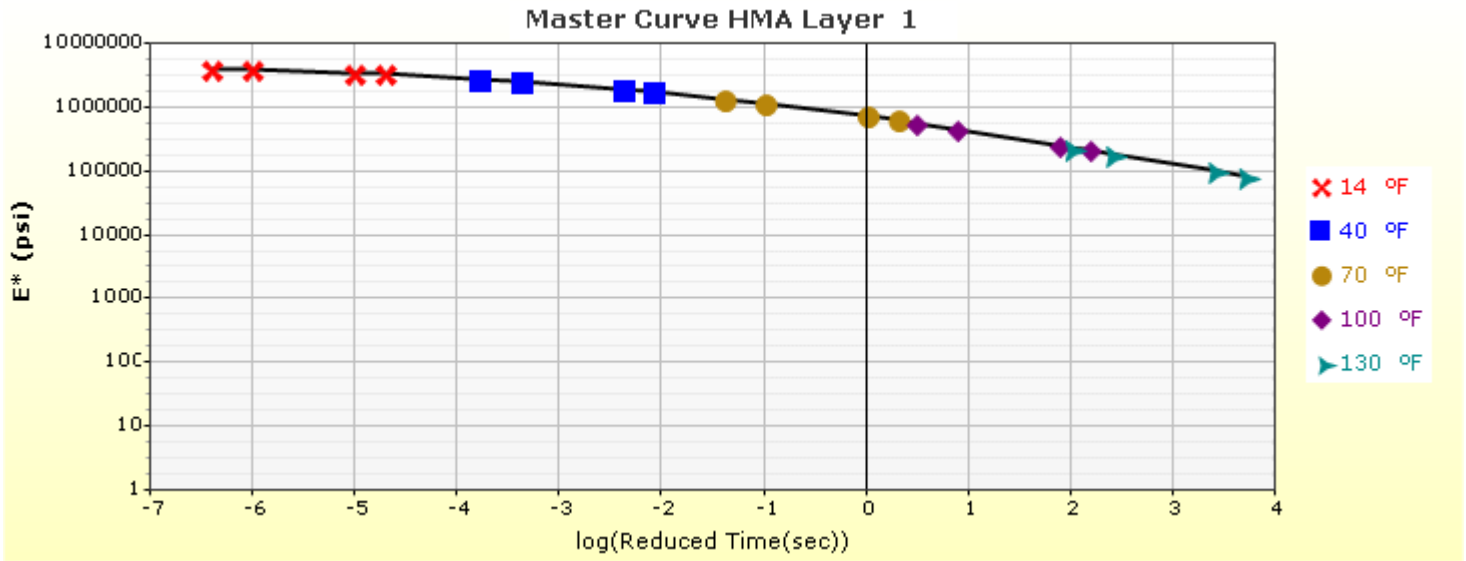
Thermal Cracking (Input Level: 1)

| | |
|---|----------|
| Indirect tensile strength at 14 °F (psi) | 572.00 |
| Thermal Contraction | |
| Is thermal contraction calculated? | True |
| Mix coefficient of thermal contraction (in/in/°F) | - |
| Aggregate coefficient of thermal contraction (in/in/°F) | 5.0e-006 |
| Voids in Mineral Aggregate (%) | 18.8 |

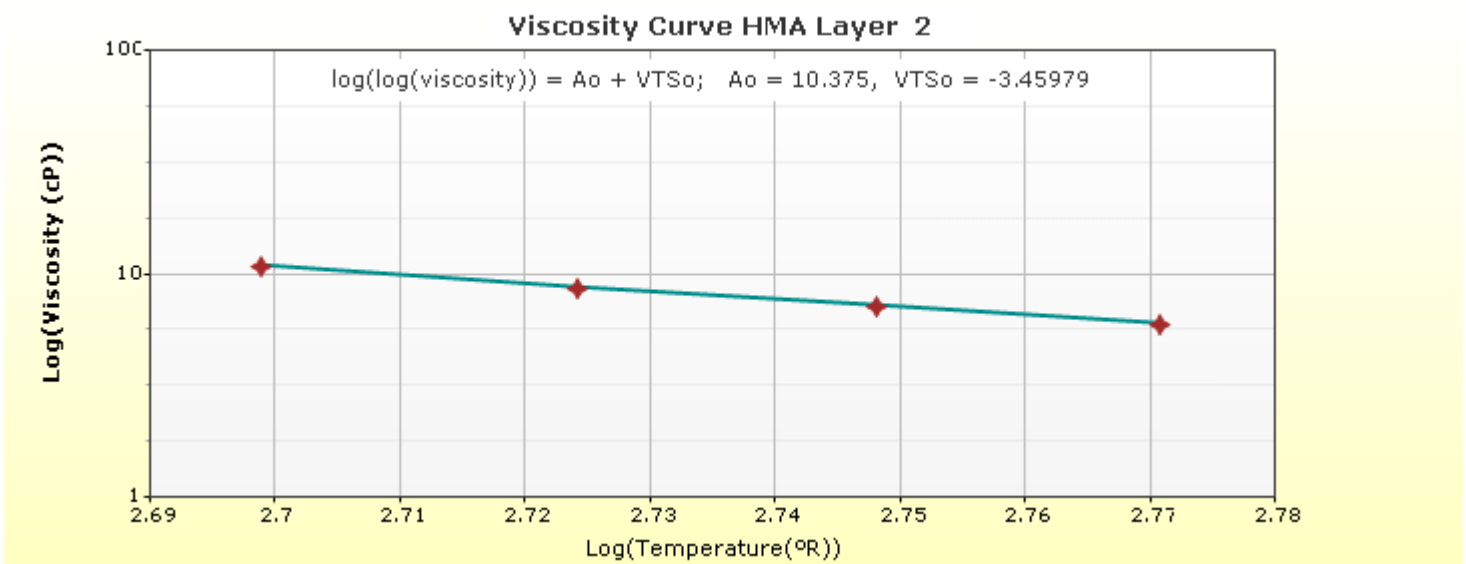
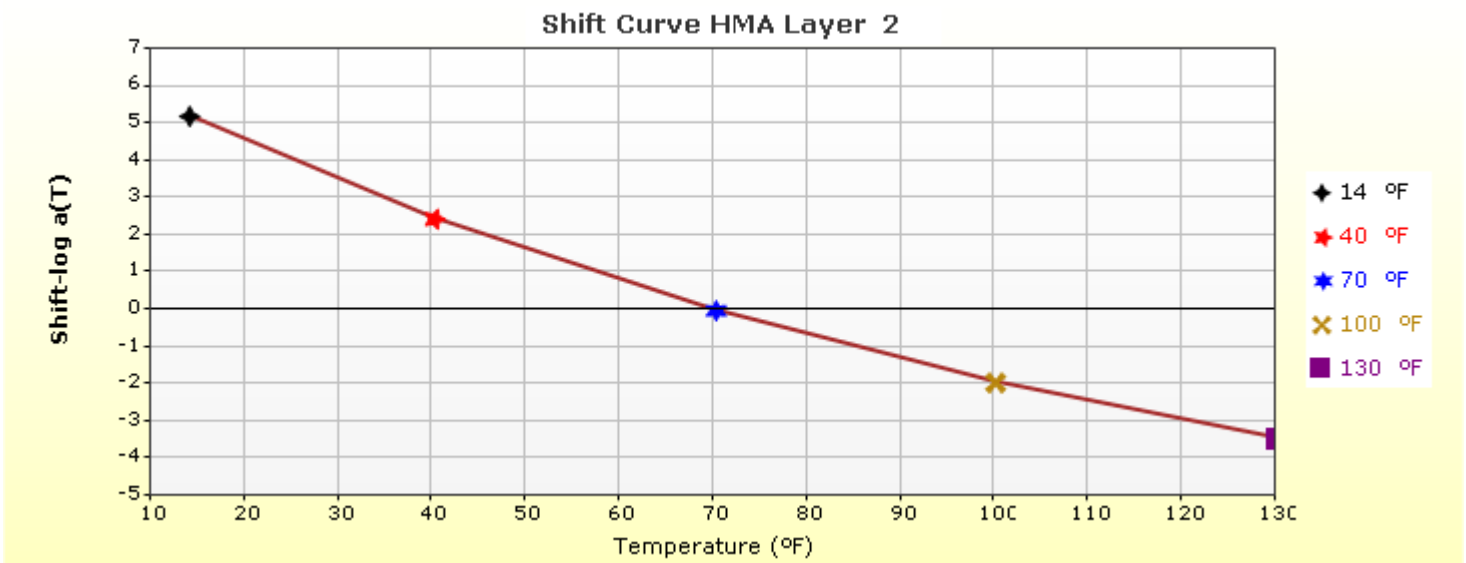
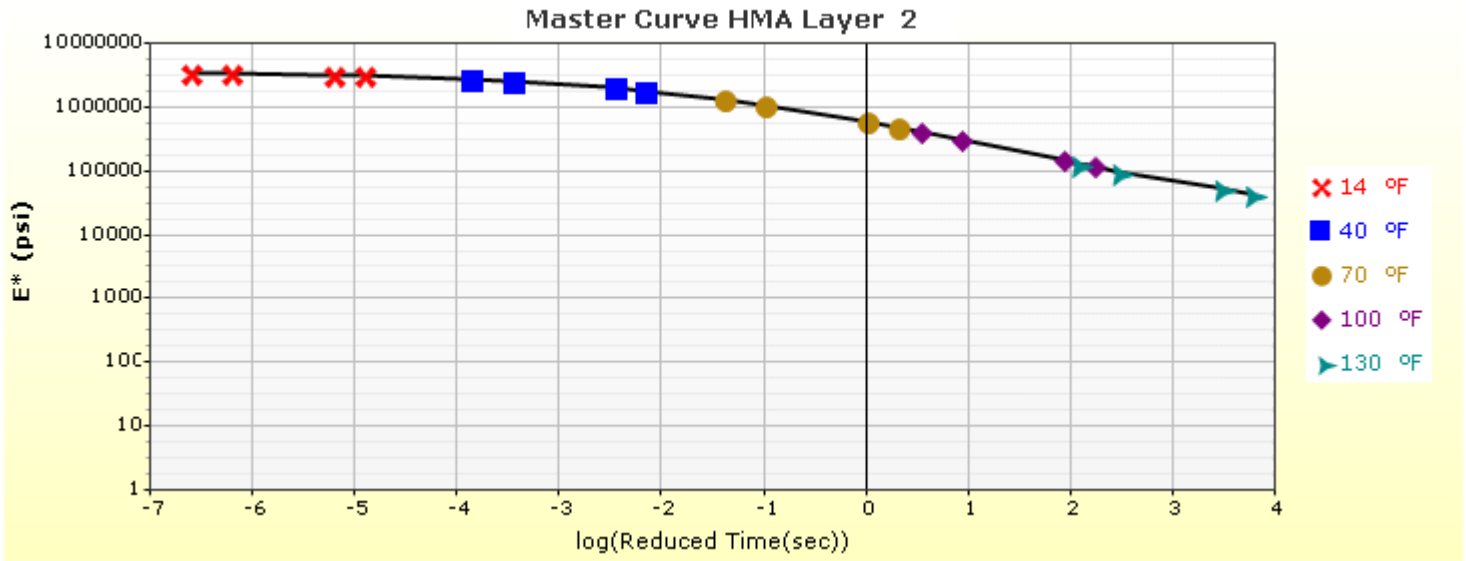
| Loading time (sec) | Creep Compliance (1/psi) | | |
|--------------------|--------------------------|-----------|-----------|
| | -4 °F | 14 °F | 32 °F |
| 1 | 1.47e-007 | 1.70e-007 | 3.86e-007 |
| 2 | 2.94e-007 | 3.49e-007 | 5.45e-007 |
| 5 | 3.45e-007 | 3.79e-007 | 7.63e-007 |
| 10 | 3.54e-007 | 4.48e-007 | 8.16e-007 |
| 20 | 3.91e-007 | 4.96e-007 | 1.03e-006 |
| 50 | 4.14e-007 | 5.95e-007 | 1.31e-006 |
| 100 | 4.76e-007 | 7.65e-007 | 1.61e-006 |



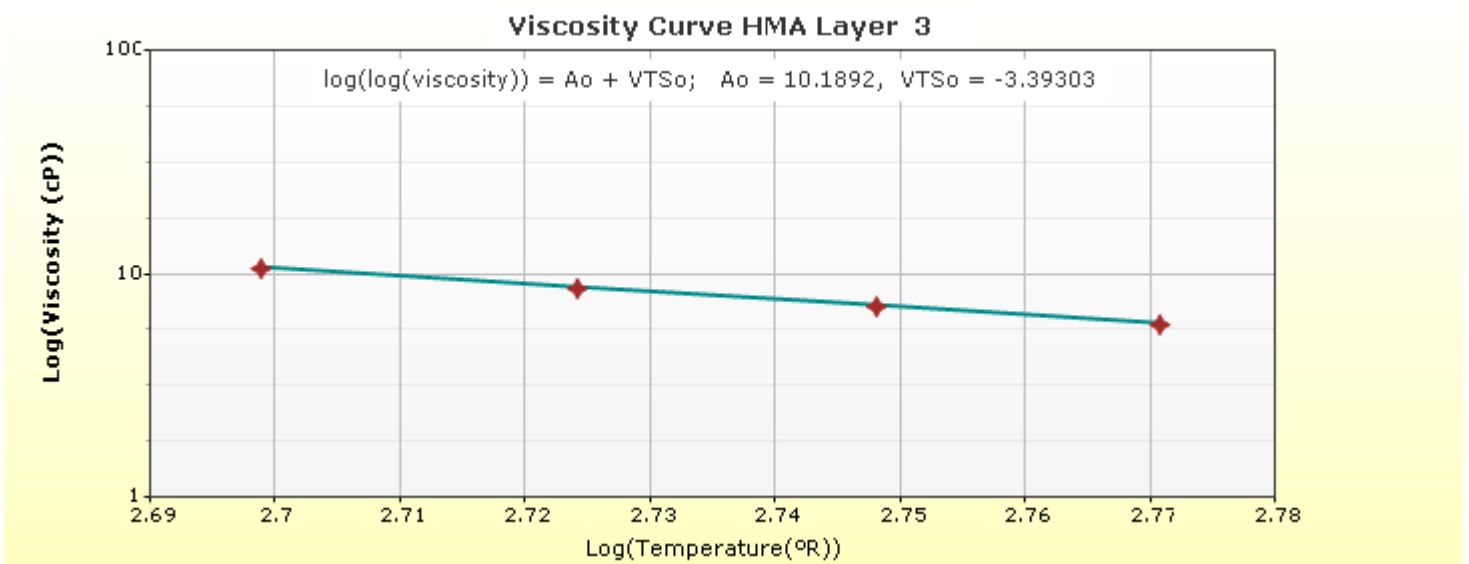
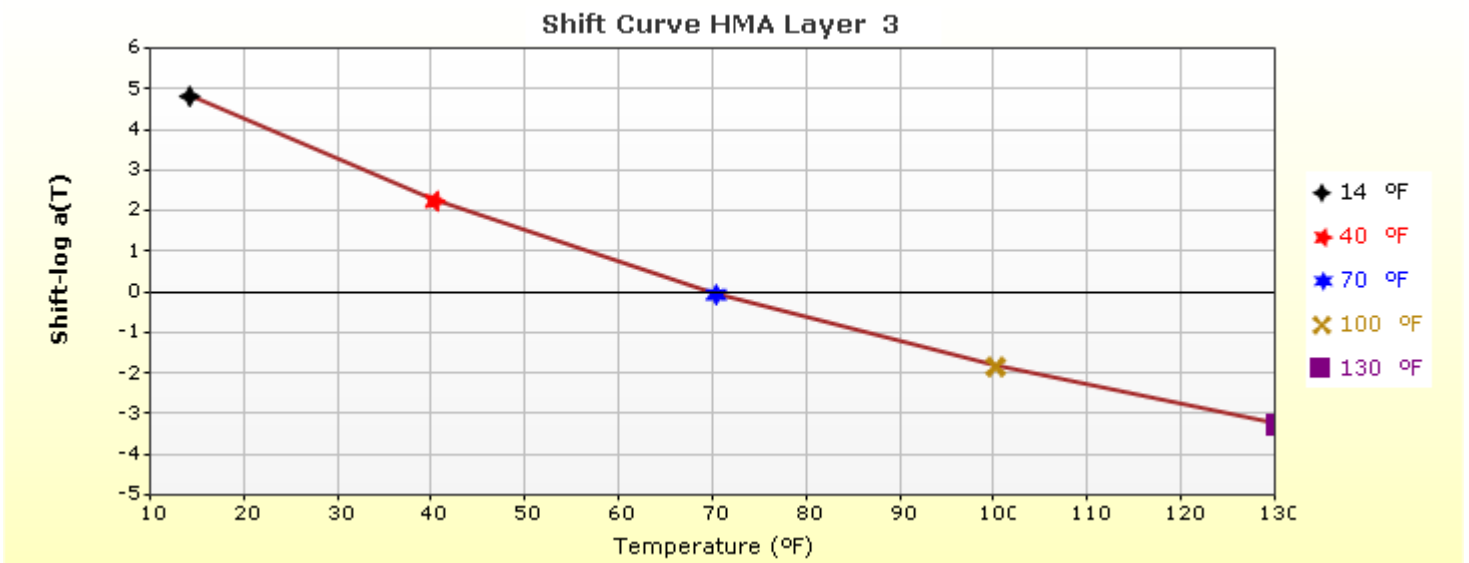
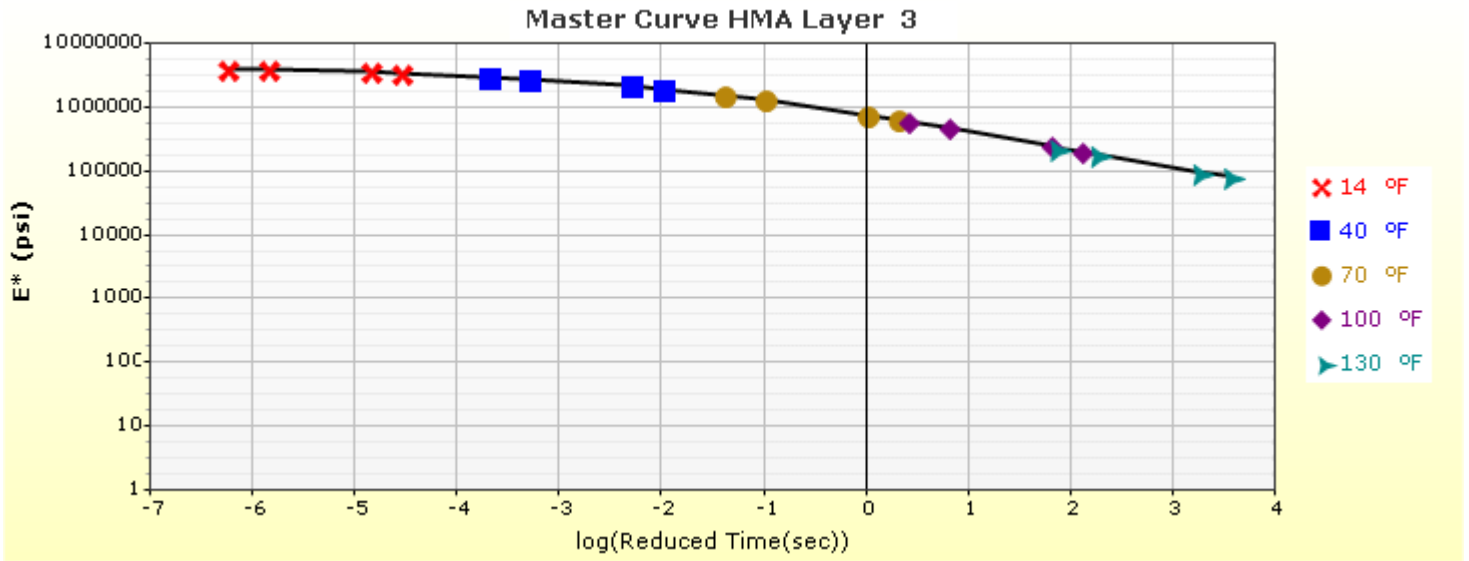
HMA Layer 1: Layer 1 Flexible : VDOT SM



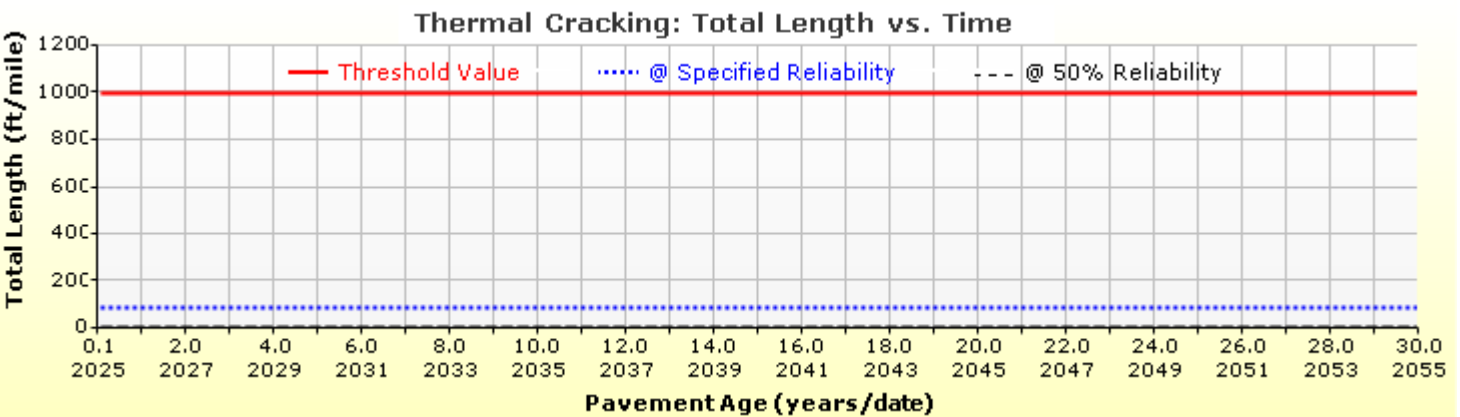
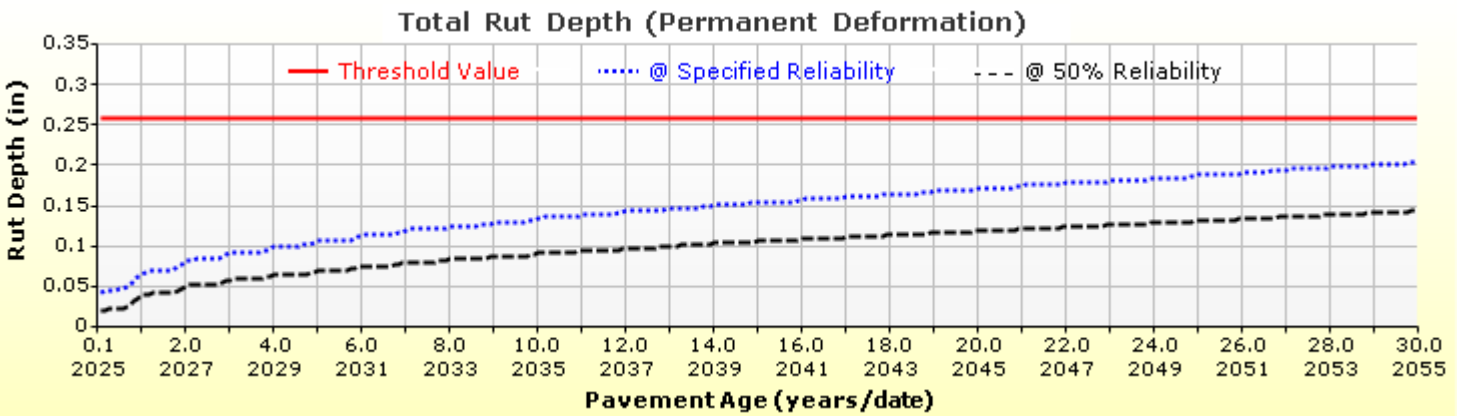
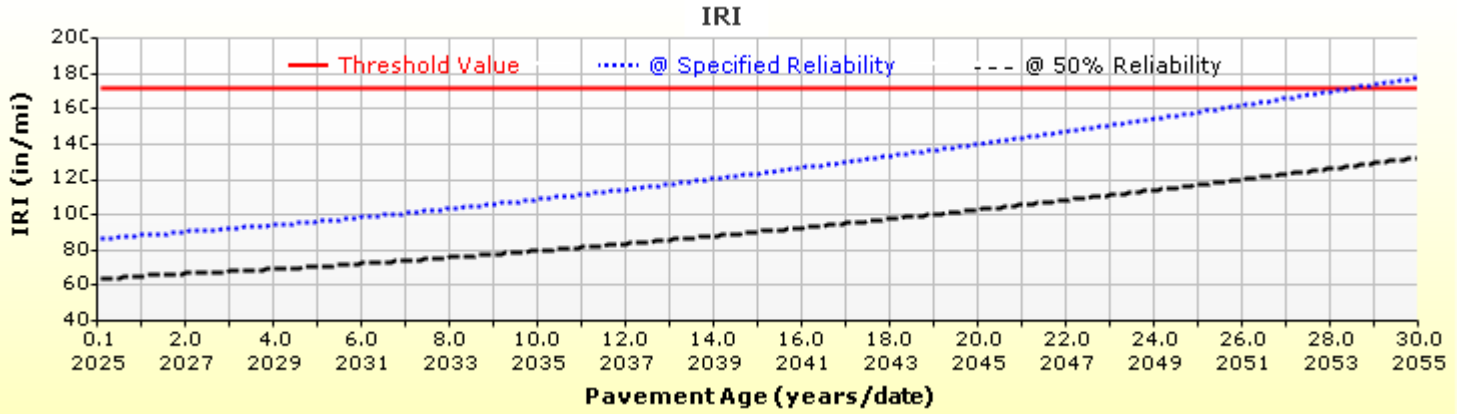
HMA Layer 2: Layer 2 Flexible : VDOT IM

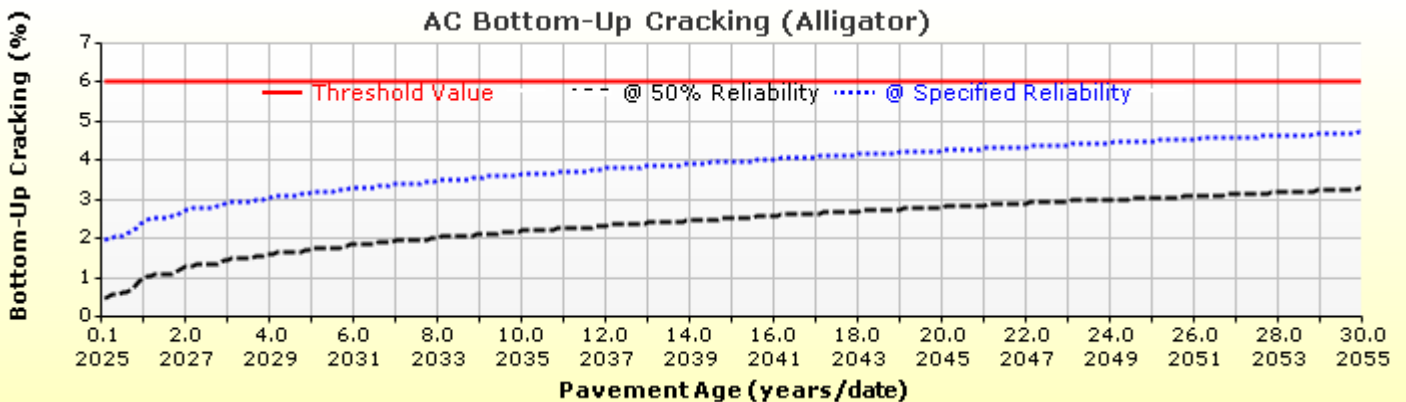
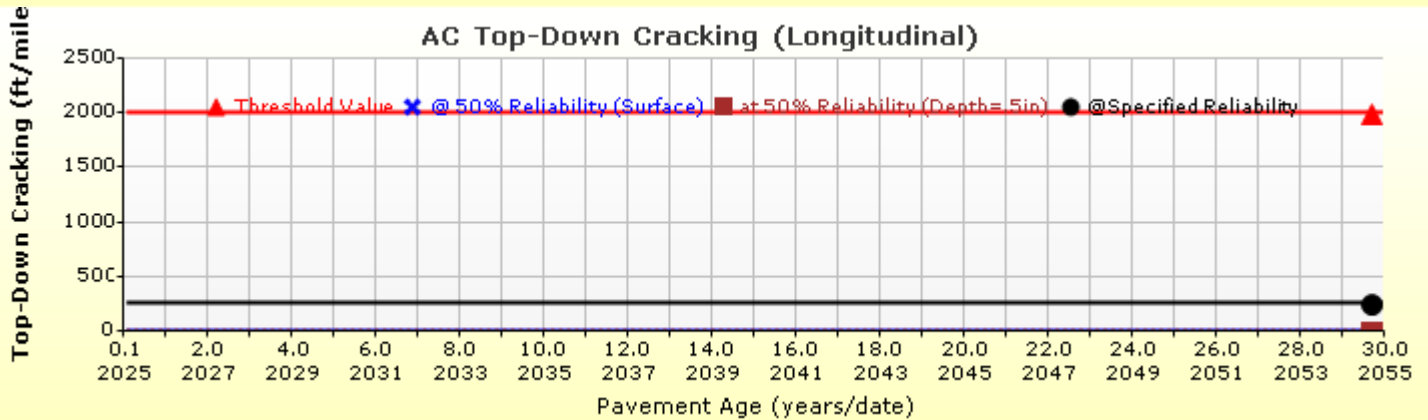
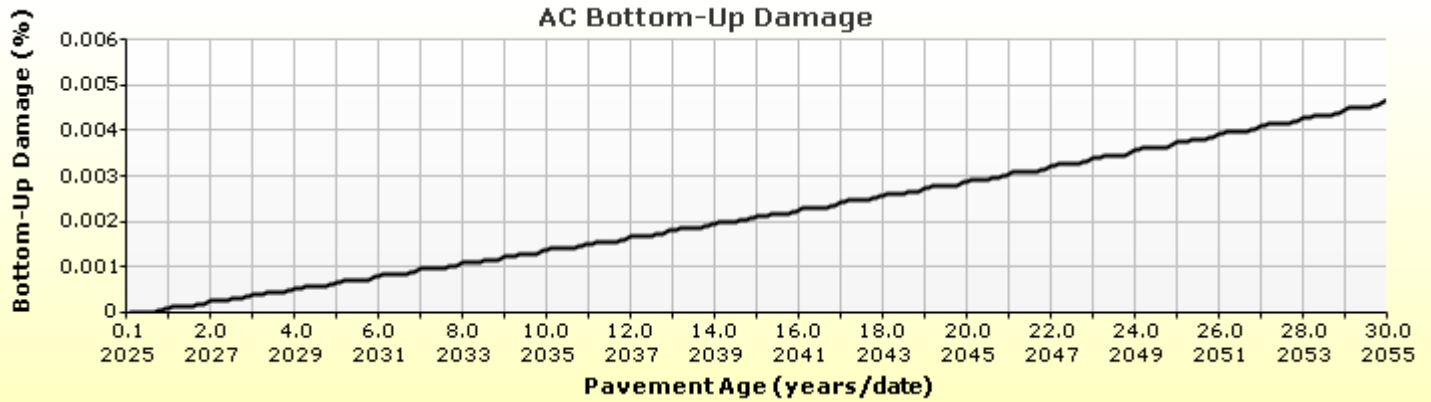
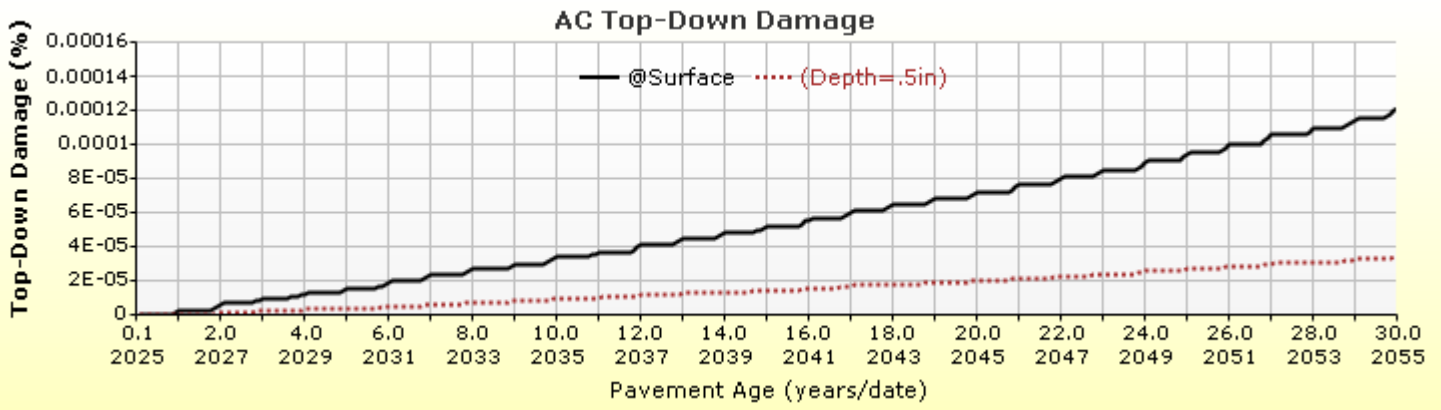


HMA Layer 3: Layer 3 Flexible : VDOT BM

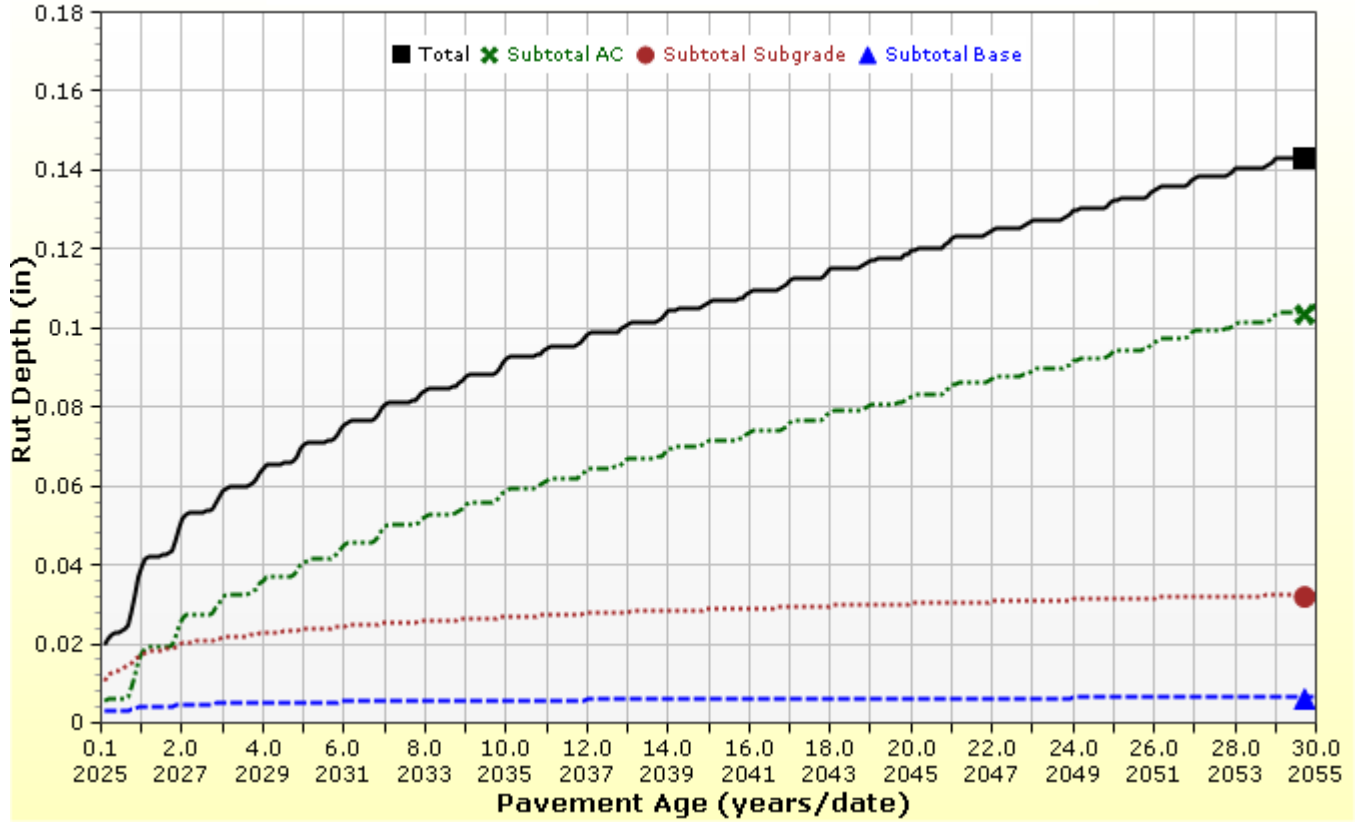


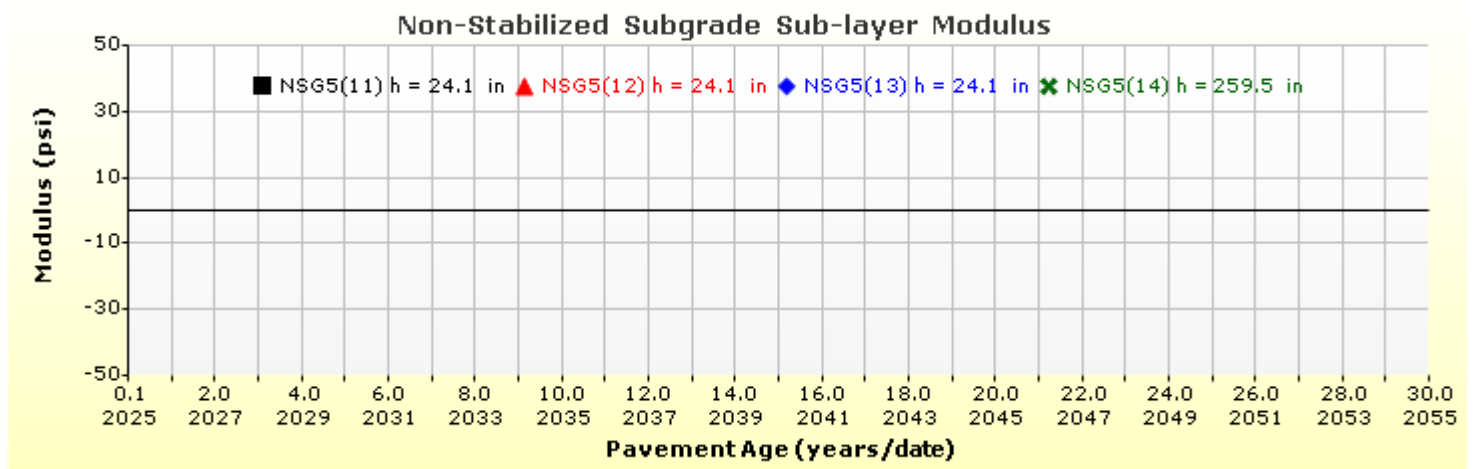
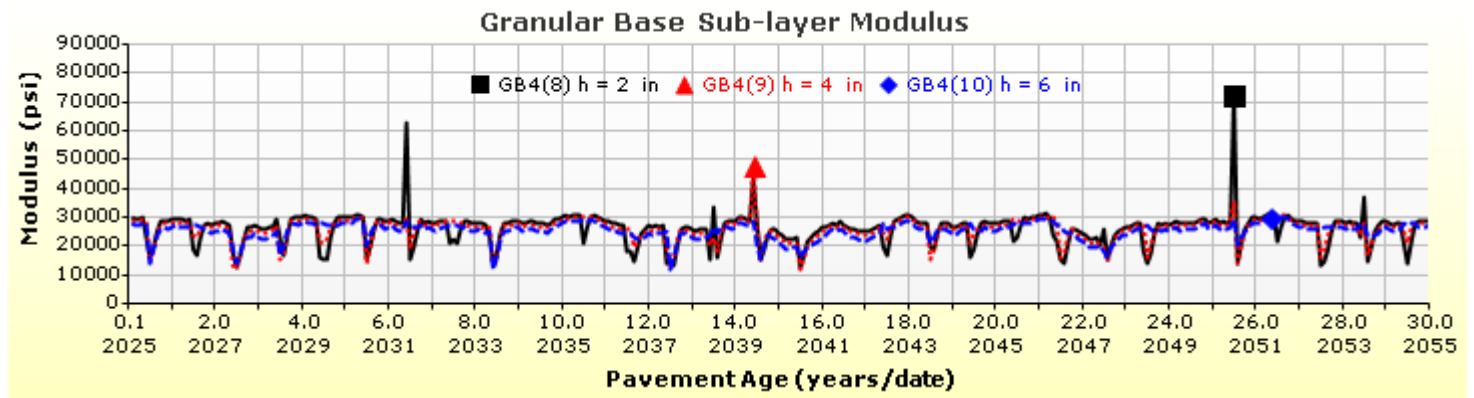
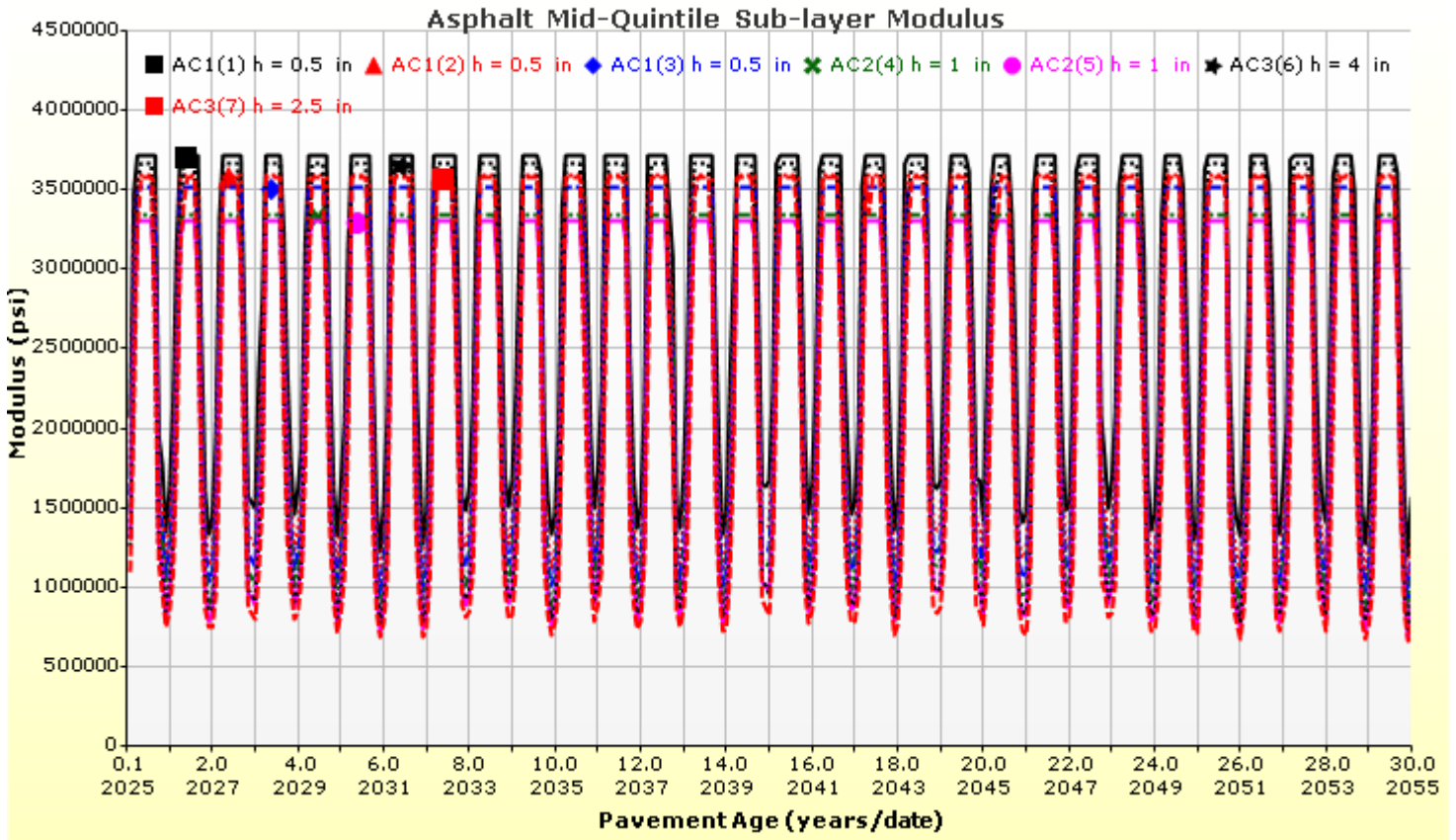
Analysis Output Charts





Rutting (Permanent Deformation) at 50% Reliability







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Layer Information

Layer 1 Flexible : VDOT SM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 1.5 | |
| Unit weight (pcf) | 150.0 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|---------|---------|---------|---------|---------|---------|
| 14 | 2472412 | 2791777 | 2933728 | 3234538 | 3357731 | 3535348 |
| 40 | 1232916 | 1577939 | 1739624 | 2097479 | 2253344 | 2458075 |
| 70 | 439283 | 625230 | 742997 | 1029685 | 1172545 | 1368737 |
| 100 | 131955 | 196277 | 253704 | 401144 | 486218 | 603850 |
| 130 | 63086 | 80291 | 97669 | 156000 | 186382 | 234042 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 158 | 4369 | 79.7 |
| 168.8 | 2208 | 82 |
| 179.6 | 1144 | 84.1 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 12.13 |
| Air voids (%) | 6.7 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT SM |
| Description of object | Average of all SM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 2 Flexible : VDOT IM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 2.0 | |
| Unit weight (pcf) | 149.6 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2585305. | 2863864 | 2978360 | 3219784. | 3320363 | 3530717 |
| 40 | 1310346 | 1717074. | 1898928 | 2307067. | 2480184 | 2725420. |
| 70 | 303426 | 493034 | 622600.3 | 934744.3 | 1092152 | 1305466. |
| 100 | 73001.66 | 112848 | 147439.6 | 262462 | 336279.6 | 447428.3 |
| 130 | 37140 | 44905.66 | 51340 | 76249 | 95369.33 | 133014 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 19423333.33 | 43.53333333 |
| 77 | 1798000 | 60.56666667 |
| 104 | 147666.6667 | 71.3 |
| 131 | 13320 | 79.33333333 |
| 158 | 1698 | 85 |
| 185 | 299.7333333 | 88.26666667 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 11.1 |
| Air voids (%) | 5.333 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|---------------------------------------|
| Display name/identifier | VDOT IM |
| Description of object | Virginia Statewide Average IM 19.0 -A |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



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Layer 3 Flexible : VDOT BM

| Asphalt | | |
|-------------------|----------------|-------|
| Thickness (in) | 6.5 | |
| Unit weight (pcf) | 151.4 | |
| Poisson's ratio | Is Calculated? | False |
| | Ratio | 0.35 |
| | Parameter A | - |
| | Parameter B | - |

Asphalt Dynamic Modulus (Input Level: 1)

| T (°F) | 0.1 Hz | 0.5 Hz | 1 Hz | 5 Hz | 10 Hz | 25 Hz |
|--------|----------|----------|----------|----------|----------|----------|
| 14 | 2839491. | 3212428. | 3365621. | 3699924. | 3854489. | 4023385. |
| 40 | 1408321. | 1818930. | 1979293. | 2386672. | 2573475. | 2821683. |
| 70 | 431548.6 | 651955.3 | 797790.0 | 1144957. | 1311973. | 1544349. |
| 100 | 121965.8 | 184863.3 | 245724.1 | 417371.1 | 511976.7 | 637217.8 |
| 130 | 65257.58 | 80140.50 | 95710.52 | 146954.7 | 176074.6 | 223634.9 |

Asphalt Binder

| Temperature (°F) | Binder Gstar (Pa) | Phase angle (deg) |
|------------------|-------------------|-------------------|
| 50 | 17562500 | 44.9 |
| 77 | 1510000 | 61.375 |
| 104 | 131975 | 70.95 |
| 131 | 13005 | 78.55 |
| 158 | 1710.75 | 84.45 |
| 185 | 313.225 | 87.95 |

General Info

| Name | Value |
|-------------------------------------|-------|
| Reference temperature (°F) | 70 |
| Effective binder content (%) | 9.82 |
| Air voids (%) | 6.31 |
| Thermal conductivity (BTU/hr-ft-°F) | 0.67 |
| Heat capacity (BTU/lb-°F) | 0.23 |

Identifiers

| Field | Value |
|-------------------------|------------------------|
| Display name/identifier | VDOT BM |
| Description of object | Average of all BM |
| Author | GM |
| Date Created | 10/30/2010 12:00:00 AM |
| Approver | |
| Date approved | 10/30/2010 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |



Flexible Design_GWMP_CBR 5

File Name: C:\Users\sbusal\Desktop\Project NEXT\Flexible Design_GWMP_CBR 5.dgpx



Layer 4 Non-stabilized Base : VDOT Avg 21A-21B

| Unbound | |
|--|------|
| Layer thickness (in) | 12.0 |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 2)

| | |
|-----------------------|---|
| Analysis Type: | Modify input values by temperature/moisture |
| Method: | Resilient Modulus (psi) |

| Resilient Modulus (psi) |
|-------------------------|
| 21000.0 |

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|-----------------------|
| Display name/identifier | VDOT Avg 21A-21B |
| Description of object | Average of all groups |
| Author | BCS |
| Date Created | 5/3/2016 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2016 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 3 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 17.0 |
| Plasticity Index | 0.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | True | 141.3 |
| Saturated hydraulic conductivity (ft/hr) | False | 1.473e-02 |
| Specific gravity of solids | True | 2.78 |
| Optimum gravimetric water content (%) | True | 6.7 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 3.9559 |
| bf | 1.6172 |
| cf | 0.6461 |
| hr | 100.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 10.0 |
| #100 | 13.0 |
| #80 | |
| #60 | |
| #50 | 17.0 |
| #40 | |
| #30 | 21.0 |
| #20 | |
| #16 | 27.0 |
| #10 | |
| #8 | 35.0 |
| #4 | 50.0 |
| 3/8-in. | 68.0 |
| 1/2-in. | 78.0 |
| 3/4-in. | 93.0 |
| 1-in. | 100.0 |
| 1 1/2-in. | 100.0 |
| 2-in. | 100.0 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | |



Flexible Design_GWMP_CBR 5

File Name: C:\Users\sbusal\Desktop\Project NEXT\Flexible Design_GWMP_CBR 5.dgpx



Layer 5 Subgrade : VDOT CBR 5 Fill Material

Unbound

| | |
|--|---------------|
| Layer thickness (in) | Semi-infinite |
| Poisson's ratio | 0.35 |
| Coefficient of lateral earth pressure (k0) | 0.5 |

Modulus (Input Level: 3)

| | |
|-----------------------|------------------------------|
| Analysis Type: | Annual representative values |
| Method: | Resilient Modulus (psi) |

Resilient Modulus (psi)

4300.0

| | |
|---|---|
| Use Correction factor for NDT modulus? | - |
| NDT Correction Factor: | - |

Identifiers

| Field | Value |
|-------------------------|--------------------------|
| Display name/identifier | VDOT CBR 5 Fill Material |
| Description of object | Default material |
| Author | VDOT |
| Date Created | 5/3/2017 12:00:00 AM |
| Approver | |
| Date approved | 5/3/2017 12:00:00 AM |
| State | |
| District | |
| County | |
| Highway | |
| Direction of Travel | |
| From station (miles) | |
| To station (miles) | |
| Province | |
| User defined field 2 | |
| User defined field 3 | |
| Revision Number | 0 |

Sieve

| | |
|----------------------------|------|
| Liquid Limit | 51.0 |
| Plasticity Index | 30.0 |
| Is layer compacted? | True |

| | Is User Defined? | Value |
|--|------------------|-----------|
| Maximum dry unit weight (pcf) | False | 98.6 |
| Saturated hydraulic conductivity (ft/hr) | False | 8.849e-06 |
| Specific gravity of solids | False | 2.7 |
| Optimum gravimetric water content (%) | False | 22.2 |

User-defined Soil Water Characteristic Curve (SWCC)

| | |
|-------------------------|----------|
| Is User Defined? | False |
| af | 136.4179 |
| bf | 0.5183 |
| cf | 0.0324 |
| hr | 500.0000 |

| Sieve Size | % Passing |
|------------|-----------|
| 0.001mm | |
| 0.002mm | |
| 0.020mm | |
| #200 | 79.1 |
| #100 | |
| #80 | 84.9 |
| #60 | |
| #50 | |
| #40 | 88.8 |
| #30 | |
| #20 | |
| #16 | |
| #10 | 93.0 |
| #8 | |
| #4 | 94.9 |
| 3/8-in. | 96.9 |
| 1/2-in. | 97.5 |
| 3/4-in. | 98.3 |
| 1-in. | 98.8 |
| 1 1/2-in. | 99.3 |
| 2-in. | 99.6 |
| 2 1/2-in. | |
| 3-in. | |
| 3 1/2-in. | 99.9 |

Calibration Coefficients

AC Fatigue

| | |
|---|--------------|
| $N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\epsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$ | k1: 0.007566 |
| $C = 10^M$ | k2: 3.9492 |
| $M = 4.84 \left(\frac{V_b}{V_a + V_b} - 0.69\right)$ | k3: 1.281 |
| | Bf1: 42.87 |
| | Bf2: 1 |
| | Bf3: 1 |

AC Rutting

| | |
|--|---|
| $\frac{\epsilon_p}{\epsilon_r} = k_z \beta_{r1} 10^{k_1 T} k_2 \beta_{r2} N^{k_3 \beta_{r3}}$ $k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$ $C_1 = -0.1039 * H_a^2 + 2.4868 * H_a - 17.342$ $C_2 = 0.0172 * H_a^2 - 1.7331 * H_a + 27.428$ <p><i>Where:</i> H_{ac} = total AC thickness(in)</p> | ϵ_p = plastic strain(in/in) ϵ_r = resilient strain(in/in) T = layer temperature(°F) N = number of load repetitions |
| AC Rutting Standard Deviation | 0.24 * Pow(RUT,0.8026) + 0.001 |
| AC Layer | K1:-3.35412 K2:1.5606 K3:0.4791 Br1:0.687 Br2:1 Br3:1 |

Thermal Fracture

| | |
|--|---|
| $C_f = 400 * N \left(\frac{\log C / h_{ac}}{\sigma} \right)$ $\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$ $A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$ | C_f = observed amount of thermal cracking(ft/500ft) k = refression coefficient determined through field calibration $N()$ = standard normal distribution evaluated at() σ = standard deviation of the log of the depth of cracks in the pavments C = crack depth(in) h_{ac} = thickness of asphalt layer(in) ΔC = Change in the crack depth due to a cooling cycle ΔK = Change in the stress intensity factor due to a cooling cycle A, n = Fracture parameters for the asphalt mixture E = mixture stiffness σ_m = Undamaged mixture tensile strength β_t = Calibration parameter |
| Level 1 K: 1.5 | Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027 |
| Level 2 K: 0.5 | Level 2 Standard Deviation: 0.2841 * THERMAL + 55.462 |
| Level 3 K: 1.5 | Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422 |

CSM Fatigue

| | | | |
|---|--|-----------|---------|
| $N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}} \right)}$ | N_f = number of repetitions to fatigue cracking σ_s = Tensile stress(psi) M_r = modulus of rupture(psi) | | |
| k1: 1 | k2: 1 | Bc1: 0.75 | Bc2:1.1 |

| Subgrade Rutting | | | |
|--|------------|--|------------|
| $\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r} \right) \left e^{-\left(\frac{\rho}{N}\right)^\beta} \right $ | | δ_a = permanent deformation for the layer N = number of repetitions ε_v = average vertical strain(in/in) $\varepsilon_0, \beta, \rho$ = material properties ε_r = resilient strain(in/in) | |
| Granular | | Fine | |
| k1: 2.03 | Bs1: 0.153 | k1: 1.35 | Bs1: 0.153 |
| Standard Deviation (BASERUT) 0.1477 * Pow(BASERUT,0.6711) + 0.001 | | Standard Deviation (BASERUT) 0.1235 * Pow(SUBRUT,0.5012) + 0.001 | |

| AC Cracking | | | |
|---|-----------|---|----------|
| AC Top Down Cracking | | AC Bottom Up Cracking | |
| $FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * \log_{10}(Damage))}} \right) * 10.56$ | | $FC = \left(\frac{6000}{1 + e^{(C_1 * C'_1 + C_2 * C'_2 * \log_{10}(D * 100))}} \right) * \left(\frac{1}{60} \right)$ $C'_2 = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$ $C'_1 = -2 * C'_2$ | |
| c1: 7 | c2: 3.5 | c3: 0 | c4: 1000 |
| c1: 0.319 | c2: 0.319 | c3: 6000 | |
| AC Cracking Top Standard Deviation | | AC Cracking Bottom Standard Deviation | |
| 200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001))) | | 1.13 + 13/(1+exp(7.57-15.5*LOG10(BOTTOM+0.0001))) | |

| CSM Cracking | | | | IRI Flexible Pavements | | | |
|--|--------|-------|-------|--|---------|-----------|-----------|
| $FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$ | | | | C1 - Rutting C3 - Transverse Crack C2 - Fatigue Crack C4 - Site Factors | | | |
| C1: 0 | C2: 75 | C3: 5 | C4: 3 | C1: 40 | C2: 0.4 | C3: 0.008 | C4: 0.015 |
| CSM Standard Deviation | | | | | | | |
| CTB*1 | | | | | | | |

Secondary Pavement Design Calculations
Proposed Pavement Section for Live Oak Drive

Project Name: I-495 Northern Extension, VDOT UPC Number: 113414, HDR Project No. 10157273
 Calculated By: SB (8/16/2019) Checked By: JDP (8/22/2019)

Pavement Design of Live Oak Drive

1. The design is based on calculations made in accordance with VDOT’s Pavement Design Guide for Subdivision and Secondary Roads in Virginia (2018).
2. Per the Typical Sections dated 07-31-2019, Live Oak Drive will be reconstructed primarily on new alignment with pavements on fill soils.
3. The lab tested Mr values of native soils near or along Live Oak Drive is:

| Boring | Mr values (psi) |
|-------------|-----------------|
| 19GWP-P03 | 10172 |
| 19GWP-P07 | 7795 |
| 19X-NOS-P19 | 7587 |

4. CBR of 5 is assumed for fill soils.

Table 1 – Summary of Design Traffic and Geotechnical Parameters

| Parameter | Value Used | Reference |
|--|------------|---|
| Year Open to Traffic | 2025 | Provided on Roadway Plans |
| ADT (2013) | 460 | http://www.virginia.gov/info/ct-TrafficCounts.asp |
| Assumed Growth Rate (GR) | 1.5% | Traffic count on source above indicates traffic count reduction after Year 2013. Assumed GR = 1.5% |
| Design Year ADT (2035) | 638 | Midpoint of 20 year design period -10 year ADT per Pavement Design Guide |
| Resiliency factor, RF | 1.5 | Table 1 of VDOT Pavement Design Guide, assuming on-site fill soils to be used as borrow material |
| Design CBR | 5.0 | Recommended minimum CBR of Fill = 5. See Notes 2 and 3 above. |
| Soil support value, SSV | 7.5 | Calculated (RF x Design CBR) |
| Required Thickness Index (D _R) | 12.8 | Appendix II of VDOT Pavement Design Guide |

Table 2: Pavement Core Observation Data

| Boring No. | Approx. Station | Offset Direction | Asphalt Concrete (in) | Portland Cement Concrete (in) | Cement Treated Aggregate (in) | Aggregate Subbase (in) | Total (in) |
|-------------|-----------------|------------------|-----------------------|-------------------------------|-------------------------------|------------------------|------------|
| 19LOD-W-P14 | 30+00 | LT | 3.5 | -- | -- | 10.0 | 13.5 |
| 19LOD-W-P15 | 18+50 | RT | 6.0 | -- | -- | 12.0 | 18.0 |

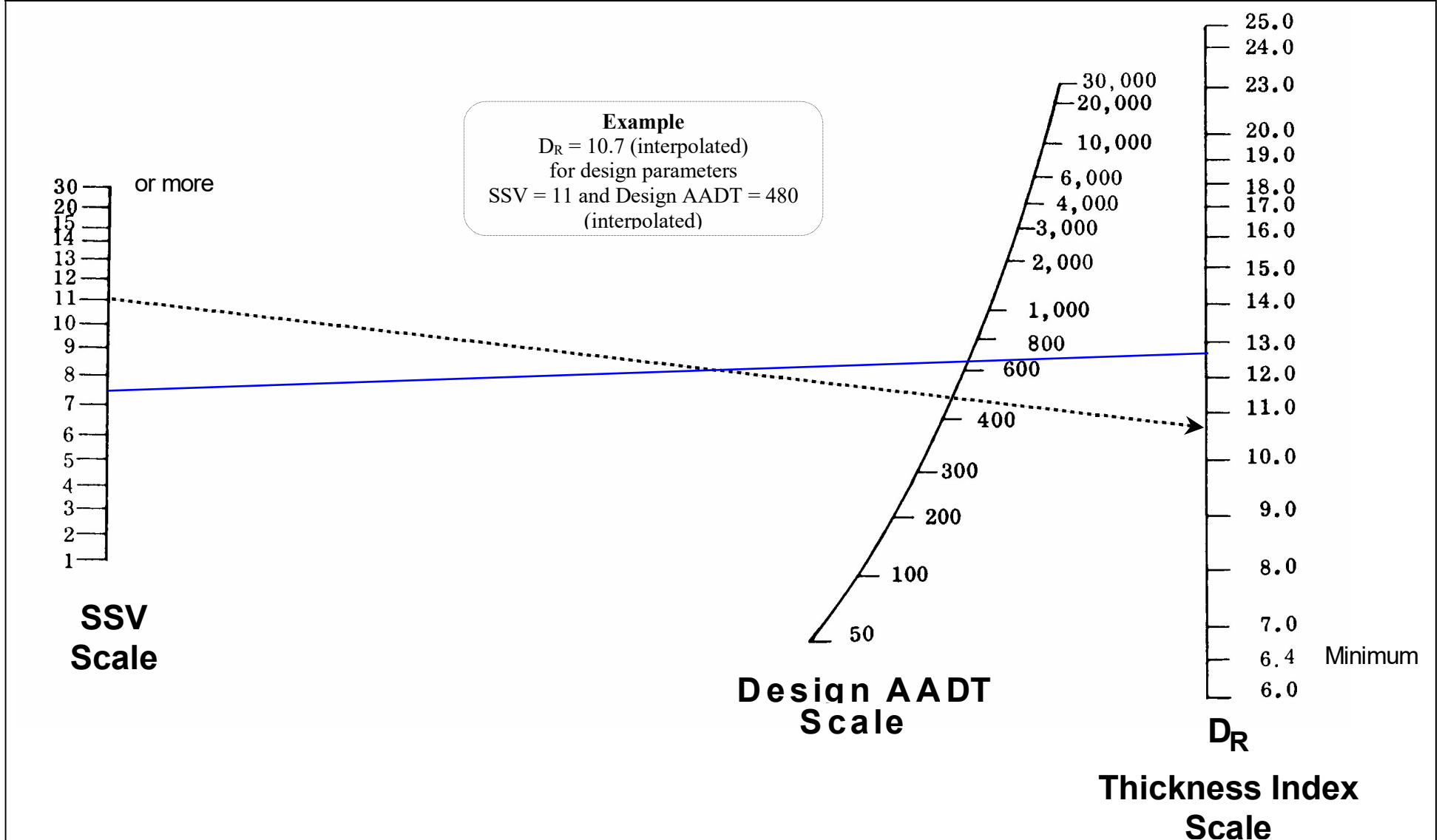
Table 3 – Pavement Thickness Design

| Pavement Layer | Material | Thickness (in) | Thickness Equivalency Value ¹ | Thickness Index value (D _p) (in) ² |
|----------------|---------------------------------|----------------|--|---|
| Surface | SM-9.5A | 1.5 | 2.25 | 3.4 |
| Intermediate | IM-19.0A | 2.0 | 2.25 | 4.5 |
| Base | BM-25.0A | 3 | 2.25 | 6.8 |
| Subbase | VDOT 21B Dense Graded Aggregate | 12 | 0.60 | 7.2 |
| Totals | | 18.5 | | 21.8 |

To match the existing pavement section

1. Refer to Note 1 of Appendix III
2. Refer to Nomograph in Appendix II.

Conclusions: Table 3 presents the required minimum pavement section for Live Oak Drive.
 The Thickness Index Value of the design section exceeds the Required Thickness Index.



Please refer to Appendices II and V for the application of this diagram in the design of pavement.

Determination of the mica content is to be done by visual observations. Borderline cases of low or high mica content shall be decided by the District Materials Engineer of the Virginia Department of Transportation.

Use Table 1 to determine the soil resiliency factor, proceeding from the top to the bottom and obtain the correct resiliency factor by the process of elimination.

**Table 1
Classification, Load Support Characteristic, and Resiliency Factor
of
Common Soils in Virginia**

| Mica Content | Soil Classification | Load Support Characteristic | Resiliency Factor |
|---------------------|---|------------------------------------|--------------------------|
| Without Mica | a) A-1 & A-3 Soils b) A-4, A-5 and A-7 soils having a sand content greater than 60% | Excellent | 3.0 |
| | A-2, A-4, A-5, A-6 and A-7 soils having a sand content between 40% and 60%. | Good | 2.5 |
| | A-2, A-4, A-5, A-6 and A-7 soils having a sand content less than 40% | Average | 2.0 |
| With Mica | a) A-7-5 soil. b) soil with low or trace mica content and having an average group index (GI) below 5 c) A-2, A-5, A-6, and A-7-6 soils with low or trace mica content | Poor | 1.5 |
| | Soils not within the category of Medium Low Resiliency Soils and also contain mica. | Very Poor | 1.0 |

AC Overlay Calculations for I-495 Mainline and Express Lanes

(Reference: AASHTO Guide for Design of Pavement Structures – 1993)



| | | | | | |
|----------|---|-----------|-----|-------|-----------|
| Project: | I 495 Northern Extension | Computed: | KDH | Date: | 3/20/2020 |
| Subject: | I-495 Travel Lane | Checked: | JP | Date: | 3/24/2020 |
| Task: | Asphalt overlay of Existing AC over PCC | Page: | 1 | of | 1 |
| Job #: | | No: | | | |

Reference: AASHTO Guide for Design of Pavement Structures, 1993 (AASHTO) Chapter 6 MOI Pavement Design Guidelines. 2011 (MOI)

ESAL CALCULATION

| | | |
|--|------------|--|
| Performance Period (yrs) = | 12 | => Design period for overlay (MOI) |
| No. Lanes in DD = | 4 | => Proposed widening will have 4 GP lanes in Design Direction |
| Directional Factor = | 56% | => From Kimley Horn July 23, 2019 |
| Lane Distribution Factor (D _L) = | 60% | => (MOI) |
| ADT 2025 = | 212400 | => From Transurban March 16, 2020 |
| % Trucks = | 9.2% | => From Transurban March 16, 2020 |
| ADTT 2025 = | 19541 | |
| % ADTT Single Unit Trucks = | 63% | => From Kimley Horn July 23, 2019 |
| % ADTT Tractor Trailer Trucks = | 38% | => From Kimley Horn July 23, 2019 |
| Truck Factor Single Unit = | 0.59 | => (MOI) |
| Truck Factor Tractor Trailer = | 1.59 | => (MOI) |
| Annual Growth Rate = | 1.0% | => 1% growth based on backcalculation of ADT values 2045 to 2025 |
| Growth Factor = | 12.68 | => Growth Factor from AASHTO Table D.20 |
| 12 Year Design ESAL (W ₁₈) = | 29,329,642 | |

AASHTO Rigid Pavement Design Calculation Sheet

| | | |
|---|------------|---|
| ESALs (W ₁₈) = | 29,329,642 | |
| Z _R = | -1.645 | (AASHTO, Part 1, Table 4.1 - Reliability = 95%) |
| Reliability = | 95% | => (MOI) |
| Overall Stand. Deviation (So) = | 0.39 | => (MOI) |
| Roadbed Resilient Modulus (CBR x 1500) = | 7500 | psi => Conservative value of Design Resilient Modulus |
| Modulus of Subgrade Reaction (k) = | 387 | pci => MOI k-value = Mr / 19.4 |
| Initial Serviceability = | 4.50 | => (MOI) - Interstate |
| Terminal Serviceability - p _t = | 3.00 | => (MOI) - Interstate |
| ΔPSI = | 1.50 | => Assume no serviceability loss due to frost |
| Concrete Elastic Modulus - E _c = | 5,000,000 | => (MOI) |
| Modulus of Rupture - S _c = | 650 | => (MOI) |
| Load Transfer Coeff. - J = | 3.2 | => (MOI) - Jointed Plain with Asphalt Shoulder (Assume LTE > 70%) |
| Drainage Coefficient - C _d = | 1.0 | => (MOI) |
| Design Slab Thickness - D _i (in) = | 13.0 | |
| Log ₁₀ W ₁₈ = | 7.4673 | (Left side of Equation) |
| Z _R *S _o + (etc.) = | 7.4936 | (Right Side of Equation) |

AASHTO Equation for Rigid Pavements from Figure 3.7

$$\text{Log}_{10}W_{18} = Z_R * S_o + 7.35 * \text{Log}_{10}(D+1) - 0.06 + \frac{\text{Log}_{10}(\Delta\text{PSI}/4.5-1.5)}{1 + (16240000/(D+1))^{8.46}}$$

$$(\text{Cont.}) + \frac{(4.22 - (0.32 * p_t)) * \text{Log}_{10} * S_c * C_d * (D^{0.75} - 1.132)}{215.63 * J * (D^{0.75} - 18.42 / (E_c/k)^{0.25}}$$

For I-495 General Purpose Lanes, 8 inches of AC is required overlying 9-inch-thick PCC slab

Effective Existing Slab Thickness (D_{eff}) - AASHTO Condition Survey Method

| | | | |
|---|------|--------|---|
| Existing AC Thickness | 8 | inches | Average Asphalt Thickness |
| Existing PCC Slab Thickness (D _{pcc}) | 9 | inches | Average PCC Thickness |
| Existing CTA Thickness | 0 | inches | |
| Existing Equivalent AC Surface Thickness (D _{ac}) | 8 | | Includes the equivalent AC from CTA thickness |
| Joints and Cracks Adjustment Factor (F _{jc}) = | 1.00 | | (Assuming Type 1, 3 and 4 joint crack repairs will be performed prior to asphalt resu |
| Durability Adjustment Factor (F _{dur}) = | 1.00 | | (Assume no signs of durability problems) |
| AC quality Adjustment Factor (F _{ac}) = | 1.00 | | (Assume no reflective cracks other than joints recorded) |
| D _{eff} = (F _{jc} × F _{dur} × D _{pcc}) + [(D _{ac} /2.0) × F _{ac}] | 13 | | inches per AASHTO, Effective equivalent PCC slab thickness |

Determination of Required AC Overlay Thickness (D_o)

"A" Factor = 2.22 per AASHTO, Section 5.7.5 (A = 2.2233 + .0099(D_i - D_{eff})² - 0.1534 (D_i - D_{eff}))
 Required AC Overlay Thickness (D_o) = 0.0 per AASHTO, Section 5.7.5 (D_o = A (D_i - D_{eff}))



| | | | | | |
|----------|---|-----------|-----|-------|-----------|
| Project: | I 495 Northern Extension | Computed: | KDH | Date: | 3/20/2020 |
| Subject: | I-495 Express Lanes | Checked: | JP | Date: | 3/24/2020 |
| Task: | Asphalt overlay of Existing AC over PCC | Page: | 1 | of: | 1 |
| Job #: | | No: | | | |

Reference: AASHTO Guide for Design of Pavement Structures, 1993 (AASHTO)
Chapter 6 MOI Pavement Design Guidelines, 2011 (MOI)

ESAL CALCULATION

| | | |
|--|-----------|--|
| Performance Period (yrs) = | 12 | => Design period for overlay (MOI) |
| No. Lanes in DD = | 2 | => Proposed widening will have 4 GP lanes in Design Direction |
| Directional Factor = | 56% | => From Kimley Horn July 23, 2019 |
| Lane Distribution Factor (D _L) = | 90% | => (MOI) |
| ADT 2025 = | 33000 | => From Transurban March 16, 2020 |
| % Trucks = | 5.9% | => From Transurban March 16, 2020 |
| ADTT 2025 = | 1947 | |
| % ADTT Single Unit Trucks = | 63% | => From Kimley Horn July 23, 2019 |
| % ADTT Tractor Trailer Trucks = | 38% | => From Kimley Horn July 23, 2019 |
| Truck Factor Single Unit = | 0.59 | => (MOI) |
| Truck Factor Tractor Trailer = | 1.59 | => (MOI) |
| Annual Growth Rate = | 1.5% | => 1.5% growth based on backcalculation of ADT values 2045 to 2025 |
| Growth Factor = | 13.04 | => Growth Factor from AASHTO Table D.20 |
| 12 Year Design ESAL (W ₁₈) = | 4,507,488 | |

AASHTO Rigid Pavement Design Calculation Sheet

| | | |
|---|------------|---|
| ESALs (W ₁₈) = | 4,507,488 | |
| Z _R = | -1.645 | (AASHTO, Part 1, Table 4.1 - Reliability = 95%) |
| Reliability = | 95% | => (MOI) |
| Overall Stand. Deviation (S _o) = | 0.39 | => (MOI) |
| Roadbed Resilient Modulus (CBR x 1500) = | 7500 | psi => Conservative value of Design Resilient Modulus |
| Modulus of Subgrade Reaction (k) = | 387 | pci => MOI k-value = Mr / 19.4 |
| Initial Serviceability = | 4.50 | => (MOI) - Interstate |
| Terminal Serviceability - p _t = | 3.00 | => (MOI) - Interstate |
| ΔPSI = | 1.50 | => Assume no serviceability loss due to frost |
| Concrete Elastic Modulus - E _c = | 5,000,000 | => (MOI) |
| Modulus of Rupture - S _c ' = | 650 | => (MOI) |
| Load Transfer Coeff. - J = | 3.2 | => (MOI) - Jointed Plain with Asphalt Shoulder (Assume LTE > 70%) |
| Drainage Coefficient - C _d = | 1.0 | => (MOI) |
| Design Slab Thickness - D_i (in) = | 9.5 | |
| Log ₁₀ W ₁₈ = | 6.6539 | (Left side of Equation) |
| Z _R *S _o + (etc.) = | 6.6415 | (Right Side of Equation) |

AASHTO Equation for Rigid Pavements from Figure 3.7

$$\log_{10}W_{18} = Z_R * S_o + 7.35 * \log_{10}(D+1) - 0.06 + \frac{\log_{10}(\Delta PSI/4.5-1.5)}{1 + (16240000/(D+1))^{0.46}}$$

$$\text{(Cont.)} + \frac{(4.22 - (0.32 * p_t) * \log_{10} * S_c' * C_d * (D^{0.75} - 1.132))}{215.63 * J * (D^{0.75} - 18.42 / (E_c/k)^{0.25}}$$

For I-495 Express Lanes, required AC thickness over 9" PCC slab is less than minimum thickness observed, which is 3 inches. Maintain minimum 3 inches of AC overlying PCC.

Effective Existing Slab Thickness (D_{eff}) - AASHTO Condition Survey Method

| | | | |
|---|------------|--------|--|
| Existing AC Thickness | 1 | inches | Average Asphalt Thickness |
| Existing PCC Slab Thickness (D _{PCC}) | 9 | inches | Average PCC Thickness |
| Existing CTA Thickness | 0 | inches | |
| Existing Equivalent AC Surface Thickness (D _{ec}) | 1 | | includes the equivalent AC from CTA thickness |
| Joints and Cracks Adjustment Factor (F _{jc}) = | 1.00 | | (Assuming Type 1, 3 and 4 joint crack repairs will be performed prior to asphalt res.) |
| Durability Adjustment Factor (F _{dur}) = | 1.00 | | (Assume no signs of durability problems) |
| AC quality Adjustment Factor (F _{ac}) = | 1.00 | | (Assume no reflective cracks other than joints recorded) |
| D_{eff} = (F_{jc} * F_{dur} * D_{PCC}) + [(D_{ec}/2.0)*F_{ac}] | 9.5 | | inches per AASHTO, Effective equivalent PCC slab thickness |

Determination of Required AC Overlay Thickness (D_{o1})

A Factor = 2.22 per AASHTO, Section 5.7.5 (A = 2.2233 + .0099(D_i - D_{eff})² - 0.1534 (D_i - D_{eff}))

Required AC Overlay Thickness (D_{o1}) = 0.0 per AASHTO, Section 5.7.5 (D_{o1} = A (D_i - D_{eff}))