

Attachment 1.5b
Design Criteria

Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2021-02-12

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2021-02-12

Design Criteria 495 Express Lanes

Roadway: 495 Express Lanes South of Georgetown Pike

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Limited Access Urban Interstate <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	70 MPH	RDM, Appendix A, GS-INT
Minimum Lane Widths	12' travel lanes	RDM, Appendix A, GS-INT
Minimum Roadway Shoulder Widths	Without Roadside Barrier - 10' Paved, 12' Graded With Roadside Barrier - 12' Paved, 16' Graded	RDM, Appendix A, GS-INT, Footnote (1 & 2) RDM, Appendix A, GS-INT, Footnote (1 & 2)
Minimum Bridge Shoulder Widths	12' Left/12' Right	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Buffer Width	4' w/ Raised Tubular Markers	
Maximum Grade	5%	RDM, Appendix A, GS-INT
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	730' (Grades <3%)	RDM, Appendix A, GS-INT AASHTO, Page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Min. $L = 15 \times V$ (MPH) = 1050' Des. Min. $L = 30 \times V$ (MPH) = 2100'	AASHTO, Page 3-111 AASHTO, Page 3-111
Minimum Radius @ 8%	1821'	RDM, Appendix A, GS-INT
Minimum Radius w/o Super (NC)	14500'	RBS, TC-5.11, Pg. 803.42
Crest Vertical Curve	Min. SSD = 730' Min. $L = 3 \times DS = 210'$	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. $K = 181$ Min. $L = 3 \times DS = 210'$ $L=KA$ (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.08 Transition Relative Gradient = 0.40 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.42 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over Express Lanes	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Clear Zone (Recoverable Terrain)	30' with 6:1 Front Slopes 42' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, Appendix A, page A-4, Figure 2

RBS = Road and Bridge Standards (October 2019 Revisions), Virginia Department of Transportation (VDOT)

RDM = Roadway Design Manual (January 2020 Revisions), Virginia Department of Transportation (VDOT)

RDG = Roadside Design Guide (2011), American Assoc. of State Highway & Transportation Officials (AASHTO)

AASHTO = American Assoc. of State Highway & Transportation Officials - A Policy on Geometric Design of Highways and Streets (2011)

MSBD = Manual of the Structure and Bridge Division - Part 2 Design Aids - Typical Details

WAPM = Work Area Protection Manual (2015 Revision 1), Virginia Department of Transportation (VDOT)

Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2021-02-12

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2021-02-12

Design Criteria 495 Express Lanes

Roadway: 495 Express Lanes North of Georgetown Pike

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Limited Access Urban Interstate <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	60 MPH	RDM, Appendix A, GS-INT
Minimum Lane Widths	12' travel lanes	RDM, Appendix A, GS-INT
Minimum Roadway Shoulder Widths	Without Roadside Barrier - 10' Paved, 12' Graded With Roadside Barrier - 12' Paved, 16' Graded	RDM, Appendix A, GS-INT, Footnote (1 & 2) RDM, Appendix A, GS-INT, Footnote (1 & 2)
Minimum Bridge Shoulder Widths	12' Left/12' Right	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Buffer Width	4' w/ Raised Tubular Markers	
Maximum Grade	5%	RDM, Appendix A, GS-INT
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	570' (Grades <3%)	RDM, Appendix A, GS-INT AASHTO, Page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Min. $L = 15 \times V$ (MPH) = 900' Des. Min. $L = 30 \times V$ (MPH) = 2100'	AASHTO, Page 3-111 AASHTO, Page 3-111
Minimum Radius @ 8%	1204'	RDM, Appendix A, GS-INT
Minimum Radius w/o Super (NC)	11500'	RBS, TC-5.11, Pg. 803.42
Crest Vertical Curve	Desirable Min. SSD = 730' Minimum SSD = 570' Min. $L = 3 \times DS = 180'$	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. $K = 136$ Min. $L = 3 \times DS = 180'$ $L=KA$ (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.08 Transition Relative Gradient = 0.45 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.42 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over Express Lanes	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Clear Zone (Recoverable Terrain)	30' with 6:1 Front Slopes 32' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, Appendix A, page A-4, Figure 2

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WAPM = Work Area Protection Manual (2015 Revision 1), Virginia Department of Transportation (VDOT)

Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: CEC Date: 2020-11-02

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: AGT Date: 2020-11-03

Design Criteria 495 General Purpose Lanes

Roadway: 495 General Purpose Lanes

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Limited Access Urban Interstate <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	60 MPH	RDM, Appendix A, GS-INT
Minimum Lane Widths	12' travel lanes	RDM, Appendix A, GS-INT
Minimum Roadway Shoulder Widths	Without Roadside Barrier - 12' Paved, 14' Graded With Roadside Barrier - 14' Paved, 18' Graded; 12' Paved shoulder permitted along Southbound I-495 between Georgetown Pike bridge over I-495 and George Washington Memorial Parkway bridge over I-495	RDM, Appendix A, GS-INT, Footnote (1 & 2) RDM, Appendix A, GS-INT, Footnote (1 & 2)
Minimum Bridge Shoulder Widths	12' Left/12' Right	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Buffer Width	4' w/ Raised Tubular Markers	
Maximum Grade	5%	RDM, Appendix A, GS-INT
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	Desirable: 730' (Grades <3%) Minimum: 570' (Grades <3%)	RDM, Appendix A, GS-INT AASHTO, Page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Min. L = 15 x V (MPH) = 900' Des. Min. L = 30 x V (MPH) = 2100'	AASHTO, Page 3-111 AASHTO, Page 3-111
Minimum Radius @ 8% Minimum Radius w/o Super (NC)	1204' 11500'	RDM, Appendix A, GS-INT, RBS, TC-5.11, Pg. 803.40 RBS, TC-5.11, Pg. 803.40
Crest Vertical Curve	Desirable Min. SSD = 730' Minimum SSD = 570' Min. L = 3 x DS = 180'	RDM, Section 2A-6; AASHTO, Table 3-34 RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 136 Min. L = 3 x DS = 180' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.08 Transition Relative Gradient = 0.45 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.40 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over GP Lanes	RDM, Appendix A, GS-INT, Footnote (8) MSBD, Part 2, File 06.02-1
Clear Zone (Recoverable Terrain)	30' with 6:1 Front Slopes 32' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, Appendix A, page A-4, Figure 2

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-04-08

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-08-31

Design Criteria Dulles Toll Road

Roadway: Dulles Toll Road

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Limited Access Urban Principal Arterial System - Freeway <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	60 MPH	RDM, Appendix A, GS-5
Minimum Lane Widths	12' travel lanes	RDM, Appendix A, GS-5
Minimum Roadway Shoulder Widths	Without Roadside Barrier - 10' Paved, 12' Graded With Roadside Barrier - 12' Paved, 16' Graded	RDM, Appendix A, GS-5, Footnote (1 & 2) RDM, Appendix A, GS-5, Footnote (1 & 2)
Minimum Bridge Shoulder Widths	12' Left/12' Right	RDM, Appendix A, GS-5, Footnote (5) MSBD, Part 2, File 06.02-1
Maximum Grade	5%	AASHTO, Table 8-1
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	570' (Grades <3%)	RDM, Appendix A, GS-5 AASHTO, Page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Min. $L = 15 \times V$ (MPH) = 900' Des. Min. $L = 30 \times V$ (MPH) = 1800'	AASHTO, Page 3-111 AASHTO, Page 3-111
Minimum Radius @ 8% Minimum Radius w/o Super (NC)	1204' 11500'	RDM, Appendix A, GS-5 RBS, TC-5.11, Pg. 803.40
Crest Vertical Curve	Min. SSD = 570' Min. $L = 3 \times DS = 180'$	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. $K = 136$ Min. $L = 3 \times DS = 180'$ $L=KA$ (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	$e_{max} = 0.08$ Transition Relative Gradient = 0.45 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.40 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over GP Lanes	RDM, Appendix A, GS-5, Footnote (7) MSBD, Part 2, File 06.02-1
Clear Zone (Recoverable Terrain)	32' with 6:1 Front Slopes 32' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, Appendix A, page A-4, Figure 2

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2021-04-06

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2021-04-06

Design Criteria Interchange Ramp, 30 MPH

Roadway: Dulles Toll Road (DTR) Ramp D2, DTR Ramp E1, DTR Ramp E3, DTR Ramp E4, DTR Ramp G3, DTR Ramp G10
Georgetown Pike (GTP) Ramp SE, GTP Ramp SW, GTP Ramp NW, GTP NW Slip Ramp, GTP Ramp NE
George Washington Memorial Parkway (GWMP) Ramp G21, GWMP Ramp G23, GWMP Ramp E21, GWMP Ramp E22

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Interchange Ramp <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	30 MPH	RDM, Appendix A, GS-R
Minimum Lane Widths	16' single travel lane	RDM, Appendix A, GS-R
Minimum Roadway Shoulder Widths	Left without Roadside Barrier: 4' Paved, 6' Graded Left with Roadside Barrier: 6' Paved, 10' Graded Right without Roadside Barrier: 8' Paved, 10' Graded Right with Roadside Barrier: 10' Paved, 14' Graded However, a minimum 2 ft. paved shoulder is allowed as long as the combined width of the paved shoulders is 10 ft. This flexibility allows for the adjustment of the right and left paved shoulder widths to maximize sight distance.	RDM, Appendix A, GS-R RDM, Appendix A, GS-R; RBS, MC-3B/4 RDM, Appendix A, GS-R RDM, Appendix A, GS-R; RBS, MC-3B/4 IIM-LD-227
Minimum Bridge Shoulder Widths	6' Left / 10' Right However, a minimum 2 ft. paved shoulder is allowed as long as the combined width of the paved shoulders is 10 ft. This flexibility allows for the adjustment of the right and left paved shoulder widths to maximize sight distance.	RDM, Appendix A, GS-R, Footnote (4) IIM-LD-227
Maximum Grade	7%	RDM, Appendix A, GS-R
Minimum Grade (Barrier Wall & Gutter Sections)	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	200' (Grades <3%)	RDM, Appendix A, GS-R AASHTO, page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves		
Minimum Radius @ 8%	215'	RDM, Appendix A, GS-R
Minimum Radius w/o Super. (NC)	3,240'	RBS, TC-5.11, Pg. 803.34
Crest Vertical Curve	Min. SSD = 200' Min. L = 3 x DS = 90'	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 37 Min. L = 3 x DS = 90' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.08 Transition Relative Gradient = 0.75 Single/0.88 dual Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.34 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over Ramp	RDM, Appendix A, GS-R, Footnote (4) MSBD, Part 2, File 06.02-13
Clear Zone (Recoverable Terrain)	14' with 6:1 Front Slopes 8' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, page A-4, Figure 2

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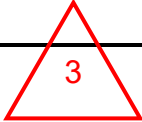
IIM-LD = Instructional and Informational Memoranda - Location and Design Division, Virginia Department of Transportation (VDOT)

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Roadway Inventory and Major Design Criteria



Project: PROJECT NEXT Computed By: AGT Date: 2021-04-06

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2021-04-06

Design Criteria Interchange Loop Ramp, 25 MPH

Roadway: George Washington Memorial Parkway (GWMP) Ramp G22

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Interchange Ramp <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	25 MPH	RDM, Appendix A, GS-R
Minimum Lane Widths	18' single travel lane	RDM, Appendix A, GS-R
Minimum Roadway Shoulder Widths	Left without Roadside Barrier: 4' Paved, 6' Graded Left with Roadside Barrier: 6' Paved, 10' Graded Right without Roadside Barrier: 8' Paved, 10' Graded Right with Roadside Barrier: 10' Paved, 14' Graded However, a minimum 2 ft. paved shoulder is allowed as long as the combined width of the paved shoulders is 10 ft. This flexibility allows for the adjustment of the right and left paved shoulder widths to maximize sight distance.	RDM, Appendix A, GS-R RDM, Appendix A, GS-R; RBS, MC-3B/4 RDM, Appendix A, GS-R RDM, Appendix A, GS-R; RBS, MC-3B/4 IIM-LD-227
Minimum Bridge Shoulder Widths	6' Left / 10' Right However, a minimum 2 ft. paved shoulder is allowed as long as the combined width of the paved shoulders is 10 ft. This flexibility allows for the adjustment of the right and left paved shoulder widths to maximize sight distance.	RDM, Appendix A, GS-R, Footnote (4) IIM-LD-227
Maximum Grade	7%	RDM, Appendix A, GS-R
Minimum Grade (Barrier Wall & Gutter Sections)	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	155' (Grades <3%)	RDM, Appendix A, GS-R AASHTO, page 3-5, Table 3-2
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves		
Minimum Radius @ 8%	135'	RDM, Appendix A, GS-R
Minimum Radius w/o Super. (NC)	2,370'	RBS, TC-5.11, Pg. 803.33
Crest Vertical Curve	Min. SSD = 155' Min. L = 3 x DS = 75'	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 26 Min. L = 3 x DS = 75' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-37 AASHTO, Page 3-161
Superelevation	e max = 0.08 Transition Relative Gradient = 0.84 Single/0.93 dual Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.34 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" Over Ramp	RDM, Appendix A, GS-R, Footnote (4) MSBD, Part 2, File 06.02-13
Clear Zone (Recoverable Terrain)	14' with 6:1 Front Slopes 4' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, page A-4, Figure 2

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-04-08

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-08-31

Design Criteria

Urban Minor Arterial w/ Curb & Gutter, 45 MPH

Roadway: VA Route 738 Old Dominion Drive

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Urban Minor Arterial <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	45 MPH	RDM, Appendix A, GS-6
Posted Speed	40 MPH	VDOT
Minimum Lane Widths	12' - travel lane	VDOT
Standard Curb and Gutter	CG-2/CG-6	RDM, Appendix A, GS-6
Minimum Bridge Shoulder Widths	Match face of curb	RDM, Appendix A, GS-6, Footnote (6)
Maximum Grade	7%	AASHTO, Table 7-4
Minimum Grade <i>(Barrier Wall & Gutter Sections)</i>	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	360' (Grades <3%)	RDM, Appendix A, GS-6 AASHTO, page 3-5, Table 3-2
Min. Intersection Sight Distance	500'	RDM, Appendix F, Pg. F-40, Table 2-5
Pavement Cross Slopes <i>(Tangent)</i>	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Des. Min. L = 15 x V (MPH) = 675'	AASHTO, Page 3-111
Minimum Radius @ 4%	713'	RDM, Appendix A, GS-6
Minimum Radius w/o Super. (NC)	5930'	RBS, TC-5.11U, Pg. 803.29
Crest Vertical Curve	Min. SSD = 360' Min. L = 3 x DS = 135'	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 79 Min. L = 3 x DS = 135' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.04 Transition Relative Gradient = 0.54 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.29 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" over Old Dominion Drive	RDM, Appendix A, GS-6, Footnote (6) MSBD, Part 2, File 06.02-8
Clear Zone <i>(Recoverable Terrain)</i>	24' with 4:1 Front Slope	RDM, Table A-2-1/RDG, Table 3.1
Lateral Offset	15' Construction Clear Zone See RDM Appendix A, Section A-2 for more detail	WAPM, page A-4, Figure 2

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: CEC Date: 2020-11-02

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked By: AGT Date: 2020-11-03

Design Criteria Urban Minor Arterial w/ Curb & Gutter, 40 MPH

Roadway: VA Route 193 Georgetown Pike

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Urban Minor Arterial <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	40 MPH	RDM, Appendix A, GS-6
Posted Speed	35 MPH	VDOT
Minimum Lane Widths	12' - travel lane	RDM, Appendix A, GS-6
Standard Curb and Gutter	CG-2/CG-6	RDM, Appendix A, GS-6
Minimum Bridge Shoulder Widths	Match face of curb	RDM, Appendix A, GS-6, Footnote (6)
Median Width	Min. 4'	RDM, Section 2E-3
Maximum Grade	8%	AASHTO, Table 7-4
Minimum Grade (Barrier Wall & Gutter Sections)	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	305' (Grades <3%)	RDM, Appendix A, GS-6 AASHTO, page 3-5, Table 3-2
Min. Intersection Sight Distance	SDL = 475', SDR = 545' (Four lane divided)	RDM, Appendix F, Pg. F-40, Table 2-5
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Des. Min. L = 15 x V (MPH) = 600'	AASHTO, Page 3-111
Minimum Radius @ 4%	536'	RDM, Appendix A, GS-6
Minimum Radius w/o Super. (NC)	4770'	RBS, TC-5.11U, Pg. 803.28
Crest Vertical Curve	Min. SSD = 305' Min. L = 3 x DS = 120'	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 64 Min. L = 3 x DS = 120' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.04 Transition Relative Gradient = 0.58 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.28 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" over Georgetown Pike	RDM, Appendix A, GS-6, Footnote (6) MSBD, Part 2, File 06.02-8
Clear Zone (Recoverable Terrain)	16' with 4:1 Front Slope 15' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, page A-4, Figure 2
Lateral Offset	See RDM Appendix A, Section A-2 for more detail	

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AASHTO = American Assoc. of State Highway & Transportation Officials - A Policy on Geometric Design of Highways and Streets (2011)

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-11-02

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-11-03

Design Criteria Class VII: Urban Parkway, 60 MPH

Roadway: George Washington Memorial Parkway

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Urban Parkway <i>Rolling Terrain</i>	PRS page 4
Minimum Design Speed (DS)	60 MPH	PRS, Table 1
Posted Speed	50 MPH	PRS, Table 1
Minimum Lane Widths	12' - travel lane	PRS, Table 10
Standard Curb and Gutter	CG-3/CG-7	RDM, Appendix A, GS-5
Minimum Bridge Shoulder Widths	Match face of curb	RDM, Appendix A, GS-5, Footnote (7)
Median Width	Match existing to maximum extent possible	
Maximum Grade	5%	PRS, Table 3
Minimum Grade	Desirable: 0.5% Minimum: 0.35%	PRS, Page 19
Min. Stopping Sight Distance	525' minimum, 650' desirable	PRS, Table 6
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Des. Min. L = 15 x V (MPH) = 900'	AASHTO, Page 3-111
Minimum Radius @ 8%	1206'	PRS, Table 5
Minimum Radius w/o Super. (NC)	11500'	RBS, TC-5.11, Pg. 803.40
Crest Vertical Curve	Min. K = 190, Desirable K = 310 Min. L = 3 x DS = 180'	PRS, Table 4 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 120, Desirable K = 160 Min. L = 3 x DS = 180' L=KA (where A=Algebraic Dif in Grades in %)	PRS, Table 4 AASHTO, Page 3-161
Superelevation	e max = 0.08 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11, Pg. 803.31 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" over George Washington Memorial Parkway	RDM, Appendix A, GS-5, Footnote (7) MSBD, Part 2, File 06.02-8
Clear Zone (Recoverable Terrain)	44' with 4:1 Front Slope 32' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, page A-4, Figure 2

PRS = Park Road Standards, National Park Service (1984)

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-04-08

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-08-31

Design Criteria Urban Local w/ Curb & Gutter, 25 MPH

Roadway: Live Oak Drive
Balls Hill Road

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Urban Local <i>Rolling Terrain</i>	VDOT
Minimum Design Speed (DS)	25 MPH	RDM, Appendix A, GS-8
Posted Speed	25 MPH	VDOT
Minimum Lane Widths	10' - travel lane	RDM, Appendix A, GS-8
Standard Curb and Gutter	CG-2/CG-6	RDM, Appendix A, GS-8, Footnote (12)
Minimum Bridge Shoulder Widths	Match face of curb	RDM, Appendix A, GS-8, Footnote (9)
Maximum Grade	11%	AASHTO, Table 5-2
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	AASHTO, Page 3-119
Min. Stopping Sight Distance	155' (Grades <3%)	RDM, Appendix A, GS-8 AASHTO, page 3-5, Table 3-2
Min. Intersection Sight Distance	280'	RDM, Appendix F, Pg. F-40, Table 2-5
Pavement Cross Slopes (Tangent)	2%	AASHTO, Pages 4-5 and 4-6
Horizontal Curves	Des. Min. L = 15 x V (MPH) = 375'	AASHTO, Page 3-111
Minimum Radius @ 4%	155'	RDM, Appendix A, GS-8
Minimum Radius w/o Super. (NC)	2050'	RBS, TC-5.11U, Pg. 803.25
Crest Vertical Curve	Min. SSD = 155' Min. L = 3 x DS = 75'	RDM, Section 2A-6; AASHTO, Table 3-34 AASHTO, Page 3-153
Sag Vertical Curve	Min. K = 26 Min. L = 3 x DS = 75' L=KA (where A=Algebraic Dif in Grades in %)	AASHTO, Table 3-36 AASHTO, Page 3-161
Superelevation	e max = 0.04 Transition Relative Gradient = 0.70 Runoff (2/3 Outside and 1/3 Inside Curve)	RBS, TC-5.11U, Pg. 803.25 RBS, TC-5.11, Pg. 803.20 RBS, TC-5.11, Pg. 803.06
Minimum Vertical Clearance	16'-6" over Live Oak Drive	RDM, Appendix A, GS-8, Footnote (9) MSBD, Part 2, File 06.02-12
Clear Zone (Recoverable Terrain)	7' with 4:1 Front Slopes 4' Construction Clear Zone	RDM, Table A-2-1/RDG, Table 3.1 WAPM, page A-4, Figure 2
Lateral Offset	See RDM Appendix A, Section A-2 for more detail	

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-04-08

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-08-31

Design Criteria Shared Use Path

Roadway: Shared Use path

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Shared Use Path	
Minimum Design Speed (DS)	18 MPH	RDM, Appendix A(1), page A(1)-30
Minimum Paved Width	10'	RDM, Appendix A(1), Fig. A(1)-1-5
Minimum Shoulder Widths	2' Graded at 6:1 max. slope	RDM, Appendix A(1), Fig. A(1)-1-5
Maximum Grade Adjacent to Roadway Independent to Roadway	Match Roadway 5%	RDM, Appendix A(1), page A(1)-31 RDM, Appendix A(1), page A(1)-31
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	RDM, Appendix A(1), page A(1)-31
Min. Stopping Sight Distance Descending Ascending	133' - 281' (Grade Dependent see Table A(1)-1-4) 133' - 191' (Grade Dependent see Table A(1)-1-5)	RDM, Appendix A(1), page A(1)-32 RDM, Appendix A(1), page A(1)-32
Pavement Cross Slopes	2%	RDM, Appendix A(1), page A(1)-30
Horizontal Curves Minimum Radius	60'	RDM, Appendix A(1), page A(1)-31
Vertical Curves	SSD (Grade Dependent See Table A(1)-1-6)	RDM, Appendix A(1), page A(1)-33
Superelevation	e max = 2.0%	RDM, Appendix A(1), page A(1)-30
Minimum Vertical Clearance	Minimum: 10'	RDM, Appendix A(1), page A(1)-30
Buffer Strip Widths	Minimum: 8' to face of curb	RDM, Appendix A(1), Fig. A(1)-1-4
Lateral Clearance	Minimum: 3'	RDM, Appendix A(1), Fig. A(1)-1-5

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Roadway Inventory and Major Design Criteria

Project: PROJECT NEXT Computed By: AGT Date: 2020-04-08

Subject: ROADWAY DESIGN

Task: DESIGN CRITERIA Checked by: CEC Date: 2020-08-31

Design Criteria Sidewalk

Roadway: Sidewalk

DESIGN ELEMENT	DESIGN VALUE	SOURCE
Facility Type	Sidewalk	
Minimum Width	5'	RDM, Appendix A(1), page A(1)-72
Minimum Shoulder Widths	Minimum 1' graded area	RDM, Appendix A(1), page A(1)-74
Maximum Grade		
Adjacent to Roadway	Match Roadway	RDM, Appendix A(1), page A(1)-73
Independent to Roadway	5%	RDM, Appendix A(1), page A(1)-73
Minimum Grade	Desirable: 0.5% Minimum: 0.3%	RDM, Appendix A(1), page A(1)-73
Pavement Cross Slopes	2%	RDM, Appendix A(1), page A(1)-73
Minimum Vertical Clearance	Minimum: 7'	RDM, Appendix A(1), page A(1)-72
Buffer Strip Widths	Minimum: 4.5' to face of curb (along roadways >25 mph) Minimum: 3.5' to face of curb (along roadways = 25 mph)	RDM, Appendix A(1), Fig. A(1)-1-23 RDM, Appendix A(1), Fig. A(1)-1-23

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