

ROAD DESIGN MANUAL REVISIONS

January, 2019

CHAPTER 1C

- Page 1C-4 – Revised “FIGURE 1C-3 COUNTIES” to reflect the reopening of two Residencies and jurisdiction changes (revised items highlighted in yellow on this page only).
- Page 1C-5 – Revised “FIGURE 1C-4 CITES AND TOWNS (Over 5000 Population)” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-6 – Revised “FIGURE 1C-5 CITES AND TOWNS (< 3500 Population)” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-7 – Revised “FIGURE 1C-6 DISTRICTS AND RESIDENCIES” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-9 – Revised “FIGURE 1C-8 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-10 – Revised “FIGURE 1C-9 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-11 – Revised “FIGURE 1C-10 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-12 – Revised “FIGURE 1C-11 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-14 – Revised “FIGURE 1C-13 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-15 – Revised “FIGURE 1C-14 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-16 – Revised “FIGURE 1C-15 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.
- Page 1C-18 – Revised “FIGURE 1C-17 OPERATIONS REGIONS TOWNS-CITY MAPPING” to reflect the reopening of two Residencies and jurisdiction changes.

CHAPTER 2A

- Page 2A-1 – Revised the following language under “URBAN PROJECTS” from; *“Projects within towns and cities with populations of 3,500 or more (and other selected urban areas under 3,500) are initiated by municipal resolution to the Urban Program Manager stating their desire for VDOT to consider the implementation of a project. Upon receipt of a request the Urban Program Manager/Project Sponsor will work with the District Project Management Office to enter the appropriate information in the “Project Pool” to establish a “New” project, obtain a Temporary UPC number and a Partial state base number. The Project Manager or Project Coordinator will initiate a request for the project to be a “Candidate” in the “Project Pool”, obtain a permanent UPC number and a complete state base number. Once the project is included in a “Live” Six Year Improvement Program (SYIP) a Form PD3 will be submitted by the Federal Programs Management Division to Fiscal Division to authorize preliminary engineering. On Federally Funded Projects the Federal Authorization must be in place to open the project to charges.”*
To; Projects within towns and cities with populations of 3,500 or more (and other selected urban areas under 3,500) are initiated by municipal resolution to the “District” Urban Program Manager stating their desire for VDOT to consider the implementation of a project. Upon receipt of a request the “District” Urban Program Manager/Project Sponsor will work with the District Project Management Office to enter the appropriate information in the “Project Pool” to establish a “New” project, obtain a Temporary UPC number and a Partial state base number. The Project Manager or Project Coordinator will initiate a request for the project to be a “Candidate” in the “Project Pool”, obtain a permanent UPC number and a complete state base number. Once the project is included in a “Live” Six Year Improvement Program (SYIP) a Form “PD4” will be submitted by the Federal Programs Management Division to Fiscal Division to authorize preliminary engineering. On Federally Funded Projects the Federal Authorization must be in place to open the project to charges.
- Page 2A-2 – Revised the following language in the fourth sentence under “INTERSTATE AND PRIMARY PROJECTS” from; *“Once the project is included in a “Live” Six Year Improvement Program (SYIP) a Form PD3 will be submitted...”* To; Once the project is included in a “Live” Six Year Improvement Program (SYIP) a Form “PD4” will be submitted...
- Page 2A-7 – Revised the following language under “REQUESTING PHOTOGRAPHIC COVERAGE/TOPOGRAPHIC MAPPING” from; *“On most new locations, it is desirable to request topographic mapping. A review of available data in most cases allows the Engineer to determine the approximate area to be mapped. In some instances it may be necessary to review the area to be mapped in the field. This area can then be shown accurately on a quadrangle sheet. After determining the area to be mapped, the ratio (scale) of mapping is to be determined. Most mapping is prepared at a 1" = 200' scale; however, it is also available at other scales. When the proper scale is determined, the Project Manager will advise the Photogrammetric Engineer who will proceed in the preparation of the mapping. Immediate action on requests for mapping may not always be possible as the flying time necessary for good aerial photography is limited.”* To; *“See Survey Manual, Chapter 5 Photogrammetric Surveys for more information.”*

Revised the following language under “ASSEMBLING PHOTOTGRAPHS AND MAPPING” from; “*After the photographs are secured, mapping is completed. Prints can be made and used as individual sheets or combined as rolls at the discretion of the Engineer. A set of individual photographs is also essential for stereo viewing. A mosaic can be ordered through the Photogrammetric Engineers, should this be found desirable.*”

To; “*See Survey Manual, Chapter 5 Photogrammetric Surveys for more information.*”

CHAPTER 2B

- Page 2B-1 – Revised the following language in the first sentence under “SURVEY AUTHORIZATION” from; “*Surveys are performed in accordance with the current VDOT Survey Manual.*” To; “*Surveys are performed in accordance with the current VDOT Survey Manual, “Chapter 1”.*”

Deleted the following language under “SURVEY AUTHORIZATION”; “*The authorization procedure for each roadway classification is described in this section.*”

INTERSTATE

Interstate projects are authorized for survey after Location Approval has been given by the Commonwealth Transportation Board and the Federal Highway Administration and in accordance with tentative construction schedules.

PRINCIPAL / MINOR ARTERIAL

Principal and Minor Arterial System projects are authorized for surveys in accordance with established construction or planning schedules. Projects with Federal funding for preliminary engineering require prior approval by the Federal Highway Administration.

URBAN

Urban projects are authorized for survey upon receipt of Form PD-3 from the Urban Program Manager / Project Manager. Projects with Federal funding for preliminary engineering require prior approval by the Federal Highway Administration.

- Page 2B-6 – Revised the following language to the first heading from; “OPERATIONAL/CAPACITY ANALYSIS” To; OPERATIONAL/CAPACITY/“SAFETY” ANALYSIS.

Revised the following language in the first paragraph under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS” from; “*A review of the volume and types of traffic and the physical characteristics of the roadway that includes capacity analysis or traffic flow simulation and considers potential roadway or traffic control improvement to improve traffic flow through the intersection(s) and along other sections of the roadway.*” To; “*This type of analysis is a*” review of the volume and types of traffic and the physical characteristics of the roadway, which includes operational, capacity, and safety analysis and/or traffic flow simulation, “*as well as Highway Safety*”

Manual methods for evaluating potential safety impacts of proposed projects. The goal is to develop” potential roadway and/or traffic control improvement to “*reduce crash potential and to improve operations for all road users*” through the intersection(s) and along other sections of the roadway.

Revised the following language in the second paragraph/sentence under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS from; “*Traffic Data must now be analyzed in relation to the pre-determined Functional Classification.*” To; Traffic Data “*shall*” be analyzed in relation to the pre-determined Functional Classification.

Revised the following language in the second sentence in the third paragraph under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS from; “*Capacities of connecting and crossing roadways shall also be determined...*” To; “*Capacity and crash risk*” of connecting and crossing roadways shall also be determined...

Revised the following language in the fourth paragraph under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS from; “*Where at-grade intersections are proposed, a capacity analysis shall be made to determine whether or not the intersection will operate at a satisfactory level of service. If the analysis indicates an unsatisfactory service level, an interchange should be considered.*” To; Where at-grade intersections are proposed, a capacity analysis shall be “*performed*” to determine whether or not the intersection will operate at a satisfactory level of service. “*Innovative intersections shall be considered before proposing to replace an existing at-grade intersection with an interchange or before proposing a new grade-separated interchange on an existing non-limited-access facility. When interchanges are proposed or are being considered, an analysis in accordance with IIM-LD-200 shall be performed to determine the most appropriate interchange type.*”

Replaced the following language after the fourth paragraph under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS from; “*When interchanges are proposed or are being considered, a capacity analysis should be utilized to determine the type of interchange required.*”

Peak hour traffic projection to the design year shall be used for all capacity analyses.

Reference materials available at this time to assist in capacity analysis include:

- 1. Highway Capacity Manual*
- 2. Design of Urban Streets*
- 3. Highway Capacity Software*

To; “*Design year peak hour traffic projections shall be used for all capacity analyses (see Chapter 2 of this Manual). Traffic capacity analysis shall be performed in accordance with the Traffic Operations and Safety Analysis Manual (TOSAM).*”

Revised the following language in the last paragraph under “OPERATIONAL/CAPACITY/SAFETY ANALYSIS from; “*A review of crash data and the physical characteristics of the roadway...*” To; A “*safety analysis*” review of crash data and the physical characteristics of the roadway...

CHAPTER 2C

- Page 2C-10 – Added the following language at the end of the first bullet under “HORIZONTAL ALIGNMENT AND VERTICAL CONTROL DATA”; “(See Chapter 2H, Figure 2H-8 for sample sheet)”.

Added the following language at the end of the second bullet under “HORIZONTAL ALIGNMENT AND VERTICAL CONTROL DATA”; “(See Chapter 2H, Figure 2H-9 for sample sheet)”.

CHAPTER 2D

- Page 2D-9 – Revised the following language in the last sentence under “UPDATING PLAN IDENTIFICATION” from; “Bridge project numbers are to appear only...” To; Bridge project numbers “and major drainage structures (D#s)” are to appear only...

CHAPTER 2E

- Page 2E-10 – Added the following language under “Raised Medians”; “6. When at least 6 feet wide can serve as a pedestrian and bicycle refuse area by reducing pedestrian exposure to traffic and crash risk by allowing them to wait in the median before continuing to cross the roadway.”

Added the following language at the end of the second paragraph under “Raised Medians”; “Medians narrower than 4 feet are not desirable, in part because of the difficulty in mounting signs within the median in accordance with the MUTCD.”

- Page 2E-24 – Revised the following language in the last sentence under “SOUND BARRIER WALL DESIGN PROCEDURES” from; “If Sound Wall is adjacent to the roadway shoulder then a Concrete Barrier Standard MB-7D is to be used, see detail below.” To; If Sound Wall is adjacent to the roadway shoulder then a Concrete Barrier Standard MB-7D “shall” be used, see detail below.
- Page 2E-26 – Revised the following language in the last sentence under “STEPS AND HANDRAILS” from; “If decorative, wooden, etc., steps are desired for replacement, they are to be designed by the Standards/Special Design Section.” To; If decorative, wooden, etc., steps are desired for replacement, “the design is to be reviewed” by the Standards/Special Design Section.
- Page 2E-50 – Added the following language (bullets) under “Items needed for Commonwealth Transportation Board (CTB) Approval”;
 - When was the traffic analysis reviewed and approved by VDOT? (Provided by the District)
 - Is the project in a non-attainment area? When was the air quality conformity review completed? (Provided by the District)
 - What type of environmental document was completed and when was it approved? (Provided by the District)

- Page 2E-64 – Added the following language after the first paragraph under “NOTES”;
“The following note is to be placed in the upper left hand corner;

For OpenRoads/ GEOPAK / Projects:

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT’S ENGINEERING DESIGN PACKAGE (OpenRoads / GEOPAK)

OpenRoads / GEOPAK Computer Identification No. (UPC NUMBER)”

- Page 2E-68 – Deleted the following language;

“For IGrds Projects:

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT’S INTERACTIVE GRAPHIC ROADWAY DESIGN SYSTEM (IGrds)

IGrds Computer Identification No. (UPC NUMBER)

For GEOPAK Projects:

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT’S ENGINEERING DESIGN PACKAGE (GEOPAK)

GEOPAK Computer Identification No. (UPC NUMBER)”

- Page 2E-69 – Revised the following language in the first sentence under ‘PROJECT LOCATION MAP’ from; *“A project location map sheet is to be included on all projects other than Secondary’s, and is to show sufficient surrounding area to provide obvious location of the proposed project.”* To; A project location map sheet is to be included on all projects and is to show sufficient surrounding area to provide obvious location of the proposed project.

- Page 2E-79 – Revised the following language under “REQUEST FOR SPECIAL DESIGN PLANS” from; *“REQUEST FOR SPECIAL DESIGN PLANS”* To; REQUEST FOR SPECIAL DESIGN “DRAWINGS”.

Revised the following language in the first paragraph under “REQUEST FOR SPECIAL DESIGN DRAWINGS” from; *“After the Field Inspection questions have been resolved, requests shall be made to the Standards/Special Design Section, by memorandum, to prepare the necessary special design roadway drawings for inclusion in the plans. This process is explained in Chapter 2G-1-FINALIZING PLANS of this manual.”* To;

After the Field Inspection questions have been resolved, requests shall be made to the Standards/Special Design Section, to prepare the necessary special design roadway drawings for inclusion in the plans. This process is explained in “Section” 2G-1-FINALIZING PLANS of this manual.

Deleted the following language at the end of the first paragraph under “REQUEST FOR SPECIAL DESIGN DRAWINGS”; *“The scheduled advertisement date, the project charge number, and prints of the pertinent plan sheets are to accompany the request. The designer is to furnish any required additional data and/or instructions to the Standards/Special Design Section to assure that correct specifications are incorporated in the drawing(s).”*

Deleted the following language under “REQUEST FOR SPECIAL DESIGN DRAWINGS”;
“The Hydraulics Engineer shall submit all requests for special design drainage items by transmittal slip (copy to the Road Designer) to the Standards/Special Design Section. When the design is completed, the Standards/Special Design Section is to review the final design with the Hydraulics Section before furnishing the road designer with the drawing for insertion in the project assembly.”

CHAPTER 2F

- Page 2F-4 – Added the following language after “COMPLIANCE WITH FEDERAL REGULATIONS”;

RIGHT OF WAY NOTE ON TITLE SHEET

In some instances, the proposed construction will be within existing Right of Way, this includes all easements. Such is the case with some intersection improvements for the addition of turning lanes or on safety projects. When this situation occurs, the following note is to be shown on the title sheet in the area adjacent to the Right of Way Approval signature block:

"All construction is to be performed within existing right of way."

- Page 2F-5 – Added the following language at the bottom of the page; *“To be used ONLY when advance acquisition is needed prior to the official right of way approval.”*
- Page 2F-6 – Added the following language at the bottom of the page; *“To be used ONLY when advance acquisition is needed prior to the official right of way approval.”*

CHAPTER 2G

- Page 2G-2 – Revised the following language in the second sentence in the second paragraph under “SPECIAL DESIGN DRAWING REQUEST PROCEDURES” from; *“The Hydraulics Engineer shall submit all requests for required special design drainage drawings (copy of memo to the Road Designer) to the Standards/Special Design Section.”*
To; The Hydraulics Engineer shall submit all requests for required special design drainage drawings to the Standards/Special Design Section *“and copy the road designer.”*

Revised the following language in the sixth sentence in the second paragraph under “SPECIAL DESIGN DRAWING REQUEST PROCEDURES” from; *“All requests shall include the scheduled advertisement date, complete project charge number and the name and telephone number of the Road Designer.”* To; All requests shall include the scheduled advertisement date, complete project charge number, *“pertinent plan sheets”* and the name and telephone number of the Road Designer.

CHAPTER 2H

- Page 2H-42 – Added “FIGURE 2H-42 SAMPLE PEDESTRIAN CROSSWALK PLAN (FOR ALTERATION PROJECTS ONLY).”
- Page 2H-43 – Added “FIGURE 2H-43 SAMPLE PEDESTRIAN CROSSWALK PLAN (FOR ALTERATION PROJECTS ONLY).”

APPENDIX A

- Page A-1 – Added the following language at the end of the second paragraph under “INTRODUCTION”; *“See Appendix B(1) for the development of new residential and mixed-use streets functional classified as “local” streets and Appendix B(2) for multimodal design standards for mixed-use urban centers.”*
- Page A-12 – Added “NEW” GEOMETRIC DESIGN STANDARDS FOR INTERSTATE SYSTEM (GS-INT)
- Page A-13 – Revised “FIGURE A-1-1 GEOMETRIC DESIGN STANDARDS FOR RURAL PRINCIPAL ARTERIAL SYSTEM (GS-1)” to eliminate the “Interstate” information as well as revised language in some of the columns.

Deleted the following language under “GENERAL NOTES”; *“Interstates - All new and major reconstructed Interstate facilities will have a posted +5 mph design speed unless concurrence by the State Location and Design Engineer.”*

Revised the following language to “FOOTNOTE” No. 1 from; *“Graded Shoulders include the paved portion. Shoulder widths shown are for right shoulders and independently graded median shoulders. No additional width is necessary for guardrail situations.*

For 4-lane non-Interstates (2 lanes in each direction) with independently graded median shoulders, an 8' graded median shoulder will be provided. For 6 or more lanes (Non-Interstate and Interstate), the graded median shoulder shall be the same as right graded shoulder. On Interstates / Freeways, if truck traffic exceeds 250 DDHV, a wider graded shoulder should be considered (14' for fills & cuts and 18' with guardrail).” To; *“Total” shoulders “widths” include the paved portion “and are applicable to the left and right shoulder.”*

On Freeways, if truck traffic exceeds 250 DDHV, a wider “total” shoulder should be considered (14' “without guardrail” and 18' with guardrail).

Revised the following language in the second sentence under “FOOTNOTE” No. 2 from; *“On Interstates / Freeways, if truck traffic exceeds 250 DDHV...”* To; *“On Freeways, if truck traffic exceeds 250 DDHV...”*

- Page A-14 - Revised language in some of the columns in “FIGURE A-1-2 GEOMETRIC DESIGN STANDARDS FOR RURAL MINOR ARTERIAL SYSTEM (GS-2)”.

Deleted the following language under the old “FOOTNOTES” No. 3; *“(3)When the mainline is 4 lanes (2 lanes in each direction) and a graded median is used, the width of the graded median shoulder is to be 8’.”*

Deleted the following language in the first sentence under the old “FOOTNOTES” No. 4, now “FOOTNOTES” No. 3; *“When the mainline is 4 lanes (2 lanes in each direction) a minimum 8' wide paved shoulder shall be provided on the right of traffic and a minimum 4' wide paved shoulder on the median side.”*

Added the following “FOOTNOTE”; *(8) Total shoulder widths include the paved portion and are applicable to the left and right shoulder.*

- Page A-15 - Revised language in some of the columns in “FIGURE A-1-3 GEOMETRIC DESIGN STANDARDS FOR RURAL COLLECTOR ROAD SYSTEM (GS-3)”.

Revised the following language in the first two sentences under “FOOTNOTE” No. 3 from; *“Provide 4' wide paved shoulders when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage. Provide 5' wide paved shoulder when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage and the route is an AASHTO approved U.S. Bicycle Route (1, 76 or 176) or designated as a bicycle route on a locally adopted transportation plan.”* To; *“When the mainline is 2 lanes” provide 4' wide paved shoulders “(right and left)” when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage. Provide 5' wide “right” paved shoulder when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage and the route is an AASHTO approved U.S. Bicycle Route (1, 76 or 176) or designated as a bicycle route on a locally adopted transportation plan.*

Revised the following language under “FOOTNOTE” No. 4 from; *“When the mainline is four lanes with ADT >2000, a minimum paved shoulder width of 6' right of traffic and 3' left of traffic will be provided.”* To; *When the mainline is four lanes with ADT >2000, a minimum paved shoulder width of 6' right of traffic and 3' left of traffic “shall” be provided.*

- Page A-16 - Revised language in some of the columns in “FIGURE A-1-4 GEOMETRIC DESIGN STANDARDS FOR RURAL LOCAL ROAD SYSTEM (GS-4)”.

Revised the following language in the first sentence under “FOOTNOTE” No. 5 from; *“Provide 4' wide paved shoulders when design year ADT exceeds...”* To; *“When the mainline is 2 lanes” provide 4' wide paved shoulders “(right and left)” when design year ADT exceeds...*

- Page A-17 – Revised “FIGURE A-1-5 GEOMETRIC DESIGN STANDARDS FOR URBAN PRINCIPAL ARTERIAL SYSTEM (GS-5)” to eliminate the “Interstate” information.

Revised the following in the last sentence in the second paragraph under “GENERAL NOTES” from; “*Under these conditions, a design speed of 70 mph is desirable because the higher design speeds are closely related to the overall quality and safety of the facility.*” To; Under these conditions, a design speed of 70 mph “*should be considered.*”

Revised language in the fourth paragraph under “GENERAL NOTES” to eliminate the term “Interstate”.

Revised the following language to “FOOTNOTE” No. 1 from; “*Shoulder widths shown are for right shoulders and independently graded median shoulders. An 8' graded median shoulder will be provided when the mainline is 4 lanes (2 lanes in each direction). For 6 or more lanes (Non-Interstate and Interstate), the median shoulder provided will be the same as that shown for independent grading. On Interstates / Freeways, if truck traffic exceeds 250 DDHV, a wider graded shoulder should be considered (14' for fills & cuts and 18' with guardrail).*” To; “*Total shoulder widths include the paved portion and are applicable to the left and right shoulder.*” On Freeways, if truck traffic exceeds 250 DDHV, a wider “total” shoulder should be considered (14' “without guardrail” and 18' with guardrail).

Revised the following language in the first sentence under “FOOTNOTE” No. 2 from; “*When the mainline is 6 or more lanes, the left paved shoulder width should be the same as the right paved shoulder.*” To; When the mainline is 6 or more lanes, the left paved shoulder width “shall” be the same as the right paved shoulder.

Revised the following language in the second sentence under “FOOTNOTE” No. 2 from; “*On Interstates / Freeways, if truck traffic exceeds 250 DDHV...*” To; “*On Freeways, if truck traffic exceeds 250 DDHV...*”

Deleted the following language at the end of the second sentence under “FOOTNOTE” No. 2; “*** AASHTO Minimum, See Interstate Guide.*”

- Page A-18 – Revised language in “Minimum Width of Shoulder” column in “FIGURE A-1-6 GEOMETRIC DESIGN STANDARDS FOR URBAN MINOR ARTERIAL STREET SYSTEM (GS-6)”.

Deleted old “FOOTNOTE” No. 7; “*If graded median is used, the width of median shoulder is to be 8' (See Standard GS-11 for shoulder design).*”

Deleted the following language in the first sentence under new “FOOTNOTES” No. 7; “*When the mainline is 4 lanes (2 lanes in each direction) a minimum 8' wide paved shoulder shall be provided on the right of traffic and a minimum 4' wide paved shoulder on the median side.*”

Revised the following language in the first sentence under new “FOOTNOTES” No. 7, now “FOOTNOTES” No. 7 from; “*Where the mainline is 6 or more lanes, both right and median paved shoulders will be 8' in width.*” To; Where the mainline is 6 or more lanes, both right and median paved shoulders “shall” be 8' in width.

Added the following “FOOTNOTE”; “(14) See Appendix J for guardrail installation adjacent to curb or curb and gutter.”

Added the following “FOOTNOTE”; “(15) Total shoulder widths include the paved portion and are applicable to the left and right shoulder.”

- Page A-19 – Revised language in “Minimum Width of Shoulder” column in “FIGURE A-1-7 GEOMETRIC DESIGN STANDARDS FOR URBAN COLLECTOR SYSTEM (GS-7)”.

Revised the following language in “FOOTNOTE” No. 7 from; “When Design year ADT exceeds 2000 VPD, with greater than 10% total truck and bus usage: Provide 4’ wide paved shoulders when the graded shoulder is 5’ wide or greater.” To; When Design year ADT exceeds 2000 VPD, with greater than 10% total truck and bus usage: Provide 4’ wide paved shoulders “(right and left)” when the graded shoulder is 5’ wide or greater.

- Page A-20 – Revised language in some of the columns in “FIGURE A-1-8 GEOMETRIC DESIGN STANDARDS FOR URBAN LOCAL STREET SYSTEM (GS-8)”.

Revised the following language in “FOOTNOTE” No. 7 from; “When Design year ADT exceeds 2000 VPD, with greater than 5% total truck and bus usage: Provide 4’ wide paved shoulders when the graded shoulder is 5’ wide or greater.” To; When Design year ADT exceeds 2000 VPD, with greater than 5% total truck and bus usage: Provide 4’ wide paved shoulders “(right and left)” when the graded shoulder is 5’ wide or greater.

Added the following “FOOTNOTE”; “(12) Where bicycle accommodation is next to curb or curb and gutter, mountable curb (CG-3) or mountable curb and gutter (CG-7) shall be used for design speeds of 45 mph and below.”

- Page A-21 – Revised language in “Minimum Width of Shoulder” column in “FIGURE A-1-9 GEOMETRIC DESIGN STANDARDS FOR SERVICE ROADS (GS-9)”.
- Page A-22 – Revised language in “Minimum Width of Shoulder” in “FIGURE A-1-10 GEOMETRIC DESIGN STANDARDS FOR INTERCHANGE RAMPS (GS-R)”.
- Page A-24 – Revised language in “FIGURE A-1-12 GEOMETRIC DESIGN STANDARDS FOR SHOULDER DESIGN (GS-11).”
- Page A-50 – Revised the following language in item #1 under “Mini-Roundabouts should meet the following geometric design criteria” from; “Central island of 25 to 50 feet, which is fully mountable” To; Central island “diameter” of 25 to 50 feet, which is fully mountable.

Revised the following language in item #2 under “Mini-Roundabouts should meet the following geometric design criteria” from; “Central island curb height is less than 2 inches high and is often flush and painted” To; Central island “and splitter island” curb height is less than 2 inches high and is flush “(traversable)” and painted “when frequently used by buses”.

Revised the following language in item #3 under “Mini-Roundabouts should meet the following geometric design criteria” from; “*Central island should be domed using 5% - 6% cross slope, with maximum height of 5 inches*” To; Central island “*that are raised*” should be domed using 5% - 6% cross slope, with maximum height of 5 inches

Deleted the following language in the last paragraph under “Mini-Roundabouts should meet the following geometric design criteria” from; “*Mini-Roundabouts are designed with painted “splitter islands” in each quadrant to guide traffic. The majority of traffic (usually estimated at 97%) should be able to pass through the mini-roundabout while staying within the circular roadway. The traversable central island and splitter islands allow larger vehicles to pass through. Mini-Roundabouts can conservatively handle 1,600 VPH (all approaches) while providing an adequate level of service.*” To; The majority of traffic (usually estimated at 97%) should be able to pass through the mini-roundabout while staying within the “*circulatory*” roadway. The “*fully*” traversable central island and splitter islands allow larger vehicles to pass through. Mini-Roundabouts “*are generally recommended for intersections in which the total average daily traffic (ADT) volume is no more than approximately 15,000 vehicles.*”

Added the following new “Source”; *FHWA Technical Summary Mini-Roundabouts*

- Page A-54 – Added the following language at the end of the second bullet under “GEOMETRIC DESIGN CRITERIA FOR SINGLE-LANE AND MULTI-LANE ROUNDABOUTS”; “*All roundabout shall be analyzed using AutoTurn to verify that S-BUS-36 school buses, (and for roundabouts on transit routes, CITY-BUS) will be able to traverse the circulatory roadway without the rear wheels tracking over the truck apron.*”
- Page A-56 – Added the following language to the “Roundabout Category Comparison” chart; *Definitions:*

Capacity: The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic and control conditions, usually expressed as vehicles per hour or persons per hour.

Operational analysis: A use of capacity analysis to determine the prevailing level of service on an existing or projected facility, with known or projected traffic, roadway and control conditions.

Source: NCHRP Report 672, page 1-12, Exhibit 1-9

- Page A-59 – Revised the following language in the second bullet under “The plan submittal shall contain and depict the following criteria” from; “*Design vehicle for Circulatory Roadway (S-BUS-36).*” To; Design vehicle for Circulatory Roadway (S-BUS-36 “*or City Bus*”)

- Page A-98 – Revised the following language in the first paragraph under “SIGNING, SIGNALS AND PAVEMENT MARKINGS” from; “Traffic control devices such as signing, signals, and pavement markings must be updated in accordance with the Manual on Uniform Traffic Control Devices and the VDOT’s Road and Bridge Standards.” To; Traffic control devices such as signing, signals, and pavement markings “shall” be “reviewed for conformance” with the Manual on Uniform Traffic Control Devices (MUTCD), “Virginia Supplement to the MUTCD” and VDOT’s Road and Bridge Standards.

Replaced the following language in the last paragraph under “SIGNING, SIGNALS AND PAVEMENT MARKINGS” from; “Signals are to be provided at warranted locations.” To; *Traffic signals should be installed where they are determined to be both warranted and justified in accordance with IIM-TE-387, (Requirements for Signal Justification Reports (SJR) For New and Reconstructed Signals).*
http://www.virginiadot.org/business/resources/IIM/TE-387_Signal_Justification_Reports.pdf

APPENDIX A(1)

- Page A(1)-6 – Added the following language after the third paragraph;
“In February 2018, FHWA released FHWA Guidebook for Measuring Multimodal Network Connectivity. This resource focuses on pedestrian and bicycle network connectivity and provides information on incorporating connectivity measures into state, metropolitan, and local transportation planning processes.

In July 2018, FHWA Updated the Guide for Improving Pedestrian Safety at Uncontrolled Locations

https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/guide_to_improve_uncontrolled_crossings.pdf that was released in January 2018. This guide assists state and local transportation or traffic safety departments that are considering developing a policy or guide to support the installation of countermeasures at uncontrolled pedestrian crossing locations. This document provides guidance to agencies, including best practices for each step involved in selecting countermeasures. By focusing on uncontrolled crossing locations, agencies can address a significant national safety problem and improve quality of life for pedestrians of all ages and abilities. Agencies may use this guide to develop a customized policy or to supplement existing local decision-making guidelines.

This version has been updated to include the Rectangle Rapid-Flashing Beacon (RRFB). FHWA issued a new Interim Approval (IA-21) for the use of RRFBs in March 2018.

In July 2018, FHWA Updated the Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/pocket_version.pdf that was also released in January 2018. This field guide helps agencies select pedestrian crash countermeasures based on criteria established in published literature, best practices, and national guidance. This guide includes a form that the agency may use to document roadway characteristics and pedestrian safety issues. It also tables that relate these documented conditions to a specific set of countermeasure options. A series of descriptions lead the agency through additional installation considerations for each countermeasure.

This version has also been updated to include the Rectangle Rapid-Flashing Beacon (RRFB). FHWA issued a new Interim Approval (IA-21) for the use of RRFBs in March 2018.”

- Page A(1)-7 – Added the following language at the top of the page;
In November 2018, the ITE Complete Streets Council released the Curbside Management Practitioners Guide <https://www.ite.org/technical-resources/topics/complete-streets/ite-curbside-management-practitioner-s-resource/> in response to widespread interest in the designation and optimization of curb space to accommodate the needs of all users. The purpose is to outline a decision-making framework that can be applied across a broad spectrum of locations and contexts.
- Page A(1)-86 – Revised “Table A(1)-2-2 Off-Street and Park-And-Ride Lot Parking Spaces” to add a new column for “Total Accessible & Van-Accessible Parking Spaces”

APPENDIX B(1)

- Page B(1)-23 – Revised the following language in the fourth paragraph from; *“If intercity buses, single unit trucks or standard 65-passenger school buses are expected to use the street, the minimum radius should be increased to accommodate the turning radius of such vehicles. Minimal encroachment into the opposing lane of traffic of the receiving street is expected. The minimum radius of the curb return shall not be less than 5 feet.”*
To; If intercity buses, standard “84” passenger school buses “or semitrailers” are expected to use the street, the minimum radius should be increased to accommodate the turning radius of such vehicles. *“However, all subdivision streets shall be designed to accommodate, at a minimum, S-BUS-36 school buses and SU-40 signal-unit trucks.”* Minimal encroachment into the opposing lane of traffic of the receiving street “by the design vehicle” is expected. The minimum radius of the curb return shall not be less than 5 feet.
- Page B(1)-54 – Added the following language at the end of the second paragraph under “I. ROADWAY LIGHTING”; *“The lighting plans shall identify whether conventional light poles are breakaway or non-breakaway. All conventional light poles within the clear zone shall be breakaway.”*

APPENDIX F

- Page F-30 – Revised the following language at the end of the first paragraph under “Spacing Standards for Commercial Entrances/Intersections Near Interchange Ramps” to;
“Note: For Limited Access Line Fence Requirements / Placement, see Figures 2E-10 and 2E-11 and for FHWA Minimum Limited Access Control: 100' Urban and 300' Rural, see bottom of Figure 2E-10 of the Road Design Manual.”
- Page F-61 – Added the following language at the end of the first paragraph; *“(Source: Highway Research Report, Number 211)”*.

- Page F-72 – Revised the following language in the first paragraph under “Double (Duel) Left-Turn Lanes” from; “Double (dual) left-turn lanes (DLTL’s) shall be considered when left-turn demand exceeds 300 vph, and are desirable where peak left-turn movements exceed 350 vph. DLTL’s require a protected (exclusive) signal phase, a minimum 4’ raised concrete median separating opposing traffic, and a width of at least 30’ on the acceptance lanes (see Figure 3-23).” To; “*Double (dual) left-turn lanes (DLTL’s) shall be considered where peak left-turn movements exceed 350 vph. DLTL’s require a protected (exclusive) signal phase, a minimum 4’ raised concrete median separating opposing traffic, and a width of at least 30’ on the acceptance lanes (see Figure 3-23).*”

Added the following language at the end of first paragraph under “Double (Duel) Left-Turn Lanes”; “*The AutoTurn analysis shall consider, at a minimum, simultaneous side-by-side turning movements by the design vehicle in the outer left turn lane and a passenger car in the inner left lanes(s).*”

Revised the following language in the second paragraph under “Double (Duel) Left-Turn Lanes” from; “The length of storage should accommodate at least 1.5 times the expected vehicles making left turns per cycle based on peak 15-min. periods.” To; The length of storage shall be sufficient to accommodate the projected queuing as per the TOSAM.

Deleted the following language after the third paragraph; “*When DLTL’s are required, a capacity analysis of the intersection shall be performed to determine what traffic controls are necessary (i.e. - signalization, separate phasing) in order to have this double left-turn lane function properly.*”

Revised language in the following heading from; “Continuous Left-Turn Lanes (Two Way in Either Direction)” To; Continuous “*Two-Way*” Left-Turn Lanes “*(TWLTL’s)*” .

Revised the following language in the first sentence under “Continuous Two-Way Left-Turn Lanes (TWLTL’s)” from; “Continuous two-way median left-turn lanes (C2WMLTL’s) should be considered on low-speed arterial highways (25 to 45 MPH) with no heavy concentrations of left-turn traffic.” To; Continuous two-way left-turn lanes (TWLTL’s) should be considered on low-speed arterial highways (25 to 45 MPH) with no heavy concentrations of left-turn traffic.

Revised the following language in the second sentence under “Continuous Two-Way Left-Turn Lanes (TWLTL’s)” from; “C2WMLTL’s also may be used where an arterial or major route must...” To; “TWLTL’s” also may be used where an arterial or major route must...

Revised the following language in the second paragraph under “Continuous Two-Way Left-Turn Lanes (TWLTL’s)” from; “C2WMLTL’s shall only be used with roadways having a maximum of 2 through lanes in each direction, and shall be shown in accordance with Figure 3-24.” To; “TWLTL’s” shall only be used with roadways having a maximum of 2 through lanes in each direction, and shall be shown in accordance with Figure 3-24.

- Page F-75 – Deleted the following language under “Medians - Channelization”; “*Median crossovers on rural, high-speed highways shall be signed with Do Not Enter and One-way signs.*”

Revised the following language under “Medians – U-turns” from; “The median width may be designed to permit U-turn movements. If a facility is too narrow to safely permit a U-turn, these movements should be addressed in design (such as flare outs in Figure 2-5) or restricted through signage. Sign use and placement require Department approval.” To; Medians “*should*” be designed to permit U-turn movements. If a “*median*” is too narrow to permit U-turns “*by the design vehicle, then a flare-out (“loon”) as shown in Figure 2-5 should be provided, or else signs shall be erected prohibiting U-turns.*”

Revised the following language in the third bullet under “Directional Median Crossovers for Left Turns and U-Turns” from; “Narrow median noses are difficult to see especially at night and in inclement weather. Reflectorized paint is of little help as it rapidly becomes dirty and loses its limited reflectivity. Reflectorized traffic buttons or reflectorized pylons help but lack the mass necessary to provide good target value.” To; Narrow median noses “*less than 4 feet wide*” are difficult to see especially at night and in inclement weather, “*even when yellow raised pavement markers are adhered to the median nose.*”

- Page F-88 – Revised the following language in “TABLE 4-1 ENTRANCE TYPES AND RULES” to add Figure “4-1B” in the “Design” column to each type of entrance.
- Page F-95 – Added the following label to the existing detail; “*Figure 4-1B Commercial Entrance Sight Distance*”.

APPENDIX J

- Page J-3 – Revised the following language under “GR-10” from; “*This system to span low fill culverts is allowed until a MASH equivalent is developed and approved with the following requirements. For Types I & II, raise the rail to 31” to match the MGS System height. For Type III, the height will remain the same, but GR-MGS4 transitions will be required on each side. Refer to Appendix I for additional guidance.*” To; This system to span low fill culverts is allowed, with the following requirements, until a MASH equivalent is developed and approved. For Types I & II, raise the rail to 31” to match the MGS System height. It is not necessary to adjust the MGS post spacing and rail splice locations for Types I & II. “*The nested rail sections will be splice to splice instead of post to post.*” Type III “*installations will remain the same with rail nesting, post spacing, rail splice location, and GR-2 27 3/4” rail height per the Standard. On each end of a GR-10 Type III, GR-MGS4 transitions will be required to transition to the MGS system. Refer to Appendix I for additional information on GR-10.*”

Added the following language after GR-10; “**THREE-BEAM BULL NOSE BARRIER**
This NCHRP 350 system is allowed, with the following requirement, until a MASH equivalent is developed and approved. If attaching to a GR-MGS system, contact the Standards and Special Design Section for guardrail transition guidance.”

- Page J-7 – Revised the following language in item #4 and “Note” (j) in “TABLE J-3-2 TYPICAL FIXED AND HAZARDOUS OBJECTS WITHIN THE CLEAR ZONE” from; “Retaining walls and culvert headwalls (j)”, Note (j) “When a barrier is required for a retaining wall or a culvert headwall over 23’ in length, a cast-in-place concrete parapet is to be used. Depending on the wall design, the parapet can be integrated into the wall or cast with a moment slab to resist overturning.” To; Retaining walls “(Including MSE walls) (j)” , Note (j) When a barrier is required “on the top of a retaining wall, a cast-in-place concrete parapet is to be used on top of the wall. Depending on the wall design, the parapet can be integrated into the wall or cast with a moment slab to resist overturning. Do not use guardrail in conjunction with a retaining wall.”

Added the following language in “TABLE J-3-2 TYPICAL FIXED AND HAZARDOUS OBJECTS WITHIN THE CLEAR ZONE”;

“10. Sound Walls (k)

(k) A cast-in-place concrete barrier is required in front of a sound wall. Refer to Chapter 2E for sound barrier wall design procedures.”

“11. Culvert Headwalls (l)

Consider extending new or existing culvert to move the headwall out of the Clear Zone or designing the headwall as a parapet for a new culvert installation. If guardrail cannot be installed due to the culvert width and shallow fill over the culvert, then cast-in-place concrete barrier must be used over the culvert. If the concrete barrier is being used as a parapet then it must be integral to the culvert or cast with a moment slab.”

- Page J-12 – Revised the following language in the first sentence on this page from; “For paving under GR-MGS1 and GR-MGS2, the same detail shown for GR-2 and GR-9 respectively in Standard MC-4 is applicable.” To; For paving under GR-MGS1 and GR-MGS2, “Standard MC-4 is applicable. If pavement depth under guardrail is greater than 2”, then the Special Provision for Guardrail Post Leave-out shall be used. The leave-out in the pavement allows the post to rotate as intended when the guardrail is hit.”