IMPERIAL ROAD DESIGN MANUAL
REVISIONS July, 2015

NOTE: Revised language throughout the Road Design Manual to remove all references to Metric units.

Revised language throughout the Road Design Manual to add "*Engineer/*" to "District Administrator" and Residency Administrator to read District "*Engineer/*"Administrators and Residency "*Engineer/*"Administrator.

CHAPTER 2A

- 2A-1 – Revised the following language under "PRELIMINARY ENGINNERING AUTHORIZATION" from; "*Projects are initiated and funding requests are submitted according to the system classification. For an electronic copy of the Funding Allocation/Verification/Submittal Process see IIM-PMO-3.4.*" To; "*This function is now the responsibility of Infrastructure Investment Division.*"

  Revised the following language in the fourth sentence under "URBAN PROJECTS" from; "*Once the project is included in a "Live" Six Year Improvement Program (SYIP) a Form PD3 will be submitted by the Programming Division…*" To; 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…

  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 by the Programming Division…*" To; "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…

CHAPTER 2B

- 2B-10 – Revised the following language in the first sentence under "AVAILABILITY OF PLANS from; "*The availability of plans is to be made in accordance with instructions contained in IIM-PMO-3.4 and PM-105.*" To; "*The availability of plans is to be made in accordance with instructions contained in PM-105.*"

CHAPTER 2C

- 2C-6 – Revised the following language at the beginning of the page from;
  SURVEY BASELINE
  All survey baselines are to be shown in accordance with CADD Standards. Circles are to be shown at each intersection point of two or more survey lines, having these points as the center. Station marks are to be shown at 100 feet - Rural, and 50 foot - Urban intervals, perpendicular to the survey baseline and extending approximately $^{1}/_{10}$ inch left and right. The 500 feet station marks are to be labeled with the station number equal distances to the left and at a distance adequate to clear anticipated proposed right of way.
  To;
  BASELINE *STATIONING*
  Station marks are to be shown on all baselines at 100 feet - Rural and 50 foot - Urban intervals, perpendicular to the baseline. *Enter all alignments for new projects using the Departments current automated engineering design package GEOPAK.* Circles are to be shown at each intersection point of two or more baselines, having these points as the center.

- 2C-8 – Added the following language at the end of the paragraph under "RIGHT OF WAY"; *"Distances, bearings and curve information (metes and bounds) are to be shown for the entire periphery of take on all properties owned by U.S. and state agencies; National Forests; Railroads and Power Companies. For more information see Chapter 6 in the Survey Manual."*

CHAPTER 2D

- Page 2D-20 – revised the following language in the second sentence in the fourth paragraph under "SHOWING PROJECT TERMINI ON PLANS" from; *"Temporary construction beyond these points is to be flagged showing "Begin Construction"," End Construction" and applicable stations."* To; *"Other"* construction beyond these points is to be flagged showing "Begin Construction"," End Construction" and applicable stations.

- 2D-25 – Revised the following language under heading "*PROCEDURE FOR THE PUBLIC HEARING"* label to PROCEDURE"*S"* FOR *"A FORMAL"* PUBLIC HEARING See *Section 3.06 Public Involvement Manual.*

- 2D-26 – Added the following language and "Heading";
  PROCEDURES FOR AN INFORMAL (OPEN FORUM) PUBLIC HEARING
  See Section 3.07 Public Involvement Manual
  See Pre-hearing Meeting Procedures on the previous page.

CHAPTER 2E

- 2E-14 – Added the following language in the second paragraph under "MEDIANS";
  Medians may be depressed, raised or flush with the pavement surface. "*The general range of median widths is from 4 feet minimum raised median in urban areas to 60 feet or greater depressed median in rural areas. A wide median between traffic moving in opposing directions is safer and more comfortable for the motorist than head-to-head traffic close together.*" Notable exceptions to this are at-grade intersections, where wide medians may cause drivers to become confused over the operational characteristics and the increased time for vehicles to cross the median may lead to inefficient signal operation. "*However, it may be necessary in urban areas where right of way is more costly to provide a narrower median with a positive barrier while maintaining the required shy line.*" Economic, environmental and land use factors "*also may*" limit the width of median that can be provided.

- 2E-15 – Revised the following language in the first sentence of the first paragraph <u>from</u>;
  "*Therefore, in the selection of a median width, the function(s) the median is to serve must be thoroughly evaluated with the economic, environmental and other impacts.*" <u>To</u>;
  Therefore, in the selection of a median width, the function(s) the median is to serve must be thoroughly evaluated "*and balanced*" with the economic, environmental and other impacts.

  Revised the following language in the second paragraph;
  Depressed median "*widths of 60 feet or greater*" are preferred on freeways and other high speed "*rural principal arterials with shoulders and ditches*" where greater separation of opposing traffic is desired. "*A 60 foot median allows for two future inside travel lanes, left (inside) shoulders, barrier and more*" efficient drainage and snow removal. Side slopes should be 6:1; however, 4:1 "*slopes may be adequate based on Appendix A, Section A-1 GS Standards. When depressed medians are used on higher speed facilities, such as freeways and other high speed principal arterials, a median barrier is not necessary as long as the median is wide enough to provide the required clear zone and recovery area (see AASHTO's <u>Roadside Design Guide</u> for selection and use of median barriers).*" Additional clearance may be required to provide the minimum stopping sight distance along the median lane on relatively short radius curves, when a median barrier is used.

  Revised the following language in the fourth paragraph;
  "*For new construction, the minimum raised median width in urban areas with a curb or curb and gutter is 40 feet. A 40 foot median allows for two future inside lanes and a 16 foot raised median. The 16 foot raised median then allows for a future left turn lane with a 4 foot raised median remaining. The wider the median, the better, but with particular attention being given to the operational characteristics of at-grade intersections. Also, clear zone requirements for a particular facility should have significance in the assessment of the median width.*"

  Revised the following language in the first and last sentence in the fifth paragraph to replace "should" with "shall".

- 2E-16 – Revised the following language in the first sentence of the first paragraph from; *"Flush medians have application on nearly all functional classifications of roadway. On low to intermediate speed facilities, where there is not a heavy concentration of left turn moves, flush medians can provide for two-way left turn lanes. Two-way left-turn medians are most beneficial under the following conditions:"* To; **Flush medians "***shall be used only on low speed roadways where there are no more than two through lanes in each direction. They are often used as two-way left-turn lanes."* Two-way left-turn medians are most beneficial under the following conditions:

  Revised the following language in the first sentence of the second paragraph from; *"The minimum width for this application shall be the normal lane width plus 2 feet (0.6 m) i.e., 11 foot lane + 2 feet = 13 feet (3.3 m + 0.6 m = 3.9 m) total width."* To; The minimum width for this application shall be "*13* "*feet, which is an 11 foot lane plus 2 feet for a solid yellow line and a dotted yellow line on each side of the 11 foot lane."*

- 2E-31 – Revised the following language in the second sentence under UNDERDRAINS from; *"(See Chapter 15 (DDM1) of VDOT Drainage Manual for more information on underdrains)."* To; (See Chapter "*9"* of VDOT Drainage Manual for more information on underdrains).

- 2E-49 – Revised the following language to the first sentence in guide #1., item "b." under "Guide to Changes to Existing Limited Access Control" from; *"…changes to the Limited Access termini, including breaks in the limited access, still need to be approved by the CTB."* To; …changes to the Limited Access termini, including breaks in the limited access, "*may"* need to be approved by the CTB.

  Revised the following language to the second sentence in guide "#1.", item "b." under "Guide to Changes to Existing Limited Access Control" from; *"… Limited Access within the established termini can be approved by the Chief Engineer."* To; … Limited Access within the established termini "*may be recommended for approval by the State Location and Design Engineer to the Chief Engineer. However, the issue should be reviewed with the appropriate Assistant State Location & Design."*

  Revised the following language under guide "#1.", item "c." under "Guide to Changes to Existing Limited Access Control" from; *"If a structure is to be constructed over a limited access highway the proposed break in limit access shall be approved by the CTB."* To; If a structure is to be constructed over a limited access highway "*and"* the proposed break in limit access "*provides connection to the limited access facility then it"* shall be approved by the CTB. "*However, if the structure does not provide connection to the limited access facility then the CTB approval is not required."*

- 2E-50 – Added the following language;
  Items needed for Chief Engineer Approval

  Below is a list of items necessary to complete the draft letter for the Chief Engineer related to the adjustment or elimination of Limited Access Control Changes (LACC);

  - *Exhibit (plan sheet) showing the existing and proposed Limited Access Line(s) (with the proposed Limited Access CTB approval date shown in the legend. Provided by the District)*
  - *Original letter from the Chief Engineer to the CTB members requesting the proposed LACC (Provided by the District)*
  - *Final Resolution of the CTB approval of the proposed LACC (Provided by the District)*
  - *Draft letter to Chief Engineer requesting approval of adjustment or elimination (Provided by the District)*
  - *Central Office Right of Way Approval (Provided by the C.O. L&D)*
  - *FHWA Approval (if applicable) (Provided by the C.O. L&D)*
  - *Letter from the State Location and Design Engineer to the Chief Engineer for approval (Provided by the C.O. L&D)*

- 2E-61 – Revised the language in the last sentence under 'PROJECT LENGTH TABULATION BLOCK to add the following; "Type Code No."- Listing of applicable Type Code Nos. such as "F000", "I000", "K000", etc. "*are to be shown in the Construction "C", Bridge "B" and Drainage Structures "D" section."*

- 2E-63 – Revised the following language in the first sentence of the first paragraph under FUNCTIONAL CLASSIFICATION – TRAFFIC DATA from; "*A block is to be shown in the upper right corner below the project number block listing the class or type of road, whether divided or undivided roadways and type of terrain (level, rolling, or mountainous)."* To; A block is to be shown in the upper right corner below the project number block listing the class or type of road, whether divided or undivided roadways, type of terrain (level, rolling, or mountainous), "*and the design vehicle that the project is design for, i.e. WB-60."*

- 2E-68 – Revised the following language in the first sentence in the second paragraph under PROJECT LOCATION MAP from; "*Applicable project numbers (right of way and construction) are to be shown…"* To; "Applicable project numbers are to be shown…"

- Page 2E-76 – Revised the following language in the first sentence in the fourth paragraph under "ESTIMATING QUANTITIES-PREPARATION OF ESTIMATE" from; "*When the estimate is received, a copy is to be sent to the Programming Division with the construction cost noted for field inspection stage."* To; When the estimate is received, a copy is to be sent to the "*Federal Programs Management"* Division with the construction cost noted for field inspection stage.

Revised the following language in the first sentence in the seventh paragraph under "ESTIMATING QUANTITIES-PREPARATION OF ESTIMATE" from; "*Cost Estimates made available outside of this division, such as to the Programming Division, the news media, etc…"* To; Cost Estimates made available outside of this division, such as to the "*Federal Programs Management"* Division, the news media, etc…

CHAPTER 2F

- 2F-1 – Revised the following language to "RIGHT OF WAY DATA SHEET" title to add "PRELIMINARY" to read *"PRELIMINARY RIGHT OF WAY DATA SHEET"*

  Revised the following language under "PRELIMINARY RIGHT OF WAY DATA SHEET" from; *"A Right of Way Data Sheet will be included with all projects requiring right of way for construction. Projects must include data indicating the total area, fee taking, fee remainder, and the area of permanent and temporary easements. This information is furnished by the Survey Section in Location and Design Division and is recorded on a Preliminary Right of Way Data Sheet (See Chapter 2H, Figure 2H-5)."* To; A "*Preliminary"* Right of Way Data Sheet will be included with all projects requiring right of way for construction. Projects must include data indicating the total area, fee taking, fee remainder, and the area of permanent and temporary easements. This information is furnished by the "*Designer"* and is recorded on a Preliminary Right of Way Data Sheet (See Chapter 2H, Figure 2H-5), "*prior to Public Hearing. Once the Utility Field Inspection commences the Survey Section takes ownership of the sheet."*

- 2F-9 – Replaced *"Programming Division"* with *"Federal Programs Management Division"* in four locations on this page.

CHAPTER 2G

- 2G-45 – Replaced FIGURE 2G-1 REVISION DATA SHEET to revise the note specifying its current location in the cell library.

- 2G-47 – Replaced FIGURE 2G-3 REVISION DATA SHEET to revise the note specifying its current location in the cell library.

- 2G-48 – Revised TABLE 2G-1 RECORD RETENTION to help simplify the length of time documents need to be retained.

APPENDIX "A"

- Page A-10 – Revised language to the LANE/SHOULDER/PAVEMENT TRANSITIONS, MERGING TAPERS & SPEED CHANGE LENGTHS formulas from: *"Less than 45 mph"* To; *"For ≤ 40 mph"* and from; *"45 mph and greater"* To; "For > 40 mph".

  Added the following language at the end of LANE/SHOULDER/PAVEMENT TRANSITIONS, MERGING TAPERS & SPEED CHANGE LENGTHS; *"For Passing/ Left Turn lanes on Two-Lane Highway See Appendix "F", Figure 3-4."*

- Page A-12 – Revised the following language in "FOOTNOTE" No. 3 from; "*When the mainline is 4 lanes (2 lanes in each direction) and a graded median is used, the width of median shoulder is to be 8'."* To; 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'.

  Revised the following language in "FOOTNOTE" No. 4 from; "*When the mainline is 4 lanes (both directions) a minimum 8' wide paved shoulder will be provided on the right of traffic and a minimum 4' wide paved shoulder on the median side. Where the mainline is 6 or more lanes, both right and median paved shoulders will be 8' in width.* To; 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. Where the mainline is 6 or more lanes, both right and median paved shoulders "*shall"* be 8' in width.

- Page A-14 – Revised the following language in "FOOTNOTE" No.1 from; "*Use Design Year ADT for new construction and reconstruction projects (not applicable to R.R.R. projects or roads with ADT < 400) in accordance with Road Design Manual, Chapter 2A, "REQUEST FOR TRAFFIC DATA" and Form LD-104."* To; Use Design Year ADT for new construction and reconstruction projects in accordance with *Road Design Manual*, Chapter 2A, "REQUEST FOR TRAFFIC DATA" and Form LD-104. For RRR projects or roads with ADT < 400, S*ee Road Design Manual, Appendix A, "GUIDELINES FOR RRR PROCTS."*

- Page A-15 – Revised the following language to the end of "General Note" No. 4 from; *"Standard TC-5.11R (Rural) superelevation based on 8% maximum is to be used for all Freeways and is to be used for Other Principal Arterials with a design speed of 60 mph."* To: Standard TC-5.11R (Rural) superelevation based on 8% maximum is to be used for **ALL** Freeways *"(50 – 70 mph)"* and is to be used for Other Principal Arterials with a design speed of 60 mph.

Revised the following language to the end of "General Note" No. 5 from; "*Standard TC-5.11U (Urban) superelevation based on 4% maximum is to be used on Other Principal Arterials with a design speed less than 60 mph."* To; Standard TC-5.11U (Urban) superelevation based on 4% maximum is to be used on Other Principal Arterials with a design speed "*of 50 mph and less"*.

Revised the following language in "FOOTNOTE" #6 from; *"If heavy truck traffic is anticipated, an additional 1 foot width is desirable."* To; "*Where"* heavy truck volume "*(equal to or greater than 10%) or bus"* traffic is anticipated, an additional 1 foot width "*should be considered*."

- Page A-16 – Revised the following language under "FOOTNOTE" #2 from; "*Heavy truck traffic or buses are anticipated, an additional 1' width is desirable."* To; "*Where"* heavy truck volume "*(equal to or greater than 10%) or bus"* traffic is anticipated, an additional 1 foot width "*should be considered*."

  Revised the following language under "FOOTNOTE" #11 from; "*Situations having restrictions on trucks may allow the use of 11' lanes."* To; Situations having restrictions on trucks may allow the use of lanes "*1 foot less in width*."

- Page A-17 – Revised the following language under "FOOTNOTE" #1 from; *"12' when Design year ADT exceeds 2000. Where feasible, lanes should be 12' in industrial areas; however, where available or attainable R/W imposes severe limitations, 10' lanes can be used in residential areas, based upon design speed and traffic volumes. (See AASHTO Green Book, Chapter 6, Section 6.2.2, page 6-6, Table 6-5) 11' lanes can be used in industrial areas."* To; *"Lane width should be 12' in industrial areas. Where Right of Way is restricted 11' lanes may be used in industrial areas. (See AASHTO Green Book Chapter6, Section 6.2.2 and 6.3.2, page 6-6, Table 6-6)."*

  Revised the following language under "FOOTNOTE" #7 from; "*When Design year ADT exceeds 2000 VPD, with greater than 5% total truck and bus usage…"* To; When Design year ADT exceeds 2000 VPD, with greater than "*10%*" total truck and bus usage…

  Added the following "FOOTNOTES" to GS-7;

  (12) Where heavy truck volume (equal to or greater than 10%) or bus traffic is anticipated, an additional 1 foot width should be considered.

  (13) Situations having restrictions on trucks may allow the use of lanes 1 foot less in width.

- Page A-28 – Revised language in "Case 3" in FIGURE A-2-1 CURB WITH SIDEWALK OR SIDEWALK SPACE to replace "Lateral Offset" with *"CZ"* (Clear Zone) and added *"Min."* to the 6.5' dimension of total width to the backslope.

- Page A-29 – Revised language in "Case 4" in FIGURE A-2-1A CURB WITH BUFFER STRIP AND SIDEWALK to replace "Lateral Offset" with "*CZ"* (Clear Zone) and added *"Min."* to the 10.5' dimension of total width to the backslope.

- Page A-47 – Revised "Footnote" (i) under "Table A-4-1 GEOMETRIC DESIGN CRITERIA" to add the following; "*(See Guardrail Installation Standard, Section 500, in VDOT Road and Bridge Standards)."*

- Page A-65 – Added the following language to the end of the second paragraph;
  In May 2015, FHWA released the Separated Bike Lane Planning and Design Guide, which outlines planning considerations for separated bike lanes (also sometimes called "cycle tracks" or "protected bike lanes") and provides a menu of design options covering typical one and two-way scenarios. The guide consolidates lessons learned from practitioners designing and implementing separated bike lanes throughout the U.S.

- Page A-81 – Revised the following language in the last sentence under "Bike Lanes and Turning Lanes" from; "*Locations where a bike lane approaches an intersection (4 feet from the edge of pavement on a curb and gutter roadway), the 4 foot wide section should continue parallel to the left of a right turn lane."* To;
  "*For example"* locations where a bike lane approaches an intersection (4 feet from the edge of pavement on a curb and gutter roadway), the "*bike lane"* should continue parallel to the left of a right turn lane. "*See Figure A-5-3 below"*.

  Revised the following language in the last sentence of the last paragraph from; "*For all other required signatures see the "No Plan" Title Sheet, which can be found in Falcon under the eng_ser directory, subfolder for "No Plan"."* To; For all other required signatures "*and Sealing and Signing,*" see the "No Plan" Title Sheet "*and Sealing and Signing Sheet,*" which can be found in Falcon under the eng_ser directory, subfolder for "No Plan".

  Revised the following language in to item #2a. from; *"Recommendations from the District Administrator at Field Inspection…"* To; Recommendations from the District "*Engineer/"*Administrator at Field Inspection…

- Page A-105 – Added the following language at the beginning of the page under MISCELLANEOUS NOTES; "*Objects such as utility covers, manhole covers, vault frames and covers and grates shall not be located on curb ramp runs, blended transitions, turning spaces or the gutter area within the pedestrian access route. This may not always be possible in alterations, but should be avoided wherever possible."*

- Page A-111 – Replaced the following language in the first paragraph under "ALTERATIONS" from; *"A change to a building or facility that affects or could affect the usability of the building or facility, or portion thereof, that is in the scope of the project and is technically feasible, without regard to cost. Alterations include, but are not limited to, remodeling, renovation, rehabilitation, reconstruction, historic restoration, and resurfacing of circulation paths or vehicular ways."* To; *"An alteration is a change to a facility in the public right-of-way that affects or could affect access, circulation, or use. Projects altering the use of the public right-of-way must incorporate pedestrian access improvements within the scope of the project to meet the requirements of the ADA and Section 504. These projects have the potential to affect the structure, grade, or use of the roadway. Alterations include items such as reconstruction, rehabilitation, widening, resurfacing (see USDOJ-FHWA technical assistance dated 6-28-13 for additional clarification), pedestrian signal installation, signal installation and upgrades, and projects of similar scale and effect (6-28-2013)and http://www.ada.gov/doj-fhwa-ta-glossary.htm"*

  Added the following language after the second paragraph (new third paragraph) under "ALTERATIONS";; *"An alteration is a change to a facility in the public right-of-way that affects or could affect access, circulation, or use. Projects altering the use of the public right-of-way must incorporate pedestrian access improvements within the scope of the project to meet the requirements of the ADA and Section 504. These projects have the potential to affect the structure, grade, or use of the roadway. Alterations include items such as reconstruction, rehabilitation, widening, resurfacing (see USDOJ-FHWA technical assistance dated 6-28-13 for additional clarification), pedestrian signal installation, signal installation and upgrades, and projects of similar scale and effect (6-28-2013)."*

  Added the following language at the end of the fourth paragraph under "ALTERATIONS"; … and repairs to drainage systems. *"(6-28-2013)"*

  Replaced the following language after the fifth paragraph under "ALTERATIONS" from; *"(Source: FHWA Office of Civil Rights Memorandum dated September 12, 2006, which can be accessed at: www.fhwa.dot.gov/civilrights/memos/ada_memo_clarificationa.htm).* To; *For additional information, see the following:*

  Special Report: Accessible Public Right-of-Way Planning and Designing for Alterations dated August 31, 2007, which can be accessed at: http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/guidance-and-research/accessible-public-rights-of-way-planning-and-design-for-alterations

  Questions and Answers About ADA/Section 504, which can be accessed at: http://www.fhwa.dot.gov/civilrights/programs/ada_sect504qa.cfm#q17

  U.S. Access Board, Chapter 2 - Alterations
  http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/guidance-and-research/accessible-public-rights-of-way-planning-and-design-for-alterations/chapter-2%e2%80%94alterations

- Page A-123 – Added the following language to the end of "Grates"; "*All efforts shall be made to avoid grates being located in pedestrian access routes.*"

APPENDIX "B(1)"

- Page B(1)-49 – Revised the following language in the first sentence of the last paragraph to add "*Curb Extension*" to the beginning of the sentence. And to add the following language at the end of the same paragraph; "*See Appendix B(2), Section B(2)-3 Elements of Typical Section for details.*"

APPENDIX "C"

- Page C-2 – Deleted the following language in the third paragraph; "*Since all spaces using this design are "Van Accessible", no additional signage is needed to denote which spaces will accommodate vans.*"

- Page C-6 – Added the following language after the first paragraph under PARK-AND-RIDE LOTS; "*See Figure C-1-14 For Parking Space Design and Arrangement for Parking Lots and Park and Ride Lots for additional information.*"

- Page C-20 – Revised language to FIGURE C-1-14 PARKING SPACE DESIGN to change dimension "D" for 90° Parking from; 24 feet To; *26 feet* and revise the title of FIGURE C-1-14 to read *FIGURE C-1-14 PARKING SPACE DESIGN AND ARRANGEMENT FOR PARKING LOTS AND PARK AND RIDE LOTS.*

- Page C-21 – Revised FIGURE C-1-15 PARKING SPACE DESIGN AND ARRANGEMENT FOR REST AREAS to include dimensions in the truck parallel parking detail.

- Page C-23 – Revised the following language to the "NOTE" under item # B from; *NOTE: See Figure C-1-14 for Parking Space Design and Arrangement.* To;
  NOTE: See Figure "*C-1-15*" for Parking Space Design and Arrangement.

- Page C-24 – Revised the "Table" in FIGURE C-1-17 PARKING SPACE DESIGN FOR ANGLE PARKING OF TRUCKS to revise the "Entrance Roadway Width" to agree with AASHTO's Guide for the Design of Park-and-Ride Facilities.

APPENDIX "F"

- Page F-31 – Added the following language to the first sentence in the second paragraph from; *"The approval of median crossovers that do not meet engineering standards…"* To; The approval of median crossovers that do not meet "*spacing or"* engineering standards…

- Page F-34 – Revised the following language in the last sentence in the second paragraph under "Stopping Sight Distance" from; *"Sag vertical curves shall meet or exceed the AASHTO design criteria for headlight sight distance and "k" Values."* To; "*The "K" valves for sag vertical curves take into account the headlight sight distance."*

- Page F-37 – Revised the following language in the first paragraph under "Median Crossover Grades" from; "*On divided highways with depressed medians, there are generally three methods by which…"* To; On divided highways with depressed medians, there are generally three "*cases"* by which…

  Revised the following language in three locations the third paragraph under "Median Crossover Grades" from; "*One method is for the median pavement edges to be held at the same, or close to the same elevation. A second method is for each baseline elevation to be approximately the same, with a corresponding difference in elevation of the median pavement edges. The third method is for the superelevation of all lanes to be obtained along a single plane."* To; One "*case"* is for the median pavement edges to be held at the same, or close to the same elevation. A second "*case"* is for each baseline elevation to be approximately the same, with a corresponding difference in elevation of the median pavement edges. The third "*case"* is for the superelevation of all lanes to be obtained along a single plane.

  Added the following language at the bottom of the page; *"Source: AASHTO Green Book, Chapter 3, Section 3.3.8, Pages 3-80 and 3-81"*

- Page F-39 – Revised the following language in the first sentence in the first paragraph from; *"The Engineer is to study the requirements of each particular situation. In the case of a facility without median crossovers, the first method above is generally…"* To; The Engineer is to study the requirements of each particular situation. In the case of a facility without median crossovers, "*Case 2"* above is generally…

  Revised the following language in the second paragraph from; "*Method 2 generally results in an undesirable situation and must be used with caution."* To; "*Case 3"* generally results in an undesirable situation and must be used with caution.

  Revised the following language in the first sentence in the fourth paragraph from; *"In most cases, the application of the superelevation in a single plane (Method 3) is the acceptable method."* To; In most cases, the application of the superelevation in a single plane "*(Case 1)"* is the acceptable method.

- Page F-40 – Added the following language after the third paragraph under "Roundabouts";
  Roundabout Consideration & Alternative Selection Guidance Tool
  1-Roundabout Screening Criteria
  2-Roundabout Cost Comparison Tool Manual v2.5
  3-Roundabout Cost Comparison Tool v2.5
  4-Roundabout Design Guidance
  NCHRP Report 672 Roundabout Informational Guide 2nd Edition 2010
  Roundabout Scan Review

- Page F-41 – Revised the following language to replace the last sentence in the second paragraph from; *"When a Roundabout(s) is being considered a simulation video is to be shown at the Public Hearing."* To; *"If a Roundabout simulation video is being shown at Public Hearing, VISSIM software is to be used."*

- Page F-77 – Revised language to Note #2 in FIGURE 3-4 PASS/LEFT TURN LANE ON TWO-LANE HIGHWAY to add clarity.

- Page F-78 – Revised language to the LANE/SHOULDER/PAVEMENT TRANSITIONS, MERGING TAPERS & SPEED CHANGE LENGTHS formulas from: "Less than 45 mph" To; *"For ≤ 40 mph"* and from; "45 mph and greater" To; *"For > 40 mph"*.

- Page F-89 – Revised the following language in the last sentence in the first paragraph under "Continuous Left-Turn Lanes (Two Way in Either Direction)" from; *The minimum width for this application shall be 13' (11' foot lane + 2 feet = 13').* To; The minimum width for this application shall be 13 "*feet, which is an 11 foot lane plus 2 feet for a solid yellow line and a dotted yellow line on each side of the 11 foot lane."*

  Deleted the following language under "Continuous Left-Turn Lanes (Two Way in Either Direction)"; *In commercial and industrial areas where property values are high and rights of way for wide medians are difficult to acquire, a paved flush traversable median 10' to 16' wide is the optimum design. Successful operation of a continuous left-turn lane requires adequate lane marking.*

APPENDIX "I"

- Page I-2 – Added the following language after the last paragraph under W-BEAM GUARDRAIL GENERAL CRITERIA; *"All roadside safety devices are to be equipped with identification numbers as per Code of Virginia §33.2-274.1."*