

IMPERIAL ROAD DESIGN MANUAL
REVISIONS July 2009

CHAPTER 1B

- Page 1B-4 – Added “PGL – Profile Grade Line” to “PRINCIPAL ABBREVIATIONS”

CHAPTER 1D

- Page 1D-1 – Revised chapter name from “PROJECT DEVELOPMENT” to “CONCURRENT ENGINEERING PROCESS”.

Revised language to include “CONCURRENT ENGINEERING PROCESS” in the first sentence.

CHAPTER 2B

- Page 2B-5 – Added the following language under “REFINING HORIZONTAL ALIGNMENT”; *“The 2009 General Assembly passed Chapter 120 (HB 2577), which amends the Code of Virginia by adding in Article 15 of Chapter 1 of Title 33.1 a section numbered 33.1-223.2:21, relating to highway noise abatement. The law provides that, for any highway construction or improvement project that includes, or may include, requirements for the mitigation of traffic noise impacts, VDOT should consider, but is not required to implement, noise reducing design techniques, such as shifting the horizontal alignment away from the noise sensitive receptors.”*
- Page 2B-6 – Added the following language under “REFINING VERTICAL ALIGNMENT”; *“As mentioned above, Chapter 120 of the 2009 Acts of Assembly provides that, for any highway construction or improvement project that includes, or may include the requirements for the mitigation of traffic noise impacts, VDOT should consider, but is not required to implement, noise reducing design, such as placing the roadway in a cut section.”*

CHAPTER 2C

- Page 2C-5 – Replaced the following Language under “IDENTIFICATION”; *“Design Engineer in Responsible Charge”* with *“Responsible Person”*.

- Page 2C-6 – Replaced the following Language under “MATCH LINE”; “*Match lines are to be shown perpendicular to the construction baseline and noted at even construction stations at the beginning and end of each applicable plan sheet and at necessary points on connection and traverse baselines.*” with “*Match lines are to be shown perpendicular to the construction baseline at even construction stations. Stations and adjacent sheet number are to be shown at the beginning and end of each applicable plan sheet and at necessary points on connection and traverse baselines.*”
- Page 2C-9 – Replaced the following Language under “IDENTIFICATION OF ITEMS ON THE PROFILE SHEETS”; “*Design Engineer in Responsible Charge*” with “*Responsible Person*”.

CHAPTER 2D

- Page 2D-9 – Replaced the following Language under “UPDATING PLAN IDENTIFICATION”; “*Design Engineer in Responsible Charge*” with “*Responsible Person*”.
- Page 2D-14 – Replaced “Chord points” with “transitions points” in three locations in the forth paragraph and added the following language in the second sentence under “DEPICTING VERTICAL ALIGNMENT ON PLANS”; “*Transition points are to be computed and shown through the superelevation transitions of all horizontal curves for TS, SC, CS, ST, PC, PT and every 25’ increment. Chord points are to be computed (Lr/10) and shown on projects with pavement widening only.* Also replaced “these elevations” with “the superelevation diagram” in the third sentence of the same paragraph.
- Page 2D-15 – Replaced “FIGURE 2D-4 SAMPLE PROFILE SHEET” to include “Begin and End Project and Station” flag.
- Page 2D-16 – Replaced the following; “*Odd pluses shown for begin and end elevations for connection grades, ramp grades, etc., will preclude the need for flagging in these instances on plan and profile sheets.*” With “*Flagging for both begin and end stations and elevations shall be shown for all connection grades, ramps grades, etc.*”
- Page 2D-18 – Replaced the following Language under “PLOTting CROSS SECTIONS”; “*Design Engineer in Responsible Charge*” with “*Responsible Person*”.

CHAPTER 2E

- Page 2E-14 – Added the following language to the third sentence in the first paragraph; “(Not applicable to Appendix B)”.
- Page 2E-15 – Deleted “recommended” and replaced “should” with “Shall” in the last paragraph.
- Page 2E-53 – Replaced the following Language in the third paragraph under “IDENTIFICATION”; “*Design Engineer in Responsible Charge*” with “*Responsible Person*”.
- Page 2E-55 – Added the following language under “PROJECT LENGTH TABULATION”;

The population and census year within the county and/or municipality boundaries is to be shown above the length tabulation block.

A note is to be shown directly below the length tabulation block detailing the method used in computing project lengths, such as:

"Note: Project lengths are based on Route 00 Survey baseline between Sta. 00+00.00 and Sta. 10+00.00 and on Off. Rev. baseline between Sta. 10+00.00 and Sta. 20+00.00."

- Page 2E-56 – Replaced the following in the second sentence of the third paragraph; “*Multiple lines of two or more pipes measuring over 20 feet (6 m) along the roadway centerline will be considered a “major structure” where the clear distance measured along the roadway centerline between openings is less than half of the smaller contiguous opening.*” with “*Multiple lines (two or more pipes) will be considered a “major structure” when, if measuring along the roadway centerline, the distance between the interior of the outer most pipe walls exceeds 20 feet (6 m).*”
- Page 2E-57 – Added detail showing method of measuring major structures.

Added the following at the beginning of the page; “D” numbers shall also be assigned to all drainage structures, single and multiple lines (two or more) with openings equal to or greater than 36 S.F. The Drainage Designer will communicate the number of structures meeting this requirement to the Roadway Designer and he or she will communicate this information to the Project Manager.

Added “Special Design Three-sided Structures” to “B” PREFIX and “Single Line Pipe Culverts (openings \geq 36 SF)” and “Multiple Line Pipe Culverts (openings \geq 36 SF)” to “D” PREFIX.

- Page 2E-58 – Replaced the first sentence in the first paragraph; *“The identification numbers are to be requested using Form LD-219 and will be assigned initially in sequence, without regard to the prefix "B" or "D"; i.e. B-601, B-602, D-603, D-604, B-605, etc.”* with *“The identification numbers “"B" or "D"” are to be requested “by the Project Manager” using the “Project Pool” and will be assigned initially in sequence, without regard to the prefix "B" or "D"; i.e. B-601, B-602, D-603, D-604, B-605, etc.”*
- Page 2E-59 – Revised reference sheet number 2E-49 under “PROJECT SECTION NUMBERS” with 2E-51.

Deleted the following language and moved it to page 2E-55;
A note is to be shown directly above the length tabulation block detailing the method used in computing project lengths, such as:

"Note: Lengths are based on Route 00 Survey baseline between Sta. 00+00.00 and Sta. 10+00.00 and on Off. Rev. baseline between Sta. 10+00.00 and Sta. 20+00.00."

“A note is to be shown in a conspicuous location, within the county and/or municipality boundaries, showing the name of the county and/or municipality, population, and census year.”

- Page 2E-61 – Added the following language under “INDEX OF SHEETS”; *“Sheet No. 1H is assigned to the Underground Utility Test Hole Information Sheet”*. Also adjusted 1 series page numbers, and included “Metes and Bounds” to “Sheets Nos. 1K, 1L etc.”
- Page 2E-62 – Revised sheet number assignment for “Metes and Bounds” from 1K to 1M.
- Page 2E-64 – Replaced “FIGURE 2E-15 SAMPLE INDEX SHEET”.
- Page 2E-65 – Replaced the following Language in the second paragraph under “RIGHT OF WAY DATA SHEET”; *“Design Engineer in Responsible Charge”* with *“Responsible Person”*.

CHAPTER 2G

- Page 2G-5 – Replaced the following Language in the first paragraph under “GENERAL”; *“Design Engineer in Responsible Charge”* with *“Responsible Person”*.
- Page 2G-13 – Added *“this includes all easements”* to the end of the first sentence under “RIGHT OF WAY NOTE ON TITLE SHEET”.

APPENDIX “A”

- Page A-1 & A-2 – Added the following;
FLEXIBILITY IN DESIGN

The policies and procedures addressed in IIM-LD-235 (Context Sensitive Solutions) are intended to clarify and emphasize VDOT’s commitment to project and program development processes that provide flexibility, innovative design and Context Sensitive Solutions (CSS) to transportation challenges.

These processes have been structured and oriented to include stakeholders and citizens in the design of transportation systems that improve public mobility, while reflecting the community’s values, preserving the scenic, aesthetic, historic and environmental resources, and without compromising safety and mobility.

This policy emphasizes the importance of recognizing the flexibility within established standards, especially AASHTO’s Policy on Geometric Design of Highways and Streets (Green Book), AASHTO’s A Guide for Achieving Flexibility in Highway Design and AASHTO’s Guidelines for Geometric Design of Low-Volume Local Roads (ADT ≤ 400). While practicable and innovative approaches to using the flexibility inherent in existing standards is encouraged by this policy, individual project development decisions on specific applications of flexibility ultimately rest with the Responsible person working with the project manager and the project team. These decisions are made after carefully processing input from all project stakeholders as well as the project team, and evaluating this input with respect to project goals as well as safety and mobility concerns.

- Page A-3 thru A-5 – Moved the following information out of the RRR section and placed it under SECTION A-1-GEOMETRIC DESIGN STANDARDS;
FUNCTIONAL CLASSIFICATION

The highway system in Virginia has been functionally classified as Principal Arterial, Minor Arterial, Collector and Local Service. The American Association of State Highway and Transportation Officials (AASHTO) utilizes, as presented in the publication: A Policy on Geometric Design of Highways and Streets, referred to as The AASHTO Book, a similar functional classification system. The designations used are: Freeway, Arterial, Collector, and Local Roads and Streets. Relationships between these two classification systems have been generally developed.

Principal and Minor Arterial Highways provide direct service between cities and larger towns and are high speed, high volume facilities. Collector highways serve small towns directly, connecting them and local roads to the arterial system.

BACKGROUND

- *All roadways are classified as to how the facility functions in accordance with Federal guidelines.*
- *The Geometric Design Standards in Appendix A of VDOT's Road Design Manual are divided by Functional Classification (FC).*
- *The terms "Urban" and "Rural" used in the FC do not necessarily coincide with the terms as applied to highway systems in Virginia.*

Urban - Urbanized areas within set boundaries having a population of 5,000 or more. This may include areas outside of incorporated cities and towns.

Rural - Areas not designated as Urban. Includes incorporated cities and towns with populations less than 5,000.

VIRGINIA HIGHWAY SYSTEMS

Urban - Roadways within the boundaries of incorporated towns and cities with a population of 3,500 or more plus eight other designated urbanized areas (Bridgewater, Chase City, Elkton, Grottoes, Narrows, Pearisburg, Saltville and Woodstock). The urban program is administered by the Local Assistance Division.

Primary - Primary Roadways

Secondary – All secondary roadways except those in Arlington and Henrico Counties. Projects are administered by the Local Assistance Division.

- *A project classified as Urban in FC may be part of the Interstate, Arterial, Primary, or Secondary System and will be administered as such. This applies also to projects classified as Rural.*
- *The Functional Classification block on the title sheet is to show the Geometric Design Standard used.*

If more than one standard is used in the design, it will be necessary to set up two Functional Classification blocks since in most cases there would be a change in traffic volumes and scope of work.

EXAMPLE

- *When the Functional Classification for a project would normally warrant either Geometric Design Standard GS-1, GS-2, GS-3, or GS-4 and Geometric Design Standard GS-5, GS-6, GS-7 or GS-8, respectively, is*

used then it will be necessary to show the standard used in the design on the title sheet under the Functional Classification.

- *If the normal Geometric standard would be GS-3 and Geometric Standard GS-7 is used, the title sheet is to show:*

RURAL COLLECTOR-ROLLING-DIVIDED (Urban St'd. GS-7 was used)

- Page A-7 (GS-1 St'd) – Replaced language in “FOOTNOTE” number 5 from “14’ Shoulders may be reduced to 10’ minimum when truck traffic is less than 250 DDHV.” to “14’ Shoulders on bridges may be reduced to 12’ minimum when truck traffic is less than 250 DDHV.”
- Page A-9 (GS-3 St'd) – Revised “Width of Ditch” from 10’ to 6’ for “Rolling Terrain” in ADT Over 2000 column in GS-3 Table.

Revised “Minimum Shoulder Width” in fills from 7’ to 8’. Also added the following “FOOTNOTE”; “(10) Shoulder width may be reduced to 4’ (7’ with guardrail) where appropriate as long as a minimum roadway width of 30’ is maintained. See AASHTO Green Book, Exhibit 6-5.”

- Page A-11 (GS-5 St'd) – Revised “Shoulder Width” from 15’ to 17’ in fills with guardrail in GS-5 Table for “Freeways”.

Revised “Pavement Width” from 12’ to 11’ for a 45 mph design speed in GS-5 Table “Other Principal Arterial with Curb & Gutter”.

Revised language in “FOOTNOTE” number 1 from “On Freeways, if truck traffic exceeds 250 DDHV, the minimum width of graded shoulder should be 17’ for fills and 14’ for cuts.” to “On Freeways, if truck traffic is less than 250 DDHV, the minimum width of graded shoulder shall be 15’ for fills and 12’ for cuts. in the last sentence.

Revised language in “FOOTNOTE” number 2 from “On Freeways, if truck traffic exceeds 250 DDHV, the right paved shoulder width should be 12’.” to “On Freeways, if truck traffic is less than 250 DDHV, the minimum right paved shoulder width shall be 10’.” And deleted “and on 6 or more lane Freeways, the left paved shoulder width should also be 12’ if truck traffic exceeds 250 DDHV.” in the last sentence.

Revised the last sentence in “FOOTNOTE” number 7 from “14’ Shoulders may be reduced to 10’ minimum when truck traffic is less than 250 DDHV.” to “14’ Shoulders on bridge may be reduced to 12’ minimum when truck traffic is less than 250 DDHV.”

Revised the last sentence in “FOOTNOTE” number 11 from “If a buffer strip is used between the back of curb and sidewalk, it should be 2’ minimum.” to “For buffer strip widths see IIM-LD-55.”

- Page A-12 (GS-6 St'd.) – Revised “Pavement Width” from 12’ to 11’ for a 45 mph design speed in GS-6 Table under “Streets with Curb & Gutter”.

Revised “Standard Curb and Gutter” column from requiring CG-6 to CG-7 for a 45 mph design speed in GS-6 Table under “Streets with Curb & Gutter”.

Replaced the last sentence in “FOOTNOTE” number 10 from “*If a buffer strip is used between the back of curb and sidewalk, it should be 2' minimum.*” to “*For buffer strip widths see IIM-LD-55.*”

- Page A-13 (GS-7 St'd.) – Revised “Pavement Width” from 12’ to 11’ for a 45 mph design speed in GS-7 Table under “Streets with Curb & Gutter”.

Replaced the last sentence in “FOOTNOTE” number 10 from “*If a buffer strip is used between the back of curb and sidewalk, it should be 2' minimum.*” to “*For buffer strip widths see IIM-LD-55.*”

- Page A-14 (GS-8 St'd.) – Replaced the last sentence in “FOOTNOTE” number 10 from “*If a buffer strip is used between the back of curb and sidewalk, it should be 2' minimum.*” to “*For buffer strip widths see IIM-LD-55.*”

- Page A-32 – Revised “TABLE A-3-2 – TYPICAL BARRIER/GUARDRAIL SELECTION AND PLACEMENT” and pertaining notes.

- Page A-33 – Inserted “design” before “speed” in the first two sentences under “GUARDRAIL INSTALLATION IN URBAN SETTINGS”.

- Page A-37 – Replaced the following language under “ENTRANCE OR CONNECTIONS ADJACENT TO A BRIDGE”; “*it is necessary*” with “*it may be necessary.*”

- Page A-46 – Deleted the following in the first paragraph; “*On secondary projects that have a 15 year traffic projection of 750 vehicles per day or less, the RRR guidelines shall be the design concept of choice.*”

- Page A-69 thru A-73 – Added the following language: “*PREVENTIVE MAINTENANCE (PM) PROJECTS / RRR PROJECTS UTILIZING FEDERAL FUNDING ON NATIONAL HIGHWAY SYSTEM (NHS) ROADWAYS*”

On April 28, 2009 VDOT and FHWA signed an Agreement for Maintenance Projects on the National Highway System (NHS) to utilize federal funding to perform maintenance/resurfacing, restoration, and rehabilitation (RRR) type work across the Commonwealth. A number of meetings were held between FHWA and VDOT’s Location and Design and Maintenance Divisions to discuss the Scope for these type projects, establish a process for the development of these type projects, and to agree upon the level of involvement/oversight that the FHWA will provide. The FHWA and VDOT recognize the fact that the intent of these projects is to preserve the existing infrastructure and provide additional service life for the roadway and/or bridges through a particular corridor with the appropriate level of Preliminary Engineering expenses and a short design/construction time period. FHWA and VDOT agree that by developing guidelines that will provide clarification, flexibility and structure to the use of maintenance/RRR criteria, it will reduce inefficiencies in preliminary engineering and improve these types of projects across the Commonwealth.

The guardrail for both RRR and Preventive Maintenance (PM) projects shall be reviewed for proper height. In cases where the guardrail height is less than 26 inches, it shall be reset as part of the RRR project. The guardrail in preventive maintenance projects will be reset if the paving operations resulted in a reduction of guardrail height.

It is agreed that FHWA will be invited to briefing/scoping meetings for all PM and RRR projects on the Interstate. Since many of these projects will not meet the thresholds for “Full Oversight”, FHWA will maintain a programmatic review of the process.

It is the intent of this policy is to identify the characteristics and document procedures to be used in the development of projects within each of the following two categories:

Category 1: Preventative maintenance and resurfacing.

Category 2: Heavy maintenance and RRR.

Category 1: Preventative Maintenance and Resurfacing:

The activities must be clearly of a preventative measure as opposed to reacting once a corrective action is required. Projects that address deficiencies in pavement structure or increase capacity of the facility are not considered preventive maintenance. All preventative maintenance projects shall maintain and preserve the current level of safety and accessibility and consider additional low cost safety improvements.

Procedural steps for the development of Category 1 projects:

- *Identify high crash locations throughout the proposed corridor and conduct a field review to determine isolated or obvious deficiencies that should be addressed as part of a future project.*
- *Determine whether additional safety improvements such as upgrading guardrail and end treatments, installation of traffic signs and pavement markings, and edge line rumble strips should be included in the proposed project where they are determined to be a cost effective way to improve safety. In no way shall preventative maintenance type projects adversely impact the safety of the traveled way or its users.*
- *It is agreed that to maintain program flexibility, and in accordance with 23 U.S.C. 109(q), safety improvements for preventative maintenance projects can be deferred and included in future projects in the Statewide Transportation Improvement Program (STIP). It is expected that safety improvements would be programmed within 2 years of the preventative maintenance project. However, extensions beyond the two years can be made with the approval of FHWA. Roadside hardware upgrades will be implemented in accordance with VDOT's Location and Design Division, Instructional and Informational Memorandum, IIM-LD-220.2 (or any subsequent revisions to the IIM), which can be accessed at <http://www.virginiadot.org/business/locdes/rd-ii-memoranda-index.asp>.*
- *Projects shall have an appropriate environmental document to satisfy the National Environmental Policy Act (NEPA), generally a Programmatic Categorical Exclusion (PCE) prepared by the VDOT District Environmental Unit.*

Examples of eligible activities under Category 1:

- *Corrosion protection activities (Area wide program)*
- *Highway sign face cleaning (Area wide program)*
- *Any corrective, restorative or rehabilitative/reconstruction of highway pavement, which extends the service life of pavement for 5 – 15 years*
- *Milling and replacement of pavement materials*
- *Addition of a layer or layers of paving materials. (<2.0")*

- *Replacing surface treatment materials with plant mix asphalt*
- *Concrete joint sealing*
- *Diamond grinding of concrete surface*
- *Thin concrete overlay*
- *Crack sealing of mainline asphalt pavement or shoulders*
- *Applying surface treatments to mainline asphalt pavement or shoulders (example: chip seals, slurry seals, latex/micro-surfacing, thin friction course, etc)*
- *Thin hot mix asphalt overlay (<2.0")*
- *Grouting, mud jacking and under sealing*
- *Retro fitting of dowel bars*
- *Shoulder pulling and wedging for pavement edge drop-off mitigation*

Eligible bridge related activities under Category 1:

- *Seal or replace leaking joints, reconstruction of joint areas during joint replacement or elimination of deck joints.*
- *Deck overlays. (Thin bonded overlays, rigid overlays, and asphalt overlays with waterproof membranes).*
- *Spot and zone painting/coating of structural steel to include bearings for pre-stressed concrete members.*
- *Painting/coating of structural steel.*
- *Cathodic Protection (CP) Systems for Bridge Decks.*
- *Cathodic Protection Systems for Substructure Elements.*
- *Cathodic Protection Systems for Superstructure Elements other than decks.*
- *Electrochemical Chloride Extraction (ECE) Treatment for decks.*
- *Electrochemical Chloride Extraction Treatment for substructure elements.*
- *Scour countermeasures installation.*
- *Removing large debris from channels.*
- *Retrofit of fracture critical members.*
- *Retrofit of fatigue prone details. (Methods to increase the fatigue life of fatigue prone details, like using ultrasonic impact treatment on welds at ends of cover plates or connection plates welds not positively connected to flanges.)*
- *Concrete deck repairs in conjunction with installation of deck overlays, CP systems, or ECE treatment.*
- *Substructure concrete repairs in conjunction with installation of CP systems, ECE treatment, or galvanic anodes (when there are several sources or experimental basis when only one source). (Includes substructure units with cathodic protection jackets.)*
- *Application of sealants, coatings, and membranes for surface protection of the concrete.*
- *Bridge cleaning and/or washing service. (Decks, joints, drains, superstructure and substructure horizontal elements.)*
- *Place concrete mat along the flow line of steel pipe culverts.*

NOTE: When eligible substructure work and/or painting/coating of ends of girders under joint locations are leaking, then it is required to have a contract for the work during the same year or the following year to seal the joints.

Category 2: Heavy Maintenance and RRR:

The purpose for this category project is to restore and rehabilitate the pavement structure to extend the service life of the corridor by 15 to 20 years. Projects will typically involve variable depth milling and pavement build up, minimal changes to the vertical and horizontal alignment, include guardrail and roadside hardware improvements and will stay within the existing right of way. The pavement structure may be removed and replaced in its entirety for up to 50% of the project length. Projects will not provide for additional capacity through the corridor. This work is not considered preventive maintenance because of the improvements to the pavement structure.

Procedural steps for the development of Category 2 projects:

- *VDOT will review the proposed project to validate that the scope and purpose meets the intent of a RRR project as outlined in this letter.*
- *Engineering design and analysis will be done to ascertain locations of existing or potential congestion and safety concerns. This analysis will be conducted with the following in mind:*
 - (1) *Early in the project development phase, VDOT will analyze the proposed project location to establish the applicable controlling design criteria. Any existing geometric features that are not brought up to current standards but meet the design standard during original construction/reconstruction will be documented by VDOT in the project files and copies sent to FHWA for their concurrence. The documentation will be in accordance with VDOT's Road Design Manual, Section A-4, Guidelines for RRR Projects (or any subsequent revisions to the guidelines).*
 - (2) *The controlling design criteria for Interstate projects are the design criteria used in the original construction or most recent reconstruction. For example, if a project was constructed in 1964, the standards in place at that time and any design exceptions approved at that time would be the allowable design criteria for the RRR project. This is allowed per AASHTO's A Policy on Design Standards Interstate System.*
 - (3) *VDOT will provide formal design exceptions only for those instances where an existing geometric feature is made worse. In these instances, VDOT will provide the same level of engineering and documentation and follow the normal steps associated with processing a design exception for FHWA approval. However, every effort will be made to bring these substandard geometric features to existing AASHTO design standards.*

- *Road Safety Audits will be conducted to identify low cost safety countermeasures such as Rumble Strips and Rumble Stripes, Median Barriers, Safety Edges, Left and Right Turn Lanes at Stop-controlled Intersections, Yellow Change Intervals, Medians and Pedestrian Refuge areas and Walkways and will be included in the proposed project where they are determined to be cost effective by the project manager and agreed to by the project team.*
- *Projects shall have an appropriate environmental document to satisfy NEPA, generally a Programmatic Categorical Exclusion (PCE) prepared by the VDOT District Environmental Unit.”*
- Page A-92 – Replaced the following language in the first paragraph in “Separation Between Shared Use Paths and Roadways” under “SHARED USE PATHS”; *“When two-way shared use paths are located adjacent to a roadway, wide separation between a shared use path and the adjacent highway is desirable to demonstrate to both the bicyclist and the motorist that the path functions as an independent facility for bicyclists and others. When this is not possible a minimum distance of 5 feet is required between the edge of the shoulder and the shared use path and a suitable physical barrier is recommended.”* with *“When two-directional shared use paths are located adjacent to a roadway, wide separation between a shared use path and the adjacent highway is desirable to demonstrate to both the bicyclist and the motorist that the path functions as an independent facility for bicyclists and others. When this is not possible and the distance between the edge of the shoulder and the shared use path is less than 5 feet, a suitable physical barrier is recommended. A suitable physical barrier is defined as dense shrubbery, railing or chain link fence.”*

Deleted the following sentence from the first paragraph in “Separation Between Shared Use Paths and Roadways” under “SHARED USE PATHS”; *“For curb and/or curb and gutter streets, the shared use path shall be a minimum of 5.5 feet from the face of the curb. Consideration should be given to future signs or mailboxes, which may require additional clearance.”*

Added the following language at the end of “Separation Between Shared Use Paths and Roadways” under “SHARED USE PATHS”; *For curb and/or curb and gutter streets, the separation between from face of the curb to the edge of the shared use path shall be a minimum of 8 feet in order to meet the minimum lateral offset distance to install signs for the roadway and the shared use path in accordance with MUTCD Part 2. If signs are required on the outside of the shared use path due to horizontal and vertical grade changes then a minimum of 6.5’ of right of way from the edge of the path shall be provided otherwise, a minimum 3’ of right of way shall be provided. See Figure A-5-3.1.*

- Page A-93 – Added Figure A-5-3.1- Shared Used Path.

Replaced “a” with “the” in the second sentence under “Width and Clearance” to read; “Under most conditions, *the* recommended paved width for a two-directional shared use path is 10 feet.” Added “*However*” to the beginning of the third sentence. Added “*and*” to the end of item 3 under “Width and Clearance”.

Added item 4 at the top of the page; “*during normal maintenance activities the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage.*”

- Page A-94 – Added the following language to the first sentence in the last paragraph; A minimum 2 foot wide graded area “*with a maximum 6:1 slope*”.

Revised language to show slope from 1:3 to 3:1 to be consistent.

- Page A-100 – Replaced the following language at the end of the second paragraph; “*The level area should be of exposed aggregate. If a sidewalk exists along the road, then the sidewalk must also slope to the same relatively level area at the road elevation.*” with “*The level area shall have a Detectable Warning Surface in accordance with IIM-LD-55. If a sidewalk intersects a Shaded Use Path, then the sidewalk must also slope to the same relatively level area as the Shared Use Path.*”

- Page A-103 & A-104 – Added the following; “**RAILS – WITH – TRAILS**”
“Rails-with-Trails” (RWT) describe any shared-use path or trail adjacent to an active railroad corridor. These trails are located adjacent to active rail lines ranging from a few slow-moving short-haul freight trains weekly, to high-frequency Amtrak trains traveling as fast as 140 mph. Like shared-use paths, RWT’s are used by bicyclists and pedestrians. Many of the characteristics of shared-use paths are also common to RWT’s. These include continuous separation from motor vehicle traffic; frequent access points; increased levels of safety and security; scenic qualities; connectivity to a variety of land uses, etc. RWT’s can bring numerous benefits to communities and railroads alike. Working closely with railroad companies and other stakeholders is critical to a successful RWT. Limiting new and/or eliminating at-grade RWT crossings, separating trails back as far as possible from tracks and providing physical separation through fencing, vertical distance, vegetation and/or drainage ditches can help create a well-designed trail. See Figure A-5-5.1 and Table A-5-12.1 for minimum separation distance between active rails and paths (RWT). Added “FIGURE A-5-5.1 Rails-With-Rails Minimal Separation Distance and TABLE A-5-12.1 Recommend Separation Between Active Rail Lines And Paths (RWT).

- Page A-112 thru 122 – This entire section was rewritten.
- Page A-123 – Replaced the following; Department's Road and Bridge Specifications dated from “2002” to “2007”, Road and Bridge Standards dated from “Feb. 1, 2001” to “December, 2008”.
- Page A-128 – Replaced the following; “2002” Road and Bridge Specifications with “2007” Road and Bridge Specifications in the fifth item.
- Page A-130 – Replaced the following; “VDOT Road & Bridge Standards, 2001” with “VDOT Road & Bridge Standards, 2008” in the first paragraph.
- Page A-132 – Replaced the following in the fifth item from “I & IM LD_01 (D) 11.22” to “IIM-LD -11.24”.

APPENDIX “B(1)”

- Page B(1)-2 – Added the following language in the first sentence in the second paragraph; Traffic generation developed to meet Chapter 527 (Traffic Impact Analysis Regulations) may be utilized to meet this requirement, at the engineer “of record’s” discretion.
- Page B(1)-3 – Replaced the following language in the second sentence of the second paragraph; “*The geometric design standards contained in this guide should be used for residential and mixed use streets classified as “local” roads. All other street classifications should use VDOT’s Road Design Manual for geometric design.*” with “The geometric design standards contained in this guide “shall” be used for “all new” residential and “mixed-use” streets “functionally” classified as “local” roads. All other street classifications should use VDOT’s Road Design Manual for geometric design.”

Added the following language under “Procedures”;

“Conceptual sketch. A conceptual sketch of the development that shows sufficient information for the Department to review and concur with the proposed functional classification for each street in the development shall be provided to the District Administrator's Designee by the local official prior to preparing detailed construction plans for review. Any preliminary or conceptual plat, plan or sketch that conforms to the locality's zoning requirements or subdivision ordinance is acceptable if the information required by this subsection is shown. For information to be included in the submittal, see Secondary Street Acceptance Requirements, Chapter 382, 24 VAC30- 92-70, page 28.”

- Page B(1)-5 – Replaced the following language at the end of sentence under “COLLECTOR AND ARTERIAL ROADWAYS”; “*of VDOT’s Road Design Manual.*” with “*in Appendix A of this Manual.*”

Added the following language in the first sentence under “LOCAL ROADWAYS”; “*and mixed-use*” between “new residential and streets”.

Added the following language at the end of the first sentence under “LOCAL ROADWAYS”; “*Mixed-use is a single unified development with 0-2000 ADT that incorporates two or more different land uses within walking distance of one another; may include office, retail, public entertainment and a variety of housing types with some commercial usage. In mixed-use areas with 0-2000 ADT and truck traffic is less than or equal to 5%, the designer may utilize pavement widths for 0-2000 ADT shown in Table 1 and 2. If truck traffic is greater than 5%, the designer should utilize pavement widths for 2001-4000 ADT shown in Tables 1 and 2.*”

Revised the edition of the “AASHTO Geometric Design of Highways and Streets” from 2001 to 2004.

- Page B(1)-7 – Added the following language to note number 1; If the Local Street has 1 point of access “*and ADT > 400 vpd,*” then the roadway width must meet design values (2001 TO 4000 vpd).

Added the following notes; “*9. Lane widths may vary between 10’-12’ feet for collectors with 2001-4000 ADT. Widths shown may be decreased by 2 feet (26 feet to 24 feet), (31 feet to 29 feet) and (36 feet to 34 feet) based upon engineering judgment subject to VDOT approval.*” And

“*Lower design speeds (and street widths) may be utilized provided they are designed in accordance with the AASHTO Green Book or AASHTO’s Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT < 400). The designer should coordinate with VDOT in advance of design (e.g. sketch plan stage) if this alternative criteria is being utilized.*”

“*An engineering speed study sealed and signed by a licensed professional engineer, using VDOT’s standard speed study report, must be provided by the developer and approved by VDOT for any roads posted at other than the statutory speed limit and planned for acceptance into the state system.*”

Revised values for Projected Traffic Volumes (ADT) “UP TO 2000” and “2001 TO 4000”.

- Page B(1)-8 – Added the following language to note number 1; If the Local Street has 1 point of access “*and ADT>400 vpd,*” then the roadway width must meet design values (2001 TO 4000 vpd). “*For 0-400 ADT ONLY minimum pavement width may be reduced from 22 feet to 18 feet.*”

Added the following note; “*10. Lane widths may vary between 10’-12’ feet for collectors with 2001-4000 ADT. Widths shown may be decreased by 2 feet (26 feet to 24 feet), (31 feet to 29 feet) and (36 feet to 34 feet) based upon engineering judgment subject to VDOT approval.*” And

“Lower design speeds (and street widths) may be utilized provided they are designed in accordance with the AASHTO Green Book or AASHTO’s Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT<400). The designer should coordinate with VDOT in advance of design (e.g. sketch plan stage) if this alternative criteria is being utilized.

An engineering speed study sealed and signed by a licensed professional engineer, using VDOT’s standard speed study report, must be provided by the developer and approved by VDOT for any roads posted at other than the statutory speed limit and planned for acceptance into the state system.

Revised values for Projected Traffic Volumes (ADT) “UP TO 2000” and “2001 TO 4000”.

- Page B(1)-9 – Added “NO PARKING” note to the “ROADWAY SECTION CRITERIA” columns, and “CURB TO CURB WIDTH” to “CURB AND GUTTER ROADWAYS” column.

Replaced “TOTAL” with “MINIMUM” in “ROADWAY WIDTH”

Revised values in table for ONE-WAY (1-LANE)

Added the following notes; “*Lower design speeds (and street widths) may be utilized provided they are designed in accordance with the AASHTO Green Book or AASHTO’s Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT<400). The designer should coordinate with VDOT in advance of design (e.g. sketch plan stage) if this alternative criteria is being utilized.*

An engineering speed study sealed and signed by a licensed professional engineer, using VDOT’s standard speed study report, must be provided by the developer and approved by VDOT for any roads posted at other than the statutory speed limit and planned for acceptance into the state system.

Replaced note number 7 with the following language; “*If on-street parking is allowed the appropriate additional paved width needs to be provided*”.

- Page B(1)-17 – Added typical for “Stabilized shoulder and ditch with ribbon curb”

- Page B(1)-21 – Added the following language to the end of item 2 under “PAVEMENT WIDTH” *“a minimum 15 ft of clear roadway width for emergency vehicles must be maintained at all times”*.

Added the following language under “PARKING LANE WIDTHS” *“and mixed use local”* to “Residential Streets”. Also added *“industrial”* to “Commercial and” in the next sentence.

- Page B(1)-22 – Added the following language under item 3 “Minimum Radii”; *“At street intersections, there are two distinct radii that need to be considered, the effective turning radius of the turning vehicle and the radius of the curb return (See 2004 AASHTO Green Book, Exhibit 5-10). The effective turning radius is the minimum radius appropriate for turning from the right-hand travel lane on the approach street to the appropriate lane of the receiving street. This radius is determined by the selection of a design vehicle appropriate for the streets being designed and the lane on the receiving street into which that design vehicle will turn.”*
- Page B(1)-23 – Revised the first sentence in the first paragraph as follows; The minimum effective *“turning radius at street intersections”* on subdivision streets shall not be less than 25 feet. 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.

Added the following language at the end of the first paragraph; *The minimum radius of the curb return shall not be less than 5 feet.*

- Page B(1)-26 – Revised “FIGURE 2 – CURB AND CURB DETAILS” to include detail for “Ribbon Curb”.
- Page B(1)-27 – Added the following language in item “c.” under number “3” “Ribbon curb” as follows; Rolltop curb and gutter and *Ribbon curb...*

Added the following language to the end of number 6; *“to allow vehicle doors to open and people to exit from the vehicle without blocking the pedestrian access route.”*

- Page B(1)-30 – Deleted the following language at the beginning of the second paragraph under item 2; *“All entrance grades shall start back of the shoulder line”*.
- Page B(1)-32 & 33 – Added the following language; *Shared use paths are facilities on exclusive right-of-way and with minimal cross flow by motor vehicles. Users are non-motorized and may include bicyclists, inline skaters, roller skaters,*

wheelchair users (both non-motorized and motorized) and pedestrians including walkers, runners, and people with baby strollers and people waking dogs. Shared use paths are most commonly designed for two-way travel, and the following guidance assumes a two-way facility is planned unless otherwise stated. When paths are planned, it is desirable to provide paths on both sides of the roadway to decrease the likelihood of children crossing the road. Pavement design for shared use paths are recommended by the Materials Division.

- *Separation Between Shared Use Paths and Roadways*

When two-directional shared use paths are located adjacent to a roadway, wide separation between a shared use path and the adjacent highway is desirable to demonstrate to both the bicyclist and the motorist that the path functions as an independent facility for bicyclists and others. When this is not possible and the distance between the edge of the shoulder and the shared use path is less than 5 feet, a suitable physical barrier is recommended. A suitable physical barrier is defined as dense shrubbery, railing or chain link fence. Such barriers serve both to prevent path users from making unwanted movements between the path and the highway shoulder and to reinforce the concept that the path is an independent facility. Where used, the barrier should be a minimum of 42 inches high (54 inches on structures), to prevent bicyclists from toppling over it. A barrier between a shared use path and adjacent highway should not impair sight distance at intersections, and should be designed to not be a hazard to motorists or bicyclist.

For curb and/or curb and gutter streets, the separation between face of the curb to the edge of the shared use path shall be a minimum of 8 feet in order to meet the minimum lateral offset distance to install signs for the roadway and the shared use path.

- *Width and Clearance*

The paved width and the operating width required for a shared use path are primary design considerations. Under most conditions, the recommended paved width for a two-directional shared use path is 10 feet. However in rare instances, a reduced width of 8 feet can be adequate. This reduced width should be used only where the following conditions prevail:

- (1) bicycle traffic is expected to be low, even on peak days or during peak hours.*
- (2) pedestrian use of the facility is not expected to be more than occasional.*
- (3) there will be good horizontal and vertical alignment providing safe and frequent passing opportunities, and*
- (4) during normal maintenance activities the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage.*

Under certain conditions it may be necessary or desirable to increase the width of a shared use path to 12 feet, or even 14 feet, due to substantial use by bicycles, joggers, skaters and pedestrians, use by large maintenance vehicles, and steep grades.

- Page B(1)-37 Added the following language to the second paragraph; *“The use of LID practices offers both economical and environmental benefits. LID measures result in less disturbance of the development area, conservation of natural features and can be less cost intensive than traditional stormwater control mechanisms. Cost savings for control mechanisms are not only for construction, but also for long-term maintenance and life cycle cost considerations.”*

Added the following language to the third paragraph; *For additional information on LID techniques see DCR’s Virginia Stormwater Management Program website at: http://www.dcr.virginia.gov/soil_and_water/stormwat.shtml, U.S. EPA’s Low Impact Development website at: <http://www.epa.gov/nps/lid/> and The National Resource Defense Council website at: <http://www.nrdc.org/water/pollution/storm/chap12.asp>.*

- Page B(1)-46 – Added the following language under “TRAFFIC CALMING”; *“Bulb-outs are traffic-calming devices that narrow the street by widening the curb and sidewalk, landscaped planting strip, or parking area. This device works well when constructed at intersections or at mid-block locations to make the street appear narrow thereby reducing speeds.”*
- Page B(1)-47 – Revised “FIGURE 12 – TRAFFIC CALMING DETAIL” to include “Curb Extension” detail.
- Page B(1)-48 – Replaced the following language; *“Exceptions to this requirement include, but are not limited to, the following”* with *“Roundabouts should not be considered as a feasible alternative when the following criteria exist”*. Following the first paragraph.
- Page B(1)-51 – Added the following language; *“When location of the utilities outside of the pavement area is not practical such as in high density developments incorporating the principles of new urbanism as described in 15.2-2223.1 of the Code of Virginia, such installations.”*
- Page B(1)-55 – Added the following language at the end of item “E”; *“See Figure 12 - Traffic Calming Details”*.

APPENDIX “C”

- Page C-2 – Added the following language to “CROSSOVER SPACING”;
“Residency or Regional/District Traffic Section are to be coordinated through the District L&D Engineer and submitted by that office on Form LD-440 to the Assistant State Location & Design Engineer.”
- Page C-18 – Replaced the “Passing/Left Turn Lane on Two-Lane Highway” detail.
- Page C-20 – Replaced the following language in the last sentence in the second paragraph; *“The minimum desirable width shall be 12’ (16’ maximum).”* with *“The minimum width for this application shall be 13’ (11’ foot lane + 2 feet = 13’).”*
- Page C-24 – Moved the following language from the fifth paragraph to the second paragraph; *“Roundabout designs shall be based on Federal Highway Administration Publication Number FHWA-RD-00-067, Roundabouts: An Informational Guide at <http://www.tfsrc.gov/safety/00068/htm> and <http://www.tfsrc.gov/safety/00068.pdf>. Additional information can also be found in VDOT’s Roundabout Brochure at <http://www.virginiadot.org/programs/faq-roundabouts.asp>. See Figure C-1-2.2 for Roundabout Details. When roundabout design is proposed, the Residency Administrator should consult the District Location & Design Engineer.”*
- Page C-25 – Added the following language in both the first and second paragraph under “THE APPROVAL PROCESS FOR ROUNDABOUTS; *“...appropriate Assistant State Location and Design Engineer for the review by the Central Office Roundabout Review Committee. Plans should be submitted at the PFI stage of project development. If during project development, significant horizontal and vertical alignment changes are made then the design shall be resubmitted for review by the Central Office Roundabout Review Committee.”*
- Page C-27 – Revised the language in the first paragraph as follows;
“At-grade intersections must provide adequately for anticipated turning and crossing movements. Figures C-1-4 and C-1-5 provide the designer with the basic types of intersection designs and recommendations pertinent to dimensions, radii, skews, angles, and the types of island separations, etc., to be considered. For additional information see AASHTO’s A Policy on Geometric Design of Highways and Streets, Chapter 9 (Intersections). This chapter provides additional information to be considered in the design since the site conditions, alignment, grades, sight distance and the need for turning lanes and other factors enter into the type of intersection design.” to

“At-grade intersections must provide adequately for anticipated turning and crossing movements.

For shoulder applications, Figures C-1-4 and C-1-5 provides the designer with the basic types of intersection designs and recommendations pertinent to dimensions, radii, skews, angles, and the types of island separations, etc., to be considered.

For curb and gutter applications see AASHTO's A Policy on Geometric Design of Highways and Streets, Chapter 9 (Intersections). This chapter provides additional information to be considered in the design since the site conditions, alignment, grades, sight distance and the need for turning lanes and other factors enter into the type of intersection design."

- Page C-29 – Revised name of detail FIGURE C-1-4 from “*INTERSECTION DESIGN*” to “*INTERSECTION DESIGN FOR RURAL APPICATIONS WITH STANDARD S-1 SIGN ISLAND DESIGN*”.
- Page C-30 – Revised name of detail FIGURE C-1-5 from “*INTERSECTION DESIGN*” to “*INTERSECTION DESIGN FOR RURAL APPICATIONS WITH STANDARD S-2 OR S-3 SIGN ISLAND DESIGN*”.
- Page C-32 – Added the following language; “*For instructions on measuring Intersection Sight Distances, see Chapter 9, AASHTO's A Policy on Geometric Design of Highways and Streets.*”
- Page C-41 – Added the following label; “*Perpendicular or Angled Parking Spaces*”.
- Page C-42 – Added the following language at the end of the first sentence in the second paragraph; “*(overhang distance 2 feet)*”.

Added the following language;
Parallel Parking Spaces

An access aisle at least 60 inches (1525 mm) wide shall be provided at street level the full length of the parking space. The access aisle shall connect to a pedestrian access route serving the space. The access aisle shall not encroach on the vehicular travel lane.

EXCEPTION: An access aisle is not required where the width of the sidewalk between the extension of the normal curb and boundary of the public right-of-way is less than 14 feet (4270 mm). When an access aisle is not provided, the parking space shall be located at the end of the block face.

APPENDIX “F”

- Page F-66 – Replaced the last bullet; *“Right turn lanes separate through and turning traffic on roadways to facilitate right turns into the entrance.”* with *“For information on Ingress Lanes, see section 3-Turning Lanes.”*