Florida Department of Transportation

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ROADWAY DESIGN BULLETIN 18-09

FHWA Approved:
Drainage Manual, Rigid Pavement Design Manual, Pavement Type Selection Manual: 10/22/18
FDOT Design Manual: 10/29/18

DATE: November 1, 2018

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Pavement Engineers, District Consultant Project Management Engineers, District Geotechnical Engineers, District Structures Design Engineers, District Maintenance Engineers, District Roadway Design Engineers, District Traffic Operations Engineers, District Program Management Engineers, District Drainage Engineers, District Materials Engineers

FROM: Michael Shepard, P.E., State Roadway Design Engineer

DocuSigned by:
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SUBJECT: **2019 Roadway Design Office Manuals**

This bulletin announces the release of the 2019 FDOT Design Manual (FDM), 2019 Drainage Manual, 2019 Rigid Pavement Design Manual, and the 2019 Pavement Type Selection Manual. These manuals are available on the State Roadway Design Office website at the following links:

http://fdot.gov/roadway/fdm

http://fdot.gov/roadway/Drainage/ManualsandHandbooks.shtm

http://fdot.gov/roadway/PM/publications.shtm

IMPLEMENTATION

The manuals listed above are effective on projects beginning design on or after January 1, 2019 and on projects currently in the design phase where implementation will not adversely impact production schedules. These manuals are effective on design-build projects with advertisement dates on or after January 1, 2019.

Changes implemented via Roadway Design Bulletins issued between December 2017 and November 2018 are incorporated into these manuals. These changes are effective as described in each Bulletin.

COMMENTARY

Roadway Design Bulletins are available on the Office of Design website at the following link:

http://www.fdot.gov/roadway/Bulletin/default.shtm

Summaries of the major changes to each manual are included as Attachments to this Bulletin. Webinars providing an overview of the major changes to these manuals are under development and will be available by December 31, 2018.

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ATTACHMENT ‘A’
2019 FDM UPDATES SUMMARY

2019 FDOT Design Manual Updates Summary

FDM 102 (Glossary)

- Consolidated the following terms: Area Designation, Design Speed, Functional Classification, and Lanes.
- Added definitions for:
  - Control Vehicle
  - Design Vehicle
  - Design speed
  - Functional Classification

FDM 104 (Public Involvement)

- 104.2 (Public Information and Outreach): This section was relocated from 2018 FDM 104.3.
- 104.3 (Community Awareness Plan) & 104.5 (Combined PD&E and Design Projects): These are new sections.
- 104.6 (Noise and Perimeter Walls): This section was relocated from 2018 FDM 104.1.1.

FDM 110 (Initial Engineering Design Process)

- 110.2 (Initial Engineering Design): Added item (4) for IAR re-evaluation to the list of activities.
- 110.5.5 (Interstate Projects Affecting Logo Structures): Updated and simplified language to remove an outdated reference to a pay item.
- 110.5.9 (Trees, Landscape, and Landscape Irrigation Systems): Added language related to tree disposition and invasive species eradication.

FDM 111 (Final Engineering Design Process)

- FDM 111.7 (Project Documentation): Incorporated Roadway Design Memorandum 18-02 (Project Documentation).

FDM 122 (Design Exceptions and Design Variations)

- 122.2 (Identification): Added clarifying language that the 10 controlling design elements apply to Limited Access ramps, regardless of design speed.
- 122.6 (Crash Analysis): Updated FDOT crash costs in Tables 122.6.1, 122.6.2. Updated HSM Crash Distributions in Florida in Table 122.6.4.
- 122.7.4 (Signature Requirements):
  - Added the following approvals for the Chief Engineer:
    - Design Variations for omission of Emergency Shoulder Use (ESU) evacuation requirements for any phase of construction (per Roadway Design Bulletin (RDB) 18-05 (Emergency Shoulder Use)

        - Design Variation for Shared Use Paths in LA R/W not meeting the criteria in FDM 224.1.1, following review by the Chief Planner
        - Design Exceptions or Variations involving lateral offsets or vertical clearances for railroads not meeting the requirements of Rule 14-57 F.A.C. or the clearance criteria for the South Florida Rail Corridor (Topic No. 000-725-003 – South Florida Rail Corridor Clearance Policy for 25 KV service)
    - Added the following approval for the State Roadway Design Engineer:
        - Design Exceptions or Variations involving lateral offsets or vertical clearances for railroads not meeting the requirements of Rule 14-57 F.A.C. or the clearance criteria for the South Florida Rail Corridor (Topic No. 000-725-003 – South Florida Rail Corridor Clearance Policy for 25 KV service)
    - Removed State Structures Engineer as approver for shoulder width exception and for lateral offset variation since these are roadway elements.
- Table 122.7.1 (Central Office Approvals):
    - Arranged items in Table 122.7.1 into a more logical order, and clarified and simplified categories
    - Incorporated the changes made in 122.7.4.
    - Removed colored bike lane assessments (first 3 years after installation). This is no longer a requirement.

FDM 126 (Lane Elimination)

- Several clarifications were made within the chapter.
- For projects in the PD&E phase, the requirements in FDM 126 must be met (i.e., chief engineer must sign off on lane elimination alternatives).
- Added Context Classification to the forms (forms located in FDM 103) and made other minor clarifications.

FDM 127 (Community Aesthetic Features)

- FDM 127.1 (General): Added a statement that the resolution must indicate the position title within the local agency with approval authority to sign the agreement.
- FDM 127.2 (Requirements): Relocated the requirements pertaining to Local ID Markers (previously numbered (6) and (7)) to FDM 127.2.3 (Local ID Marker (Stand-Alone)).
- FDM 127.2.2 (Public Art (Affixed)): Item (e) was updated to allow alpha-numeric characters (meeting the requirements specified in this section) provided they are part of official seals or logos. Item (f) was added to allow maps on traffic control cabinets, as long as they do not face the roadway.

- FDM 127.2.3 (Local ID Marker): A map will be added as part of the requirements for submittal of a Local ID Marker. This map should show the location of the Feature in relationship to the local government's geographic boundary.

FDM 131, 132, & 133 (Plans Processing and Revisions)

- The 2018 FDM 131 includes Plans Processing, Revisions After Award, and Retention of Electronic Documents. This has been separated into 3 chapters.
- New chapters:
  - FDM 131 (Plans Processing) – This will now only include information regarding district plans processing and CO plans processing
    - FDM 131.1.1 (Definitions): added several new definitions.
    - FDM 131.2 (District Plans Processing): updated the name to include "District" and revised the language to clarify the activities that occur during this time.
  - FDM 132 (Plans Revisions) – This new chapter consists of the following sections from the 2018 FDM:
    - FDM 131.2.2 (Revisions to the PS&E Submittal): now FDM 132.2
    - FDM 131.3 (Revisions After Award): now FDM 132.3
    - FDM 131.4 (Final "As-Built" Plans Process): now FDM 132.4
    - Each of these sections were relocated, with no additional revisions.
  - FDM 133 (Retention of Electronic Documents) – This new chapter consists of the following sections from the 2018 FDM:
    - FDM 131.5 ((Retention of Electronic Documents): now FDM 133.1
    - This section was relocated, with no additional revisions.

FDM 201 (Design Controls)

- Table 201.3.2 (Rule 14-97 – Arterial Access Classifications & Standards): Added notes regarding connection spacing near interchange ramps. This information is in Rule 14-97, but not specified in the FDM. This change is only for clarification, and does not change criteria.
- FDM 201.4.1 (Design Speed Selection): Consolidated ramp design speed information into a single location, and created Table 201.4.2 (Ramp Design Speeds).
- FDM 201.4.3 (RRR Projects): Updated this section to more-accurately reflect the requirements of PPM, Volume 1, Chapter 25.

FDM 202 (Speed Management)

- New chapter

FDM 210 (Arterials and Collectors)

- 210.2.3 (On-Street Parking):
  - Deleted specific dimensions for parking spaces, as this information is shown in the Standard Plans. Added a reference to Standard Plans, Index 711-001.
  - Language regarding bike lanes adjacent to on-street parking was relocated to FDM 223.
- 210.4.6 (Audible and Vibratory Treatment): Incorporated RDB 18-03 (Audible and Vibratory Treatments).
- Table 210.9.1 (Superelevation Rates for e_{max}=0.10): Added note (3) stating D_{max} for Interstate is 3º00'. This note was previously in PPM Table 2.8.3 (Maximum Curvature of Horizontal Curve) and was inadvertently left out of the FDM.
- 210.11.2 (Passing Sight Distance): Added a clarifying statement from the 2004 AASHTO Green Book to clarify why FDM passing sight distance values are different from those in the FDOT Manual on Uniform Traffic Studies (MUTS).

FDM 211 (Limited Access Facilities)

- 211.1.1 (Interstate Resurfacing Projects): New subsection to increase awareness of existing language.
- 211.3.2 (Median Crossovers): The RPM details (pattern and spacing) for median crossovers were placed into the Standard Plans. The specific details have been removed, and a reference to Standard Plans, Index 706-001 has been added. These updates have been incorporated into Exhibits 211-1 & 211-2. Also, these 2 exhibits were consolidated into a single exhibit.
- 211.4.6 (Emergency Shoulder Use): Incorporated RDB18-05 (Emergency Shoulder Use)
- 211.9 (Vertical Alignment):
  - Added language from the PPM (regarding designing mainline travel lanes of the Turnpike to be above the 100-year flood plain elevation) that was inadvertently omitted in the FDM. It is now in the FDM as a requirement for Turnpike, and a consideration for all other LA facilities.
  - Table 211.9.1: Maximum grades for ramps with design speeds ≥ 55mph were added.
- 211.12 (Interchange and Ramp Spacing): Updated Figure 211.12.1 (Ramp Connection Spacing) to delete a note that referred to an exhibit in WisDOT's manual.
- 211.12.1 (Weaving Sections): Clarified language in this section, and added a subset for Braided Ramps, along with 2 new figures. The purpose was to clarify when Braided Ramps might be used.
- Exhibits 211-3 & 211-4 are new exhibits showing begin & end express lanes.

FDM 213 (Modern Roundabouts)

- Chapter was reorganized and expanded.

FDM 214 (Driveways)

- New chapter.

FDM 215 (Roadside Safety)

- Table 215.2.2 (Minimum Lateral Offset): For the Design Element "Bridge Piers and Abutments," under "Curbed Roadways": Updated to clarify criteria, and correct the reference to Figures 260.6.3 & 260.6.4.
- New section, 215.5.1.2 (Opaque Visual Barrier): Provides guidance on when opaque visual barriers may be used.
- FDM 215.7.5 (Existing Guardrail to Bridge Railing Transitions): Added item (6) to the list for clarification.

FDM 223 (Bicycle Facilities)

- 223.2.1.3 (Keyhole Lanes): Added a consideration to provide 17-foot right turn lane for development of future keyhole lane.
- 223.2.1.4 (Green-Colored Bicycle Lanes):
  - Removed the bullet regarding bike lanes that are ≤ 5-ft wide adjacent to on-street parking. 5-ft wide (or less) bike lanes are not placed adjacent to on-street parking.
  - Added clarifying language for which pay item to use for green bike lanes.
- FDM 223.2.2.1 (Marked Shoulders): New section that clarifies when Helmeted Bicyclist Symbol and Bicycle Lane Arrow may be placed on flush shoulders.
- Exhibit 223-3 (Green-Colored Bicycle Lanes): Added "A, B, C, D, E" to each figure within this exhibit. This helps to provide a reference from the discussion within the text.
- 223.4 (On-Street Parking) - new section: This information was previously found in FDM 210.2.3. The language was relocated to this section and expanded.

FDM 224 (Shared Use Paths)

- 224.1 (General):
  - Relocated some of the language from 2018 FDM 224.1.2 (Considerations) to here.
  - Added language regarding when shared use paths may (or may not) substitute for other facilities.
- 224.1.1 (Shared Use Path Within Department LA R/W): New section.
- 224.4.1 (Tunnel Widths) - new section: Created from language that has been relocated from the last paragraph of 2018 FDM 266.2. It is more appropriately placed in this chapter.

FDM 228 (Landscape Design)

- 228.2 (Landscape Design Requirements): Added language for maintenance requirements.
- 228.2.2 (Soil Enhancements): New section.
- 228.3 (Landscape Opportunity Plan): This section was relocated from 2018 FDM 228.4.
- 228.4 (Landscape Maintenance Plan): This section has been rewritten.
- 228.5 (Outdoor Advertising Signs): This section provides additional guidance for permitted signs.

FDM 229 (Selective Clearing and Grubbing Design)

- This is a new chapter that was created from extracts from 2018 FDM 323 (Selective Clearing and Grubbing). In addition to the extracted language, there is also new language.

FDM 230 (Signing and Pavement Marking)

- 230.2.8 (Enhanced Highway Signing Assemblies): Updated name of this section from "Roadside Flashing Beacon" because the Standard Plan includes items in addition to flashing beacons.
- 230.2.10 (Tourist-Oriented Directional Signs): New section added due to its removal from Standard Plans, Index 700-103.
- Figure 230.3.1 (Pavement Marking Material Selection): Updated this flowchart for clarification
- 230.3.5 (Raised Pavement Markers (RPMs)): New section.

FDM 231 (Lighting)

- 231.1.3 (Voltage Drop Criteria): Updated voltage drop to be 5% (recommended value from the National Electric Code). This will also make adding fixtures to an existing circuit more feasible.
- Table 231.2.1 (Lighting Initial Values):
    - Title change from "Maintained" to "Initial"
    - Heading for "Illumination Levels Average Foot Candle," removed the word "Initial"
    - Updated Lighting Retrofit Horizontal Foot Candle & Vertical Foot Candle values to 1.5 (standard), 1.0 (minimum) to be consistent with RDB 17-09 (Pedestrian Lighting Retrofits at Signalized Intersections). These values were inadvertently omitted in the 2018 FDM.
- FDM 231.2 (Design Criteria): Incorporated RDB 18-08 (Minimum Mounting Heights for Conventional Lighting based on Maximum Candela).

FDM 233 (ITS)

- Chapter was significantly reorganized and rewritten.

FDM 240 (TTC)

- 240.1.1 (Emergency Shoulder Use): Incorporated RDB18-05 (Emergency Shoulder Use)
- 240.4.2.9 (Detours, Diversions, and Lane Shifts): Additional guidance added for detours that use local roadways.
- 240.4.2.13 (Highway Lighting): Incorporated RDB18-01 (Temporary Highway Lighting)
- 240.4.2.16 (Short-Term Raised Rumble Strip Sets) and 240.9.8 (Temporary Raised Rumble Strip Sets): Incorporated RDB18-07 (Temporary and Short-Term Raised Rumble Strip Sets)

FDM 265 (Reinforced Concrete Box and Three-Sided Culverts)

- 265.1 (General): Clarified the definition of bridge culvert, and created a corresponding figure.

FDM 266 (Bicycle and Pedestrian Bridges)

- 266.2 (Design Criteria): Edited language to provide clarification. No change to criteria. Also, the last paragraph of this section was moved to FDM 224.4.1 (Shared Use Paths chapter).

FDM 301 (Sequence of Plans Preparation)

- 301.2 (Phase Submittals): Added language to provide a PDF of the Summary of Pay Items Report generated from AASHTOWare Project™ Webgate.
- 301.2.1 (Phase I Submittal): Added elements for Landscape Opportunity Plan and for Vegetation Disposition Plan.
- 301.2.4 (Phase IV Submittal): Added item (4) to verify Begin/End project mileposts with Work Program Administration system.
- 301.2.5 (PS&E Phase Submittals): Added language describing the two required submittals during the PS&E Phase.
- 301.3.1 (Direction to All Discipline Phase Reviewers on Non-Conventional Projects): Added this language which was inadvertently omitted in the 2018 FDM. This was in the PPM as Exhibit 20-F.
- 301.3.3 (90% Plans Component Submittal Requirements) and 301.3.4 (Final Plans Submittal): Added language to allow the EOR to provide sketches of details or revised plan sheets with their written responses to review comments (for Design-Build projects).

FDM 305 (Drainage Map and Bridge Hydraulic Recommendation Sheet)

- 305.1.3 (Flood Data Summary Box) and Exhibit 305-1: The note under Summary of Flood Data table has been simplified.
- 305.2 (Bridge Hydraulic Recommendation Sheet): The BHRS is to be placed in the Structures component only (even for non-bridge culverts).

FDM 307 (Summary of Quantities)

- Modification for Non-Conventional Projects box at the beginning of the chapter: Incorporated RDB 17-17 (Design-build (DB) Asphalt Quantities).
- FDM 307.3 (Box Culvert): Incorporated RDB 17-18 (Box Culvert Summary of Quantities).

FDM 323 (Selective Clearing and Grubbing Plans)

- Chapter was significantly reorganized and rewritten. Much of this information was moved into the new Part 2 chapter, FDM 229 (Selective Clearing and Grubbing Design).

FDM 325 (Signing and Pavement Marking Plans)

- 325.6.1: Item (7) added to describe how to include AVTs in Signing and Pavement Marking plan sheets. This complements information added via RDB 18-03 (Audible and Vibratory Treatments).
- Exhibits 325-1 and 325-2: New exhibits created to provide an example of a Tabulation of Quantities sheet and a Signing and Pavement Marking Plan sheet.

FDM 326 (Lighting Plans)

- 326.6 (Lighting Data Table and Legend Sheet): Updated to reflect the current data table contents.
- 326.7.1 (Required Information): Added a requirement to include the as-built foundation depths for high mast lighting in the plans, for informational purposes only.
- 326.8 (Foundation Details Sheet): Updated the language in this section to clarify when a non-standard foundation design is required.

FDM 329 (Landscape Plans)

- 329.1 (General): Language from 228.1 added for consistency between the chapters. Also added language regarding Standalone Landscape plan sets.
- 329.2 (Key Sheet): Added language regarding Standalone Landscape plan sets.
- 329.4 (Tabulation of Quantities and Plant Schedule): Added clarification for when to use Tabulation of Quantities versus Summary of Quantities sheets.
- Exhibit 329-1: This exhibit was updated to reflect current Landscape Architecture plans production, and to incorporate new guidance for Soil Enhancement.
- Exhibit 329-2: This is a new exhibit created to provide an example of a Landscape Plan sheet.

ATTACHMENT 'B'
2019 DRAINAGE MANUAL UPDATES SUMMARY

2019 Drainage Manual Updates Summary

Table of Contents

- Updated as necessary to reflect the revisions listed below.

Chapter 1 (Introduction)

- Section 1.4 – Added statement to clarify shaded boxes throughout the manual.
- Section 1.5 – Moved the information from the "Modification for Non-Conventional Projects" box requiring the Drainage Design Reports to be submitted with all phase submittals into the section as to apply to all projects.

Chapter 2 (Open Channel)

- Table 2.1 – Removed reference to "piped or open" since this table is in the open channel chapter and no further description is needed. The piped option will now be covered in Table 3.1.
- Section 2.4.5 – Added language to clarify where channel freeboard is measured from.
- Section 2.4.6 – Added new section on driveways.

Chapter 3 (Storm Drain Hydrology and Hydraulics)

- Table 3.1 – Added "Outfalls" after removing the requirement for piped outfalls from Table 2.1.
- Section 3.7.1.1 – Added some language to specifically prohibit ponding and erosion in conjunction with driveways. Added a statement to prohibit the placement of inlets in bridge approach slabs. Also moved the "Modification for Non-Conventional Projects" box on trench drains to the new Section 3.9.3.
- Table 3.3 – Added footnote (7) to reemphasize that Type S Inlet is subject to heavy wheel loads.
- Table 3.4 – Reworded title of the table for clarity.
- Table 3.5 – Added footnote (6) regarding slope and ditch transitions in conjunction with cross drain mitered end sections.
- Table 3.6 – Added specific criteria for spread in turn lanes.
- Section 3.9.3 – Added a new section on trench drains.
- Section 3.9.4 – Renumbered the Hydroplaning Section to allow for the addition of the new Trench Drain section. Also added a statement to ensure the runoff from driveways is considered in calculations.
- Section 3.10 – Added a paragraph on providing top side access at pipe bends and junctions. Also recommended the use of a new inlet in place of a junction box when the conditions are appropriate.

- Section 3.10.2 – Renamed section to "Minimum Pipe Cover and Clearances". Deleted bullet 1 and renumbered the remaining bullets. Added a provision that if minimum pipe cover can't be met, then District Drainage Engineer approval is required.
- Section 3.12.2 – Added additional criteria on French Drains to match Standard Plan Indexes 443-001 and 443-002.

Chapter 4 (Cross Drain Hydraulics)

- Section 4.2.1 – Renamed section to "LRFD Design Specifications". Also updated LRFD references.
- Table 4.3 – Added a bullet to cover temporary bridges.
- Section 4.9.3.2.1 – Removed option for grout filled mattresses.

Chapter 5 (Stormwater Management)

- Section 5.4.1.4.2 – Deleted statement that required approval from downstream home owner and permitting authority regarding water quantity and rate control criteria.
- Section 5.4.1.4.3 – Deleted statement that required approval from downstream home owner and permitting authority regarding compensatory treatment.
- Section 5.4.1.4.4 – Deleted statement that required an exemption from the permitting authority when the downstream property owner agrees to accept increased runoff.
- Section 5.4.4.2 – Added additional language regarding Context Sensitive Solutions Policy and other landscape factors.

Chapter 6 (Optional Culvert Materials)

- Section 6.6 – Deleted statement that allowed for alternate pipe materials to be considered other than the pipes listed in the Drainage Manual. Increased the maximum allowed diameter of Steel Reinforced Polyethylene (SRPE) to 120".
- Table 6.1 – Added joint less cast in place box culvert as an option for wall zone pipe.

Appendix C (Cover Height Tables)

- General Notes – Updated some references.

Appendix D (Pipes within Walled Embankment Sections)

- Wall Zone Criteria Notes – Revised note 3 to clarify expectations.

ATTACHMENT 'C'

2019 RIGID PAVEMENT DESIGN MANUAL & 2019 PAVEMENT TYPE SELECTION MANUAL UPDATES SUMMARY

2019 Rigid Pavement Design Manual Updates Summary

Chapter 11 (Recommended Rehabilitation Alternatives):

- Added a section regarding the use of fiber reinforced polymer patching material (Developmental Spec 351) on small repairs as a possible cost and time saving tool as part of concrete pavement restoration (CPR) projects.

2019 Pavement Type Selection Manual Updates Summary

Chapter 2 (General Information)

- Added "and reconstructed" in **Section 2.3 Pavement Type Selection Report Exceptions**, to further clarify that reconstruction results in all new pavement, and therefore meets the intent of this FDOT policy.