



## Florida Department of Transportation

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### **ROADWAY DESIGN BULLETIN 20-11**

**FHWA Approved:**

***Drainage Manual: 10/02/2020***

***Rigid Pavement Design Manual, Flexible Pavement Design Manual: 10/15/20***

***FDOT Design Manual: 10/27/20***

DATE: October 30, 2020

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

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SUBJECT: **2021 Roadway Design Office Manuals**

This bulletin announces the release of the 2021 FDOT Design Manual (FDM), 2021 Drainage Manual, 2021 Rigid Pavement Design Manual, and the 2021 Flexible Pavement Design 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 all projects beginning design on or after January 1, 2021 and on projects currently in the design phase where implementation will not adversely impact production schedules.

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Changes implemented via Roadway Design Bulletins issued between December 2019 and November 2020 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 a link below or as Attachments to this Bulletin. Webinars providing an overview of the major changes to the FDM are under development and will be available by December 31, 2020.

The summary of changes to the 2021 FDM can be found at the following link:

<https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2021/summaryof2021fdmupdates.pdf?>

### **CONTACTS**

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**ATTACHMENT ‘A’**  
**2021 RIGID PAVEMENT DESIGN MANUAL &**  
**2021 FLEXIBLE PAVEMENT DESIGN MANUAL**  
**UPDATES SUMMARY**

# Summary of Updates to 2021 Pavement Design Manuals

## Flexible Pavement Design Manual

### Chapter 2 – Definitions

- **Section 2.2.1 (Variables), definition for Reliability (%R)**
  - Added clarification that a single %R should be used for a single roadway facility. The Reliability should be for the entire facility, not just the type of work being done.

### Chapter 5 – Pavement Thickness Design Process For New Construction Or Reconstruction

- **Table 5.6 General Use Optional Base Groups and Structural Numbers**
  - Removed the applicability of the following note to Graded Aggregate Base (GAB) for Optional Base Groups 10 & 11:

“Φ To be used for widening, three feet or less.”

This change makes the Flexible Pavement Design Manual consistent with FDOT Standard Specifications, Table 285-1.

- **5.6.6 Layer Thickness**
  - “Specification Requirements on Layer Thickness for Type SP Structural Courses” table
    - FDOT Standard Specifications, Section 334 was updated to increase the maximum allowable lift thickness to be 3” for SP-12.5 (per [DCE Memo 20-15/Materials Bulletin 20-13](#)). Updated the table in the Flexible Pavement Design Manual to include the increased allowable lift thickness for SP-12.5.
    - Added a note referencing the FDOT Standard Specifications, Section 334.
  - Overbuild language
    - This text within Chapter 5 was repeated in Chapter 7. To remove redundancy, the text has been deleted from Chapter 5 and refers to the text within Chapter 7.
- **Table 5.11, Example Layer Thicknesses for Asphaltic Concrete Structural Courses**
  - Updated the table to include options for the new 3” maximum lift thickness allowed for SP-12.5.
  - Added a note to clarify that the table is not meant to be all-encompassing.

## **Chapter 6 – Pavement Widening**

- **6.6 Widening Design Sample Problem**

- Updated some of the details in this example problem:
  - Problem should use design speed, rather than posted speed of 65 mph.
  - Since this is a 2-lane, two-way road, FC-5 should not be used (per the friction course policy in Chapter 4). This was updated to be FC-12.5.
  - The example problem previously included a paved shoulder but was not mentioned in the problem statement. This was added to the “Given” section.
  - Calculations were updated to reflect the change from FC-5 to FC-12.5.
  - Discussion on the constructability was updated.
  - Summary text describing the proposed pavement design was updated.
  - Figure 6.1 was updated to reflect the change from FC-5 to FC-12.5.

## **Chapter 7 – Pavement Thickness Design Process For Rehabilitation Projects**

- **Figure 7.1 Flexible Pavement Rehabilitation Process**

- Moved to be located between sections 7.2 and 7.3. This was for formatting purposes only.

- **7.3 Resilient Modulus ( $M_R$ ) Variations**

- Added a third method for obtaining  $M_R$  values – historic deflection testing data (Falling Weight Deflectometer (FWD) Dashboard).
- Added new language discussing the difference between  $M_R$  values obtained in the laboratory versus those obtained in the field (via FWD testing).
  - Lab  $M_R$  values used on new construction projects
  - Field  $M_R$  values used on rehabilitation projects

*Summary of 2021 Rigid Pavement Design Manual &  
2021 Flexible Pavement Design Manual Updates*

- Added a new section for the FWD Dashboard as an option to obtain  $M_R$  data when it is not feasible to obtain it through field testing.
- Modified the section on  $M_R$  from LBR – significant revisions include:
  - Clarified that this method is intended for use on off-system projects.
  - Stated that if lab data (either  $M_R$  or LBR) is to be used, it must be coordinated with Central Office staff so that the Department can assist with the conversion of the lab value to a field value.
- **7.4.1 Field Testing**
  - Added language to provide background for why deflection testing is not typically done on ramps and frontage roads.
  - Added a bullet to the list of where deflection testing requests should not be made. New bullet says, “Ramps or frontage roads.”
- **7.5.4 Cross Slope**
  - Added language stating that the multi-purpose survey vehicle (MPSV) is not typically used to collect cross slope data on ramps or frontage roads unless there is a concern for safety during field data collection.
- **7.8.2 Overbuild**
  - Included a few overbuild items that were in Chapter 5, but not here.
  - Updated language to match what is in the FDOT Standard Specifications.
- **7.8.5 Pavement Only Projects**
  - Added “and detectable warnings” to clarify that they are included in ADA requirements, even when curb ramps are not present. This is for flush shoulder projects that include pedestrian facilities, but no curb and gutter, and therefore no curb ramps. Detectable warnings still need to be installed on these facilities.

## Rigid Pavement Design Manual

### Chapter 3 – Pavement Thickness Design Process For New Construction

- **3.4 District Coordination**
  - District Drainage – added a bullet for projects with curb and gutter under items that need to be coordinated with the District Drainage Office. Types 5, 6, 9, & 10 drainage inlets create constructability issues for concrete pavement. Therefore, the guidance in the Drainage Manual is being updated in conjunction with this change to advise designers to not use these inlets on concrete pavement projects. If these inlet types are existing on a project that is an asphalt-to-concrete conversion, it is important to coordinate with the drainage engineer to make sure alternate inlets will fit within the R/W. If they do not fit, a special design may be necessary to accommodate the construction around the existing Type 5, 6, 9, & 10 inlets.
  
- **Figure 3.1 Florida Rigid Pavement Design Climate Regions**
  - Updated the colors of this figure for improved clarity.

### Chapter 5 – Joint Details

- **5.4.1 Tie Bars**
  - Corrected a conflict between the Rigid Pavement Design Manual (RPDM) and the [Standard Plans, Index 350-001](#) (note 3B). The RPDM stated #5 bars are spaced at 30 inches, and the Index states a spacing of 38 inches. The Index is correct.
  - Deleted RPDM text associated with standard tie bar sizes and spacings and included a reference to the Standard Plans.

### Chapter 10 – Concrete Pavement Rehabilitation (CPR)

- Updated chapter to remove redundant information to [Standard Plans, Index 353-001](#).

**ATTACHMENT 'B'**  
**2021 DRAINAGE MANUAL**  
**UPDATES SUMMARY**

## Summary of Updates to 2021 Drainage Design Manual

- **General:** Language made directive, references to other manuals and guides shown in bold text.
- **Table 2.4:** Ft/sec. updated to 'fps', psf and fps defined in Table notes.
- **Table 2.5:** Deleted 'Staked Sod' to match current Standard Specifications and Standard Plans.
- **Section 3.4.1:** Language updated to directive, NWLON link updated to connect directly to station listing for Florida Relative Sea Level Trends listing. Added Example Relative Sea Level Trend figure. Deleted outdated Table 3.2 and Figure 3.1. Designers will now obtain the most recent information through the updated link.
- **Section 3.6.1:** Feet per second abbreviated to fps.
- **Section 3.7.1.1:** Added language to state preference for Inlet Types 1-4 for maintenance access, and to prohibit certain inlet types for concrete pavement due to cracking issues.
- **Section 3.7.3:** Shoulder Gutter requirements moved to FDM 210.4. Renamed Section to Shoulder Gutter Inlets and added information for placement of inlets along shoulder gutter.
- **Table 3.3:** Updated references in Notes to Standard Plans.
- **Section 3.9.1:** Reworded sentence pertaining to spread limits for clarification.
- **Section 3.9.3:** Updated to reflect new Hydroplaning tools housed within the Drainage website.
- **Section 3.11:** Clarified that pipes within walled embankments are Wall Zone Pipes.
- **Section 3.12.3:** Added language to require resilient connectors with respect to walled embankments and wall zone pipe structure.
- **Section 3.12.4:** Reworded for clarification.
- **Section 3.13.1:** Added information for upcoming FDM 900 Series.
- **Section 3.13.2:** Added documentation requirements.
- **Section 4.10.2:** Added missing units.
- **Section 4.10.3:** Added reference to Table 3.5.
- **Section 4.11.2.2:** Added language to clarify documentation requirements.
- **Section 5.4.1.1:** Reworded for clarification.
- **Section 5.4.1.5:** Added reference to FAA's guidance document.
- **Section 6.2.1:** Corrected references to the Drainage Design Guide.
- **Section 6.3:** Added reference to the version of LRFD-BDS that was used to develop the cover requirements.
- **Section 6.5:** Added requirement to "upsized" pipe for wall zones.
- **Section 6.7:** Updated reference to reflect web-based CSLE.
- **Section 6.8:** Added LRFD documentation requirements.
- **Table 6-1:** Added wall zone pipes to requirements for resilient connectors to match Specifications.
- **Appendix C:** Added reference to the version of LRFD-BDS and clarified assumptions used to develop the cover requirements.