FLORIDA DEPARTMENT OF TRANSPORTATION

FDOT STRUCTURES MANUAL

Volume 1 - Structures Design Guidelines

Volume 2 - Structures Detailing Manual

Volume 3 - Modifications to LTS-6

Volume 4 - Fiber Reinforced Polymer Guidelines

Frequently Asked Questions

2015 Revision History

Archived Structures Manuals

Additional Links

INTRODUCTION

I.1 GENERAL (Rev. 01/15)

The Structures Design Office publishes this ***Manual*** (FDOT Procedure # 625-020-018) to provide engineering and detailing standards, criteria, and guidelines to designers and detailers who design structures for the Florida Department of Transportation.

The requirements given in the ***Structures Manual*** apply to all projects. Special requirements for Non-Conventional Projects, e.g. Design-Build Projects and all Non-Design-Bid-Build Public-Private-Partnership Projects, are shown in a "Modification for Non-Conventional Projects" box as seen in the following example:

Modification for Non-Conventional Projects:
Delete ***SDG*** 4.2.2.C and insert the following: C. For "Major Widenings" and "Minor Widenings" (see criteria in SDG Chapter 7) the thickness of CIP bridge decks on beams or girders is 8-inches unless otherwise indicated in RFP.

These boxes are located immediately before or after the section which is to be modified and are only applicable to Non-Conventional Projects.

Commentary: The goal of this format is to better clarify the requirements for Non-Conventional Projects. Some requirements of this manual have been relaxed/waived for Non-Conventional Projects because they were a Department preference or deemed as good engineering practice rather than mandatory requirements. The Engineer of Record on a Non-Conventional Project may choose to follow these requirements even though they are not specifically mandated.

This Manual as well as companion documents are intended to address five distinct audiences listed below:

1. *The Engineer of Record on a Non-Conventional Project. The Structures Manual requirements apply except where specifically modified by a "Modification for Non-Conventional Projects" Box.*
2. *The Engineer of Record on a Conventional Design-Bid-Build Project. The Structures Manual requirements apply.*
3. *The Author of the Request for Proposal on a Non-Conventional Project. Standard boilerplate language is to be used as a starting point in developing RFPs on all Department Non-Conventional projects. Section V of the Design-Build boilerplate establishes Department, FHWA and AASHTO manuals, guidelines, and design codes that serve as design constraints to be used in the performance of the work. The governing regulations list in Section V cannot be modified without the approval of the State Construction Office. The standard boilerplate language is available at the FDOT Construction Office website.*

Pre-scoping questions have been developed to aid in establishing project constraints to be included in the RFP. See link below: http://www.dot.state.fl.us/construction/DesignBuild/DBRules/DB-PrescopingQuestions.pdf

4. *Contractor's Engineer of Record or Specialty Engineer on a Non-Conventional or Design-Bid-Build Project. Structures Manual, Structures Design Guidelines, Chapter 11 applies.*
5. *Consultant Performing Professional Services during the PD&E Phase of a Non-Conventional or Design-Bid-Build Project. The Structures Manual requirements apply.*

Refer to the Design-Bid-Build and Design-Build FDOT Standard Specifications for Road and Bridge Construction, Section 1 for Definitions.

The "***Structures Manual***" is provided in PDF format. The manual is accessible via the Structures FDOT Internet Website. Links to resources outside of the control of the FDOT Structures Design Office access the default web page of the host site.

Please note that while it is possible for those with PDF editing software to download and modify the ***Structures Manual*** PDF, the only recognized official version shall be the document that is provided on the FDOT Internet Website.

I.2 CONTENTS (Rev. 01/15)

Volume 1 - Structures Design Guidelines

The ***Structures Design Guidelines*** (***SDG***) incorporate technical design criteria and includes additions, deletions, or modifications to the requirements of the ***AASHTO LRFD Bridge Design Specifications*** (***LRFD***).

The ***SDG*** provides engineering standards, criteria, and guidelines for developing and designing bridges and retaining walls for which the Structures Design Office (SDO) and District Structures Design Offices (DSDO) have overall responsibility.

Volume 2 - Structures Detailing Manual

The ***Structures Detailing Manual*** (***SDM***) provides guidance for drafting and detailing criteria and methods used in preparing Florida Department of Transportation (FDOT) contract plans for structural elements or systems. These elements or systems include bridges, overhead sign structures, earth retaining structures and miscellaneous highway structures. The ***SDM*** includes preferred details and examples of general component plan sheets.

Volume 3 - Modifications to LTS-6

Modifications to the "***Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (LTS-6)***"

Volume 4 - Fiber Reinforced Polymer Guidelines

The ***Fiber Reinforced Polymer Guidelines (FRPG)*** incorporates technical design criteria and associated plan content requirements for structures and components of structures constructed using Fiber Reinforced Polymer (FRP) composites including FRP reinforcing bars, FRP prestressing strands, FRP structural shapes, and FRP composite systems for strengthening and repairs.

I.3 AUTHORITY

Section 334.048(3) and 20.23(4)(a), Florida Statutes (F.S.)

I.4 SCOPE

The use of the ***Structures Manual*** is required of anyone performing structural design or analysis on either Conventional or Non-Conventional projects for the Florida Department of Transportation.

I.5 ABBREVIATIONS

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AREMA	American Railway Engineering and Maintenance-of-Way Association
AWS	American Welding Society
DSDE	District Structures Design Engineer
DSDO	District Structures Design Office
DSME	District Structures Maintenance Engineer
DSMO	District Structures Maintenance Office
FHWA	Federal Highway Administration
FDOT	Florida Department of Transportation
LRFD	Load and Resistance Factor Design
PPM	Plans Preparation Manual
SDG	Structures Design Guidelines
SDM	Structures Detailing Manual
SDO	Structures Design Office
SSDE	State Structures Design Engineer
SSPC	Steel Structures Painting Council
TAG	Technical Advisory Group
SDB	Structures Design Bulletin

I.6 REFERENCES (Rev. 01/15)

A. Except where modified in this ***Manual***, conform to the requirements of the specifications, codes, manuals and design requirements referenced in this section.

B. AASHTO Publications

1. AASHTO/AWS D1.5M/D1.5-2008 Bridge Welding Code
2. Construction Handbook for Bridge Temporary Works, 1st Edition (1995) with 2008 interims
3. Guide Design Specifications for Bridge Temporary Works, 1st Edition (1995) with 2008 interims
4. Manual for Bridge Evaluation (MBE), 2nd Edition(2011)
5. LRFD Bridge Design Specifications, 7th Edition
6. LRFD Movable Highway Bridge Design Specifications, 2nd Edition (2007) with 2008, 2010 and 2011 Interims
7. Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013)
8. Guide Specifications for Bridges Vulnerable to Coastal Storms (2008)
9. LRFD Guide Specifications for the Design of Pedestrian Bridges (2009)
10. Manual for Assessing Safety Hardware, First Edition (2009)

C. FDOT Publications (latest editions)

1. Plans Preparation Manual, Volume 1(Topic No.: 625-000-007)
2. Plans Preparation Manual, Volume 2(Topic No.: 625-000-008)
3. Drainage Manual (Topic No.: 625-040-001)
4. Design Standards with latest Revisions (Topic No.: 625-010-003)
5. CADD Production Criteria Handbook
6. FDOT Standard Specifications for Road and Bridge Construction
7. Bridge Load Rating Manual (Topic No: 850-010-035)
8. Soils and Foundations Handbook

D. Other Publications

1. AISC Steel Construction Manual - Fourteenth Edition
2. FHWA GEC 11 (FHWA-NHI-10-024 & FHWA-NHI-10-025) Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes - Volumes 1 & 2.
3. AREMA Manual for Railway Engineering
4. Code of Federal Regulations 23 CFR 635.410
5. ASCE Standard ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures

I.7 COORDINATION

A. Coordinate all plans production activities and requirements between the ***Structures Manual***, ***PPM*** and ***AASHTO LRFD Bridge Design Specifications (LRFD)***. Each of these documents has criteria pertaining to bridge or structures design projects, and, normally, all must be consulted to assure proper completion of a project for the Department.

B. Direct all questions concerning the applicability or requirements of any of these or other referenced documents to the appropriate FDOT Structures Design Engineer. For a list of Structures Contacts, see the contacts section of the SDO website.

Modification for Non-Conventional Projects:

Delete ***SM*** I.7.B and insert the following:

B. Prior to Procurement or After Award: Direct all questions concerning the applicability or requirements of any of these or other referenced documents to the appropriate FDOT Project Manager or to the appropriate FDOT Structures Design Engineer. For a list of Structures Contacts, see the contacts section of the SDO website.

During Procurement: Direct all questions after the pre-bid meeting as instructed.

C. Collaborate with the roadway engineer prior to completion of Phase II roadway plans or the BDR, whichever is earlier, to assure an efficient and economical design. In particular provide structural input that will impact roadway geometrics (***PPM***, Volume 1, Chapter 2) and the traffic control plan (***PPM***, Volume 1, Chapter 10).

Modification for Non-Conventional Projects:

Delete ***SM*** I.7.C and insert the following:

C. Collaborate with the roadway engineer to assure coordination between roadway and structure design elements and the traffic control aspects during construction. Ensure that the design approach meets the minimum traffic restriction requirements given in the RFP. In particular provide structural input that will impact roadway geometrics (***PPM***, Volume 1, Chapter 2) and the traffic control plan (***PPM***, Volume 1, Chapter 10).

I.8 DISTRIBUTION

This ***Structures Manual*** is furnished via the SDO web page at no charge. The user must regularly check for additions, modifications and bulletins. Address questions regarding this ***Manual*** and any modifications to:

Florida Department of Transportation
Structures Design Office
Mail Station 33
Attn: Structures Manual Editor
605 Suwannee Street
Tallahassee, Florida 32399-0450
Tel.: (850) 414-4255
http://www.dot.state.fl.us/structures

I.9 ADMINISTRATIVE MANAGEMENT

Administrative Management of the ***Structures Manual*** is a cooperative effort of SDO staff and the nine members of the Technical Advisory Group (TAG).

I.9.1 The Technical Advisory Group (TAG)

The TAG comprises the State Structures Design Engineer (SSDE), the seven District Structures Design Engineers and the Turnpike Enterprise Structures Design Engineer (DSDEs).

I.9.2 SDO Staff

SDO Staff comprises the Assistant State Structures Design Engineers and Senior Structures Design Engineers selected by the SSDE.

I.10 REVISIONS

Revisions to the ***Structures Manual*** may be the result of changes in FDOT specifications, FDOT organization, Federal Highway Administration (FHWA) regulations, and AASHTO requirements; or occur from recent experience gained during construction, through maintenance, and research.

Structures Manual users are encouraged to suggest modifications and improvements such as design procedures, text clarity, technical data, or commentary. Address questions regarding this ***Manual*** and any proposed modifications to the Structures Design Office contact listed in Section I.8 above.

I.10.1 Adoption of Revisions

Structures Manual revisions are issued by the SDO as ***Structures Design Bulletins*** (***SDBs***) or Permanent Revisions following a formal adoption process. To receive notification of ***SDB*** postings or other important updates, sign up for the FDOT Contact Mailer list.

I.10.2 Structures Design Bulletins

A. ***SDBs*** are mandatory, supersede the current ***Structures Manual,*** and will be issued when the SSDE deems a change essential to production or structural integrity issues and in need of immediate implementation. ***SDBs*** may address issues in plans production, safety, structural design methodology, critical code changes, or new specification requirements.

B. ***SDBs*** are effective for up to 360 calendar days unless superseded by subsequent ***SDBs*** or Permanent Revisions to the ***Structures Manual***. ***SDBs*** automatically become proposed Permanent Revisions unless withdrawn from consideration by the SSDE.

C. ***SDBs*** indicate their effective date of issuance and are numbered sequentially with reference to the year of issuance and version number. For example, ***Structures Design Bulletin No. 10-2*** would be the second ***Bulletin*** issued in 2010.

D. ***SDBs*** may be proposed by any DSDE, DSME or PE in the ***SDO*** for consideration by the SSDE. The author must research all affected FDOT policies, criteria and specifications. Proposed ***SDBs*** must be submitted to one of the Assistant SSDEs for review, comment and concurrence. If the Assistant SSDE concurs with the proposal, it will be sent to the SSDE for consideration, final approval and publication on the SDO's website.

E. ***SDBs*** that significantly affect other offices must be composed with the assistance of the affected office. ***SDBs*** that significantly affect construction will be issued as a ***Joint Bulletin*** with the State Construction Office (coordinate with the State Construction Office on the proper Construction ***Bulletin*** number).

F. Proposed ***SDBs*** must be formatted to include Requirements, Commentary, Background, Implementation and Contact sections:

   1. Requirements: This section codifies exceptions, revisions and/or additions to policies or criteria as specified in current adopted specifications (i.e. ***Structures Manual***, ***AASHTO LRFD Bridge Design Specifications***, etc.). Requirements must reference the specific section) in the ***Structures Manual*** or other documents where they are to be incorporated. Revisions to the Department's ***Standard Specifications*** will be handled through the Specifications Office.
   2. Commentary: This section provides the essential technical support behind the new requirement and is intended to be brief. It includes references to the literature, both pro and con, that influenced the decision. This information will not be included in the ***Structures Manual***, ***Plans Preparation Manual***, etc. Include commentary that needs to be included in the ***Structures Manual***, ***Plans Preparation Manual***, etc. in the requirements section of the ***SDB*** in italics.
   3. Background: This section discusses the circumstances that prompted the ***SDB***. It should not duplicate the Commentary but simply facilitate the reader's understanding of situations that occurred and the SDO's response to them. Include background information including history of a practice, problem issues, references, sources of information, etc. This information will not be included in the ***Structures Manual***, ***Plans Preparation Manual***, etc.

4. Implementation: This section specifies the timeline upon which the requirements are to be implemented. Factors to be considered in the implementation plan include funding sources to implement changes to existing design and construction contracts, effect on adopted work program, etc. Implementation plans typically include effective, publishing and letting dates for the Requirements.
5. Contact: Although the SSDE is the responsible author of all ***SDBs***, this section lists the ***SDB's*** champion who will also be the key contact person for questions and comments related to the ***SDB***. This section lists the ***SDB's*** key contact name, title, work telephone number and email address.

I.10.3 Permanent Revisions

Permanent Revisions to the ***Manual*** are made annually or "as-needed." If the SDO considers an individual revision or addition, or an accumulation of revisions or additions, to be substantive, the ***Manual*** may be completely rewritten. The following steps are required for adoption of a revision or addition:

A. SDO Staff will assess proposed revisions and additions to the Manual, conduct any necessary research and will coordinate the proposed revision or addition with all other affected offices. If the proposed revision or addition is deemed appropriate, SDO Staff will prepare a complete, written draft with any needed commentary. Substantive revisions or additions that result in policy change will be coordinated with the Executive Committee for concurrence.

B. Proposed revisions or additions are distributed in draft form to the DSDEs. The DSDE coordinates the review of the proposed revisions or additions with other affected district offices. The goal is to resolve criteria and procedural issues before revisions are adopted. DSDEs provide review comments on the proposed revisions and additions to the SDO. These comments are addressed and resolved by SDO Staff and modifications are made to the proposed revisions or additions as required.

C. Revisions and additions to the Manual are adopted or rejected by the SSDE. The SSDE's approval signifies the SDO's position on the proposed revision or addition. Requirements mandated by FHWA or State Rules will be coordinated with the DSDEs and affected offices within the Central Office and are considered compulsory.

D. Unless agreed otherwise, the revised Manual will be issued within 4 weeks after approval by the SSDE. This period allows the Forms and Procedures Office to update the ***Standard Operating System, Procedure No. 025-020-002*** (Reference: ***Sections 20.23(4)(a) and 334.048(3), F.S.)*** and any electronic media before electronic distribution of the ***Manual***.

I.11 TRAINING

No specific training is necessary for the use of this ***Manual***. Major revisions are often presented and discussed at conferences and annual ***PPM*** update training.

I.12 ADDITIONAL LINKS

Instructions for Design Standards (Previously Volume 3)

Structures Design Standards (Previously Volume 4)

LRFD Design Examples (Previously Volume 5)

Bridge Load Rating Manual (Previously Volume 8 Modifications to LRFR)

STRUCTURES MANUAL INTRODUCTION - REVISION HISTORY

I.1 ..... Revised first Paragraph.

I.2 ..... Added Volume 4 description.

I.6 ..... Revised Paragraph B.5 per SDB 14-10; Revised Paragraph B.7.