Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD
SECRETARY

STRUCTURES DESIGN BULLETIN 13-11

(FHWA Approved: July 8, 2013)

DATE: July 8, 2013

TO: District Directors of Operations, District Directors of Production, District Design Engineers, District Construction Engineers, District Structures Design Engineers

FROM: Andre Pavlov, P.E. for
Robert V. Robertson, P. E., State Structures Design Engineer

COPIES: Tom Byron, Brian Blanchard, Duane Brautigam, David Sadler, Charles Boyd, Jeffrey Ger (FHWA)

SUBJECT: Implementation of AASHTO Type II Beams for Short-Medium Span Bridges

This ***Structures Design Bulletin*** re-introduces the AASHTO Type II Beam as a standard option for short-medium span bridges concurrent with the release of the 2014 ***Design Standards***. This bulletin also includes changes to the ***Structures Design Guidelines*** that are necessary for the preparation of Bridge Development Reports (BDR) and final designs when the AASHTO Type II Beam is the preferred superstructure option.

REQUIREMENTS

1. Replace ***Structures Design Guidelines***, Table 2.2-1, Page 2-3 (first line item) with the following:

ITEM	UNIT	LOAD
AASHTO Type II (Index 20120)	Lb/ft	385

2. Replace ***Structures Design Guidelines***, Section 4.2.13 with the following:

For pretensioned simple span AASHTO Type II, Florida-I and Florida-U Beam bridges, design thickened slab end at locations of slab discontinuity not supported by full depth diaphragms. See ***SDM*** Chapter 15 for thickened slab end details for Florida-I Beams (AASHTO Type II and Florida-U Beam details are similar between adjacent beams). Do not thicken slab at intermediate supports within AASHTO Type II, Florida-I and Florida-U Beam simple span units where the deck slab is continuous.

3. Replace ***Structures Design Guidelines***, Section 4.3.1, first paragraph, and the associated Modification for Non-Conventional Projects box with the following:

The Florida-I Beams and the AASHTO Type II Beam are the Department's standard prestressed concrete I-shaped beams and will be used in the design of all new bridges and bridge widenings with I-shaped beams as applicable. Florida Bulb-T Beams and AASHTO Beams other than the AASHTO Type II Beam will not be used in new designs or widenings.

Modification for Non-Conventional Projects:
Delete ***SDG*** 4.3.1 and insert the following: The Florida-I Beams and the AASHTO Type II Beam are the Department's standard prestressed concrete I-shaped beams.

4. Replace ***Structures Design Guidelines***, Section 4.3.1.C.3, Table 4.3.1-1 and associated commentary with the following:

3. When analyzing stresses of simple span beams, limit stresses in accordance with ***LRFD*** Table 5.9.4.1.2-1 with the exception that for the outer 15 percent of the design span of straight longitudinal beams, tensile stress at the top of beam at release may be taken as $0.24\sqrt{f'ci}$ [ksi] ($7.5\sqrt{f'ci}$ [psi]) ***LRFD*** C5.9.4.1.2 or Table 4.3.1-1 minimum tension reinforcement is developed in the section.

Table 4.3.1-1 Minimum Top Flange Longitudinal Reinforcing in Beam Ends

Beam Type	Minimum A_s (in^2)	Design Standard A_s (in^2)
AASHTO Type II	0.79	0.790
FIB 36 to FIB 63	1.5	1.580
FIB 72 & FIB 78	2.1	2.100
FIB 84 & FIB 96	2.3	2.372
FUB 48 to FUB 72	2.7	2.730

For transient loads during construction the tensile stress limit may be taken as $6\sqrt{f'c}$. It is not necessary to check tensile stresses in the top of simple span beams in the final condition.

*Commentary: Since the mid 1980's, the Department has allowed a limit $12\sqrt{f'ci}$ tension in the top of the beam at release knowing the actual tension was less due to the additional compression provided by the top partially stressed (dormant) strands. Now that design software accounts for partially stressed top strands, a $12\sqrt{f'ci}$ tension limit is no longer justified. When the minimum areas of tension reinforcement shown in the table are provided, refined analysis shows top tensile beam stresses are within reasonable limits. Since the method suggested in **LRFD** C5.9.4.1.2 may give an unreasonably large required area of reinforcement at locations near the prestress transfer length, minimum reinforcement areas are given in the table for FDOT standard beams.*

5. Replace ***Structures Design Guidelines***, Section 4.3.1.G with the following:

G. For pretensioned simple span AASHTO Type II and Florida-I Beam bridges, eliminating the permanent end diaphragms is the preferred option. However, in cases where there are significant lateral loads, partial depth, permanent end diaphragms may be used. See SDM Chapter 15 for partial depth diaphragm details. For spans requiring end diaphragms, determine if diaphragms are necessary for every bay.

Commentary: For spliced post-tensioned girder bridges, diaphragms at the splice and anchorage locations are required.

Modification for Non-Conventional Projects:
Delete ***SDG*** 4.3.1.G and associated Commentary.

6. Replace ***Structures Design Guidelines***, Section 7.6.A.1 with the following:

1. For widening AASHTO, Bulb-T, and cast-in-place concrete beam bridges, use Florida-I beams. For widening existing AASHTO Type II Beam bridges, investigate the most economical option for using either AASHTO Type II Beams or FIB 36 Beams. For all other widenings, use the same superstructure type and depth where possible.

Commentary: The increased span and load carrying capacity of the Florida-I Beam will generally allow designers to widen bridges using a shallower beam depth than existing beams. For example, the designer can use a FIB 54 to widen an existing AASHTO Type V Beam bridge.

7. Replace ***Structures Design Guidelines***, Section 7.6.F with the following:

F. When widening with AASHTO Type II or Florida-I Beams, squaring beam ends, placing bearing pads orthogonally and eliminating permanent end diaphragms are the preferred options. However, skewed beam ends, skewed bearing pads and end diaphragms may be used at the discretion of the DSDE.

Modification for Non-Conventional Projects:
Delete ***SDG*** 7.6.F.

8. Add the following to ***Structures Design Guidelines***, Section 9.2.2.B.2 (cost per linear foot):

AASHTO Type II Beam	$98

COMMENTARY

The AASHTO Type II Beams are considered to be optimized for simple span ranges between 50 to 70 feet.

BACKGROUND

Introduction of the Florida-I Beam series in 2009 (see ***Structures Design Bulletin*** C09-03) eliminated the AASHTO and Florida Bulb-T Beams as optional beam types for consideration on FDOT projects. For bridge spans less than 80 feet, the FIB-36 is not optimized given the practical limitation on beam spacing. Additionally some projects may have crane lifting capacity constraints that dictate the maximum weight of precast components. After consultation with the Florida Prestressed Concrete Association (FPCA), it was agreed to reintroduce the AASHTO Type II beam as an available design option, given its relatively light weight and good historical performance.

IMPLEMENTATION

The following Design Standards have been added or updated with the 2014 eBooklet:

- Index 20120 - AASHTO Type II Beam
- Index 20199 - Build-Up & Deflection Data for Prestressed I-Beams
- Index 20510 - Composite Elastomeric Bearing Pads - Prestressed Florida-I & AASHTO Type II Beams
- Index 20511 - Bearing Plates (Type 1) - Prestressed Florida-I and AASHTO Type II Beams
- Index 20512 - Bearing Plates (Type 2) - Prestressed Florida-I and AASHTO Type II Beams

The Bridge Development Report Cost Estimating spreadsheet referenced in the ***Structures Design Guidelines***, Section 9.1.C has been updated to include AASHTO Type II beams.

The CADD cells for the associated Data Tables are available to download as an update to the CADD bar menu by following the link and instructions on the Structures Design Standards webpage, and will be updated in the next FDOT CADD software update scheduled for release in the summer of 2013.

These requirements are effective immediately on all Design-Bid-Build projects in Phase I design development (less than 30% complete). These requirements may be implemented immediately on all Design-Bid-Build projects in Phase II, III or IV at the discretion of the District.

At the discretion of the Design-Build team, the contents of this bulletin may be used on all Design-Build projects for which the technical proposal has yet to be delivered to the Department.

CONTACT

Gevin J. McDaniel, P.E.
Senior Structures Design Engineer
Florida Department of Transportation
605 Suwannee Street, MS 33
Tallahassee, FL 32399-0450
Phone (850)-414-4284
Gevin.McDaniel@dot.state.fl.us

RVR/SJN

Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

June 19, 2013

MEMORANDUM

TO: Andre Pavlov, Tom Andres, and Charles Boyd

FROM: Robert V. Robertson, Jr., P.E., State Structures Design Engineer

COPIES: A. Prasad, B. Blanchard, T. Byron, D. Brautigam

RE: DELEGATION OF SIGNATURE AUTHORITY
For Cost Centers 986 and 988

The following list establishes priority for signature authority in the absence of the State Structures Design Engineer. This authorization includes all documents requiring the signature of the State Structures Design Engineer, WITH THE EXCEPTION OF personnel actions and out-of-state travel requests and reimbursements.

Cost Center 986
1. Andre Pavlov
2. Tom Andres
3. Charles Boyd

Cost Center 988
1. Sam Fallaha
2. Will Potter

This memo supersedes any previous authorization and shall remain in effect until rescinded by me.

RVR/ar