



Florida Department of Transportation

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STRUCTURES DESIGN BULLETIN 16-01

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TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Structures Design Engineers, District Maintenance Engineers

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

COPIES: Brian Blanchard, Tom Byron, Tim Lattner, David Sadler, Bruce Dana, Gregory Schiess, SDO Staff, Jeffrey Ger (FHWA)

SUBJECT: Florida Slab Beam Superstructure System

This bulletin introduces the Florida Slab Beam (FSB) Superstructure System, *Developmental Design Standards* Indexes D20450 through D20453 Florida Slab Beams and the associated *Instructions for Developmental Design Standards* as an option for short span bridges. This bulletin also includes changes to the *Structures Design Guidelines* that are necessary for the preparation of Bridge Development Reports (BDRs) and final designs when the FSB Superstructure System is the selected superstructure type.

The use of the FSB Superstructure System will typically be restricted to off-system bridges with low Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT).

REQUIREMENTS

1. Replace *SDG* 4.3.1.E with the following:
 - E. Provide embedded bearing plates in all prestressed I-Girder beams deeper than 60-inches. Provide embedded bearing plates for all Florida-I beams. Include beveled bearing plates for all I-beam and U-beam designs where the beam grade exceeds 2%.
2. Replace *SDG* 4.4.3.A and the associated Modification for Non-Conventional Projects Box with the following:
 - A. Design pretensioned slab beams and units so that the theoretical design camber at the end of construction is a minimum ¼" positive (upward) after all non-composite and composite dead loads are applied. Unless otherwise required as a design parameter, base beam or unit camber that is used for designing and detailing and that is to be shown on the plans on 120-day-old beam or unit concrete. The design camber shown on the plans is the value of camber due to prestressing minus the dead load deflection after all prestress losses.

Modification for Non-Conventional Projects:

Delete **SDG 4.4.3.A** and insert the following:

- A. Design pretensioned slab beams and units so that the theoretical design camber at the end of construction is a minimum ¼" positive (upward) after all non-composite and composite dead loads are applied. The design camber shown on the plans is the value of camber due to prestressing minus the dead load deflection after all prestress losses.

3. Replace SDG 6. 5.D with the following:

- For cast-in-place flat slab superstructures, use unreinforced bearing strips with a minimum thickness of ¾". Bearing strips must extend the full width of the bridge and may be continuous for their full length or may be a series of discontinuous segments 5 feet or longer placed end to end. For prestressed slab beams or units, use individual unreinforced bearing strips or pads with a minimum thickness of 1".

4. Add the following to SDG 9.2.2.B.2:

Florida Slab Beam; 12" x 48"	\$203 ²
Florida Slab Beam; 12" x 60"	\$260 ²
Florida Slab Beam; 15" x 48"	\$213 ²
Florida Slab Beam; 15" x 60"	\$270 ²
Florida Slab Beam; 18" x 48"	\$248 ²
Florida Slab Beam; 18" x 60"	\$310 ²

² Interpolate between given prices for intermediate width FSBs.

5. Add the following to SDG 9.2.2.C.1:

Topping Concrete for slab beams and units (including cost of shrinkage reducing admixture)	\$600
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COMMENTARY

Initially, the use of the FSB Superstructure System and *Developmental Design Standards* Index D20450 Series will typically be restricted to off-system bridges with low Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT). This restriction will allow for potential improvements to be made to the system and or the standards prior to their use at more critical locations.

Florida Slab Beams, *Developmental Design Standards* Index D20450 Series, will be used as the basis for a new series of *Developmental Design Standards* for fully designed superstructures. These new standards, which will be released later this year, will also be restricted to use on off-system bridges.

BACKGROUND

The FSB Superstructure System which utilizes Florida Slab Beams, *Developmental Design Standards* Index D20450 Series, is based on the [Minnesota DOT Precast Composite Slab Span System \(PCSSS\)](#). The Minnesota PCSSS was itself based on the French precast Poutre Dalle slab span system that was identified in a 2004 FHWA International Scanning Tour of Prefabricated Bridge Elements and Systems utilized for accelerated bridge construction. The FSB superstructure system is similar to prestressed slab beam superstructures that were standardized by the Department and used in the mid to late 1950s. It is also similar to several slab beam superstructures that have been constructed in Florida in recent years that were based to some extent on the Minnesota PCSSS. Several modifications to the slab beam superstructures previously constructed in Florida and the Minnesota PCSSS have been incorporated into the FSB superstructure system to provide for improved constructability and better long term durability as follows.

- To simplify fabrication of the FSBs:
 - All FSBs in a given span are required to be the same width, have the same cross sectional shape and have the same prestressing strand pattern, except as required to accommodate phased construction or significant cross slope changes.
 - The reinforcing steel used to anchor traffic and pedestrian railings is embedded only into the cast-in-place composite concrete topping. This is especially important for those FSBs that are used for bridges with horizontally curved alignments.
- To accommodate fabrication tolerances and placement of adjacent FSBs in the field, and to provide some accommodation for shrinkage of the cast-in-place concrete topping in the transverse direction, a minimum ½" gap is required between adjacent FSBs.
- To facilitate placement of adjacent FSBs in the field, the transverse reinforcing bars that protrude from the sides of the FSBs (Bars 5E) do not extend beyond the edges of the FSB flanges.
- To reduce the potential for the backer rod that is used to fill the gap between adjacent FSBs to be displaced during placement of the topping concrete, the edges of the FSB flanges are sloped and the backer rod is required to be oversized and secured in place with construction adhesive.
- To reduce the potential for cracking of the cast-in-place composite concrete topping in the longitudinal direction at the joint between adjacent FSBs:
 - The FSBs are required to be saturated with water for 12 hours prior to casting of the composite concrete topping.
 - A shrinkage reducing admixture is required to be included in the concrete for the composite topping.
- To reduce the potential for cracking of the cast-in-place composite concrete topping in the transverse direction near the span ends, the FSBs and the topping are designed and constructed as simple spans with an expansion joint located at each end of each span.

IMPLEMENTATION

Florida Slab Beams *Developmental Design Standards* Index D20450 Series will be used to replace Prestressed Slab Units *Developmental Design Standards* Index D20350 Series.

The FSB Superstructure System and the associated Florida Slab Beams *Developmental Design Standards* Index D20450 Series may be used for off-system bridges with low Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT) following the process outlined in the "[Developmental Design Standards - Usage Process](#)". The FSB superstructure system may be used at other locations where specifically approved by the State Structures Design Engineer. The Florida Slab Beam *Developmental Design Standards* and the associated *Instructions for Developmental Design Standards* and CADD Cells are available on the [Developmental Design Standards website](#).

Use Florida Slab Beams *Developmental Design Standards* Index D20450 Series in lieu of Prestressed Slab Units *Developmental Design Standards* Index D20350 Series and other similar non-standard prestressed slab units for design-bid-build projects in Phase I design (less than 30% complete). Florida Slab Beams may be used in lieu of Prestressed Slab Units and other similar non-standard prestressed slab units for other design-bid-build projects at the discretion of the District.

Use Florida Slab Beams *Developmental Design Standards* Index D20450 Series in lieu of Prestressed Slab Units *Developmental Design Standards* Index D20350 Series and other similar non-standard prestressed slab units for all design build projects for which the final RFP has not been released. Design build projects for which the final RFP has been released are exempt from these requirements, but may incorporate Florida Slab Beams if desired, unless otherwise directed by the District.

Use *Developmental Specifications* Dev346SRA, Dev450FSB and Dev924SRA with Florida Slab Beams. These specifications are available on the [Developmental Specifications website](#).

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