Index 450-120 AASHTO Type II Beams

Design Criteria

AASHTO LRFD Bridge Design Specifications; ***Structures Detailing Manual (SDM)***; ***Structures Design Guidelines (SDG)***

Design Assumptions and Limitations

Index 450-120 is the standard for the AASHTO Type II Beam. Use this standard with Indexes 450-199, 400-510, and 450-511 or 450-512.

This standard must be supplemented with project specific information including a Table of Beam Variables, Strand Pattern Details and a Strand Debonding Legend which must be completed and included in the Structures Plans. This standard and the supplemental project specific information that is included in the plans provides sufficient information to permit beam fabrication without the submittal of shop drawings.

Data tables for associated Indexes 450-199, 400-510 and 450-511 or 450-512 must also be completed and included in the plans.

A Framing Plan is required for bridges meeting the criteria stated in the ***SDM***.

The use of End Diaphragms is not preferred on simple span, pretensioned, I-Beam structures. In lieu of End Diaphragms, the preferred detail is a Thickened Slab End at all locations of slab discontinuity. Where End Diaphragms are required by design or for widening projects, partial depth diaphragms are preferred. See SDM Chapter 15 for suggested details.

Except for widening projects where special details may be required, squared beam ends are preferred on all pretensioned I-Beam structures.

The prestressed beams in these Standards are generally assumed to act as simple spans under both Dead Load and Live Load even where the deck is detailed to be continuous across the intermediate supports or back-to-back diaphragms are present. For detailing purposes, Prestressed I-Beams are assumed to be erected plumb.

When the total initial tensioning force of the fully bonded strands required by design exceeds the value shown below, shield additional strands at the end of the beam when possible. The end reinforcement may only be redesigned to accommodate an increased vertical splitting force when approved by the State Structures Design Office. If approval is granted, Index 450-120 must then be modified for inclusion in the contract documents and signed and sealed by the EOR.

To limit vertical splitting forces in the webs of beams, the maximum prestress force at the beam ends from fully bonded strands must be limited to the following:

Index No.	Beam Type	Max. Bonded Prestress Force	Last Revision Date
450-120	AASHTO Type II	755 Kips	07/01/05 or later

Do not apply losses and use the jacking force of all the strands located in the bottom half of the beam when calculating the Bonded Prestress Force.

If the beam grade exceeds 2%, provide Embedded Bearing Plates and Beveled Bearing Plates at each end of the beam as shown on Index 450-511 or 450-512.

See additional instructions in the ***SDG***.

Plan Content Requirements

In the Structures Plans:

Complete the appropriate "TABLE OF BEAM VARIABLES" and include it in the plans. Use additional sheets when the actual number of beams or strand patterns exceeds the capacity of a single plan sheet using the standard table. Supplemental details and modifications are permitted if special conditions require dimensions, details or notes. However, the "TABLE OF BEAM VARIABLES" itself should not be modified. See ***FDM*** **115** for more information regarding use of Data Tables.

Report elastic and time dependent shortening effects (DIM R) at the top of the beam @ 120 days. The average of the calculated values for the top and bottom of the beam may be used.

Report DIM P for beams placed on grade if the calculated value is equal or greater than 1" using ⅛" increments.

Show strands in the outermost positions of the lowest row to support Bars D.

Round Angle Φ up to the nearest degree.

Specify shear stirrup spacings V1, V2 and V3 for Bars 4K or 5K to the nearest inch.

Prepare a Framing Plan for bridges meeting the criteria stated in the SDM.

When intermediate diaphragms are required by design, show them on the Framing Plan. Tabulate insert locations with respect to the beam ends and beam faces. Include length adjustments for beams placed on grade and for elastic and time dependent shortening effects. Show Type 33 No. 8 reinforcing bars with 3" thread lengths for attachment to the inserts on the intermediate diaphragm details. Include these bars in the Superstructure Reinforcing Bar list.

For bridge widenings where beam ends are encased in full height diaphragms and the diaphragms are to be extended, modify Index 450-120 and include it in the plans as follows:

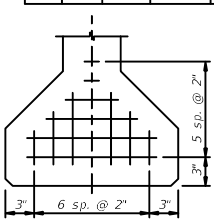
- Modify the Standard Plans in accordance with Method 1, Method 2 or Method 3 as defined in the Terms Of Use for the Borderless DGNs provided in the Standard Plans eBooklet.
- Remove all notes, call-outs and details regarding cutting the strands and coating the ends of the beams with epoxy.

- Insert all notes, call-outs and details to ensure proper placement of Bars 4L as shown in the 2010 Design Standards Index 20120. Detail the number of bars, bar locations and bar bending diagrams.

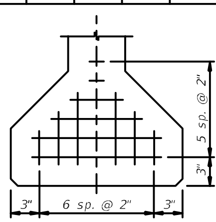
AASHTO TYPE II BEAM - TABLE OF BEAM VARIABLES

Table Date 01-01-16

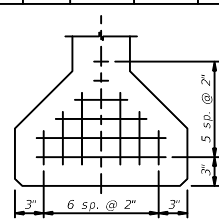
LOCATION		CONCRETE PROPERTIES			STND.	END	PLAN VIEW		BRG. PLATE		END OF BEAM & BEARING DIMENSIONS **						BEAM		REINFORCING STEEL													
SPAN	BEAM	CLASS	STRENGTHS (psi)		PTRN.	ELEV.	CASE		MARK ***		ANGLE Ø		DIM P	DIM J	DIM K1	DIM K2	DIMENSIONS *		3D1		3D2		4K	NO. OF SPACES BARS 4K				SPACING BARS 4K *			
NO.	NO.		28 Day	Release	TYPE	COND.	END 1	END 2	END 1	END 2	END 1	END 2					DIM L	DIM R	B	Length	B	Length	NO.	S1	S2	S3	S4	V1	V2	V3	V4



TYPE ① __ STRANDS



TYPE ② __ STRANDS



TYPE ③ __ STRANDS

STRAND DESCRIPTION: Use ___ Diameter, Grade 270 Low-Relaxation Carbon Steel Strands stressed at ___ kips each. Area per strand equals ___ sq. in.

STRAND PATTERNS

STRAND DEBONDING LEGEND

- • – fully bonded strands.
- – strands debonded _'-__" from end of beam.
- – strands debonded _'-__" from end of beam.
- – strands debonded _'-__" from end of beam.
- – strands debonded _'-__" from end of beam.

NOTE: On beams with skewed ends the debonded length shall be measured along the debonded strand.

NOTE: Work this sheet with Standard Plans Index 450-120.

DIMENSION NOTES

* All longitudinal beam dimensions shown on this sheet with a single asterisk (*) are measured along the top of beam at the centerline of beam.

** End of beam bearing dimensions "J" and "K" are measured along the bottom of the beam.

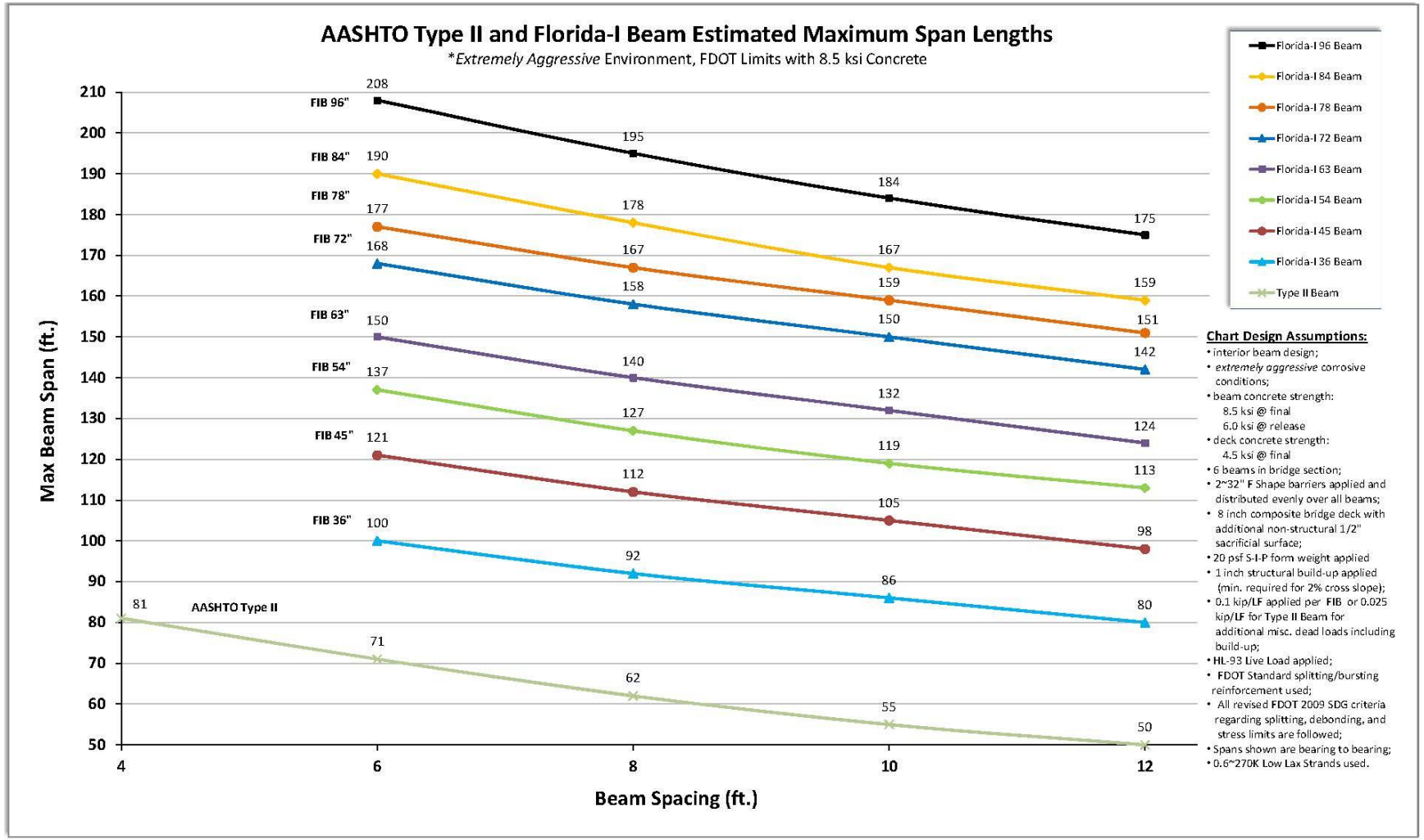
BEARING PLATES

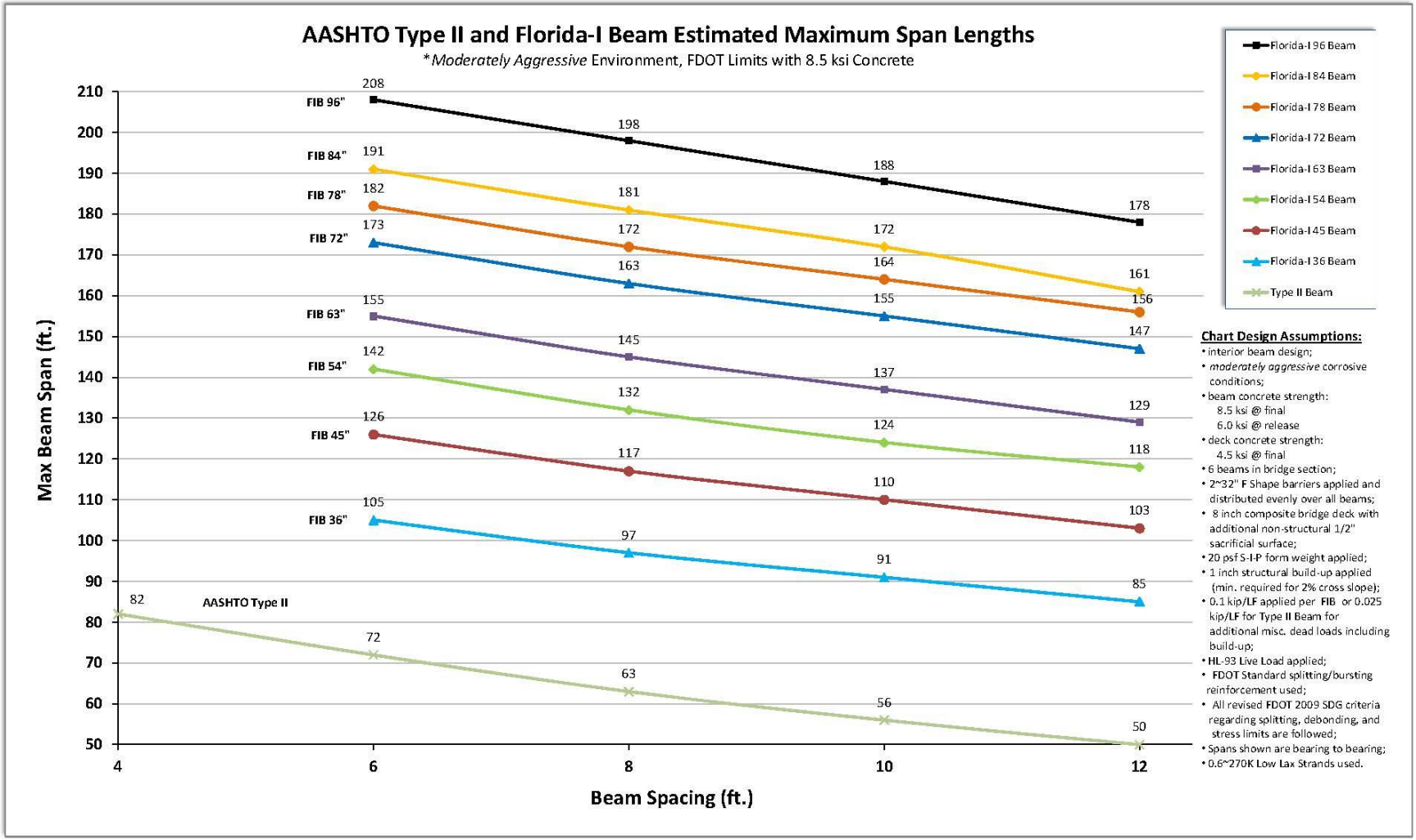
*** Mark indicates beveled bearing plate and embedded bearing plate required. See Index 450-511 or 450-512 for details.

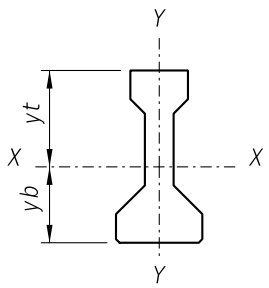
Payment

Item number	Item Description	Unit Measure
450-1-1	Prestressed Beams: AASHTO Type II	LF

Design Aids




AASHTO Type II and Florida-I Beam Estimated Maximum Span Lengths
*Moderately Aggressive Environment, FDOT Limits with 8.5 ksi Concrete
Max Beam Span (ft.)
Beam Spacing (ft.)
FIB 96"
FIB 84"
FIB 78"
FIB 72"
FIB 63"
FIB 54"
FIB 45"
FIB 36"
AASHTO Type II
208
198
188
178
191
181
172
161
182
172
164
156
173
163
155
147
155
145
137
129
142
132
124
118
126
117
110
103
105
97
91
85
82
72
63
56
50
Florida-I96 Beam
Florida-I84 Beam
Florida-I78 Beam
Florida-I72 Beam
Florida-I63 Beam
Florida-I54 Beam
Florida-I45 Beam
Florida-I36 Beam
Type II Beam
Chart Design Assumptions:
• interior beam design;
• moderately aggressive corrosive conditions;
• beam concrete strength:
8.5 ksi @ final
6.0 ksi @ release
• deck concrete strength:
4.5 ksi @ final
• 6 beams in bridge section;
• 2^32" F Shape barriers applied and distributed evenly over all beams;
• 8 inch composite bridge deck with additional non-structural 1/2" sacrificial surface;
• 20 psf S-I-P form weight applied;
• 1 inch structural build-up applied (min. required for 2% cross slope);
• 0.1 kip/LF applied per FIB or 0.025 kip/LF for Type II Beam for additional misc. dead loads including build-up;
• HL-93 Live Load applied;
• FDOT Standard splitting/bursting reinforcement used;
• All revised FDOT 2009 SDG criteria regarding splitting, debonding, and stress limits are followed;
• Spans shown are bearing to bearing;
• 0.6^270K Low Lax Strands used.



AASHTO TYPE II BEAM
(INDEX 450-120)

Section Properties*					
Beam	**Area ($in.^2$)**	**Ixx ($in.^4$)**	**Iyy ($in.^4$)**	**yt (in.)**	**yb (in.)**
AASHTO Type II	369	50,979	5,333	20.17	15.83

* These section properties are based on gross section properties and neglect the 3/4" chamfers on the bottom flanges.