Florida Department of Transportation

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TEMPORARY DESIGN BULLETIN C09-03

DATE: June 2, 2009

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

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

COPIES: Lora Hollingsworth, Brian Blanchard, Ghulam Mujtaba, Tom Malerk, Jeffrey Ger (FHWA)

SUBJECT: Implementation of New Florida-I Beam Design Standards Including Related Data Tables and Structures Manual Revisions

REQUIREMENTS

1. Design Standards

The Florida-I Beam and related Design Standards Index Sheets will be released for implementation with the July 2009 Interim Design Standards. Copies of these sheets and their associated data tables are included with Attachments 'A' & 'B' as listed below.

Attachment 'A', Florida-I Beam and Related Design Standards:

- Index No. 20010 (2 Sheets): Typical Florida-I Beam Details and Notes
- Index No. 20036 (2 Sheets): Florida-I 36 Beam - Standard Details
- Index No. 20045 (2 Sheets): Florida-I 45 Beam - Standard Details
- Index No. 20054 (2 Sheets): Florida-I 54 Beam - Standard Details
- Index No. 20063 (2 Sheets): Florida-I 63 Beam - Standard Details
- Index No. 20072 (2 Sheets): Florida-I 72 Beam - Standard Details
- Index No. 20078 (2 Sheets): Florida-I 78 Beam - Standard Details
- Index No. 20199 (1 Sheet): Build-Up and Deflection Data
- Index No. 20510 (1 Sheet): Composite Elastomeric Bearing Pads for Florida-I Beams
- Index No. 20511 (2 Sheets): Bearing Plate Details for Florida-I Beams

Attachment 'B', Florida-I Beam Related Data Tables (CADD Cells):

- Cell No. 20010: Florida-I Beam Table of Beam Variables
- Cell No. 20199: Build-up & Deflection Data Table
- Cell No. 20510: Bearing Pad – Data Table (Florida-I Beam)
- Cell No. 20511: Bearing Plate – Data Table (Florida-I Beam)

2. Structures Manual – January 2009

a. Volume 1 – *Structures Design Guidelines*

i. Replace Section 2.3.1A with the following:

"The majority of Florida bridges will be exempt from seismic or restrainer design requirements. For exempted bridges, only the minimum bearing support dimensions need to be satisfied as required by LRFD [4.7.4.4]. Exempted bridges include those with superstructures comprising simple-span or continuous flat slabs, simple-span prestressed slabs or double-tees, and simple-span AASHTO, Florida Bulb-T, Florida-I, or steel girders."

ii. In Section 2.5, insert the following into Table 2.1 under Prestressed Beams:

Florida-I 36 Beam (Index No. 20036)	Lb/ft	840
Florida-I 45 Beam (Index No. 20045)	Lb/ft	906
Florida-I 54 Beam (Index No. 20054)	Lb/ft	971
Florida-I 63 Beam (Index No. 20063)	Lb/ft	1037
Florida-I 72 Beam (Index No. 20072)	Lb/ft	1103
Florida-I 78 Beam (Index No. 20078)	Lb/ft	1146

iii. Replace the text of Section 4.1.3 – Girder Transportation with the following:

"Coordinate the transportation of heavy and/or long girders with the Department's Permit Office and the appropriate industry representatives during the design phase of the project."

Commentary: Longer beams may require evaluation of delivery routes by the appropriate industry representative to ensure turns can be made safely, particularly in urban areas."

iv. Renumber Sections 4.3.1A through 4.3.1F to Sections 4.3.1B through 4.3.1G respectively. Insert the following as the new Section 4.3.1A:

"The Florida-I Beams are the Department's standard prestressed concrete beams and will be used in the design of all new bridges and bridge widenings as applicable. AASHTO Beams and Florida Bulb-T Beams will not be used in new designs."

v. Replace item 1 of renumbered Section 4.3.1E with the following:

"Strand patterns utilizing an odd number of strands per row (a strand located on the centerline of beam) and a minimum side cover (centerline of strand to face of concrete) of 3-inches are required for all Florida-I, AASHTO, and Bulb-T beam sections except AASHTO Type V and VI beams for which a strand pattern with an even number of strands per row must be utilized."

vi. Replace item 8 of renumbered Section 4.3.1E with the following:

"For wide-top beams such as Florida-I, Bulb-T, and AASHTO Types V & VI beams, evaluate the top flanges of those beams to safely and adequately support the self-weight of the forms, concrete, and construction load specified in Section 400 of the FDOT Standard Specifications for Road and Bridge Construction.

For the Florida-I Beam, the Standard top flange reinforcing allows for a beam spacing up to 14 feet with an 8½" deck."

vii. Replace renumbered Section 4.3.1F with the following:

"The maximum prestressing force (P_u) from fully bonded strands at the ends of prestressed beams must be limited to the values shown on the Standard Drawings. For non-standard single web prestressed beam designs, modify the requirements of LRFD 5.10.10.1 to provide vertical reinforcement in the ends of pretensioned beams with the following splitting resistance:

- 3% P_u from the end of the beam to h/8, but not less than 10";
- 5% P_u from the end of the beam to h/4, but not less than 10";
- 6% P_u from the end of the beam to 3h/8, but not less than 10".

Do not apply losses to the calculated prestressing force (P_u). The minimum length of debonding from the ends of the beams is half the depth of the beam (h/2). Do not modify the reinforcing in the ends of the beams shown in the Standard Drawings without the approval of the State Structures Design Office.

Commentary: To minimize horizontal and diagonal web cracks and compensate for the longer splitting force distribution length adopted by LRFD in 2002 (h/4), the maximum splitting force from bonded prestressing has been increased. An additional splitting zone from h/4 to 3h/8 has been added to control the length of potential cracks, consistent with previous standard FDOT designs."

viii. Replace renumbered Section 4.3.1.G with the following:

"Provide embedded bearing plates for all AASHTO & Florida Bulb-T beams with beam sections deeper than 60 inches. Provide embedded bearing plates for all Florida-I beams. For all beam designs where the beam grade exceeds 2%, include beveled bearing plates."

ix. Replace the heading of Section 4.3.3 with the following:

"Florida Bulb-T Beams and Florida-I Beams [5.14.1.2.2]
The minimum web thicknesses for Florida-I and Florida Bulb-T beams are:"

x. Insert the following girder costs into Section 9.2.2.B.2 (Prestressed Concrete Girders; cost per linear foot.):

Florida-I; 36	$190
Florida-I; 45	$205
Florida-I; 54	$220
Florida-I; 63	$235
Florida-I; 72	$250
Florida-I; 78	$260

xi. Insert the following debris quantity estimations into Section 9.4 (Component; CY/LF):

36” Florida-I	0.207
45” Florida-I	0.224
54” Florida-I	0.240
63” Florida-I	0.256
72” Florida-I	0.272
78” Florida-I	0.283

b. Volume 2 – *Detailing Manual*

i. Replace item 2AA of Section 3.5A with the following:

“Bulb-T / Florida-I Beam Superstructure”

ii. Replace Section 13.11A with the following:

“See Design Standards Index Nos. 20500 (Bearing Pads - AASHTO & Florida Bulb-T Beams), 20510 (Bearing Pads – Florida-I Beams), 20501 (Bearing Plates - AASHTO & Florida Bulb-T Beams), 20502 (Bearing Plates - Florida U-Beams), and 20511 (Bearing Plates – Florida-I Beams). See *Volume 3, Instructions for Design Standards* for example drawings and general instructions.”

c. Volume 3 – *Examples, Details & Instructions*

Add the following Instructions for Design Standards shown in Attachment ‘C’:

- Index 20000 Series (1 Sheet): Prestressed Florida-I Beam Instructions
- Index 20510 (1 Sheet): Composite Elastomeric Bearing Pad Instructions for Florida-I Beams

d. Volume 7 – *Design Aids*

Add the following Design Aids as shown in Attachment ‘D’:

- ‘Florida-I Beam Section Properties’ (1 Sheet)
- ‘Florida-I Beam Estimated Maximum Span Lengths’ charts (2 Sheets)

COMMENTARY

This Temporary Design Bulletin (TDB) is a follow-up to TDB C09-01 released in January 2009. This TDB implements Florida-I Beam sizes 36” through 78” depth. Potential beams of deeper size will be addressed in the future.

HISTORY

See Temporary Design Bulletin C09-01.

IMPLEMENTATION

Florida I-Beams (FIB’s) will be used on all new Design-Bid-Build projects having both a design start date of February 1, 2009 or later and a letting date of July 1, 2010 or later. The FIB’s shall be used for preliminary design and estimates of projects with projected schedules falling on or after these dates.

AASHTO Beams and Florida Bulb-T Beams will no longer be used in Design-Bid-Build projects where the design start date is scheduled on or after February 1, 2009 with a letting date on or after July 1, 2010. Bridge Development Reports (BDR’s) for these projects shall not include AASHTO Beams and Florida Bulb-T Beams in cost comparisons.

No currently designed projects will require a redesign as a result of this TDB, but Districts may elect to introduce FIB’s into current designs at their discretion. For projects where the BDR already recommends an AASHTO or Florida Bulb-T beam design, FIB’s may be substituted into the final design without issuing a BDR addendum.

For all projects requiring the use of FIB’s as stated above, Value Engineering Change Proposals (VECP’s) to use AASHTO and Florida Bulb-T beams will not be accepted.

New BDR’s shall continue to consider the use of all viable structure types including the possibility of steel box and/or I-girders. Current policies stated in the Plans Preparation Manual Vol. 1 Section 26.9 still apply.

FIB’s may be used on Design-Build projects effective immediately.

Current policies regarding the shipping of large girders remain in effect for FIB’s. Allowable size limits for beams are limited to project-specific transportation considerations. As stated in Structures Design Guidelines Section 4.1.3, the transportation of heavy and/or long girders requires coordination with the Department’s Permit Office and the appropriate industry representative during the design phase of the project.

Since implementation is dependent on the design start date, there will be a period of time where lettings have some projects with the new FIB’s while others use the old AASHTO Beams and Florida Bulb-T Beams. For this transition period, the Design Standards will continue to include both the new FIB shapes and the old beam shapes.

Changes to specifications and procedures are summarized as follows:

1. Structures Manual

   SDG Vol. 7 Design Aids – 'BDR Bridge Cost Estimate': FIB Estimated Costs per Liner Foot have been added to the spreadsheet.

   All other updates are included in the Requirements of this Bulletin.

2. Design Standards

   All updates are included in the Requirements of this Bulletin.

3. Standard Specifications

   Section 450 – 'Precast Prestressed Concrete Construction': All references and updates regarding the FIB will be included in the FDOT January, 2010 Specifications Workbook.

4. Basis of Estimates

   New Pay Items will be added to the FDOT Basis of Estimates Manual for lettings beginning January, 2010.

5. Plans Preparations Manual

   No changes are anticipated at this time.

6. Misc. Design Tool Updates

   a. CADD: New FIB cells and tables in MicroStation & PDF format will be released with the July 2009 Interims and posted on the Structures Design website. These Cells are shown in Attachment 'B', and they will be included in the MicroStation Structures Menu with the next Maintenance Release.

   b. Design Software: The new FIB's are included in Version 3.0 of the FDOT LRFD Prestressed Beam Program already released. Proprietary software vendors have been contacted and given the new FIB section properties to be included for use in their design programs.

CONTACT

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RVR/rms
Attachments

Attachment A

Florida-I Beam & Related Design Standards

- Index No. 20010 (2 Sheets): Typical Florida-I Beam Details and Notes
- Index No. 20036 (2 Sheets): Florida-I 36 Beam - Standard Details
- Index No. 20045 (2 Sheets): Florida-I 45 Beam - Standard Details
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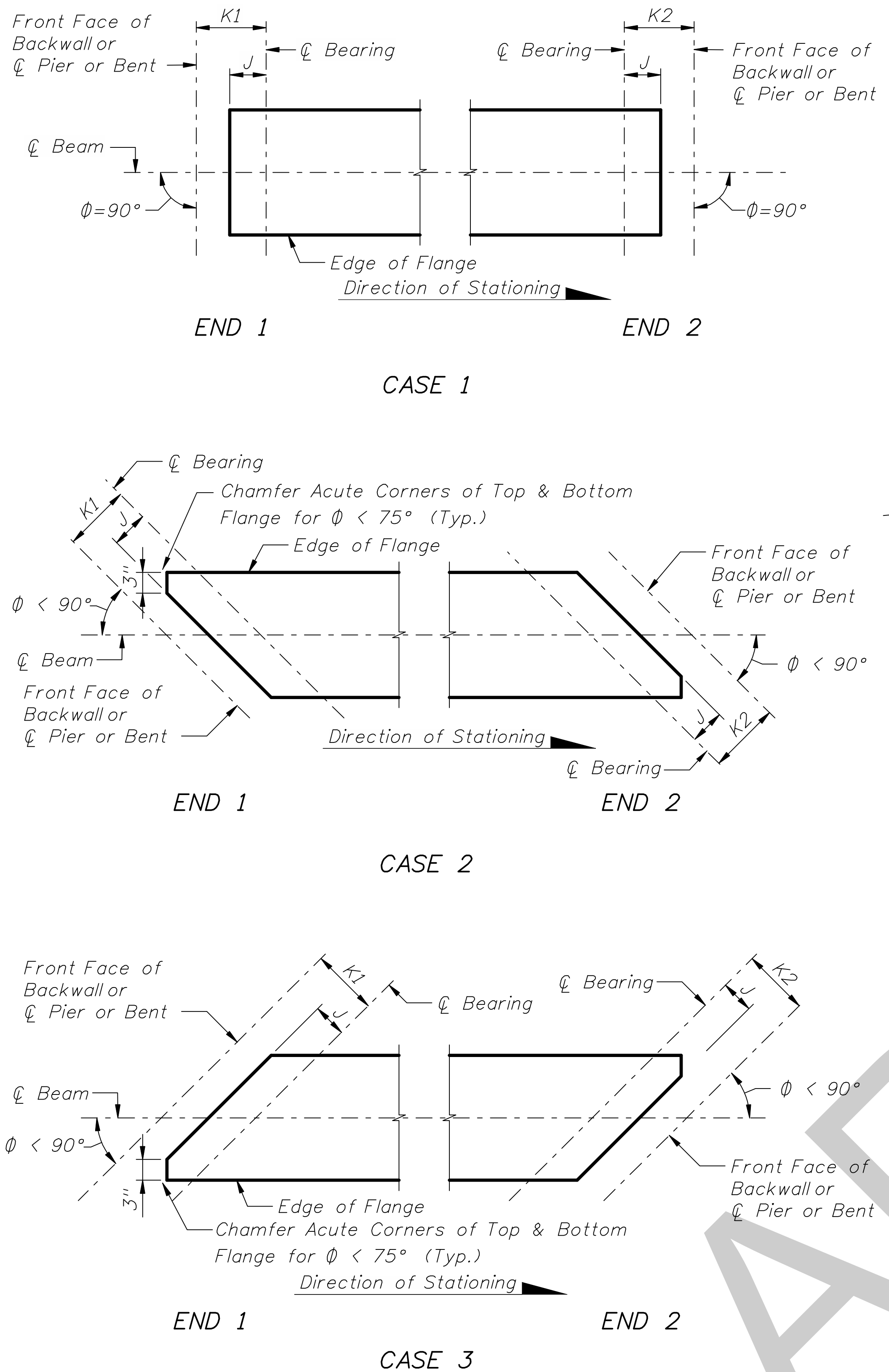
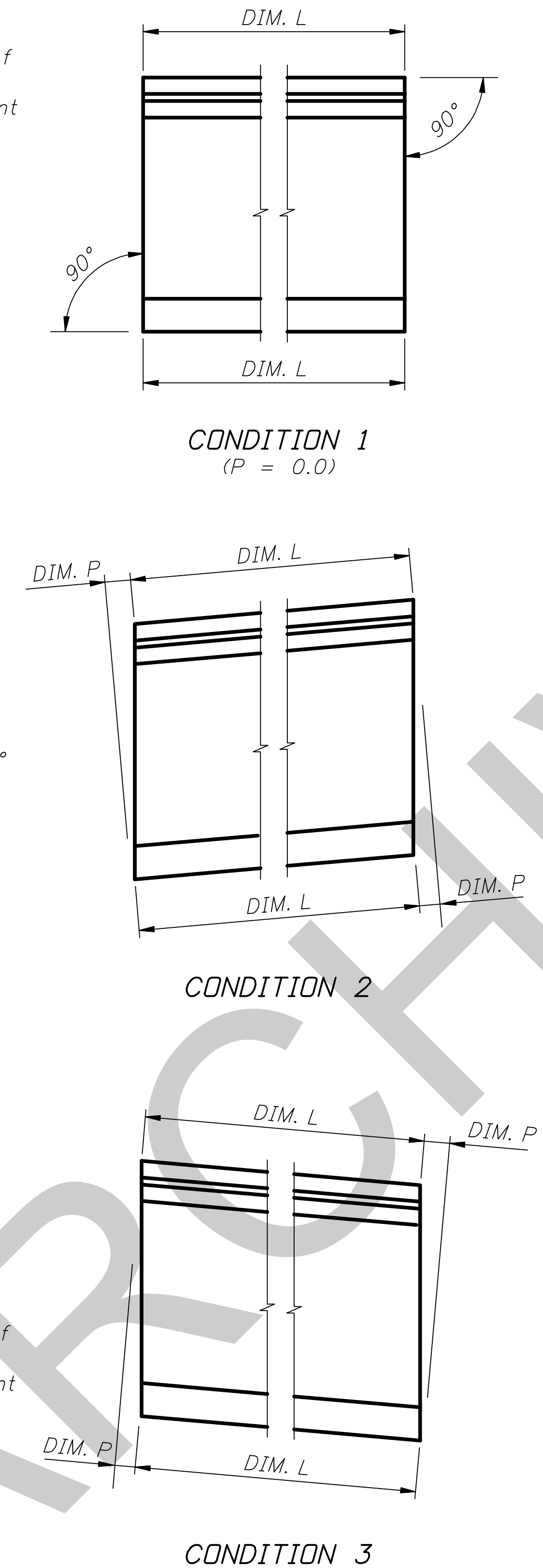


SCHEMATIC PLAN VIEWS AT BEAM ENDS



SCHEMATIC END ELEVATIONS OF BEAMS
(Showing Vertical Bevel of Beam End)

BEAM NOTES

1. All bar dimensions are out-to-out.
2. Place one (1) Bar 5K or 5Z at each location as detailed alternating the direction of the ends for each bar (see "ELEVATION AT END OF BEAM", Index Nos. 20036, 20045, 20054, 20063, 20072 and 20078).
3. Bars 4L shall be bent prior to the beam leaving the prestressing yard. Bars 4L shall be bent parallel to the ends of the beams.
4. Caution should be used with Bars 4L in the ends of exterior beams to assure the bent portion of the bar is properly oriented so that the bar will be embedded in the diaphragm concrete.
5. Strands N shall be either ASTM A416, Grade 250 or Grade 270, seven-wire strands ⅜" Φ or larger, stressed to 10,000 lbs. each.
6. Unless otherwise noted, the minimum concrete cover for reinforcing steel shall be 2".
7. At the Contractors option, welded deformed wire reinforcement may be used in lieu of Bars 3D, 5K, 4M, and 5Z as shown on the Standard Details for each beam size. Welded deformed wire reinforcement shall conform to AASHTO M221, with a minimum yield strength of 75 ksi.
8. Install Safety Sleeves approximately 2'-0" from ends of beam and spaced on 8'-0" (Max.) centers. Safety Sleeves shall be 2½" NPS x 5" Sch. 40 PVC Pipe with Cap. Holes shall be free of debris and water prior to casting deck.
9. For beams with skewed end conditions, the end reinforcement, defined as Bars 3C1, 3C2, 3D1, 3D2, 5K, 4M1, 4M2, 5Y and 5Z placed within the limits of the spacing for Bars 3C in "ELEVATION AT END OF BEAM", shall be placed parallel to the skewed end of the beam. Bars 3D3, 5K and 4M3 located beyond the limits of Bars 3C shall be placed perpendicular to the longitudinal axis of the beam. Fan Bars as needed to avoid overlapping bars at the transition to Bars 3D3 and 4M3, and field cut to maintain minimum cover. Provide additional Bars 4M1, 4M2, 3D1 and 3D2 as required; additional bars are not included in the Number Required on the "BILL OF REINFORCING STEEL". For placement locations, see "SKEWED BEAM END DETAILS". Adjust the dimensions of Bars 3C1, 3C2, 3D1, 3D2, 4M1 and 4M2 as shown on the "BENDING DIAGRAM" for skewed end conditions.
10. Placement of Bars 3C1, 3D1 and 4M1 correspond to END 1, and Bars 3C2, 3D2 and 4M2 correspond to END 2. END 1 and END 2 are shown on the beam "ELEVATION".
11. For Beams with vertically beveled end conditions, place first row of Bars 3C1, 3C2, 3D1, 3D2, 5K, 5Y and 5Z parallel to the end of the beam. Progressively rotate remaining bars within the limits of Bars 5Z until vertical by adjusting the spacing at the top of beam up to a maximum of 1". For welded deformed wire reinforcement, cut top cross wire and rotate bars as required or reduce end cover at top of the beam to minimum 1".
12. For beams with skewed end conditions, welded deformed wire reinforcement shall not be used for end reinforcement (Bars 3D1, 3D2, 4M1 and 4M2).
13. Bars 5K and 5Z shall be placed and tied to the fully bonded strands in the bottom or center row (see "STRAND PATTERN" on the Table of Beam Variables in Structures Plans). For welded deformed wire reinforcement, supplemental transverse #4 bars are permitted to support Pieces K & S under the cross wires on the bottom row of strands.
14. At the Contractor's option, Bars 3D1, 3D2 and 3D3 may be fabricated as a single bar with a 1'-0" minimum lap splice of the top legs.
15. For referenced Dimensions, Angles and Case Numbers, see the Table of Beam Variables in Structures Plans.

INSTRUCTIONS TO DESIGNER:

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:

Beam Type	Max. Bonded Prestress Force	Index No.	Last Revision Date
Florida-I 36	1450 Kips	20036	07/01/09
Florida-I 45	1670 Kips	20045	07/01/09
Florida-I 54	1740 Kips	20054	07/01/09
Florida-I 63	1740 Kips	20063	07/01/09
Florida-I 72	1980 Kips	20072	07/01/09
Florida-I 78	2230 Kips	20078	07/01/09

No losses shall be applied when calculating the Bonded Prestress Force. The reinforcing in the ends of the beams must not be modified without the approval of the State Structures Design Engineer.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

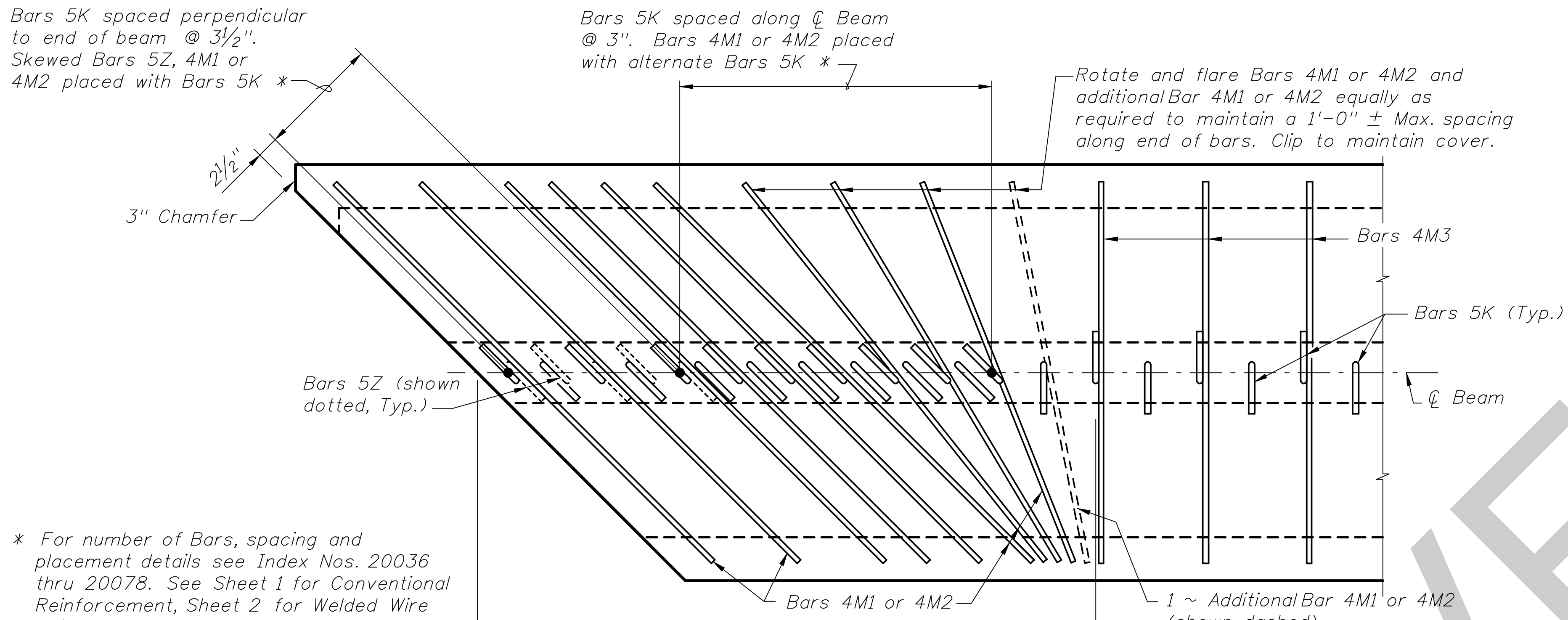
2008 Interim Design Standard

TYPICAL FLORIDA-I BEAM DETAILS AND NOTES

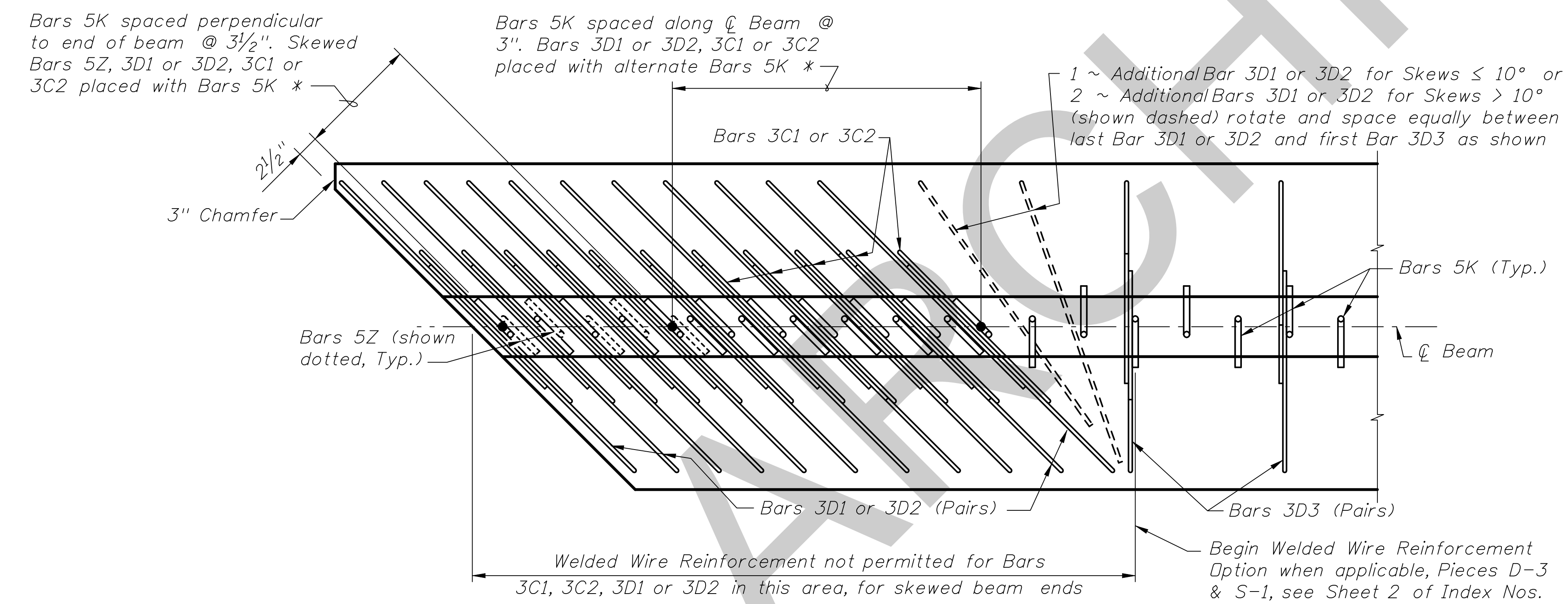
Interim Date 07/01/09

Sheet No. 1 of 2

Index No. 20010

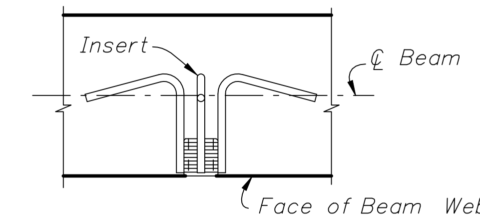


PARTIAL PLAN VIEW (SHOWING TOP FLANGE)
(End 1 Shown, End 2 Similar)
(Bars 5A, 4L, 5Y & Strands N not shown for clarity)



PARTIAL SECTION THRU WEB (SHOWING BOTTOM FLANGE)
(End 1 Shown, End 2 Similar)
(Bars 4L, Bars 5Y & Strands not shown for clarity)

SKEWED BEAM END DETAILS
(Florida-I 36 Beam shown, others similar)



PLAN SECTION THRU BEAM WEB AT INSERT FOR DIAPHRAGM REINFORCING
(When Intermediate Diaphragms are Required by Design)

INSERT NOTES

1. Provide 1" Ø, zinc-electroplated, ferrule wing nut or coil inserts, UNC threads, 1/0 minimum gage wire, not more than 4" in depth with a minimum ultimate tensile strength of 11,400 lbs. in 4,000 p.s.i. concrete.
2. If inserts are needed on both sides (faces) of beam webs, an assembly as long as the thickness of the beam web, consisting of two (2) ferrule or coil inserts attached by two (2) or more struts may be utilized. The connecting struts shall have a minimum ultimate tensile strength of 11,400 lbs.
3. Inserts for diaphragm reinforcing are required at each end of each intermediate diaphragm shown on the Beam Framing Plan. See Superstructure and Beam Framing Plans for longitudinal location of inserts for each face of beam.

INSERT DETAIL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	New Design Standard			

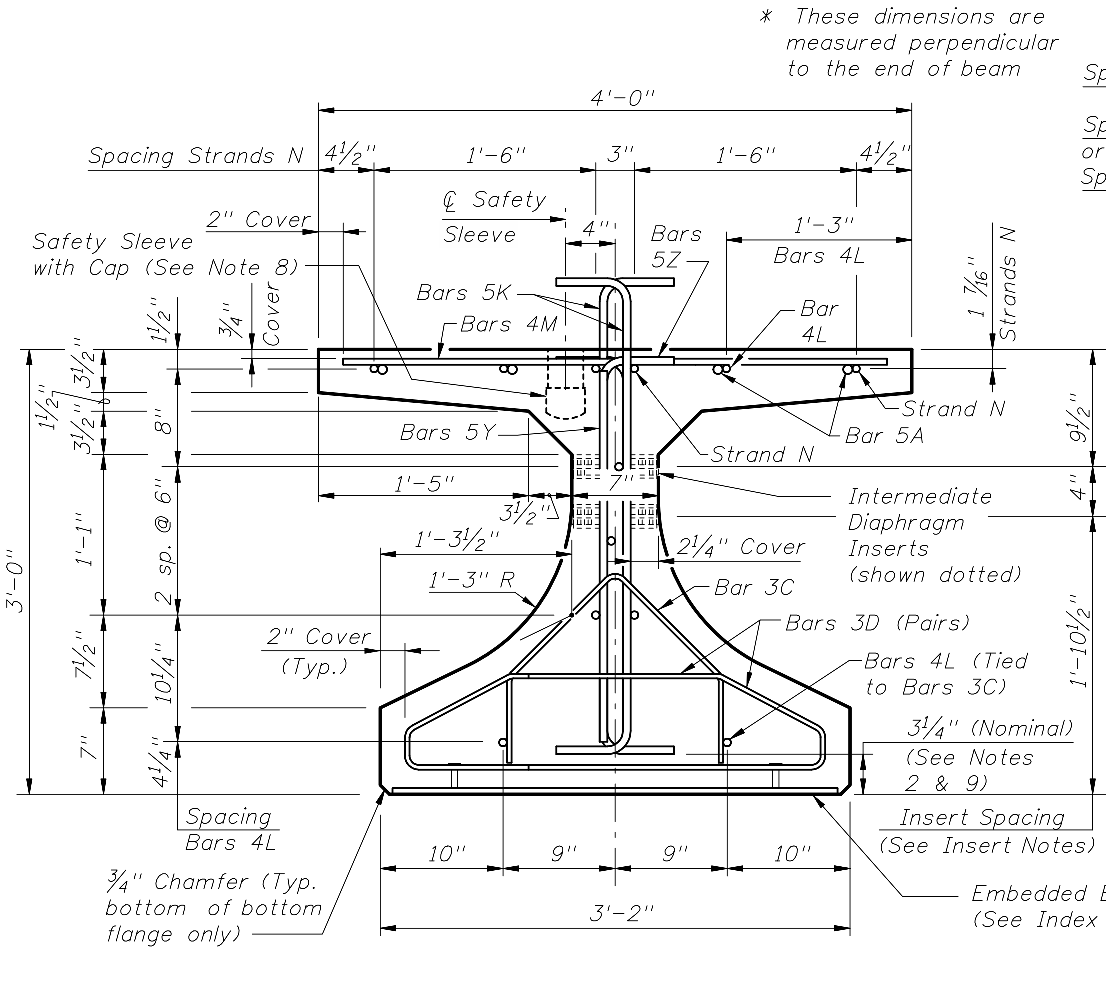
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2008 Interim Design Standard

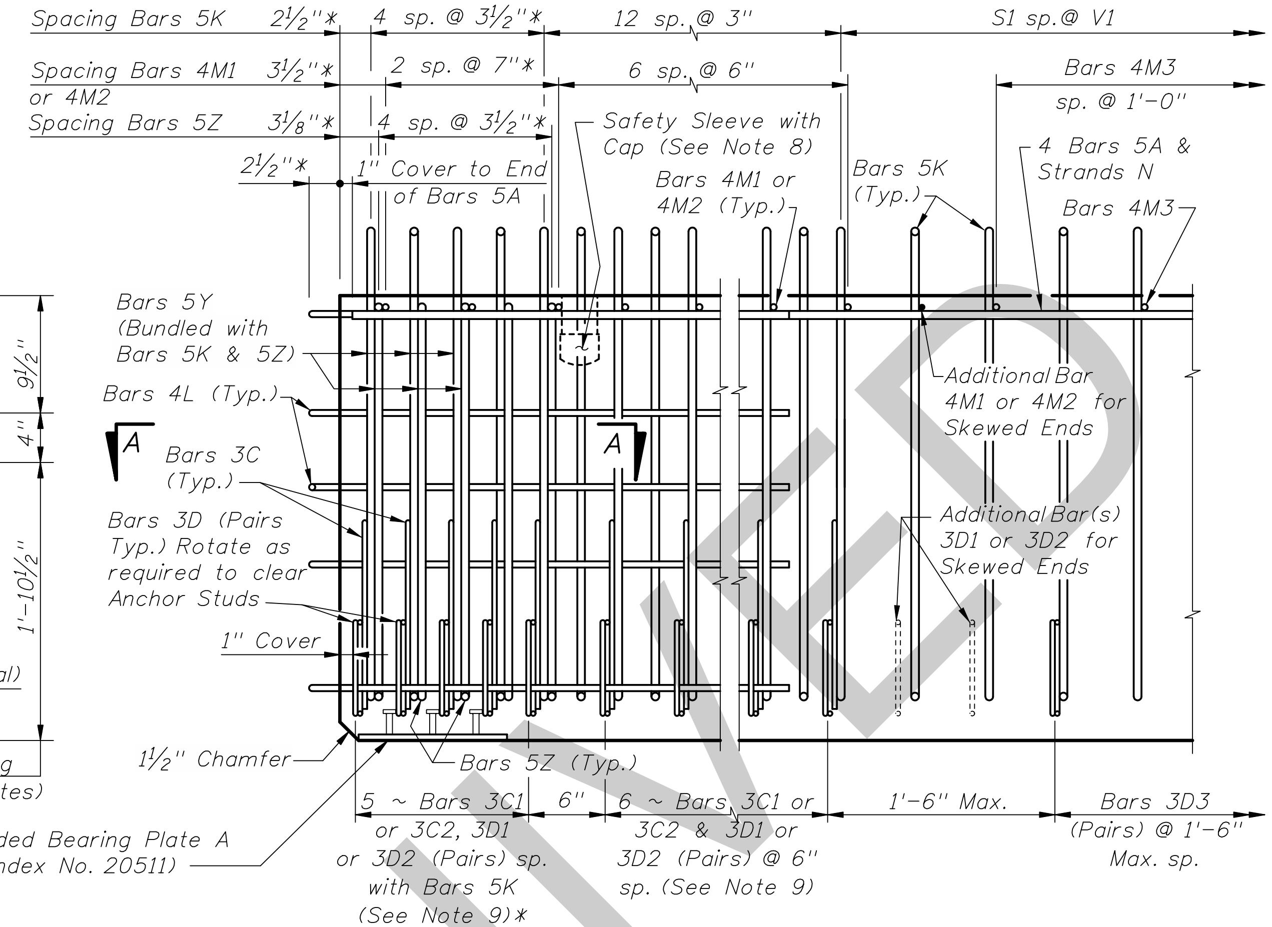
TYPICAL FLORIDA-I BEAM DETAILS AND NOTES

Interim Date 07/01/09

Index No. 20010



END VIEW



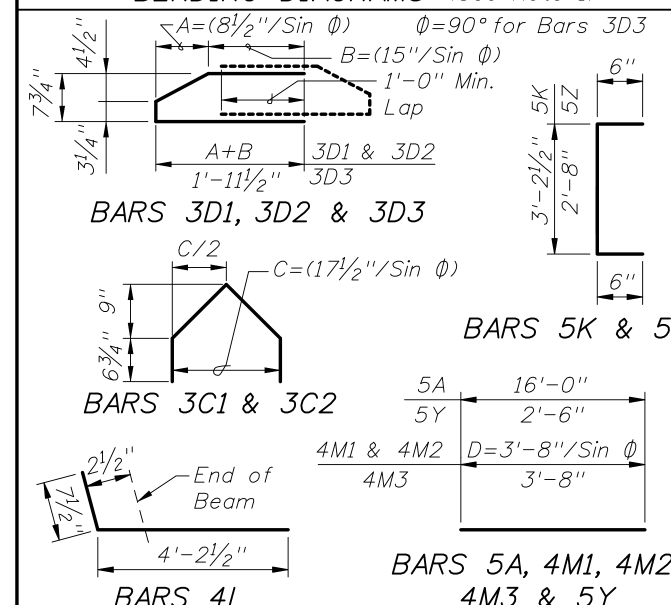
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

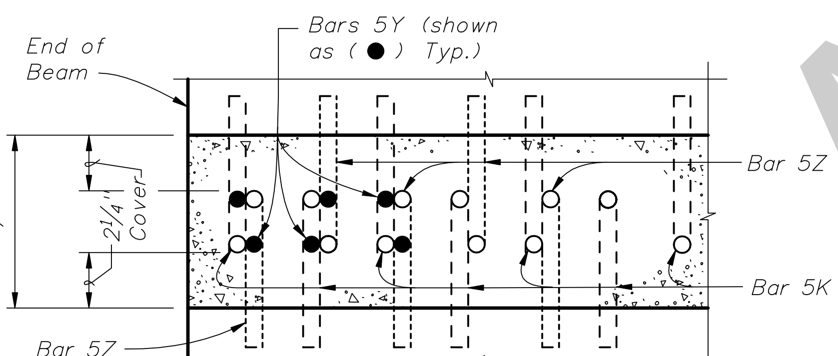
BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	5	8	16'-0"
C1	9, 10 & 11	3	11 (End 1)	Varies
C2	9, 10 & 11	3	11 (End 2)	Varies
D1	9, 10, 11 & 14	3	22 (End 1)	Varies
D2	9, 10, 11 & 14	3	22 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	4'-2"
L	3 & 4	4	16	4'-10"
M1	9 & 10	4	9 (End 1)	Varies
M2	9 & 10	4	9 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	3/8" ⌀ Strand	4	DIM L+5"
Y	9 & 11	5	12	2'-6"
Z	2, 9, 11 & 13	5	10	3'-8"

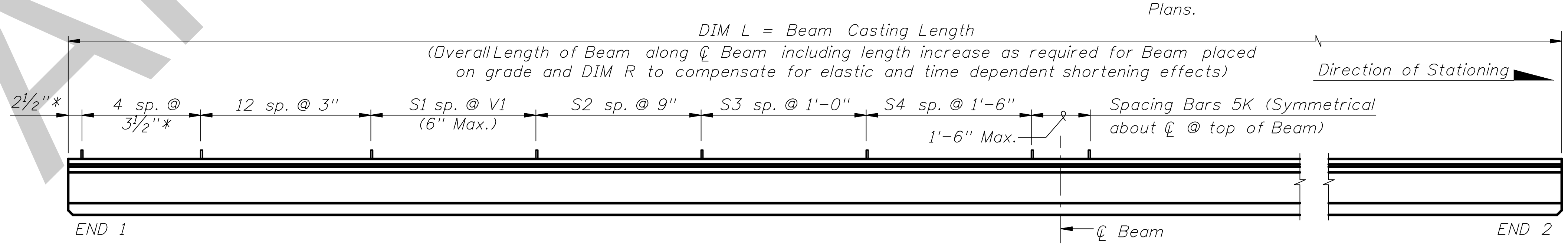
BENDING DIAGRAMS (See Note 1)



NOTES:
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.
B. For referenced notes, see Index No. 20010.
C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

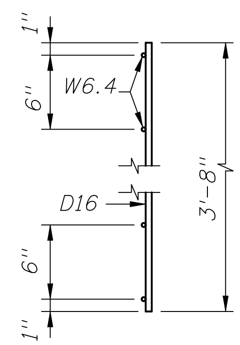
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2008 Interim Design Standard

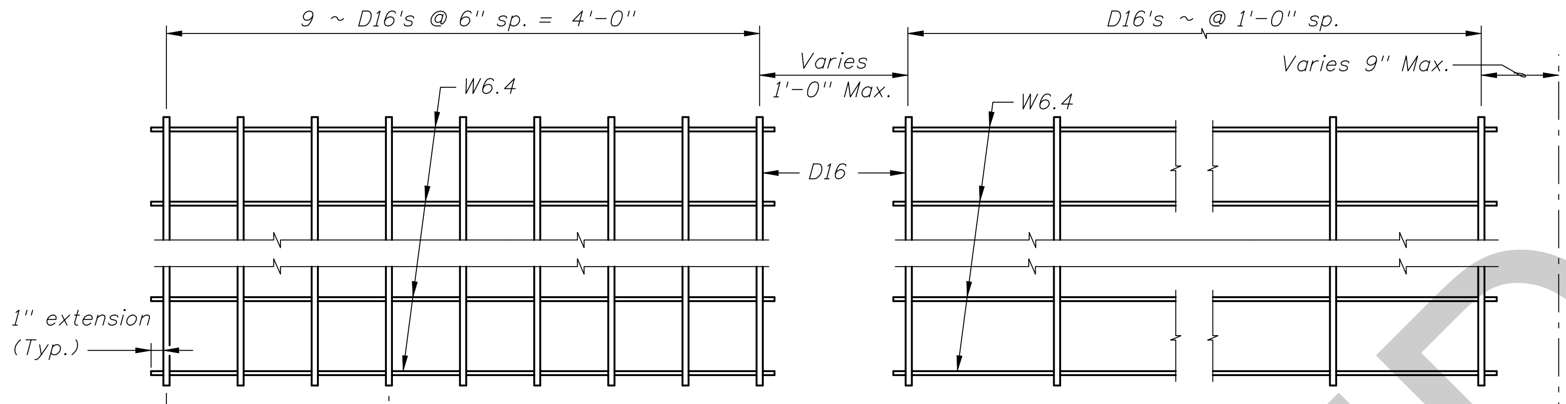
FLORIDA-I 36 BEAM - STANDARD DETAILS

Interim Date	Sheet No.
07/01/09	1 of 2

Index No. 20036

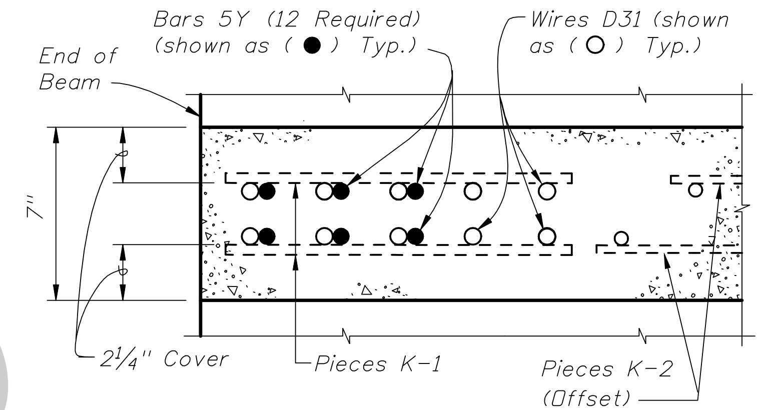


PIECES M
END VIEW

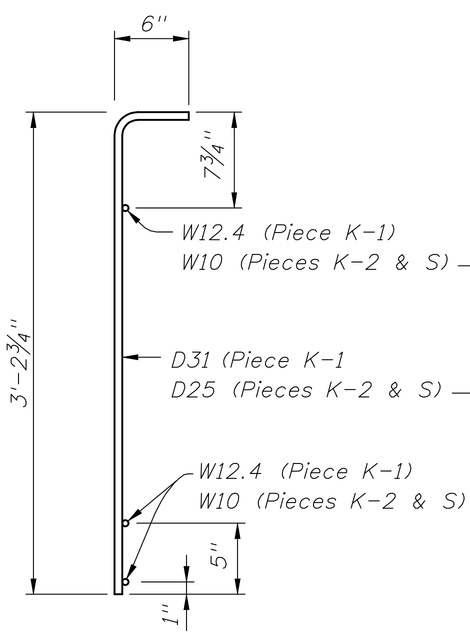


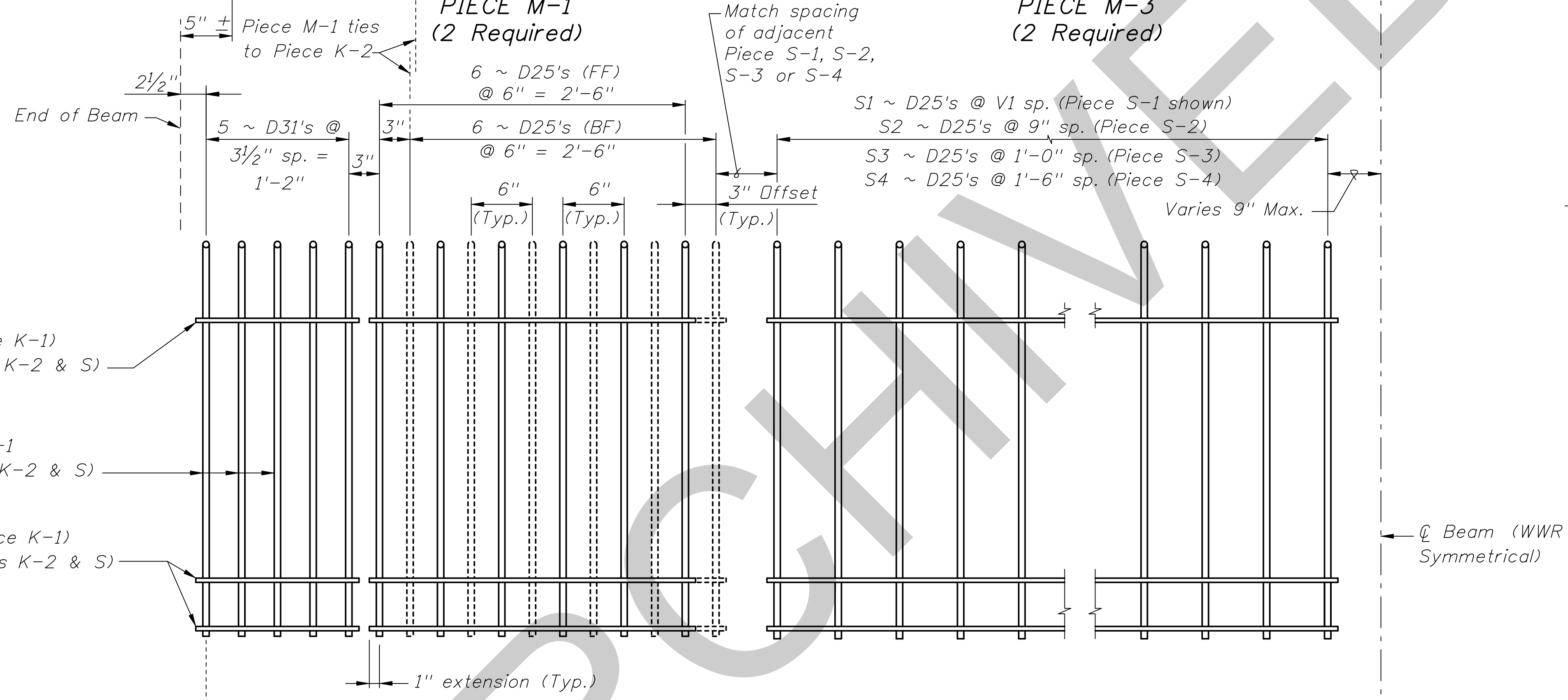
PLAN VIEW
PIECE M-1
(2 Required)

PLAN VIEW
PIECE M-3
(2 Required)



SECTION A-A
FOR WELDED WIRE REINFORCEMENT



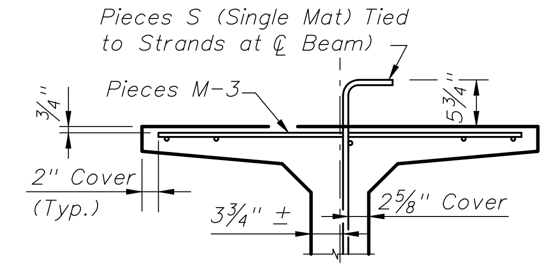


PIECES K & S
END VIEW

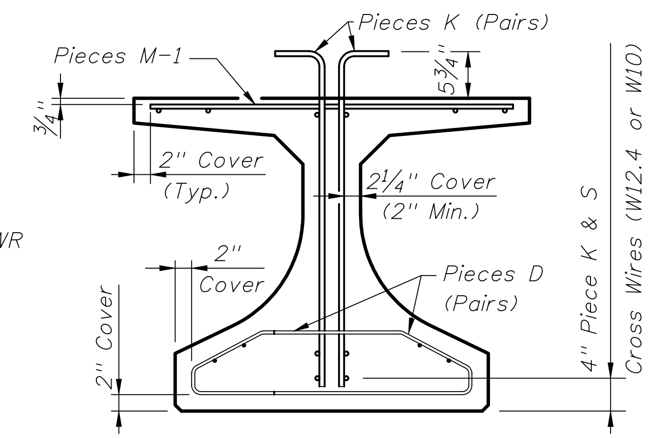
PIECE K-1
(Aligned EF)
(4 Required
~ 2 Pairs)

PIECE K-2
(FF Shown Solid)
(BF Shown Dashed)
(4 Required)

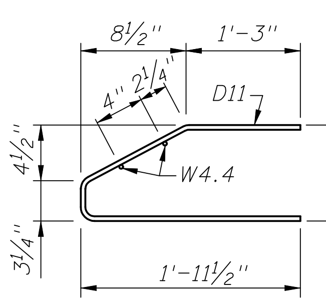
PIECE S-1, S-2, S-3 or S-4
(2 Required Each Piece)



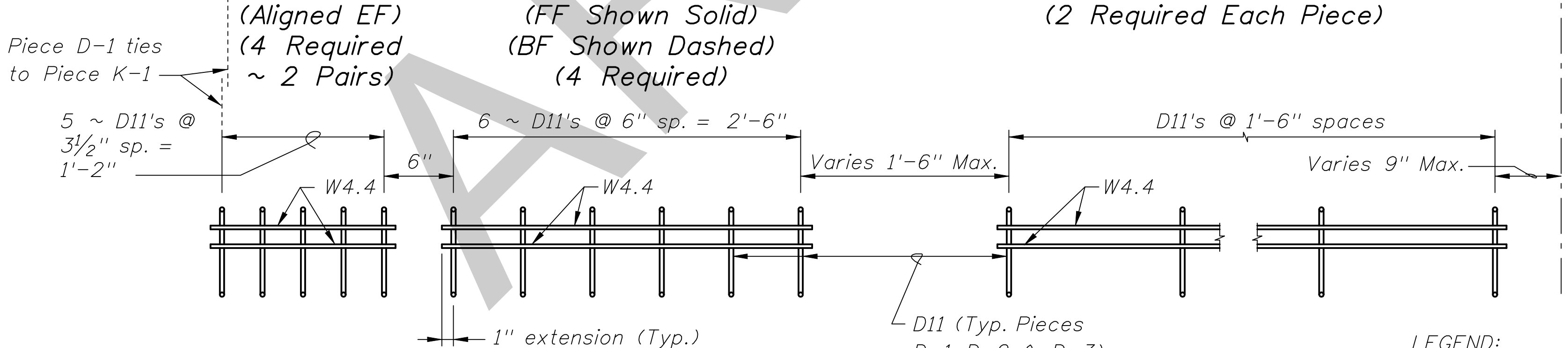
PARTIAL SECTION AT CENTER BEAM



PARTIAL BEAM END VIEW
(Conventional Reinforcing Bars A, C, L, Y
and Strands not Shown for Clarity)



PIECES D
END VIEW



PIECE D-1
(4 Required ~ 2 Pairs)

PIECE D-2
(4 Required ~ 2 Pairs)

PIECE D-3
(4 Required ~ 2 Pairs)

LEGEND:
EF = Each Face
FF = Front Face
BF = Back Face

NOTES:
a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
b. Place Conventional Reinforcement Bars 5A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.
c. Pieces may be fabricated in multiple length sections.
d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

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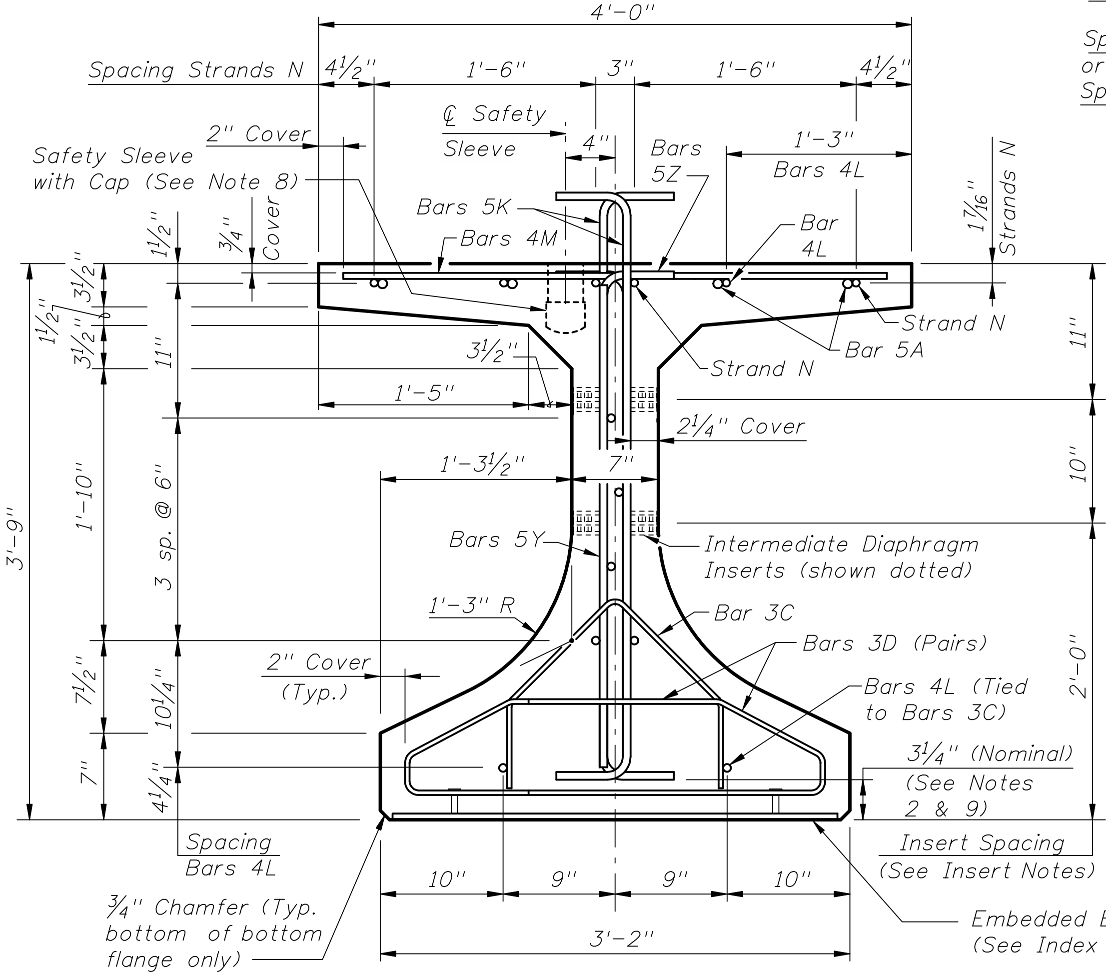
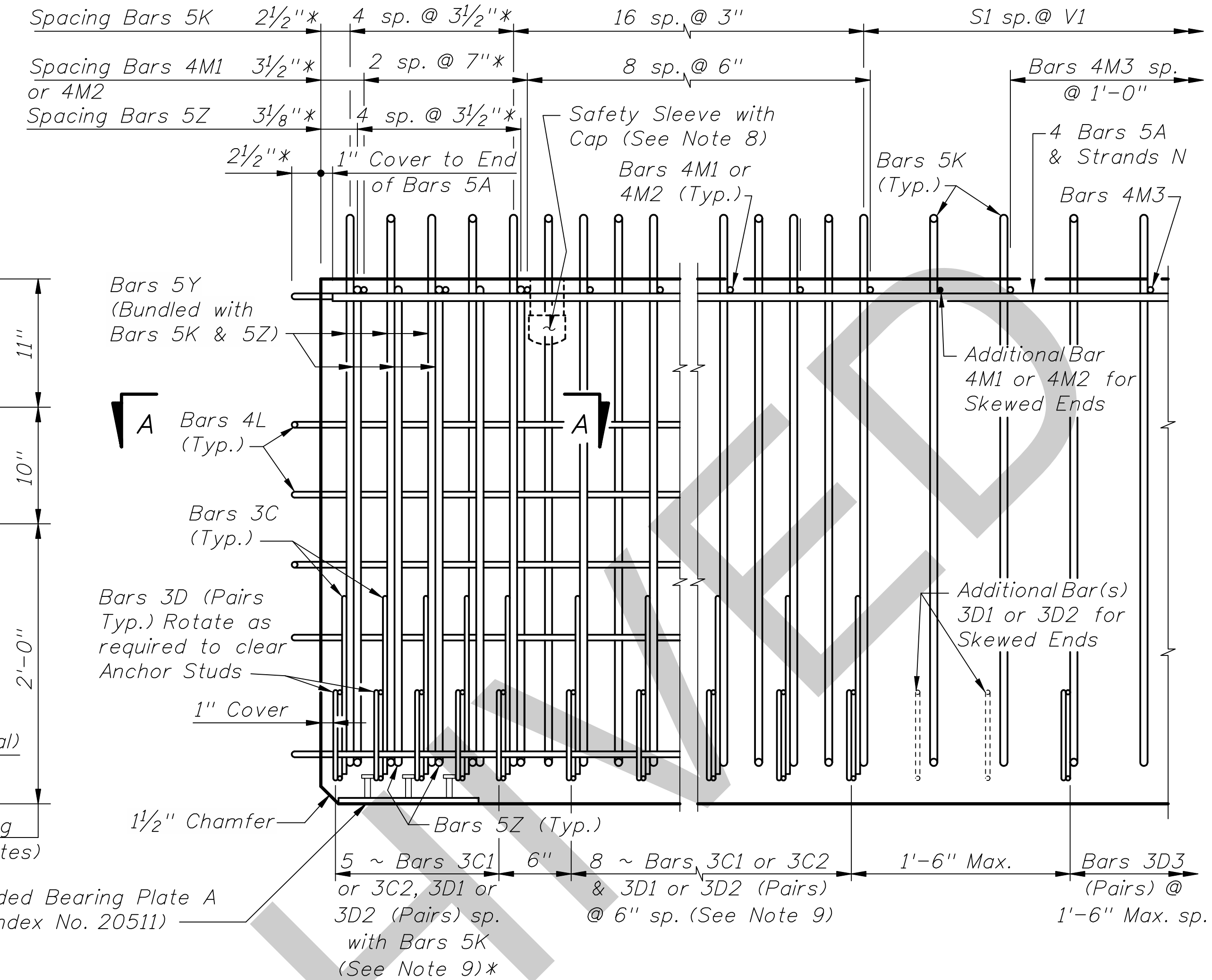
FLORIDA-I 36 BEAM - STANDARD DETAILS

* These dimensions are measured perpendicular to the end of beam



END VIEW



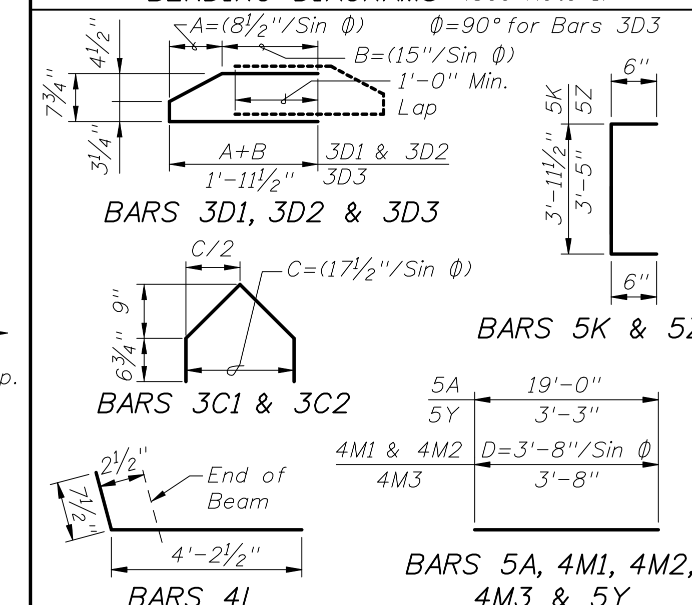
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	5	8	19'-0"
C1	9, 10 & 11	3	13 (End 1)	Varies
C2	9, 10 & 11	3	13 (End 2)	Varies
D1	9, 10, 11 & 14	3	26 (End 1)	Varies
D2	9, 10, 11 & 14	3	26 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	4'-11"
L	3 & 4	4	18	4'-10"
M1	9 & 10	4	11 (End 1)	Varies
M2	9 & 10	4	11 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	⅜" Ø Strand	4	DIM L+5"
Y	9 & 11	5	12	3'-3"
Z	2, 9, 11 & 13	5	10	4'-5"

BENDING DIAGRAMS (See Note 1)

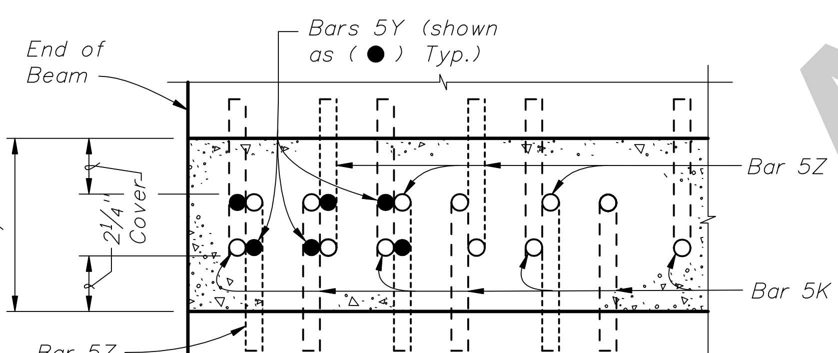


NOTES:

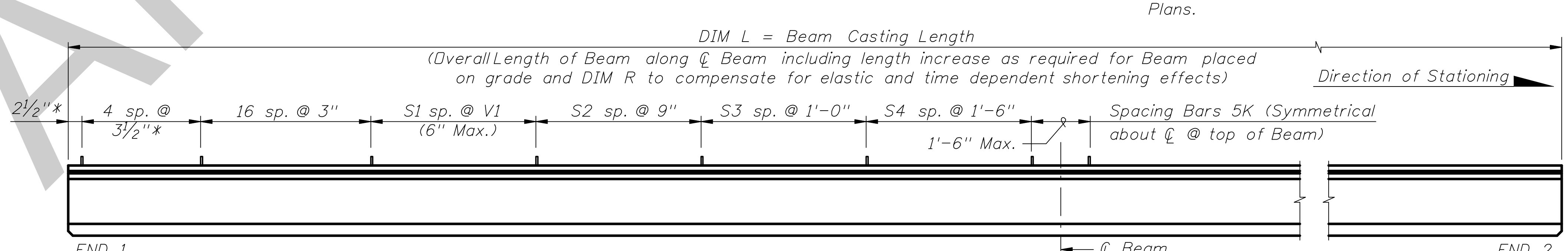
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.

B. For referenced notes, see Index No. 20010.

C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

ARCHIVED

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2008 Interim Design Standard

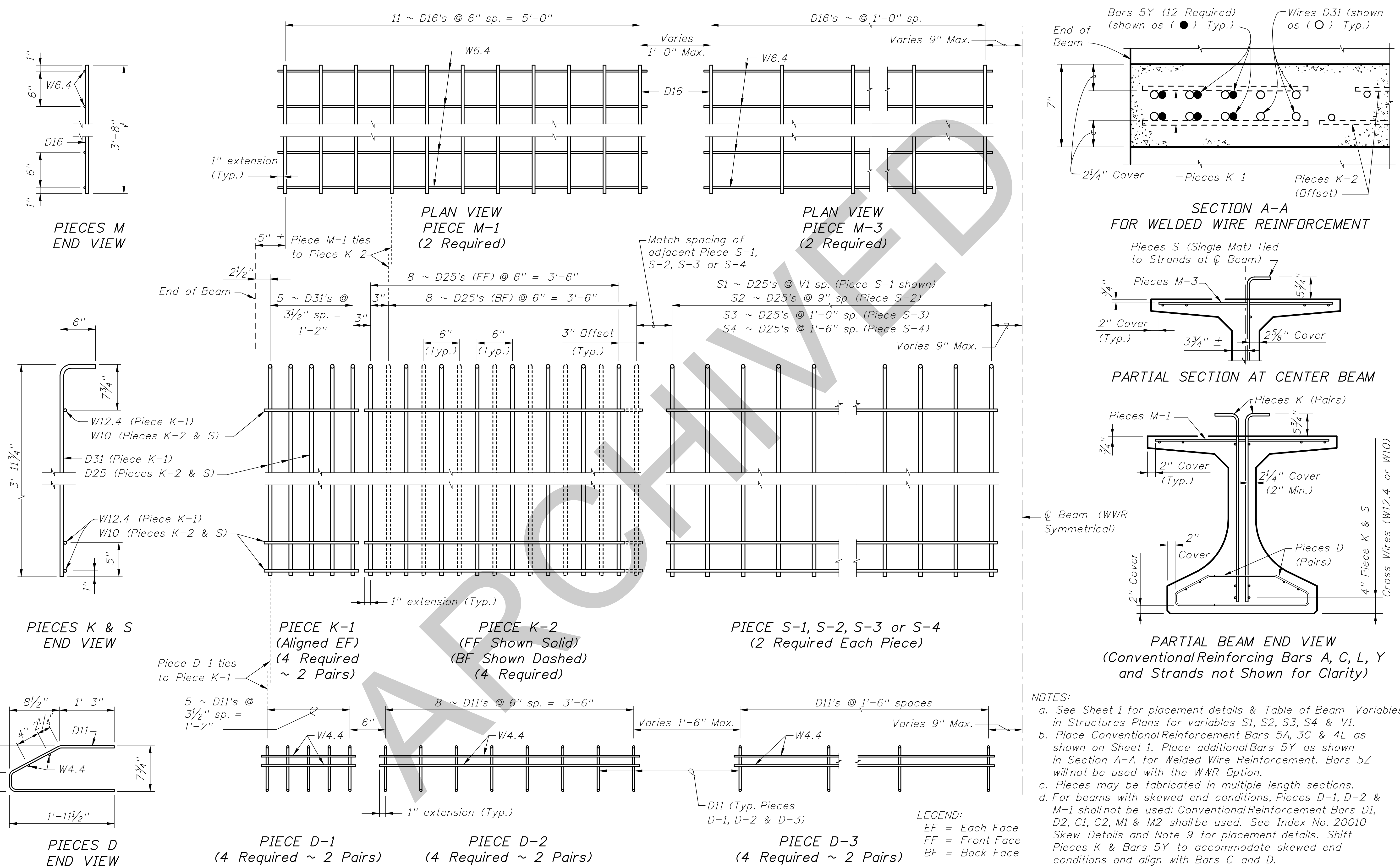
FLORIDA-I 45 BEAM - STANDARD DETAILS

Interim Date 07/01/09

Sheet No. 1 of 2

Index No. 20045

ALTERNATE REINFORCING STEEL (WELDED WIRE REINFORCEMENT) DETAILS



NOTES:

a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.

b. Place Conventional Reinforcement Bars 5A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.

c. Pieces may be fabricated in multiple length sections.

d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

LEGEND:
EF = Each Face
FF = Front Face
BF = Back Face

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

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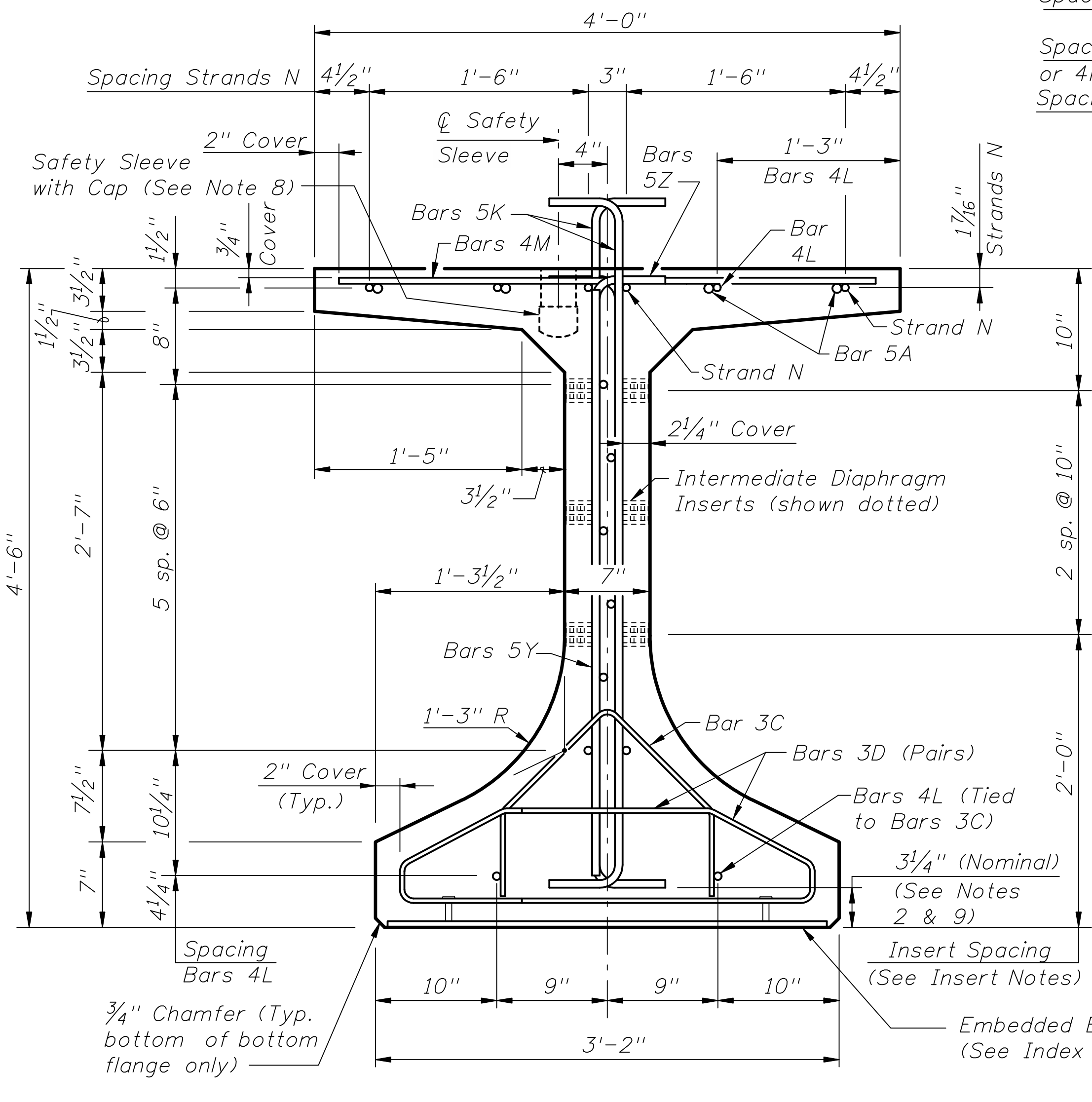
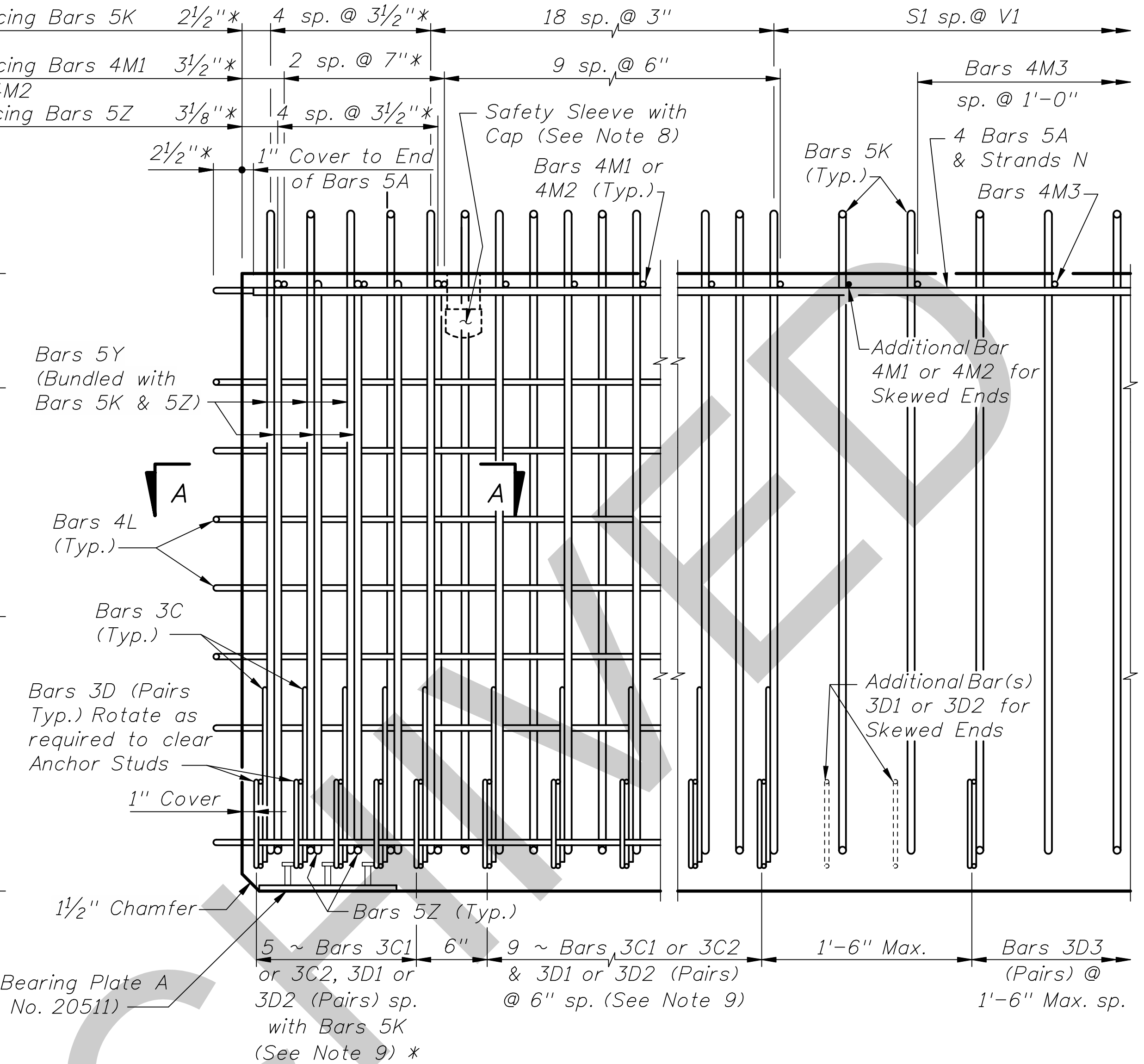
FLORIDA-I 45 BEAM - STANDARD DETAILS

Interim Date 07/01/09

Index No. 20045



END VIEW



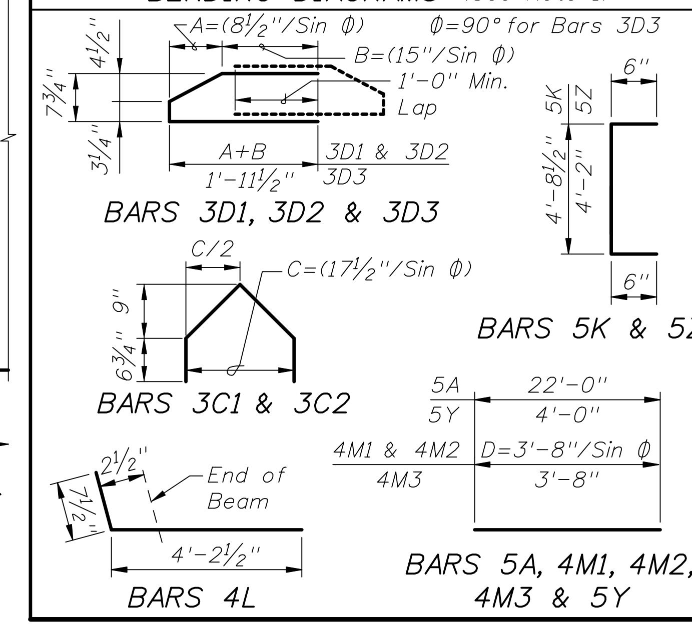
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	5	8	22'-0"
C1	9, 10 & 11	3	14 (End 1)	Varies
C2	9, 10 & 11	3	14 (End 2)	Varies
D1	9, 10, 11 & 14	3	28 (End 1)	Varies
D2	9, 10, 11 & 14	3	28 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	5'-8"
L	3 & 4	4	22	4'-10"
M1	9 & 10	4	12 (End 1)	Varies
M2	9 & 10	4	12 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	⅜" ∅ Strand	4	DIM L+5"
Y	9 & 11	5	12	4'-0"
Z	2, 9, 11 & 13	5	10	5'-2"

BENDING DIAGRAMS (See Note 1)

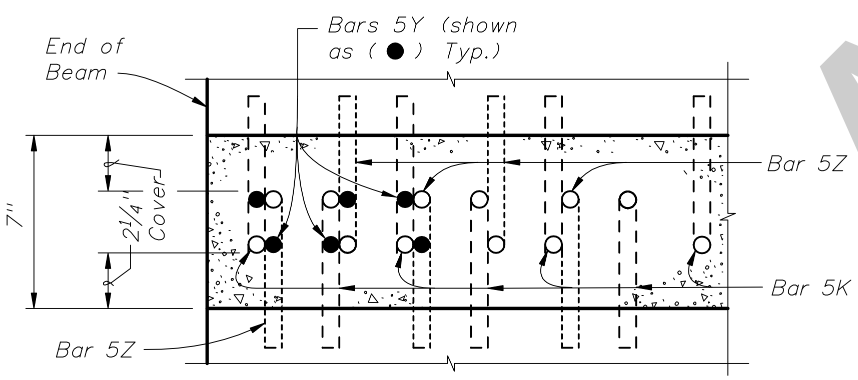


NOTES:

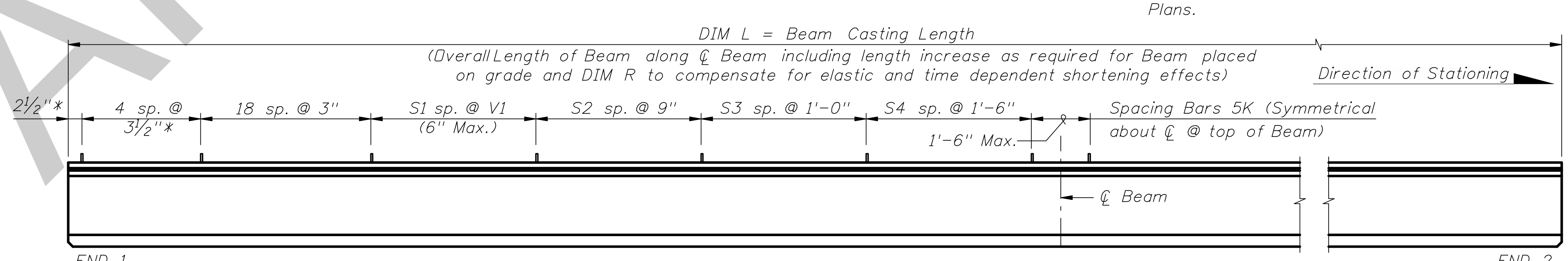
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.

B. For referenced notes, see Index No. 20010.

C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

ARCHIVED

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

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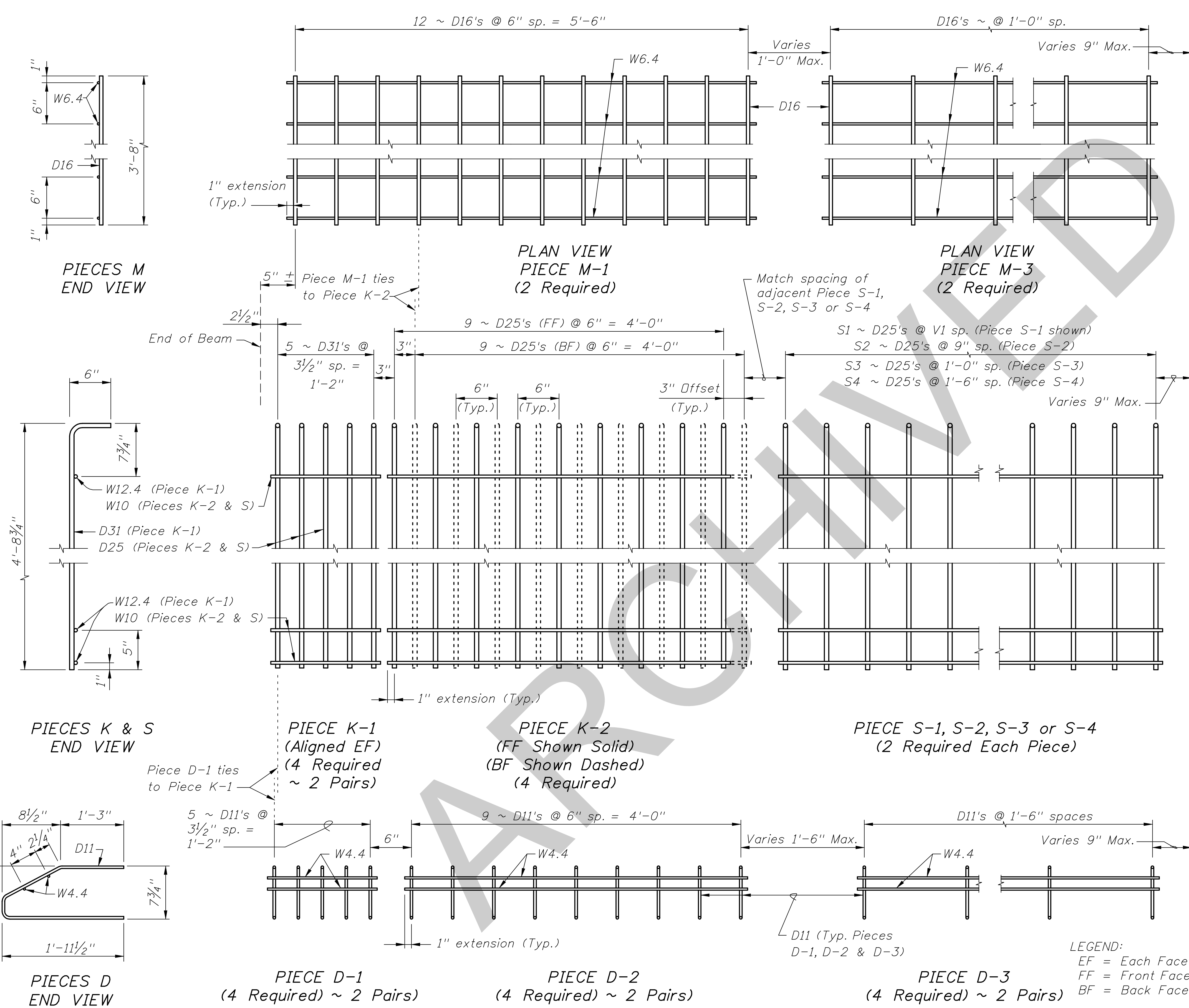
FLORIDA-I 54 BEAM - STANDARD DETAILS

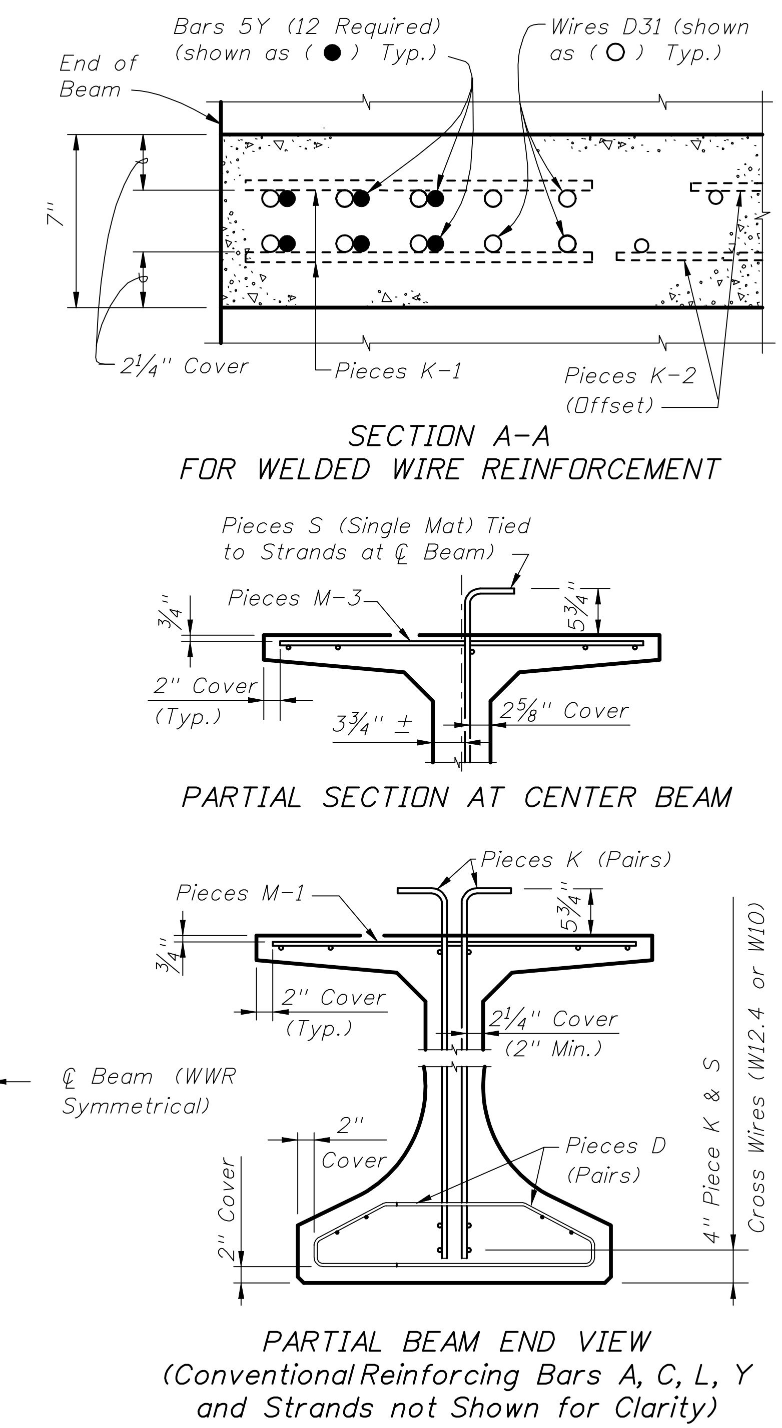
Interim Date 07/01/09

Sheet No. 1 of 2

Index No. 20054

ALTERNATE REINFORCING STEEL (WELDED WIRE REINFORCEMENT) DETAILS





NOTES:

a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.

b. Place Conventional Reinforcement Bars 5A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.

c. Pieces may be fabricated in multiple length sections.

d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

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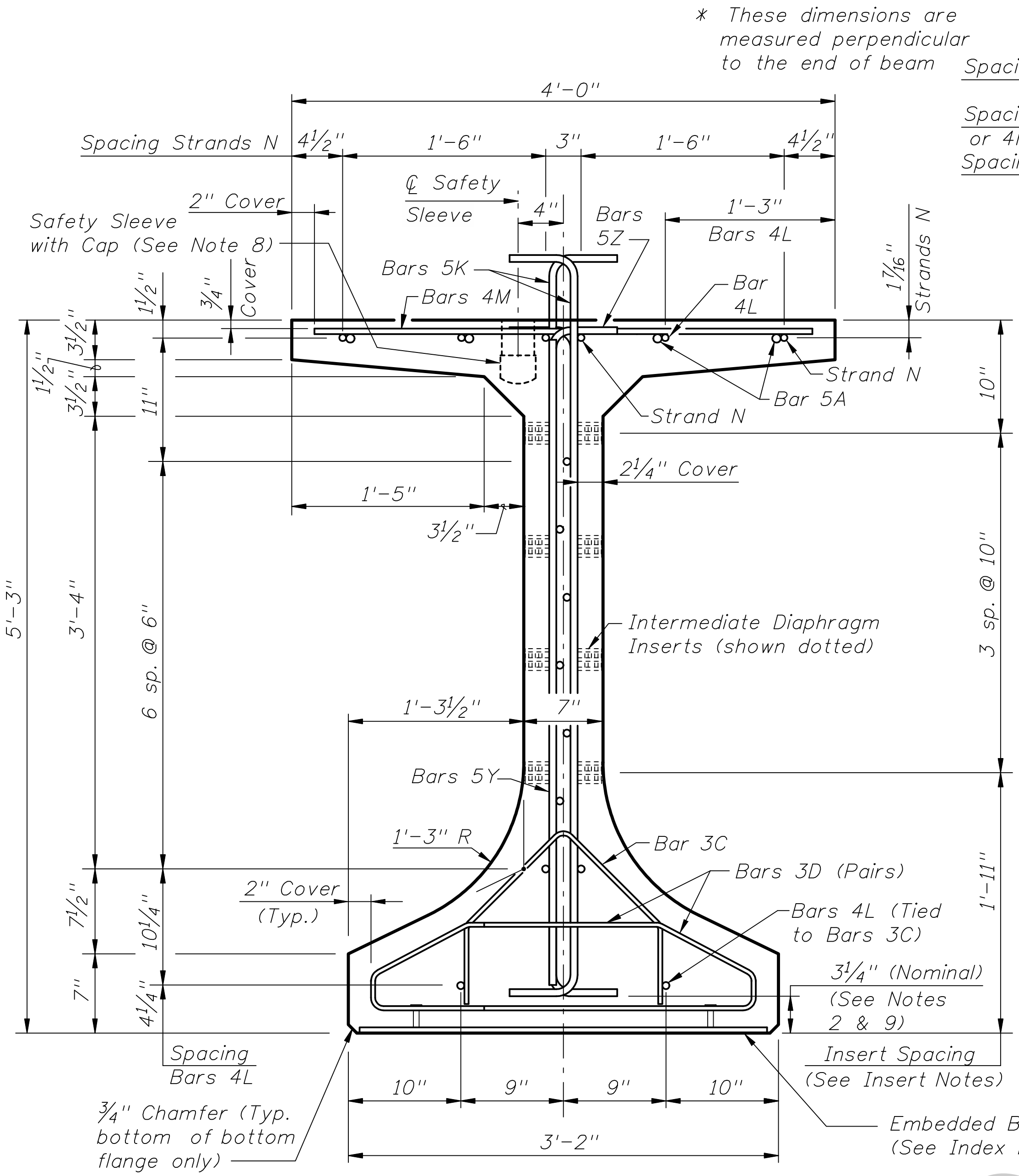
FLORIDA-I 54 BEAM - STANDARD DETAILS

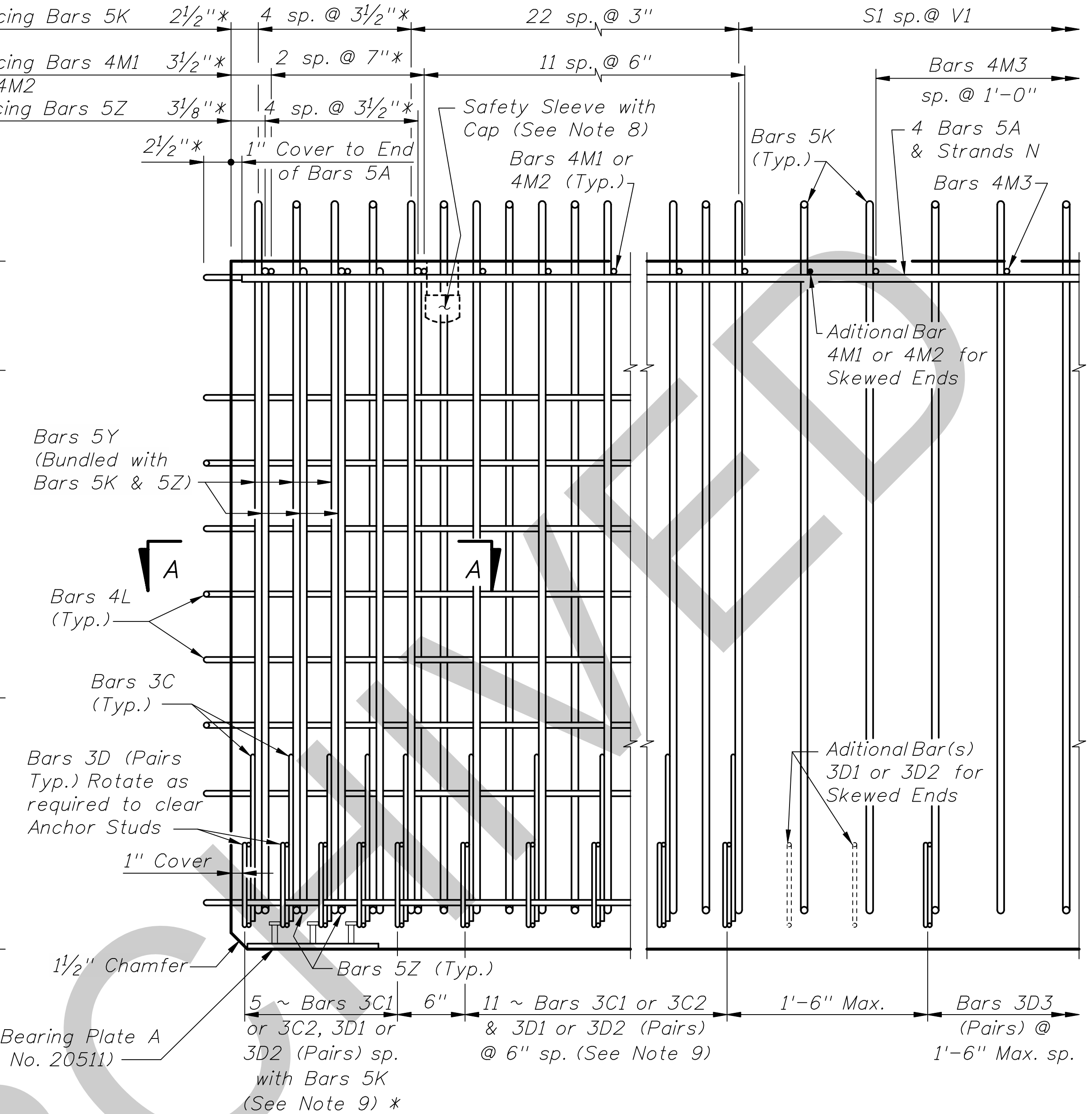
Interim Date 07/01/09

Sheet No. 2 of 2

Index No. 20054



END VIEW



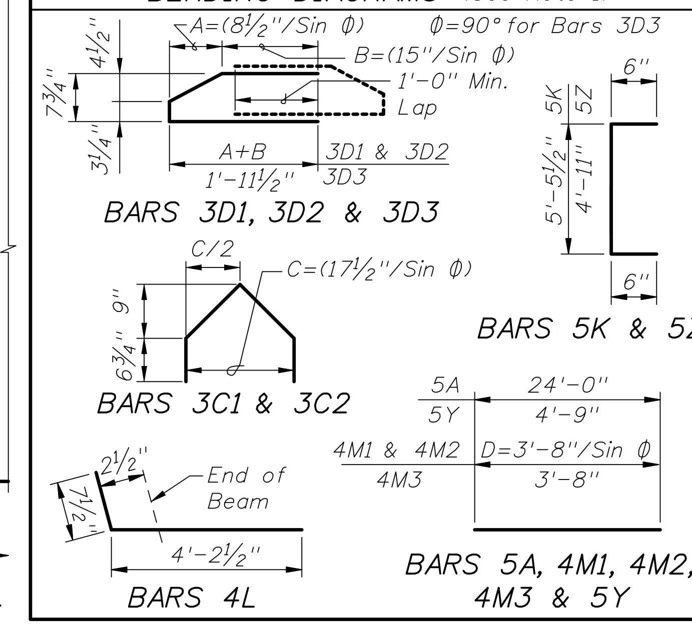
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

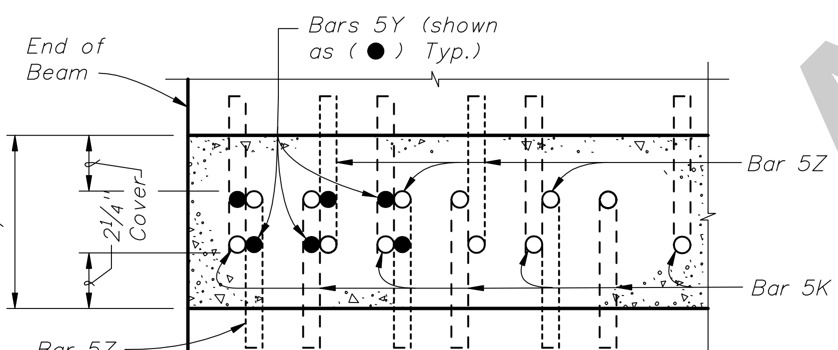
BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	5	8	24'-0"
C1	9, 10 & 11	3	16 (End 1)	Varies
C2	9, 10 & 11	3	16 (End 2)	Varies
D1	9, 10, 11 & 14	3	32 (End 1)	Varies
D2	9, 10, 11 & 14	3	32 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	6'-5"
L	3 & 4	4	24	4'-10"
M1	9 & 10	4	14 (End 1)	Varies
M2	9 & 10	4	14 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	3/8" ∅ Strand	4	DIM L+5"
Y	9 & 11	5	12	4'-9"
Z	2, 9, 11 & 13	5	10	5'-11"

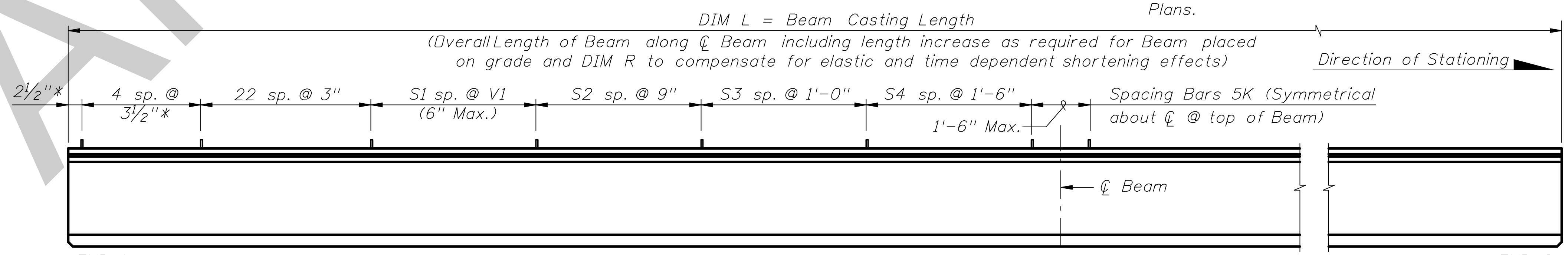
BENDING DIAGRAMS (See Note 1)



NOTES:
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.
B. For referenced notes, see Index No. 20010.
C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

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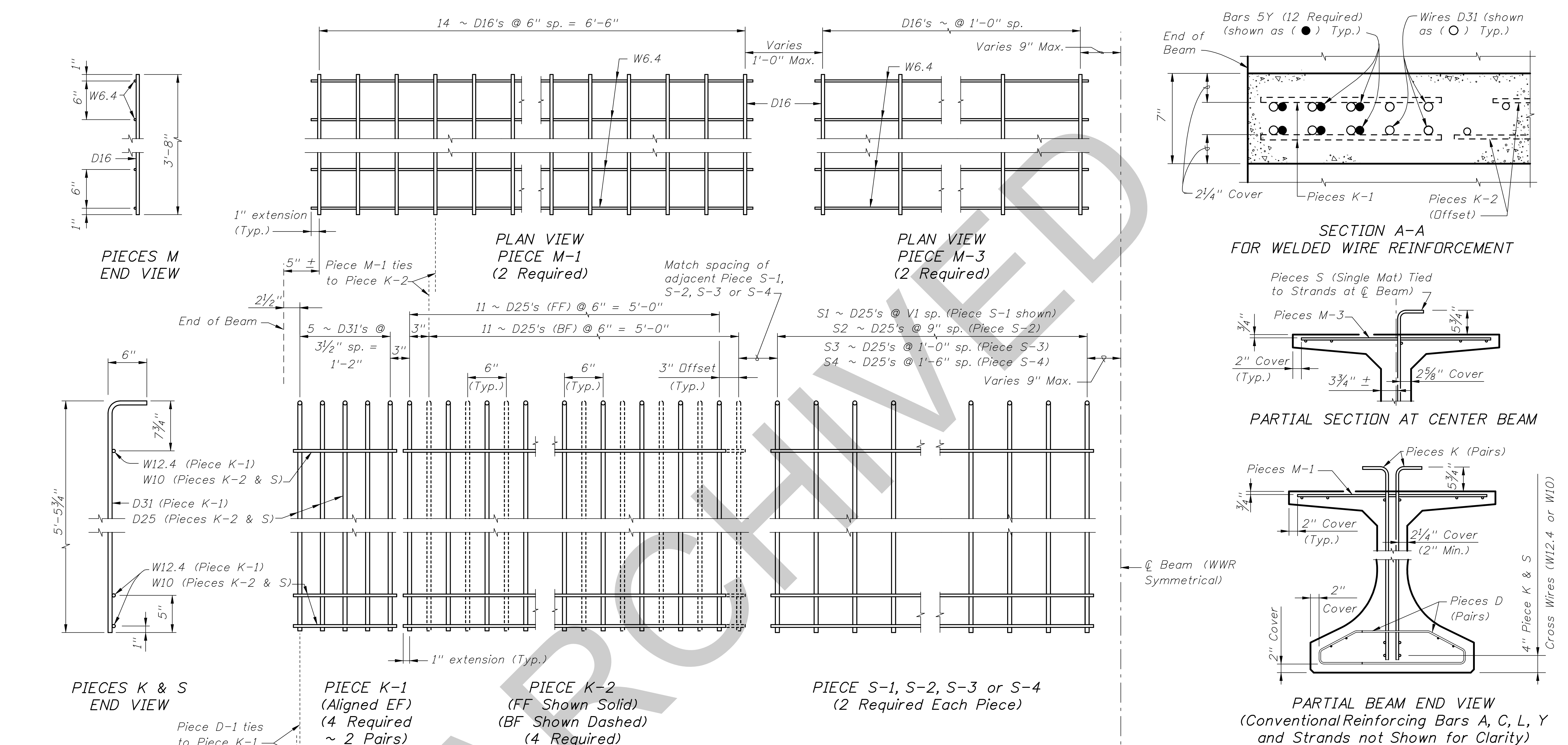
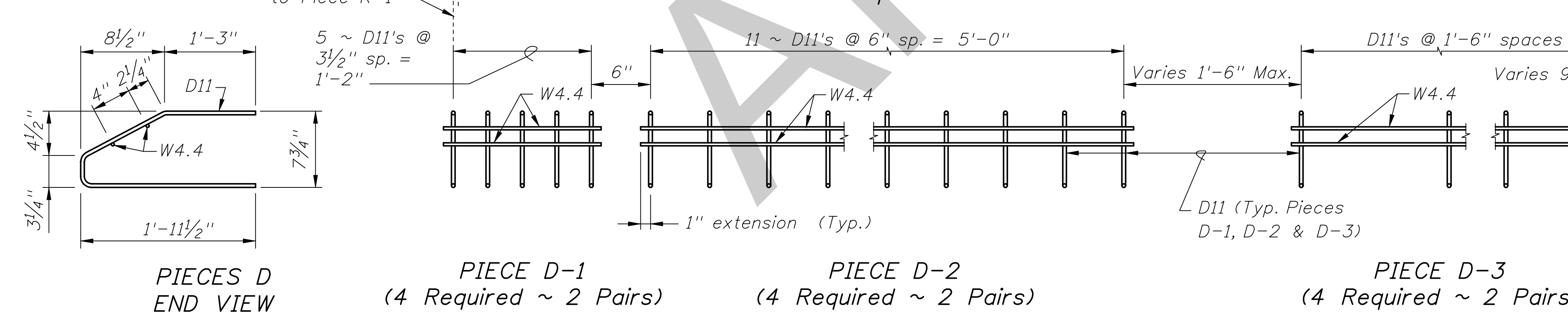
FLORIDA-I 63 BEAM - STANDARD DETAILS

Interim Date 07/01/09 | Sheet No. 1 of 2 | Index No. 20063

ALTERNATE REINFORCING STEEL (WELDED WIRE REINFORCEMENT) DETAILS





LEGEND:
EF = Each Face
FF = Front Face
BF = Back Face

NOTES:
a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
b. Place Conventional Reinforcement Bars 5A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.
c. Pieces may be fabricated in multiple length sections.
d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

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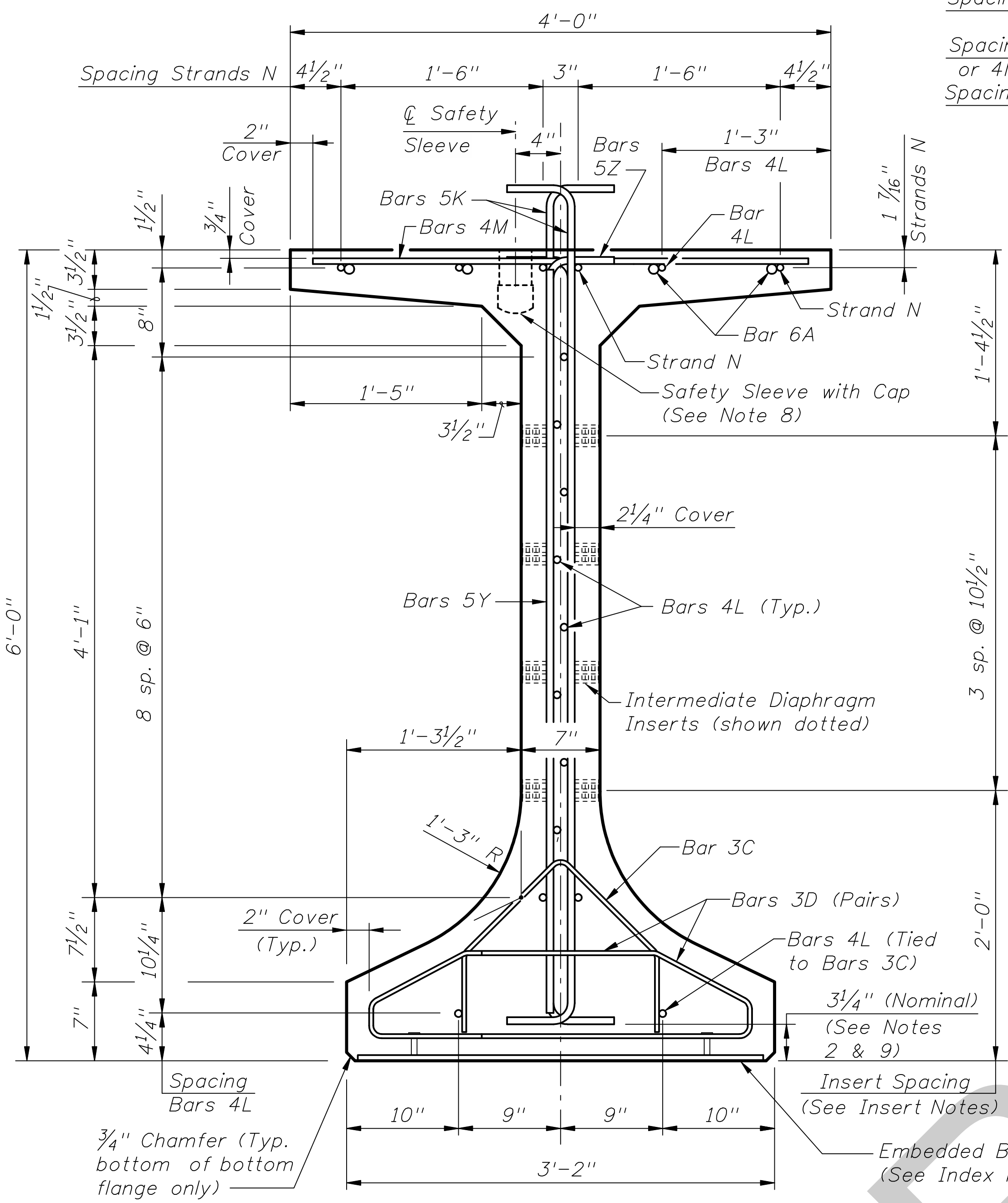
FLORIDA-I 63 BEAM - STANDARD DETAILS

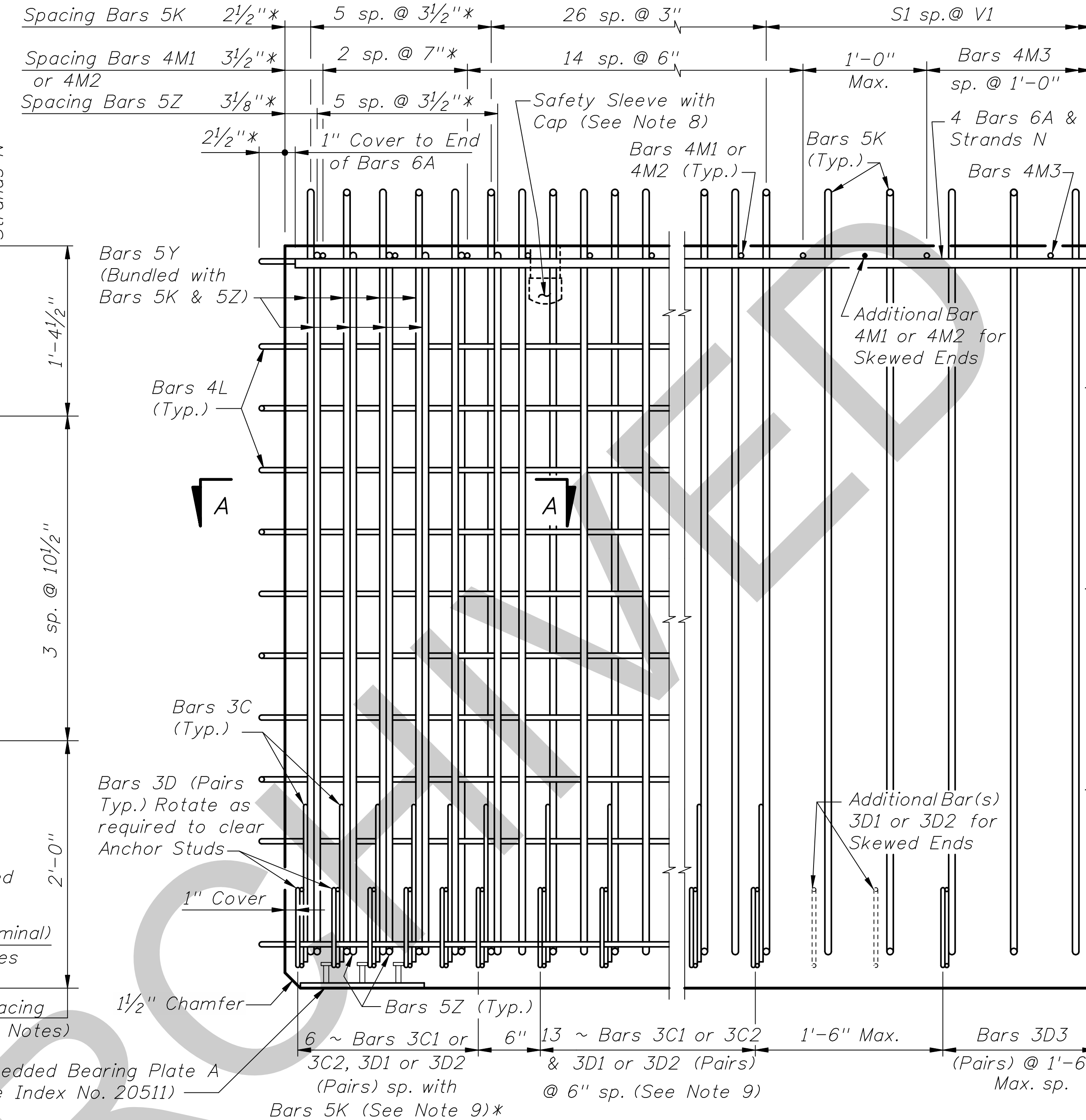
Interim Date 07/01/09

Sheet No. 2 of 2

Index No. 20063



END VIEW



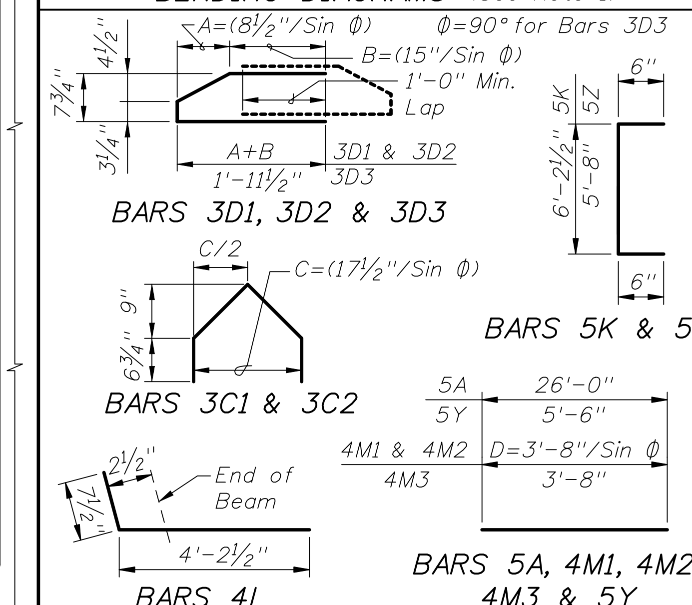
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

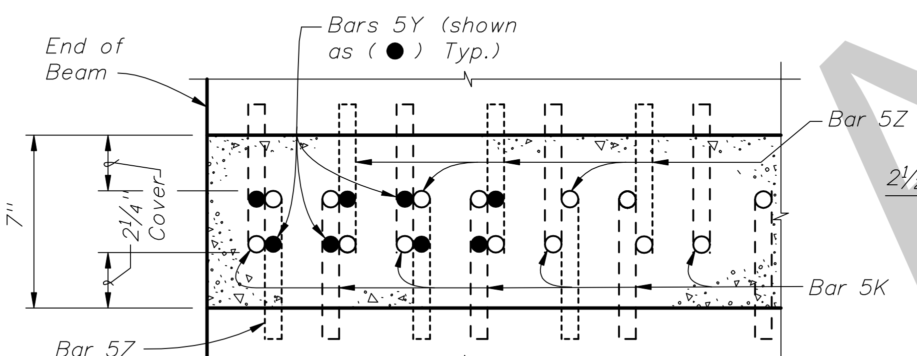
BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	6	8	26'-0"
C1	9, 10 & 11	3	19 (End 1)	Varies
C2	9, 10 & 11	3	19 (End 2)	Varies
D1	9, 10, 11 & 14	3	38 (End 1)	Varies
D2	9, 10, 11 & 14	3	38 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	7'-2"
L	3 & 4	4	28	4'-10"
M1	9 & 10	4	17 (End 1)	Varies
M2	9 & 10	4	17 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	⅜" Ø Strand	4	DIM L+5"
Y	9 & 11	5	16	5'-6"
Z	2, 9, 11 & 13	5	12	6'-8"

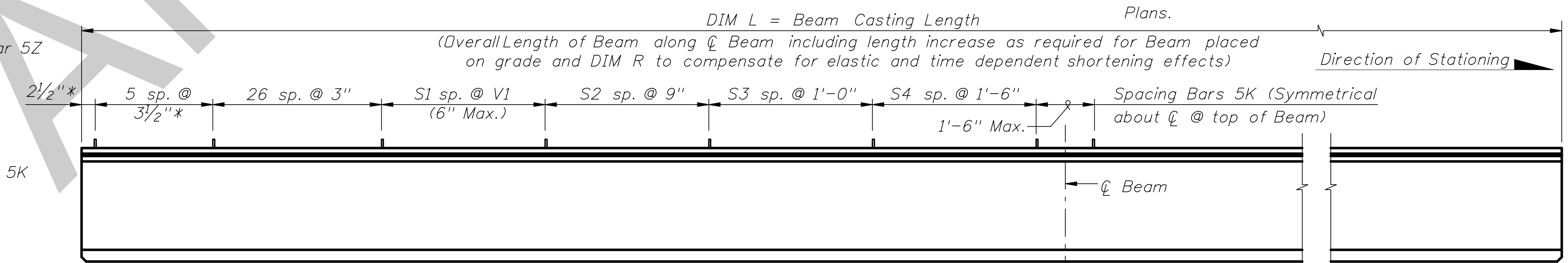
BENDING DIAGRAMS (See Note 1)



NOTES:
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.
B. For referenced notes, see Index No. 20010.
C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

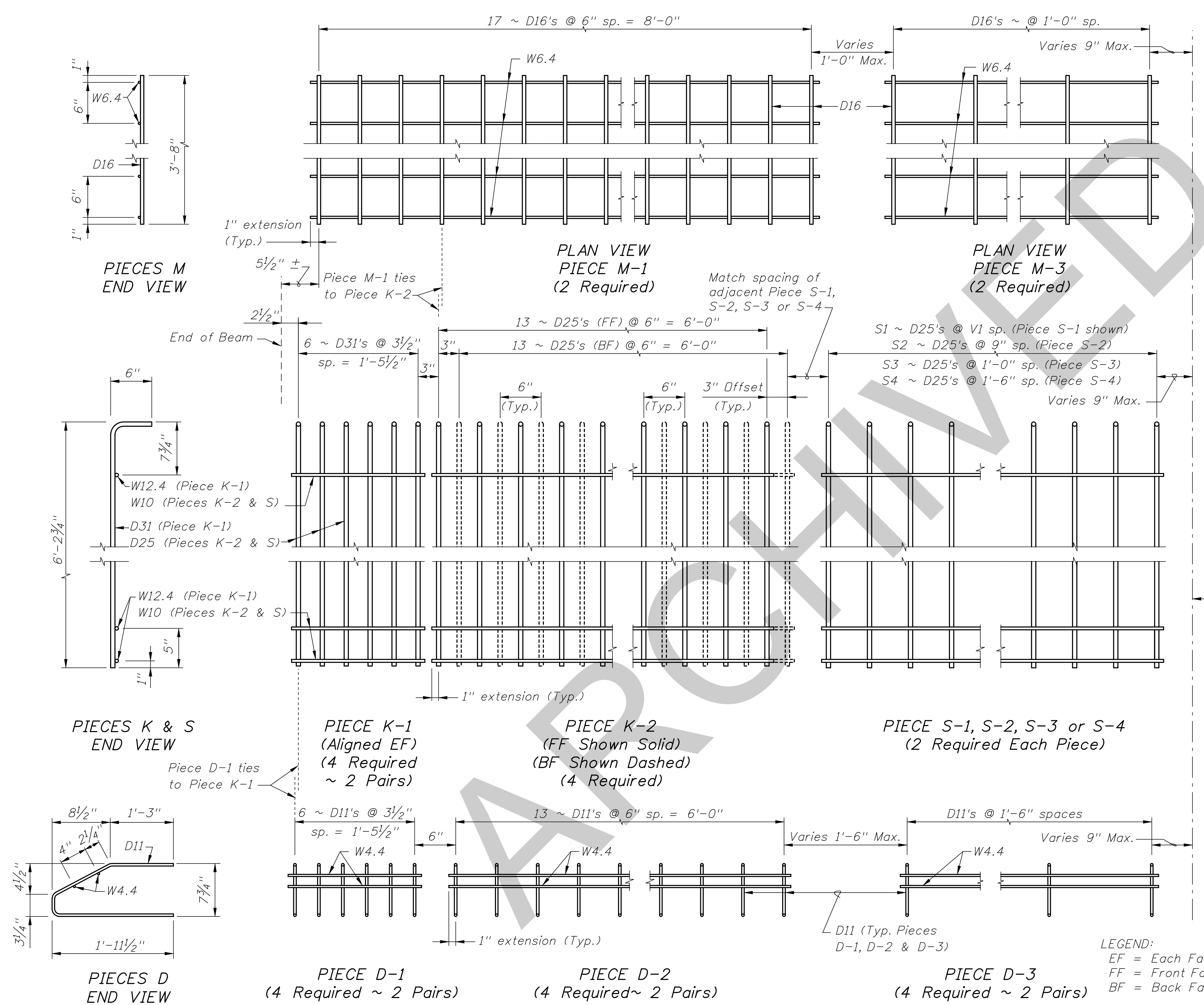
2008 Interim Design Standard

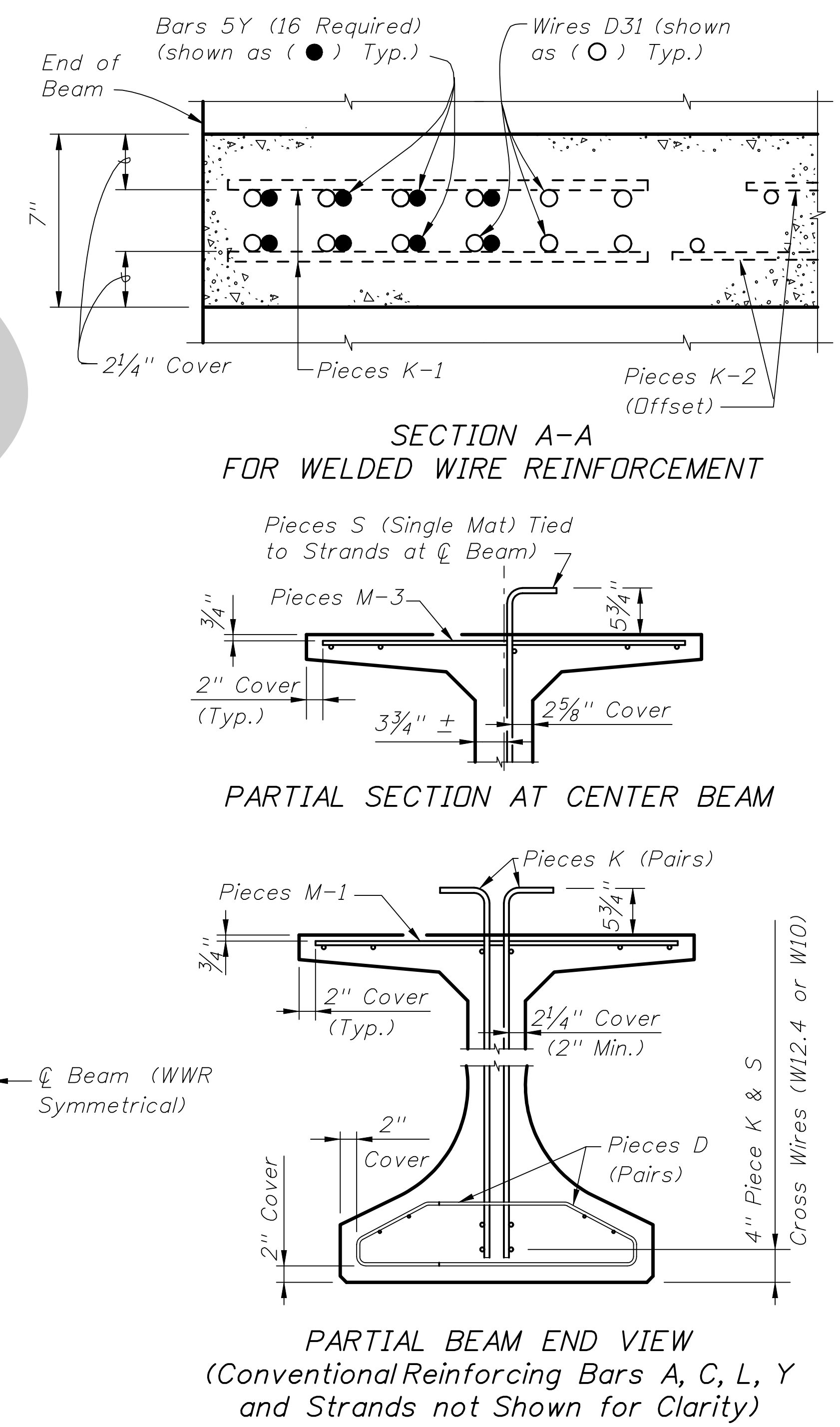
FLORIDA-I 72 BEAM - STANDARD DETAILS

Interim Date 07/01/09

Sheet No. 1 of 2

Index No. 20072



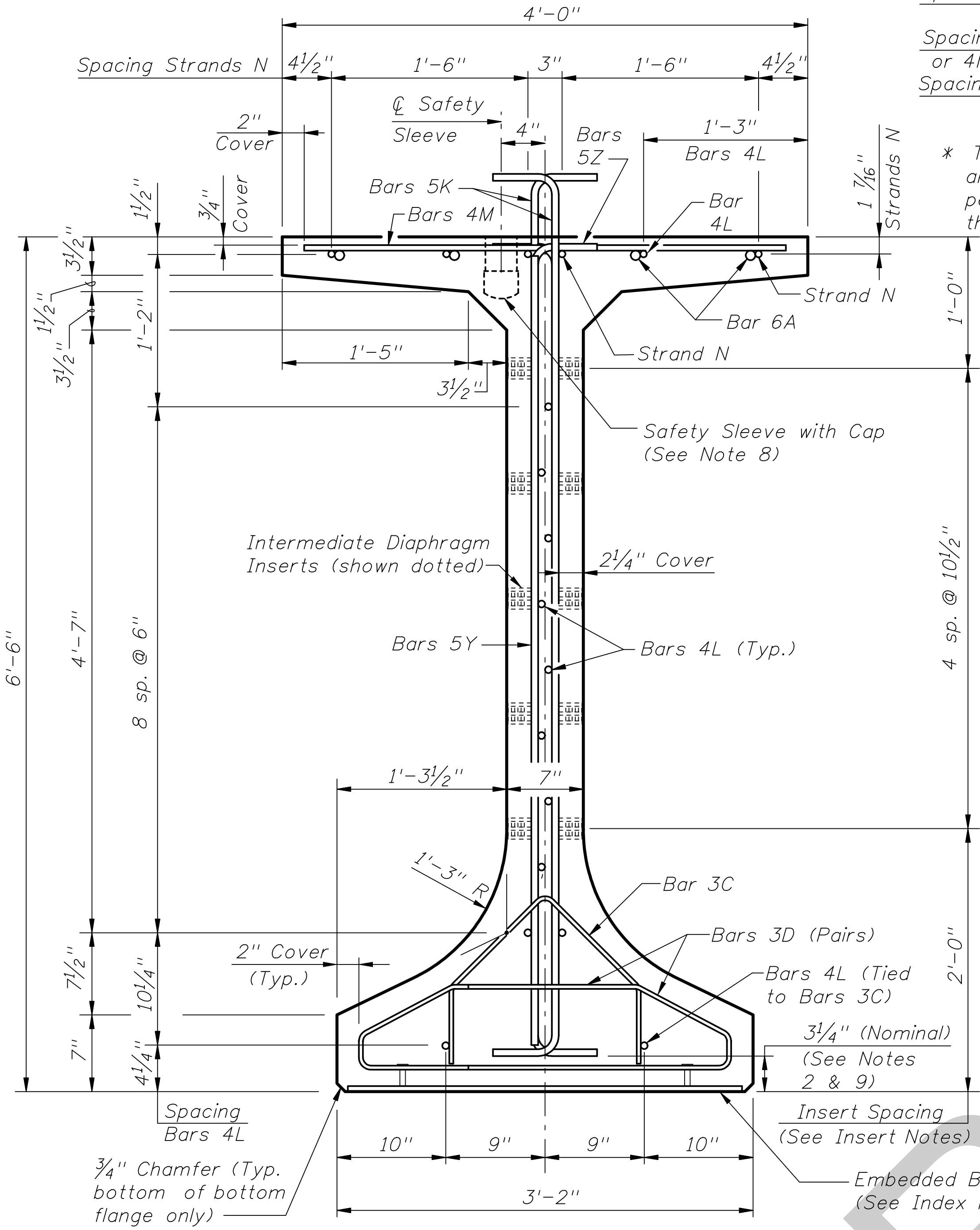


LEGEND:
EF = Each Face
FF = Front Face
BF = Back Face

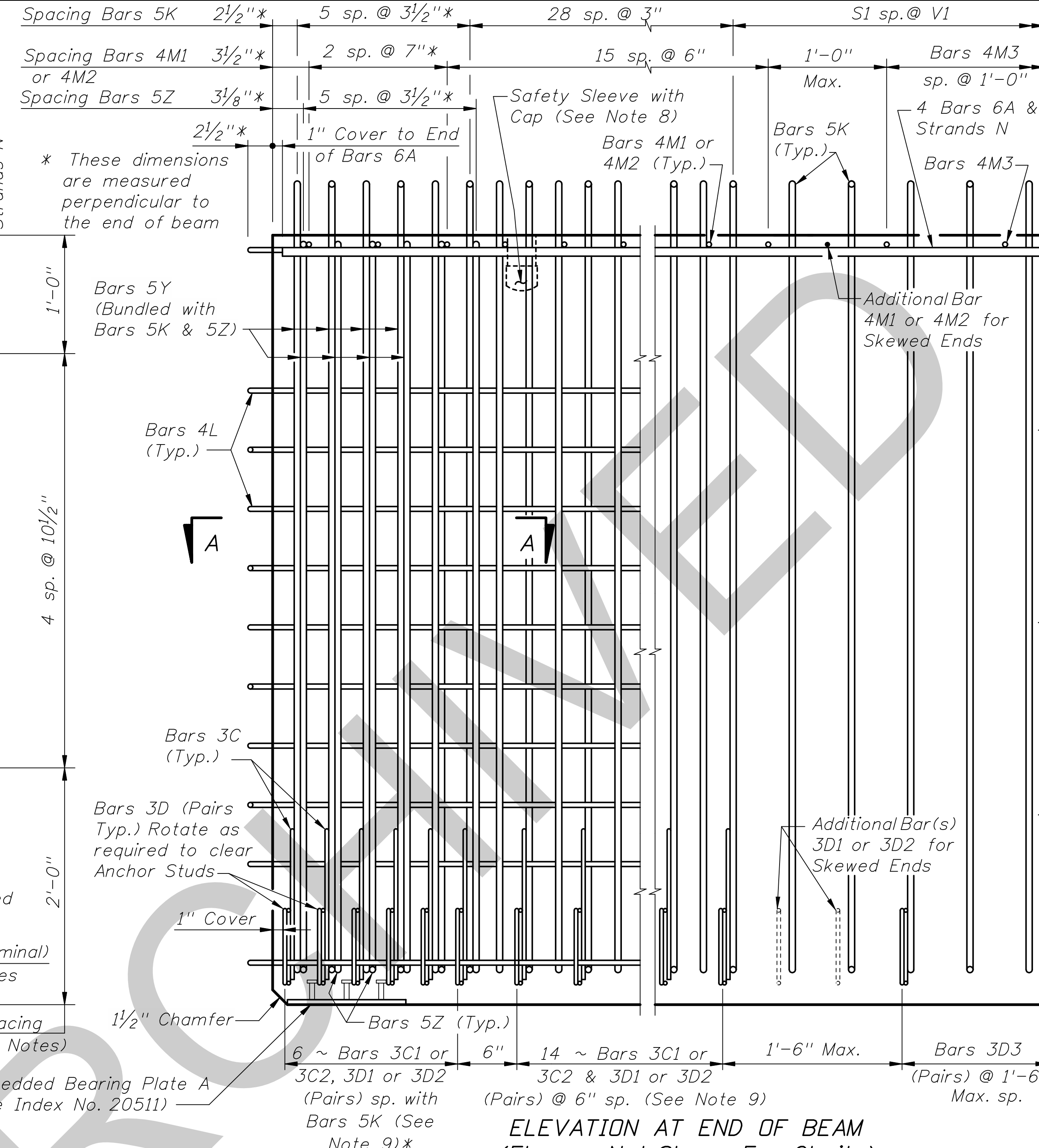
NOTES:
a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.
b. Place Conventional Reinforcement Bars 6A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.
c. Pieces may be fabricated in multiple length sections.
d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			



END VIEW



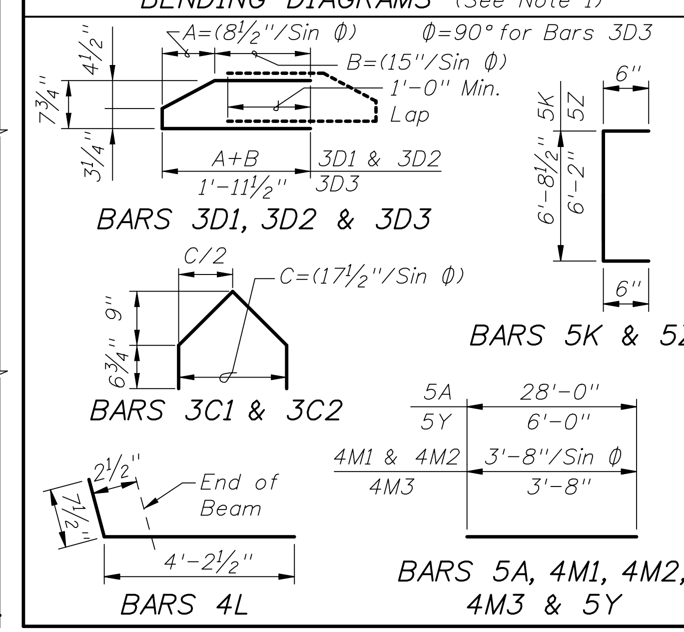
ELEVATION AT END OF BEAM
(Flanges Not Shown For Clarity)
(End 1 Shown, End 2 Similar)

CONVENTIONAL REINFORCING BAR BENDING DETAILS

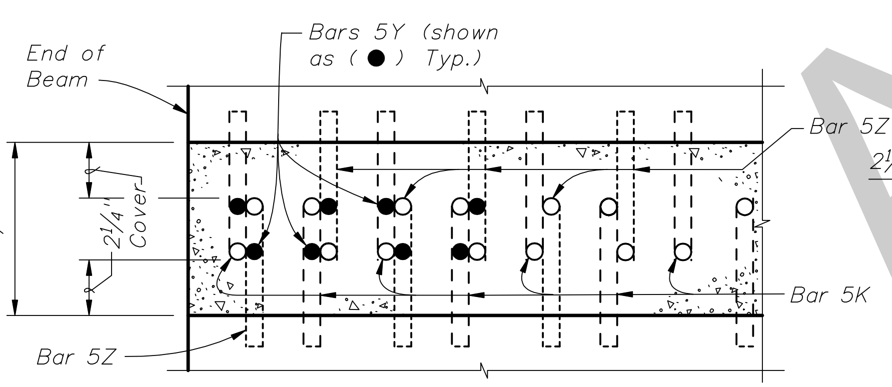
BILL OF REINFORCING STEEL

MARK	NOTE NUMBERS	SIZE	NUMBER REQUIRED	LENGTH (NOTE 1)
A	—	6	8	28'-0"
C1	9, 10 & 11	3	20 (End 1)	Varies
C2	9, 10 & 11	3	20 (End 2)	Varies
D1	9, 10, 11 & 14	3	40 (End 1)	Varies
D2	9, 10, 11 & 14	3	40 (End 2)	Varies
D3	9 & 14	3	See Table	4'-3"
K	2, 9, 11 & 13	5	See Table	7'-8"
L	3 & 4	4	28	4'-10"
M1	9 & 10	4	18 (End 1)	Varies
M2	9 & 10	4	18 (End 2)	Varies
M3	9	4	See Table	3'-8"
N	5	⅜" Ø Strand	4	DIM L+5"
Y	9 & 11	5	16	6'-0"
Z	2, 9, 11 & 13	5	12	7'-2"

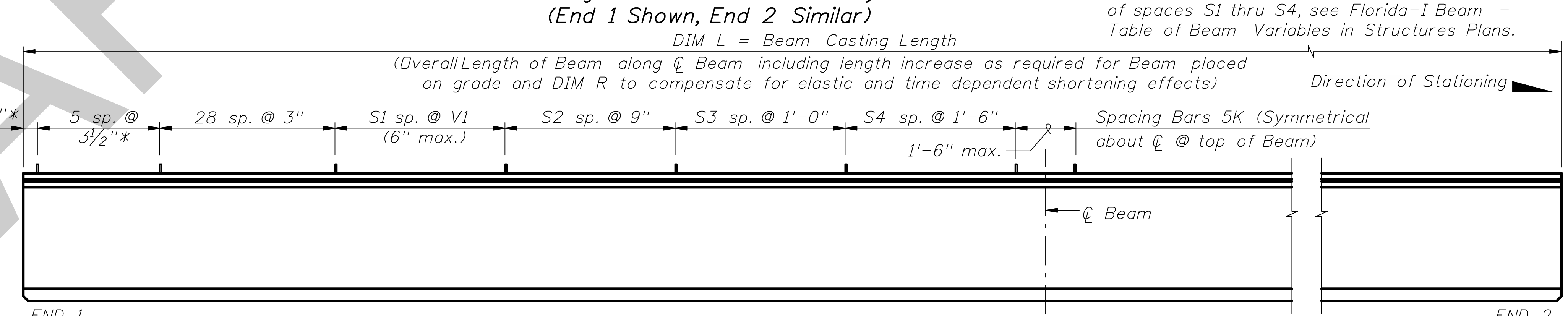
BENDING DIAGRAMS (See Note 1)



NOTES:
A. Work this Index with Index No. 20010 - Typical Florida-I Beam Details and Notes and the Florida-I Beam - Table of Beam Variables in Structures Plans.
B. For referenced notes, see Index No. 20010.
C. For Dimensions A, B, C, D, L, R & V1 and number of spaces S1 thru S4, see Florida-I Beam - Table of Beam Variables in Structures Plans.



SECTION A-A FOR CONVENTIONAL REINFORCING
(Showing Bars 5K, 5Y & 5Z Only)



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	RMS	New Design Standard			

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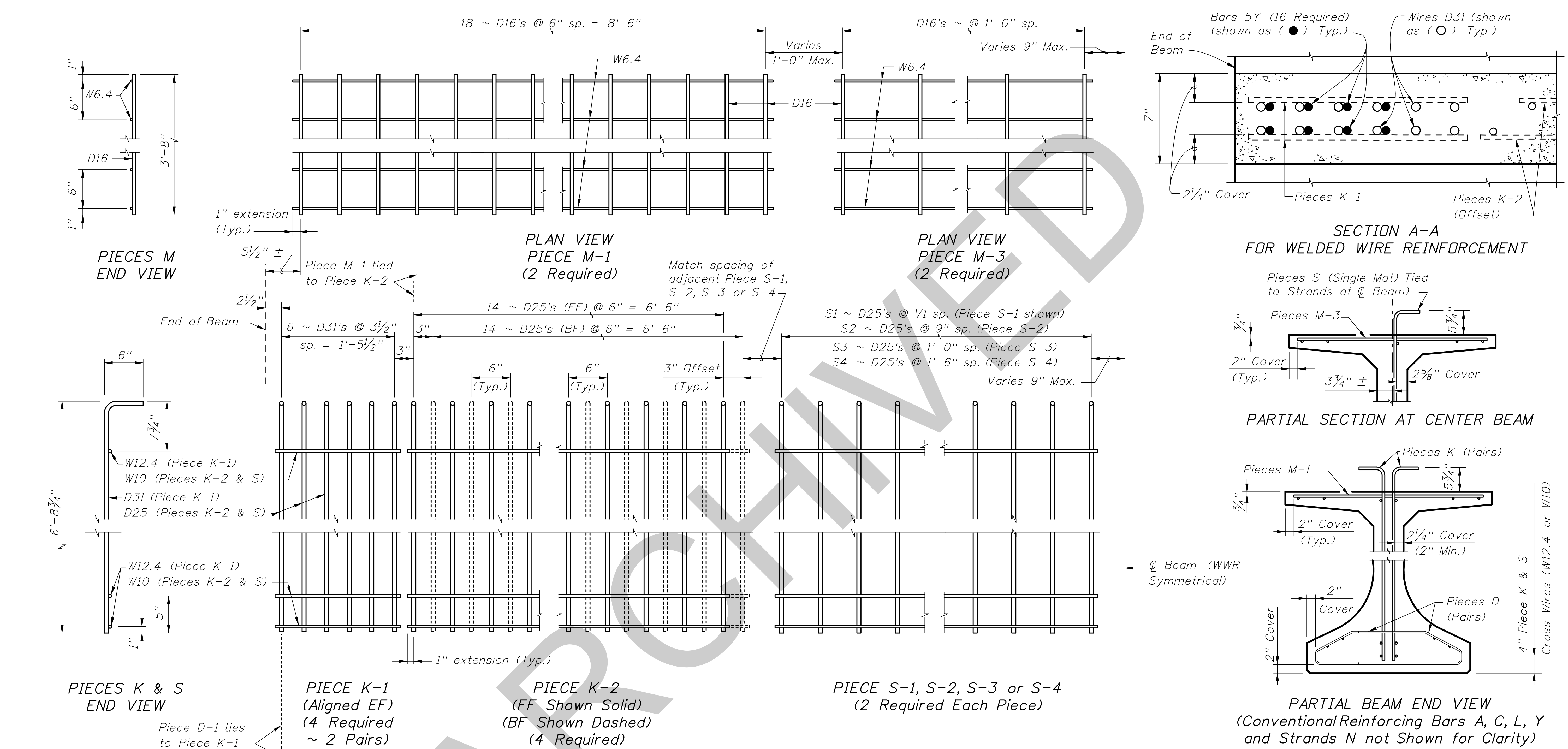
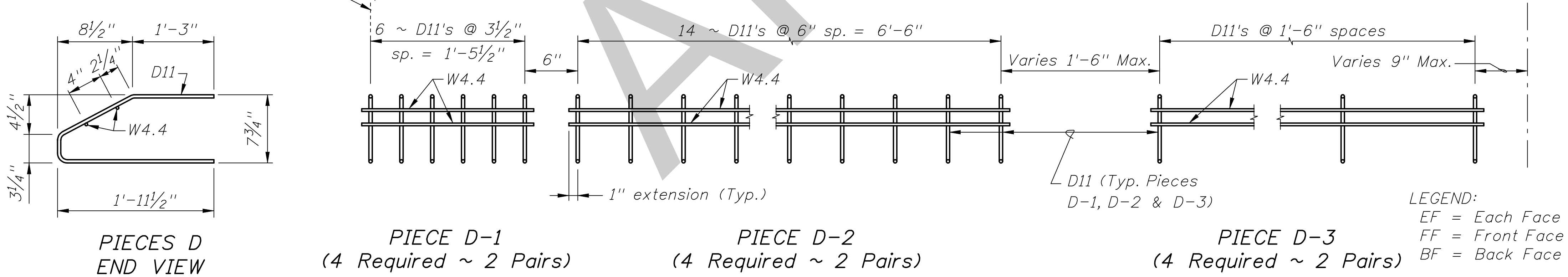
FLORIDA-I 78 BEAM - STANDARD DETAILS

Interim Date 07/01/09 | Sheet No. 1 of 2 | Index No. 20078





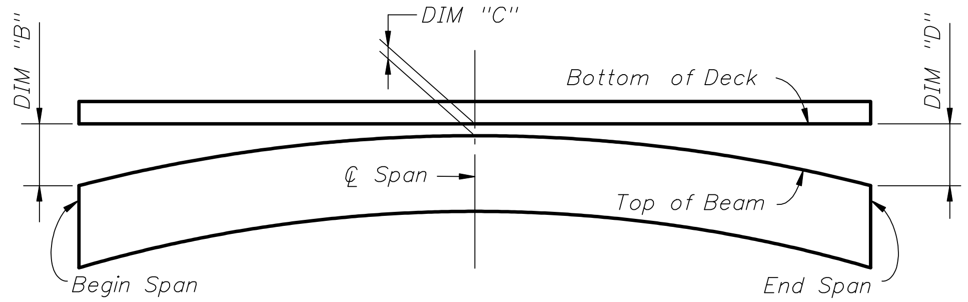
NOTES:

a. See Sheet 1 for placement details & Table of Beam Variables in Structures Plans for variables S1, S2, S3, S4 & V1.

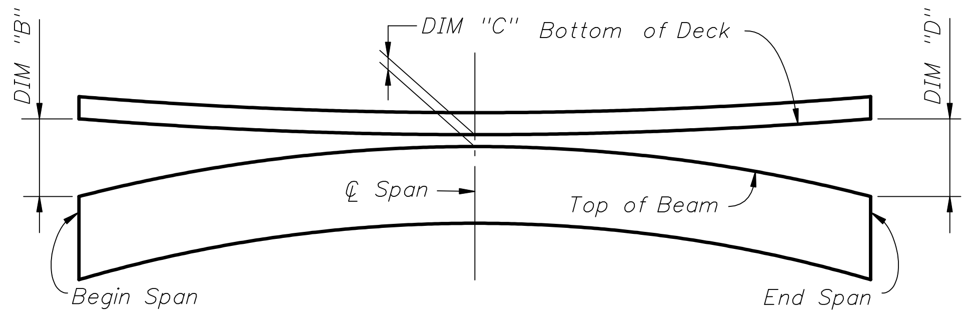
b. Place Conventional Reinforcement Bars 6A, 3C & 4L as shown on Sheet 1. Place additional Bars 5Y as shown in Section A-A for Welded Wire Reinforcement. Bars 5Z will not be used with the WWR Option.

c. Pieces may be fabricated in multiple length sections.

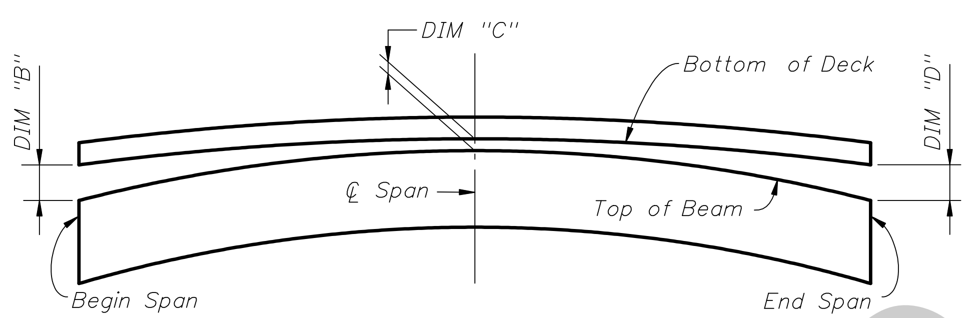
d. For beams with skewed end conditions, Pieces D-1, D-2 & M-1 shall not be used; Conventional Reinforcement Bars D1, D2, C1, C2, M1 & M2 shall be used. See Index No. 20010 Skew Details and Note 9 for placement details. Shift Pieces K & Bars 5Y to accommodate skewed end conditions and align with Bars C and D.



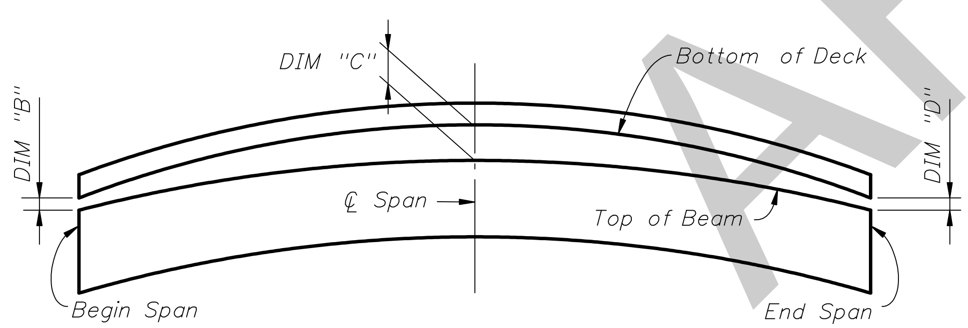
BUILD-UP DIAGRAM FOR TANGENT SPANS
(ALONG ℄ BEAM) (CASE 1)



BUILD-UP DIAGRAM FOR SAG VERTICAL CURVE SPANS
(ALONG ℄ BEAM) (CASE 2)



BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS
- CONTROL AT ℄ SPAN
(ALONG ℄ BEAM) (CASE 3)

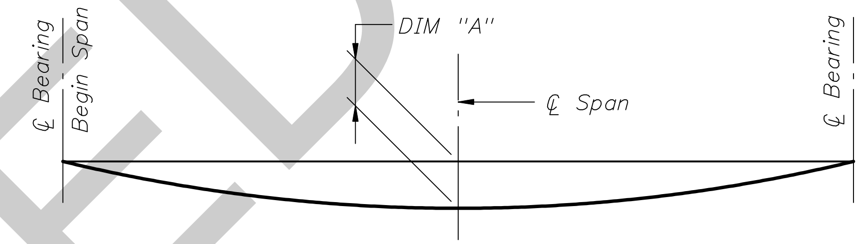


BUILD-UP DIAGRAM FOR CREST VERTICAL CURVE SPANS
- CONTROL AT BEGIN OR END SPAN
(ALONG ℄ BEAM) (CASE 4)

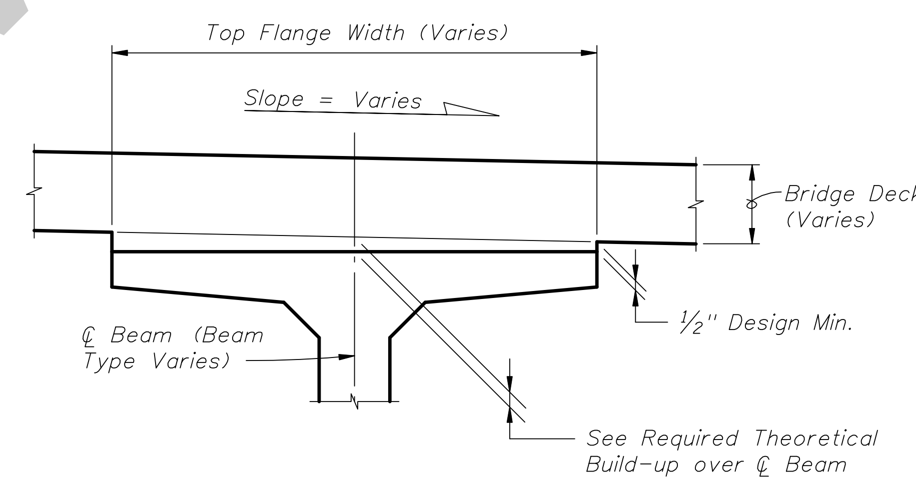
BEAM CAMBER AND BUILD-UP NOTES:

The build-up values given in the table are based on theoretical beam cambers. The Contractor shall monitor beam cambers for the purpose of predicting camber values at the time of the deck pour. If the predicted cambers based on field measurements differ more than +/- ½" from the theoretical "Net Beam Camber @ 120 Days" shown in the Data Table, obtain approval from the Engineer to modify the build-up dimensions as required. When the measured beam cambers create a conflict with the bottom mat of deck steel, notify the Engineer a minimum of 21 days prior to casting.

DIM "A" includes the weight of the Stay-In-Place Formwork.



DEAD LOAD DEFLECTION DIAGRAM



BUILD-UP OVER BEAMS

INSTRUCTIONS TO DESIGNER:

Although not shown here in the Diagrams or Notes, the effect of Horizontal Curvature, when present, needs to be considered for the Build-up Calculations.

NOTE:
Work this Index with the Build-up and Deflection Data Table for AASHTO, Bulb-T and Florida-I Beams in Structures Plans.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	Added FLORIDA-I BEAMS to the Standard Title Block and Note. Changed the beam section to Florida-I Beam in the BUILD UP OVER BEAMS detail. Changed third sentence in BEAM CAMBER AND BUILD-UP NOTES.			

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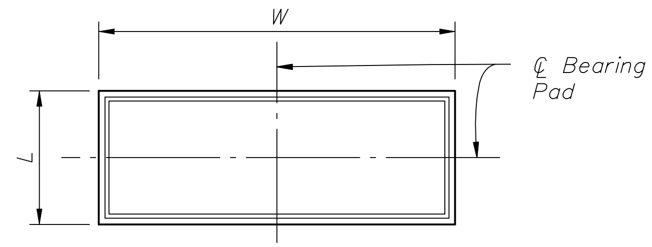
2008 Interim Design Standard

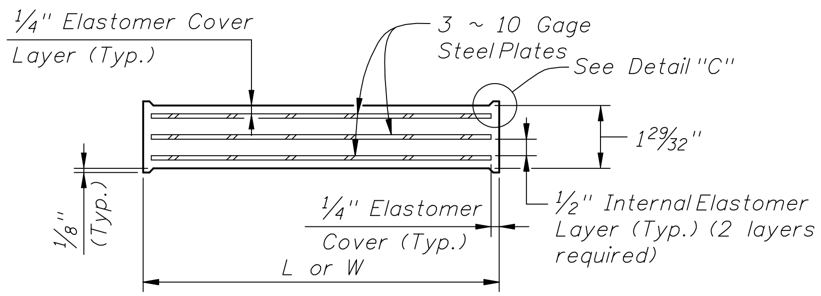
BUILD-UP & DEFLECTION DATA FOR AASHTO, BULB-T AND FLORIDA-I BEAMS

Interim Date 07/01/09

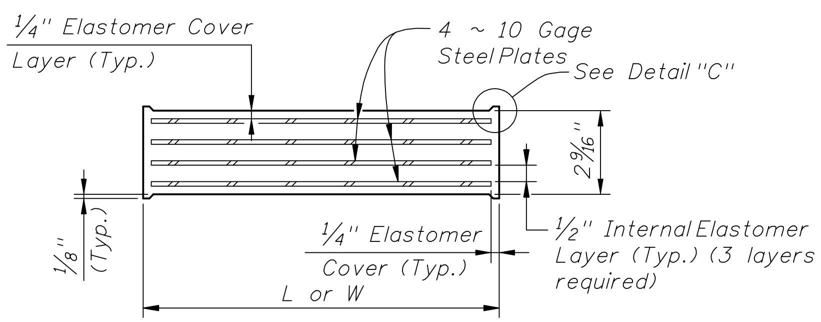
Index No. 20199



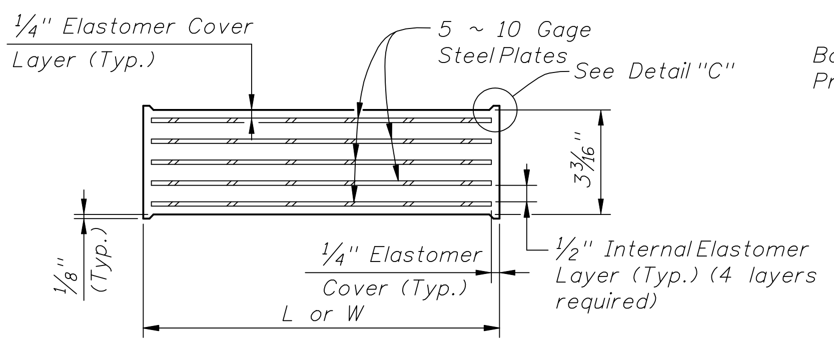
PLAN



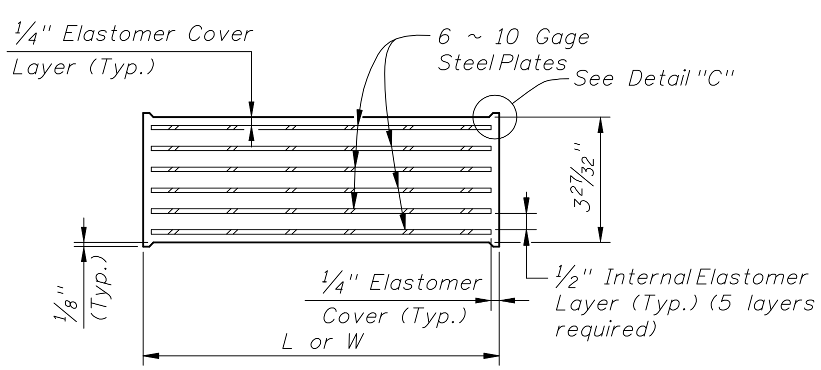
TYPICAL SECTION TYPE D & E PAD



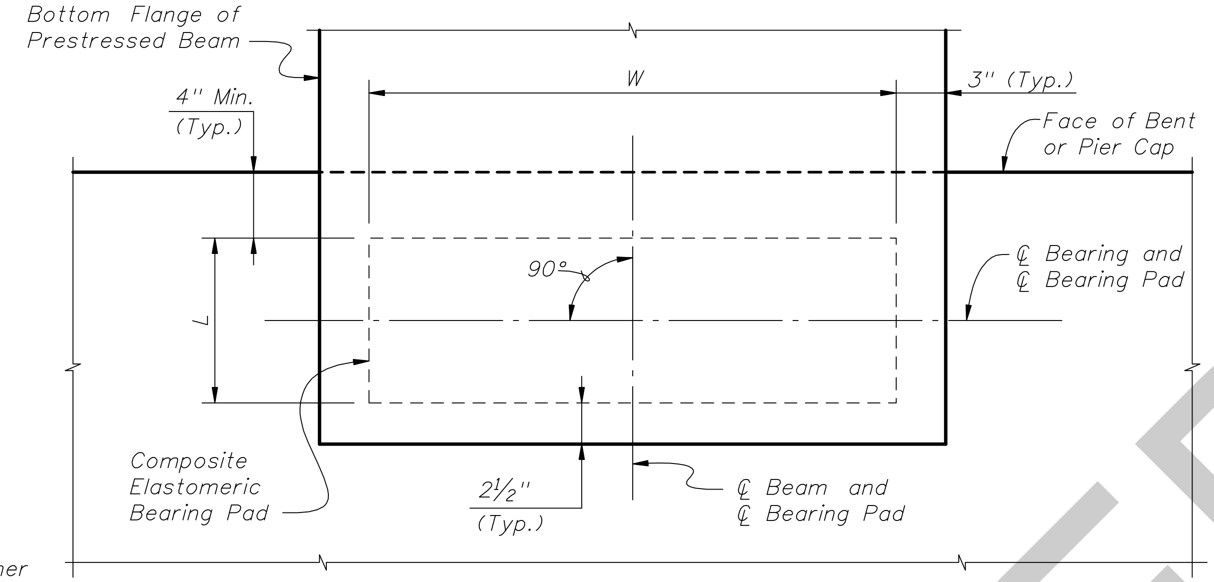
TYPICAL SECTION TYPE F & G PAD



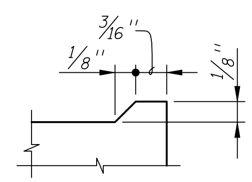
TYPICAL SECTION TYPE H PAD



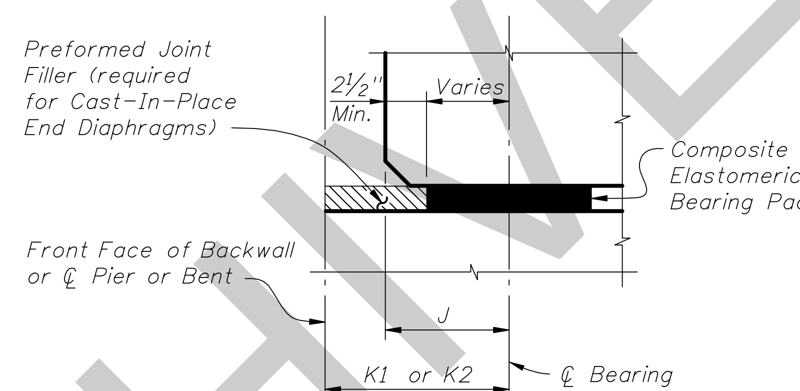
TYPICAL SECTION TYPE J & K PAD



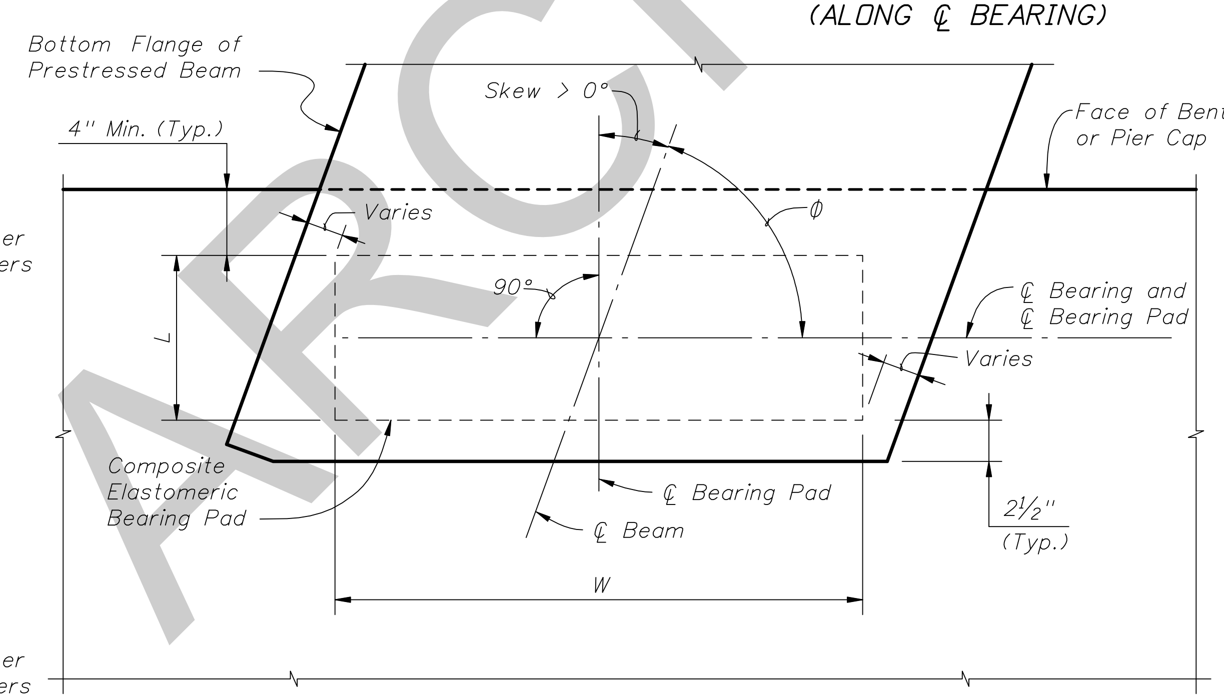
PARTIAL PLAN
(Skew = 0°)



DETAIL "C"



PARTIAL SIDE ELEVATION
(ALONG ℄ BEARING)



PARTIAL PLAN
(Skew > 0°)

	BEARING PAD DIMENSIONS		*BEARING PLATE DIMENSIONS	
PAD TYPE (See Note 1)	L	W	C	D
D (G=110psi)	8"	32"	12"	36"
E (G=110psi)	10"	32"	12"	36"
F (G=110psi)	10"	32"	12"	36"
G (G=150psi)	10"	32"	12"	36"
H (G=150psi)	10"	32"	12"	36"
J (G=150psi)	10"	32"	12"	36"
K (G=150psi)	12"	32"	14"	36"

* Work this sheet with Index No. 20511 - Bearing Plate Details and BEARING PAD DATA TABLE in the Structures Plans. See TABLE OF BEAM VARIABLES and BEARING PLATE DATA TABLE in the Structures Plans for locations where beveled bearing plates are required.

BEARING PAD NOTES:

1. Neoprene in Type D, E & F bearing pads shall have a shear modulus (G) of 110 psi. Neoprene in Type G, H, J & K bearing pads shall have a shear modulus (G) of 150 psi.
2. Steel Plates in bearing pads shall conform to ASTM A1011 Grade 36, Type 1.
3. Unless otherwise shown in the Structures Plans:
   (a) For beam grades less than 0.5%, finish the Beam Seat level.
   (b) For beam grades between 0.5% and 2%, finish the Beam Seat parallel to the bottom of the beam in both transverse and longitudinal directions.
   (c) For beam grades greater than 2% finish the Beam Seat level and provide Beveled Bearing Plates.
4. See Bearing Pad Data Table in Structures Plans for quantities of Type D, E, F, G, H, J and/or K Bearing Pads.

INSTRUCTIONS TO DESIGNER:
See the Structures Manual - Instructions For Design Standards, for bearing pad design loads and limitations.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	New Design Standard.			

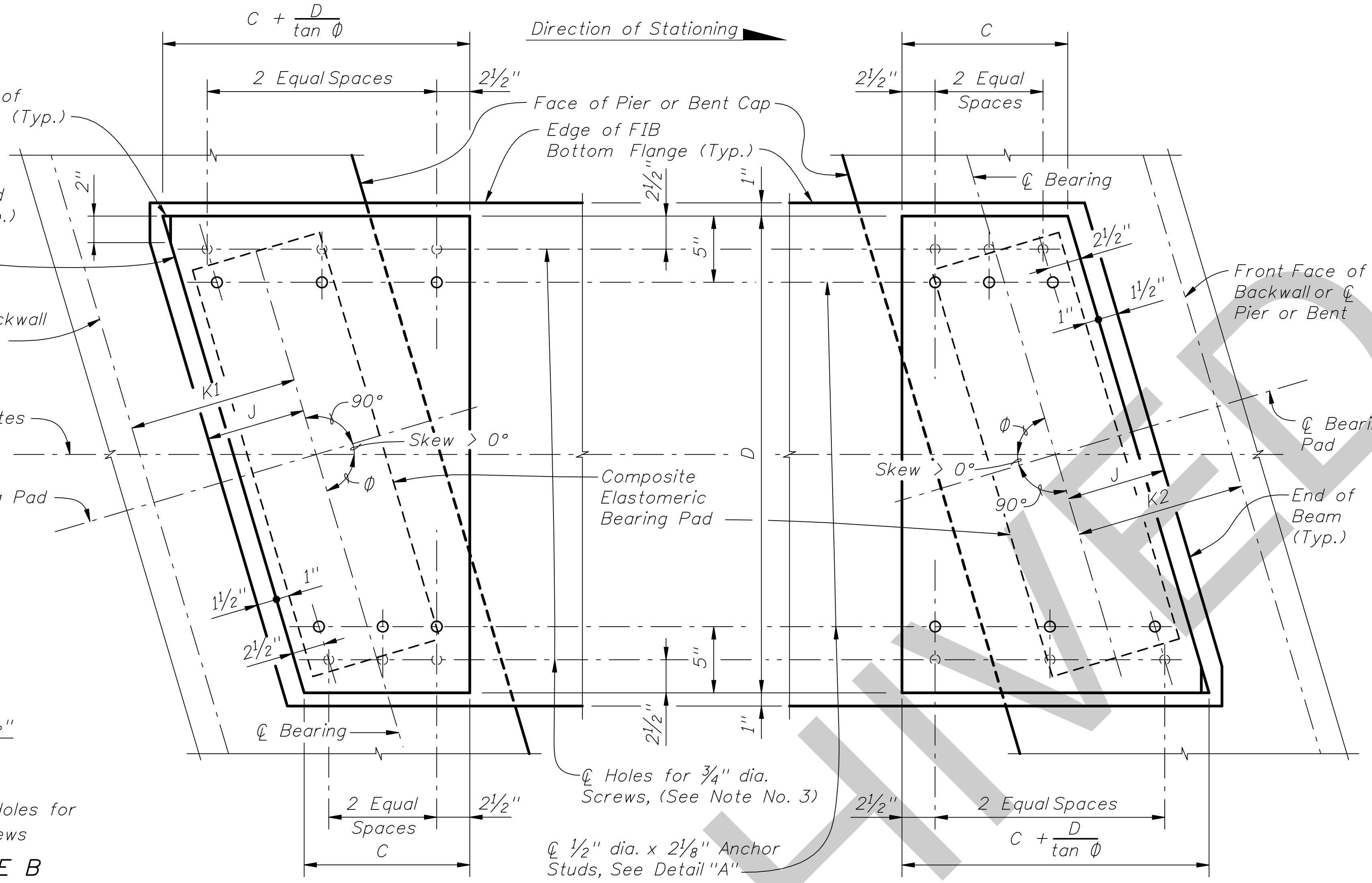
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2008 Interim Design Standard

COMPOSITE ELASTOMERIC BEARING PADS PRESTRESSED FLORIDA-I BEAMS

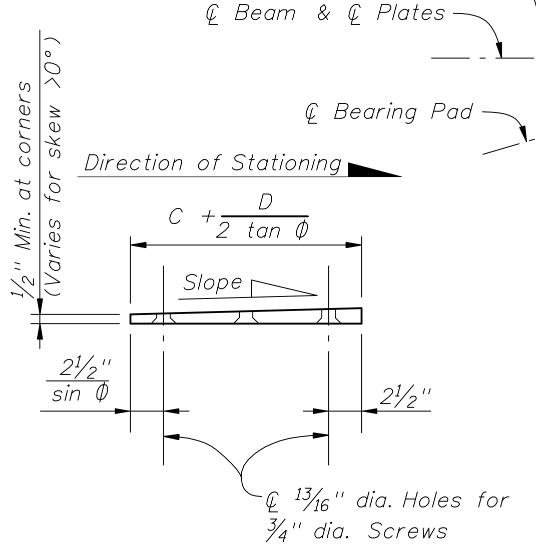
Interim Date	Sheet No.
07/01/09	1 of 1

Index No. 20510



PLAN

(0° < Skew ≤ 45° shown, Skew = 0° Similar)



BEVELED BEARING PLATE B

(Along ℄ Beam)

(Positive Slope, Begin Bearing shown; Negative Slope, End Bearing similar)

NOTES:

1. Work this sheet with Index No. 20510 – Composite Elastomeric Bearing Pads, and 'BEARING PLATE DATA TABLE' in the Structures Plans.

2. Embedded Bearing Plates A are required for all Florida-I beams. Beveled Bearing Plates B with Embedded Bearing Plates A are required for beams as scheduled in the 'BEARING PLATE DATA TABLE' in the Structures Plans.

3. Bearing plate material shall conform to ASTM A36 or ASTM A709 (Grade 36 or 50). Headed Concrete Anchor Studs shall conform to Specification Section 502. Hot-dip galvanize Bearing Plates A & B after fabrication except that Galvanized Caps may be welded in place after hot-dip galvanizing. Drill Bearing Plates A and B as an assembled unit, thread Bearing Plate A only. Holes are not required in Plate A when Plate B is not required. Drill and thread holes perpendicular to the bottom of Plate B and prior to plates being galvanized (ASTM A 123).

4. Provide Electroplated, Flat Countersunk Head Cap Screws in accordance with ASTM F 835. Electroplating shall be ASTM B633, SC 2, Type 1. Provide screws long enough to maintain a ¾" minimum embedment into Embedded Bearing Plate A and Galvanized Cap. Provide steel Galvanized Caps with ½" min. to 1½" max. height and nominal 1" inside diameter.

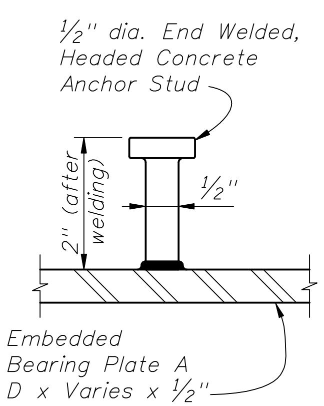
5. Include the cost of Bearing Plates in the pay item for Prestressed Beams.

6. For Dimensions C and D, see 'BEARING PLATE DIMENSIONS' on Index No. 20510 and the 'BEARING PLATE DATA TABLE' in the Structures Plans. For Dimensions J, K1 and K2, see 'TABLE OF BEAM VARIABLES' in the Structures Plans.

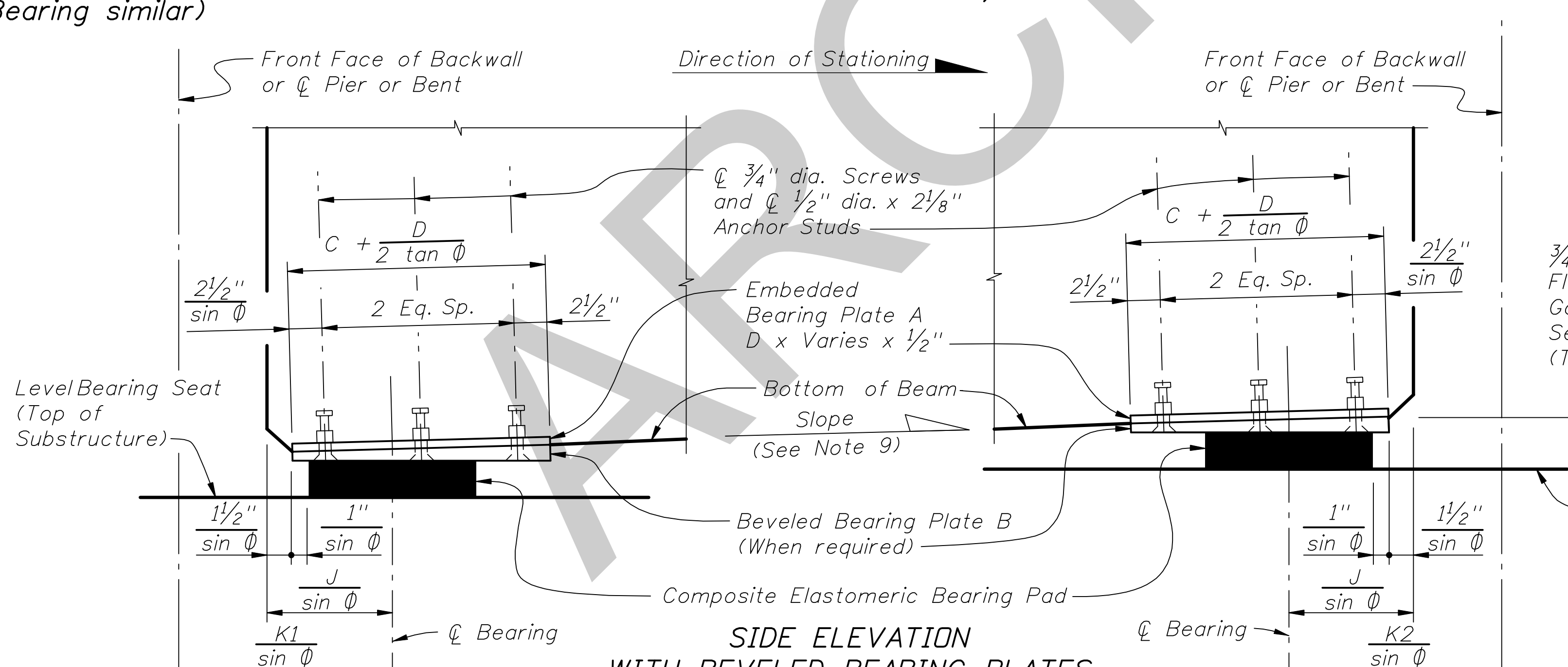
7. All details and dimensions shown are along ℄ Beam, except for dimensions to ¾" dia. Screws and ½" dia. x 2⅛" Anchor Studs, which are along ℄ Screws or ℄ Anchor Studs. Positive Slope shown, Negative Slope similar.

8. When Skew = 0°, dimensions for Embedded Bearing Plate A are D x C x ½" and for Beveled Plate B are D x C x ½" Min.

9. Slope is determined along ℄ Beam at ℄ Bearing. See 'BEARING PLATE DATA TABLE' in the Structures Plans for Slope and Angle ∅.



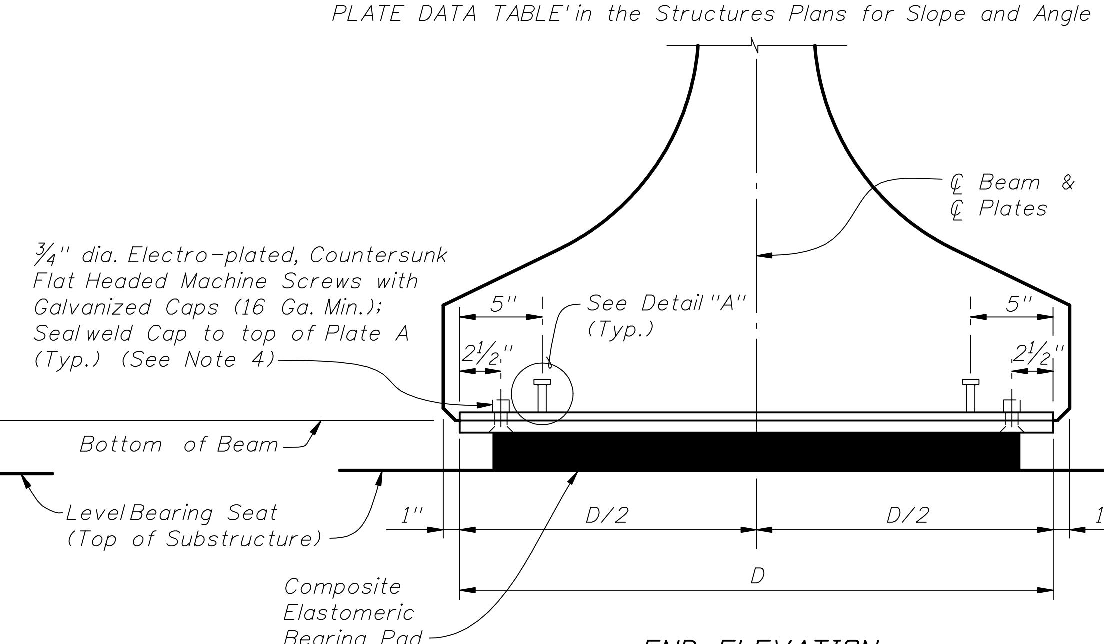
DETAIL "A"



SIDE ELEVATION

WITH BEVELED BEARING PLATES

(Slopes >2% along ℄ Beam) (See Note 7)



END ELEVATION

WITH BEVELED BEARING PLATE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	New Design Standard.			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

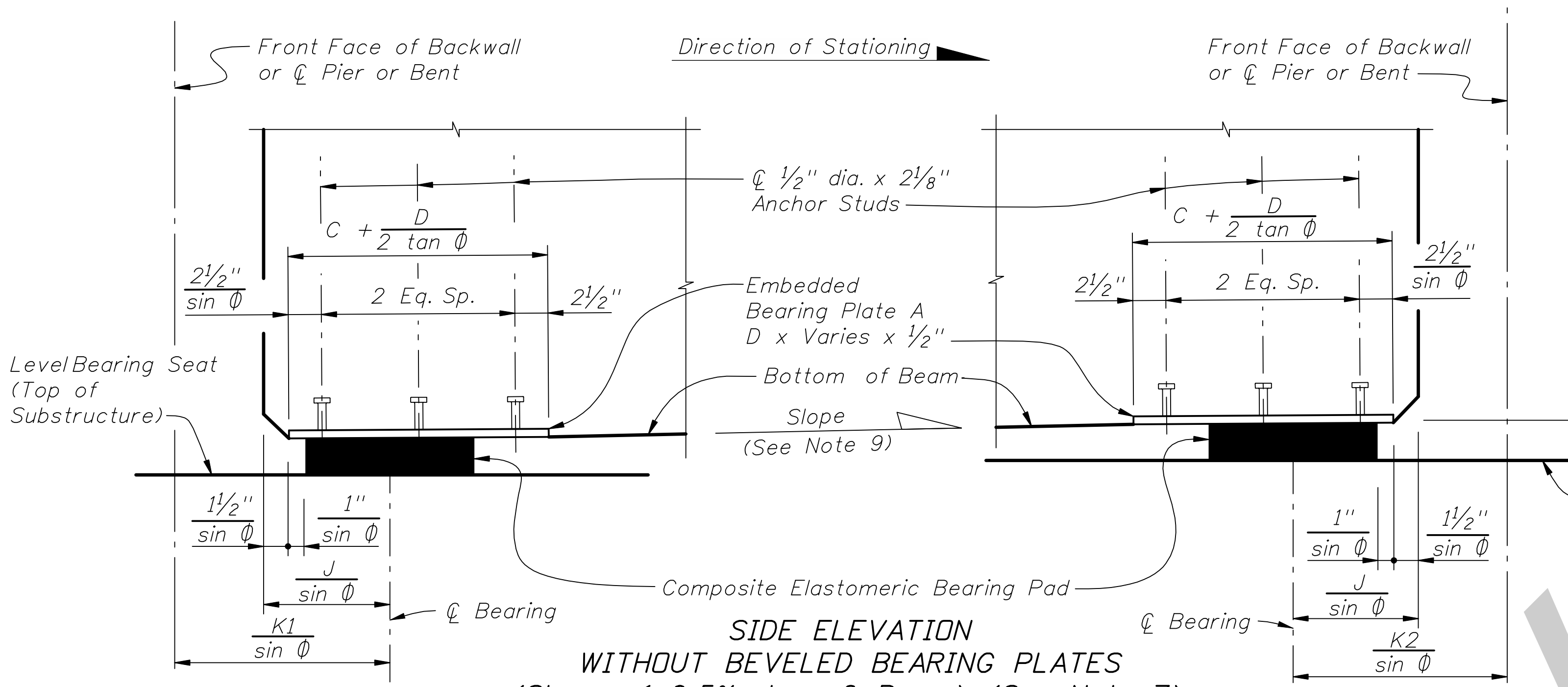
2008 Interim Design Standard

BEARING PLATE DETAILS
PRESTRESSED FLORIDA-I BEAMS

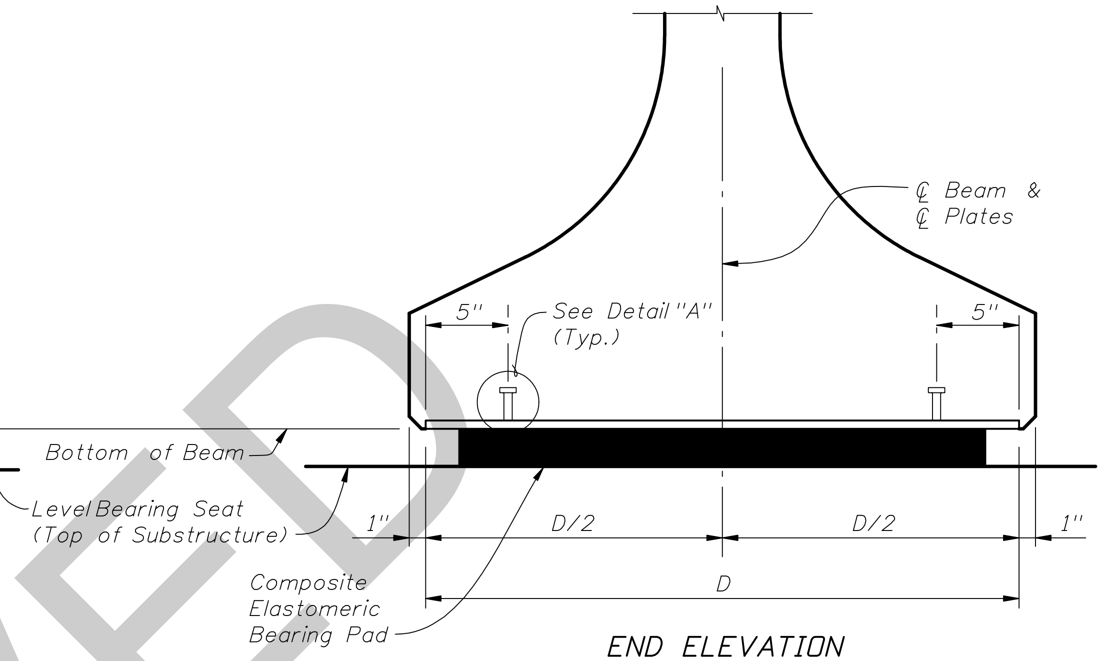
Interim Date 07/01/09

Sheet No. 1 of 2

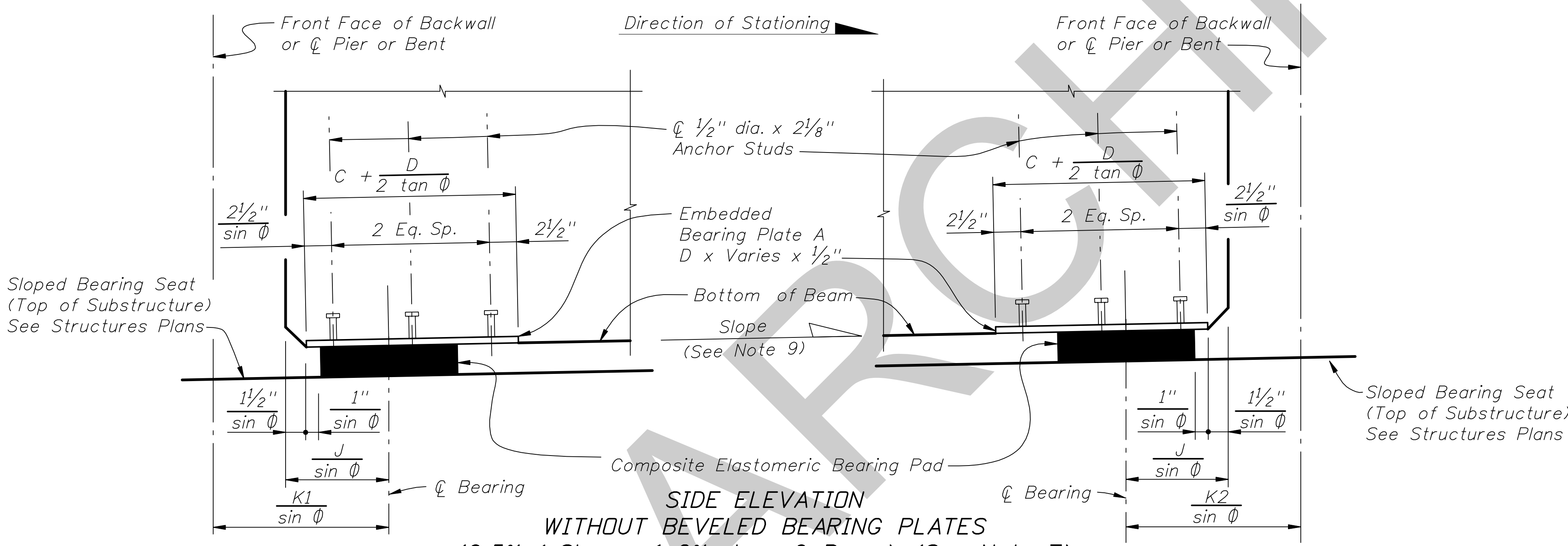
Index No. 20511



SIDE ELEVATION
WITHOUT BEVELED BEARING PLATES
(Slopes ≤ 0.5% along ℄ Beam) (See Note 7)



END ELEVATION
WITHOUT BEVELED BEARING PLATE



SIDE ELEVATION
WITHOUT BEVELED BEARING PLATES
(0.5% < Slopes ≤ 2% along ℄ Beam) (See Note 7)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
07/01/09	SJN	New Design Standard.			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2008 Interim Design Standard

BEARING PLATE DETAILS
PRESTRESSED FLORIDA-I BEAMS

Interim Date 07/01/09

Sheet No. 2 of 2

Index No. 20511

Attachment B

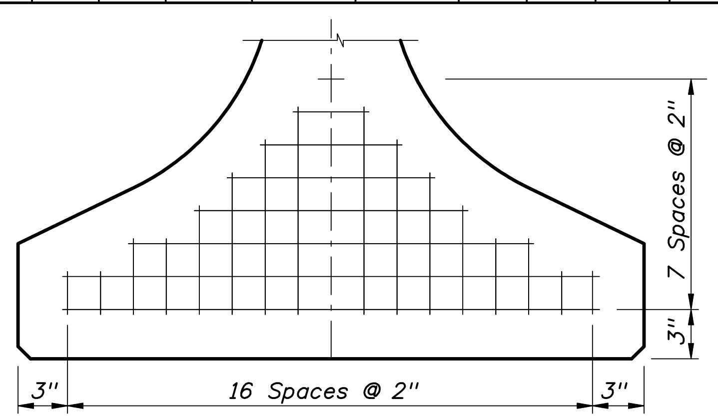
Florida-I Beam Related Data Tables (CADD Cells)

- Cell No. 20010 (1 Sheet): Florida-I Beam Table of Beam Variables
- Cell No. 20199 (1 Sheet): Build-up & Deflection Data Table
- Cell No. 20510 (1 Sheet): Bearing Pad – Data Table (Florida-I Beam)
- Cell No. 20511 (1 Sheet): Bearing Plate – Data Table (Florida-I Beam)

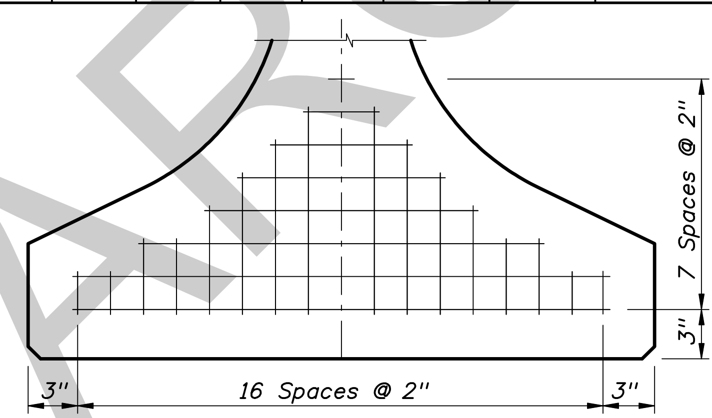
FLORIDA-I BEAM - TABLE OF BEAM VARIABLES

Table Date 7-01-09

LOCATION		BEAM TYPE	CONCRETE PROPERTIES			STND. PTRN. TYPE	END ELEV. COND.	PLAN VIEW CASE		BRG. PLATE MARK ***		END OF BEAM & BEARING DIMENSIONS **						BEAM DIMENSIONS *		REINFORCING STEEL															
SPAN NO.	BEAM NO.		CLASS	STRENGTHS (psi)				END 1	END 2	END 1	END 2	ANGLE ∅		DIM P	DIM J	DIM K1	DIM K2			3C1	3C2	3D1		3D2		3D3	4M1	4M2	4M3	5K	NO. OF SPACES BARS 5K				SP. BARS 5K *
				28 Day	Release							END 1	END 2					DIM L	DIM R	C	C	A	B	A	B	NO.	D	D	NO.	NO.	S1	S2	S3	S4	V1



TYPE ① __ STRANDS



TYPE ② __ STRANDS

STRAND DESCRIPTION: Use ____ Diameter, Grade ___, ___ ___ 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 shielded strand.

NOTE: Work this sheet with Design Standards Index Nos. 20010 and the applicable "Florida-I Beam Standard Details" Index.

DIMENSION NOTES

* All longitudinal beam dimensions shown on this sheet with a single asterisk (*) are measured along the centerline of beam. Dimension "R" is calculated at mid-height of the beam.

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

BEARING PLATES

*** See Index No. 20511 and the Bearing Plate Data Table for details.

BUILD-UP & DEFLECTION DATA TABLE FOR AASHTO, BULB-T AND FLORIDA-I BEAMS

Table Date 7-01-09

LOCATION		REQUIRED THEORETICAL BUILD-UP OVER ℄ BEAM			NET BEAM CAMBER (PRESTRESS - DEAD LOAD OF BEAM) @ 120 DAYS	DEAD LOAD DEFLECTION DURING DECK POUR @ 120 DAYS DIM "A"	BUILD-UP CASE NO.
SPAN NO.	BEAM NO.	AT BEGIN SPAN DIM "B"	AT ℄ SPAN DIM "C"	AT END SPAN DIM "D"			

BUILD-UP & DEFLECTION DATA TABLE FOR AASHTO, BULB-T AND FLORIDA-I BEAMS

Table Date 7-01-09

LOCATION		REQUIRED THEORETICAL BUILD-UP OVER ℄ BEAM			NET BEAM CAMBER (PRESTRESS - DEAD LOAD OF BEAM) @ 120 DAYS	DEAD LOAD DEFLECTION DURING DECK POUR @ 120 DAYS DIM "A"	BUILD-UP CASE NO.
SPAN NO.	BEAM NO.	AT BEGIN SPAN DIM "B"	AT ℄ SPAN DIM "C"	AT END SPAN DIM "D"			

BUILD-UP & DEFLECTION DATA TABLE FOR AASHTO, BULB-T AND FLORIDA-I BEAMS

Table Date 7-01-09

LOCATION		REQUIRED THEORETICAL BUILD-UP OVER ℄ BEAM			NET BEAM CAMBER (PRESTRESS - DEAD LOAD OF BEAM) @ 120 DAYS	DEAD LOAD DEFLECTION DURING DECK POUR @ 120 DAYS DIM "A"	BUILD-UP CASE NO.
SPAN NO.	BEAM NO.	AT BEGIN SPAN DIM "B"	AT ℄ SPAN DIM "C"	AT END SPAN DIM "D"			

NOTES: Work this sheet with Design Standard Index No. 20199.

BEARING PAD DATA TABLE				Table Date 7-01-09
SPAN NO(s).	BEAM NO(s).	PAD TYPE	BEAM TYPE	BEAM END *

NOTE:
Work this table with Index No. 20510 for Pad Types D, E, F, G, H, J & K, and/or any project specific bearing pads.
* END 1 = Begin Bridge end of beam (Back station).
END 2 = End Bridge end of beam (Ahead station).

INSTRUCTIONS TO DESIGNER:

This table is intended for use with prestressed beam bridges, but may be modified for steel girder or other bridge types.
Supplement the BEARING PAD DATA TABLE with additional columns or notes as required to clearly identify the location and type of bearing pads.

PLEASE DELETE THIS NOTE UPON COMPLETION OF THIS DRAWING

ESTIMATED BEARING PAD QUANTITIES		Table Date 07-01-09
PAD TYPE	NUMBER REQUIRED	QUANTITY (CF)

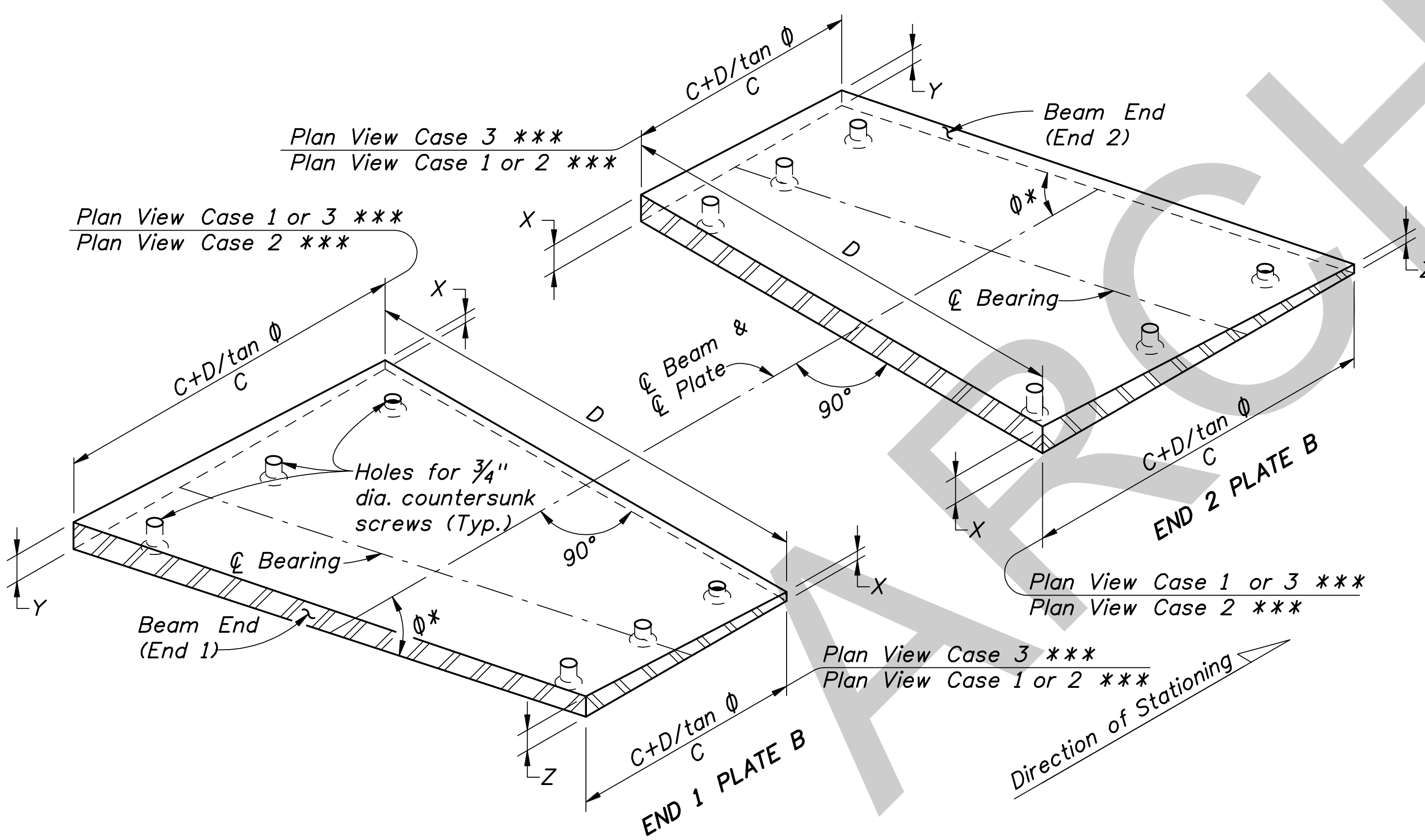
BEARING PLATE DATA TABLE

Table Date 7-01-09

GENERAL BEARING PLATE DATA								EMBEDDED PLATE DIMENSIONS (PLATE A) (inches)			BEVELED PLATE REQUIRED (Yes/No)	BEVELED PLATE DIMENSIONS (PLATE B) (inches)					
BRG. PLATE MARK ***	SPAN NO(s).	BEAM NO(s).	PAD TYPE	BEAM END	PLAN VIEW CASE	SLOPE (%) **	ANGLE ∅ *	C	D	C+D/TAN ∅		C	D	C+D/TAN ∅	X	Y	Z

NOTES:
- * ∅ = Acute angle (≤ 90°) measured from left or right side of ℄ Beam as required.
- ** Slope measured along ℄ of Beam at ℄ of Bearing.
- *** See "TABLE OF BEAM VARIABLES" and Index No. 20010.

See Index No. 20511 for additional notes and details.



ISOMETRIC VIEW OF BEVELED BEARING PLATES
(SKEWED PLATES SHOWN, NON-SKEWED PLATES SIMILAR)

INSTRUCTIONS TO DESIGNER:

1. Fill in the table to correspond with data on the 'TABLE OF BEAM VARIABLES' using inch units for Beveled Plate dimensions 'X', 'Y' & 'Z' rounded to $\frac{1}{16}$th of an inch.
2. Use the following equations to determine the Beveled Plate thicknesses for 'PLAN VIEW CASES' and 'END ELEVATION CONDITIONS' corresponding to those shown on Design Standards Index No. 20010. The Slope parameter in these equations requires decimal units and correct sign convention:

	END 1	END 2
(I) PLAN VIEW CASE 1:		
(a) END ELEVATION CONDITION 1 or 2 (Positive Slope)		
	X = 0.5" + (C) x Slope	X = 0.500"
	Y = Z = 0.500"	Y = Z = 0.5" + (C) x Slope
(b) END ELEVATION CONDITION 3 (Negative Slope)		
	X = 0.500"	X = 0.5" − (C) x Slope
	Y = Z = 0.5" − (C) x Slope	Y = Z = 0.500"
(II) PLAN VIEW CASE 2:		
(a) END ELEVATION CONDITION 1 or 2 (Positive Slope)		
	X = 0.5" + (C + D / tan ∅) x Slope	X = 0.500"
	Y = 0.500"	Y = 0.5" + (C) x Slope
	Z = 0.5" + (D / tan ∅) x Slope	Z = 0.5" + (C + D / tan ∅) x Slope
(b) END ELEVATION CONDITION 3 (Negative Slope)		
	X = 0.500"	X = 0.5" − (C + D / tan ∅) x Slope
	Y = 0.5" − (C + D / tan ∅) x Slope	Y = 0.5" − (D / tan ∅) x Slope
	Z = 0.5" − (C) x Slope	Z = 0.500"
(III) PLAN VIEW CASE 3:		
(a) END ELEVATION CONDITION 1 or 2 (Positive Slope)		
	X = 0.5" + (C + D / tan ∅) x Slope	X = 0.500"
	Y = 0.5" + (D / tan ∅) x Slope	Y = 0.5" + (C + D / tan ∅) x Slope
	Z = 0.500"	Z = 0.5" + (C) x Slope
(b) END ELEVATION CONDITION 3 (Negative Slope)		
	X = 0.500"	X = 0.5" − (C + D / tan ∅) x Slope
	Y = 0.5" − (C) x Slope	Y = 0.500"
	Z = 0.5" − (C + D / tan ∅) x Slope	Z = 0.5" − (D / tan ∅) x Slope

PLEASE DELETE THIS NOTE UPON COMPLETION OF THIS DRAWING

Attachment C

Instructions for Design Standards

- Index 20000 Series (1 Sheet): Prestressed Florida-I Beam Instructions
- Index 20510 (1 Sheet): Composite Elastomeric Bearing Pad Instructions for Florida-I Beams

INSTRUCTIONAL NOTES TO DESIGNERS

GENERAL INSTRUCTIONS:

The Standard Drawings for prestressed beams depict details and notes that are fully developed. These drawings are included in the contract documents by reference to the Index No. in the plans. Companion MicroStation CADD cells are located on the FDOT Structures Bar Menu, and they contain generic details and notes that require completion including the Table of Beam Variables, the Strand Pattern Details and the Strand Debonding Legend. When completed, the CADD cells shall be included in the plans.

Standard Drawings and completed CADD cells provide sufficient information to permit beam fabrication without the submittal of shop drawings.

The prestressed beams in these Standard Drawings are generally assumed to act as simple spans under both Dead Load and Live Load even where the deck is designed continuous across the support.

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

When the total initial tensioning force of the fully bonded strands required by design exceeds the values shown on Index No. 20010, 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 approved, Index No.20010 and the appropriate Standard Detail Drawings must then be modified for inclusion in the contract documents and signed and sealed by the E.O.R.

Include the following data tables in the Structures Plans for all Florida-I Beams:

FDOT Structures CADD Cell:	Description:	Associated Design Standards Index No.:
20010	Table of Beam Variables	20036 through 20078
20199	Build-Up & Deflection Data Table	20199
20510	Bearing Pad Data Table	20510
20511	Bearing Plate Data Table	20511

OTHER CONSIDERATIONS:

When the actual number of beams or strand patterns exceed the capacity of a single plan sheet using the standard "TABLE OF BEAM VARIABLES", use additional sheets. If special conditions require dimensions, details or notes not shown in the standard CADD cells, modifications are permitted. However, the "TABLE OF BEAM VARIABLES" should not be modified when utilizing the Standard Drawings.

When required by design, intermediate diaphragms shall be shown on the Framing Plan sheet included with the bridge drawings. Insert locations with respect to the beam ends and beam faces shall be tabulated for each beam. The table shall include length adjustments for beams placed on grade and for elastic and time dependent shortening effects. Type 33 No. 8 reinforcing bars with 3" thread lengths must be shown on the intermediate diaphragm details and included in the rebar list for attachment to the inserts.

Embedded bearing plates are required for all beams. If the beam grade exceeds 2%, provide beveled bearing plates at each end of the beam as shown in Index No. 20511.

Angle Ø, as defined in Design Standards Index No. 20010, shall be rounded up to the nearest degree. The shear stirrup spacing V1 for Bars 5K should be specified to the nearest inch.

EXAMPLE PROBLEM

The following example shows the data required for completion of a Florida-I Beam Table of Beam Variables CADD cell. This case shows a Florida-I 45 Beam (Index No. 20045).

The example assumes a three span bridge designed for the following conditions:

Live Load: HL-93
No intermediate Diaphragms
Stay-in-Place Metal Forms:
  Allowance of 20 PSF non-composite dead load over the projected plan area of the forms (this includes the unit weight of metal forms and the concrete required to fill the form flutes).

Environment (Superstructure): Moderately Aggressive
Bridge Characteristics:
  Length: 276 ft.
  Width: 51'-1" (out-to-out)
  Clear Roadway: 48 ft.
Superstructure:
  Three simple spans of prestressed concrete beams with 8-inch composite deck slab (plus ½" sacrificial deck thickness).
Span: 87'-0", 102'-0", 87'-0"
Sidewalk: None
Horizontal Alignment: Straight
Vertical Alignment: 0.00% Grade
Skew Angle: 15 degrees (Right)

Beam Design:
Beam: Florida-I 45 Beam
Spacing:
  11'-3", 87' Span (5 Beams)
  9'-0", 102' Span (6 Beams)
Design Span Length:
  84'-6" (Spans 1 & 3)
  99'-8" (Span 2)

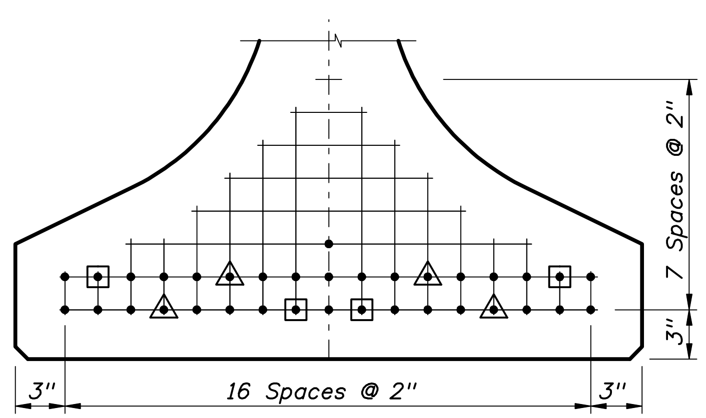
SAMPLE DRAWING USING CADD CELL 20010

FLORIDA-I BEAM - TABLE OF BEAM VARIABLES

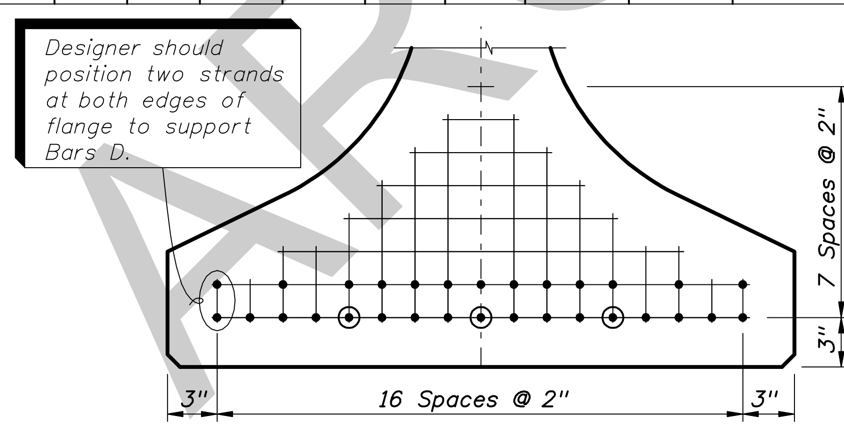
Table Date 7-01-09

Location: Span No.	Location: Beam No.	Beam Type	Concrete Properties: Class	Strengths (psi): 28 Day	Strengths (psi): Release	Stnd. Ptrn. Type	End Elev. Cond.	Plan View Case: End 1	Plan View Case: End 2	Brg. Plate Mark ***: End 1	Brg. Plate Mark ***: End 2	End of Beam & Bearing Dimensions **: Angle Ø End 1	Angle Ø End 2	Dim P	Dim J	Dim K1	Dim K2	Beam Dimensions *: Dim L	Dim R	Reinforcing Steel: 3C1 C	3C2 C	3D1 A	3D1 B	3D2 A	3D2 B	3D3 No.	4M1 D	4M2 D	4M3 No.	5K No.	No. of Spaces Bars 5K: S1	S2	S3	S4	Sp. Bars 5K *: V1
1	1-5	45	V	6500	5000	2	1	2	2	1-1	1-2	75°	75°	–	7½"	1'-3½"	1'-1½"	85'-10½"	1"	1'-6¼"	1'-6¼"	8¾"	1'-3½"	8¾"	1'-3½"	102	3'-9½"	3'-9½"	74	148	16	35	–	2	6"
2	1-6	45	V	6500	5000	1	1	2	2	2-1	2-2	75°	75°	–	7½"	1'-1½"	1'-1½"	101'-0¾"	1¼"	1'-6¼"	1'-6¼"	8¾"	1'-3½"	8¾"	1'-3½"	120	3'-9½"	3'-9½"	89	136	10	13	10	14	6"
3	1-5	45	V	6500	5000	2	1	2	2	3-1	3-2	75°	75°	–	7½"	1'-1½"	1'-3½"	85'-10½"	1"	1'-6¼"	1'-6¼"	8¾"	1'-3½"	8¾"	1'-3½"	102	3'-9½"	3'-9½"	74	148	16	35	–	2	6"

NOTE: Work this sheet with Design Standards Index Nos. 20010 and the applicable "Florida-I Beam Standard Details" Index.



TYPE 1 35 STRANDS



TYPE 2 30 STRANDS

STRAND DESCRIPTION: Use 0.6 Diameter, Grade 270, Low Relaxation Strands stressed at 44 kips each. Area per strand equals 0.217 sq. in.

STRAND DEBONDING LEGEND

- • – fully bonded strands.
- ⊙ – strands debonded 10'-0" from end of beam.
- ⊡ – strands debonded 20'-0" from end of beam.
- ◬ – strands debonded 25'-0" from end of beam.

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

DIMENSION NOTES

* All longitudinal beam dimensions shown on this sheet with a single asterisk (*) are measured along the centerline of beam. Dimension "R" is calculated at mid-height of the beam.

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

BEARING PLATES

*** See Index No. 20511 and the Bearing Plate Data Table for details.

STRAND PATTERNS

BRIDGE NO. 123456

GENERAL INSTRUCTIONS:

Design Standard No. 20510 depicts details and notes for elastomeric bearing pads for prestressed concrete beams with or without skewed end conditions. Include the 'BEARING PAD DATA TABLE' in the plans. (See FDOT Structures Bar Menu).

Design Standard No. 20511 contains generic details and notes for beveled and embedded bearing plates. Include the 'BEARING PLATE DATA TABLE' in the plans. (See FDOT Structures Bar Menu)

For beam grades greater than 2%, provide beveled bearing plates. For Florida-I beams on grades less than or equal to 2%, only Embedded Bearing Plates A need to be installed in the 'BEARING PLATE DATA TABLE'.

LIMITING PARAMETERS FOR ELASTOMERIC BEARING PADS USED WITH PRESTRESSED FLORIDA-I BEAMS

PAD TYPE	LENGTH (in)	WIDTH (in)	MAXIMUM SERVICE LIVE LOAD (kips)	MAXIMUM SERVICE DEAD LOAD (LL = actual Service Live Load)	SKEW ANGLE (degrees)	MAXIMUM SHEAR DEFLECTION (in)	SHEAR MODULUS, G (psi)
D	8	32	135	DL=147+1.75(135-LL)	0 - 5	0.75	110
D	8	32	110	DL=120+1.75(110-LL)	0 - 15	0.75	110
E	10	32	150	DL=233+1.75(150-LL)	0 - 5	0.75	110
E	10	32	110	DL=113+1.75(110-LL)	0 - 20	0.75	110
F	10	32	150	DL=290+1.75(150-LL)	0 - 5	1	110
F	10	32	120	DL=139+1.75(120-LL)	0 - 30	1	110
G	10	32	145	DL=230+1.75(145-LL)	0 - 30	1	150
G	10	32	95	DL=98+1.75(95-LL)	0 - 45	1	150
H	10	32	180	DL=268+1.75(180-LL)	0 - 35	1.25	150
H	10	32	135	DL=230+1.75(135-LL)	0 - 45	1.25	150
J	10	32	145	DL=227+1.75(145-LL)	0 - 45	1.5	150
K	12	32	200	DL=383+1.75(200-LL)	0 - 45	1.5	150

The Service Live Load (including impact) and Service Dead Load Reactions can be determined from the beam design. The Shear Deflection is the product of the coefficient of thermal expansion, 65% of the thermal gradient and the length of bridge contributing to movement, plus the contributing beam creep and shrinkage at the bottom of beam. Assume beam creep and shrinkage from day 120 to day 240 (this value can be determined from data in the beam design output).

Standard Elastomeric bearing pads have been designed in accordance with AASHTO LRFD Specifications, Method "B" (2009 Interim), for a maximum static rotation (beam grade, camber and dead load rotation) of 0.0125 radians and a cyclic rotation (live load) of 0.004 radians. Live load rotations are assumed to be in the opposite direction to static rotations. Rotation does not need to be checked for standard prestressed beams provided that the top of the beveled bearing plates (when required) or the bearing seats (pedestals) are finished approximately parallel to the slope of the beam. The effects of camber (at day 120) from prestressing and dead load deflection, may be neglected when determining the slope at the ends of the beam, unless the sum of these effects exceeds 0.0125 radians (1.25%).
Bearing seats may be finished level for beam grades less than 0.5%, or when the combined effects of beam grade, camber and dead load rotation do not exceed 1.25%. Whenever possible, the bearing seats at each end of the beam should be detailed with the same slope.

For design values exceeding the limiting parameters shown on this sheet, the designer must develop custom designs and details. For skew angles greater than 45°, consider round pads with elastomer and plate thicknesses similar to those shown in Design Standard No. 20510.

EXAMPLES:

The following examples show the information required to determine the correct standard elastomeric bearing pad type to use:

EXAMPLE 1 *

Given Information:
- Superstructure Type - One Simple Span
- 45" Florida I Beams 101'-0" long, spaced at 9'-0" centers (99'-8" center to center bearing)
- No longitudinal restraints except friction between the pad and the concrete substructure
- Service Live Load Reaction = 106 kips
- Service Dead Load Reaction = 109 kips
- Coefficient of Thermal Expansion = 0.000006/°F
- Thermal Gradient = 70°F
- Creep and Shrinkage at the Bottom of Beam (from day 120 to day 240) = 0.28"
- Shear Deflection = (0.000006/°F x 0.65 x 70°F x 99.67'/2 x 12"/') + 0.280"/2 = 0.30"
- Beam Grade = 2.0%
- Skew Angle = 15°
- Service Dead Load Rotation = 0.007 radians (0.7%)
- Beam Camber Rotation @ 120 days = 0.012 radians (1.2%)
- Net Beam Camber Rotation after Dead Load Deflection = 0.012 - 0.007 = 0.005 radians (0.5%)

Elastomeric Bearing Pad Type Determination:
- Compare the design values to the Limiting Parameters Table, Pad Type D for Florida-I Beams.
- Limiting Parameters Versus Design Values:
  - Maximum Service Live Load Reaction of 110 kips versus Design Value of 106 kips; therefore, OK
  - Maximum Service Dead Load Reaction of 120+1.75(110-106) = 127 kips versus Design Value of 109 kips; therefore, OK
  - Maximum Shear Deflection of 0.75" versus Design Value of 0.30"; therefore, OK
  - Skew Angle is between 0° and 15°; therefore, OK

Conclusion:
- Use Elastomeric Bearing Pad Type D.
- No beveled plate is required. Detail beam seat with a 2% slope along the centerline of beam.
- Complete 'BEARING PLATE DATA TABLE' for embedded bearing plate only.

EXAMPLE 2 *

Given Information:
- Superstructure Type - Four Simple Spans with Continuous Deck
- 45" Florida I Beams 101'-0" long, spaced at 9'-0" centers (99'-8" center to center bearing)
- No longitudinal restraints except friction between the pad and the concrete substructure
- Service Live Load Reaction = 106 kips
- Service Dead Load Reaction = 109 kips
- Coefficient of Thermal Expansion = 0.000006/°F
- Thermal Gradient = 70°F
- Creep and Shrinkage at the Bottom of each Beam (from day 120 to day 240) = 0.28"
- Shear Deflection = (0.000006/°F x 65% x 70°F x 202' x 12"/') + 0.280"/2 = 0.80"
- Beam Grade = 5%
- Skew Angle = 15°
- Service Dead Load Rotation = 0.007 radians (0.7%)
- Beam Camber Rotation @ 120 days = 0.012 radians (1.2%)
- Net Beam Camber Rotation after Dead Load Deflection = 0.012 - 0.007 = 0.005 radians (0.5%)

Elastomeric Bearing Pad Type Determination:
- Compare the design values to the Limiting Parameters Table, Pad Type F for Florida-I Beams.
- Limiting Parameters Versus Design Values:
  - Maximum Service Live Load Reaction of 120 kips versus Design Value of 106 kips; therefore, OK
  - Maximum Service Dead Load Reaction of 139+1.75(120-106) = 163.5 kips versus Design Value of 109 kips; therefore, OK
  - Maximum Shear Deflection of 1.0" versus Design Value of 0.80"; therefore, OK
  - Skew angle is between 0° and 30°; therefore, OK

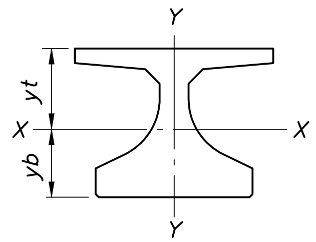
Conclusion:
- Use Elastomeric Bearing Pad Type F. Additionally, because beam end slope exceeds 2%, include a beveled bearing plate in the 'BEARING PLATE DATA TABLE' and detail bearing seats level. Neglect the effects of net beam camber in the beveled bearing plate design since rotation is less than 0.0125 radians.

* The above examples do not assume any wind or braking loads are applied to the elastomeric bearing pads.

Attachment D

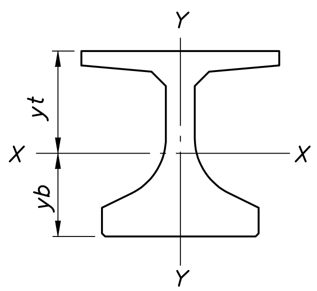
Design Aids

- 'Florida-I Beam Section Properties' (1 Sheet)
- 'Florida-I Beam Estimated Maximum Span Lengths' charts (2 Sheets)
  Note: For preliminary design and cost estimating purposes only, not a substitute for beam design



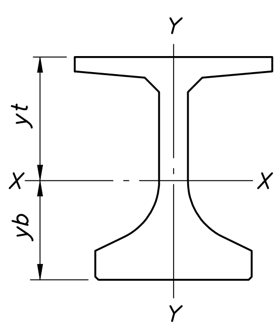
F.I.B.-36
(INDEX NO. 20036)

SECTION PROPERTIES	
Area (in^2)	806.58
Perimeter (in)	206.57
Ixx (in^4)	127,564
Iyy (in^4)	81,131
yt (in.)	19.51
yb (in.)	16.49



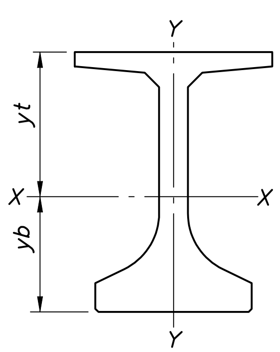
F.I.B.-45
(INDEX NO. 20045)

SECTION PROPERTIES	
Area (in^2)	869.58
Perimeter (in)	224.57
Ixx (in^4)	226,625
Iyy (in^4)	81,397
yt (in.)	24.79
yb (in.)	20.21



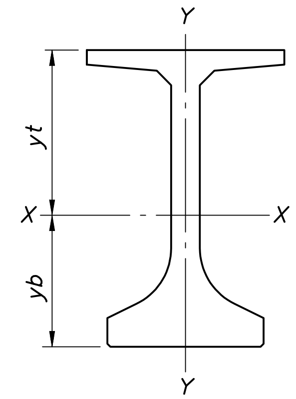
F.I.B.-54
(INDEX NO. 20054)

SECTION PROPERTIES	
Area (in^2)	932.58
Perimeter (in)	242.57
Ixx (in^4)	360,041
Iyy (in^4)	81,656
yt (in.)	29.97
yb (in.)	24.03



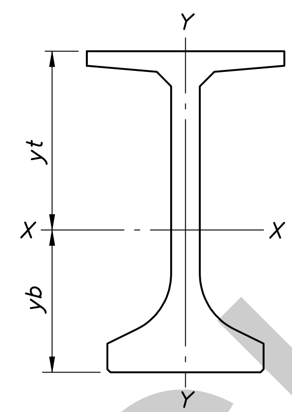
F.I.B.-63
(INDEX NO. 20063)

SECTION PROPERTIES	
Area (in^2)	995.58
Perimeter (in)	260.57
Ixx (in^4)	530,560
Iyy (in^4)	81,919
yt (in.)	35.06
yb (in.)	27.94



F.I.B.-72
(INDEX NO. 20072)

SECTION PROPERTIES	
Area (in^2)	1,058.58
Perimeter (in)	278.57
Ixx (in^4)	740,895
Iyy (in^4)	82,187
yt (in.)	40.09
yb (in.)	31.91



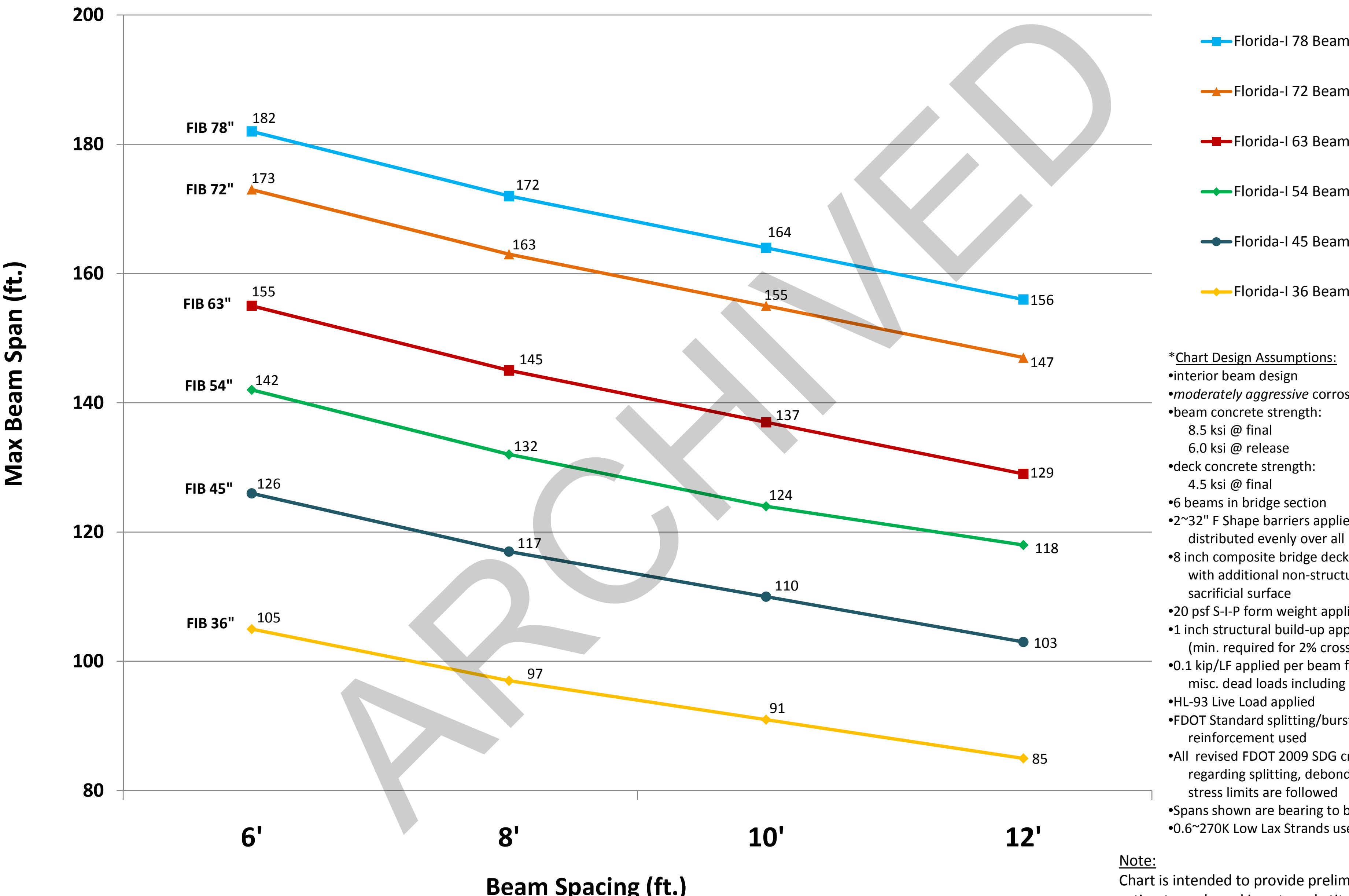
F.I.B.-78
(INDEX NO. 20078)

SECTION PROPERTIES	
Area (in^2)	1,100.58
Perimeter (in)	290.57
Ixx (in^4)	904,567
Iyy (in^4)	82,367
yt (in.)	43.40
yb (in.)	34.60

FLORIDA-I BEAM PROPERTIES

Florida-I Beam Estimated Maximum Span Lengths

**Moderately Aggressive* Environment, FDOT Limits with 8.5 ksi Concrete



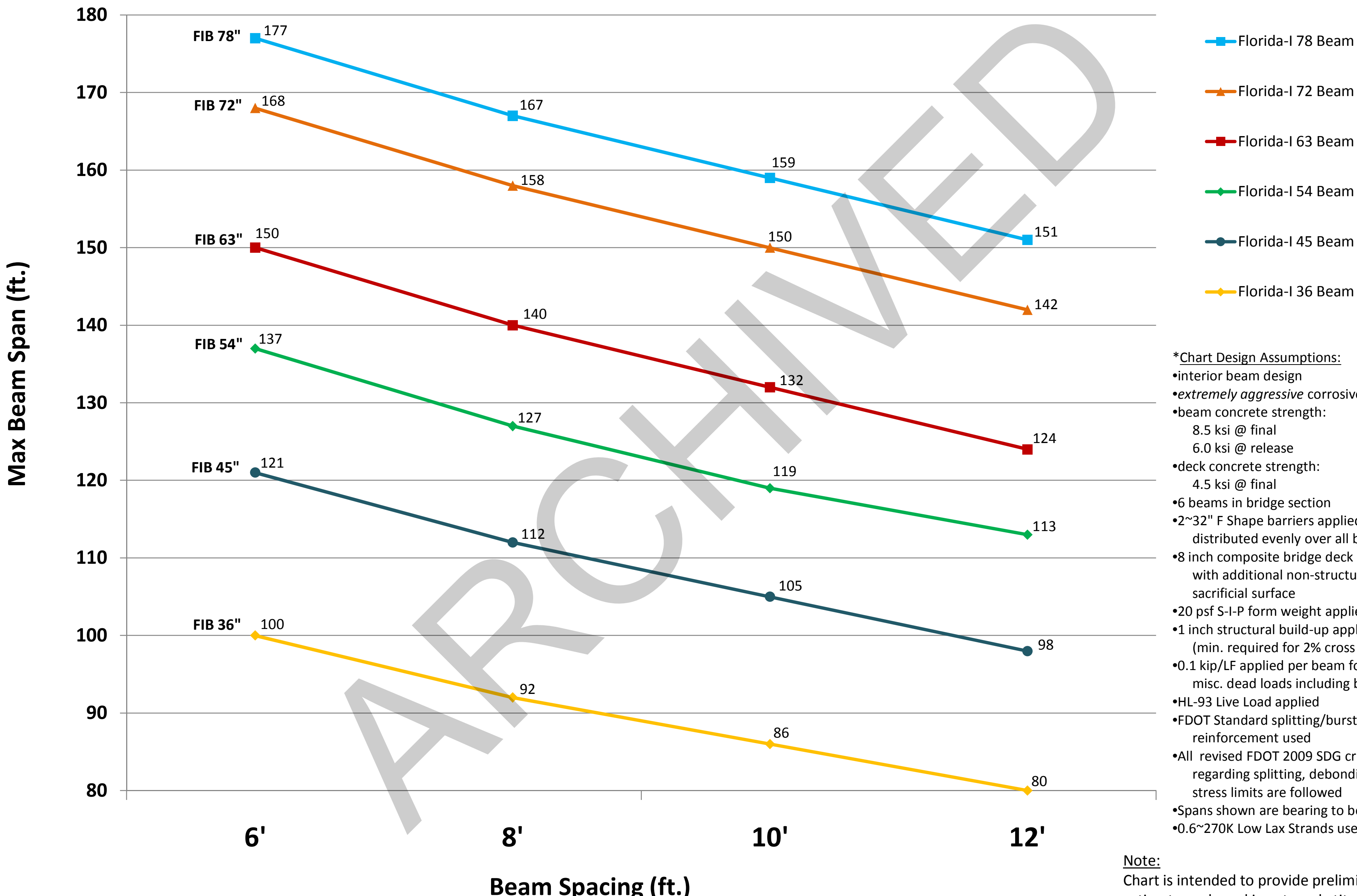
*<u>Chart Design Assumptions:</u>

- 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 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

<u>Note:</u>
Chart is intended to provide preliminary estimates only and is not a substitute for case-specific beam design.

Florida-I Beam Estimated Maximum Span Lengths

**Extremely Aggressive* Environment, FDOT Limits with 8.5 ksi Concrete



*<u>Chart Design Assumptions:</u>

- interior beam design
- *extremely 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 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

<u>Note:</u>
Chart is intended to provide preliminary estimates only and is not a substitute for case-specific beam design.